Site Investigation Work Plan

Bishop's Creek Community Development Corporation
4759 North 32nd Street
Milwaukee, Wisconsin

FID No. 341055770
BRRTS No. 02-41-306192
BRRTS No. 02-41-553373
BRRTS No. 03-41-556393

Prepared for:

Bishop's Creek Community Development Corporation
Milwaukee, Wisconsin

September 13, 2017
Revised March 27, 2018
Giles Project No. 1E-1705006

GILES
ENGINEERING ASSOCIATES, INC.

GILES
ENGINEERING ASSOCIATES, INC.
GEOTECHNICAL, ENVIRONMENTAL & CONSTRUCTION MATERIALS CONSULTANTS

• Atlanta, GA
• Baltimore, MD
• Dallas, TX
• Los Angeles, CA
• Manassas, VA
• Milwaukee, WI

March 27, 2018

Wisconsin Department of Natural Resources
2300 North Martin Luther King Jr. Drive
Milwaukee, WI 53212

Attention: Mr. John Hnat
Hydrogeologist

Subject: Site Investigation Work Plan
Bishop's Creek CDC
North Lot #3 / Building #1 Oil Spill / Building #3 South Footing
4759 North 32nd Street
Milwaukee, Wisconsin
Giles Project No. 1E-1705006

WDNR FID No. 341055770
WDNR BRRTS No.'s 02-41-306192, 02-41-553373, and 03-41-556393

Dear Mr. Hnat:

Enclosed is a Revised Site Investigation Work Plan (SIWP) for the referenced property. Giles Engineering Associates, Inc. Giles has revised the previously-submitted a SIWP pertinent to the subject site. The required $700 review fee to petition the Wisconsin Department of Natural resources (WDNRs) for their review and concurrence has already been provided. If there are any questions regarding the information contained herein, or if we can be of any additional service, please contact the undersigned at your convenience.

Respectfully submitted,

GILES ENGINEERING ASSOCIATES, INC.

Kevin T. Bugel, P.G., C. P. G.
Environmental Division Manager

Distribution: Wisconsin Department of Natural Resources
Attn: Mr. John Hnat (1 via USPS and 1 via email: John.Hnat@Wisconsin.gov)

Bishop's Creek CDC
Attn: Mr. Daren Daniels (1 via email: songhai6971@hotmail.com)

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4759 NORTH 32ND STREET
MILWAUKEE, WISCONSIN
WDNR BRRTS No. (Multiple)
WDNR FID No. 341055770

SITE INVESTIGATION WORK PLAN

BISHOP'S CREEK CDC
BUILDING #1 OIL SPILL / BUILDING #3 SOUTH FOOTING / NORTH LOT #3
4759 NORTH 32ND STREET
MILWAUKEE, WISCONSIN
WDNR BRRTS NO. (MULTIPLE)
WDNR FID NO. 341055770

1.0 INTRODUCTION

1.1. Objective and Purpose

Giles Engineering Associates, Inc. (Giles) has prepared this Site Investigation Work Plan (SIWP) on behalf of Bishops Creek Community Development Corporation (BC CDC) for the Lot No. 3 of the property located at 4759 North 32nd Street in the City of Milwaukee, Milwaukee County, Wisconsin (herein referred to as the "Site"). The Wisconsin Department of Natural Resources (WDNR) opened the initial environmental case file under the Bureau of Remediation and Redevelopment Tracking system (BRRTS) No. 02-41-3061992 for the entire Site on May 7, 2002, due to suspected contamination from the former use of the Site as a tannery. Subsequent tank removal and additional investigation activities resulted in the opening of additional case files for the Building #3 south footing area on March 3, 2009, and the Building #1 oil spill area on November 4, 2010 (BRRTS No.'s 02-41-553373 and 03-41-556393, respectively). This SIWP has been prepared to address the elements set forth in a Stipulation (August 10, 2016), Second Order Amending Judgment, and Second Amended Judgment (May 4, 2017) filed against the BC CDC Site by the State of Wisconsin Department of Justice.

The purpose of this SIWP is to document a formal plan to specify the media to be sampled, the locations where the samples will be collected, and the methods and procedures to be employed during the investigation of soil and groundwater impacts initially identified during investigative activities completed by others from 2002 through 2009 and by Giles from 2009 through 2012. The scope of services presented in the SIWP were developed to assess whether contamination exists, and, if so, to determine the extent and magnitude of soil and potentially groundwater impact stemming from activities at the Site during the early and middle 1900s when the Site was used for warehousing.

This SIWP was prepared in general accordance with Wisconsin Administrative Code (WAC), Natural Resources Chapter (NR) 716.09. Upon completion of the scope of services presented in the SIWP, the results of the investigation as well as Giles' conclusions and recommendations will be presented in a Site Investigation Report.

1.2. Site Location and Setting

The Site is located in the NW ¼ of the NE ¼ of Section 1, Township 7 North, Range 22 East of the Wauwatosa Township. The Site address is 4759 N 32nd Street in the City of Milwaukee, Milwaukee County, Wisconsin. The site is located in a mixed use industrial and commercial setting with the East Hampton Avenue right-of way abutting to the north, the N.

32nd Street right-of-way abutting to the east, Lincoln Creek abutting to the south, and the Canadian Pacific Railroad right-of-way abutting to the west. The Site and the surrounding area are depicted on the Site location map provided as Figure 1.

The Site is located on the southwest corner of the intersection of West Hampton Avenue and North 32nd Street, in Milwaukee Wisconsin (Figure 2). The Former Kaiser/Greenbaum Tannery is comprised of Lots 1, 2, and 3 and is approximately 5.17 acres in area. "Lot 1" and "Lot 2" are part of a closed leaking underground storage tank (LUST) site and are not included in the investigation scope of services of this SIWP. Lot 3 is addressed by three BRRTS listings and is the subject of this SIWP.

Several Site buildings were razed during the period of 2004 to 2009 in preparation for the BC CDC redevelopment. Lot 3 and the buildings that remain are being incorporated into this next phase of Site redevelopment plan (Figure 2). The following original buildings remain:

- Building 1 located in the west-central portion of Lot 3;
- Buildings 7 and 8 located in the northeast portion of Lot 3; and
- Building 13 located in the northeast portion of Lot 3.

1.3. Previous Studies

Drake Consulting Group, LLC (Drake) completed a report titled: *Master Site Investigation Report Southern Area; Bishop's Creek Community Development Corporation* (March 2007). In addition, Giles performed investigation activities at the Site and documented our findings in the report titled: *Remedial Action Documentation Report* (February 2012). The following synopsis summarizes soil and groundwater impacts identified by Drake and Giles believed to persist within Lot 3 at the Site:

Soil

- Lead was detected in soil samples collected near the former railroad spur at levels exceeding its respective NR 720 residual contaminant level (RCL) for groundwater protection.
- Arsenic was detected in soil samples collected near the former railroad spur at concentrations exceeding its WDNR-established background concentration for southeastern Wisconsin of 8 micrograms per kilogram (µg/kg).
- PAH compounds were detected at concentrations above their respective WDNR Ch. NR 720 RCL for protection of groundwater in soil samples collected from with the western portion of Lot 3.

Groundwater

- Lead was detected in groundwater samples collected from wells TW-1 and TW-4 located near the eastern and northern region of Lot 2 (respectively), and TW-3 located near the former railroad spur at levels exceeding its NR 140 groundwater Enforcement Standard (ES). However, the wells were located on the Lots 1 and 2 located in the closed portion of the parcel. In addition, the degree of impact was not noted in groundwater samples collected from monitoring wells installed in similar locations by Giles in 2009.

2.0 TECHNICAL APPROACH AND SCOPE OF SERVICES

2.1. Investigation 1 - Oil Spill Area

Oil Spill Investigation

An oil spill/release was documented by Genesis Construction Management on November 4, 2010, during utility excavation activities associated with the renovation of Building No. 1. At the time, Genesis Construction instructed Giles to collect soil confirmation samples from the release area and to provide notification to the Wisconsin Department of Natural Resources (WDNR). The WDNR was provided verbal notification on the same day. Subsequently, Mr. John Hnat, the WDNR Project Manager, visited the Site to conduct an inspection. On November 30, 2010, the WDNR issued a "Responsible Party" ("RP") letter, informing BC CDC of their statutory obligation to investigate and remediate the contaminated soil and groundwater associated with the oil release.

The actual source of the fuel oil spill is unknown, however, Giles infers the release to be associated with a former 10,000 gallon fuel tank system for a boiler room that existed immediately east of Building No. 1 (Figure 2).

The goal of the soil and groundwater sampling associated with this investigation is intended to provide data sufficient to define the extent and magnitude of contamination associated with the fuel oil spill area. In addition, Giles will utilize a portion of the existing monitoring well network (GMW-1 through GMW-3) to evaluate the direction of groundwater flow in conjunction with the investigation.

Scope of Services (Fuel Oil Spill Investigation Area)

The scope of services for the oil spill investigation activities includes the following:

- Prepare a Site Investigation Work Plan in general accordance with Chapter NR 716 included hereon.
- Coordinate field activities, request a utility locate, and communicate/schedule fieldwork with the client.

- Complete direct-push soil borings to a maximum depth of 20 to 25 feet below ground surface (bgs) with one soil boring completed near the spill area to 25 feet, a second boring completed approximately 20 feet east of the spill area to 20 feet bgs, and a third boring completed on the southeast region of Building No. 1 to 20 feet bgs (Figure 2). Proximal existing wells GMW-2 and GMW-3 may be integrated into the assessment, also. It is assumed that a second phase of investigation may be necessary should analytical results be indicative of soil or groundwater contamination at concentrations exceeding Wisconsin soil RCLs or groundwater ES concentrations beyond the limits of the borings and wells proposed herein.
- Classify the soil samples collected from the borings during the drilling activities using the USCS classification system, and perform and field screening for the presence of organic vapors utilizing a photoionization detector (PID) equipped with a 10.6 electron-volt (eV) lamp calibrated to a benzene-equivalent isobutylene gas standard.
- Petition the WDNR for a variance to Ch. NR 141 to construct the monitoring wells utilizing 1-inch diameter, prepacked well screens.
- Construct two WAC Ch. NR 141 variance 1-inch inside diameter wells with prepacked well screens in the soil borings along the north wall of Building No. 1 to facilitate groundwater sampling.
- Observe and document the exploration activities performed, including the location, elevation, depth of the soil borings, and the abandonment of the borings.
- Submit up to 6 soil samples (two samples per boring) to a State of Wisconsin certified analytical laboratory for the analysis of petroleum volatile organic compounds (PVOC) plus naphthalene by EPA Method 8021 and polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8310.
- Drill through existing building's concrete floor slab at one location in the northeast corner of Building No. 1 and establish a sealed soil gas sampling port.
- Collect a sub-slab soil gas sample using laboratory-supplied 6-liter Summa Canister equipped with 200 milliliter per minute regulator.
- Submit the soil gas sample to an analytical laboratory for the chemical analysis of volatile organic compounds (VOCs) by US EPA Method TO-15
- Perform two groundwater sampling events to evaluate the contaminant trends from the newly installed monitoring well and existing wells GMW-2 and GMW-3. Groundwater level gauging will be conducted with the two quarterly events to establish the direction of groundwater flow.
- Submit groundwater samples to a State of Wisconsin-certified analytical laboratory for the analysis of PVOCs plus naphthalene.
- Complete data verification and data reduction.

- Evaluate the information collected and provide the Client with verbal communication of our findings.
- Prepare a closure packet if conditions are favorable.

Giles Standard Operating Procedures for the referenced field work are included in Attachment A. The Oil Spill location and soil borings associated with the oil spill investigation are included in Figure 2.

2.2. Investigation 2 - Building #3 South Footing Line CVOCs Area

An open WDNR BRRTS environmental case file (BRRTS No. 02-41-553373) exists the former Building #3 South Footing Spill Investigation addressing the presence of chlorinated VOC (CVOC) contamination (Figure 2). The former Building No. 3 south footing line spill/release area resulted from the rupture of a previously-unknown buried pipe during removal of a subsurface vault structure that formerly contained a 10,000-gallon auxiliary fuel oil tank for the boiler room located in former Building #3. Soil samples were collected by Drake in the area in December 2008. Based on the Drake data, CVOCs including tetrachloroethene (PCE) and trichloroethene (TCE) were present in soil at concentrations in excess of Wisconsin RCLs. In March 2009, Drake oversaw the removal of approximately 715 tons of impacted soil, collected several closure samples, and, based on the initial analytical results, extended the excavation westward and then collected additional samples from the floor and walls of the western portion of the excavation in March 2009 (Figures 2 and 3). The analytical results for the post-excavation soil samples collected from the eastern portion of the initial excavation in combination with the post-excavation soil samples (EX-1 through EX-5) collected from the western portion of the subsequent excavation are indicative of the mitigation of the contamination which stemmed from the ruptured pipe (Figure 3). However, no groundwater samples were collected at that time. Therefore, the WDNR has requested that the scope of services of this SIWP include a groundwater investigation for the Building No. 3 south footing wall area to verify that the CVOC spill did not impact groundwater in this area (Figure 2).

In order to provide sufficient groundwater data to satisfy closure criteria pertinent to the BRRTs case file number the for the Former Building No. 3 south footing area, the WDNR requires that the groundwater condition be investigated through this region of the Site. To accomplish the characterization, Giles is petitioning the WDNR for concurrence to an investigation consisting to include the installation of WAC Ch. NR 141 variance, 1-inch inside diameter wells with prepacked well screens to be constructed to facilitate the collection of groundwater at the locations depicted on Figure 2.

Scope of Services (Building No. 3 South Footing Line Investigation)

The scope of services includes the following:

- Prepare a Sampling Plan.
- Coordinate field activities, request a utility locate, and communicate/schedule fieldwork with the client.
- Complete 1 direct-push boring in the former Building No. 3 footing spill excavation and to maximum depth of 15 to 22 feet bgs.
- Classify the soil samples collected from the borings during the drilling activities to the USCS classification system, and perform and field screening for the presence of organic vapors utilizing a photoionization detector (PID) equipped with a 10.6 electron-volt (eV) lamp calibrated to a benzene-equivalent isobutylene gas standard.
- Observe and document the exploration activities performed, including the location, elevation, depth of the soil borings, and the abandonment of the borings.
- Submit one soil sample (one sample per boring) to a State of Wisconsin certified analytical laboratory for the analysis of volatile organic compounds (VOCs) by EPA Method 8260B, PAHs (8310) and total metals (lead and arsenic).
- Install a Ch. NR 141 variance 1-inch well screen in the soil boring to facilitate groundwater sample collection.
- Submit groundwater samples to a State of Wisconsin certified analytical laboratory for the analysis of VOCs (8260B) and metals (lead and arsenic).
- The variance-well will be retained until analytical results are received. Should no WAC groundwater preventative action limits (PALs) or ES exceedances be noted after two sampling events, the well will be abandoned in accordance with Ch. NR 141 requirements.
- Complete data verification and data reduction.
- Evaluate the information collected and provide the Client with verbal communication of our findings.
- Prepare a closure packet if conditions show to be favorable.

Giles Standard Operating Procedures for the referenced field work are included in Attachment A.

2.3. Investigation 3 – Northern Lot #3

The Northern Lot #3 Investigation (BRRTS No. 02-41-306192) will address potential VOCs, PAHs, and metals contamination (Figure 2). An open WDNR BRRTS environmental case file exists for the northern portion of Lot #3 Investigation (BRRTS No. 02-41-306192) that addressed petroleum and metals contamination (Figure 2).
In order to provide sufficient soil and groundwater data to satisfy closure criteria pertinent to the BRRTs case file number for Northern Lot No.3, the WDNR requires that the existing soil and groundwater conditions be investigated through this region of the Site. To accomplish the characterization, Giles proposes an investigation consisting of a 15 soil borings, on a grid spacing of 90 feet through the northern Lot 3 region. WAC Ch. NR 141 variance 1-inch inside diameter wells with prepacked well screens will be constructed in 10 of the soil borings to facilitate the collection of groundwater at the locations depicted on Figure 2.

Scope of Services (Lot No. 3 Investigation)

The scope of services includes the following:

- Prepare a Sampling Plan.
- Coordinate field activities, request a utility locate, and communicate/schedule fieldwork with the client.
- Complete 14 direct-push borings on a grid spacing of 90 feet through the northern Lot 3 region to maximum depths of 15 to 22 feet bgs. It is assumed that a second phase of investigation may be necessary should analytical results be indicative of soil or groundwater contamination at concentrations exceeding Wisconsin soil RCLs or groundwater ES concentrations beyond the limits of the borings and wells proposed herein.
- Classify the soil samples collected from the borings during the drilling activities to the USCS classification system, and perform and field screening for the presence of organic vapors utilizing a photoionization detector (PID) equipped with a 10.6 electron-volt (eV) lamp calibrated to a benzene-equivalent isobutylene gas standard.
- Observe and document the exploration activities performed, including the location, elevation, depth of the soil borings, and the abandonment of the borings.
- Submit up to 28 soil samples (two samples per boring) to a State of Wisconsin certified analytical laboratory for the analysis of volatile organic compounds (VOCs) by EPA Method 8260B, PAHs (8310) and total metals (lead and arsenic).
- Install Ch. NR 141 variance 1-inch well screens in 10 soil borings to facilitate groundwater sample collection.
- Submit groundwater samples to a State of Wisconsin certified analytical laboratory for the analysis of VOCs (8260B) and metals (lead and arsenic).

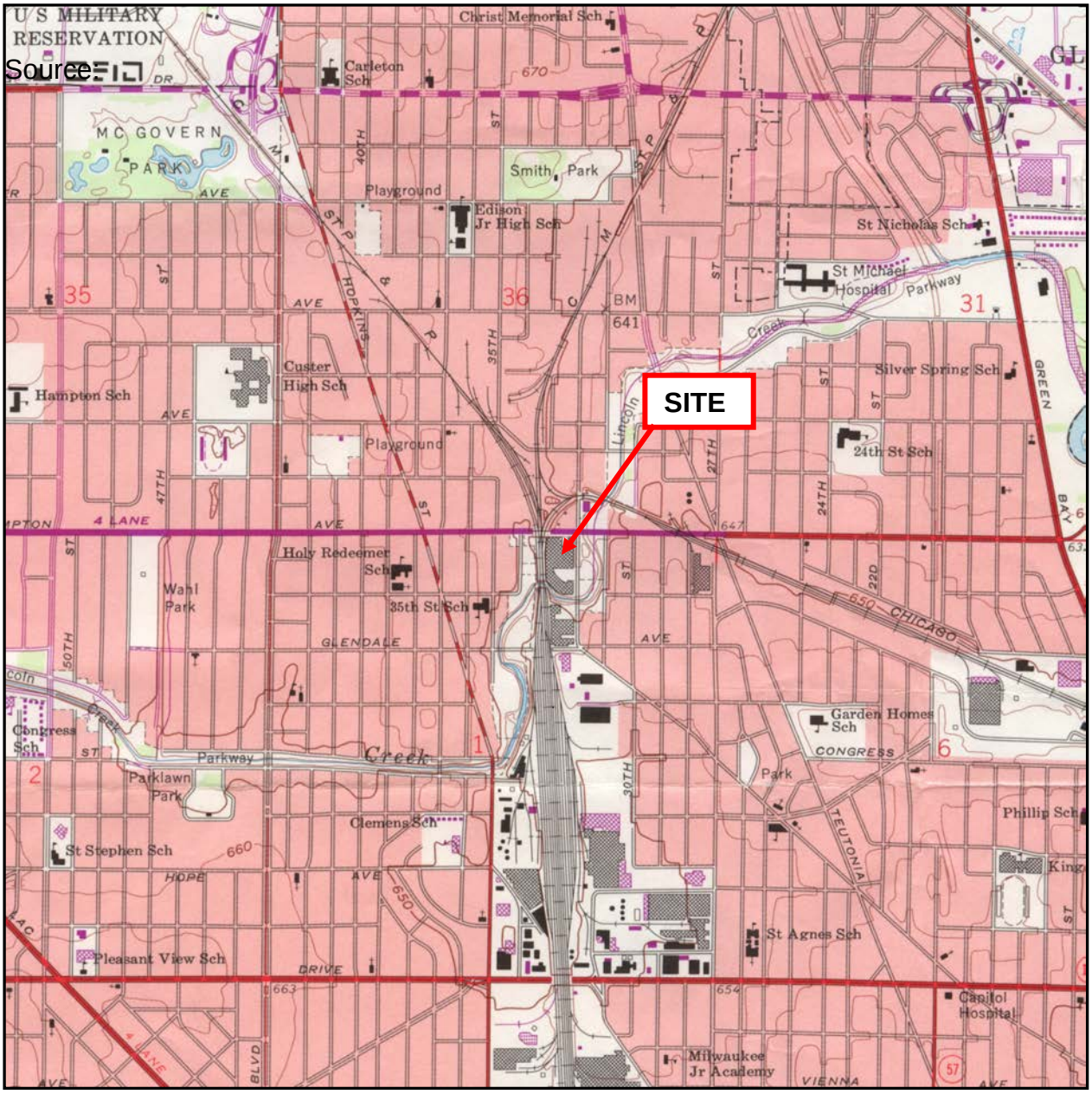
- The variance-wells will be retained until analytical results are received. Should no WAC groundwater preventative action limits (PALs) or ES exceedances be noted, the wells will be abandoned in accordance with Ch. NR 141 requirements.
- Complete data verification and data reduction.
- Evaluate the information collected and provide the Client with verbal communication of our findings.
- Prepare a closure packet if conditions show to be favorable.

Giles Standard Operating Procedures for the referenced field work are included in Attachment A.

3.0 SCHEDULE

Giles anticipates two weeks to initiate the utility location, drilling, and soil sampling work. Giles anticipates a ten working day turnaround time for laboratory results. The SI activities, as listed, are expected to take up to 13 months to complete. Giles will provide copies of the final SIR within eight weeks after receipt of the laboratory results.

FIGURES

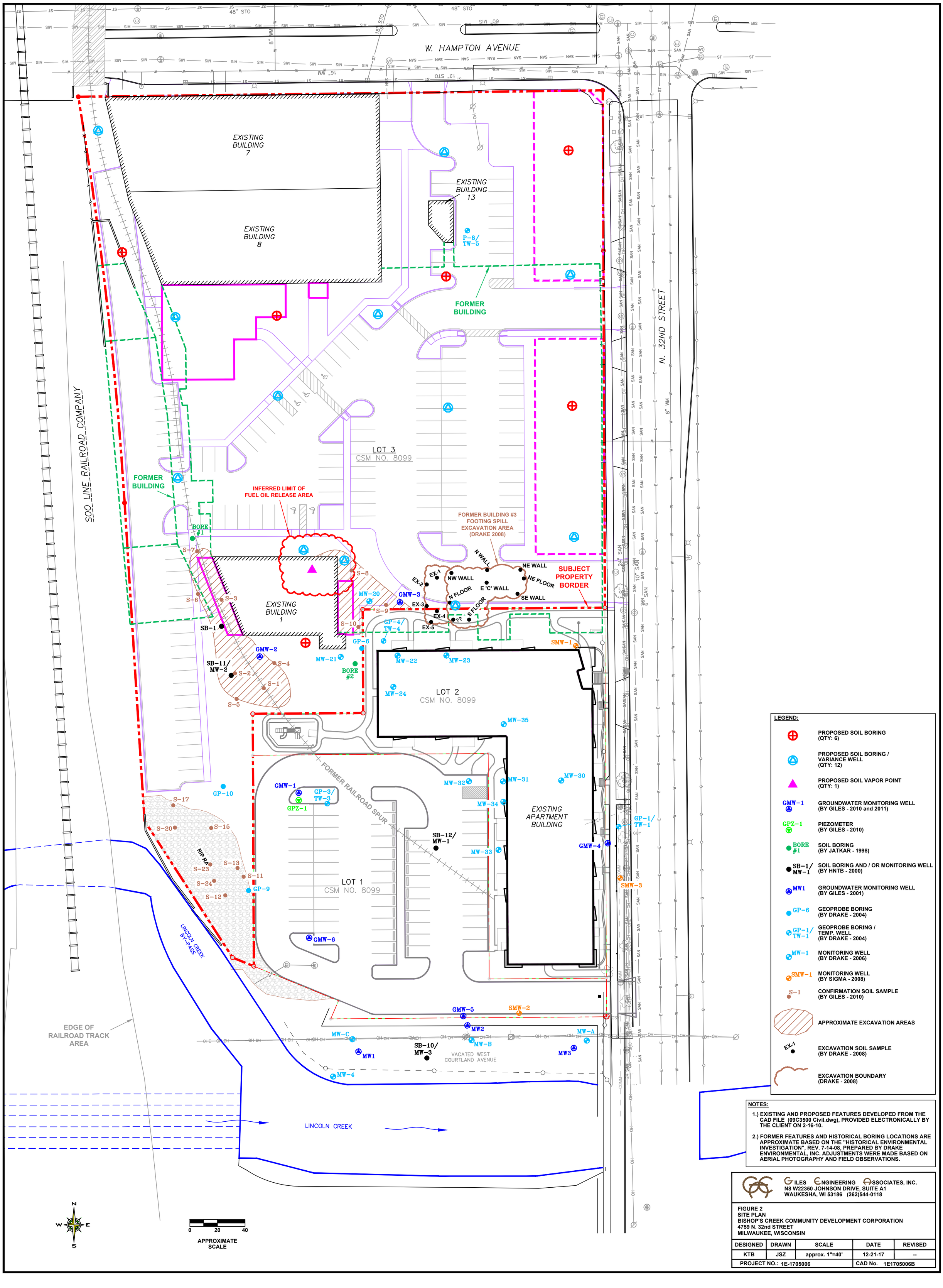


Source: USGS *Milwaukee, Wisconsin* 7.5-Minute Series (topographic) Quadrangle Map (1958; photorevised in 1971)

Scale: 1:24,000
Contour Interval: 10 Feet

N
W E
S

FIGURE 1
SITE LOCATION MAP
Bishop's Creek Community Development Corporation
4759 North 32nd Street
Milwaukee, Wisconsin
Project No. 1E-1705006



LEGEND:

- PROPOSED SOIL BORING (QTY: 6)
- PROPOSED SOIL BORING / VARIANCE WELL (QTY: 12)
- PROPOSED SOIL VAPOR POINT (QTY: 1)
- GMW-1 — GROUNDWATER MONITORING WELL (BY GILES - 2010 and 2011)
- GPZ-1 — PIEZOMETER (BY GILES - 2010)
- BORE #1 — SOIL BORING (BY JATKAR - 1998)
- SB-1/ MW-1 — SOIL BORING AND / OR MONITORING WELL (BY HNTB - 2000)
- MW1 — GROUNDWATER MONITORING WELL (BY GILES - 2001)
- GP-6 — GEOPROBE BORING (BY DRAKE - 2004)
- GP-1/ TW-1 — GEOPROBE BORING / TEMP. WELL (BY DRAKE - 2004)
- MW-1 — MONITORING WELL (BY DRAKE - 2006)
- SMW-1 — MONITORING WELL (BY SIGMA - 2008)
- S-1 — CONFIRMATION SOIL SAMPLE (BY GILES - 2010)
- APPROXIMATE EXCAVATION AREAS
- EX-1 — EXCAVATION SOIL SAMPLE (BY DRAKE - 2008)
- EXCAVATION BOUNDARY (DRAKE - 2008)

NOTES:

1.) EXISTING AND PROPOSED FEATURES DEVELOPED FROM THE CAD FILE (09C3500 Civil.dwg), PROVIDED ELECTRONICALLY BY THE CLIENT ON 2-16-10.

2.) FORMER FEATURES AND HISTORICAL BORING LOCATIONS ARE APPROXIMATE BASED ON THE "HISTORICAL ENVIRONMENTAL INVESTIGATION", REV. 7-14-08, PREPARED BY DRAKE ENVIRONMENTAL, INC. ADJUSTMENTS WERE MADE BASED ON AERIAL PHOTOGRAPHY AND FIELD OBSERVATIONS.

GILES ENGINEERING ASSOCIATES, INC.
N8 W22350 JOHNSON DRIVE, SUITE A1
WAUKESHA, WI 53186 (262)544-0118

FIGURE 2
SITE PLAN
BISHOP'S CREEK COMMUNITY DEVELOPMENT CORPORATION
4759 N. 32nd STREET
MILWAUKEE, WISCONSIN

DESIGNED	DRAWN	SCALE	DATE	REVISED
KTB	JSZ	approx. 1"=40'	12-21-17	--
PROJECT NO.: 1E-1705006			CAD No. 1E1705006B	

APPENDIX A

Giles Standard Operating Procedures

Standard Operating Procedures

Completion of Soil Borings

Field Screening and Visual Soil Classification

Soil Sample Collection and Analyses

Monitoring Well Installation and Development

Groundwater Level Measurements

Groundwater Quality Measurements

Groundwater Sample Collection and Analyses

Decontamination

Chain-of-Custody

Field Note Documentation

GILES
ENGINEERING ASSOCIATES, INC.

Standard Operating Procedure

for

Completion of Soil Borings

Direct Push Soil and Groundwater Sampling

Soil borings will be advanced with a direct-push unit to retrieve a soil sample from a desired depth interval and/or install a temporary well for groundwater sample collection. The direct-push unit uses a 1 or 2-inch diameter Macrocore sampler to reach the top of the desired sampling depth. Once the sampler is positioned at the desired depth, a soil sample obtained with the Macrocore sampler lined with an acetate liner. To push the soil sample into the liner, the rod is advanced 2 or 4 feet with a hydraulically driven percussion hammer.

When the liner containing soil is brought to the surface and removed from the Macrocore sampler, the liner is cut open to allow access to the soil. Soil retrieved from the liner is used for PID/FID screening and visual classification (*Standard Operating Procedure for Field Screening and Visual Soil Classification)* and collection of soil sample for laboratory analyses (*Standard Operating Procedure for Soil Sample Collection and Analyses)*.

Prior to reinserting the Macrocore sampler for retrieval of another soil sample, the Macrocore sampler will be decontaminated to prevent cross-contamination between the sampling intervals. A new plastic liner will be inserted into the Macrocore sampler to be advanced to the top of the next sample interval. The sampling procedure will be repeated at 2- or 4-foot continuous depth intervals until the end of each Direct-push boring.

The information collected during Direct-push advancement will be presented on the final borehole logs. The logs will include information on sampling intervals and other pertinent information related to the Direct-push activities. Soil investigative waste management and disposal will follow the Standard Operating Procedure for Investigative Derived Waste.

Standard Operating Procedure
for
Field Screening and Visual Soil Classification

A portion of each soil sample will be screened for organic vapors, using a photoionization detector (PID) or a flame ionization detector (FID). The volatile vapor scan technique with either a PID or FID is a field screening method used to assess the presence of total volatile compounds. The PID will typically be equipped with a 10.6 electron-volt (eV) lamp. However, this may vary depending upon contaminant type anticipated. The PID will be zeroed, using ambient air, and then calibrated with 100 parts per million (ppm) isobutylene gas (benzene equivalent) in accordance with the manufacturers specifications prior to use each day. The PID calibration data will be recorded on the *Photoionization Detector Calibration Documentation* form.

At the discretion of the Giles project manager, an FID may be used instead of the PID. An FID must be rented, and subsequently calibrated to the manufacturer's specifications prior to use in the field for the first time and daily thereafter.

Note: This SOP for Soil Sample Field Screening and Soil Sample Collection must be applied to all sites regulated by the Wisconsin Department of Natural Resources (WDNR). This protocol may not be approved or recognized as an acceptable SOP for soil sample screening/sampling in other states and therefore, should be re-evaluated for other states, or when the EPA has regulatory jurisdiction.

This protocol has been adopted with consideration given for field-time constraints, reducing the amount of hazardous waste (methanol) generated, and unnecessary use/waste of glass-ware. However, this protocol can only be implemented properly if the field technician allows adequate time to perform the following tasks correctly. The Giles technician, being the environmental technician onsite, is the manager of the field activity, and the drilling crew must adhere to the speed the field representative dictates. Environmental field screening and soil sample collection will always dictate the work (drilling) rate. If work rate problems arise, contact the Giles project manager immediately.

- Prior to drilling each borehole, prepare heavy-duty re-sealable containers (i.e. zip-lock bags) freezer bags for each soil sample interval anticipated to be collected per boring. The re-sealable container will be used for field screening. With a ball point pen (avoid indelible large markers), write the sample interval depth on the bags (ie; 0-2, 2-4, etc.). Laboratory supplied glassware will be provided for samples to be submitted for analysis.

- Once the drilling crew provides the split-spoon or sleeve sample (interval of soil), a representative portion of the entire spoon length will be collected and split into replicate portions and placed in the laboratory supplied glassware and re-sealable container. The laboratory samples will be immediately placed in a sample cooler on ice, and cooled to 4 degrees Celsius; the re-sealable container will be placed in a location to promote volatilization. Volatilization will occur by warming the sample, preferably to room temperature if possible.

- The split portion of the interval will be classified by Giles field personnel in general accordance with the Unified Soil Classification System (USCS) guidelines.

- Once the boring has been completed and the split soil samples have been containerized for field screening and potential laboratory analysis, field screening will be performed. Field screening will be performed by inserting the probe end of the PID into re-sealable container. The PID should register a stable value within 5 seconds. Avoid subjecting the PID unit to excessive moisture by using a moisture trap on the probe end at all times. After removing the PID probe from the sample, allow the PID several seconds to return to background prior to subjecting the instrument to the next field screening sample. Measure and record the readings of the field screening soil samples one after another.

- Based on the field screening results and the field protocol determined by the Project Manager, select the split portion of the sample intervals for laboratory analysis preparation from the cooler. Follow the SOP for Soil Sample Collection and Analyses.

- The samples not selected for laboratory submittal and the field-screened samples will be managed in the same manner as the soil cuttings.

Soil samples should be containerized within 30 minutes of collection from the split spoon or sleeve sample. Again note the lamp of a PID may become saturated and produce false (high) readings if subjected to high repeated moisture. Moisture traps should always be used and then be replaced after use.

Upon completion of soil classification of each soil sample, the soil sample description will be logged on the soil boring log. The description of each soil sample interval will include information on soil type, gradation, color, moisture content, field PID/FID readings, sample recoveries, N values, total boring depth and whether a well/piezometer was installed. Sample intervals where the soil was collected for laboratory analysis will be clearly marked on the logs. The appearance of the soil samples and any incidental odors will also be noted on the logs.

Giles Engineering Associates, Inc.

Standard Operating Procedure
for
Soil Sample Collection and Analyses

The results of soil sample field screening combined with visual and olfactory observations will aid in selecting samples for laboratory analysis. The select soil samples will be submitted to a laboratory for analyses as required by the sampling plan. Depending on suspected contaminants at a specific site, these analyses may include volatile organic compounds (VOCs) or petroleum VOCs (PVOCs), polynuclear aromatic hydrocarbons (PAHs), Resource Conservation and Recovery Act (RCRA) metals, and/or polychlorinated biphenyls (PCBs).

Upon opening of the sampling device (e.g., split-spoon or plastic liner), the soil sample will be split for organic vapor field screening and collection of laboratory analyses, in accordance with the SOP for Field Screening and Visual Classification. The recovered soil will be partitioned in the sampling device and will be placed in two re-sealable containers per interval. One re-sealable container will be immediately placed in a cooler and stored at 4 degrees Celsius. The second re-sealable container per interval will be set aside for field screening. This will provide temporary sample preservation while field screening is performed on the replicate portion of the sample. Sticks, rocks and large debris will be removed from the sample aliquots sent to the laboratory. A new pair of Nitrile gloves will be worn for the handling of each sampling interval.

The soil sample collection, storage, and transportation will be performed in general accordance with USEPA, and/or Wisconsin Department of Natural Resources (WDNR) specifications and follow standard Chain-of-Custody (COC) requirements (including keeping samples in a refrigerator or on ice in a cooler).

Certain soil analyses (e.g. VOCs, PVOCs, etc) require that a specific amount of soil be weighed in the field before placing in the sample container. To weigh appropriate amount of soil, the field scale will be used. Prior to use, the scale will be properly calibrated in accordance with the calibration procedure described in the *Standard Operating Procedure for Use of Field Equipment*. Calibration will be recorded in a field book or on the appropriate form.

Specific requirements for sample container type, preservative, and holding times are discussed in the following section of this SOP and summarized in Table 1, attached. Please note that the type of containers may vary for different laboratories. The following section describes the specific container types.

<u>VOCs & PVOCs</u>
Soil samples collected for the VOC and PVOC analyses will be preserved with methanol, which must be noted on the Chain-of-Custody. The soil samples must be preserved with methanol using one of the following techniques:

Standard Soil Sample Collection - Immediate Methanol Preservation.
After field screening, collect soil into tarred VOC vials and preserve immediately with methanol. Store samples on ice or at 4 ° C. Vials should be shipped in an upright position. Vials should also be placed in separate "zip lock" bags to limit the potential for cross contamination. Field personnel should be aware that laboratories use a variety of vial tare methods, so it is important to use only vials supplied by the specific laboratory.

PAHs
For the PAH analysis, a minimum 100 grams of soil will be packed into a non-preserved, labeled 4-oz glass container, and sealed with a Teflon-lined lid. Following collection, the sample will be placed on ice in a cooler.

RCRA Metals
For RCRA metals analysis, a minimum 20 grams of soil will be packed into a non-preserved, labeled 100-ml plastic container and sealed with plastic lid. Following collection, sample will be placed on ice in a cooler.

PCBs
For PCB analysis, a minimum 100 grams of soil will be packed into a non-preserved, labeled 4-oz glass container, and sealed with a Teflon-lined lid. Following collection, the sample will be placed on ice in a cooler.

The sample containers designated for laboratory analyses will be labeled and identified by sample number, date and time of collection, sample depth interval, analyses to be performed, and the project number. The same information will be recorded on the COC.

Table 1. Sample Container, Preservation, and Holding Time Requirements for Select Soil Analyses.

Analysis	**Container**	**Preservation**	**Holding Time**
VOCs/PVOCs	1-2oz glass jar	Methanol & Cool to 4° C	14 days
PAHs	1-4 oz glass jar	Cool to 4° C	14 days
PCBs	1-4 oz glass jar	Cool to 4° C	14 days
Metals	1-100 ml plastic container	Cool to 4° C	6 months, except chromium hexavalent 24 hrs, mercury 28 days

Table 2. QA/QC Sample Requirements

QA/QC Sample Type	**Frequency of Sample Analysis**	**Details**
Methanol Trip Blank	1 blank per sampling event	To prepare the methanol trip blank sample, field personnel will transfer methanol from a premeasured vial to an empty, but tarred, vial. (This QA/QC sample is not required for samples preserved with methanol in the laboratory.)
Methanol Field Blank	1 blank per sampling event or day	To prepare a methanol field blank, open the sample container or vial to the atmosphere to expose the methanol to potential atmospheric background – contamination.

Giles Engineering Associates, Inc.

Standard Operating Procedure
for
Monitoring Well Installation and Development

Monitoring wells will be installed in a manner that permits the screened interval to intercept the water table through seasonal water table level fluctuations. Monitoring wells will be constructed of 0.01-inch slotted, 2-inch diameter (1-inch for the interior well), flush-threaded, Schedule 40 polyvinyl chloride (PVC) screen. The screen will be 10 feet in length for monitoring wells. The riser pipe will consist of Schedule 40, flush threaded PVC. A 4-inch long flush threaded, Schedule 40 PVC cap will be placed on the bottom of the monitoring well screens.

The annular space surrounding each well screen will be backfilled with clean, well-sorted silica sand as a filter between the formation material and the well screen. Monitoring wells will be constructed inside of the 4¼-inch inside diameter hollow-stem augers. Care will be taken to properly place a continuous filter pack between the well screen and the borehole wall. The filter packs will extend approximately 1 to 2 feet above the top of the well screens. The top of the filter pack will be measured with a weighted measuring tape for depth confirmation.

A bentonite seal, 2 to 3 feet thick, will be placed in the annular space above the filter pack. The seal will be composed of commercially-manufactured bentonite chips. The bentonite will be slowly poured through the hollow-stem augers to minimize the potential for bridging. The finished bentonite surface will be measured with a weighted measuring tape for depth confirmation. The well screen will be positioned so as to intercept the chemicals of concern or assess the hydrogeologic properties of the saturated zone.

Granular bentonite will be placed above the bentonite seal to the ground surface. The bentonite will be slowly poured through the hollow-stem augers to minimize the potential for bridging. The bentonite will be backfilled until it is observed near the ground surface. The annular seal will be added in lifts; alternating between bentonite placement through the hollow-stem augers and auger removal.

During well construction, a cap will be installed at the top of the riser to prevent material from entering the well. A flush-mount (road box) type, protective casings will be used in high traffic areas. A lock on the compression cap will be installed on monitoring wells, completed with a road box; the protective casing cover will be bolted in place.

Monitoring Well Development

The Monitoring wells will be developed following well installation.

The objectives of the well development are to:

- assure that groundwater enters the well screen freely, thus yielding a representative groundwater sample and water level measurement;

- remove fine-grained sediment in the filter pack and the nearby formation adjacent to the filter pack to minimize groundwater sample turbidity and silting of the well; and,

- maximize the efficiency of the filter pack for aquifer hydraulic testing.

Well development will consist of alternating periods of surging with a disposable bailer and purging using a 2-inch diameter centrifugal pump, an air lift pump, or equivalent. The pumping rate will be set to correspond with the aquifer yield. Well development activities will continue until the groundwater effluent turbidity is reduced to clear conditions or until the suspended sediments have stabilized. For wells exhibiting low recharge (i.e. clay) development will consist of pumping until the well until it no longer yields water.

Giles Engineering Associates, Inc.

Standard Operating Procedure
for
Groundwater Level Measurements

Static water level measurements will be made using a Solinst Model 102 groundwater level indicator (or equivalent) prior to groundwater monitoring well development, purging, down-hole groundwater quality measurements and groundwater sample collection.

- Do not place groundwater level indicator in monitoring wells known or suspected to contain free-product.
- The groundwater level indicator will be decontaminated before and after each measurement location with a solution of water/Alconox solution and 2 water rinses.
- Monitoring wells will be opened and allowed to equilibrate for a minimum of 10 minutes prior to measurements.
- The depth to groundwater within each well will be recorded at the time the measurement is completed.
- The measurement shall be made referenced to a mark in the PVC top of casing, which is also indicated by a mark made on the northern most edge of the top of the casing.
- Groundwater measurements will be recorded to the nearest 0.01–foot.
- The data will be recorded on the Giles *Summary Sheet for Groundwater Sampling*. The completed form will contain the following information: monitoring well number; time and date of the measurement; depth to groundwater; type of measuring device used; initials of individuals collecting the data; project number; location of the site; weather conditions; and any additional observations noted (i.e. well protector top condition).

Giles Engineering Associates, Inc.

Standard Operating Procedure
for
Groundwater Sample Collection and Analyses

Groundwater samples will be submitted to a laboratory for analyses as required. These analyses may often include, but are not limited to volatile and semi volatile organic analyses (VOCs/PVOCs, and PAHs), and inorganic analyses (RCRA metals).

Groundwater samples may also be analyzed for natural attenuation parameters (ferrous iron, nitrate-nitrite, sulfate, alkalinity, and methane) during periodic groundwater monitoring, if conducted at the site. The ferrous iron will be tested in the field using a field kit, while sulfate, nitrate-nitrite, and methane will be analyzed in the laboratory. Standard field measurements including temperature, conductivity, pH, dissolved oxygen, and redox potential will also be collected during each sampling event using the water quality probe and will conform to the *Groundwater Quality Measurements SOP*.

Groundwater samples can be collected from a temporary well, established in the Geoprobe borehole, or from a permanent groundwater monitoring well/piezometer.

- Collection of Groundwater Samples from Temporary Wells

  Groundwater samples obtained from temporary wells will be collected by placing slotted ¾-inch inside diameter (I.D.) PVC pipe and solid PVC riser within the borehole. If possible, the temporary well will be purged and the volume of water evacuated during purging will be recorded. One-quarter inch I.D. plastic/silicone tubing with a Geo-pump© or a ½-inch disposable "pencil bailer" will be used to collect the groundwater sample.

- Collection of Groundwater Samples from Permanent Wells/Piezometers

  Groundwater samples from permanent groundwater monitoring wells/piezometers will be collected in accordance with the WDNR, Bureau of Drinking Water and Groundwater, Groundwater Sampling Field Manual, dated September 1996 (PUBL-DG-03896). A copy of Section 2.0 of the manual entitled "Sampling Procedures for Monitoring Wells" is attached with this SOP. A brief description of purging and sampling procedures is presented below.

  The permanent groundwater monitoring wells/piezometers must be purged prior to sampling. There are several methods that can be utilized for the purging of wells that do not purge dry and those that purge dry:

  <u>Wells that do NOT Purge Dry</u>

  - Low-flow purging <1 l/min, low-flow sampling <300 ml/min and monitor indicator parameters for stability in a closed flow-through cell. The procedure for low-flow purging and sampling using the closed flow-through cell is described in the above-referenced WDNR manual.

- Purging FOUR well volumes with a standard pump or a bailer. Please use Giles *Summary Sheet for Groundwater Sampling* form to calculate the well volume (in gallons) based on the well size and the height of water column in the well.

Wells that Purge Dry

- Low-flow Purging and Sampling – purge well dry. Collect groundwater samples within 24 hrs of purging.

- Purging and Sampling with a Bailer – purge well dry. Collect groundwater samples within 24 hrs of purging.

Depending on the type of analyses requested, groundwater will be collected into containers in the following order from an inline sample port located immediately before the low flow cell:

1. Unfiltered samples for in-field water quality measurements. (This is not necessary, if a down-hole or closed flow-through cell measurements are taken.)
2. VOCs.
3. Non-filtered, non-preserved (e.g., sulfate, total chromium VI, mercury, semi- and non-volatiles, pesticides.
4. Non-filtered, preserved (e.g., nitrogen series, total metals, and total organic carbon).
5. Filtered, non-preserved (e.g., dissolved chromium VI, and nitrate).
6. Filtered, preserved immediately (e.g., dissolved metals).
7. Other parameters.

The date and time of sample collection among other pertinent information (i.e., project number, sample identification number, and analysis requested) will be recorded on the sample container and on the sampling log. The groundwater sample collection, storage, and transportation will be performed in general accordance with ASTM and WDNR specifications and will follow standard COC requirements. The specific requirements for sample container type, preservative, and holding times are discussed in the following section of this SOP and summarized in Table 1, attached. Please note that the type of containers may vary for different laboratories. The following section describes the specific container types that are currently provided by Synergy of Appleton, Wisconsin.

VOCs/PVOCs

Groundwater collected for VOCs/PVOCs will be placed in three laboratory-supplied, 40-ml glass vials with Teflon® lined lids preserved with hydrochloric acid. Tip the container at a slight angle and allow a slow, steady stream of water to run down its inner wall. Fill the sample container until the water forms a positive meniscus at the vial rim, then immediately replace the cap. Invert the sample container and tap it lightly to check for bubbles. If bubbles are present, fill a new sample container. Trip and field water blank samples will also be analyzed for VOCs to serve as QA checks (see Table 2, attached).

RCRA Metals

Groundwater collected for RCRA metals will be field-filtered and placed in laboratory-supplied, 500-ml plastic bottles, preserved with nitric acid and sealed.

PCBs
Groundwater collected for PCBs will be placed in a laboratory-supplied, unpreserved 1,000-ml amber glass bottle sealed with Teflon® lined lids.

Ferrous Iron
Ferrous iron will be measured in the field using a Hach kit.

Nitrate
Groundwater samples collected for nitrate will be placed in a laboratory-supplied, 250-ml plastic high-density polyethylene (HDPE) container.

Sulfate
Groundwater collected for sulfate will be placed in a laboratory-supplied, unpreserved 500-ml plastic HDPE container.

Methane
Groundwater collected for methane will be placed in two laboratory-supplied, 40-ml glass vials with Teflon® lined lids preserved with hydrochloric acid.

The groundwater samples collected for laboratory analysis will be placed on ice in a cooler immediately following collection. Samples accompanied by COC will be picked up from the Giles office by the laboratory courier the next day. Overnight storage must be at a minimum temperature of 4°C (i.e., on ice or in a refrigerator).

Groundwater generated as a part of permanent monitoring well/piezometer purging will be contained in labeled drums and temporarily staged pending receipt of groundwater analytical results. If based on the analytical results, the drummed water contains detectable concentrations of contaminants; the drummed groundwater will be disposed of in the sanitary sewer system (if approved) or off site by a licensed waste hauler. If groundwater does not contain any detectable contaminants, it will be dispersed on site (thin spread on pavement). Due to small quantity, the groundwater evacuated from temporary wells set in Geoprobe boreholes will be dispersed on site.

Table 1. Sample Container, Preservation, and Holding Time Requirements for Select Groundwater Sample Analyses.

Analysis	Container	Preservation	Holding Time
Metals, Dissolved and Field-Filtered	1-500 ml HDPE jar	HNO3 to pH<2, cool to 4° C	6 months, chromium hexavalent 24 hrs, mercury 28 days
VOCs	3-40 ml, glass vials	HCL, cool to 4° C	14 days
PAHs	1-1,000 ml amber glass bottles	Cool to 4° C	7 days
Nitrate	1-250 ml HDPE jar	Cool to 4° C	48 hrs
Sulfate	1-500 ml HDPE jar	Cool to 4° C	28 days
Methane	2-40ml, glass vials	HCL, cool to 4° C	14 days

Table 2. QA/QC Sample Requirements

QA/QC Sample Type	Frequency of Sample Analysis	Details
Duplicates	1 duplicate per 20 samples	Duplicate sample is a groundwater sample that will be collected by the same methods and at the same time as original sample.
Trip Blanks	1 trip blank per cooler containing samples for VOC analysis	Trip blank is a laboratory-prepared blank containing DI water. The trip blank will be submitted for VOC analysis to assess potential contamination during sample container shipment and storage.
Field Blanks	1 field blank per day collected for VOC analysis or other analysis dependant of background conditions	Field blank is a background atmospheric blank sample. The field blank consists of laboratory reagent grade (contaminant-free) water that is exposed to the atmosphere where the water sampling is taken place. The field blank will be submitted for VOC analysis to assess the potential for background contamination during sampling. Additional analyses may be requested depending on Site conditions.
Equipment Blanks	1 equipment blank per day collected for VOC analysis	Equipment blank is a rinsate blank, decontamination blank, or equipment blank sample. The equipment blank consists of laboratory reagent grade (contaminant-free) water that is ran through the sampling device (e.g., bailer or pump) that has been decontaminated in the field. The field blank will be submitted for VOC analysis to assess adequacy of field decontamination procedures and potential for cross-contamination during sampling.

Giles Engineering Associates, Inc.

Standard Operating Procedure
for
Decontamination

The objective of decontamination is to limit false positives and potential cross-contamination by the removal of contaminants from environmental investigation/remedial equipment and personal protective equipment (PPE), or directly from the field technician's body. Decontamination will serve two purposes for the Giles field technician prior to sampling; equipment decontamination, and personnel decontamination. For high profile projects, a regulatory agency may require that an equipment rinsate blank be submitted to verify that decontamination procedures adequately remove contaminants from sampling equipment. Personnel decontamination procedures are used in order to protect Giles field personnel from accidental absorption, ingestion, and inhalation of residual contaminants, to which the field technician may have become exposed and to prevent false positives through cross-contamination.

Giles environmental field activities will be performed wearing Level-D PPD. Level D PPE includes a minimum standard of steel-toed shoes or boots, full length pants, and nitrile/latex gloves. Level D PPE may also include wearing a hard hat, long-sleeve shirt, hearing, and eye protection. Disposable coveralls will be made available to field personnel if warranted, or if required by the site-specific Health and Safety Plan. When site activities include the handling or exposure to potentially contaminated soil/groundwater, decontamination proceedings such as hand washing (soap and warm water), should take place prior to taking breaks where food or drink may be consumed. Soil/sludge should be removed from boots prior to leaving site. Disposable PPE should be removed and containerized onsite. Onsite personnel decontamination stations should be made available whenever possible. Equipment decontamination stations should not be used for personal decontamination.

Equipment (ie; water level indicators, down-hole measuring devices) will be decontaminated between sampling points (ie; monitoring wells). Multiple equipment uses while at a same monitoring point do not require decontamination. Decontamination should be conducted with a stationary set of wash buckets positioned outside the work area. Equipment decontamination should include a minimum of three separate 5-gallon bucket wash/rinse cycles. The first bucket should contain a De-ionized (DI) water/Alconox detergent solution (or equivalent), in which scrub brushes will be used to clean residual debris from the instrument. The following two buckets are rinses. If equipment appears unclean, repeat the procedure, and replace decontamination water with clean water. Cleaned equipment shall be placed on clean plastic sheeting for immediate use. If use is prolonged the equipment should be dried, and stored in the equipment case. Water used for decontamination should be replaced with clean water at minimum, on a daily basis. Depending upon the severity of contamination to which the equipment is being exposed, several water changes may be required daily.

To further reduce cross-contamination, and by using prior site data, measurements with field equipment should always progress from the least contaminated monitoring point to the most contaminated. The sampling order should be established prior to the site visit. Cross-contamination can also be prevented using disposable sampling equipment,

which does not require decontamination. Disposable sampling equipment is intended for retrieval of one sample and cannot be reused to collect from a second sampling point.

Personnel Decontamination

Field personnel will adhere to the following procedure with respect to personal decontamination:

- Perform decontamination when leaving the contaminated area, during breaks, and at the end of the field day.
- If available, wash boots, gloves, and outer PPE in Alconox solution, then rinse with water. If disposable latex booties or Tyvex coverall suits are worn, rinse with water, remove, and discard.
- Wear the required minimum PPE.
- Wash hands/face before handling food or drink.
- Do not eat or drink while in the work zone or while wearing contaminated PPE.
- Do not use equipment decontamination stations for personal decontamination.
- At the end of the work day, shower entire body.

Equipment Decontamination

The field technician will adhere to the following procedure with respect to soil sampling equipment (split-spoons, spatulas, etc.) decontamination:

- Scrape soil from sample device.
- Decontamination of the sampling equipment occurs between each sampling and at the end of every working day.
- Wash sample barrel in water/Alconox solution or equivalent, then rinse with tap water, and final rinse with DI water.
- Place on plastic sheeting and allow to air dry or wipe with clean paper towel.
- Depending upon the severity of the contamination for which the equipment is exposed, disposal of decontamination solution will be site-specific, and may involve disposal/thinspreading onsite, or containerization in 55-gallon drums for future disposal.

Monitoring Equipment Decontamination

The field technician will adhere to the following procedure with respect to the decontamination of monitoring equipment:

- Always progress the sample point order from least contaminated to most contaminated location.
- Decontamination of the monitoring equipment occurs between each sampling location, and at the end of every working day.
- In between each measurement location, wash equipment in water/Alconox solution or equivalent, then rinse with tap water, and final rinse with DI water.
- Place on plastic sheeting and allow to air dry or wipe with clean paper towel.

- Depending upon the severity of the contamination for which the monitoring equipment is exposed, disposal of spent decontamination solutions will be site-specific, and may involve disposal onsite, or containerization in 55-gallon drums for future disposal.

Drill/Geoprobe Rig and Drill/Geoprobe Equipment Decontamination

The drill rig and drilling equipment such as augers and drill rods will be decontaminated between boring locations by washing surfaces that have been in contact with soil and groundwater using a pressurized steam cleaner. If available and appropriate, a decontamination location should be selected where a bermed decontamination pad can be constructed to collect decontamination water. Depending upon the severity of the contamination for which the drill rig/geoprobe equipment is exposed, disposal of spent decontamination solutions will be site-specific, and may involve disposal onsite, or containerization in 55-gallon drums for future disposal.

Giles Engineering Associates, Inc.

Standard Operating Procedure
for
Chain-of-Custody

Custody procedures will be used to record and document the custodial possession of samples during the project. The sample media requiring custody procedures includes soil, groundwater, air, and vapor samples that are submitted to a laboratory for chemical analyses. The samples are considered in custody, if they are:

- In person's possession;
- In view of the person after being in their possession;
- Sealed in a manner that they cannot be tampered with after having been in physical possession;
- In a secure area restricted to authorized personnel.

A Giles Chain-of-Custody (COC) form (or a laboratory-provided form) will be used to ensure that the proper custody procedures have been followed for the samples collected and submitted to the laboratory.

Upon collection, samples will be cataloged on the Giles COC form using the sample identification designation and/or number. In addition, the date and time of collection, the number of containers for each type of sample, the type of sample preservation, and the type of analyses requested will be recorded on the COC form. A separate COC will accompany each cooler or shipping container containing samples at all times.

The COC form will be sealed in a plastic bag and placed inside the sample container for transportation to the laboratory. Upon relinquishing the sample container to the laboratory (or the laboratory courier), Giles field personal will transfer custody of the samples to laboratory personnel by signing and dating the bottom of the COC form. Giles field personnel will retain one copy (pink) of the COC form. The original COC will be sent to the laboratory with the samples.

The completed original copy of the COC will be included with the final laboratory report.

Giles Engineering Associates, Inc.

Standard Operating Procedures
For
Field Note Documentation

Giles site visits under this QAPP require the completion of the documentation of the site visit in a dedicated project field book. The dedicated field book will be kept in the project file at the respective Giles office. The field book/notes will supplement field forms. **Note: Field notes are not intended to substitute for the completion of all Giles field forms**. Field notes are used to document the following;

- Chronological account of the field day,
- Objectives for the day,
- Phone discussions,
- Changes in scope or methodologies,
- Site conditions,
- Weather conditions,
- Subcontractor and subcontractor personnel,
- Times onsite and times offsite for applicable personnel,
- Site visits and discussions with client personnel or regulatory personnel,
- Photographs taken,
- Equipment calibration results (if in-field re-calibration is necessary),
- Health and safety meeting proceedings or incidents, if any,
- Other pertinent information such as tons removed, trucks leaving site, gallons pumped, feet drilled, bailers used, samples collected, drums left onsite, etc.
- Cross-reference the field forms completed for that event. Examples of field forms to be completed will include the following;
    - *Record of Subsurface Exploration,*
    - *Photoionization Detector Calibration Documentation,*
    - *Summary sheet for groundwater sampling,*
    - *Natural attenuation parameters*.

    Other forms such as *Giles Equipment Billing (Unit Rates), Expense* forms, in-house drilling forms, and WDNR forms, (i.e.; Monitoring Well Construction, Development, Well/Drillhole/Borehole Abandonment, and Groundwater Monitoring Well Information) will be finalized at the office, immediately following field activities.

On a per day and per site basis, field notes will always be started on the left hand page of the field note book. The title block of each daily site entry will start with the following;

Date;
Project Name:
Project Number:
Objective for the day:
Miles driven to site, and vehicle used:
Giles personnel:
Subcontractor name, personnel, and arrival time:
Current weather conditions (and if they drastically change during the day):

Arrival time onsite:

Following the title block data, the field note entries then document the site activities on a chronological basis, beginning each entry with the time of the day. Field notes will adhere to the following guidelines.

- Notes will be legibly printed or typed into a lap top computer.
- If pages are skipped to start on the left-hand page, a strike through of the skipped page will be made with one line diagonally across the page, and the strike through will be initialized and dated by the person making the strike through.
- All pages will be numbered in the upper right hand corner of each page and will be labeled 1/6 or 1 of 6, indicating page 1 of 6 pages per one day.
- No lines will be skipped.
- The documentation will be in pen, and must be made immediately after activity, measurement, or event.
- An error in documentation will be striked through with a single line and initialized.
- The pages will be initialized and dated at the bottom of each page by the person taking notes.
- The field notes will be finalized before leaving the site on a daily basis.
- Figures are drawn on the right-hand page and adhere to the following guidelines.
    1. The plan view North arrow and scale (if applicable) must be put in upper right hand corner of page.
    2. Dimensions should be shown on the figure.
    3. Monitoring well/soil boring locations must be put on figure with a minimum of 2 dimensions (X,Y coordinates) to permanent points (i.e.; building corners),
    4. The figures must show at minimum; approximate property lines, buildings (dimensioned), monitoring well/soil boring locations, pavement/grass areas, tree lines, known utility/UST locations, overhead obstructions (i.e.; power lines), manhole locations, and surface water impoundment areas.
    5. Offsite adjacent properties integral to the site activities, such as adjacent surface waters, may be required on site figure.

Geotechnical, Environmental & Construction Materials Consultants

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APPENDIX A

Giles Standard Operating Procedures

Standard Operating Procedures

Completion of Soil Borings

Field Screening and Visual Soil Classification

Soil Sample Collection and Analyses

Monitoring Well Installation and Development

Groundwater Level Measurements

Groundwater Quality Measurements

Groundwater Sample Collection and Analyses

Decontamination

Chain-of-Custody

Field Note Documentation

GILES
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Standard Operating Procedure

for

Completion of Soil Borings

Direct Push Soil and Groundwater Sampling

Soil borings will be advanced with a direct-push unit to retrieve a soil sample from a desired depth interval and/or install a temporary well for groundwater sample collection. The direct-push unit uses a 1 or 2-inch diameter Macrocore sampler to reach the top of the desired sampling depth. Once the sampler is positioned at the desired depth, a soil sample obtained with the Macrocore sampler lined with an acetate liner. To push the soil sample into the liner, the rod is advanced 2 or 4 feet with a hydraulically driven percussion hammer.

When the liner containing soil is brought to the surface and removed from the Macrocore sampler, the liner is cut open to allow access to the soil. Soil retrieved from the liner is used for PID/FID screening and visual classification (*Standard Operating Procedure for Field Screening and Visual Soil Classification)* and collection of soil sample for laboratory analyses (*Standard Operating Procedure for Soil Sample Collection and Analyses)*.

Prior to reinserting the Macrocore sampler for retrieval of another soil sample, the Macrocore sampler will be decontaminated to prevent cross-contamination between the sampling intervals. A new plastic liner will be inserted into the Macrocore sampler to be advanced to the top of the next sample interval. The sampling procedure will be repeated at 2- or 4-foot continuous depth intervals until the end of each Direct-push boring.

The information collected during Direct-push advancement will be presented on the final borehole logs. The logs will include information on sampling intervals and other pertinent information related to the Direct-push activities. Soil investigative waste management and disposal will follow the Standard Operating Procedure for Investigative Derived Waste.

Standard Operating Procedure
for
Field Screening and Visual Soil Classification

A portion of each soil sample will be screened for organic vapors, using a photoionization detector (PID) or a flame ionization detector (FID). The volatile vapor scan technique with either a PID or FID is a field screening method used to assess the presence of total volatile compounds. The PID will typically be equipped with a 10.6 electron-volt (eV) lamp. However, this may vary depending upon contaminant type anticipated. The PID will be zeroed, using ambient air, and then calibrated with 100 parts per million (ppm) isobutylene gas (benzene equivalent) in accordance with the manufacturers specifications prior to use each day. The PID calibration data will be recorded on the *Photoionization Detector Calibration Documentation* form.

At the discretion of the Giles project manager, an FID may be used instead of the PID. An FID must be rented, and subsequently calibrated to the manufacturer's specifications prior to use in the field for the first time and daily thereafter.

Note: This SOP for Soil Sample Field Screening and Soil Sample Collection must be applied to all sites regulated by the Wisconsin Department of Natural Resources (WDNR). This protocol may not be approved or recognized as an acceptable SOP for soil sample screening/sampling in other states and therefore, should be re-evaluated for other states, or when the EPA has regulatory jurisdiction.

This protocol has been adopted with consideration given for field-time constraints, reducing the amount of hazardous waste (methanol) generated, and unnecessary use/waste of glass-ware. However, this protocol can only be implemented properly if the field technician allows adequate time to perform the following tasks correctly. The Giles technician, being the environmental technician onsite, is the manager of the field activity, and the drilling crew must adhere to the speed the field representative dictates. Environmental field screening and soil sample collection will always dictate the work (drilling) rate. If work rate problems arise, contact the Giles project manager immediately.

- Prior to drilling each borehole, prepare heavy-duty re-sealable containers (i.e. zip-lock bags) freezer bags for each soil sample interval anticipated to be collected per boring. The re-sealable container will be used for field screening. With a ball point pen (avoid indelible large markers), write the sample interval depth on the bags (ie; 0-2, 2-4, etc.). Laboratory supplied glassware will be provided for samples to be submitted for analysis.

- Once the drilling crew provides the split-spoon or sleeve sample (interval of soil), a representative portion of the entire spoon length will be collected and split into replicate portions and placed in the laboratory supplied glassware and re-sealable container. The laboratory samples will be immediately placed in a sample cooler on ice, and cooled to 4 degrees Celsius; the re-sealable container will be placed in a location to promote volatilization. Volatilization will occur by warming the sample, preferably to room temperature if possible.

- The split portion of the interval will be classified by Giles field personnel in general accordance with the Unified Soil Classification System (USCS) guidelines.

- Once the boring has been completed and the split soil samples have been containerized for field screening and potential laboratory analysis, field screening will be performed. Field screening will be performed by inserting the probe end of the PID into re-sealable container. The PID should register a stable value within 5 seconds. Avoid subjecting the PID unit to excessive moisture by using a moisture trap on the probe end at all times. After removing the PID probe from the sample, allow the PID several seconds to return to background prior to subjecting the instrument to the next field screening sample. Measure and record the readings of the field screening soil samples one after another.

- Based on the field screening results and the field protocol determined by the Project Manager, select the split portion of the sample intervals for laboratory analysis preparation from the cooler. Follow the SOP for Soil Sample Collection and Analyses.

- The samples not selected for laboratory submittal and the field-screened samples will be managed in the same manner as the soil cuttings.

Soil samples should be containerized within 30 minutes of collection from the split spoon or sleeve sample. Again note the lamp of a PID may become saturated and produce false (high) readings if subjected to high repeated moisture. Moisture traps should always be used and then be replaced after use.

Upon completion of soil classification of each soil sample, the soil sample description will be logged on the soil boring log. The description of each soil sample interval will include information on soil type, gradation, color, moisture content, field PID/FID readings, sample recoveries, N values, total boring depth and whether a well/piezometer was installed. Sample intervals where the soil was collected for laboratory analysis will be clearly marked on the logs. The appearance of the soil samples and any incidental odors will also be noted on the logs.

Giles Engineering Associates, Inc.

Standard Operating Procedure
for
Soil Sample Collection and Analyses

The results of soil sample field screening combined with visual and olfactory observations will aid in selecting samples for laboratory analysis. The select soil samples will be submitted to a laboratory for analyses as required by the sampling plan. Depending on suspected contaminants at a specific site, these analyses may include volatile organic compounds (VOCs) or petroleum VOCs (PVOCs), polynuclear aromatic hydrocarbons (PAHs), Resource Conservation and Recovery Act (RCRA) metals, and/or polychlorinated biphenyls (PCBs).

Upon opening of the sampling device (e.g., split-spoon or plastic liner), the soil sample will be split for organic vapor field screening and collection of laboratory analyses, in accordance with the SOP for Field Screening and Visual Classification. The recovered soil will be partitioned in the sampling device and will be placed in two re-sealable containers per interval. One re-sealable container will be immediately placed in a cooler and stored at 4 degrees Celsius. The second re-sealable container per interval will be set aside for field screening. This will provide temporary sample preservation while field screening is performed on the replicate portion of the sample. Sticks, rocks and large debris will be removed from the sample aliquots sent to the laboratory. A new pair of Nitrile gloves will be worn for the handling of each sampling interval.

The soil sample collection, storage, and transportation will be performed in general accordance with USEPA, and/or Wisconsin Department of Natural Resources (WDNR) specifications and follow standard Chain-of-Custody (COC) requirements (including keeping samples in a refrigerator or on ice in a cooler).

Certain soil analyses (e.g. VOCs, PVOCs, etc) require that a specific amount of soil be weighed in the field before placing in the sample container. To weigh appropriate amount of soil, the field scale will be used. Prior to use, the scale will be properly calibrated in accordance with the calibration procedure described in the *Standard Operating Procedure for Use of Field Equipment*. Calibration will be recorded in a field book or on the appropriate form.

Specific requirements for sample container type, preservative, and holding times are discussed in the following section of this SOP and summarized in Table 1, attached. Please note that the type of containers may vary for different laboratories. The following section describes the specific container types.

<u>VOCs & PVOCs</u>
Soil samples collected for the VOC and PVOC analyses will be preserved with methanol, which must be noted on the Chain-of-Custody. The soil samples must be preserved with methanol using one of the following techniques:

Standard Soil Sample Collection - Immediate Methanol Preservation.
After field screening, collect soil into tarred VOC vials and preserve immediately with methanol. Store samples on ice or at 4 ° C. Vials should be shipped in an upright position. Vials should also be placed in separate "zip lock" bags to limit the potential for cross contamination. Field personnel should be aware that laboratories use a variety of vial tare methods, so it is important to use only vials supplied by the specific laboratory.

PAHs
For the PAH analysis, a minimum 100 grams of soil will be packed into a non-preserved, labeled 4-oz glass container, and sealed with a Teflon-lined lid. Following collection, the sample will be placed on ice in a cooler.

RCRA Metals
For RCRA metals analysis, a minimum 20 grams of soil will be packed into a non-preserved, labeled 100-ml plastic container and sealed with plastic lid. Following collection, sample will be placed on ice in a cooler.

PCBs
For PCB analysis, a minimum 100 grams of soil will be packed into a non-preserved, labeled 4-oz glass container, and sealed with a Teflon-lined lid. Following collection, the sample will be placed on ice in a cooler.

The sample containers designated for laboratory analyses will be labeled and identified by sample number, date and time of collection, sample depth interval, analyses to be performed, and the project number. The same information will be recorded on the COC.

Table 1. Sample Container, Preservation, and Holding Time Requirements for Select Soil Analyses.

Analysis	**Container**	**Preservation**	**Holding Time**
VOCs/PVOCs	1-2oz glass jar	Methanol & Cool to 4° C	14 days
PAHs	1-4 oz glass jar	Cool to 4° C	14 days
PCBs	1-4 oz glass jar	Cool to 4° C	14 days
Metals	1-100 ml plastic container	Cool to 4° C	6 months, except chromium hexavalent 24 hrs, mercury 28 days

Table 2. QA/QC Sample Requirements

QA/QC Sample Type	**Frequency of Sample Analysis**	**Details**
Methanol Trip Blank	1 blank per sampling event	To prepare the methanol trip blank sample, field personnel will transfer methanol from a premeasured vial to an empty, but tarred, vial. (This QA/QC sample is not required for samples preserved with methanol in the laboratory.)
Methanol Field Blank	1 blank per sampling event or day	To prepare a methanol field blank, open the sample container or vial to the atmosphere to expose the methanol to potential atmospheric background – contamination.

Giles Engineering Associates, Inc.

Standard Operating Procedure
for
Monitoring Well Installation and Development

Monitoring wells will be installed in a manner that permits the screened interval to intercept the water table through seasonal water table level fluctuations. Monitoring wells will be constructed of 0.01-inch slotted, 2-inch diameter (1-inch for the interior well), flush-threaded, Schedule 40 polyvinyl chloride (PVC) screen. The screen will be 10 feet in length for monitoring wells. The riser pipe will consist of Schedule 40, flush threaded PVC. A 4-inch long flush threaded, Schedule 40 PVC cap will be placed on the bottom of the monitoring well screens.

The annular space surrounding each well screen will be backfilled with clean, well-sorted silica sand as a filter between the formation material and the well screen. Monitoring wells will be constructed inside of the 4¼-inch inside diameter hollow-stem augers. Care will be taken to properly place a continuous filter pack between the well screen and the borehole wall. The filter packs will extend approximately 1 to 2 feet above the top of the well screens. The top of the filter pack will be measured with a weighted measuring tape for depth confirmation.

A bentonite seal, 2 to 3 feet thick, will be placed in the annular space above the filter pack. The seal will be composed of commercially-manufactured bentonite chips. The bentonite will be slowly poured through the hollow-stem augers to minimize the potential for bridging. The finished bentonite surface will be measured with a weighted measuring tape for depth confirmation. The well screen will be positioned so as to intercept the chemicals of concern or assess the hydrogeologic properties of the saturated zone.

Granular bentonite will be placed above the bentonite seal to the ground surface. The bentonite will be slowly poured through the hollow-stem augers to minimize the potential for bridging. The bentonite will be backfilled until it is observed near the ground surface. The annular seal will be added in lifts; alternating between bentonite placement through the hollow-stem augers and auger removal.

During well construction, a cap will be installed at the top of the riser to prevent material from entering the well. A flush-mount (road box) type, protective casings will be used in high traffic areas. A lock on the compression cap will be installed on monitoring wells, completed with a road box; the protective casing cover will be bolted in place.

Monitoring Well Development

The Monitoring wells will be developed following well installation.

The objectives of the well development are to:

- assure that groundwater enters the well screen freely, thus yielding a representative groundwater sample and water level measurement;

- remove fine-grained sediment in the filter pack and the nearby formation adjacent to the filter pack to minimize groundwater sample turbidity and silting of the well; and,

- maximize the efficiency of the filter pack for aquifer hydraulic testing.

Well development will consist of alternating periods of surging with a disposable bailer and purging using a 2-inch diameter centrifugal pump, an air lift pump, or equivalent. The pumping rate will be set to correspond with the aquifer yield. Well development activities will continue until the groundwater effluent turbidity is reduced to clear conditions or until the suspended sediments have stabilized. For wells exhibiting low recharge (i.e. clay) development will consist of pumping until the well until it no longer yields water.

Giles Engineering Associates, Inc.

Standard Operating Procedure
for
Groundwater Level Measurements

Static water level measurements will be made using a Solinst Model 102 groundwater level indicator (or equivalent) prior to groundwater monitoring well development, purging, down-hole groundwater quality measurements and groundwater sample collection.

- Do not place groundwater level indicator in monitoring wells known or suspected to contain free-product.
- The groundwater level indicator will be decontaminated before and after each measurement location with a solution of water/Alconox solution and 2 water rinses.
- Monitoring wells will be opened and allowed to equilibrate for a minimum of 10 minutes prior to measurements.
- The depth to groundwater within each well will be recorded at the time the measurement is completed.
- The measurement shall be made referenced to a mark in the PVC top of casing, which is also indicated by a mark made on the northern most edge of the top of the casing.
- Groundwater measurements will be recorded to the nearest 0.01–foot.
- The data will be recorded on the Giles *Summary Sheet for Groundwater Sampling*. The completed form will contain the following information: monitoring well number; time and date of the measurement; depth to groundwater; type of measuring device used; initials of individuals collecting the data; project number; location of the site; weather conditions; and any additional observations noted (i.e. well protector top condition).

Giles Engineering Associates, Inc.

Standard Operating Procedure
for
Groundwater Sample Collection and Analyses

Groundwater samples will be submitted to a laboratory for analyses as required. These analyses may often include, but are not limited to volatile and semi volatile organic analyses (VOCs/PVOCs, and PAHs), and inorganic analyses (RCRA metals).

Groundwater samples may also be analyzed for natural attenuation parameters (ferrous iron, nitrate-nitrite, sulfate, alkalinity, and methane) during periodic groundwater monitoring, if conducted at the site. The ferrous iron will be tested in the field using a field kit, while sulfate, nitrate-nitrite, and methane will be analyzed in the laboratory. Standard field measurements including temperature, conductivity, pH, dissolved oxygen, and redox potential will also be collected during each sampling event using the water quality probe and will conform to the *Groundwater Quality Measurements SOP*.

Groundwater samples can be collected from a temporary well, established in the Geoprobe borehole, or from a permanent groundwater monitoring well/piezometer.

- Collection of Groundwater Samples from Temporary Wells

  Groundwater samples obtained from temporary wells will be collected by placing slotted ¾-inch inside diameter (I.D.) PVC pipe and solid PVC riser within the borehole. If possible, the temporary well will be purged and the volume of water evacuated during purging will be recorded. One-quarter inch I.D. plastic/silicone tubing with a Geo-pump© or a ½-inch disposable "pencil bailer" will be used to collect the groundwater sample.

- Collection of Groundwater Samples from Permanent Wells/Piezometers

  Groundwater samples from permanent groundwater monitoring wells/piezometers will be collected in accordance with the WDNR, Bureau of Drinking Water and Groundwater, Groundwater Sampling Field Manual, dated September 1996 (PUBL-DG-03896). A copy of Section 2.0 of the manual entitled "Sampling Procedures for Monitoring Wells" is attached with this SOP. A brief description of purging and sampling procedures is presented below.

  The permanent groundwater monitoring wells/piezometers must be purged prior to sampling. There are several methods that can be utilized for the purging of wells that do not purge dry and those that purge dry:

  <u>Wells that do NOT Purge Dry</u>

  - Low-flow purging <1 l/min, low-flow sampling <300 ml/min and monitor indicator parameters for stability in a closed flow-through cell. The procedure for low-flow purging and sampling using the closed flow-through cell is described in the above-referenced WDNR manual.

- Purging FOUR well volumes with a standard pump or a bailer. Please use Giles *Summary Sheet for Groundwater Sampling* form to calculate the well volume (in gallons) based on the well size and the height of water column in the well.

Wells that Purge Dry

- Low-flow Purging and Sampling – purge well dry. Collect groundwater samples within 24 hrs of purging.

- Purging and Sampling with a Bailer – purge well dry. Collect groundwater samples within 24 hrs of purging.

Depending on the type of analyses requested, groundwater will be collected into containers in the following order from an inline sample port located immediately before the low flow cell:

1. Unfiltered samples for in-field water quality measurements. (This is not necessary, if a down-hole or closed flow-through cell measurements are taken.)
2. VOCs.
3. Non-filtered, non-preserved (e.g., sulfate, total chromium VI, mercury, semi- and non-volatiles, pesticides.
4. Non-filtered, preserved (e.g., nitrogen series, total metals, and total organic carbon).
5. Filtered, non-preserved (e.g., dissolved chromium VI, and nitrate).
6. Filtered, preserved immediately (e.g., dissolved metals).
7. Other parameters.

The date and time of sample collection among other pertinent information (i.e., project number, sample identification number, and analysis requested) will be recorded on the sample container and on the sampling log. The groundwater sample collection, storage, and transportation will be performed in general accordance with ASTM and WDNR specifications and will follow standard COC requirements. The specific requirements for sample container type, preservative, and holding times are discussed in the following section of this SOP and summarized in Table 1, attached. Please note that the type of containers may vary for different laboratories. The following section describes the specific container types that are currently provided by Synergy of Appleton, Wisconsin.

VOCs/PVOCs

Groundwater collected for VOCs/PVOCs will be placed in three laboratory-supplied, 40-ml glass vials with Teflon® lined lids preserved with hydrochloric acid. Tip the container at a slight angle and allow a slow, steady stream of water to run down its inner wall. Fill the sample container until the water forms a positive meniscus at the vial rim, then immediately replace the cap. Invert the sample container and tap it lightly to check for bubbles. If bubbles are present, fill a new sample container. Trip and field water blank samples will also be analyzed for VOCs to serve as QA checks (see Table 2, attached).

RCRA Metals

Groundwater collected for RCRA metals will be field-filtered and placed in laboratory-supplied, 500-ml plastic bottles, preserved with nitric acid and sealed.

PCBs
Groundwater collected for PCBs will be placed in a laboratory-supplied, unpreserved 1,000-ml amber glass bottle sealed with Teflon® lined lids.

Ferrous Iron
Ferrous iron will be measured in the field using a Hach kit.

Nitrate
Groundwater samples collected for nitrate will be placed in a laboratory-supplied, 250-ml plastic high-density polyethylene (HDPE) container.

Sulfate
Groundwater collected for sulfate will be placed in a laboratory-supplied, unpreserved 500-ml plastic HDPE container.

Methane
Groundwater collected for methane will be placed in two laboratory-supplied, 40-ml glass vials with Teflon® lined lids preserved with hydrochloric acid.

The groundwater samples collected for laboratory analysis will be placed on ice in a cooler immediately following collection. Samples accompanied by COC will be picked up from the Giles office by the laboratory courier the next day. Overnight storage must be at a minimum temperature of 4°C (i.e., on ice or in a refrigerator).

Groundwater generated as a part of permanent monitoring well/piezometer purging will be contained in labeled drums and temporarily staged pending receipt of groundwater analytical results. If based on the analytical results, the drummed water contains detectable concentrations of contaminants; the drummed groundwater will be disposed of in the sanitary sewer system (if approved) or off site by a licensed waste hauler. If groundwater does not contain any detectable contaminants, it will be dispersed on site (thin spread on pavement). Due to small quantity, the groundwater evacuated from temporary wells set in Geoprobe boreholes will be dispersed on site.

Table 1. Sample Container, Preservation, and Holding Time Requirements for Select Groundwater Sample Analyses.

Analysis	Container	Preservation	Holding Time
Metals, Dissolved and Field-Filtered	1-500 ml HDPE jar	HNO3 to pH<2, cool to 4° C	6 months, chromium hexavalent 24 hrs, mercury 28 days
VOCs	3-40 ml, glass vials	HCL, cool to 4° C	14 days
PAHs	1-1,000 ml amber glass bottles	Cool to 4° C	7 days
Nitrate	1-250 ml HDPE jar	Cool to 4° C	48 hrs
Sulfate	1-500 ml HDPE jar	Cool to 4° C	28 days
Methane	2-40ml, glass vials	HCL, cool to 4° C	14 days

Table 2. QA/QC Sample Requirements

QA/QC Sample Type	Frequency of Sample Analysis	Details
Duplicates	1 duplicate per 20 samples	Duplicate sample is a groundwater sample that will be collected by the same methods and at the same time as original sample.
Trip Blanks	1 trip blank per cooler containing samples for VOC analysis	Trip blank is a laboratory-prepared blank containing DI water. The trip blank will be submitted for VOC analysis to assess potential contamination during sample container shipment and storage.
Field Blanks	1 field blank per day collected for VOC analysis or other analysis dependant of background conditions	Field blank is a background atmospheric blank sample. The field blank consists of laboratory reagent grade (contaminant-free) water that is exposed to the atmosphere where the water sampling is taken place. The field blank will be submitted for VOC analysis to assess the potential for background contamination during sampling. Additional analyses may be requested depending on Site conditions.
Equipment Blanks	1 equipment blank per day collected for VOC analysis	Equipment blank is a rinsate blank, decontamination blank, or equipment blank sample. The equipment blank consists of laboratory reagent grade (contaminant-free) water that is ran through the sampling device (e.g., bailer or pump) that has been decontaminated in the field. The field blank will be submitted for VOC analysis to assess adequacy of field decontamination procedures and potential for cross-contamination during sampling.

Giles Engineering Associates, Inc.

Standard Operating Procedure
for
Decontamination

The objective of decontamination is to limit false positives and potential cross-contamination by the removal of contaminants from environmental investigation/remedial equipment and personal protective equipment (PPE), or directly from the field technician's body. Decontamination will serve two purposes for the Giles field technician prior to sampling; equipment decontamination, and personnel decontamination. For high profile projects, a regulatory agency may require that an equipment rinsate blank be submitted to verify that decontamination procedures adequately remove contaminants from sampling equipment. Personnel decontamination procedures are used in order to protect Giles field personnel from accidental absorption, ingestion, and inhalation of residual contaminants, to which the field technician may have become exposed and to prevent false positives through cross-contamination.

Giles environmental field activities will be performed wearing Level-D PPD. Level D PPE includes a minimum standard of steel-toed shoes or boots, full length pants, and nitrile/latex gloves. Level D PPE may also include wearing a hard hat, long-sleeve shirt, hearing, and eye protection. Disposable coveralls will be made available to field personnel if warranted, or if required by the site-specific Health and Safety Plan. When site activities include the handling or exposure to potentially contaminated soil/groundwater, decontamination proceedings such as hand washing (soap and warm water), should take place prior to taking breaks where food or drink may be consumed. Soil/sludge should be removed from boots prior to leaving site. Disposable PPE should be removed and containerized onsite. Onsite personnel decontamination stations should be made available whenever possible. Equipment decontamination stations should not be used for personal decontamination.

Equipment (ie; water level indicators, down-hole measuring devices) will be decontaminated between sampling points (ie; monitoring wells). Multiple equipment uses while at a same monitoring point do not require decontamination. Decontamination should be conducted with a stationary set of wash buckets positioned outside the work area. Equipment decontamination should include a minimum of three separate 5-gallon bucket wash/rinse cycles. The first bucket should contain a De-ionized (DI) water/Alconox detergent solution (or equivalent), in which scrub brushes will be used to clean residual debris from the instrument. The following two buckets are rinses. If equipment appears unclean, repeat the procedure, and replace decontamination water with clean water. Cleaned equipment shall be placed on clean plastic sheeting for immediate use. If use is prolonged the equipment should be dried, and stored in the equipment case. Water used for decontamination should be replaced with clean water at minimum, on a daily basis. Depending upon the severity of contamination to which the equipment is being exposed, several water changes may be required daily.

To further reduce cross-contamination, and by using prior site data, measurements with field equipment should always progress from the least contaminated monitoring point to the most contaminated. The sampling order should be established prior to the site visit. Cross-contamination can also be prevented using disposable sampling equipment,

which does not require decontamination. Disposable sampling equipment is intended for retrieval of one sample and cannot be reused to collect from a second sampling point.

Personnel Decontamination

Field personnel will adhere to the following procedure with respect to personal decontamination:

- Perform decontamination when leaving the contaminated area, during breaks, and at the end of the field day.
- If available, wash boots, gloves, and outer PPE in Alconox solution, then rinse with water. If disposable latex booties or Tyvex coverall suits are worn, rinse with water, remove, and discard.
- Wear the required minimum PPE.
- Wash hands/face before handling food or drink.
- Do not eat or drink while in the work zone or while wearing contaminated PPE.
- Do not use equipment decontamination stations for personal decontamination.
- At the end of the work day, shower entire body.

Equipment Decontamination

The field technician will adhere to the following procedure with respect to soil sampling equipment (split-spoons, spatulas, etc.) decontamination:

- Scrape soil from sample device.
- Decontamination of the sampling equipment occurs between each sampling and at the end of every working day.
- Wash sample barrel in water/Alconox solution or equivalent, then rinse with tap water, and final rinse with DI water.
- Place on plastic sheeting and allow to air dry or wipe with clean paper towel.
- Depending upon the severity of the contamination for which the equipment is exposed, disposal of decontamination solution will be site-specific, and may involve disposal/thinspreading onsite, or containerization in 55-gallon drums for future disposal.

Monitoring Equipment Decontamination

The field technician will adhere to the following procedure with respect to the decontamination of monitoring equipment:

- Always progress the sample point order from least contaminated to most contaminated location.
- Decontamination of the monitoring equipment occurs between each sampling location, and at the end of every working day.
- In between each measurement location, wash equipment in water/Alconox solution or equivalent, then rinse with tap water, and final rinse with DI water.
- Place on plastic sheeting and allow to air dry or wipe with clean paper towel.

- Depending upon the severity of the contamination for which the monitoring equipment is exposed, disposal of spent decontamination solutions will be site-specific, and may involve disposal onsite, or containerization in 55-gallon drums for future disposal.

Drill/Geoprobe Rig and Drill/Geoprobe Equipment Decontamination

The drill rig and drilling equipment such as augers and drill rods will be decontaminated between boring locations by washing surfaces that have been in contact with soil and groundwater using a pressurized steam cleaner. If available and appropriate, a decontamination location should be selected where a bermed decontamination pad can be constructed to collect decontamination water. Depending upon the severity of the contamination for which the drill rig/geoprobe equipment is exposed, disposal of spent decontamination solutions will be site-specific, and may involve disposal onsite, or containerization in 55-gallon drums for future disposal.

Giles Engineering Associates, Inc.

Standard Operating Procedure
for
Chain-of-Custody

Custody procedures will be used to record and document the custodial possession of samples during the project. The sample media requiring custody procedures includes soil, groundwater, air, and vapor samples that are submitted to a laboratory for chemical analyses. The samples are considered in custody, if they are:

- In person's possession;
- In view of the person after being in their possession;
- Sealed in a manner that they cannot be tampered with after having been in physical possession;
- In a secure area restricted to authorized personnel.

A Giles Chain-of-Custody (COC) form (or a laboratory-provided form) will be used to ensure that the proper custody procedures have been followed for the samples collected and submitted to the laboratory.

Upon collection, samples will be cataloged on the Giles COC form using the sample identification designation and/or number. In addition, the date and time of collection, the number of containers for each type of sample, the type of sample preservation, and the type of analyses requested will be recorded on the COC form. A separate COC will accompany each cooler or shipping container containing samples at all times.

The COC form will be sealed in a plastic bag and placed inside the sample container for transportation to the laboratory. Upon relinquishing the sample container to the laboratory (or the laboratory courier), Giles field personal will transfer custody of the samples to laboratory personnel by signing and dating the bottom of the COC form. Giles field personnel will retain one copy (pink) of the COC form. The original COC will be sent to the laboratory with the samples.

The completed original copy of the COC will be included with the final laboratory report.

Giles Engineering Associates, Inc.

Standard Operating Procedures
For
Field Note Documentation

Giles site visits under this QAPP require the completion of the documentation of the site visit in a dedicated project field book. The dedicated field book will be kept in the project file at the respective Giles office. The field book/notes will supplement field forms. **Note: Field notes are not intended to substitute for the completion of all Giles field forms**. Field notes are used to document the following;

- Chronological account of the field day,
- Objectives for the day,
- Phone discussions,
- Changes in scope or methodologies,
- Site conditions,
- Weather conditions,
- Subcontractor and subcontractor personnel,
- Times onsite and times offsite for applicable personnel,
- Site visits and discussions with client personnel or regulatory personnel,
- Photographs taken,
- Equipment calibration results (if in-field re-calibration is necessary),
- Health and safety meeting proceedings or incidents, if any,
- Other pertinent information such as tons removed, trucks leaving site, gallons pumped, feet drilled, bailers used, samples collected, drums left onsite, etc.
- Cross-reference the field forms completed for that event. Examples of field forms to be completed will include the following;
    - *Record of Subsurface Exploration,*
    - *Photoionization Detector Calibration Documentation,*
    - *Summary sheet for groundwater sampling,*
    - *Natural attenuation parameters*.

    Other forms such as *Giles Equipment Billing (Unit Rates), Expense* forms, in-house drilling forms, and WDNR forms, (i.e.; Monitoring Well Construction, Development, Well/Drillhole/Borehole Abandonment, and Groundwater Monitoring Well Information) will be finalized at the office, immediately following field activities.

On a per day and per site basis, field notes will always be started on the left hand page of the field note book. The title block of each daily site entry will start with the following;

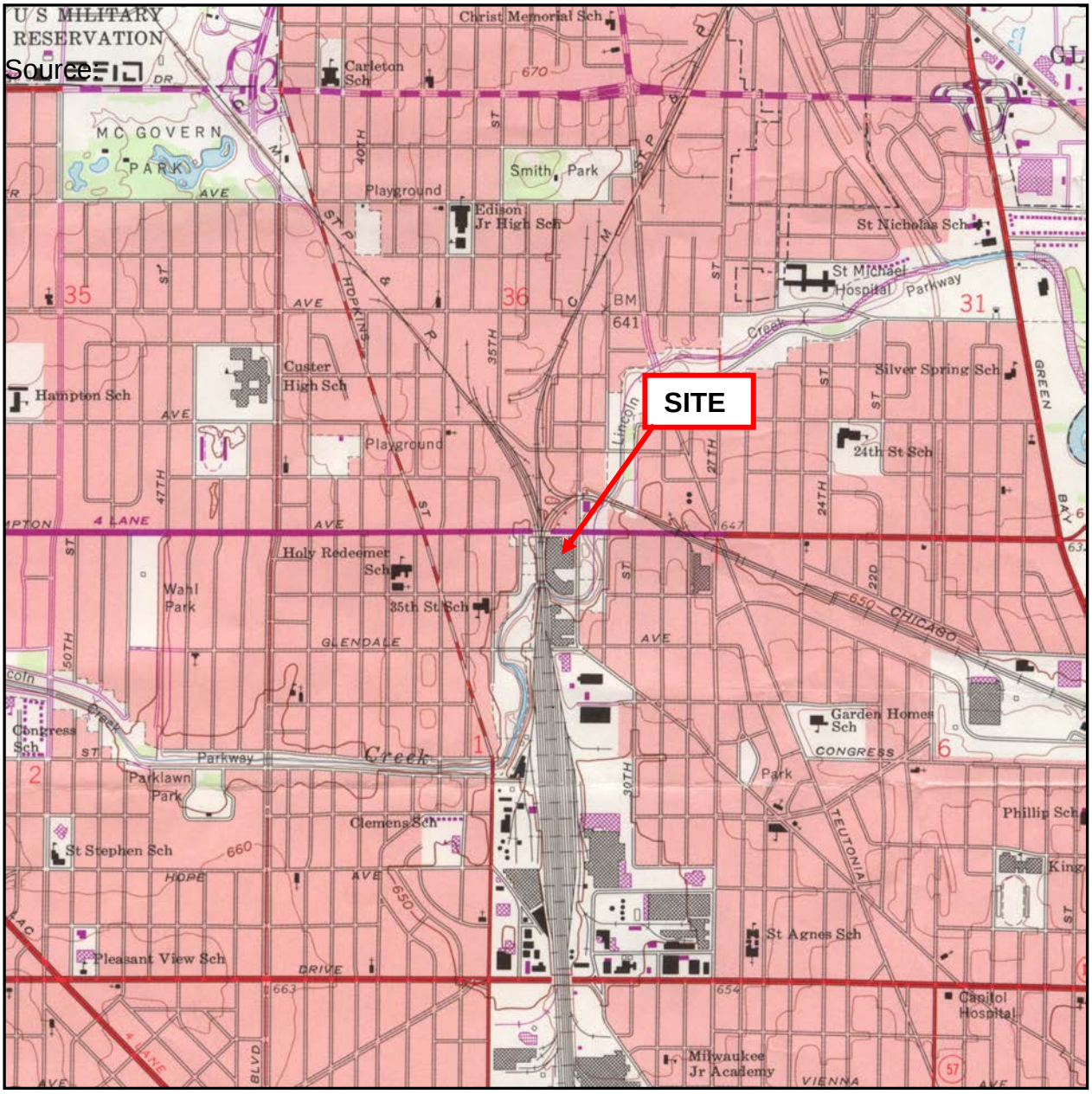
Date;
Project Name:
Project Number:
Objective for the day:
Miles driven to site, and vehicle used:
Giles personnel:
Subcontractor name, personnel, and arrival time:
Current weather conditions (and if they drastically change during the day):

Arrival time onsite:

Following the title block data, the field note entries then document the site activities on a chronological basis, beginning each entry with the time of the day. Field notes will adhere to the following guidelines.

- Notes will be legibly printed or typed into a lap top computer.
- If pages are skipped to start on the left-hand page, a strike through of the skipped page will be made with one line diagonally across the page, and the strike through will be initialized and dated by the person making the strike through.
- All pages will be numbered in the upper right hand corner of each page and will be labeled 1/6 or 1 of 6, indicating page 1 of 6 pages per one day.
- No lines will be skipped.
- The documentation will be in pen, and must be made immediately after activity, measurement, or event.
- An error in documentation will be striked through with a single line and initialized.
- The pages will be initialized and dated at the bottom of each page by the person taking notes.
- The field notes will be finalized before leaving the site on a daily basis.
- Figures are drawn on the right-hand page and adhere to the following guidelines.
    1. The plan view North arrow and scale (if applicable) must be put in upper right hand corner of page.
    2. Dimensions should be shown on the figure.
    3. Monitoring well/soil boring locations must be put on figure with a minimum of 2 dimensions (X,Y coordinates) to permanent points (i.e.; building corners),
    4. The figures must show at minimum; approximate property lines, buildings (dimensioned), monitoring well/soil boring locations, pavement/grass areas, tree lines, known utility/UST locations, overhead obstructions (i.e.; power lines), manhole locations, and surface water impoundment areas.
    5. Offsite adjacent properties integral to the site activities, such as adjacent surface waters, may be required on site figure.

FIGURES

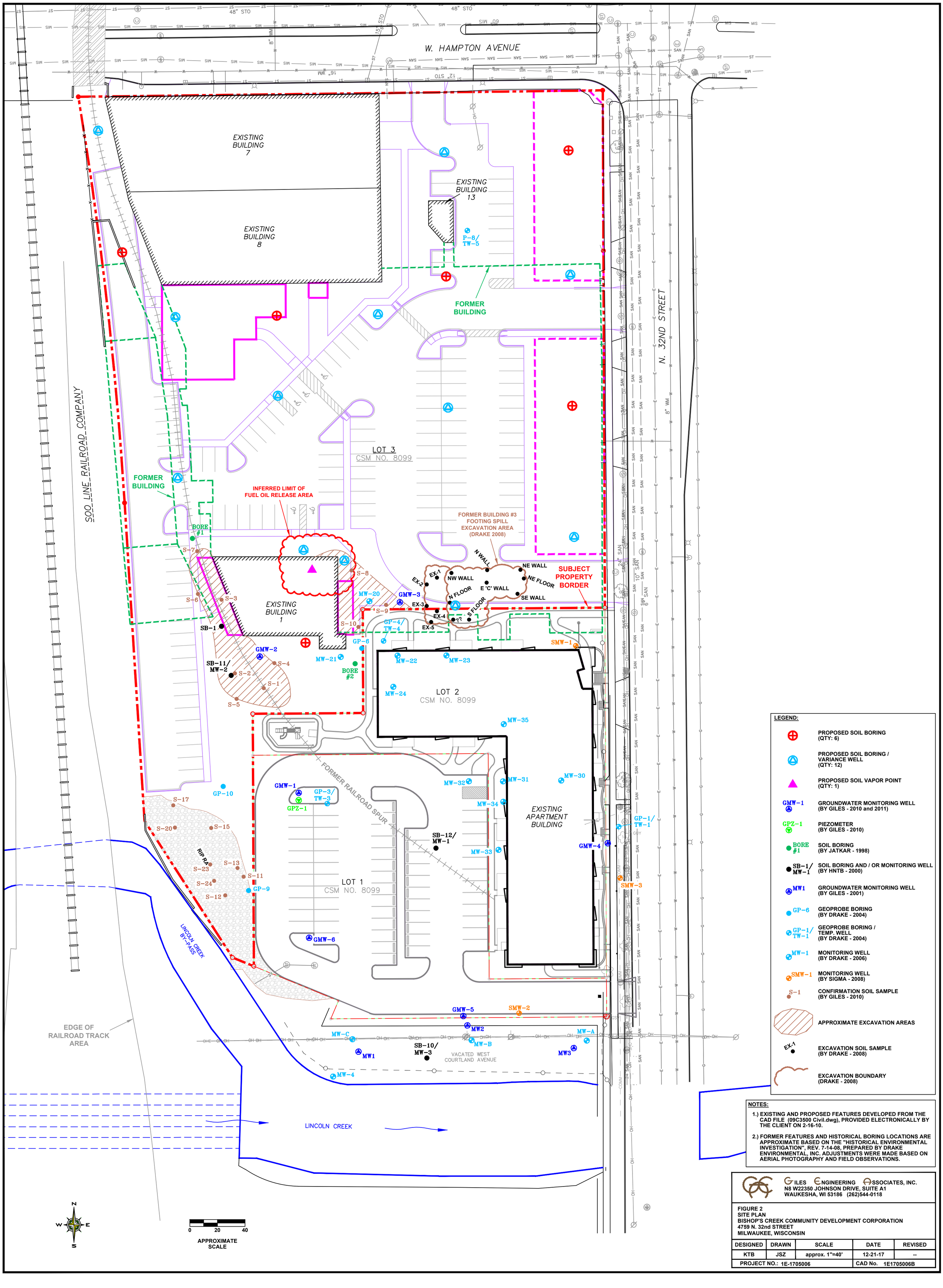


Source: USGS *Milwaukee, Wisconsin* 7.5-Minute Series (topographic) Quadrangle Map (1958; photorevised in 1971)

Scale: 1:24,000
Contour Interval: 10 Feet

N
W E
S

FIGURE 1
SITE LOCATION MAP
Bishop's Creek Community Development Corporation
4759 North 32nd Street
Milwaukee, Wisconsin
Project No. 1E-1705006



LEGEND:

- PROPOSED SOIL BORING (QTY: 6)
- PROPOSED SOIL BORING / VARIANCE WELL (QTY: 12)
- PROPOSED SOIL VAPOR POINT (QTY: 1)
- GMW-1 — GROUNDWATER MONITORING WELL (BY GILES - 2010 and 2011)
- GPZ-1 — PIEZOMETER (BY GILES - 2010)
- BORE #1 — SOIL BORING (BY JATKAR - 1998)
- SB-1/ MW-1 — SOIL BORING AND / OR MONITORING WELL (BY HNTB - 2000)
- MW1 — GROUNDWATER MONITORING WELL (BY GILES - 2001)
- GP-6 — GEOPROBE BORING (BY DRAKE - 2004)
- GP-1/ TW-1 — GEOPROBE BORING / TEMP. WELL (BY DRAKE - 2004)
- MW-1 — MONITORING WELL (BY DRAKE - 2006)
- SMW-1 — MONITORING WELL (BY SIGMA - 2008)
- S-1 — CONFIRMATION SOIL SAMPLE (BY GILES - 2010)
- APPROXIMATE EXCAVATION AREAS
- EX-1 — EXCAVATION SOIL SAMPLE (BY DRAKE - 2008)
- EXCAVATION BOUNDARY (DRAKE - 2008)

NOTES:

1.) EXISTING AND PROPOSED FEATURES DEVELOPED FROM THE CAD FILE (09C3500 Civil.dwg), PROVIDED ELECTRONICALLY BY THE CLIENT ON 2-16-10.

2.) FORMER FEATURES AND HISTORICAL BORING LOCATIONS ARE APPROXIMATE BASED ON THE "HISTORICAL ENVIRONMENTAL INVESTIGATION", REV. 7-14-08, PREPARED BY DRAKE ENVIRONMENTAL, INC. ADJUSTMENTS WERE MADE BASED ON AERIAL PHOTOGRAPHY AND FIELD OBSERVATIONS.

GILES ENGINEERING ASSOCIATES, INC.
N8 W22350 JOHNSON DRIVE, SUITE A1
WAUKESHA, WI 53186 (262)544-0118

FIGURE 2
SITE PLAN
BISHOP'S CREEK COMMUNITY DEVELOPMENT CORPORATION
4759 N. 32nd STREET
MILWAUKEE, WISCONSIN

DESIGNED	DRAWN	SCALE	DATE	REVISED
KTB	JSZ	approx. 1"=40'	12-21-17	--
PROJECT NO.: 1E-1705006			CAD No. 1E1705006B	