REMEDIAL ACTION IMPLEMENTATION REPORT

ONE HOUR MARTINIZING
13405 WATERTOWN PLANK ROAD
ELM GROVE, WISCONSIN 53122
WDNR BRRTS# 02-68-552102

January 8, 2019

Prepared For:

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APPENDICES

CERTIFICATIONS

I, Andrew Horwath, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

Director of Engineering, P.E. License No. E-43831-6

Signature, title and P.E. number P.E. stamp

I, Wayne Fassbender, hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03 (1), Wis. Adm. Code, am registered in accordance with the requirements of ch. GHSS 2, Wis. Adm. Code, or licensed in accordance with the requirements of ch. GHSS 3, Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

Senior Project Manager _1/8/2019_____

Signature and title Date

1.0 BACKGROUND

EnviroForensics, LLC (EnviroForensics) has prepared this Remedial Action Implementation Report (Report) on behalf of OHM Holdings for the One Hour Martinizing site located at 13405 Watertown Plank Road in Elm Grove, Wisconsin (Site). The location of the site is shown on **Figure 1**. This Report follows guidelines for documentation of remedial actions set forth in Wisconsin Administrative Code (WAC) Chapter NR 724 rule and other associated State of Wisconsin Chapter NR 700 series rules.

This Report follows submittal of the Remediation Injection Request, dated April 10, 2018, which described a plan for in-situ remediation of groundwater contamination. This Report details the implementation of the groundwater treatment plan, as well as the installation of a soil vapor extraction (SVE) system for remediation of unsaturated soil.

1.1 Site Description

The Site was an active dry cleaning facility from 1969 until 2007, when the business changed to a drop off and pick-up store for clothes cleaned at a main facility located elsewhere. Chlorinated solvents are no longer used in the dry cleaning process in favor a more environmentally friendly cleaning compound. The Site is improved with a single story, approximately 2,000 square foot, concrete slab-on-grade commercial building with an asphalt parking area and drive-through pick-up lane. A private water supply well is located on the eastern property boundary and provides potable water to the Site building. However, the potable water is currently only used for processes, flushing toilets, and washing hands. Drinking water is currently supplied by a vendor in the form of large bottles and a water cooler. The Site is bound by Watertown Plank Road to the northwest; railroad tracks to the northeast; and parking and driveway areas to the south. Underwood Creek flows through a concrete man-made channel to the southwest of the Site. The surrounding area consists of commercial properties with residential properties located nearby. The layout of the Site, including investigative boring and groundwater monitoring well locations is depicted on **Figure 2**.

1.2 Site Hydrogeology

The geological profile at the Site consists of interbedded mixtures of clay, silt, sand and gravel to 15 feet below ground surface (bgs). Underlying this upper unit is a fine to medium-grained sand to approximately 50 feet bgs, where dolomitic bedrock is encountered. An approximately 2 to 3-foot thick layer of anthropogenic subgrade fill is present below the parking areas and driveways

and in proximity to Underwood Creek. The water table is generally encountered at around 17 feet bgs; however, the water table has been observed over several years of monitoring to occasionally fluctuate between a minimum depth of 13 feet and a maximum depth of 19 feet bgs. The direction of groundwater flow is toward the southeast. Groundwater elevation data indicates that there is a consistent upward vertical gradient.

1.3 Nature and Extent of Contamination

The contaminants of concern (COCs) at the Site are chlorinated volatile organic compounds (CVOCs) including the dry cleaning solvent tetrachloroethene (PCE) and its degradation products: trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), and vinyl chloride (VC). The site investigations revealed that two (2) primary source areas exist on the Site including one to the southeast of the building and the other to the northwest of the building. **Figure 3** shows the two (2) areas of soil impacts and relative concentration iso-contours without reference to concentration trends with depth. The source area to the southeast is believed to be associated with surface spills from the dry cleaning machine or storage area within the building and former filter drying/disposal practices outside the building because contaminant concentrations are greatest in shallow soil and decrease with depth. The area to the northwest of the building has deeper soil impacts, which has been determined to have resulted from discharge of contaminated liquids into the site sanitary sewer system and subsequent leakage from the sanitary conveyance piping through eroded joints. As will be discussed further in Section 2.1 below, **Figure 3** also shows the effective radius of vacuum influence greater than 0.1 inches of water (in H_2O) at each extraction well overlaid on the two (2) source areas. These vacuum measurements were taken upon SVE system startup.

Figure 4 shows the areas of groundwater impacts on the Site with relative concentrations of PCE. **Figure 4** is overlaid by borings used for groundwater remedial injections along with the amounts of various remedial products injected at each boring location. The groundwater remedial injections will be further discussed below in Section 2.2. The primary groundwater contaminant plume encompasses the northwestern portion of the property. A secondary, smaller plume exists on the eastern property boundary. The private water supply well for the Site is located near this eastern area; however, CVOCs have not been detected in the private water supply well at concentrations exceeding groundwater enforcement standards.

Soil gas impacts above the applicable vapor risk screening level (VRSL) are present along the sanitary sewer lines along the northwest and southwest Site boundaries. Sub-slab vapor samples collected from beneath the Site building also contained PCE at concentrations that exceeded the

VRSL for small commercial buildings (refer to sub-slab samples SS-2 and SS-3 collected inside the Site building in **Table 1**.

1.4 Remedial Action Options Selection

Remedial action options were evaluated according to technical and economic feasibility, effectiveness, ability to implement, and likely continuing obligations. The following remedial technologies were selected:

- SVE
- Bioaugmented Enhanced Reductive Dechlorination (ERD)
- Sub-slab Depressurization via SVE – this technology will address the existing vapor intrusion risk to the Site building, eliminating the need for a vapor mitigation system and associated commissioning, maintenance, and monitoring.

The permeable soil present at the Site is likely amenable to several in-situ remediation methods. SVE was selected over other options for the following reasons:

- Soil impacts extend to the water table (approximately 15 feet bgs). The deeper impacts are more easily treated with SVE than other competing technologies;
- More benefit with respect to overall costs of implementation in terms of remediation and mass removal/treatment;
- SVE will allow treatment of contaminated soil located beneath the dry cleaner building without disrupting ongoing business at the Site;
- The use of SVE is a more environmentally friendly and sustainable option as compared to excavating and placing contaminated soil within a landfill;
- SVE addresses the existing vapor intrusion risk to the Site building, eliminating the need for a vapor mitigation system and associated commissioning, maintenance, and monitoring.

An SVE pilot study was performed to confirm the feasibility of SVE implementation at the Site, to determine the effective area of vacuum influence, and to determine sustained concentrations of CVOCs in the exhaust for mass removal determinations. The data from the pilot test indicated that a large radius of vacuum influence could be achieved with elevated concentrations of CVOCs detected in the exhaust. The pilot study documentation is presented in **Appendix A**.

Likewise, several in-situ treatment options for contaminated groundwater are also suitable. Bioaugmented ERD was selected over other options for the following reasons:

- PCE daughter products are present at elevated concentrations indicating that there is limited microbial degradation already in progress and that subsurface conditions can be enhanced to increase effectiveness
- Lower product cost for a given treatment volume compared to other injectable materials
- Products are safer to store, handle, mix, and inject
- The products are non-reactive, so there is less concern with unintended off-site movement and/or impacting the on-site potable well intake

The ERD design summary is presented in **Appendix B**.

1.5 Remedial Objectives

As enumerated in NR 722.09(2)(a) and NR 722.09(2)(b)(1), the overall remedial objectives are the following:

1. Utilize SVE to reduce CVOC concentrations in vadose zone soil to residual contaminant levels (RCLs) based on the protection of groundwater. The groundwater protection RCL for PCE is less than the test method 8260 detection limit. Therefore, the remedial goal is effectively to achieve non-detect results in soil samples. When monitoring data indicates that operation of the SVE system is no longer efficient or beneficial, post-remediation soil sampling will be performed to determine if this goal is technically and economically achievable; and
2. Inject ERD solutions to enhance microbial populations capable of reducing the CVOC mass in groundwater to concentrations that are below the groundwater Preventative Action Limit for these chlorinated compounds. Progress groundwater monitoring will be performed to determine if this goal is technically and economically achievable.

If the goals stated above are not attainable, then a combination of engineering and institutional controls will be utilized to achieve site closure while ensuring the adequate protection of public health, safety, and welfare, and the environment.

2.0 IMPLEMENTATION OF REMEDIAL ACTIONS

2.1 Soil Vapor Extraction

The SVE system is designed to remove contaminant mass from vadose zone to reduce mass flux into soil gas and groundwater. The following sections describe the SVE system design, operation and maintenance activities, and performance monitoring program. The SVE system design was based on the results of the pilot study (see **Appendix A**). The SVE system consists of four (4) extraction wells, underground conveyance piping, and mechanical equipment and controls. The layout of the system is shown on **Figure 3**.

2.1.1 Extraction Well and Conveyance Piping Installation

EnviroForensics directed the installation of the extractions wells and subsurface conveyance piping from June 11-18, 2018. In addition to SVE-1 which was installed for the pilot study, three (3) additional extraction wells were installed at strategic positions as follows:

- SVE-2 is located in the soil "hotspot" identified near the potable well
- SVE-3 is located just outside the southwest building wall, targeting soil impacts identified near the former dry cleaning machine location
- SVE-4 is located northwest of the Site building to remediate soil impacts caused by leakage from the sanitary sewer lines

All extraction wells were constructed of 4-inch diameter schedule 40 PVC with 0.020-inch slot Vee-Wire® screen from 4.5 to 7 feet bgs (SVE-2), 5.5 to 8 feet bgs (SVE-3), and 6 to 11 feet bgs (SVE-4). The annular space around the wells was filled with coarse sand to the top of the screened intervals, followed by a layer of hydrated bentonite chips, and then cement-bentonite grout. The wellheads are protected at the surface with 24-inch square flush-mount vaults set in a concrete apron. The construction details for each extraction well are depicted on **Figure 5a** through **5d**.

The extraction wells are connected to the SVE blower and associated equipment with individual conveyance lines. Conveyance piping for SVE-2 through SVE-4 consists of 4-inch diameter high-density polyethylene pipe installed by directional boring. The conveyance piping leading to SVE-1 is 4-inch diameter PVC that was installed in a trench and backfilled with compacted sand and gravel. The conveyance lines connect to a manifold mounted on the SVE equipment trailer.

2.1.2 Mechanical Components

The results of the SVE pilot study indicated an achievable radius of influence (ROI) ranging from 52 feet in the shallow zone (3.5 to 4 feet bgs) to 72 feet in the deep zone (11.5-12 feet bgs) at a vacuum of 9.5 in Hg. The full-scale SVE system design parameters are as follows:

- Extraction rate of 700 standard cubic feet per minute (ACFM), or 175 ACFM per extraction well
- Maximum operating vacuum of 10 inches Hg
- ROI of 50 feet for the shallow extraction wells and 70 feet for the deep extraction wells

The SVE system is designed to allow each extraction well to be operated independently. Valves are installed at each wellhead so that each well can be disconnected from service. This design allows targeting of specific areas and/or depth intervals as the remediation progresses to maximize efficiency.

The SVE mechanical equipment and controls consist of the following:

- 25 HP – 1,770 rpm electrical motor
- Roots URAI 59 DSL positive displacement blower
- Variable frequency drive (VFD)
- Human-machine interface (HMI)/Programmable logic controller (PLC) unit
- 200-gallon air-water separator tank
- 1.5 horsepower progressive cavity transfer pump
- One (1) bag filter housing
- One (1) granular activated carbon vessel for water treatment

Recovered vapors and condensate are directed to the air-water separator tank. After the water and vapor have been separated, the SVE exhaust is discharged to the atmosphere. At this time it is not known how much condensate water will be generated, if any at all. If significant water is generated, then a condensate management strategy will be implemented. The water may be discharged to the sanitary or storm sewer systems under permit obtained through the appropriate regulating agency. If needed, the condensate water will be pumped through the bag filter and carbon treatment vessels to comply with permitted discharge limits. Water may also be stored in a holding tank and emptied vis vacuum truck and treated appropriately off-site, as needed. The

water will be analyzed for CVOCs and disposed of properly. A process and instrumentation diagram is presented on **Figure 6**.

2.1.3 SVE System Operation and Maintenance

The SVE system is designed to operate continuously. Extraction wells can be individually disconnected from service by closing the gate valve installed at the wellhead. This design allows operators to target specific areas and/or depths as the remediation progresses to maximize efficiency. Operational changes are made as needed during the maintenance visits described below. Some system controls are also accessible remotely via custom internet-based software. System equipment can be activated or deactivated, and operational parameters can be monitored and adjusted without visiting the Site.

Items that can be monitored via the remote telemetry connection include:

- Blower RPMs, amps, blower status (on/off), blower vacuum
- Alarms and alarm history
- Variable Frequency Drive blower setting
- Enclosure temperature
- Blower and transfer pump hours of operation

System components that can be controlled by the remote telemetry include:

- Turning on/off the blower, enclosure fan, and condensate transfer pump
- Adjusting blower RPMs via the Variable Frequency Drive
- Resetting of alarms
- Adjusting the operating schedule (7 day programmable)

Operation and maintenance activities conducted by EnviroForensics personnel are intended to:

- Maximize system efficiency and contaminant mass removal rates
- Maintain the mechanical equipment in good working order
- Comply with air emissions standards set by WAC Chapter NR419.07
- Collect data to track system performance and determine a timeframe for shutdown

Routine maintenance activities performed monthly include the following:

- Service all equipment as recommended by the manufacturers

- Record the following operational parameters and vapor concentrations to evaluate efficiency:
    - Effluent CVOC vapor concentration as measured by laboratory analysis
    - Wellhead vacuums
    - Vacuum at monitoring points

Additional maintenance visits may be required to address system shutdowns or operational issues. EnviroForensics has prepared an Operation, Maintenance, and Monitoring Plan (OM&M Plan) that details the operation and maintenance procedures. The OM&M Plan is provided as **Appendix C**.

2.1.4 SVE Performance Monitoring

The effectiveness of the SVE system is evaluated periodically by monitoring the subsurface vacuum influence and concentration of CVOCs in the vapor effluent. These activities are summarized below.

Subsurface vacuum influence will be measured periodically to evaluate magnitude of vacuum and confirm the ROI around each extraction well. Measurements are collected from the seven (7) nested vacuum monitoring points (MP-1S/I/D through MP-7S/I/D) and water table monitoring wells, as appropriate, using a hand-held digital manometer. These monitoring points are shown on **Figure 3**.

Samples of the SVE system air emissions are collected from a port in the exhaust stack and analyzed at a laboratory for CVOCs according to Environmental Protection Agency Method TO-15 to track mass removal and to determine operational changes to optimize system performance. Performance monitoring is conducted in accordance with the following emissions testing schedule required under WAC Chapter 419.07:

- Once each day for the first three (3) days of system operation
- Weekly for the next three (3) weeks
- Monthly thereafter

The permitting thresholds that apply to SVE systems (WAC Chapters NR 406 and 407, respectively) are as follows:

- Total volatile organic compound (VOC) limit of 5.7 pounds per hour (lb/hr)
- PCE limits of 9.11 lb/hr and 301 pounds per year (lb/yr)

Initial start-up of the SVE system occurred on November 7, 2018. Samples of the system emissions were collected during the first two (2) days of system operation to demonstrate compliance with the permitting requirements. Additional sampling events are planned to satisfy WAC air permit requirements. The VOC emission rate at system startup was approximately 0.17 pounds per hour, which is well below the hourly emission limit. It is anticipated that the amount of PCE emitted will be well below the 301 lb/yr limit; however, the emission rate will be closely tracked to ensure compliance. The laboratory reports associated the initial startup air emissions sampling is included in **Appendix D**.

Two (2) outdoor air samples were also collected during system startup to confirm that emissions do not affect air quality at adjacent properties or to tenants of the on-Site buildings. The ambient air standards are established in WAC Chapter NR 445. The air samples were collected directly to the northeast and east of the SVE system in the down-wind direction, which was from the west/southwest on the day of sampling. The air samples were collected in 6-liter vacuum canisters over a 24-hour period during the first day of system operation. COCs were not detected in the outdoor air samples (**Appendix D**).

2.2 Groundwater Remedial Injections

This section describes the implementation of the remedial action selected to treat groundwater impacts, including permitting, injection field activities, and remediation performance monitoring.

2.2.1 Permits and Approvals

An Injection Request and associated documents (prepared according to PUB RR-935), including a Wisconsin Pollutant Discharge Elimination System permit application, are required for Wisconsin Department of Natural Resources (WDNR) approval prior to implementation of injection activities. EnviroForensics prepared these documents and received the necessary permits and approvals (see **Appendix E**). In addition, the Village of Elm Grove provided approval to work in the Watertown Plank Road right-of-way.

2.2.2 ERD Product Injections

The target compound for treatment is PCE, identified in Site groundwater at concentrations up to 900 micrograms per liter (µg/L). Investigation data indicates that an upward hydraulic gradient has limited the vertical migration of contaminants to approximately 25 feet bgs. Therefore, the target treatment interval was 15 (i.e., the approximate water table depth) to 25 feet bgs. The ERD solution is a combination of the following products manufactured by Regenesis®:

- 3-D Microemulsion® (electron donor emulsion)
- Chemical Reducing Solution® (CRS), an iron-based reagent
- Bio-Dechlor Inoculum Plus® (BDI), a microbial consortium containing species of dehalococcoides

All products are non-hazardous and safe to handle with level D personal protective equipment.

EnviroForensics and Regenesis developed an injection design based on groundwater CVOC concentrations and the hydrogeological properties of the aquifer. Two (2) separate target remediation areas were designated based on the distribution of groundwater impacts defined during the site investigation as shown on **Figure 4**. Area A is located in the northwestern part of the Site, extending into a Village of Elm Grove right-of-way. Area B is located along the northeast Site boundary around a hot-spot identified at boring B-10. Injection activities occurred in each area as described below.

Area A

- 30 direct-push injection points (IP-1 through IP-30) were advanced on a general grid as shown on **Figure 4**
- 413 gallons of 3-D Microemulsion and 190 gallons of CRS were mixed with water to produce 5,245 gallons of solution. The average amount of this solution injected into each of the 30 injection points was 175 gallons
- 0.25 gallons of BDI was mixed with water to produce 10 gallons of solution which was injected into each of the 30 injection points

Area B

- Seven (7) direct-push injection points (IP-31 through IP-37) were advanced at the locations shown on **Figure 4**. Three (3) of the points (IP-33 through IP-35) were angled to the northeast to reach beneath the railroad right-of-way
- 147 gallons of 3-D Microemulsion and 49 gallons of CRS were mixed with water to produce 2,970 gallons of solution. The average amount of this solution injected into each of the injection points was 425 gallons
- 0.25 gallons of BDI was mixed with water to produce 10 gallons of solution and injected into each of IP-31 through IP-36

The products were mixed with potable water to achieve the desired solution concentration. Mixing was performed in large, trailer-mounted tanks with continuous agitation. The solution was then pumped from the tanks, through a manifold and hose to the injection points. Injection points were advanced using direct-push rods with a retractable screen tool specifically designed for fluid injection. The remedial solutions were injected from deeper to shallower in 2-foot intervals (as evenly as possible) as the drill rod was extracted beginning at a depth of 25 feet and ending at a depth of 15 feet. Pressure and flow rates were monitored and recorded to confirm that injection design parameters were met.

At IP-11 and IP-13 the full volume of solution could not be injected due to surfacing around the direct-push rods. In these cases, the remaining solution was redistributed to adjacent points. In addition, IP-37 was added to receive the remaining volume from IP-36 after solution surfacing occurred at that location. The volumes injected at each point are listed on **Figure 4**. Additional injection data, including average flow rate and pressure, are presented in **Table 2**.

The direct-push tooling was removed from each location after the prescribed volume of solution was injected, and the boreholes were abandoned in accordance with NR 141.25 and patched to match the surrounding surface material. Common borehole abandonment forms for all injection point locations can be found in **Appendix F**.

2.2.3 ERD Performance Monitoring

A remediation performance monitoring program is being implemented to verify that aquifer conditions are supportive of microbial growth and the water table is exhibiting decreasing CVOC concentration trends.

Details of the remediation performance monitoring program including frequency and type of analyses are provided in **Table 3**. Monitoring wells within the treatment areas will be monitored periodically with decreasing frequency. Monitoring will be conducted for a minimum of two (2) years following injections, with the first event occurring approximately two (2) months after injections. Third and fourth years of monitoring will be implemented if needed to demonstrate continuing reductions. Monitoring well locations are depicted on **Figure 7**.

Groundwater samples will be collected via low-flow methods. Water quality data including electrical conductivity, temperature, dissolved oxygen, total dissolved solids, pH and oxidation-reduction potential (ORP) will be measured in the field using a flow-through cell and a multi-probe meter. The groundwater samples collected will be analyzed in a Wisconsin Certified Laboratory for total VOCs, and indicators of ERD including: ethene; ethane; methane; total dissolved iron, manganese, sulfate, nitrate, nitrite; total iron; and dehalococcoides populations.

Methane may be produced via the biodegradation of CVOCs. The SVE system is expected to capture methane and prevent it from accumulating under the building slab.

Investigation-derived media (IDM), including purge water and decontamination fluids, will be containerized in 55-gallon drums. A licensed contractor will be retained to remove drums following each monitoring event. The IDM will be managed under existing non-hazardous waste profiles.

2.3 Reporting

Semi-annual remediation progress reports will be submitted to WDNR, as required, using the Remediation Site Operation, Maintenance, Monitoring & Optimization Report (WDNR Form 4400-194). The reports will include information on the SVE system operational configuration, concentration trends and cumulative contaminant removal, and groundwater treatment performance monitoring data. Tables, figures, charts and other required attachments will be provided. The reporting periods will be January 1 through June 30, and July 1 through December 31. The progress reports will be submitted by July 31 and January 31 for each reporting period, respectively.

3.0 CLOSURE STRATEGY AND CONTINUING OBLIGATIONS

The closure strategy for the Site consists of in-situ remediation of impacts in the vadose zone and groundwater applying the active remedial actions described in this report, followed by the implementation of institutional and engineering controls, if needed. Residual soil and groundwater contamination with concentrations above soil to groundwater RCLs and enforcement standards, respectively, may exist in isolated areas after remediation is deemed to be complete. In addition, the vapor intrusion pathway will be re-evaluated once operation of the SVE system is discontinued. Additional possible closure requirements consist of the following:

1. Designating the existing building and asphalt parking areas as an engineered cap to obstruct the soil to groundwater migration pathway. This will require long-term inspection and maintenance of the cap as a post-closure continuing obligation;
2. Designating the building as a structural impediment to complete removal of any remaining soil impacts below or around the foundation;
3. Installation of a sub-slab depressurization system in the Site building if vapor intrusion risks are still present; and
4. GIS registry for any remaining groundwater impacts

The estimated duration of the remedial actions is 2 to 3 years, including performance monitoring and reporting. The time frame for case closure will depend on regulatory concurrence with achieving remedial objectives and any requirements for additional monitoring.

TABLES

TABLE 1
SHALLOW SOIL GAS & SUB-SLAB VAPOR SAMPLE ANALYTICAL RESULTS
One Hour Martinizing
Elm Grove, Wisconsin

Sampling Identification	Date Sampled	Depth (feet bgs)	Tetrachloroethene	Trichloroethene	Methylene Chloride
6142-SS-1	10/23/2012	sub-slab	**970**	<36	**150**
6142-SS-2	10/23/2012	sub-slab	**3,900**	<130	<210
	5/19/2015		**42,200**	**30.6**	NA
6142-SS-3	5/19/2015	sub-slab	**105,000**	**142**	NA
6142-SG-2	10/23/2012	4	**1,600**	<21	<35
6142-SG-4	4/12/2013	4	**4.7**	<2.0	**245**
Vapor Risk Screening Level (Small Commercial)			**6,000**	**290**	**87,000**

[1] The Vapor Risk Screeing Levels are based on U.S. E.P.A.'s Regional Screening Levels (RSL's) for small commercial indoor air with an attenuation factor of 0.03 for shallow soil gas/sub-slab samples and a 0.1 adjustment for 1 x 10-5 lifetime cancer risk for carcinogens

All concentrations reported in untis of micrograms per cubic meter (µg/m³)

Bolded values are above detection limits

Bolded and Shaded values exceed the WDNR Non-residential Vapor Risk Screening Level

NA = Not Analyzed

TABLE 2
REMEDIAL INJECTION DATA SUMMARY
One Hour Martinizing
Elm Grove, Wisconsin

Injection Point Identification	Injection Pressure (psi)	Flow Rate (gpm)	3DMe + CRS Mixture Injected (gallons)	BDI Injected (gallons)	Total Solution Injected (gallons)
IP-1	10.0	2.5	165	10	175
IP-2	4.1	2.4	165	10	175
IP-3	10.8	4.5	165	10	175
IP-4	7.4	5.6	165	10	175
IP-5	8.5	5.7	165	10	175
IP-6	11.4	5.8	165	20	185
IP-7	14.8	5.6	165	10	175
IP-8	19.5	2.8	165	10	175
IP-9	21.8	5.4	165	0	165
IP-10	6.8	5.1	236	0	236
IP-11	8.3	1.3	94	30	124
IP-12	5.0	3.6	279	20	299
IP-13	18.5	1.0	46	0	46
IP-14	29.1	8.1	165	0	165
IP-15	30.8	6.8	165	10	175
IP-16	69.3	8.0	165	10	175
IP-17	44.3	8.0	165	10	175
IP-18	30.6	7.6	165	10	175
IP-19	17.8	8.0	165	10	175
IP-20	18.8	8.0	165	10	175
IP-21	19.0	6.9	165	10	175
IP-22	18.8	8.0	165	10	175
IP-23	15.5	7.5	165	10	175
IP-24	20.0	8.0	165	10	175
IP-25	28.5	7.9	165	10	175
IP-26	21.3	8.0	165	10	175
IP-27	30.2	8.0	165	10	175
IP-28	25.8	8.0	165	10	175
IP-29	32.5	8.0	165	10	175
IP-30	43.4	8.0	165	10	175
IP-31	33.0	8.3	485	10	495
IP-32	35.0	10.0	485	10	495
IP-33	19.2	9.0	485	10	495
IP-34	50.0	10.6	485	10	495
IP-35	65.8	10.2	485	10	495
IP-36	65.3	9.5	325	10	335
IP-37	102.5	12.5	160	0	160
		Total	**7,855**	**360**	**8,215**

Notes:

psi = pounds per square inch
gpm = gallons per minute
3DME = 3-D Microemulsion
CRS = Chemical Reducing Solution
BDI = Bio-Dechlor Enoculum Plus

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TABLE 3
REMEDIATION PERFORMANCE MONITORING PROGRAM
One Hour Martinizing
Elm Grove, Wisconsin

Year 1								
Parameter	**VOCs**	**Total Fe**	**Dissolved Fe**	**Sulfate**	**Nitrate**	**Nitrite**	**Ethene/Ethane/Methane**	**DHC Population/Species**
MW-5	Q	Q	Q	Q	Q	Q	Q	S
MW-6	Q	Q	Q	Q	Q	Q	Q	S
MW-7	Q	Q	Q	Q	Q	Q	Q	S
PZ-2	Q							

Year 2								
Parameter	**VOCs**	**Total Fe**	**Dissolved Fe**	**Sulfate**	**Nitrate**	**Nitrite**	**Ethene/Ethane/Methane**	**DHC Population/Species**
MW-5	Q	S	S	S	S	S	S	A
MW-6	Q	S	S	S	S	S	S	A
MW-7	Q	S	S	S	S	S	S	A
PZ-2	Q							

Year 3								
Parameter	**VOCs**	**Total Fe**	**Dissolved Fe**	**Sulfate**	**Nitrate**	**Nitrite**	**Ethene/Ethane/Methane**	**DHC Population/Species**
MW-5	S	S	S	S	S	S	S	A
MW-6	S	S	S	S	S	S	S	A
MW-7	S	S	S	S	S	S	S	A
PZ-2	S							

Notes:

The first monitoring event will be performed approximately 2 months after injections

Q = Sample collected for analysis quarterly

S = Sample collected for analysis semi-annually

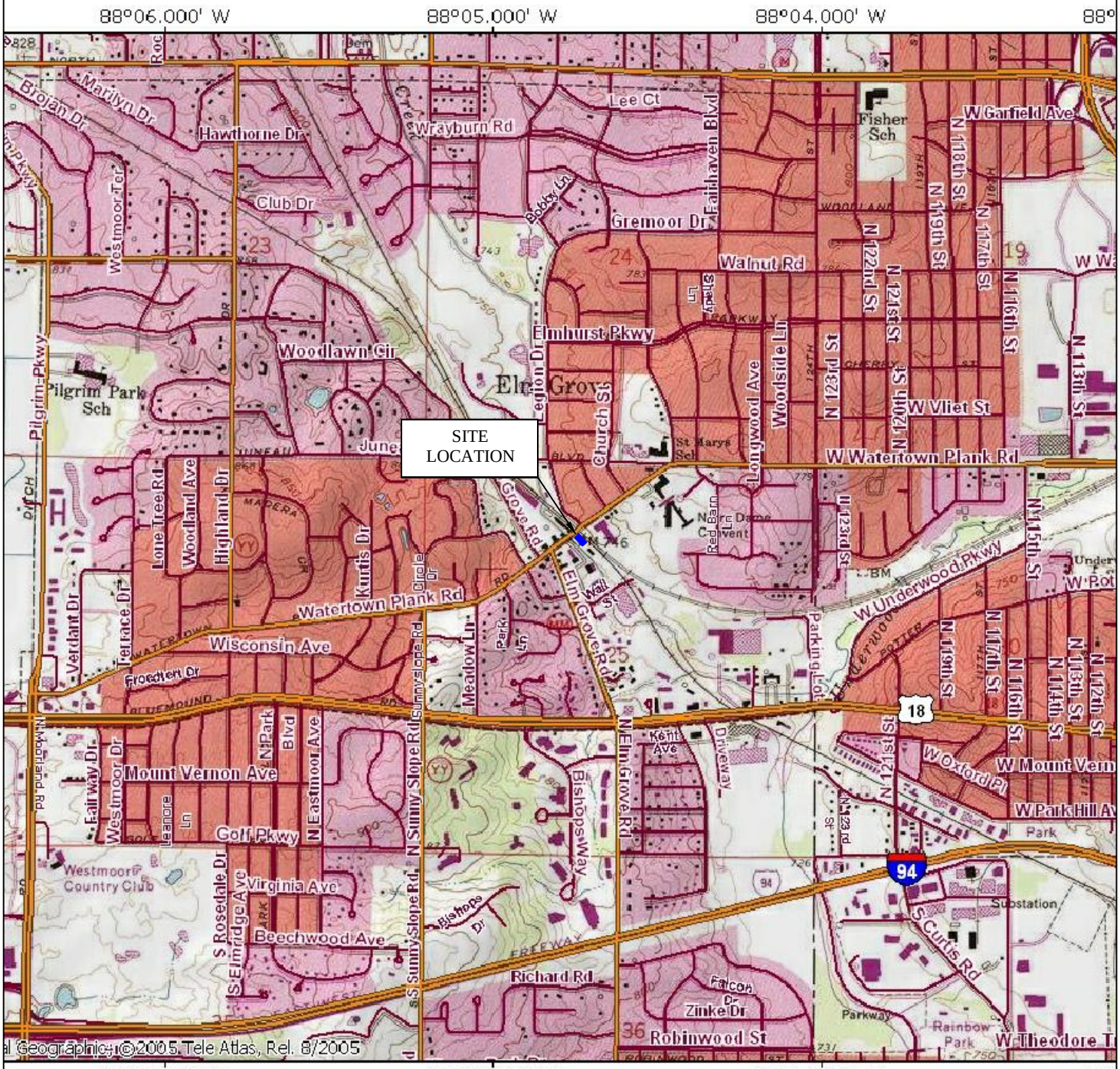
A = Sample collected for analysis annually

DHC = Dehalococcoides

Fe = Iron

VOCs = Volatile Organic Compounds

FIGURES



Source: US Geological Survey, Wauwatosa, Wisconsin, 7.5 minute quadrangle

No.	Date	Revision	Approved

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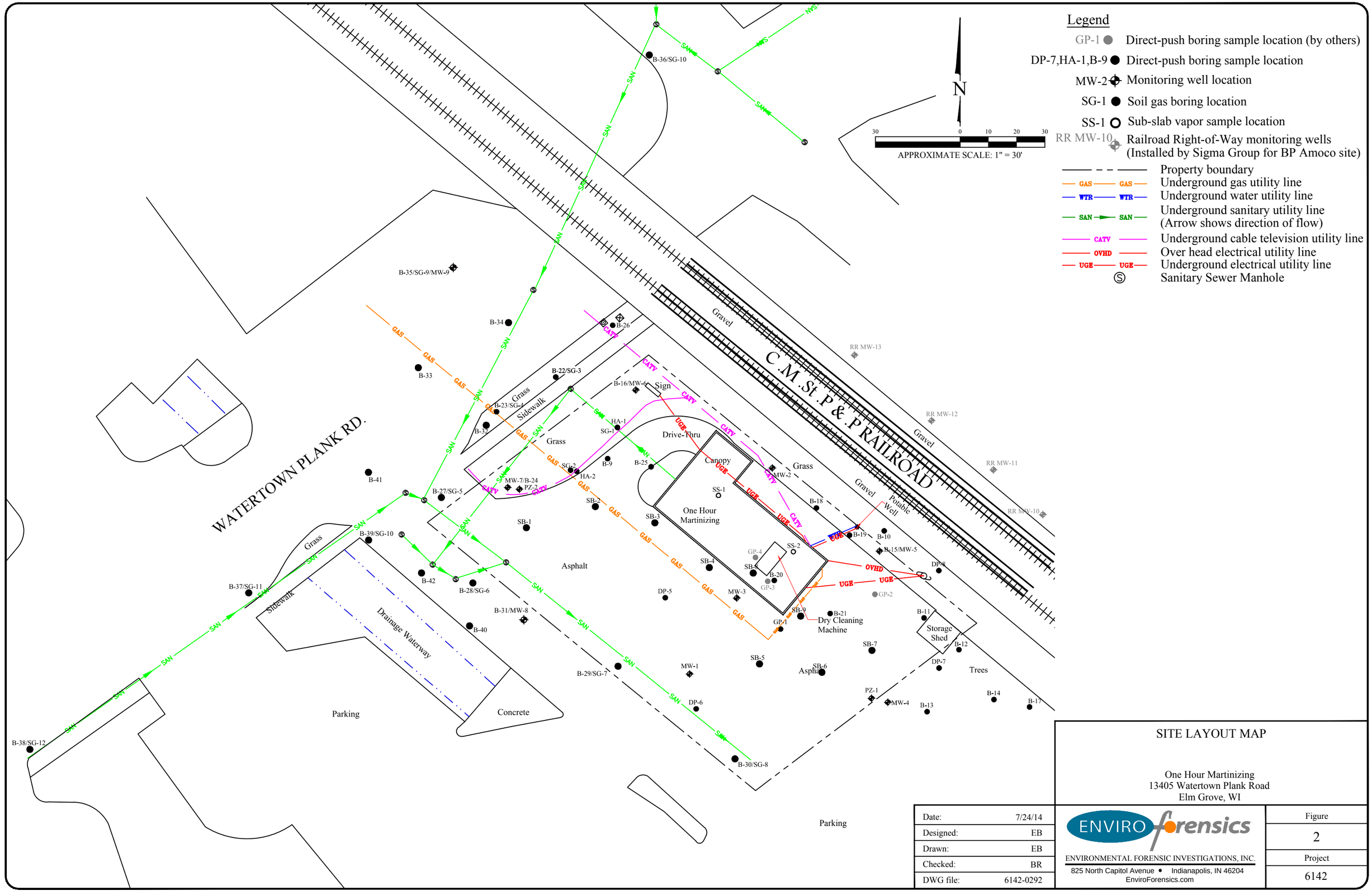
Date:	7/29/13
Designed:	MMM
Drawn:	MMM
Checked:	WF
DWG file:	67172-12

SITE LOCATION MAP

One Hour Martinizing

13405 Watertown Plank Road
Elm Grove, WI

Figure
1
Project
6142



SITE LAYOUT MAP

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Date:	7/24/14
Designed:	EB
Drawn:	EB
Checked:	BR
DWG file:	6142-0292

ENVIRO forensics
ENVIRONMENTAL FORENSIC INVESTIGATIONS, INC.
825 North Capitol Avenue • Indianapolis, IN 46204
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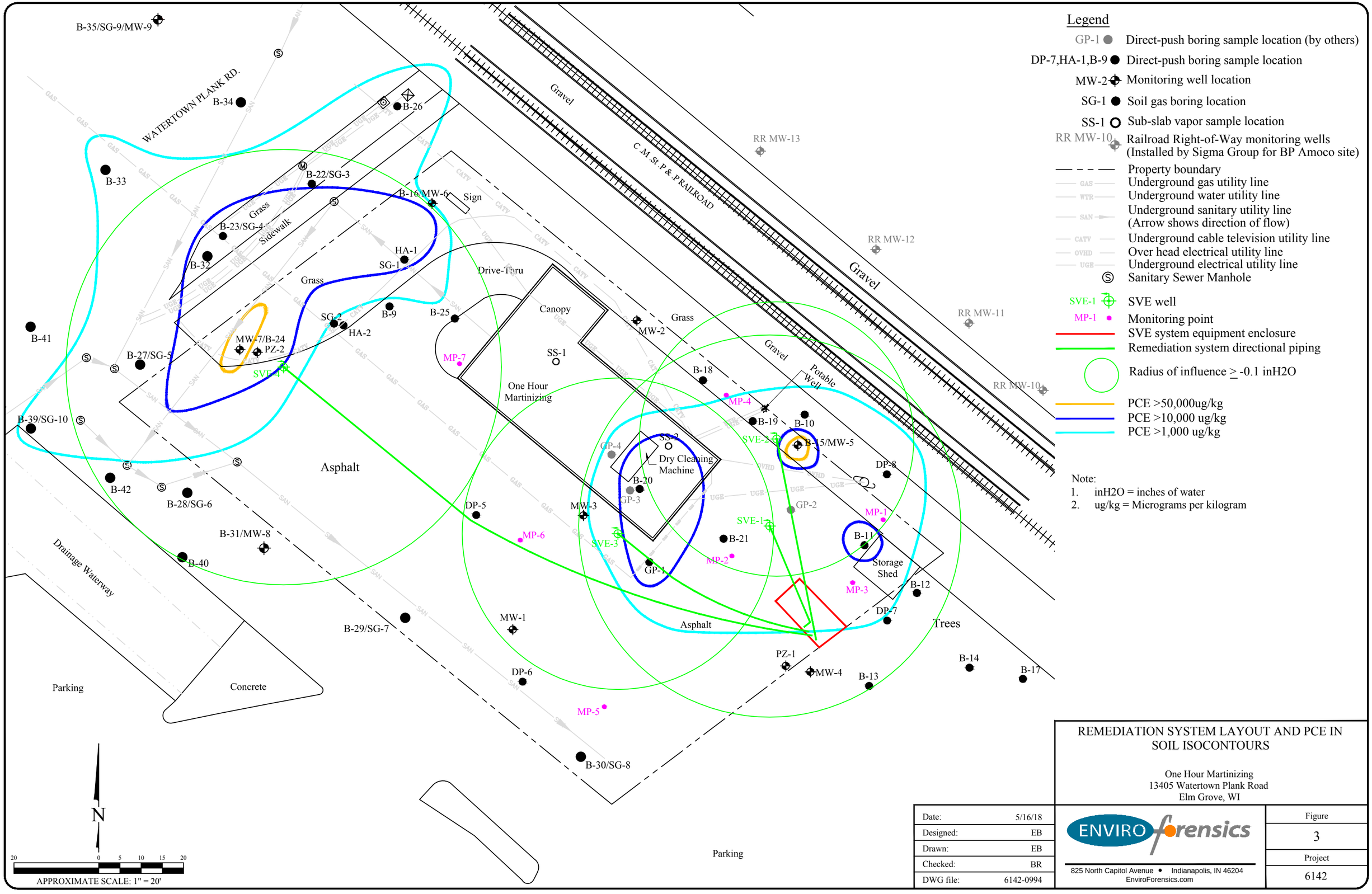
Figure
2
Project
6142



Legend

- GP-1 — Direct-push boring sample location (by others)
- DP-7,HA-1,B-9 — Direct-push boring sample location
- MW-2 — Monitoring well location
- SG-1 — Soil gas boring location
- SS-1 — Sub-slab vapor sample location
- RR MW-10 — Railroad Right-of-Way monitoring wells (Installed by Sigma Group for BP Amoco site)
- Property boundary
- GAS — Underground gas utility line
- WTR — Underground water utility line
- SAN — Underground sanitary utility line (Arrow shows direction of flow)
- CATV — Underground cable television utility line
- OVHD — Over head electrical utility line
- UGE — Underground electrical utility line
- Sanitary Sewer Manhole
- SVE-1 — SVE well
- MP-1 — Monitoring point
- SVE system equipment enclosure
- Remediation system directional piping
- Radius of influence ≥ -0.1 inH2O
- PCE >50,000ug/kg
- PCE >10,000 ug/kg
- PCE >1,000 ug/kg

Note:
1. inH2O = inches of water
2. ug/kg = Micrograms per kilogram

REMEDIATION SYSTEM LAYOUT AND PCE IN SOIL ISOCONTOURS

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Date:	5/16/18
Designed:	EB
Drawn:	EB
Checked:	BR
DWG file:	6142-0994

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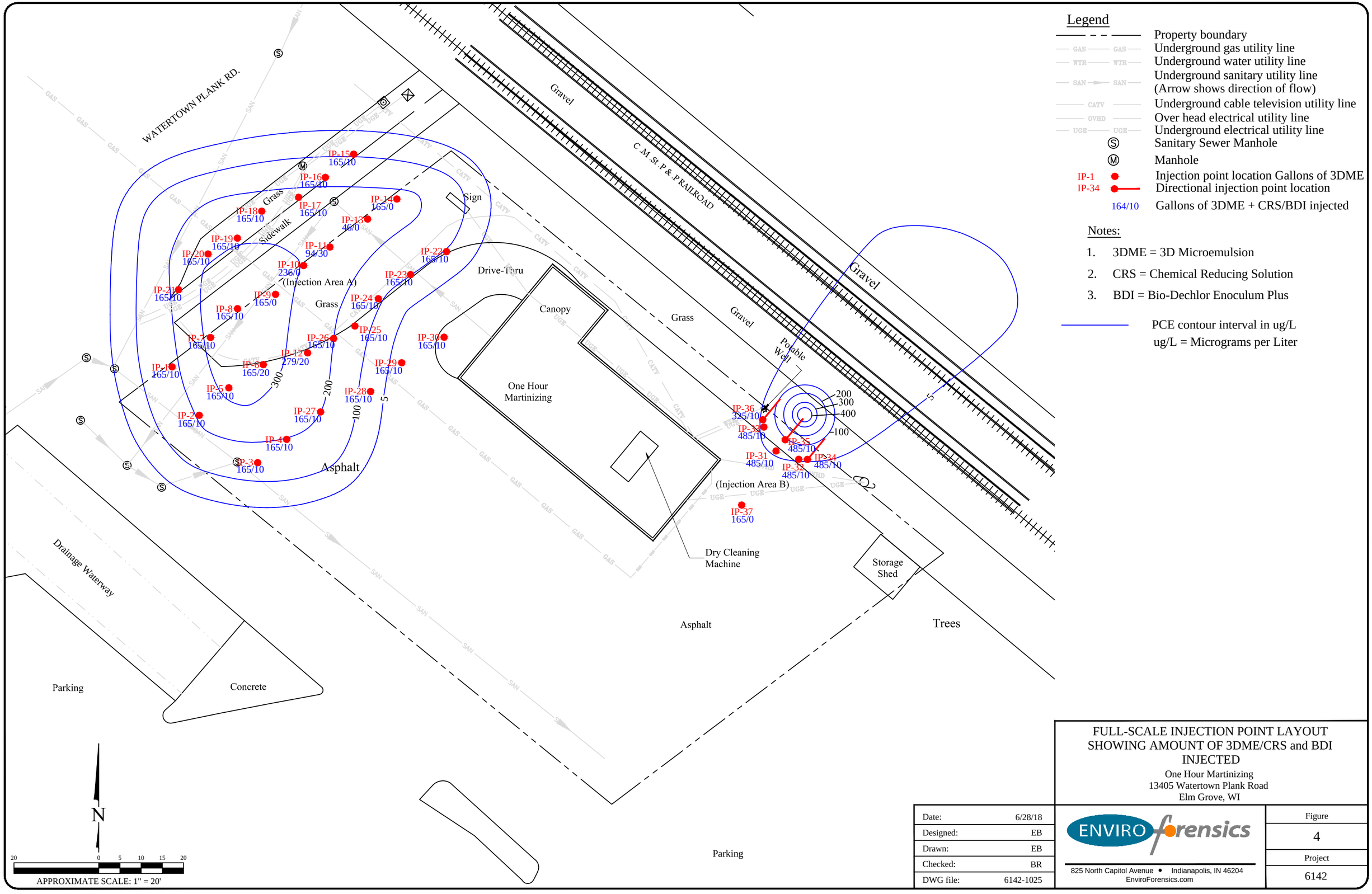
Figure 3

Project 6142



Legend

- Property boundary
- Underground gas utility line
- Underground water utility line
- Underground sanitary utility line (Arrow shows direction of flow)
- Underground cable television utility line
- Over head electrical utility line
- Underground electrical utility line
- Sanitary Sewer Manhole
- Manhole
- IP-1 — Injection point location Gallons of 3DME
- IP-34 — Directional injection point location
- 164/10 — Gallons of 3DME + CRS/BDI injected

Notes:

1. 3DME = 3D Microemulsion
2. CRS = Chemical Reducing Solution
3. BDI = Bio-Dechlor Enoculum Plus

PCE contour interval in ug/L

ug/L = Micrograms per Liter

FULL-SCALE INJECTION POINT LAYOUT SHOWING AMOUNT OF 3DME/CRS and BDI INJECTED

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Date:	6/28/18
Designed:	EB
Drawn:	EB
Checked:	BR
DWG file:	6142-1025

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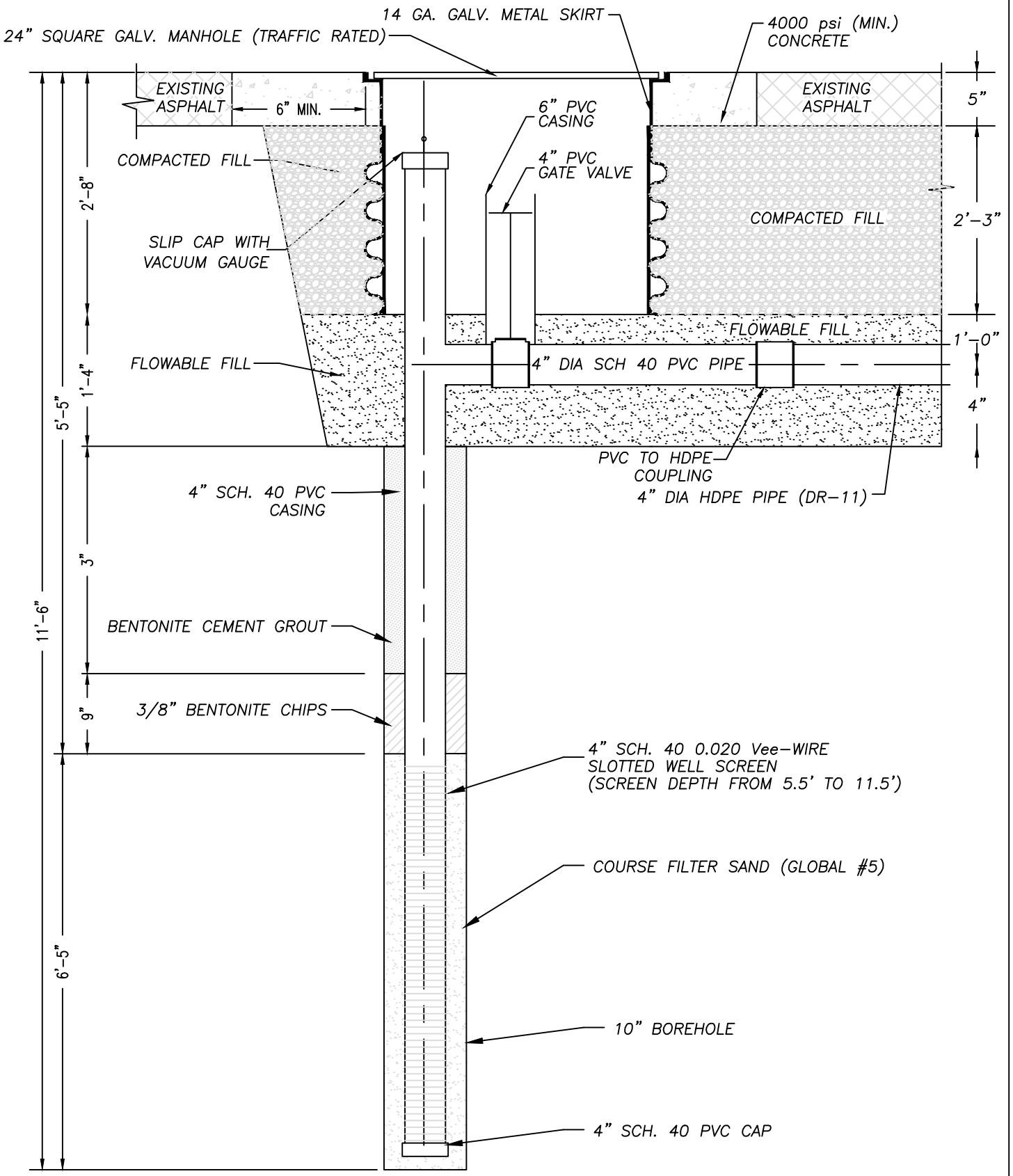
Figure 4

Project 6142



No.	Date	Revision	Approved

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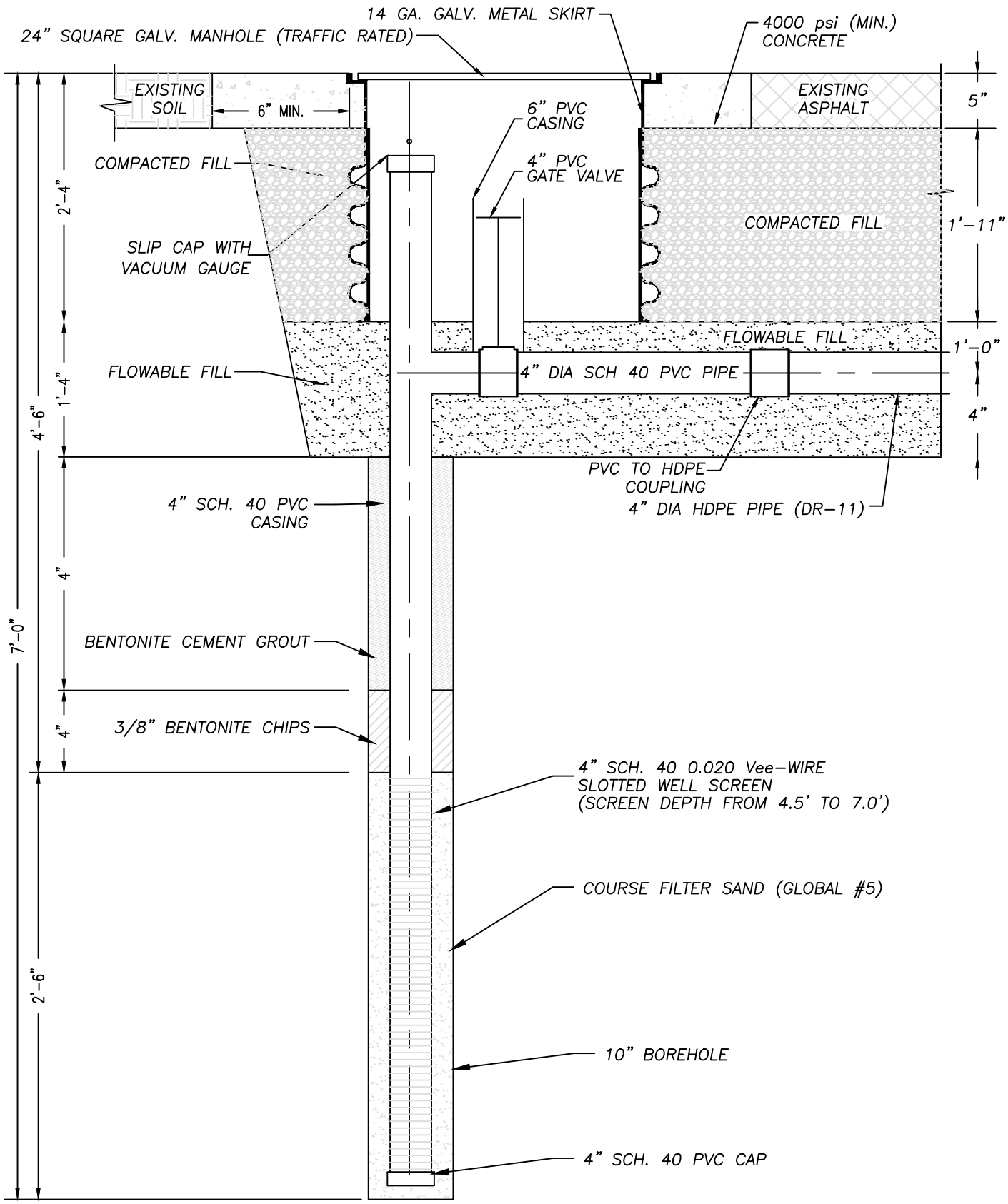
Date:	7/31/18
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file:	6142-0997

SVE-1 CONSTRUCTION DIAGRAM

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Figure
5a
Project
6142



No.	Date	Revision	Approved

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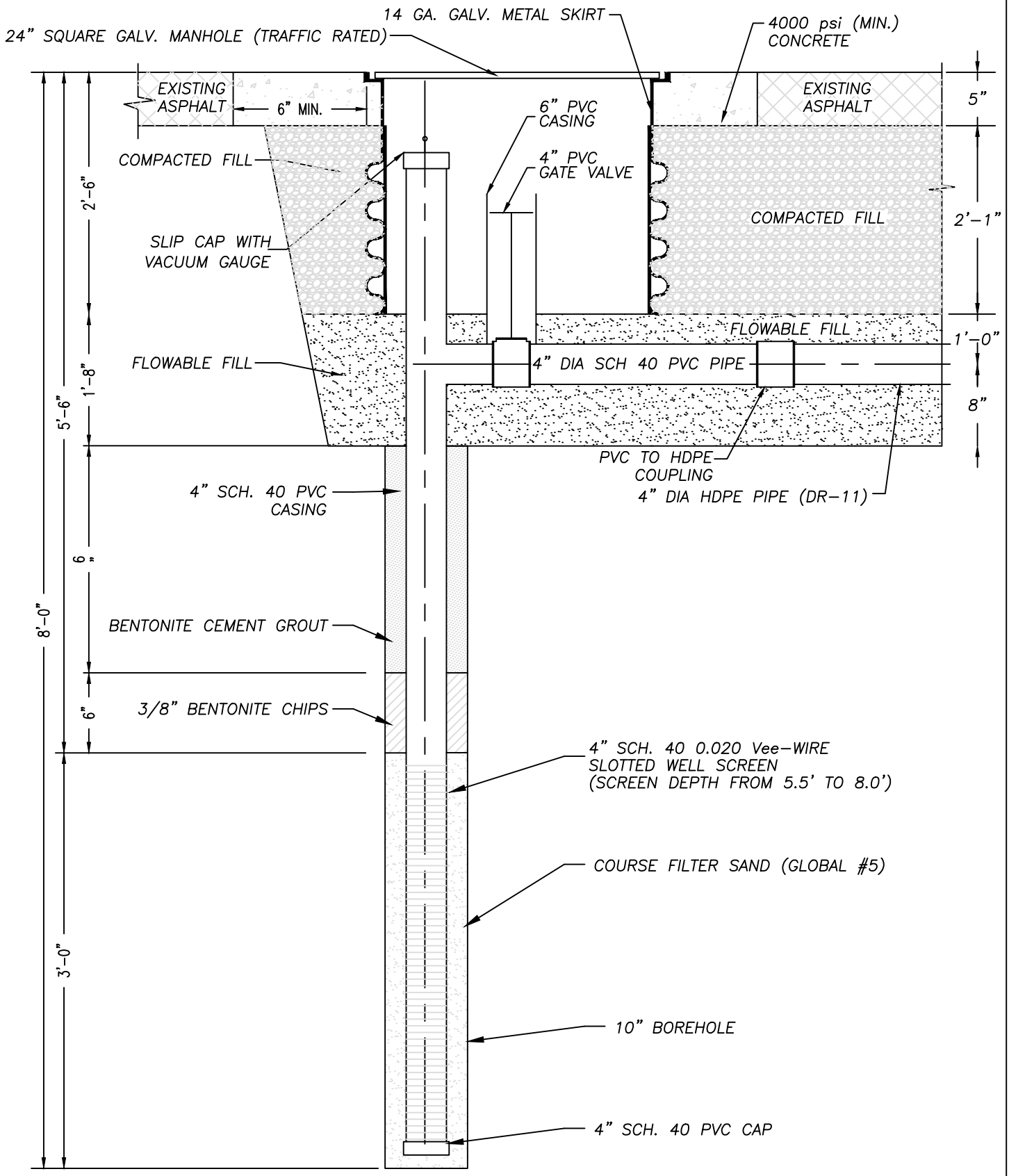
Date:	7/31/18
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file:	6142-0997

SVE-2 CONSTRUCTION DIAGRAM

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Figure
5b
Project
6142



No.	Date	Revision	Approved

ENVIRO forensics
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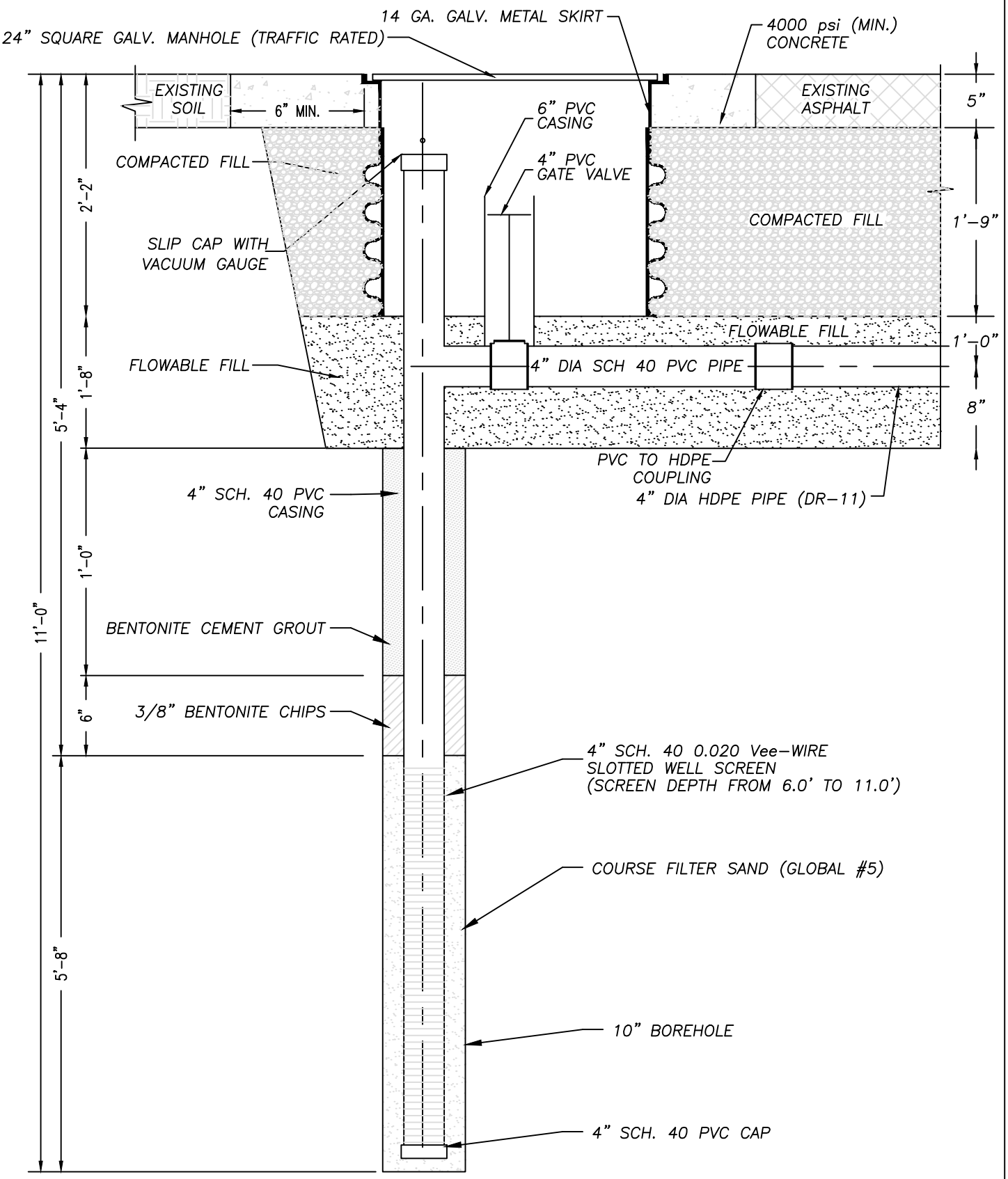
Date:	7/31/18
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file:	6142-0997

SVE-3 CONSTRUCTION DIAGRAM

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Figure
5c
Project
6142



No.	Date	Revision	Approved

ENVIRO forensics
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Date:	7/31/18
Designed:	EB
Drawn:	EB
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DWG file:	6142-0997

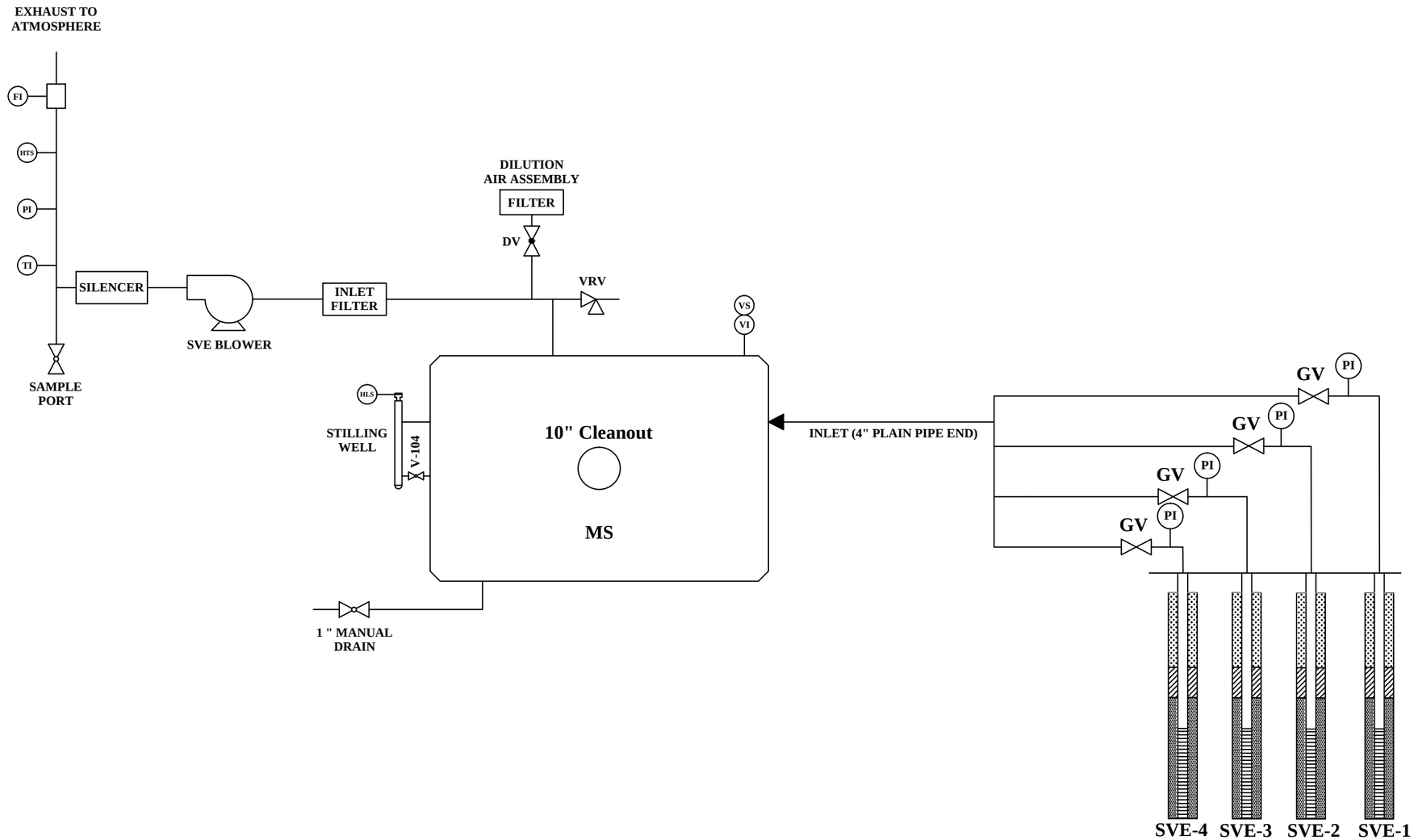
SVE-4 CONSTRUCTION DIAGRAM

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Figure
5d
Project
6142

Legend

FI - Flow Indicator
PI - Pressure Indicator
TI - Temperature Indicator
VI - Vacuum Indicator
DV - Dilution Valve
GV - Gate Valve
VRV - Vacuum Relief Valve
HLS - High Level Switch
HTS - High Temperature Switch
VS - Vacuum Switch
MS - Moisture Separator



SVE SYSTEM PROCESS AND INSTRUMENTATION DIAGRAM

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Date:	5/16/18
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file:	6142-0998

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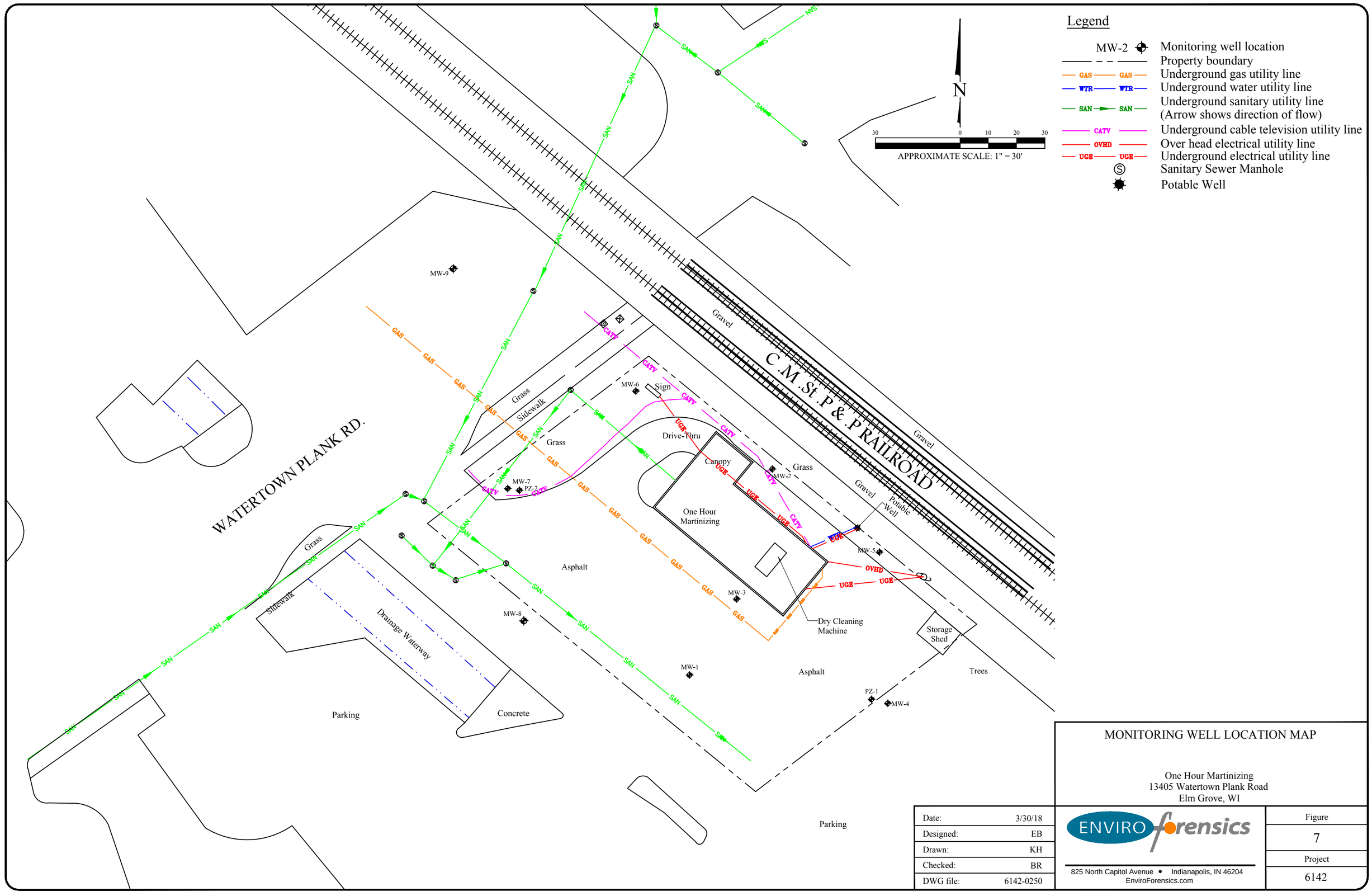
Figure 6

Project 6142



MONITORING WELL LOCATION MAP

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Date:	3/30/18
Designed:	EB
Drawn:	KH
Checked:	BR
DWG file:	6142-0250

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Figure
7
Project
6142

APPENDIX A

SVE PILOT STUDY DOCUMENTATION

An SVE pilot study was performed to confirm the feasibility of SVE implementation at the Site, determine the effective area of vacuum influence, and determine sustained concentrations of COCs in the exhaust.

Extraction Well and Monitoring Point Installation

EnviroForensics mobilized to the Site on December 4, 2017 to install a pilot test extraction well and vacuum monitoring points. The extraction well (SVE-1) was installed within the shallow vadose zone soils to a depth of 11.5 feet bgs. The well was drilled using 8.25-inch diameter hollow-stem augers and constructed of 4-inch diameter polyvinyl chloride (PVC) piping with 6 feet of 0.020-inch slotted, Vee-Wire® well screen. The annular space around the well was filled with silica sand to approximately 0.5 feet above the screen, followed by one foot of hydrated bentonite chips and cement-bentonite grout to 1 foot bgs. The SVE well was completed at grade with flush-mounted well vault and concrete apron.

Seven (7) sets of nested vacuum monitoring points (MP-1S/I/D through MP-7S/I/D) were installed at the locations shown on **Figure A1**. Each set of monitoring points was constructed as follows:

- An 8.25-inch diameter borehole was advanced to a depth of 12 feet bgs using hollow-stem augers;
- Three (3) 0.5 feet long, 0.5-inch diameter stainless steel screens with 0.0057-inch pore size were placed in the borehole with individual sections of low-density polyethylene (LDPE) tubing extending from each screen to the surface;
- The annular space was filled with sand spanning the screens and hydrated bentonite chips between screened intervals;
- An 8-inch flush-mount vault and concrete apron was installed at surface to provide protection and access to the tubing.

The screens at each vacuum monitoring point locations are designated “S” for shallow, “I” for intermediate, and “D” for deep. Screened intervals are as follows:

- Shallow screens are set from 3.5 to 4 feet bgs;
- Intermediate screens are set from 7.5 to 8 feet bgs;
- Deep screens are set from 11.5 to 12 feet bgs.

Extraction well and vacuum monitoring point construction details can be found on **Table A1**.

Data Collection

The SVE pilot study was performed on December 12 and 13, 2017. The extraction well was connected via 4-inch diameter piping to a Roots URAI-59 blower housed within an enclosed trailer. Extracted vapor was discharged through an exhaust pipe elevated above the roof of the trailer. Effluent vapor samples were collected from a port installed downstream of the blower.

The SVE pilot study consisted of inducing a vacuum on extraction well SVE-1 and measuring subsurface vacuum response in the vacuum monitoring points and monitoring wells screened across the water table. Vacuum was applied in two (2) steps of 6 and 9 inches of mercury (inHg), respectively. System operational parameters recorded during each step are presented on **Table A2**.

Subsurface vacuum response was measured at the 21 vacuum monitoring point screens (MP-1S/I/D through MP-7S/I/D) and six (6) water table monitoring wells. The radial distances of the monitoring locations from the extraction well ranged from 10 feet to 91 feet. Vacuum readings were collected several times during each step as summarized on **Table A3**. Effluent vapor samples were collected at the beginning of each step in 1-liter vacuum canisters and analyzed for VOCs via US EPA Method TO-15.

Data Analysis and Results

In order to evaluate the generalized SVE radius of influence (ROI) for the shallow, intermediate, and deep zones at the Site, a best-fit statistical distribution was identified for Step 1 and Step 2 to describe the attenuation of subsurface vacuum with respect to distance from the extraction well. The ROI analysis charts and ROI data are summarized in **Table A4**. For SVE remediation purposes, the ROI is considered to be the distance at which the fitted regression line crosses the 0.1 inches of water threshold on the charts. The ROIs for each step are illustrated on **Figures A2 and A3**. For both steps, the ROI was smallest in the shallow zone and largest in the deep zone. The shallow zone ROIs estimated for steps 1 and 2 were 41 feet and 52 feet, respectively. The deep zone ROIs estimated for steps 1 and 2 were 60 feet and 72 feet, respectively.

The laboratory analytical report associated with the effluent vapor samples is attached. The analytical data summary and contaminant mass removal calculations are presented on **Table A5**. The highest concentration of VOCs in the effluent vapor samples was detected during Step 2, with a total VOC concentration of 10,120 micrograms per cubic meter ($\mu g/m^3$). The total VOC mass removed during the pilot study was 0.04 pounds. Coupling effluent vapor concentrations with the effluent flow rates over the test duration for each step indicates that the VOC mass removal rate would be approximately 75 pounds per year during full-scale system operation. However, the pilot study extraction well was not installed within an identified source areas.

Vapor removed via extraction wells optimally placed in source areas can be expected to yield higher VOC concentrations.

The study results indicated that SVE is a viable remedial alternative for unsaturated soils at the Site. It may also provide additional benefit for mitigation of the existing commercial building during implementation, but would require multiple SVE extraction points to achieve this goal. Evaluation of SVE design for remedial implementation at the Site will consider the ROIs, flow rates, and other information, as well as Site-specific considerations such as local VOC concentrations, access limitations, lithologic heterogeneities, and subsurface utility corridors that may affect the vacuum propagation or influence the design criteria.

TABLE A1
SVE WELL AND MONITORING POINT CONSTRUCTION INFORMATION
One Hour Martinizing
Elm Grove, Wisconsin

Monitoring Well ID	Date Installed	Northing	Easting	Top of Casing Elevation (amsl)	Ground Elevation (amsl)	Total Depth (feet bgs)	Screened Interval (feet bgs)
MW-1	11/09/09	385,917.65	2,513,553.97	741.88	742.14	19.4	9.4-19.4
MW-2	11/09/09	385,990.56	2,513,583.23	743.40	743.87	19.5	9.5-19.5
MW-3	11/10/09	385,944.57	2,513,570.64	742.94	743.33	19.5	9.5-19.5
MW-4	11/10/09	385,907.67	2,513,624.16	741.88	742.20	19.7	9.7-19.7
MW-5	10/23/12	385,961.16	2,513,621.20	742.96	743.36	24.4	14.4-24.4
MW-6	10/23/12	386,018.16	2,513,534.92	744.05	744.51	24.4	14.4-24.4
MW-7	04/09/13	385,983.68	2,513,489.58	742.95	743.38	24.4	14.4-24.4
MW-8	11/14/13	385,936.73	2,513,495.30	741.81	742.19	23.7	13.7-23.7
MW-9	11/14/13	386,061.40	2,513,470.29	744.62	744.98	24.1	14.1-24.1
PZ-1	04/08/13	385,909.07	2,513,618.36	741.81	742.22	47.3	42.3-47.3
PZ-2	06/30/14	385,981.52	2,513,493.14	742.83	743.13	45.8	40.8-45.8
MP-1	12/04/17	NS	NS	NS	NS	4.5	3.5-4
		NS	NS	NS	NS	8.5	7.5-8
		NS	NS	NS	NS	12.0	11.5-12
MP-2	12/04/17	NS	NS	NS	NS	4.5	3.5-4
		NS	NS	NS	NS	8.5	7.5-8
		NS	NS	NS	NS	12.0	11.5-12
MP-3	12/04/17	NS	NS	NS	NS	4.0	3-3.5
		NS	NS	NS	NS	6.5	5.5-6
		NS	NS	NS	NS	12.0	11.5-12
MP-4	12/04/17	NS	NS	NS	NS	4.5	3.5-4
		NS	NS	NS	NS	8.5	7.5-8
		NS	NS	NS	NS	12.0	11.5-12
MP-5	12/04/17	NS	NS	NS	NS	3.5	2.5-3
		NS	NS	NS	NS	6.0	5-5.5
		NS	NS	NS	NS	12.0	11.5-12
MP-6	12/04/17	NS	NS	NS	NS	4.5	3.5-4
		NS	NS	NS	NS	8.5	7.5-8
		NS	NS	NS	NS	12.0	11.5-12
MP-7	12/04/17	NS	NS	NS	NS	4.5	3.5-4
		NS	NS	NS	NS	8.5	7.5-8
		NS	NS	NS	NS	12.0	11.5-12
SVE-1	12/04/17	NS	NS	NS	NS	11.5	5.5-11.5

Notes:

All wells were installed by On-Site Environmental using hollow-stem auger methods

All wells are 2 inches in diameter

Horizontal coordinates are State Plane, Wisconsin Southern Zone, NAD 27

amsl = feet above mean sea level

NS = Not surveyed

TABLE A2
SVE PILOT STUDY OPERATIONAL DATA
One Hour Martinizing
Elm Grove, Wisconsin

Date	Time	System Runtime	VFD Setting	System Vacuum*	Effluent Flow Rate	Effluent VOC Concentration	Inlet Temperature	Exhaust Temperature	Dilution	Notes
		Hours	Hertz	inHg	cfm	µg/m^3	°F	°F	(%)	
12/12/2017 (Step 1)	13:25	5.7	30.0	-6.00	170	--	--	65	40	Runtime at pilot study start-up was 5.7 hrs
	13:45	6.1	30.0	-5.97	170	--	--	85	40	
	14:05	6.4	30.0	-5.97	170	--	--	90	40	
	14:25	6.7	30.0	-5.93	170	--	--	90	40	
	14:45	7.1	30.0	-5.79	170	3,815	--	90	40	
	15:15	7.6	30.0	-5.72	170	--	--	105	40	
	15:45	8.1	30.0	-5.83	170	--	--	115	0	
12/13/2017 (Step 2)	8:30	8.1	30.0	-9.5	250	--	--	90	0	
	9:10	8.7	30.0	-9.5	250	--	--	160	0	
	9:30	9.1	30.0	-9.5	250	--	--	175	0	
	10:00	9.6	30.0	-9.5	250	--	--	180	0	
	10:50	10.4	30.0	-9.5	250	--	--	180	0	
	11:30	11.1	30.0	-9.5	250	--	--	185	0	
	12:00	11.6	30.0	-9.5	250	10,120	--	185	0	

Notes:

-- = Reading not recorded

inHg = inches of mercury

cfm = cubic feet per minute

µg/m^3 = micrograms per cubic meter

* = Faulty vacuum gauge in system during Step 1. Vacuum readings estimated from wellhead readings. Accurate readings recorded during final hour of Step 2 utilized for all data readings in Step 2.

VFD = Varaible Frequency Drive

VOC = Volatile Organic Compound

TABLE A3
SUMMARY OF SUBSURFACE VACUUM DATA
One Hour Martinizing
Elm Grove, Wisconsin

Date	Time	Vacuum Readings *Inches of water column*															
		SVE-1	**MP-1s**	**MP-1i**	**MP-1d**	**MP-2s**	**MP-2i**	**MP-2d**	**MP-3s**	**MP-3i**	**MP-3d**	**MP-4s**	**MP-4i**	**MP-4d**	**MP-5s**	**MP-5i**	**MP-5d**
Distance from SVE-1		--	14	14	14	10	10	10	20.8	20.8	20.8	40.6	40.6	40.6	63.4	63.4	63.4
Screened Interval (ft bgs)		5.5-11.5	3.5-4	7.5-8	11.5-12	3.5-4	7.5-8	11.5-12	3-3.5	5.5-6	11.5-12	3.5-4	7.5-8	11.5-12	2.5-3	5-5.5	11.5-12
12/12/2017 (Step 1)	13:25	-81.6	-0.094	-0.309	-0.365	-0.468	-0.487	-0.728	-0.155	-0.504	-0.520	-0.008	-0.035	-0.089	-0.034	-0.038	-0.047
	13:45	-81.16	-0.105	-0.316	-0.664	-0.500	-0.490	-0.760	0.472	-0.531	-0.512	-0.009	-0.042	-0.092	-0.037	-0.051	-0.049
	14:00	-81.23	-0.100	-0.307	-0.786	-0.491	-0.489	-0.759	-0.313	-0.556	-0.515	-0.010	-0.041	-0.086	-0.037	-0.049	-0.053
	14:15	-80.6	-0.089	-0.314	-0.711	-0.490	-0.491	-0.757	-0.314	-0.538	-0.519	-0.007	-0.040	-0.083	-0.048	-0.044	-0.050
	14:45	-78.78	-0.103	-0.313	-0.718	-0.501	-0.497	-0.751	-0.315	-0.529	-0.501	-0.009	-0.041	-0.088	-0.041	-0.059	-0.051
	15:15	-77.73	-0.105	-0.315	-0.691	-0.492	-0.499	-0.760	-0.337	-0.522	-0.534	-0.007	-0.038	-0.081	-0.039	-0.045	-0.049
	15:45	-79.32	-0.111	-0.309	-0.700	-0.500	-0.479	-0.751	-0.331	-0.523	-0.530	-0.009	-0.041	-0.085	-0.037	-0.041	-0.048
12/13/2017 (Step 2)	8:35	O.F.L	-0.180	-0.549	-1.252	-0.841	-0.851	-1.278	-0.576	-0.945	-0.917	-0.027	-0.075	-0.142	-0.081	-0.059	-0.057
	8:55	O.F.L	-0.201	-0.589	-1.274	-0.911	-0.904	-1.354	-0.582	-0.974	-0.919	-0.030	-0.055	-0.155	-0.067	-0.077	-0.099
	9:25	O.F.L	-0.187	-0.585	-1.289	-0.933	-0.937	-1.392	-0.589	-0.960	-0.944	-0.032	-0.060	-0.168	-0.081	-0.110	-0.127
	9:45	O.F.L	-0.186	-0.582	-1.304	-0.965	-0.946	-1.425	-0.608	-0.953	-0.990	-0.029	-0.075	-0.174	-0.092	-0.112	-0.121
	10:15	O.F.L	-0.188	-0.591	-1.299	-9.710	-0.943	-1.420	-0.615	-0.969	-0.993	-0.034	-0.075	-0.177	-0.085	-0.110	-0.115
	11:00	O.F.L	-0.208	-0.597	-1.808	-0.972	-0.976	-1.441	-0.632	-0.984	-0.984	-0.032	-0.070	-0.160	-0.079	-0.098	-0.116
	11:30	O.F.L	-0.205	-0.502	-1.326	-0.971	-0.974	-1.472	-0.628	-0.971	-0.978	-0.032	-0.073	-0.161	-0.083	-0.082	-0.108
	12:00	O.F.L	-0.198	-0.578	-1.323	-0.972	-0.953	-1.433	-0.613	-0.979	-0.976	-0.031	-0.069	-0.175	-0.076	-0.082	-0.102

Notes:

O.F.L. = Over Flow Limit

NM = Not Measured

TABLE A3
SUMMARY OF SUBSURFACE VACUUM DATA
One Hour Martinizing
Elm Grove, Wisconsin

Date	Time	Vacuum Readings *Inches of water column*											
		MP-6s	**MP-6i**	**MP-6d**	**MP-7s**	**MP-7i**	**MP-7d**	**MW-2**	**MW-3**	**MW-4**	**MW-5**	**MW-6**	**MW-7**
Distance from SVE-1		65.5	65.5	65.5	91	91	91	63	54	36	18	90	90
Screened Interval (ft bgs)		3.5-4	7.5-8	11.5-12	3.5-4	7.5-8	11.5-12	9.5-19.5	9.5-19.5	9.7-19.7	14.4-24.4	14.4-24.4	14.4-24.4
12/12/2017 (Step 1)	13:25	-0.029	-0.035	-0.079	0.000	0.000	0.000	0.000	0.000	-0.350	-0.300	NM	NM
	13:45	-0.026	-0.061	-0.081	0.000	0.000	0.000	0.000	-0.240	-0.400	1.000	NM	NM
	14:00	0.021	-0.057	-0.076	0.000	0.000	0.000	0.000	-0.220	-0.300	-0.600	NM	NM
	14:15	-0.031	-0.052	-0.110	0.000	0.000	0.000	0.000	0.300	-0.260	-0.400	NM	NM
	14:45	-0.030	-0.053	-0.106	0.000	0.000	0.000	-0.310	-0.250	-0.400	-0.540	NM	NM
	15:15	-0.035	-0.045	-0.101	0.000	0.000	0.000	-0.030	-0.250	-0.400	-0.390	NM	NM
	15:45	-0.036	-0.039	-0.102	0.000	0.000	0.000	-0.110	-0.200	-0.400	-0.400	NM	NM
12/13/2017 (Step 2)	8:35	-0.033	-0.085	-0.125	0.000	0.000	0.000	-0.140	-0.380	-0.670	-0.700	0.000	0.000
	8:55	-0.040	-0.089	-0.174	0.000	0.000	0.000	-0.160	-0.420	-0.680	-0.720	-0.160	0.000
	9:25	-0.067	-0.093	-0.145	0.000	0.000	0.000	-0.060	-0.550	-0.710	-0.740	0.000	0.000
	9:45	-0.064	-0.117	-0.179	0.000	0.000	0.000	-0.070	-0.380	-0.700	-0.740	0.000	0.000
	10:15	-0.066	-0.101	-0.172	0.000	0.000	0.000	NM	NM	NM	NM	NM	NM
	11:00	-0.061	-0.115	-0.180	0.000	0.000	-0.002	-0.070	-0.450	-0.720	-0.750	0.000	0.000
	11:30	-0.059	-0.108	-0.168	0.000	-0.001	-0.009	-0.070	-0.450	-0.710	-0.740	0.000	0.000
	12:00	-0.061	-0.104	-0.183	0.000	-0.001	-0.011	-0.070	-0.450	-0.720	-0.750	0.000	0.000

Notes:
O.F.L. = Over Flow Limit
NM = Not Measured

TABLE A4
RADIUS OF INFLUENCE DATA SUMMARY
One Hour Martinizing
Elm Grove, Wisconsin

	Radius of Influence in Feet at 0.1 inWC (R^2)		
	Shallow	**Intermediate**	**Deep**
Screened Interval (feet bgs)	3.5 - 4	7.5 - 8	11.5 - 12
Step 1	**41** (0.6159)	**53** (0.7126)	**60** (0.8657)
Step 2	**52** (0.6176)	**65** (0.7934)	**72** (0.8303)

Notes:

inWC = inches of water column

bgs = below ground surface

R^2 = A statistical measure of how close the data are to the fitted regression line

TABLE A5
SUMMARY OF EFFLUENT VOC CONCENTRATIONS
One Hour Martinizing
Elm Grove, Wisconsin

Date	Step	Total hours during step	Airflow Rate (scfm)	Effluent Concentration (µg/m^3)		Total VOCs Removed During Step (pounds)	Cumulative VOCs Removed (pounds)
				Tetrachloroethene	Trichloroethene		
12/12/2018	1	2.3	170	**3,770**	**45**	0.01	0.01
		VOCs Removed During Step (pounds)		0.00560	0.00007		
12/13/2018	2	3.5	250	**9,990**	**130**	0.03	0.04
		VOCs Removed During Step (pounds)		0.03274	0.00043		

Notes:

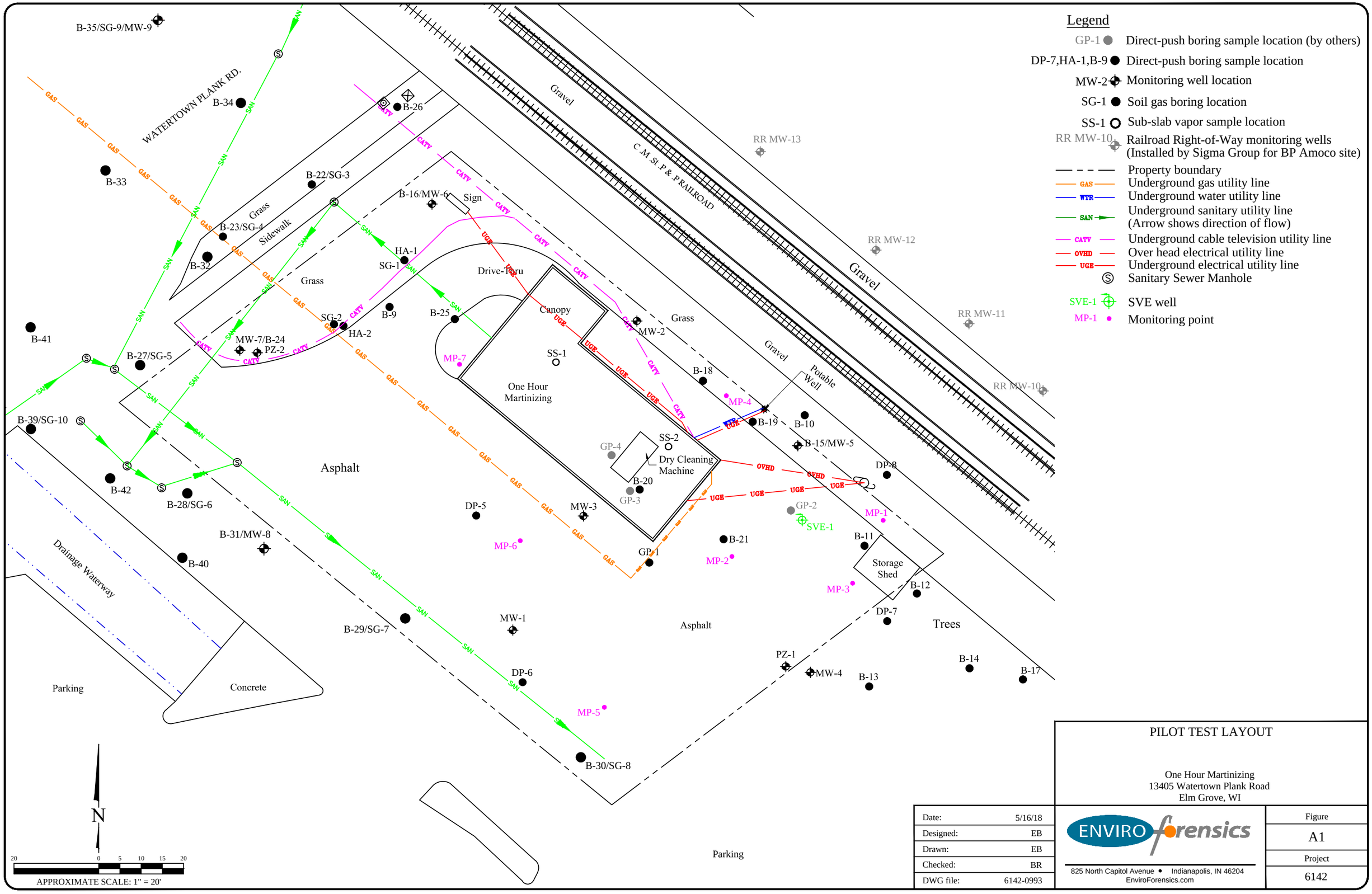
µg/m^3 = micrograms per cubic meter

scfm = standard cubic feet per minute

Constituents not shown are below laboratory detection limits

Constituents not presented contained concentration below laboratory reporting limits

Bolded values are above detection limits



Legend

- GP-1 — Direct-push boring sample location (by others)
- DP-7,HA-1,B-9 — Direct-push boring sample location
- MW-2 — Monitoring well location
- SG-1 — Soil gas boring location
- SS-1 — Sub-slab vapor sample location
- RR MW-10 — Railroad Right-of-Way monitoring wells (Installed by Sigma Group for BP Amoco site)
- Property boundary
- GAS — Underground gas utility line
- WTR — Underground water utility line
- SAN — Underground sanitary utility line (Arrow shows direction of flow)
- CATV — Underground cable television utility line
- OVHD — Over head electrical utility line
- UGE — Underground electrical utility line
- Sanitary Sewer Manhole
- SVE-1 — SVE well
- MP-1 — Monitoring point

PILOT TEST LAYOUT

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Date:	5/16/18
Designed:	EB
Drawn:	EB
Checked:	BR
DWG file:	6142-0993

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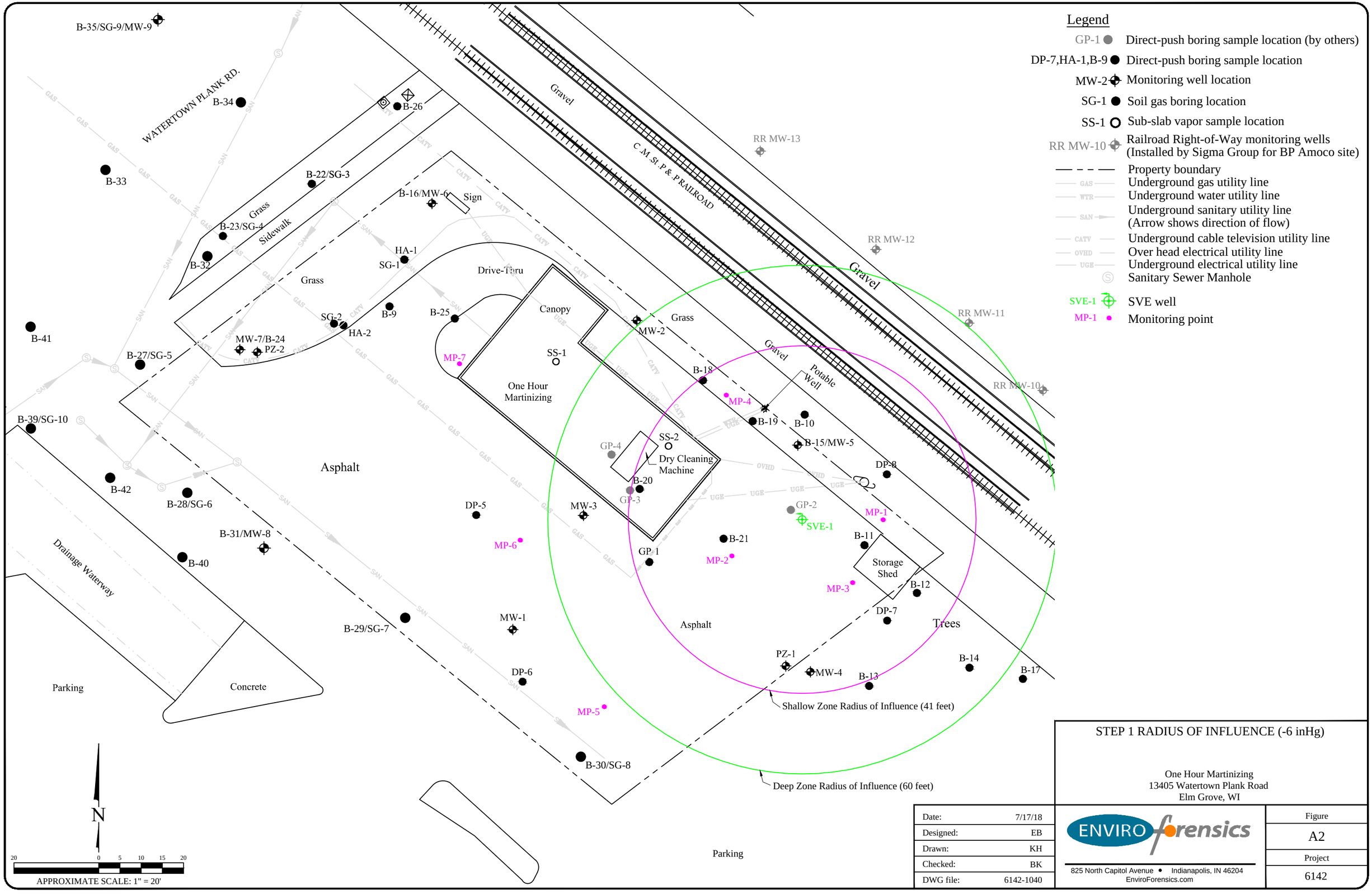
Figure
A1

Project
6142



STEP 1 RADIUS OF INFLUENCE (-6 inHg)

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Date:	7/17/18
Designed:	EB
Drawn:	KH
Checked:	BK
DWG file:	6142-1040

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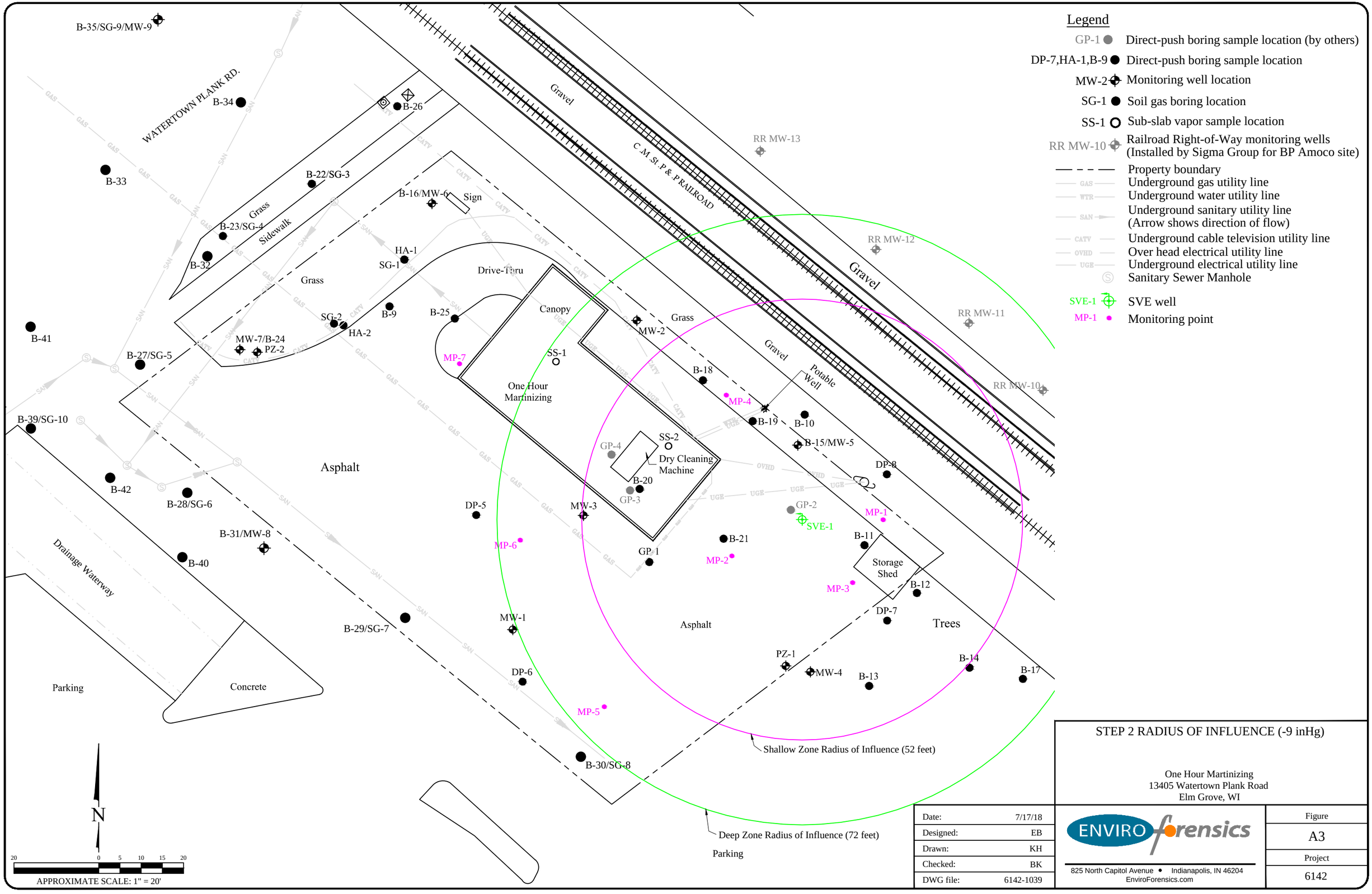
Figure
A2

Project
6142



Legend

- GP-1 — Direct-push boring sample location (by others)
- DP-7,HA-1,B-9 — Direct-push boring sample location
- MW-2 — Monitoring well location
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- CATV — Underground cable television utility line
- OVHD — Over head electrical utility line
- UGE — Underground electrical utility line
- Sanitary Sewer Manhole
- SVE-1 — SVE well
- MP-1 — Monitoring point

STEP 2 RADIUS OF INFLUENCE (-9 inHg)

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Date:	7/17/18
Designed:	EB
Drawn:	KH
Checked:	BK
DWG file:	6142-1039

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Figure: A3

Project: 6142

APPENDIX B

ERD APPLICATION DESIGN SUMMARY

REGENESIS

Project Information		
One Hour Martinizing		
Elm Grove, WI		
Area A ERD		
Prepared For:		
EFI		
Target Treatment Zone (TTZ) Info	**Unit**	**Value**
Treatment Area	ft^2	4,000
Top Treat Depth	ft	15.0
Bot Treat Depth	ft	25.0
Vertical Treatment Interval	ft	10.0
Treatment Zone Volume	ft^3	40,000
Treatment Zone Volume	cy	1,481
Soil Type	---	sand
Porosity	cm^3/cm^3	0.33
Effective Porosity	cm^3/cm^3	0.20
Treatment Zone Pore Volume	gals	98,743
Treatment Zone Effective Pore Volume	gals	59,844
Fraction Organic Carbon (foc)	g/g	0.002
Soil Weight	lbs	4.3E+06
Hydraulic Conductivity	ft/day	25.0
Hydraulic Conductivity	cm/sec	8.82E-03
Hydraulic Gradient	ft/ft	0.003
GW Velocity	ft/day	0.38
GW Velocity	ft/yr	137
Sources of 3-D Microemulsion Demand	**Unit**	**Value**
Dissolved Phase Mass	lbs	0
Sorbed Phase Contaminant Mass	lbs	1
Competing Electron Acceptor Mass	lbs	74
Stoichiometric 3DME Demand	**lbs**	**78**
TTZ Groundwater Mass Flux	L/day	1,062
CVOC Mass Flux through TTZ	lb/yr	0
CEA Mass Flux through TTZ	lb/yr	77
Total Mass Flux through TTZ	lb/yr	77
Total Mass Flux 3DME Demand	**lbs**	**240**
Application Dosing		
3-D Microemulsion to be Applied	**lbs**	**3,200**
CRS to be Applied	**lbs**	**1,600**
BDI Plus to be Applied	**liters**	**30**
HRC Primer to be Applied	**lbs**	**0**

3-D Microemulsion®, BDI® Plus, CRS® Application Design Summary

Area A ERD		Field App. Instructions
Application Method	**Direct Push**	
Spacing Within Rows (ft)	8	Spacing is approximate, may be modified in the field.
Spacing Between Rows (ft)	16	
Application Points	**30**	
Areal Extent (square ft)	4,000	
Top Application Depth (ft bgs)	15	**Field Mixing Ratios**
Bottom Application Depth (ft bgs)	25	3DME Concentrate per Pt (lbs)
3DME to be Applied (lbs)	**3,200**	107
3DME to be Applied (gals)	383	Mix Water per Pt (gals)
3DME Mix %	8%	147
Volume Water (gals)	**4,410**	3DME Mix Volume per Pt (gals)
3DME Mix Volume (gals)	4,793	160
CRS to be Applied (lbs)	**1,600**	CRS Volume per Pt (gals)
CRS Volume (gals)	183	6
BDI Plus to be Applied (L)	**30**	BDI Volume per Pt (L)
BDI Mix Water Volume (gals)	300	1.0
Total Application Volume (gals)	**5,284**	Volume per pt (gals)
Estimated Radius of Injection (ft)	4	176
Prepared by:	**Doug Davis-Sr. Design Specialist**	Volume per vertical ft (gals)
Date:	**3/13/2018**	18

Technical Notes/Discussion

Assumptions/Qualifications

In generating this preliminary estimate, Regenesis relied upon professional judgment and site specific information provided by others. Using this information as input, we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required to affect remediation of the site.

REGENESIS developed this Scope of Work in reliance upon the data and professional judgments provided by those whom completed the earlier environmental site assessment(s). The fees and charges associated with the Scope of Work were generated through REGENESIS' proprietary formulas and thus may not conform to billing guidelines, constraints or other limits on fees. REGENESIS does not seek reimbursement directly from any government agency or any governmental reimbursement fund (the "Government"). In any circumstance where REGENESIS may serve as a supplier or subcontractor to an entity which seeks reimbursement from the Government for all or part of the services performed or products provided by REGENESIS, it is the sole responsibility of the entity seeking reimbursement to ensure the Scope of Work and associated charges are in compliance with and acceptable to the Government prior to submission. When serving as a supplier or subcontractor to an entity which seeks reimbursement from the Government, REGENESIS does not knowingly present or cause to be presented any claim for payment to the Government.

REGENESIS

Project Information		
One Hour Martinizing		
Elm Grove, WI		
Area B ERD		
Prepared For:		
EFI		
Target Treatment Zone (TTZ) Info	**Unit**	**Value**
Treatment Area	ft^2	400
Top Treat Depth	ft	15.0
Bot Treat Depth	ft	25.0
Vertical Treatment Interval	ft	10.0
Treatment Zone Volume	ft^3	4,000
Treatment Zone Volume	cy	148
Soil Type	---	sand
Porosity	cm^3/cm^3	0.33
Effective Porosity	cm^3/cm^3	0.20
Treatment Zone Pore Volume	gals	9,874
Treatment Zone Effective Pore Volume	gals	5,984
Fraction Organic Carbon (foc)	g/g	0.002
Soil Weight	lbs	4.3E+05
Hydraulic Conductivity	ft/day	25.0
Hydraulic Conductivity	cm/sec	8.82E-03
Hydraulic Gradient	ft/ft	0.003
GW Velocity	ft/day	0.38
GW Velocity	ft/yr	137
Sources of 3-D Microemulsion Demand	**Unit**	**Value**
Dissolved Phase Mass	lbs	0
Sorbed Phase Contaminant Mass	lbs	0
Competing Electron Acceptor Mass	lbs	7
Stoichiometric 3DME Demand	**lbs**	**8**
TTZ Groundwater Mass Flux	L/day	425
CVOC Mass Flux through TTZ	lb/yr	0
CEA Mass Flux through TTZ	lb/yr	31
Total Mass Flux through TTZ	lb/yr	31
Total Mass Flux 3DME Demand	**lbs**	**96**
Application Dosing		
3-D Microemulsion to be Applied	**lbs**	**1,200**
CRS to be Applied	**lbs**	**400**
BDI Plus to be Applied	**liters**	**6**
HRC Primer to be Applied	**lbs**	**0**

3-D Microemulsion®, BDI® Plus, CRS® Application Design Summary

Area B ERD		Field App. Instructions
Application Method	**Direct Push**	
Spacing Within Rows (ft)	8	**Spacing is approximate, may be modified in the field. Three of the 6 borings will be angled.**
Spacing Between Rows (ft)	8	
Application Points	**6**	
Areal Extent (square ft)	400	
Top Application Depth (ft bgs)	15	**Field Mixing Ratios**
Bottom Application Depth (ft bgs)	25	3DME Concentrate per Pt (lbs)
3DME to be Applied (lbs)	**1,200**	200
3DME to be Applied (gals)	144	Mix Water per Pt (gals)
3DME Mix %	5%	455
Volume Water (gals)	**2,732**	3DME Mix Volume per Pt (gals)
3DME Mix Volume (gals)	2,876	479
CRS to be Applied (lbs)	**400**	CRS Volume per Pt (gals)
CRS Volume (gals)	46	8
BDI Plus to be Applied (L)	**6**	BDI Volume per Pt (L)
BDI Mix Water Volume (gals)	60	1.0
Total Application Volume (gals)	**2,983**	Volume per pt (gals)
Estimated Radius of Injection (ft)	7	497
Prepared by:	**Doug Davis-Sr. Design Special**	Volume per vertical ft (gals)
Date:	**3/13/2018**	50

Technical Notes/Discussion

Assumptions/Qualifications

In generating this preliminary estimate, Regenesis relied upon professional judgment and site specific information provided by others. Using this information as input, we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required to affect remediation of the site.

REGENESIS developed this Scope of Work in reliance upon the data and professional judgments provided by those whom completed the earlier environmental site assessment(s). The fees and charges associated with the Scope of Work were generated through REGENESIS' proprietary formulas and thus may not conform to billing guidelines, constraints or other limits on fees. REGENESIS does not seek reimbursement directly from any government agency or any governmental reimbursement fund (the "Government"). In any circumstance where REGENESIS may serve as a supplier or subcontractor to an entity which seeks reimbursement from the Government for all or part of the services performed or products provided by REGENESIS, it is the sole responsibility of the entity seeking reimbursement to ensure the Scope of Work and associated charges are in compliance with and acceptable to the Government prior to submission. When serving as a supplier or subcontractor to an entity which seeks reimbursement from the Government, REGENESIS does not knowingly present or cause to be presented any claim for payment to the Government.

APPENDIX C

SVE SYSTEM OPERATION, MAINTENANCE AND MONITORING PLAN

SOIL VAPOR EXTRACTION SYSTEM
OPERATION, MAINTENANCE, AND MONITORING PLAN

ONE HOUR MARTINIZING
13405 WATERTOWN PLANK ROAD
ELM GROVE, WISCONSIN 53122
WDNR BRRTS# 02-68-552102

December 3, 2018

Prepared For:

OHM Holdings LLC
W229N2494 County Road F
Waukesha, Wisconsin 53186

Prepared By:

EnviroForensics LLC
N16 W23390 Stone Ridge Drive, Suite G
Waukesha, WI 53188
Phone: (262) 290-4001
www.enviroforensics.com

Document: 6142-1083

TABLE OF CONTENTS

FIGURES

APPENDICES

1.0 INTRODUCTION

A soil vapor extraction (SVE) system has been installed at the One Hour Martinizing (OHM) facility located at 13405 Watertown Plank Road in Elm Grove, Wisconsin (Site). The system is designed to remove tetrachloroethene (PCE) and associated vapors from the vadose zone in the unconsolidated sediment. Proper operation and maintenance of the SVE system is necessary to document remedial progress and to optimize system performance. This Operation and Maintenance plan (O&M Plan) has been prepared in accordance with Wisconsin Administrative Code (WAC) Chapter NR 724.

1.1 Site Information and Contacts

Property Information:
County: Waukesha
PLSS Location: NE ¼ of NW ¼ of Sec. 25, T7N, R20E
WTM Coords: X=676485, Y=287358
Waukesha County Tax Key: EGV 1106973

Property Owner/Responsible Party Information:
Owner Name: OHM Properties 5, LLC
Address: W229N2494 Hwy F, Waukesha, WI 53186
Contacts: Brian Cass
Telephone: (262) 521-9710
E-mail Address: brian@ohmholdings.com

Consultant Information:
Company Name: EnviroForensics, LLC
Address: N16W23390 Stone Ridge Drive, Suite G, Waukesha, WI 53188
Contacts: Wayne Fassbender - Senior Project Manager/ Kyle Heimstead – Project Manager
Telephone: (262) 290-4001
E-mail Address: wfassbender@enviroforensics.com/ kheimstead@enviroforensics.com

WDNR Project Manager: Mr. Jim Delwiche
Address: 141 NW Barstow Street, Room 180, Waukesha, WI 53188
Telephone: (262) 574-2145
Email: jim.delwiche@Wisconsin.gov

2.0 SYSTEM DESCRIPTION

2.1 Extraction Wells and Conveyance Piping

The SVE system consists of four (4) extraction wells screened in unconsolidated sediment. Subsurface conveyance piping connects the extraction wells to a vacuum blower and associated equipment and controls housed inside a trailer-mounted enclosure positioned southeast of the Site building. The extraction wells are constructed of 4-inch diameter Schedule 40 PVC pipe and 0.020-inch slot Vee-Wire continuous wrap screen. The screened intervals of the SVE well are variable based on location and target treatment depths as follows:

Well ID	Screen Interval (feet bgs)
SVE-1	5.5 - 11.5
SVE-2	4.5 - 7
SVE-3	5.5 - 8
SVE-4	6 – 11

The extraction wells are connected to the SVE blower and associated equipment with individual conveyance lines. Conveyance piping for SVE-2 through SVE-4 consists of 4-inch diameter high-density polyethylene (HDPE) pipe installed by directional boring. The conveyance piping leading to SVE-1 is 4-inch diameter PVC that was installed in a trench and backfilled with compacted sand and gravel. The conveyance lines connect to a manifold mounted on the SVE equipment trailer. The extraction well locations and conveyance piping layout are depicted on **Figure 1**. Individual gate valves and pressure measurement ports are installed at each wellhead. The wellheads are protected at the surface with 24-inch square flush-mount vaults set in a concrete apron. SVE wellhead configurations diagrams are depicted on **Figures 2a through 2d**.

2.2 Mechanical Components

The mechanical system consists of the following components:

- 25 HP – 1,770 rpm electrical motor;
- Roots URAI 59 DSL positive displacement blower;
- Variable frequency drive (VFD);
- Human-machine interface (HMI)/Programmable logic controller (PLC) unit;
- 200-gallon air-water separator tank;
- 1.5 horsepower progressive cavity transfer pump;
- One (1) bag filter housing;
- One (1) granular activated carbon vessel for water treatment.

The components are contained in a trailer-mounted enclosure measuring approximately 10 feet long by 5 feet wide. The vacuum blower exhaust stack extends out the side of the enclosure to a height of 12 feet above ground surface. Exhaust samples are collected from a port in the stack downstream from the vacuum blower. A system process and instrumentation diagram is presented on **Figure 3**.

3.0 OPERATION AND MAINTENANCE

Operation and maintenance activities are conducted by EnviroForensics personnel to:

- Maximize system efficiency and contaminant mass removal rates;
- Maintain the mechanical equipment in good working order; and
- Collect data to track system performance and determine a timeframe for shutdown.

3.1 System Operation

The vacuum blower is controlled by a VFD mounted in the control cabinet. The VFD can be operated at a range from 30 to 60 hertz (Hz). Refer to the System Operation Manual located at the Site for detailed information on operating the VFD. The system controls are also accessible remotely via custom internet-based software. System equipment can be stopped and started, and operational parameters can be monitored and adjusted without visiting the Site.

The SVE system is designed to operate continuously. Any of the four (4) extraction well can be disconnected from service by closing the gate valve installed at the wellhead. This design allows the operators to target specific areas and/or depths as the remediation progresses to maximize efficiency. Operational changes are made as needed during the maintenance visits described below.

3.2 System Maintenance and Monitoring

Samples of the SVE system emissions are collected from a port in the exhaust stack downstream of the blower to calculate mass removal rates and cumulative mass removed; and to determine operational changes to optimize system performance. The samples are analyzed for VOCs by EPA test method TO-15. Performance monitoring is conducted in accordance with the following emissions testing schedule required under WAC Chapter 419.07:

- Once each day for the first 3 days of system operation;
- Weekly for the next 3 weeks; and
- Monthly thereafter.

Long-term maintenance activities will be performed monthly and include the following:

- Adjusting the operational configuration of the system (i.e., open or close wellhead valves);
- Addressing system shutdowns or operational issues;
- Inspection and replacement of the inlet air filter;
- Inspection and replacement of the bag filter;
- Manage disposal of water;
- Routine maintenance of the vacuum pump in accordance with manufacturer recommendations, including oil replacement; and
- Recording operational parameters according to the table below:

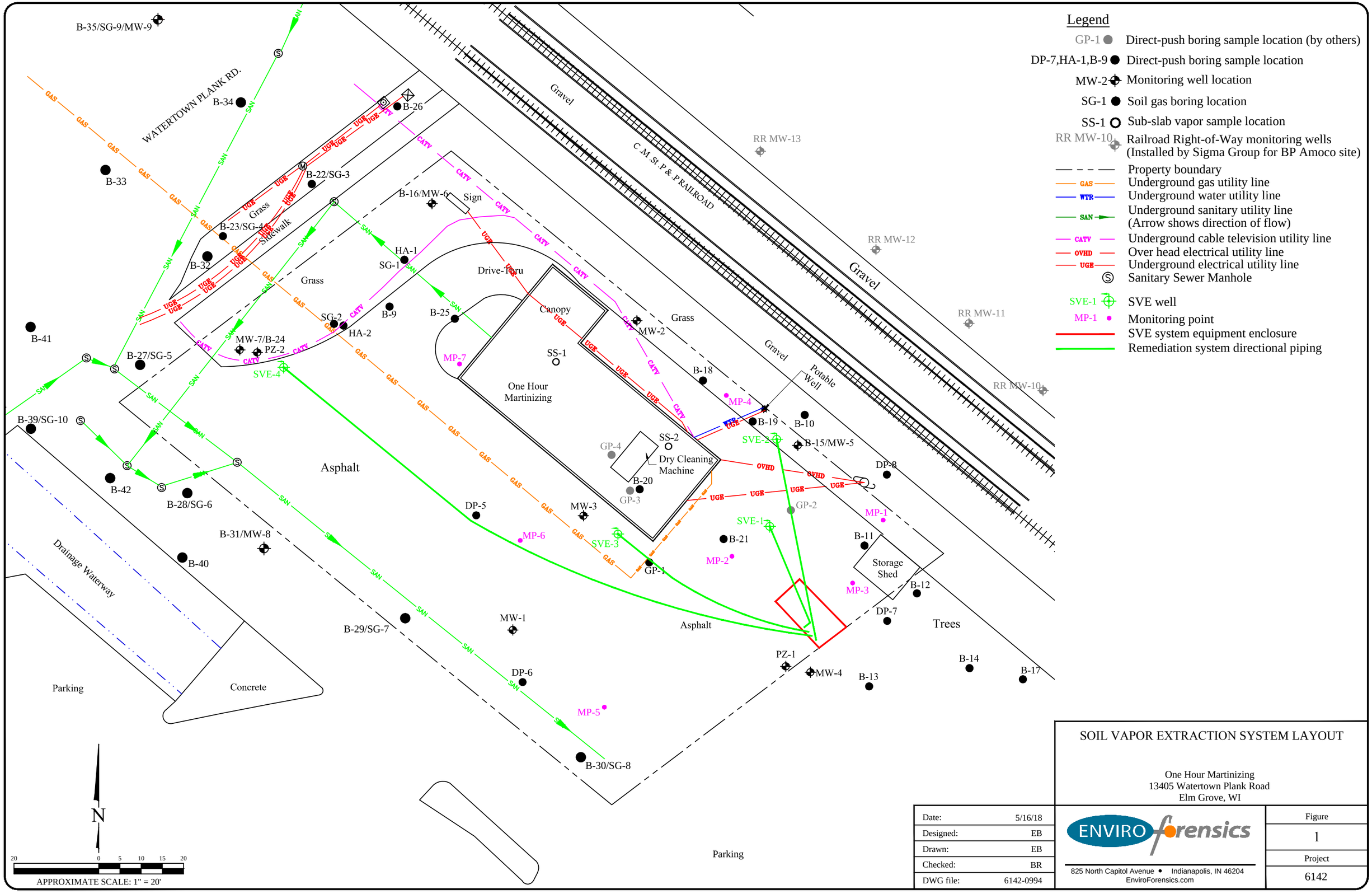
Parameter	Method	Frequency
Effluent VOC vapor concentration;	1-liter vacuum canister sample	Monthly
System runtime;	VFD reading	Monthly
System vacuum (max 12 in Hg);	Gauge reading	Monthly
Pre- and post-inlet filter vacuums	Gauge readings	Monthly
Flow rate;	Gauge reading	Monthly
Exhaust temperature (max 180ºF);	Gauge Reading	Monthly
Wellhead vacuum;	Hand-held digital manometer	As needed
Vacuum at monitoring points;	Hand-held digital manometer	As needed

O&M information is recorded on the log presented in **Appendix A**. SVE wellhead and monitoring point locations are depicted on **Figure 1**.

4.0 REPORTING

Semi-annual remediation progress reports will be submitted to WDNR, as required, using the Remediation Site Operation, Maintenance, Monitoring & Optimization Report (WDNR Form 4400-194). The reports will include information on operational configuration during the reporting period, figures, tables, and graphs showing time versus contaminant removal and cumulative contaminant removal. The reporting periods each year are from January 1 to June 30 and July 1 to December 31. The deadline for submittal of progress reports is 30 days after the end of each reporting period.

FIGURES



Legend

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- CATV — Underground cable television utility line
- OVHD — Over head electrical utility line
- UGE — Underground electrical utility line
- Sanitary Sewer Manhole
- SVE-1 — SVE well
- MP-1 — Monitoring point
- SVE system equipment enclosure
- Remediation system directional piping

SOIL VAPOR EXTRACTION SYSTEM LAYOUT

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Date:	5/16/18
Designed:	EB
Drawn:	EB
Checked:	BR
DWG file:	6142-0994

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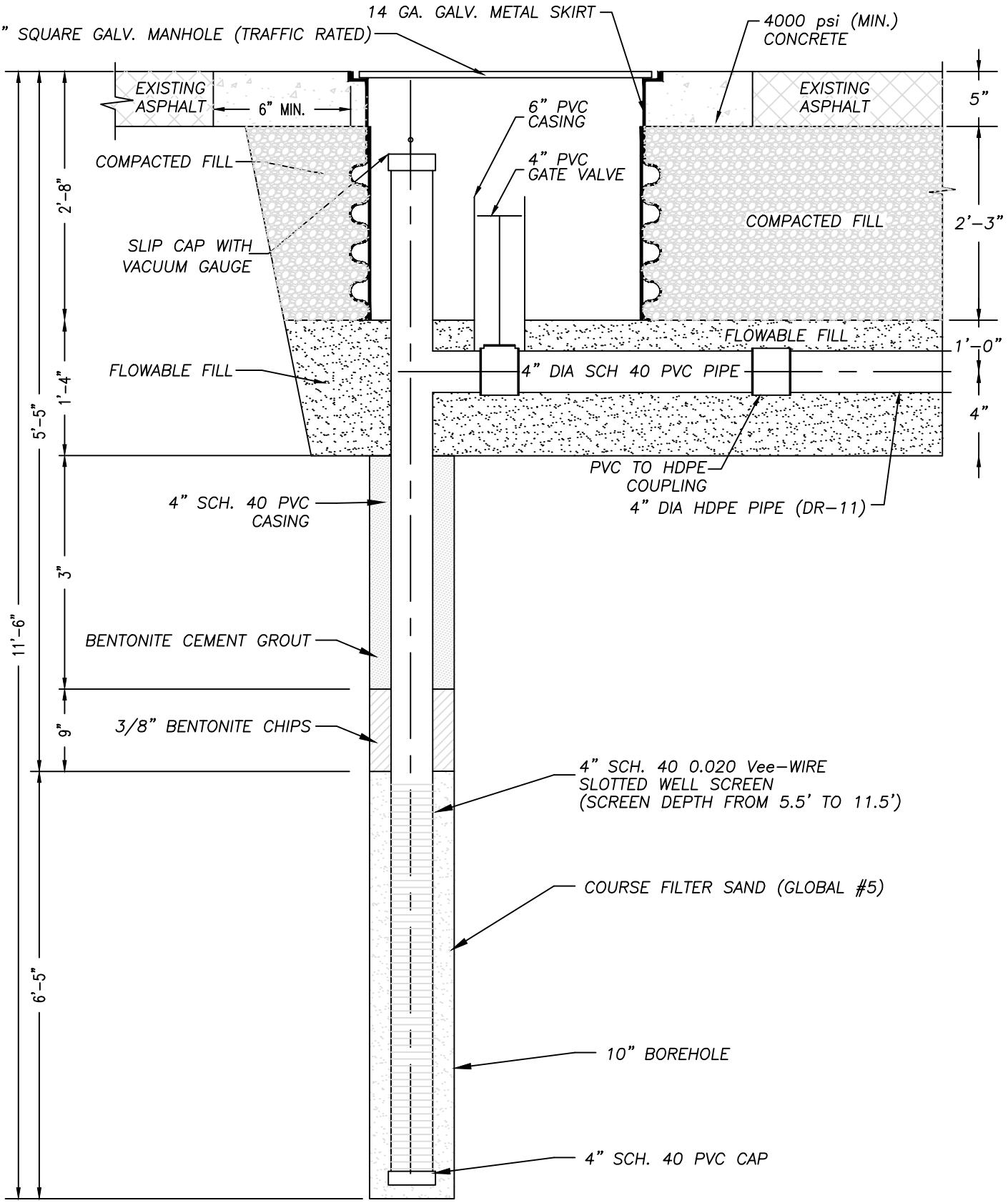
Figure	1
Project	6142



No.	Date	Revision	Approved

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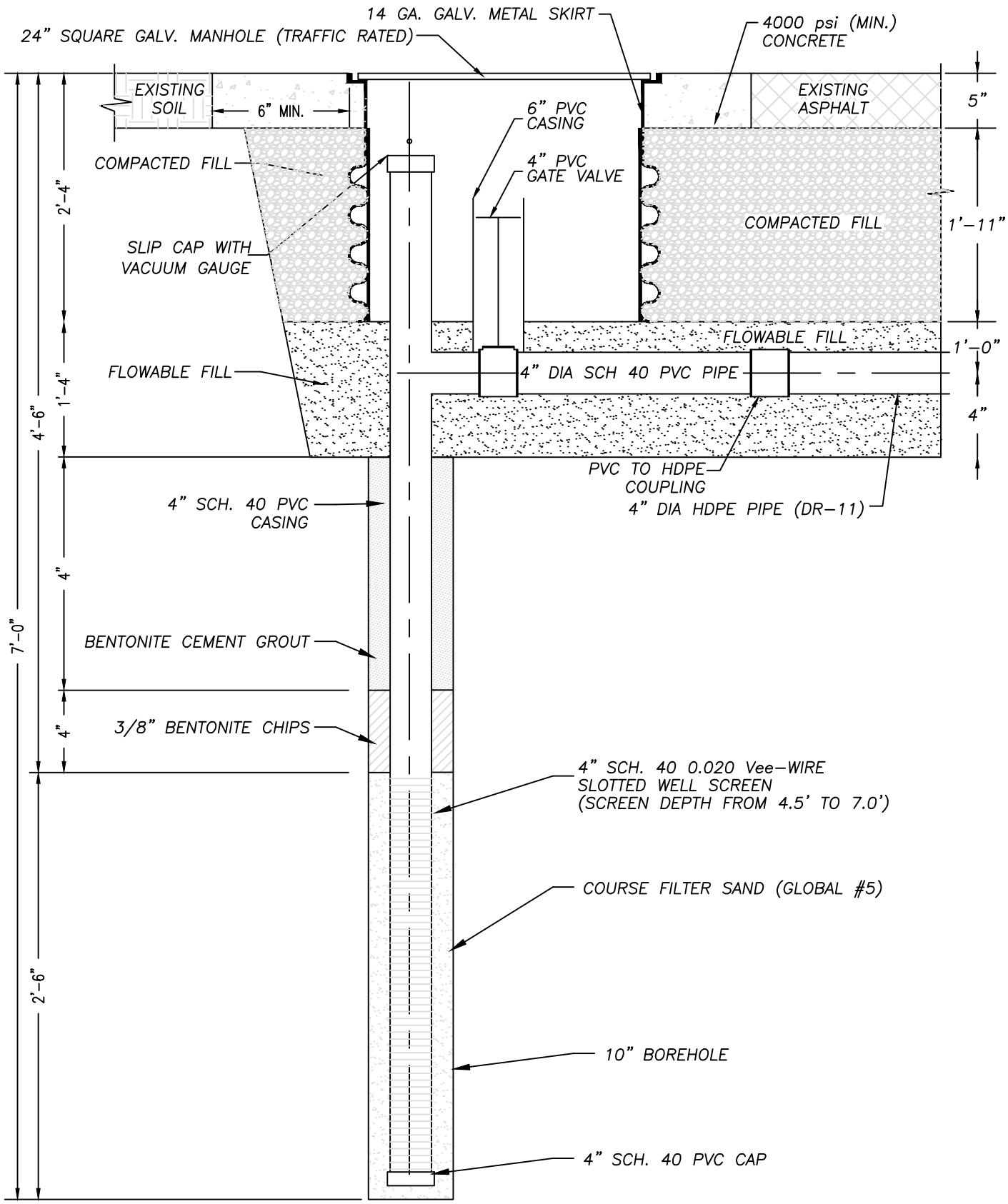
Date:	7/31/18
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file:	6142-0997

SVE-1 CONSTRUCTION DIAGRAM

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Figure
2a
Project
6142



No.	Date	Revision	Approved

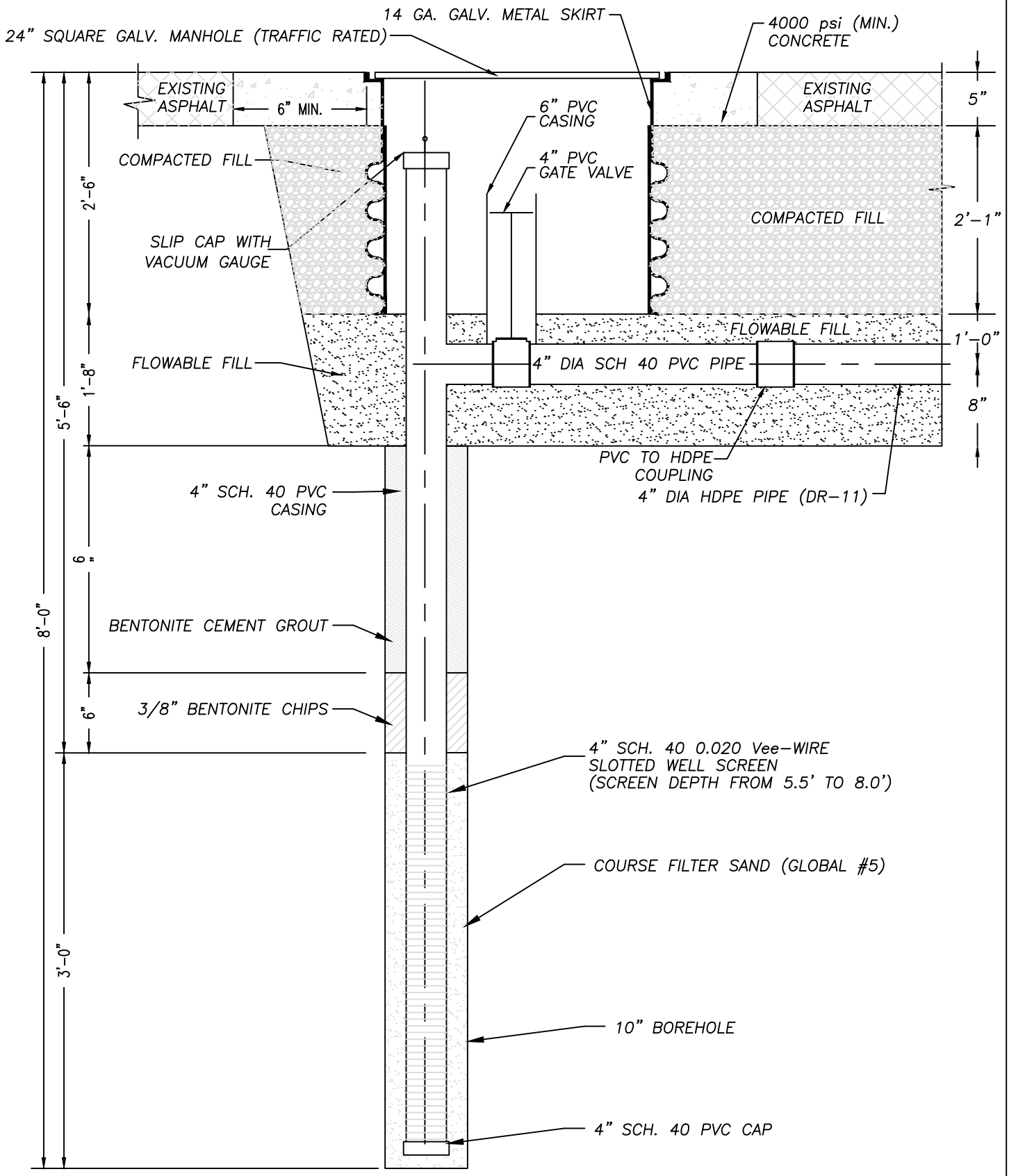
ENVIRO forensics
825 North Capitol Avenue • Indianapolis, IN 46204
EnviroForensics.com

Date:	7/31/18
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file:	6142-0997

SVE-2 CONSTRUCTION DIAGRAM

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Figure
2b
Project
6142



No.	Date	Revision	Approved

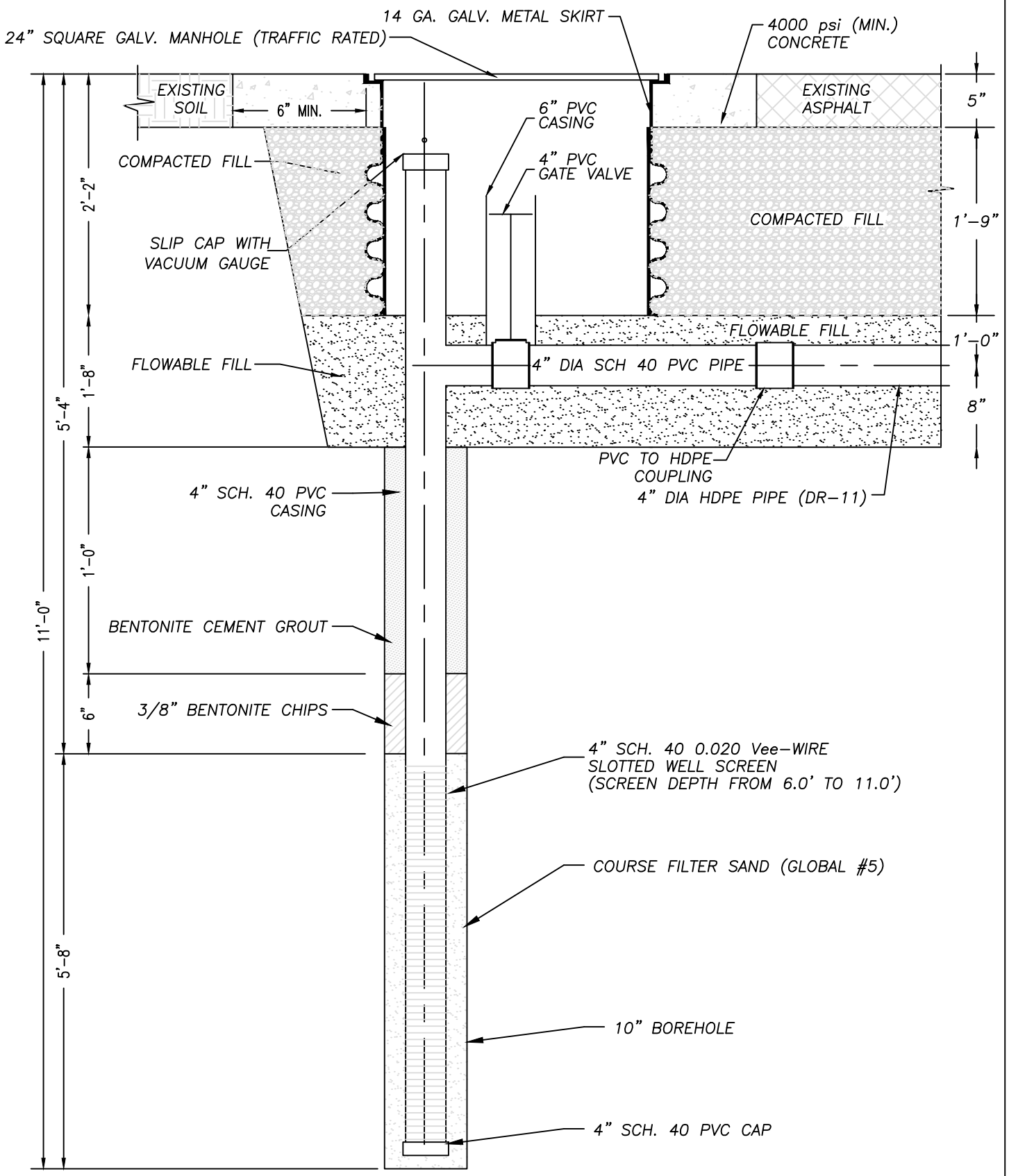
ENVIRO forensics
825 North Capitol Avenue • Indianapolis, IN 46204
EnviroForensics.com

Date:	7/31/18
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file:	6142-0997

SVE-3 CONSTRUCTION DIAGRAM

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Figure
2c
Project
6142



No.	Date	Revision	Approved

ENVIRO forensics
825 North Capitol Avenue • Indianapolis, IN 46204
EnviroForensics.com

Date:	7/31/18
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file:	6142-0997

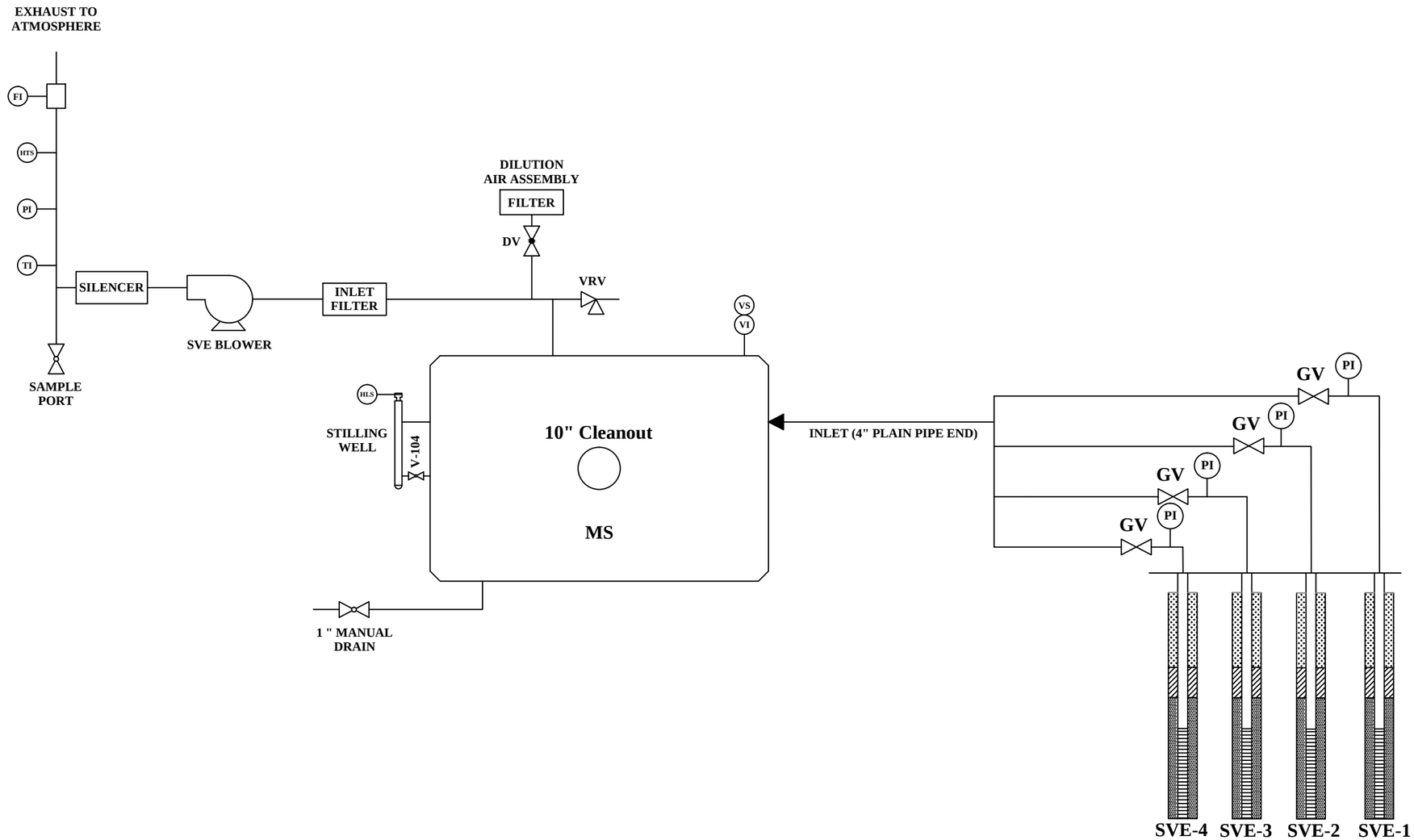
SVE-4 CONSTRUCTION DIAGRAM

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Figure
2d
Project
6142

Legend

FI - Flow Indicator
PI - Pressure Indicator
TI - Temperature Indicator
VI - Vacuum Indicator
DV - Dilution Valve
GV - Gate Valve
VRV - Vacuum Relief Valve
HLS - High Level Switch
HTS - High Temperature Switch
VS - Vacuum Switch
MS - Moisture Separator



SVE SYSTEM PROCESS AND INSTRUMENTATION DIAGRAM

One Hour Martinizing
13405 Watertown Plank Road
Elm Grove, WI

Date:	5/16/18
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file:	6142-0998

ENVIRO forensics
825 North Capitol Avenue • Indianapolis, IN 46204
EnviroForensics.com

Figure 3

Project 6142

APPENDIX A

SVE System Operation and Maintenance Log

SVE SYSTEM OPERATION, MAINTENANCE, AND MONITORING LOG

One Hour Martinizing
13405 Watertown Plank Road, Elm Grove, Wisconsin

Date: _____ System Status: _____ Why: _____

SVE SYSTEM STATUS - IN AMBIENT TEMP. AND WEATHER:

Time	System Runtime (hours)	VFD Setting (Hz)	System Vac (inHg)	Effluent Flow (scfm)	Effluent Air Temp (°F)	Effluent Pressure (psi)	Dilution (0-100 %)

EXTRACTION POINTS (inHg)

SVE-1		SVE-3	
SVE-2		SVE-4	

SYSTEM MONITORING POINTS (inH_20)

MP-1s		MP-4s		MP-7s		SS-1	
MP-1i		MP-4i		MP-7i		SS-2	
MP-1d		MP-4d		MP-7d			
MP-2s		MP-5s					
MP-2i		MP-5i		MW-1			
MP-2d		MP-5d		MW-2			
MP-3s		MP-6s		MW-3			
MP-3i		MP-6i		MW-4			
MP-3d		MP-6d		MW-5			

SVE SYSTEM INSPECTION

Pre-Filter Vac (inHg)	Post-Filter Vac (inHg)	Motor Grease C-Checked / R-Replaced	Blower Gear Oil C-Checked / R-Replaced	Inlet Air Filter C-Checked / R-Replaced	Dilution Air Filter C-Checked / R-Replaced	Trailer Secure and Clean?	Water Volume (Gallons)

SAMPLE COLLECTION

Sample Location: _____ System Runtime at Time of Sample: _____

Sample ID: _____

Canister ID: _____ Flow Controller ID: _____

Pressure: Initial: _____ Time: Initial: _____

Final: _____ Final: _____

SVE SYSTEM STATUS - OUT AMBIENT TEMP. AND WEATHER:

Time	System Runtime (hours)	VFD Setting (Hz)	System Vac (inHg)	Effluent Flow (scfm)	Effluent Air Temp (°F)	Effluent Pressure (psi)	Dilution (0-100 %)

Notes

APPENDIX D

SVE SYSTEM COMMISSIONING LABORATORY REPORT

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Mr. Kyle Vander Heiden
Enviroforensics
N16 W. 23390 Stone Ridge Dr
Suite G
Waukesha, WI 53188

November 21, 2018

EnvisionAir Project Number: 2018-683
Client Project Name: 6142

Dear Mr. Vander Heiden,

Please find the attached analytical report for the samples received November 13, 2018. All test methods performed were fully compliant with local, state, and federal EPA methods unless otherwise noted. The project was analyzed as requested on the enclosed chain of custody record. Please review the comments section for additional information about your results or Quality Control data.

Feel free to contact me if you have any questions or comments regarding your analytical report or service.

Thank you for your business. EnvisionAir looks forward to working with you on your next project.

Yours Sincerely,

Stanley A Hunnicutt

Project Manager
EnvisionAir, LLC

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6142

Client Project Manager: KYLE VANDER HEIDEN

EnvisionAir Project Number: 2018-683

Sample Summary

Canister Pressure / Vacuum

Laboratory Sample Number:	Sample Description:	Matrix:	START Date Collected:	START Time Collected:	End Date Collected:	End Time Collected:	Date Received:	Time Received	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)
18-2749	6142-OA-N	A	11/7/18	11:15	11/8/18	9:50	11/13/18	11:00	-29	0	0
18-2750	6142-OA-E	A	11/7/18	11:20	11/8/18	9:50	11/13/18	11:00	-30	-3	-3
18-2751	6142-SVE-EX	A	11/7/18	12:12	11/8/18	12:17	11/13/18	11:00	-27	-2	-2
18-2752	6142-SVE-EX	A	11/8/18	13:15	11/8/18	13:21	11/13/18	11:00	-30	-2	-2

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6142

Client Project Manager: KYLE VANDER HEIDEN

EnvisionAir Project Number: 2018-683

Analytical Method: TO-15
Analytical Batch: 111818AIR

Client Sample ID: 6142-OA-N
Envision Sample Number: 18-2749
Sample Matrix: AIR

Sample Collection START Date/Time: 11/7/18 11:15
Sample Collection END Date/Time: 11/8/18 9:50
Sample Received Date/Time: 11/13/18 11:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	89%		
Analysis Date/Time:	11-18-18/21:36		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6142

Client Project Manager: KYLE VANDER HEIDEN

EnvisionAir Project Number: 2018-683

Analytical Method: TO-15
Analytical Batch: 111818AIR

Client Sample ID: 6142-OA-E
Envision Sample Number: 18-2750
Sample Matrix: AIR

Sample Collection START Date/Time: 11/7/18 11:20
Sample Collection END Date/Time: 11/8/18 9:50
Sample Received Date/Time: 11/13/18 11:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 19.8	19.8	
Tetrachloroethene	< 3.19	3.19	
trans-1,2-Dichloroethene	< 39.6	39.6	
Trichloroethene	< 1.07	1.07	
Vinyl Chloride	< 1.28	1.28	
4-bromofluorobenzene (surrogate)	83%		
Analysis Date/Time:	11-18-18/22:43		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6142

Client Project Manager: KYLE VANDER HEIDEN

EnvisionAir Project Number: 2018-683

Analytical Method: TO-15
Analytical Batch: 111818AIR

Client Sample ID: 6142-SVE-EX
Envision Sample Number: 18-2751
Sample Matrix: AIR

Sample Collection START Date/Time: 11/7/18 12:12
Sample Collection END Date/Time: 11/8/18 12:17
Sample Received Date/Time: 11/13/18 11:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	**2,650**	793	1
Tetrachloroethene	**7,980**	1280	2
trans-1,2-Dichloroethene	< 396	396	
Trichloroethene	**345**	10.7	
Vinyl Chloride	**96.1**	12.8	
4-bromofluorobenzene (surrogate)	97%		
Analysis Date/Time:	11-19-18/01:37		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6142

Client Project Manager: KYLE VANDER HEIDEN

EnvisionAir Project Number: 2018-683

Analytical Method: TO-15
Analytical Batch: 111818AIR

Client Sample ID: 6142-SVE-EX
Envision Sample Number: 18-2752
Sample Matrix: AIR

Sample Collection START Date/Time: 11/8/18 13:15
Sample Collection END Date/Time: 11/8/18 13:21
Sample Received Date/Time: 11/13/18 11:00

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	**620**	793	1,3
Tetrachloroethene	**8,680**	1280	2
trans-1,2-Dichloroethene	< 396	396	
Trichloroethene	**406**	10.7	
Vinyl Chloride	**65.7**	12.8	
4-bromofluorobenzene (surrogate)	90%		
Analysis Date/Time:	11-19-18/03:18		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 111818AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	87%		
Analysis Date/Time:	11-18-18/21:01		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	8.64	8.88	10	86%	89%	2.7%	
trans-1,2-Dichloroethene	10.2	10.9	10	102%	109%	6.6%	
cis-1,2-Dichloroethene	10.1	10.8	10	101%	108%	6.7%	
Trichloroethene	11.2	11.4	10	112%	114%	1.8%	
Tetrachloroethene	10.5	11.3	10	105%	113%	7.3%	
4-bromofluorobenzene (surrogate)	102%	107%					
Analysis Date/Time:	11-18-18/20:27	11-18-18/22:13					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Flag Number	Comments
1	Reported value is from a 40x dilution. TJG 11/20/18
2	Reported value is from a 400x dilution. TJG 11/20/18
3	Reported value is below the reporting limit but above the MDL. TJG 11/20/18

EnvisionAir Proj#: 2018-683 Page 1 of 1 KH

CHAIN OF CUSTODY RECORD

EnvisionAir | 1441 Sadlier Circle West Drive | Indianapolis, IN 46239 | Phone: (317) 351-0885 | Fax: (317) 351-0882

Client: EnviroForensics, LLC	P.O. Number: 2018-1413
Report Address: N16 W23390 Stone Ridge Dr Suite G Waukesha, WI 53188	Project Name or Number: 6142
Report To: K. VanderHeiden	Sampled by: K. VanderHeiden
Phone: 262-290-4001	QA/QC Required: (circle if applicable) Level III Level IV
Invoice Address:	Reporting Units needed: (circle) ug/m³ mg/m³ PPBV PPMV
Desired TAT: (Please Circle One) 1 day 2 days 3 days Std (5 bus. days)	Media type: 1LC = 1 Liter Canister, 6LC = 6 Liter Canister, TB = Tedlar Bag, TD = Thermal Desorption Tube

REQUESTED PARAMETERS

TO-15 Full List

TO-15 Short List

ENVISIONAIR

Sampling Type:
Soil-Gas: ☒
Sub-Slab: ☐
Indoor-Air: ☒ OA

www.envision-air.com

Canister Pressure / Vacuum

Air Sample ID	Media Type (see code above)	Coll. Date (Grab/Comp Start)	Coll. Time (Grab/Comp Start)	Coll. Date (Comp. End)	Coll. Time (Comp. End)					Canister Serial #	Flow Controller Serial #	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)	EnvisionAir Sample Number
6142-OA-N	6LC	11/7/18	1115	11/8/18	0950		x			4687	07460	-29	0	Ø	18-2749
6142-OA-E	6LC	11/7/18	1120	11/8/18	0950		x			16088	07304	-30	-3	-3	18-2750
6142-SVE-Ex	1LC	11/7/18	1217	11/7/18	1217		x			83729	0055	-27	-2	-2	18-2751
6142-SVE-Ex	1LC	11/8/18	1315	11/8/18	1321		x			83920	0089	-30	-2	-2	18-2752

Comments:

Relinquished by:	Date	Time	Received by:	Date	Time
	11/9/18		FedEx		
			Stan Hunnicutt	11/13/18	1100

APPENDIX E

WDNR APPROVAL LETTERS

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
101 S. Webster Street
Box 7921
Madison WI 53707-7921

Scott Walker, Governor
Daniel L. Meyer, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

May 24, 2018

Mr. Brian Cass
W229 N2494 County Highway F
Waukesha, WI 53186

Subject: Temporary Injection Exemption Request for OHM Holdings - Elm Grove, 13405 Watertown Plank Rd. Elm Grove, WI 532102
13405 Watertown Plank Rd, WI 53122
BRRTS #: 02-68-552102
FID #: 268104540

Dear Mr. Cass:

The purpose of this letter is to provide a temporary exemption for the injection of a remedial material into the soils and groundwater. On April 16, 2018, the Wisconsin Department of Natural Resources (WDNR) received a request for a temporary exemption for the enhanced reductive dechlorination (ERD) of a combined product of 3-D Macroemulsion® (electron donor emulsion), Chemical reducing solution® (CRS) - an iron-based reagent, and Bio-Dechlor Inoculum Plus® (BDJ) - a microbial consortium containing species of Dehalococcoides at the OHM Holdings - Elm Grove, 13405 Watertown Plank Rd. Elm Grove, WI 53122. The request was submitted by EnviroForensics, LLC the project's environmental consultant, on behalf of the OHM Holdings - Elm Grove, 13405 Watertown Plank Rd. Elm Grove, WI 53122.

The submittal included a $700 review fee for Technical Assistance. EnviroForensics, LLC also made a request for a Wisconsin Pollutant Discharge Elimination System (WPDES) General Permit for contaminated groundwater for remedial action operations at the site. A WDNR injection approval and a WPDES permit are required prior to the injection of remedial materials into the subsurface. This temporary exemption provides assurance to the Village of Elm Grove that the proposed injection of ERD and combined products to be injected in the soils and groundwater proposed for the environmental cleanup conforms to s. 292.12, Wis. Stats.

EnviroForensics, LLC has proposed a developed injection design that is based on the groundwater volatile organic compounds (VOCs) and the hydrogeological properties of the site aquifer. 3-D Macroemulsion and CRS will be mixed in one solution and they will inject approximately 166 gallons into each of the 30 injection points shown in Figure 1 of this request. Next, BDI will be mixed in a separate solution and 10 gallons will be injected in each of the 6 injections points. The injection points are shown in Figure 1 of this submittal. All products will be mixed with potable water to the desired solution concentration. A total volume of 8,262 gallons solution will be injected. This means that 5,230 gallons solution will be injected in Area A and 2,892 gallons will be injected in Area B. Solution mixing will be done in large trailer-mounted tanks that will be agitated continuously. The solution will be pumped from the tanks through a manifold to the injection points via a hose. Pressure and flow rate will be monitored and recorded to make sure that the design parameters are met. Injection will be done using direct-push rods that have retractable screen injection tools.

Determination on the NR 812 Wis. Adm. Code Injection Prohibitions:

The injection prohibition under s. NR 812.05, Wis. Adm. Code, is not applicable in this case because the proposed action is a WDNR-approved activity necessary for the remediation of soils and groundwater. This letter serves as your approval from the WDNR for the ERD injection and combined products at the OHM Holdings - Elm Grove, 13405 Watertown Plank Rd. Elm Grove, WI 53122.

NR 140 Wis. Adm. Code Temporary Exemptions:

The WDNR approval is hereby granted to EnviroForensics, LLC for the ERD injection and combined products at the OHM Holdings - Elm Grove, 13405 Watertown Plank Rd. Elm Grove, WI 53122 with certain terms and conditions. The expiration date of this temporary exemption must be less than 2-years, per NR 140.28(5)(e) (1). from the date of this letter.

The need to obtain a temporary exemption for the injection of a remedial material for which a groundwater quality standard has not been established is required under s. NR 140.28 (1) (d), Wis. Adm. Code. Based on the information provided by your consultant, it appears the requirements for a temporary exemption for the injection of a remedial material for which a groundwater quality has not been established under s. NR 140.28 (I) (d) have been or will be met in accordance with s. NR 140.28 (5) (c) and (d), Wis. Adm. Code.

Department approval is granted with the following terms and conditions:

A. General:

The remedial action for restoring contaminated groundwater or soil, and any infiltrated or injected contaminated water and remedial materials, shall achieve the applicable response objectives required by s. NR 140.24 (2) or s. NR 140.26(2), Wis. Adm. Code, within reasonable period.

1. The type, concentration and volume of substances or remedial material to be infiltrated or injected shall be minimized to the extent that is necessary for restoration of contaminated groundwater.
2. Any infiltration or injection of contaminated water or remedial material into the groundwater shall not significantly increase the threat to public health, or welfare, or to the environment.
3. No uncontaminated or contaminated groundwater, substance or remedial material shall be infiltrated or injected into an area where a floating non-aqueous liquid is present in the contaminated groundwater.
4. There shall be no expansion of soil or groundwater contamination, or migration of an infiltrated or injected contaminated water or remedial material, beyond the edge of previously contaminated areas, except that infiltration or injection into previously uncontaminated areas may be allowed if the Department determines that expansion into adjacent, previously uncontaminated areas is necessary for the restoration of the contaminated groundwater, and the requirements of s. NR 140.18 (1), Wis. Adm. Code will be met.
5. All necessary federal, state and local licenses, permits and other approvals are obtained and compliance with all applicable environmental protection requirements is required. A WPDES general permit for Discharge of Contaminated Groundwater from remedial action operation is required for this action.

B. Specific:

6. The remedial materials to be injected to the soils and groundwater shall be limited to the treatment of CVOCs.
7. The remedial material and injection project shall be as described in EnviroForensics, LLC's request.
8. EnviroForensics, LLC will notify the Southeast Region WDNR Project Manager, Jim Delwiche of field activities, no less than one (1) week before starting the injection.
9. Include soil vapor screening, using a PID, as a best management practice as part of the monitoring plan.

11. Remediation progress reports shall be submitted semi-annually, and shall include the groundwater monitoring results. The first report should be submitted not more than three months after the first injection. Recommendations as to the next phase of sampling and/or the need for additional treatment shall be included in a future report. This report shall be submitted prior to the expiration date of this temporary approval.
12. Any significant changes to the injection process, based on information from the injection groundwater monitoring reports or results, shall be submitted to the WDNR for approval prior to the changes being implemented to the injection and treatment of CVOCs in the groundwater and soils at the OHM Holdings – Elm Grove. 13405, Watertown Plank, WI 53122. This includes, but is not limited to adjustments to the volume/mass of the media injected.
13. Modifications to the sampling schedule may be requested.
14. The responsible party may apply to the WDNR for an extension of this approval in the event that future injection/delivery activities are required, and the WDNR must receive any extension request before the expiration date of this approval.
15. The WDNR will review all permit extension requests, site-specific data and or any other necessary information.
16. Upon completion of the project, the placement monitoring wells must be abandoned in accordance with s. NR 141.25, Wis. Adm. Code, and later topped off with grout or native soils if settling occurs, unless converted to NR 141 complying monitoring wells, or through an alternative approved by the WDNR Project Manager.

Monitoring Conditions:

In addition to your plan, it is your responsibility to meet all the following approval conditions during your proposed injection procedures at this site. The conditions are:

1. Maintain and follow the Site-Specific Health and Safety Plan in accordance with the Occupation Safety and Health Administration (OSHA) and the United States Environmental Protection Agency (USEPA) health and safety standards for hazardous waste workers.
2. If a chlorinated water source (i.e. municipal water) is used as the make-up water, it shall be filtered through an activated carbon filter or method proposed in your report to remove chlorine.
3. Record the start and stop times and the actual volume of the enhanced treatment of CVOCs injected into each injection or delivered to each placement monitoring well.
4. Monitor the ambient air in and around the work area during the proposed enhanced treatment of CVOCs injection process using in-situ blending methods.
5. Monitor the headspace of all injection points prior to the proposed treatment of CVOCs, using in-situ blending methods.
6. Monitor the headspace of all groundwater monitoring wells prior to each groundwater monitoring event.
7. Conduct vapor monitoring at the closest proposed monitoring locations, including a measurement of percent (%) LEL every 15 minutes during the first hour of each infiltration event.
8. Immediately notify the WDNR if any new groundwater quality enforcement standards are exceeded during monitoring.
9. Notify digger's hotline and all owners of utility lines if your project requires notification. Also, notify the local fire department prior to injection activities, and ensure that any representatives of these entities be allowed to observe the injection activities as needed. After completing the injection, sample all monitoring wells for applicable parameters quarterly.
10. Ensure that the injection is performed at less than 100 psi or at a reasonable psi which minimizes solution mounding in the aquifer, and plume disfigurement.
11. Maintain a log of all field monitoring results and injection/delivering activities.

12. Document and report all project activities and all test results to the WDNR within 60 days of completing the injection activities.

Failure to adhere to the provisions of this temporary exemption may result in WDNR requiring revisions to the remedial action design, operation or monitoring procedures, or the revocation of this exemption and the implementation of an alternative remedial action to restore soil or groundwater quality, or both.

WPDES Permit:

Your proposed discharge is eligible for coverage under the general Wisconsin Pollutant Discharge Elimination System (WPDES) permit WI-0046566-06 for Discharge of Contaminated Groundwater from Remedial Action Operations. You are responsible for compliance with the conditions contained in this permit. The permit and an accompanying facts sheet can be downloaded from the WDNR website at http://dnr.wi.gov/topic/wastewater/GeneralPermits.html. The amended water will be injected into the groundwater. No pollutants shall be injected into the groundwater.

Discharges under this permit are required to be consistent with a discharge management plan that has been approved by the WDNR. Your plan, EnviroForensics, LLC's April 10, 2018 request will be considered as the required discharge management plan, which specifies analytical sampling of the discharge for CVOCs treatment will be provided by injection/delivering of the proposed in-situ enhanced reductive dechlorination using in-situ blending methods to soil and groundwater. The facility must immediately notify the WDNR if any treated groundwater will be discharged to surface water. Any significant system changes will require WDNR approval.

The WDNR hereby authorizes your pollutant discharge under the general WPDES permit for Discharge of Contaminated Groundwater from Remedial Action Operations (WI-0046566-06) that was granted on April 12, 2018. The following conditions are highlighted for your information:

Section 283.35, Wisconsin Statutes, authorizes the WDNR to issue general permits for discharges from categories or classes of point sources. If a permittee believes coverage of a facility under a general WPDES permit is not appropriate, the permittee may apply for issuance of an individual WPDES permit pursuant to section 283.35 (2) and may petition the WDNR for withdrawal of coverage under the general permit. The individual permit application should indicate which site-specific factors would justify alternate WPDES limits for the operation, issuance of such a site specific WPDES permit will provide for a 30-day public comment period, and potentially a public informational hearing and/or an adjudicatory hearing. The WDNR may withdraw a facility from coverage under a general permit if it is determined that a discharge is a significant contributor of pollutants to waters of Wisconsin, or in certain other cases set out in s. 283.35, Stats. In lieu of general permit withdrawal, the WDNR may refer any violation of this permit to the Department of Justice for enforcement under s. 283.89, Stats. In order to avoid any enforcement action, please read the WPDES permit carefully and comply with the permit requirements.

If you believe you have a right to challenge the WDNR's decision to cover this facility with a WPDES general permit, you should know that Wisconsin statutes and administrative rules establish time periods within which requests to review WDNR decisions must be filed. To request a contested case hearing pursuant to section 227.42, Wis. Stats., you have 30 days after the decision is mailed, or otherwise served by the WDNR, to serve a petition for hearing on the Secretary of the Department of Natural Resources. Such a petition should identify pollutant(s) that are believed to be not appropriately regulated by the general permit for the specific site. All requests for contested case hearings must be made in accordance with section NR 2.05 (5), Wis. Adm. Code, and served on the Secretary in accordance with section NR 2.03, Wis. Adm. Code. The filing of a request for a contested case hearing is not a prerequisite for judicial review and does not extend the time for filing a petition for judicial review.

For judicial review of a decision pursuant to sections 227.52 and 227.53, Wis. Stats., you have 30 days after the decision is mailed, or otherwise served by the WDNR, to file your petition with the appropriate circuit court and serve the petition on the WDNR. A petition for judicial review must name the Department of Natural Resources as the respondent.

If you have any questions regarding this letter, please contact me either at 414-263-8607 or by e-mail: Binyoti.Amungwafor@Wisconsin.gov.

Sincerely,

Binyoti F. Amungwafor
Hydrogeologist
Remediation & Redevelopment Program

Cc: Mr. Kyle Hempstead, EnviroForensics, LLC
Mr. Jim Delwiche- RR/SER
Mr. Karl Knutson, Wastewater Specialist/WI-DNR SER General Wastewater Permits
Mr. Brian Austin, WDNR DG/5
Mr. Bill Phelps, WDNR DG/5
Case File #: 268104540

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
2300 N. Dr. Martin Luther King Jr. Drive
Milwaukee WI 53212-3128

Scott Walker, Governor
Daniel L. Meyer, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

April 12, 2018

(via email to: rhoverman@enviroforensics.com)
Rob Hoverman
EnviroForensics
N16 W23390 Stone Ridge Drive
Suite G
Waukesha, WI 53188

SUBJECT:	Coverage under General Permit WI-0046566-06, Contaminated Groundwater from Remedial Action Operations
FACILITY:	One Hour Martinizing
LOCATION:	13405 Watertown Plank Rd., Elm Grove, WI
FIN:	62706

Dear Rob Hoverman,

The Wisconsin Department of Natural Resources, hereafter the Department, has reviewed your application for authorization to inject 3-D Microemulsion® (3-DME), Chemical Reducing Solution (CRS), and Bio-Dechlor Inoculum Plus (BDI) solutions for in-situ treatment of tetrachloroethane (PCE) dissolved in groundwater at 13405 Watertown Plank Road, WI (One Hour Martinizing). The presence of chlorinated solvent PCE and the products of natural degradation of PCE to include: trichloroethene, dichloroethene, and other secondary volatile organic compounds (VOCs) are likely attributable to improper handling and disposal of dry cleaning solvents at the OHM Holdings site (WDNR BRRTS #02-68-552102).

EnviroForensics is authorized by this letter for enhanced biodegradation in-situ treatment of PCEs in contaminated groundwater at the addresses stated above. According to the management plan EnviroForensics has proposed, enhanced biodegradation will be implemented using concentrated 3-DME and CRS liquids which will be mixed with water to produce a solution. The products will be mixed with potable water to achieve the desired solution concentrations. The products will be injected through direct-push tooling below the water table, which is encountered at approximately 15 feet below ground surface (bgs). The target injection interval is 15 to 25 feet bgs.

Two (2) separate target remediation areas have been designated based on the distribution of groundwater impacts defined during the site investigation. Area A is located in the northern part of the Site, extending into Village of Elm Grove right-of-way. Area B is located along the northeast Site boundary around a hotspot identified at boring B-10. The injection design is summarized below.

Area A

- Advance 30 direct-push injection points on a grid.
- Mix 13 gallons of 3-D Microemulsion and 6 gallons of CRS with water to produce 166 gallons of solution. Inject the 166 gallons of solution into each of the 30 injection points.
- Mix 0.25 gallon BDI with water to produce 10 gallons of solution and inject the solution into each of the 30 injection points.

Area B

- Advance six (6) direct-push injection point. Three (3) of the points will be angled to the northeast to reach beneath the railroad right-of-way.
- Mix 24 gallons of 3-D Microemulsion and 8 gallons of CRS with water to produce 487 gallons of solution. Inject the 487 gallons of solution into each of the 6 injection points.
- Mix 0.25 gallon BDI with water to produce 10 gallons of solution and inject the solution into each of the 6 injection points.

The products will be mixed with potable water to achieve the desired solution concentrations. The volume of solutions injected will be approximately 5,284 gallons, or 176 gallons per point for Area A; and 2,983 gallons or 497 gallons per point for Area B.

Any significant injection changes will require Department approval.

Your proposed discharge is eligible for coverage under the general Wisconsin Pollutant Discharge Elimination System (WPDES) permit WI-0046566-06 for Discharge of Contaminated Groundwater from Remedial Action Operations. You are responsible for compliance with the conditions contained in this permit. The permit and fact sheet should be downloaded from the DNR website at http://dnr.wi.gov/topic/wastewater/generalpermits.html.

Discharges under this permit are required to be consistent with a discharge management plan that has been approved by the Department. Your application submitted will be considered as the required discharge management plan. All of your contaminated wastewater treatment, discharges, and remedial actions must be done according to the terms and conditions of the permit, specifically sections 1, 2, 6 and 8.

General Requirements

1. **Effective Term:** Permit Coverage begins on April 12, 2018. The general permit expired on June 30, 2017, however it will remain in effect until a new general permit is reissued. This permit applies only to the sites described in the Request for Coverage.

2. **Additives:** The discharge of other water treatment additives is prohibited unless their use is approved in writing by the DNR.

3. **Monitoring requirements:** Monitoring requirements for discharges designed to enhance the remediation of in-situ contaminants are found in Section 6 of the permit.
    - **Flow:** A record must be kept of the total daily volume of each solution injected.
    - **Parameters:** Jim Delwiche, DNR Remediation & Redevelopment Project Manager may require additional monitoring and reporting.

4. **Reporting:**
    - Records of effluent volume and chemical monitoring data shall be submitted on discharge monitoring report (DMR) forms following each injection. All sample results must be reported on the DMR. Reports are due on the 15th day of the month following the completion of the injection. The owner must sign the DMRs. DMRs should be sent to the address indicated on the DMR. Please make copies of the enclosed DMR for your use.
    - Records required by this permit must be kept for the duration of the permit and made available for inspection by Department staff upon request.
    - **Any exceedances of the permit limits shall be reported to the Department within 24 hours of the permittee becoming aware of the exceedance.**

Limits based on groundwater quality protection are set at the preventive action limits in ch. NR 140, Wis. Adm. Code. These limits are based on substances reported to be in the discharge, but may not necessarily include all substances of public health or welfare concern, which are in the discharge. However, nothing in this permit allows the permittee to discharge any substance in a concentration that would cause groundwater standards in Ch. NR 140 to be exceeded.

If you have any questions about permit requirements or the contents of this letter, please feel free to contact me at (414) 263-8713.

Sincerely,

Karl Knutson (electronic signature)

Karl Knutson
Wastewater Specialist

cc: Trevor Moen, General Permit Coordinator, WDNR (via email)
Jim Delwiche, R&R Project Manager, WDNR (via email)
Wayne Fassbender, EnviroForensics (via email)
Brian Kappen, EnviroForensics (via email)

Enc: Solution Injection Form (DMR Form)

LEGAL AUTHORITIES and APPEAL RIGHTS

Section 283.35(1), Wis. Stats., authorizes the Department to issue a general permit applicable to a designated area of the state authorizing discharges from specified categories or classes of point sources located within that area. Upon the request of the owner or operator of a point source, the Department shall withdraw the point source from the coverage of a general permit and issue an individual Wisconsin Pollutant Discharge Elimination System (WPDES) permit for that source in accordance with s. 283.35(2), Wis. Stats. Additionally, the Department may withdraw a point source from the coverage of a general permit and issue an individual WPDES permit if that source meets any of the factors listed in s. 283.35(3), Wis. Stats. Issuance of such an individual permit will provide for a public comment period, and potentially a public informational hearing and/or an adjudicatory hearing. In lieu of general permit withdrawal, the Department may refer any violation of a general permit to the Department of Justice for enforcement under s. 283.91, Wis. Stats., pursuant to s. 283.89, Wis. Stats. In order to remain in compliance and avoid any enforcement action, **please read your permit carefully**.

To challenge the reasonableness of or necessity for any term or condition of an issued, reissued, or modified general permit, s. 283.63, Wis. Stats., and ch. NR 203, Wis. Adm. Code, require that you file a verified petition for review with the Secretary of the Department of Natural Resources within 60 days after notice of the permit decision was issued by the Department. For other permit-related decisions, such as the decision to confer general permit coverage to your facility, that are not reviewable pursuant to s. 283.63, Wis. Stats., it may be possible for permittees or other persons to obtain an administrative review pursuant to s. 227.42, Wis. Stats., and s. NR 2.05(5), Wis. Adm. Code, or a judicial review pursuant to s. 227.52, Wis. Stats. If you choose to pursue one of these options, you should know that Wisconsin Statutes and Administrative Code establish time periods within which requests to review Department decisions must be filed.

APPENDIX F

WELL/DRILLHOLE/BOREHOLE FILLING & SEALING REPORT FORM 3300-005

State of Wis., Dept. of Natural Resources
dnr.wi.gov

Well / Drillhole / Borehole Filling & Sealing Report

Form 3300-005 (R 4/2015)

Notice: Completion of this report is required by chs. 160, 281, 283, 289, 291-293, 295, and 299, Wis. Stats., and chs. NR 141 and 812, Wis. Adm. Code. In accordance with chs. 281, 289, 291-293, 295, and 299, Wis. Stats., failure to file this form may result in a forfeiture of between $10-25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. Return form to the appropriate DNR office and bureau. See instructions on reverse for more information.

☒ **Verification Only of Fill and Seal**

Route to DNR Bureau:
☐ Drinking Water ☐ Watershed/Wastewater ☐ Remediation/Redevelopment
☐ Waste Management ☐ Other: _____

1. Well Location Information

County	WI Unique Well # of Removed Well	Hicap #
Waukesha	_ _ _ _ _	

Latitude / Longitude (see instructions)	Format Code	Method Code
_____ N	☐ DD	☐ GPS008
_____ W	☐ DDM	☐ SCR002 ☐ OTH001

¼ / ¼	¼	Section	Township	Range
NE	NW	25	07 N	☒ E ☐ W

or Gov't Lot #

Well Street Address: 13405 Watertown Plank Rd

Well City, Village or Town	Well ZIP Code
Elm Grove	53122

Subdivision Name	Lot #

Reason for Removal from Service	WI Unique Well # of Replacement Well
Temp. Injection Point	_ _ _ _ _

2. Facility / Owner Information

Facility Name: One Hour Martinizing

Facility ID (FID or PWS): 268104540

License/Permit/Monitoring #:

Original Well Owner: Brian Cass

Present Well Owner: Brian Cass

Mailing Address of Present Owner: W229 N2494 CTH F

City of Present Owner	State	ZIP Code
Waukesha	WI	53188

3. Filled & Sealed Well / Drillhole / Borehole Information

☐ Monitoring Well
☐ Water Well
☒ Borehole / Drillhole

Original Construction Date (mm/dd/yyyy): 6/5/2018 - 6/18/2018

If a Well Construction Report is available, please attach.

Construction Type:
☐ Drilled ☒ Driven (Sandpoint) ☐ Dug
☐ Other (specify): _____

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth From Ground Surface (ft.)	Casing Diameter (in.)

Lower Drillhole Diameter (in.)	Casing Depth (ft.)
2.3	

Was well annular space grouted? ☐ Yes ☐ No ☐ Unknown

If yes, to what depth (feet)?	Depth to Water (feet)

4. Pump, Liner, Screen, Casing & Sealing Material

Pump and piping removed?	☐ Yes	☐ No	☒ N/A
Liner(s) removed?	☐ Yes	☐ No	☒ N/A
Liner(s) perforated?	☐ Yes	☐ No	☒ N/A
Screen removed?	☐ Yes	☐ No	☒ N/A
Casing left in place?	☐ Yes	☐ No	☒ N/A
Was casing cut off below surface?	☐ Yes	☐ No	☒ N/A
Did sealing material rise to surface?	☒ Yes	☐ No	☐ N/A
Did material settle after 24 hours?	☐ Yes	☒ No	☐ N/A
If yes, was hole retopped?	☐ Yes	☐ No	☒ N/A
If bentonite chips were used, were they hydrated with water from a known safe source?	☒ Yes	☐ No	☐ N/A

Required Method of Placing Sealing Material
☐ Conductor Pipe-Gravity ☐ Conductor Pipe-Pumped
☒ Screened & Poured (Bentonite Chips) ☐ Other (Explain): _____

Sealing Materials
☐ Neat Cement Grout ☐ Concrete
☐ Sand-Cement (Concrete) Grout ☒ Bentonite Chips

For Monitoring Wells and Monitoring Well Boreholes Only:
☐ Bentonite Chips ☐ Bentonite - Cement Grout
☐ Granular Bentonite ☐ Bentonite - Sand Slurry

5. Material Used to Fill Well / Drillhole

	From (ft.)	To (ft.)	No. Yards, Sacks Sealant or Volume (circle one)	Mix Ratio or Mud Weight
Bentonite	Surface	25	0.7	

6. Comments

IP-1 through IP-33 & IP-37

7. Supervision of Work

Name of Person or Firm Doing Filling & Sealing	License #	Date of Filling & Sealing or Verification (mm/dd/yyyy)
EnviroForensics, LLC		06/08/2018

Street or Route	Telephone Number
N16 W23390 Stone Ridge Dr. Suite G	(317) 972-7870

City	State	ZIP Code	Signature of Person Doing Work	Date Signed
Waukesha	WI	53188		06/08/2018

DNR Use Only

Date Received	Noted By

Comments:

State of Wis., Dept. of Natural Resources
dnr.wi.gov

Well / Drillhole / Borehole Filling & Sealing Report

Form 3300-005 (R 4/2015)

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☒ **Verification Only of Fill and Seal**

Route to DNR Bureau:
☐ Drinking Water ☐ Watershed/Wastewater ☐ Remediation/Redevelopment
☐ Waste Management ☐ Other:

1. Well Location Information

County	WI Unique Well # of Removed Well	Hicap #
Waukesha		

Latitude / Longitude (see instructions) ____ N ____ W | Format Code: ☐ DD ☐ DDM | Method Code: ☐ GPS008 ☐ SCR002 ☐ OTH001

¼ / ¼	¼	Section	Township	Range	or Gov't Lot #
NE	NW	25	07 N	20 ☒ E ☐ W	

Well Street Address: W3405 Watertown Plank Rd

Well City, Village or Town	Well ZIP Code
Elm Grove	53122

Subdivision Name	Lot #

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Temp. Injection Point	

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Facility Name: One Hour Martinizing

Facility ID (FID or PWS): 268104540

License/Permit/Monitoring #:

Original Well Owner: Brian Lass

Present Well Owner: Brian Lass

Mailing Address of Present Owner: W229 N2494 CTH F

City of Present Owner	State	ZIP Code
Waukesha	WI	53188

3. Filled & Sealed Well / Drillhole / Borehole Information

☐ Monitoring Well ☐ Water Well ☒ Borehole / Drillhole

Original Construction Date (mm/dd/yyyy): 6/5/2018 - 6/18/2018

If a Well Construction Report is available, please attach.

Construction Type:
☐ Drilled ☒ Driven (Sandpoint) ☐ Dug ☐ Other (specify):

Formation Type:
☒ Unconsolidated Formation ☐ Bedrock

Total Well Depth From Ground Surface (ft.)	Casing Diameter (in.)

Lower Drillhole Diameter (in.)	Casing Depth (ft.)
2.3	

Was well annular space grouted? ☐ Yes ☐ No ☐ Unknown

If yes, to what depth (feet)?	Depth to Water (feet)

4. Pump, Liner, Screen, Casing & Sealing Material

Pump and piping removed?	☐ Yes	☐ No	☒ N/A
Liner(s) removed?	☐ Yes	☐ No	☒ N/A
Liner(s) perforated?	☐ Yes	☐ No	☒ N/A
Screen removed?	☐ Yes	☐ No	☒ N/A
Casing left in place?	☐ Yes	☐ No	☒ N/A
Was casing cut off below surface?	☐ Yes	☐ No	☒ N/A
Did sealing material rise to surface?	☒ Yes	☐ No	☐ N/A
Did material settle after 24 hours?	☐ Yes	☒ No	☐ N/A
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☐ Conductor Pipe-Gravity ☒ Conductor Pipe-Pumped
☐ Screened & Poured (Bentonite Chips) ☐ Other (Explain):

Sealing Materials
☒ Neat Cement Grout ☐ Concrete
☐ Sand-Cement (Concrete) Grout ☐ Bentonite Chips

For Monitoring Wells and Monitoring Well Boreholes Only:
☐ Bentonite Chips ☐ Bentonite - Cement Grout
☐ Granular Bentonite ☐ Bentonite - Sand Slurry

5. Material Used to Fill Well / Drillhole

	From (ft.)	To (ft.)	No. Yards, Sacks Sealant or Volume (circle one)	Mix Ratio or Mud Weight
Neat Cement Grout	Surface	30.5	0.98	

6. Comments

IP-34 thru IP-36

7. Supervision of Work

Name of Person or Firm Doing Filling & Sealing	License #	Date of Filling & Sealing or Verification (mm/dd/yyyy)
EnviroForensics, LLC		06/08/2018

Street or Route	Telephone Number
N116 W23390 Stone Ridge Dr. Suite G	(317) 972-7870

City	State	ZIP Code	Signature of Person Doing Work	Date Signed
Waukesha	WI	53188		06/08/2018

DNR Use Only

Date Received	Noted By

Comments: