Ohio Voluntary Action Program (VAP)

Final Draft VAP Phase II Work Plan

Former Whirlpool Park
County Road 187
Green Springs, Ohio 43410

April 17, 2013

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List of Acronyms

AECOM	AECOM Technical Services
AST	Above Ground Storage Tank
bgs	below ground surface
CAH	Chlorinated aliphatic hydrocarbons
CL	Lean Clay
COCs	Constituents of Concern
CP	Certified Professional
CS	Fat Clay
DA	de minimis area
DGS	Division of Geological Survey
EPA	Environmental Protection Agency
ER	Electrical Resistivity
FSP	Field Sampling Plan
ft	Feet
FWP	Former Whirlpool Park
ft/ft	Feet per Foot
gpm	gallons per minute
GUPUS	Generic Unrestricted Potable Use Standards
HASP	Health and Safety Plan
IA	Identified Area
mg/kg	milligrams per kilograms
msl	Mean Sea Level
MW	Monitoring Well
µg/L	Micrograms per Liter
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
ODNR	Ohio Department of Natural Resources
O&M	Operation and Maintenance
PA	Property Assessment
POGWMUPUS	Protection of Groundwater meeting GUPUS
RC	Representative Concentration
RMP	Risk Mitigation Plan
SCS	Soil Classification System
TAL	Target Analyte List
TGM	Technical Guidance Manual
UPUS	Unrestricted Potable Use Standards
USCS	Unified Soil Classification System
USDA	United States Department of Agriculture
USGS	United States Geological Survey
VAP	Voluntary Action Program
VOCs	Volatile Organic Compounds

1.0 Introduction

This VAP Phase II Property Assessment (PA) Work Plan was developed in support of the environmental assessment of the Former Whirlpool Park (FWP) site located at County Road 187, Green Springs, Ohio. This work plan was prepared in general accordance with the Ohio Environmental Protection Agency (OEPA) Voluntary Action Program (VAP) Rule 7 (Ohio Administrative Code (OAC) 3745-300-07 dated April 23, 2012). The VAP Phase I PA (date) determined the location of three (3) Identified Areas (IAs) on the Property. The purpose of this Phase II Work Plan is to describe sampling activities needed to determine if the IAs meet VAP applicable standards.

2.0 Phase I Summary

2.1 Property Identification

The Property is located about one mile north of Green Springs, Ohio in Sandusky County as shown on Figure 1, Property Location Map (USGS, 1980). The Property consists of an odd-shaped parcel of 27 acres with the main southern area consisting of a 20-acre triangle (South Triangle) and the remaining seven acres a narrow strip of land extending to the north along Flag Run Creek (North Leg). The Property is situated in a rural area of southern Sandusky County in a region used mostly for agricultural purposes as shown on Figure 2.

2.2 Eligibility

The Property is eligible to participate in the VAP, although remedial obligations under the Toxic Substance Control Act (TSCA) would need to be satisfied prior to submittal of a VAP No Further Action (NFA) Letter.

2.3 Identified Areas

The Phase I PA resulted in the recognition of three (3) IAs, as shown on Figure 3, Identified Area Map. A detailed description of each IA and associated COCs is provided below:

> IA#1 – Former East Ravine – VOCs, SVOCs, TAL Metals, pesticides and herbicides, PCBs – The area between the existing manhole and the culvert outfall to the East Pond is a former ravine which may have been partially filled in 1954 with excavated soil from construction of the former swimming pool area in 1954. Information provided in this report indicates that a culvert and manhole were later installed in 1959 with the culvert and ravine filled to match surface grade sometime between 1960 and 1964 at least partially with a gray fill material (origin unknown). The fill depth is up to 11 ft deep and sampling conducted by USEPA in 2012 indicates the presence of PCBs, cobalt and nickel above agency screening levels.
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> IA#2 – Soil Stockpiles – Asbestos, lead, mercury – Stockpiles of soil have been placed on the parking lot and beyond the east edge of the parking lot paving since the property was sold by Whirlpool in 2008. The stockpiles are reportedly associated with construction activity conducted by a contractor during construction of the new elementary school in Green Springs, Ohio.

IA#3 – Fill Area – VOCs, SVOCs, TAL Metals, pesticides and herbicides, PCBs– Although no known COCs would be associated with the demolished former grist mill, material from a manufacturing plant, paint materials, empty rusted drums and a former gasoline AST may have impacted soil and groundwater at this area of the property.

2.4 De Mimimis Areas

The Phase I PA did not identify any de minimis areas.

2.5 Adjacent Properties

There was one off-site source discovered that may impact the VAP Property. Based on interview information, fill material was placed on the property located directly south and adjacent to the FWP property at 1909 County Road 181 in 1953. An aerial photo from 1976 also indicates a fill area at this location. Origin of the fill material is unknown and reportedly did not originate from the FWP site and is up-gradient of the FWP site.

3.0 Subsurface Conditions

The Property is situated within the Huron-Erie Lake Plains physiographic region of Ohio, which is characterized as a flat, low-lying portion of the state underlain by glacial till, glacial lacustrine clays and beach ridge sands that overlie primarily limestone bedrock (Ohio Division of Geologic Survey, 1998). According to the Ohio Department of Natural Resources (ODNR) Groundwater Resources Map of Sandusky County published in 1980 (Schmidt, 1980), the Property lies in an area of clayey glacial till occasionally containing inter-bedded sand and gravel lenses within a buried valley aquifer system that trends northward toward Lake Erie. Yields in the buried valley system range (Ohio Division of Geologic Survey, 1998) from 25 to 100 gpm in the unconsolidated deposits.

An ODNR well survey conducted for the Phase I PA indicated the presence of 40 water supply wells within a one-mile radius of the Property. The ODNR driller logs were used to construct a generalized regional geologic cross-section taken in an east-west direction as shown on Figure 4. Figure 4 indicates the presence of a north-south trending buried bedrock valley filled with a clay-based glacial till with inter-bedded sand and gravel layers or lenses. Depth to bedrock varies from 50 to 125 ft bgs within the region and varies from 75 to 125 ft deep beneath the property (Schmidt, 1980). A significant sand and gravel layer up to 20 ft thick appears to be present atop the bedrock in the vicinity of the property. In the vicinity of the Property there appears to be a shallow groundwater potentiometric surface associated with the Flag Run Creek water level near Elevation 650 ft and a deeper water level near Elevation 630 ft.

4.0 Sampling History

One environmental assessment limited to shallow soil sampling and testing was conducted on a small portion of the South Triangle by the United States Environmental Protection Agency (USEPA) as described in a report dated September 28, 2012 (Weston, 2012). Six soil borings were advanced on June 15, 2012 ranging in depth from 8 to 16 below ground surface (bgs) near the existing tennis court and basketball court. Each soil core sample was field-screened at 2-foot intervals for volatile organic compounds (VOC) using a photoionization detector (PID). Sampling

locations and depth intervals were selected based on historical data, field conditions and PID field screening results. Up to two soil samples were collected from each soil boring and analyzed for:

- Total volatile organic compounds (VOCs);
- Total semi-volatile organic compounds (SVOCs);
- Target Analyte List (TAL) metals;
- Boron and hexavalent chromium;
- Total pesticides and herbicides;
- Polychlorinated biphenyls (PCBs);
- Toxicity Characteristic Leaching Procedure (TCLP) metals, VOCs, SVOCs, pesticides and herbicides.

Results indicate that the subsurface materials consist of a thin veneer of topsoil and/or sandy silt at the surface underlain by brown silty clay and brown glacial till to the maximum depth explored of 16 ft bgs. Fill material was encountered at three of the four boring locations around the basketball court ranging from two to nine feet thick with a maximum depth of 11 ft bgs. Analytical results indicated that PCBs, cobalt and nickel were detected at levels exceeding USEPA Regional Screening Levels (RSL) for residential properties. PCBs were detected in soil samples obtained from the 0 to 12 ft depth range with six samples exhibiting PCB concentrations above the TSCA High Occupancy Remediation standard of 1 mg/kg, of which two samples exhibited PCB concentrations above the TSCA remediation waste threshold of 50 mg/kg.

5.0 Exposure Pathway Analysis

A preliminary exposure pathway assessment was conducted for each IA in order to develop a sampling rationale to determine sampling required to complete the draft VAP Phase II PA report. This analysis included an evaluation of the existing and potential exposure pathways and identification of sources, source areas, affected media contributing to the pathway, identification of receptors and applicable points of compliance. The results of the preliminary exposure pathway analysis for each IA including transport mechanism, receptors and explanation for elimination of a pathway, if appropriate, is provided in Appendix A and summarized below.

5.1 Identified Areas

The exposure pathway analysis for each IA was conducted assuming future residential property use and potential ecologic resources are present due to the non-urban area at which the property is located. The following pathways were determined to be potentially complete for the IAs at the Property:

Property

1. Soil to direct contact residential;
2. Soil to direct contact construction worker;
3. Soil leaching to groundwater;
4. Soil vapor intrusion from soil and groundwater to indoor air;
5. Soil to ecological;

6. Surface water to non-potable use;
7. Surface water to ecological;
8. Sediment direct contact to residential; and
9. Sediment to ecological.

Off-Property

1. Surface water to non-potable use;
2. Surface water to ecological;
3. Sediment direct contact to residential; and
4. Sediment to ecological.

Exposure pathways to groundwater cannot be determined until groundwater is sampled, tested and classified, if needed, to determine groundwater response requirements as described below.

5.2 Groundwater

5.2.1 Groundwater Classification

In accordance with OAC 3745-300-10(A), groundwater underlying the Property must be classified if COCs in groundwater exceed Generic Unrestricted Potable Use Standards (GUPUS). Once groundwater is sampled and tested and this is determined, groundwater may require classification so that minimum groundwater response requirements can be determined in accordance with 3745-300-10(E). Yield testing of monitoring wells screened within the unconsolidated saturated zone will be performed in accordance with OAC 3745-300-07(D)(9) to determine the representative adjusted yield for groundwater classification purposes. It is likely that the unconsolidated saturated zone, however, does not qualify as critical resource groundwater since:

1. The groundwater is not used by a public water system;

2. The groundwater is not in a drinking water source protection area; and

3. The yield is likely not greater than 100 gpm as noted on ODNR well logs within a one-mile radius of the Property (Schmidt, 1980).

It is anticipated that an upper and lower unconsolidated saturated zone may be present beneath the property within water-bearing sand and gravel lenses.

5.2.2 POGWMUPUS Determination

In accordance with VAP rule 3745-300-07(D)(4), the Volunteer is required to make a demonstration that the COCs on the Property did not or will not cause COCs in a lower saturated zone to exceed GUPUS, otherwise known as protection of groundwater meeting GUPUS (POGWMUPUS). This determination will be made after information on COCs in groundwater and groundwater classification is determined.

5.2.3 Anthropogenic Influence

The Property has not been sufficiently investigated to determine if anthropogenic features (e.g., underground utilities, pipes and other potential preferential migration conduits) are present on the Property that could potentially influence groundwater flow and vapor migration characteristics and COC distribution.

6.0 Sampling Rationale

6.1 Data Quality Objectives

The data quality objective (DQO) process is a requirement of VAP rule OAC 3745·300·07(C) and is typically used to define the type, quantity and quality of data needed to support the decision making process. The main elements of this process consist of identification of applicable standards, evaluation of historic data, identified areas to be assessed, exposure pathway evaluation, data acceptance criteria and development of a sampling rational for each identified area.

Data collection activities and data analysis generally follow those procedures outlined in OAC Rule 3745-300-07(D), various VAP Technical Guidance Compendium (Ohio EPA, 2012), and the *USEPA Guidance on Systematic Planning Using the Data Quality Objectives Process* dated February 2006 for data quality assessment (U.S. EPA., 2006). The DQO process also ensures that sampling procedures are consistent with quality requirements of the certified laboratory, that the laboratory is capable and VAP-certified for the specific analysis conducted and that acceptable quality assurance and quality control procedures have been established as outlined in Section 8.0 of this work plan.

6.2 Applicable Standards Review

An applicable standard comparison was conducted for each IA to identify potential action levels for results comparison and is provided on Table 1, Applicable Standards Summary. Table 1 presents a comparison for each IA potential COC, media affected, potentially completed pathway, point of compliance (POC) and the proposed applicable standard. As previously noted, groundwater response requirements and standards for soil leaching to groundwater will be developed once groundwater has been sampled and tested. Preliminary applicable standards for soil consist of VAP generic levels for residential direct contact and temporary construction worker. The 2009 VAP rule does not provide generic standards for soil and groundwater for the vapor intrusion pathway. Action levels can be determined by modeling using the Johnson-Ettinger model and back-calculating soil and groundwater action levels based on exposure of COCs to potential receptors breathing indoor air. Surface water standards will be Ohio's water quality standards outlined in OAC 3745-1 (Ohio EPA, 2011) with the most stringent criteria applied to any one of the use designations. Based on the applicable standard comparison, the following sampling rational has been developed for each IA.

6.3 Identified Areas

The following sampling will be conducted in order to develop representative concentrations of COCs in various media to determine if applicable standards have been met. Since completed pathways, points-of-compliance and applicable standards for surface water bodies such as the mill race, ponds and creek are different from the individual IA geographic areas, the three IAs will be subdivided into exposure units (EUs) in accordance with procedures outlined in VAP Technical Guidance Compendium VA30007.09.003 (Ohio EPA, 2012). The purpose of using EUs is to allow for

comparison of representative concentrations to the appropriate VAP standard and point-of-compliance for each IA.

6.3.1 IA#1 – Former East Ravine

IA#1 – Former East Ravine – VOCs, SVOCs, TAL Metals, pesticides and herbicides, PCBs – The former east ravine fill area will be designated EU#1, while the mill race, ponds and Flag Run Creek will be designated EU#2.

IA#1-EU#1 - The estimated limits of the fill area and the USEPA sample locations are shown on Figure 5. There are three objectives for soil sampling at IA#1-EU#1 as follows:

1. Determine vertical and horizontal limit of fill material based on visual inspection of soil samples;

2. Determine vertical and horizontal limit of known PCB-impacted soil to less than 1 mg/kg; and

3. Confirm that the remaining COCs in soil meet VAP applicable standards.

To achieve objective #1, soil borings will be advanced on an approximate 100 ft grid as shown on Figures 5 and 6. In the immediate vicinity of the former ravine, the grid is tightened to 50 ft. Additional borings may be added in order to delineate lateral extent of the fill material. Soil borings that encounter fill material will be extended at least 5 ft into native material. Soil borings that do not encounter fill material will be extended to a maximum depth of 10 ft.

To achieve objective #2, a composite soil sample of each 2–ft interval will be obtained from each boring location and submitted to the laboratory for analysis of PCBs.

To achieve objective #3, at least one sample from 50% of the boring locations will be obtained and tested for VOCs, SVOCs, TAL Metals, pesticides and herbicides. The soil sample tested from each boring will be that exhibiting the highest PID reading, the deepest soil sample obtained or from just above the first saturated zone.

IA#1-EU#2 - Since historic drainage from the fill area emptied to the mill race, including the east and west pond areas, this drainage feature will be sampled and tested. Since the mill race and ponds are currently dry, soil will be tested rather than surface water/sediment samples using the same protocol noted above by treating sediment as fill material and sampling at least 5 ft into native non-sediment soil. If drilling equipment is unable to be operated within these areas due to soft soil conditions, samples will be obtained as deep as possible using hand sampling equipment as described in Section 7.2 of this work plan.

Drainage from the mill race and pool eventually flowed to Flag Run Creek at which 4 combination surface water/sediment samples are located. At these locations, one surface water sample and two sediment samples (upper foot and

the 1 to 2 ft interval) will be sampled and submitted to the laboratory for analysis of COCs. Surface water and sediment samples, if present, will also be obtained and tested in this manner from the portion of the mill race that is still flowing, storm drain manhole, the storm drain outfall and the downstream side of the East Pond breach as shown on Figures 5 and 6.

As previously noted, depth to first groundwater and groundwater flow direction is unknown at this time and was estimated based on general geologic information provided in the VAP Phase I PA report. For this reason, 4 nested monitoring well locations (Figure 5) have been selected to sample groundwater down-gradient of IA#1. It is anticipated that each nested well will consist of two monitoring wells, one screened in the upper unconsolidated saturated zone (10 to 30 ft deep) and one screened from the lower unconsolidated saturated zone (75 to 100 ft deep). A fifth nested monitoring well (Figure 6) is also planned at the north end of the South Triangle to check water quality near the property boundary. Monitoring wells placed within the IA#1 area will be installed after the soil sampling is conducted to avoid placing monitoring wells through fill material. Monitoring wells placed through fill material will be cased off through the fill material to avoid impacting soil and groundwater below the fill material.

The first round of groundwater sampling will include analysis of all COCs with subsequent sampling events to include testing for COCs that were detected above screening levels from the first round of sampling.

6.3.2 IA#2 – Soil Stockpiles

IA#2 – Soil Stockpiles – Asbestos, lead, mercury – The soil stockpile area will be designated EU#1, while the mill race will be designated EU#2.

IA#2-EU#1 - A series of unbiased surface samples from the stockpiles will be obtained at approximate 100 ft intervals to evaluate the direct contact and leachate pathways. Deep soil samples will not be obtained at these locations due to inability to situate a drilling rig. A composite sample of the upper two feet will be obtained and submitted to the laboratory for analysis of COCs. A licensed asbestos inspector will examine the stockpiles prior to sampling to bias sample locations toward suspected asbestos containing materials.

IA#2-EU#2 - The upper 2 ft composite soil samples will be obtained from three locations within the mill race between the East and West ponds and tested for asbestos.

One nested groundwater monitoring well is proposed for the down-gradient (northwest) side of IA#2 as shown on Figure 5.

6.3.3 IA#3 – Fill Area

IA#3 – Fill Area – VOCs, SVOCs, TAL Metals, pesticides and herbicides, PCBs – The fill area will be designated EU#1, while Flag Run Creek will be designated EU#2 as shown in Figure 6.

IA#3-EU#1 – The fill area will be assessed in stages with the first stage (included in this work plan) consisting of visual verification of contents using two test trenches excavated into the fill material as shown on Figure 6. The north, west and south sides of the fill area appear to terminate on existing grades. This lateral extent will be visually verified and marked with lathes for measurement during the topographic survey of the property. Since the east side cannot be visually verified, test trenches will be placed on the east side to verify the eastern limit of fill material. The deepest soil sample or the soil sample from each test pit exhibiting odors, staining or elevated field-screening levels will be obtained and tested for COCs.

One shallow groundwater monitoring well will be placed between the fill area and Flag Run Creek as shown on Figure 6. The first round of groundwater sampling will include analysis of all COCs with subsequent sampling events to include testing for COCs that were detected above screening levels from the first round of sampling.

Since the type of fill material at IA#3 is not completely known, a 7-day Notification Letter will be submitted to the Ohio EPA in accordance with OAC 3745-27-13 (G) which states that any person proposing to obtain an authorization from the director for filling, grading, excavating, building, drilling, or mining for the purpose of sampling material, pursuant to paragraph (D)(3) of the rule, shall submit a certified notification letter to the Ohio EPA seven days prior to conducting the sampling activities.

IA#3-EU#2 - The surface water/sediment sampling in Flag Run Creek conducted for IA#1-EU#2 will be used since the same COCs will be tested.

6.4 Adjacent Properties

Due to fill material placed on the property located directly south and adjacent to the FWP at 1909 County Road 181, one shallow monitoring well will be placed on the FWP at the location shown on Figure 5 and tested at least once for VOCs, SVOCs, TAL Metals, pesticides and herbicides, PCBs with subsequent sampling events to include testing for COCs that were detected above screening levels from the first round of sampling.

7.0 Sampling Methods

This work plan has been prepared to provide Property-specific soil, groundwater, surface water and sediment sampling procedures to be used during implementation of the draft VAP Phase II Work Plan for the FWP Property. A summary of the sampling to be conducted is provided on Table 2 with proposed sample locations provided on Figures 5 and 6. Sampling procedures used for this project will be conducted in accordance with current VAP technical guidance compendium for Phase II property assessments and AECOM standard operating procedures. Groundwater monitoring well installation, development and sampling procedures will be consistent with the Ohio EPA *Technical Guidance Manual for Hydro-geologic Investigations and Groundwater Monitoring* dated February 1995 (Ohio EPA, 1995).

7.1 Pre Data Collection Field Activities

Preparation for field work will include obtaining Property access; selection and procurement of qualified subcontractors; procurement of necessary field supplies and sampling equipment; establishment of a field storage area, designation of an equipment decontamination area, designation of IDW staging area and identification of on-site and off-site utilities.

Field work will be conducted in accordance with a site-specific Health and Safety Plan (HASP) which will cover site field sampling activities. All personnel involved with the fieldwork, including subcontractors, will be required to review the HASP prior to commencing the field activities and will comply with all health and safety requirements.

An underground utility survey will be conducted prior to any vertical profiles and monitoring well installation to avoid existing subsurface structures. The survey will include:

- Public and private utility locating/marking services
- Ground-penetrating radar (GPR) and electromagnetic locating.

Sample locations will be located at a proper distance (greater than 3 feet) from all identified underground utilities.

7.2 Surface Soil Sampling

Surface soil samples will be obtained using stainless steel trowels or stainless steel hand augers and/or slide hammer with stainless steel split spoons. If soil sampling within the mill race cannot be achieved using a track-mounted drilling rig, these samples will be collected to the maximum depth attainable using these methods. Spoons or trowels will be decontaminated between each sample in accordance with Section 8.5.

7.3 Surface Water Sampling

Surface water samples will be obtained at the same location of sediment samples immediately before and prior to sediment sampling at the locations shown on Figures 5 and 6.

Observations and measurements will be documented in the field notebook prior to sample collection at each sample point. These observations will include water depth, an estimate of stream surface-flow velocity, measurements of pH, specific conductance and temperature. Visual observations will be recorded such as excessive silting, presence of sheen, excessive foaming or other unusual condition.

Sampling will begin at the sample location most downstream and proceed progressively to the upstream locations. Samples will be collected as near to midstream (or mid-channel) as possible. Sampling at midstream may be changed in the field due to practical considerations such as safety and minimizing disturbance of sediment by the sample team if walking in the stream. The samples will be collected directly from the stream by immersing the sample bottle with its opening pointed down- stream. Alternatively, a dip sampler may be used to obtain surface water samples from the creek bank or bridge deck.

Collecting substrate and floating debris will be avoided. Sample bottles containing preservative will not be immersed in the stream. Instead, they should be filled with an intermediate laboratory supplied bottle. Samples for field parameters will be collected in a clean sample bottle.

Samples for VOC analysis will be collected first. Care will be taken to slowly fill the sample containers to prevent volatilization of the VOCs. Each VOC sample container will be filled with no head-space in the sample container. After collecting the VOC samples, the sample containers for other COCs will be filled.

7.4 Sediment Sampling

This procedure describes the basic techniques and general considerations to be followed for the collection of sediment samples. For the purposes of this work plan, sediment is defined as soil, sand, silt, clay, organic matter, or other materials that accumulate on the bottom of a water body (U.S. EPA., 1998). Sediment sample collection generally involves collection of a representative sediment sample from, or near, a water body (e.g., stream, wetland, pond, or lake) into appropriate containers.

Potential interferences could result from cross-contamination between sample locations or entrainment of non-target material in the samples will be minimized by using the following procedures:

- Approach of sample locations from downstream,
- Collection of surface water samples prior to sediment samples at individual locations and as required,
- The use of clean, decontaminated or dedicated sampling tools at each location in the field and during sediment sample processing.
- Avoidance of material (e.g., re-suspended solids) that is not representative of the medium to be sampled.

Sediment samples will be obtained by personnel using AMS hand-sampling equipment from either one of the existing foot bridges or from the bank of the creek by manually extending a Teflon dip sampler into the surface of the top sediment layer.

The AMS sampling equipment will be fitted with sediment samplers specifically designed to retain non-cohesive saturated materials. A valved core tip fills the sampler without losing the sample upon retrieval. The sampler uses a disposable plastic soil catcher that fits on the end of a 2" x 12" plastic liner. Once the soil core catcher and liner are placed on the core tip they are loaded into a standard multi-stage base section and screwed together. During deployment, the flap cap opens and allows excess air and water to escape through the top of the sampler – eliminating pressure buildup, while the sediment enters and fills the liner. When the sampler is lifted the flap closes and creates suction to assist the soil core catcher in retaining the sample. Up to four 12-inch sections can be placed in series for deeper sediment sections.

Two sediment samples from each location will be submitted to the lab for analysis: one from the 0 to 1 ft interval and one from the 1 to 2 ft interval. Transfer the contents to a stainless steel or disposable bowl for mixing prior to filling sample jars except that samples for VOCs will be collected prior to homogenization. Cap and label the container with in accordance with Section of this work plan and have all reusable equipment decontaminated in accordance with Section 8.5.

7.5 Soil Sampling

Each soil boring will be advanced using a track-mounted direct-push rig (Geoprobe® 6620DT (8,000 pounds loaded, 60 inches wide) in combination with the Geoprobe® dual-tube sampling system. The dual tube sampling system uses two sets of probe rods to collect continuous soil cores with the added benefit of providing a cased boring to eliminate contaminate migration between geologic units.

As part of this system, a larger diameter probe rod is first advanced into the subsurface to serve as an outer casing. A second smaller diameter probe rod is then advanced within the outer casing in conjunction with a sample liner. Upon reaching the depth of the outer casing, the smaller diameter rods are retracted to obtain the sample liner. This process is then repeated until the target depth has been reached. Care will be taken to minimize any potential for cross-contamination between sand units.

Each soil boring will be continuously logged by an on-site geologist. Soils will be visually classified in the field and described on the boring logs using the Unified Soil Classification System (USCS) (ASTM International, 2011). Additional soil characteristics will be noted on each boring including zones of increased and reduced porosity and permeability, moisture condition, odor and/or discoloration.

Geologic samples will be collected from each soil boring/sample location in order to evaluate subsurface stratigraphy and determine potential screen depths for groundwater monitoring wells. Samples will be retrieved from the subsurface using 4-foot long plastic Geoprobe® sample liners. If sample recovery is sufficient (>60%), each soil core will be further subdivided into 2-foot sample intervals. Photos will be collected from each soil core providing physical documentation to correlate with the soil boring logs developed in the field.

Soil samples collected from each boring will be screened in the field using a photo-ionization detector (PID) outfitted with a 10.7 EV bulb.

Following logging and sample collection, each soil boring will be properly abandoned using a cement/bentonite mixture. The mixture will be pumped into the borehole using a tremie pipe making sure that the mixture is added to the bottom of the borehole and fills the borehole until the mixture is flush with the ground surface. All reusable equipment decontaminated in accordance with Section 8.5.

7.6 Groundwater Sampling

7.6.1 Monitoring Well Installation

A total of five (5) nested (shallow and deep) and two (2) shallow groundwater monitoring wells will be installed using sonic drilling techniques (Mini-Sonic 200C (20,000 pounds loaded, 8.5 ft wide) at locations on the Property as shown on Figures 5 and 6 of this work plan. In conjunction with monitoring well installation activities, continuous coring and lithologic classification will be performed at all well borehole locations. Logging procedures will be conducted according to the procedures outlined in Section 7.5 of this work plan.

Monitoring wells will be constructed with an assembly consisting of 2-inch inner-diameter, schedule 40 polyvinyl chloride (PVC) casing and screen (with 0.010 slot size), inserted through the outer Sonic casing. The borehole diameter will be a minimum of 4 inches greater than the outside diameter of the well screen and riser pipe used to construct the monitoring wells. Well construction details will be in accordance with VAP protocols.

The screen length of each well will be based on the observed thickness of the sand and gravel unit being targeted. Well designations will be designated deep or shallow per the sample designation section of this work plan.

Each well will be centered within its borehole while clean silica sand is placed in the annular space surrounding the well screen to a depth of approximately one foot above the top of the screen. The filter pack and bentonite seal will be added to the annulus inside the sonic casing prior to removing any tooling from the borehole to ensure a more complete installation around the well pipe. Monitoring well bentonite seals will be overlain by a cement/bentonite grout mixture (at a mixture of approximately nine to one) extending from the top of the seal to a depth of three to five feet below ground surface. The grout will be installed via a tremie pipe to ensure an accurate placement of well completion materials. All wells will be completed with a steel protective flush well mount.

Each well will be tagged with its unique well identification number and made visible for ease of identification. Each permanent monitoring well will be completed with a cap and lock. A two-foot square by 4 inch thick concrete pad will be placed around each protective stick-up protective cover cemented in place.

Soil cuttings from the monitoring well installation will be carefully managed and placed in 55-gallon steel drums. Soil cuttings will be collected in Department of Transportation (DOT)-approved containers, marked, labeled and temporarily staged at the Property. Spent personal protective equipment (PPE) and disposable sampling equipment will be disposed as solid waste. All reusable equipment will be decontaminated in accordance with Section 8.5.

A Form DNR 7802.96, Well Log and Drilling Report will be completed for each new monitoring well and will be submitted to ODNR in accordance with the Ohio Revised Code Section 1521.05 - Well Construction Logs.

7.6.2 Monitoring Well Development

Following installation, each of the newly installed monitoring wells will be developed to remove excess fine particulates and stabilize groundwater indicator parameters. Any water introduced during the drilling process will have been documented for removal during this process. A combination of stainless steel pumps and/or air-lifting utilizing an air compressor will be the preferential mode of development in which a well is simultaneously surged and then purged until the development criteria have been achieved. After an equal volume of water introduced during drilling has been removed, a minimum of three well volumes will be removed before a well may be considered developed. If, after the removal of three to five well volumes, the development criteria (turbidity) have not been achieved, the process will continue until either the criteria have been met, or ten well volumes have been removed.

Water generated during development activities will be collected in 55 gallon drums, transported from the well location, and transferred to a temporary staging area. Drums will be properly labeled with the date of generation and applicable source information.

7.6.3 Purging and Sampling

Wells planned to be installed as part of this work plan will be sampled a minimum of four consecutive quarters in order to calculate a representative concentration for COCs.

Prior to purging a well, clean polyethylene sheeting will be placed on the ground to provide a clean working surface. The monitoring well will first be opened and allowed to equilibrate to stabilize to atmospheric conditions. The water level will then be measured from the survey mark at the top of the casing using an electronic water level indicator that is accurate to 0.01 feet, and the water level will be recorded. Total depth and depth to water from the top of the casing will be measured with an electronic water level indicator and recorded in the field log and groundwater sampling logs.

Each monitoring well will be purged using low-flow techniques as described below for collecting valid and representative samples of groundwater from monitoring wells. Monitoring wells will be purged and sampled using a peristaltic pump or bladder pump in combination with polyethylene tubing. The tubing intake will be placed within the screened interval of each monitoring well. Flow rates will not exceed the recharge rate of the groundwater-bearing zone, typically on the order of 0.2 to 0.5 L/min.

An in-line water quality instrument in combination with a flow-through cell will be used to establish stabilization for field parameters. The instrument will be calibrated each day before initiation of field activities. A total of six field parameters will be measured during purging activities; pH, specific conductance, temperature, dissolved oxygen, ORP, and turbidity. Pumping rate, field parameters and drawdown within each monitoring well will be monitored throughout the purging process. Measurements will be collected and recorded every 5 minutes. The pumping rate (typical flow rates are less than 0.5 L/min.) will be adjusted to minimize drawdown within the well. Data on pumping rate, drawdown, and volume required for parameter stabilization will be recorded on a standard field form.

Samples will be collected from each sand unit after stabilization of field parameters has occurred. Stabilization is defined as consecutive readings within ten percent. Field indicator readings have stabilized when measurements are within the following limits:

- Turbidity –±10% or less than 10 NTUs;
- Specific Conductance –±3%;
- ORP– ± 10mV;
- Temperature– ±0.5°C;
- pH – ± 0.1 units; and
- DO – ± 0.3 mg/L.

In general, the order of parameter stabilization is pH, temperature, and specific conductance, followed by ORP, DO and turbidity. Temperature and pH, while commonly used as purging indicators, are actually quite insensitive in distinguishing between formation water and stagnant casing water. Nevertheless, these are important parameters for data interpretation purposes and will be measured. Performance criteria for determination of stabilization will be based on water-level drawdown, pumping rate and equipment specifications for measuring indicator parameters.

In conjunction with monitoring the parameters necessary to determine stabilization of the groundwater such as part of the low-flow sampling (i.e., temperature, pH, conductivity, etc.), water level measurements will also be taken and recorded. Water level measurements will be taken once every five minutes, and the water levels and sample times will be recorded. The groundwater levels will be assumed to have stabilized when three consecutive consistent (10%) groundwater levels have been measured. The pumping rate will be measured and recorded once every five minutes using a stopwatch and a graduated cylinder or graduated beaker. Groundwater samples will be collected

only after three consecutive readings of both the groundwater field parameters and the water levels have met the stabilization criteria listed above. If the well goes dry as a result of obtaining these water quality measurements, the sampling will be postponed between 6 and 24 hours, during which time the water level will have time to stabilize in the well.

Once purging is completed, the sample will either be collected before the flow-through cell using a by-pass sampling port, if available, or the flow-through cell will be removed from the pumping system and sample collection will commence directly from the pump discharge line.

The laboratory-supplied containers will be filled by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence. Sampling flow rate may remain at the established purge rate or may be adjusted slightly to minimize aeration, bubble formation, turbulent filling of sample bottles or extended residence time. Once the container has been filled to capacity, the sample will be sealed, labeled and placed in a cooler on ice until delivery to the VAP-certified laboratory. Routine chain of custody protocols will be followed and a chain of custody will be prepared for each sample cooler before it is shipped to the laboratory. At a minimum, the chain-of-custody form will identify the sample collector, sample location identifications, sample numbers, date and time of collection, parameters monitored, preservatives and method of transport to the analytical laboratory.

7.7 Test Trenches

Test trenches will be used to identify the type of fill and lateral extent of buried materials on the southeast side of the fill area (IA#3) as shown on Figure 6. Trenches will be advanced using an excavator to determine the location, configuration, and characteristics of potential buried material. The soil cover will be removed first and segregated from the trench material contents. Material such as drums, tanks or soil exhibiting visual or olfactory evidence of impacts will be placed in a roll-off box or other container, while non-suspect material will be returned to the trench. The test trenches will be extended vertically until no further fill is encountered or maximum reach of the equipment (about 12 ft).

To determine lateral extent of fill on the southeast side of the fill area, the test trenches will be initiated in an area of known buried material, excavated vertically until buried material is encountered and then excavated laterally outward until no buried material is encountered. Fill material from each excavation will be returned to the open trench and then covered with the original soil cover material. Visual observation of the buried material limits will be made during test trench excavations with representative material photographed and included on the test trench log. A marker will be left at each trench location where the lateral extent of fill was identified. Each marker will be surveyed during the site topographic survey.

Each test trench will be backfilled the same day that it is excavated following completion of all field observations.

8.0 Sample Handling and Analysis

8.1 Quality Control Samples

QC samples assess the validity of field and analytical results by measuring the accuracy and precision of each method and matrix, serving as a means to detect errors or out-of-control events, and requiring corrective action techniques to prevent of minimize the recurrence of these events. The QC samples associated with field sampling will include trip blanks, field equipment blanks, field duplicates, MS/MSDs. Trip blanks are included in each cooler shipped to the Site from the laboratory. Each QC sample (excluding trip blanks) will be analyzed for the required suite of analyses. Trip blanks will be analyzed for VOCs only in aqueous samples. Trip blanks, field equipment blanks, field duplicates, and MS/MSDs will be prepared or collected according to the protocols and frequencies specified below:

- Equipment rinsate blanks – Equipment rinsate blanks will be prepared by routing deionized water (provided by the laboratory) through non-dedicated sampling equipment after equipment decontamination and before field sample collection. Equipment rinsate blanks will be collected for any aqueous or solid samples collected with non-dedicated equipment (at a frequency of one per 10 samples), and will be analyzed for the same parameters as their associated samples.

- Field blanks – Field blanks will be collected by pouring deionized water (provided by the laboratory) into sample containers at specified groundwater sampling locations (at the time of sample collection). Field blanks will be collected at a frequency of one per 10 samples and will be analyzed for the same parameters as their associated samples.

- Trip blanks – Trip blanks will be included in each shipment of VOC samples. Trip blanks will originate in the laboratory and will be prepared by filling two 40-mL VOA vials with laboratory deionized water and sealing the vials with septum-lined caps (allowing no headspace). Trip blanks will accompany the sample bottles to the site and will remain (unopened) in the shipping container until the sample bottles are received back at the laboratory. Trip blanks will be analyzed for VOCs only.

- Field duplicates – Field duplicates will be collected at a frequency of one field duplicate for every 10 or less investigative samples. Sample containers for VOC field duplicates will be filled consecutively. All field duplicates will be analyzed for the same parameters as their associated samples.

- MS/MSDs – MS/MSD samples will be collected at a frequency of one for every 20 or less investigative samples. For those samples designated as MS/MSDs, triple volume will be collected.

Laboratory generated QC samples will include method blanks, calibration standards, MS, laboratory replicates, and laboratory check samples.

8.2 Analytical Methods

Each sample will be submitted to a VAP-Certified Laboratory for analysis using the following Ohio VAP methods:

- VOCs: USEPA SW-846 Method 8260B;
- SVOCs: USEPA SW-846 Method 8270C;
- TAL Metals (except mercury) (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, total chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, silver, selenium, sodium, thallium, vanadium and zinc): USEPA SW-846 Method 6020A;
- Mercury: USEPA SW-846 Method 7471B;
- Pesticides and herbicides (USEPA SW-846 Method 8081);
- PCBs: USEPA SW-846 Method 8082A; and
- Asbestos: Soil: Polarized Light Microscopy (PLM) by ENV.004 (VAP);and
  Transmission Electron Microscopy (TEM) Method CARB; and
  Water: USEPA Method 100.1 (drinking water).

It should be noted that field-filtering of groundwater samples to be tested for metals will be conducted using a 0.45 micron filter if turbidity at the monitoring well is shown to be generally above 5 NTUs.

8.3 Sample Designations

Each field sample will be assigned a unique sample identifier. This identifier will be used throughout the sample collection, analysis, and reporting activities, and will be clearly linked to identified area, sample media, depth indication, date (if applicable) and Quality Assurance/Quality Control (QA/QC) identifier (if applicable). The identifier will contain a sufficient number of characters to include the information as described below. This information will be recorded in both field log books and the project database management system. Prefixes used to identify matrix spike (MS) sample, matrix spike duplicates (MSD), re-analyzed samples, and samples re-analyzed at a secondary dilution will be appended by the laboratory and included in laboratory deliverables. The sample identifier will be clearly shown on the chain-of-custody form and sample container labels.

The field identifier code will include:

- Location Identification – identified area or monitoring well number;
- Media type;
- Depth at which the sample was taken (for soil and sediment samples);
- One-letter code to indicate field QA samples:
  B – Field sample duplicate;
  C – Equipment blank sample;
  FB – Field blank sample; and
  TB – Trip blank sample, and
- For those locations which may be sampled multiple times (e.g. monitoring wells, surface water samples), the sample ID will also include a date code to distinguish between sampling events. This code will be six digits, representing the month-day-year, e.g. 072613.

Media type will consist of groundwater, surface water, soil and sediment. Groundwater monitoring wells will start with MW.

Soil samples will be designated by identified area such as IA#1S1 (depth) (QA qualifier).

Examples of the sample labeling nomenclature are as follows:

- IA#1S1-0608 - analytical soil sample taken at IA#1 at a depth of 6-8 feet;
- MW-3A-070912 - groundwater sample taken from an on-Property monitoring well screened in upper saturated zone on July 9, 2012;
- MW-2B-070910-B - duplicate groundwater sample taken from an on-Property monitoring well screened in lower saturated zone on July 9, 2010;
- IA#2-Sed2-0102 – The second sediment sample obtained from IA#2 at a depth of 1 to 2 ft.; and
- IA#3-SW1-070912 – The first surface water sample obtained from IA#3 on July 9, 2012.

The trip blanks will be linked to a specified cooler and will use the date of shipment as the sample identification number. Samples being designated for MS/MSD analysis will not include an identifier as part of the sample code, but will be identified in the comments section of the chain-of-custody form.

8.4 Sample Containment, Handling, and Shipping

Standard Chain-Of-Custody (COC) procedures will be followed. The samples will be placed in laboratory-supplied sample bottles, labeled accurately and completely to match all information on the completed COC, including sample ID, sample time, date, type of analysis, project and samplers' name, and location. The following procedures will be used for sample shipment:

- Hand tighten each sample bottle lid and wrap sample bottles in laboratory supplied bubble-wrap or foam padding;
- Place packing material (approx. 3-inches) in the bottom of a the sample cooler followed by and appropriately sized polyethylene trash bag;
- Seal bottles or bottle sets in clear plastic sealable bags and place them vertically in the trash bag/cooler;
- Fill the trash bag/cooler with ice and seal the trash bag with packing or strapping tape;
- Place the completed paperwork (i.e., chain-of-custody forms) in a sealable plastic bag and tape to the inside of the cooler;
- Close the cooler and secure the lid by taping the cooler completely around the outside with strapping tape at two locations and apply custody seals;
- Place the laboratory address on top of the container;
- Place "THIS SIDE UP" labels on all four sides and "FRAGILE" labels on at least two sides of the container; and
- Ship each sample container to the laboratory by Federal Express using "PRIORITY OVER-NIGHT DELIVERY".

Any deviation of this procedure will be noted in the report. Samples will be shipped daily or as required from the field to the laboratory using an overnight service or reputable courier. Samples will

be handled and shipped in accordance with current DOT and International Air Transport Authority (IATA).

8.5 Field Equipment Decontamination

Equipment used in the field investigations at the Site will be cleaned between sample collection points. Cleaning of equipment is performed to prevent cross-contamination between samples and to maintain a clean working environment for field personnel.

A summary of the decontamination method for the sampling equipment used for the collection of samples for trace organic compounds and/or metals analyses is presented below:

1. Wipe excess residue or soil from sampling equipment as necessary.
2. Rinse equipment in potable or distilled water.
3. Scrub with solution of distilled water and non-phosphate detergent.
4. If analyzing for organic compounds, rinse with isopropyl alcohol. Omit this step if not and proceed to Step 7.
5. Rinse with potable or distilled water
6. Rinse with de-ionized water;
7. Wipe dry followed by an aluminum foil wrap.

Steps 1 and 2 were repeated, if necessary.

For decontamination of drilling equipment (casing, rods, etc.), a decontamination pad will be constructed by the subcontractor to contain solids and rinse water. All drilling equipment that has come into contact with Site soil and/or groundwater will be pressure washed with potable water prior to reuse. Rinse water will be properly containerized as necessary.

Detergents and rinse waters used to clean field equipment will be replaced as necessary as well as any remaining solids and rinse water within the decontamination pad. Solids and liquids will be containerized and temporarily staged on Site in conjunction with other investigative derived materials.

8.6 Investigative Derived Materials (IDM) Management

IDM generated during field activities will be managed to ensure proper storage, handling and disposal. Materials which may become IDM include personal protective equipment (PPE), disposable equipment, groundwater obtained through well development and purging, soil cuttings and cleaning fluids. Groundwater equipment decontamination fluids will be containerized in approved 55-gallon drums and staged at a central location designated by the property owner pending results of laboratory analyses and selection of final disposal method(s).

IDM generated in areas with obvious (visual or olfactory) impacts will be segregated and containerized separately from other IDM to the extent practical and appropriate. Analytical results for

groundwater samples will be utilized to determine an appropriate aqueous IDM disposal method. Analytical results from soils samples will be used to profile soils generated during implementation of the work plan.

All IDM will be properly managed, marked, labeled, stored, profiled and manifested for off-Site disposal in accordance with all applicable local, state and federal regulations.

9.0 Reporting

9.1 Mapping

A topographic survey using a minimum 2-ft contour interval will also be completed and a Property topography map will be included in the Phase II Report in accordance with 3745-300-07(E)(2)(j) and 3745-300-07(J)(13) and (14). The map will include locations of buried pipes/infrastructure which will be developed from known surface features, existing maps and the underground utility survey conducted prior to sampling.

9.2 Reporting

After collection of all appropriate information, the data will be used to develop a draft VAP Phase II Property Assessment Report documenting the results of the analytical testing and all other information required by the Phase II Property Assessment rule, OAC 3745-300-07(J). The draft VAP Phase II Property Assessment Report will include, but not be limited to full regional and Property-specific geologic and hydro-geologic conditions, geologic cross section, groundwater classification, POGWMUPUS determination, receptor populations review, exposure pathway analysis, applicable standards comparison and required maps.

10.0 References

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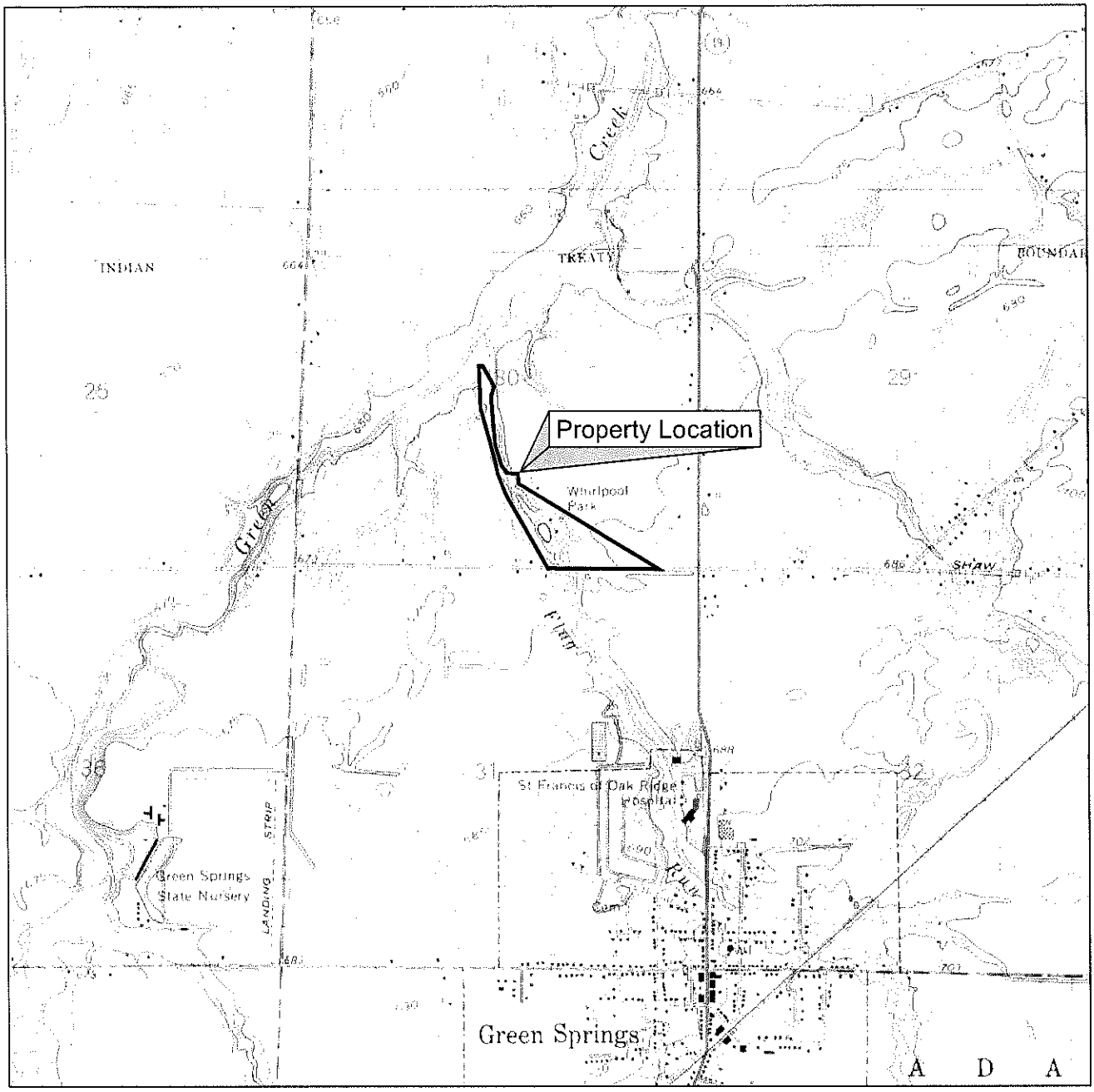
Figures



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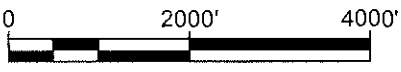

Quadrangle Location

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VAP PHASE II WORK PLAN
FORMER WHIRLPOOL PARK

PROPERTY LOCATION MAP

AECOM

Project No.: 60273522.3 Date: 2012-12-13

FIGURE: 1

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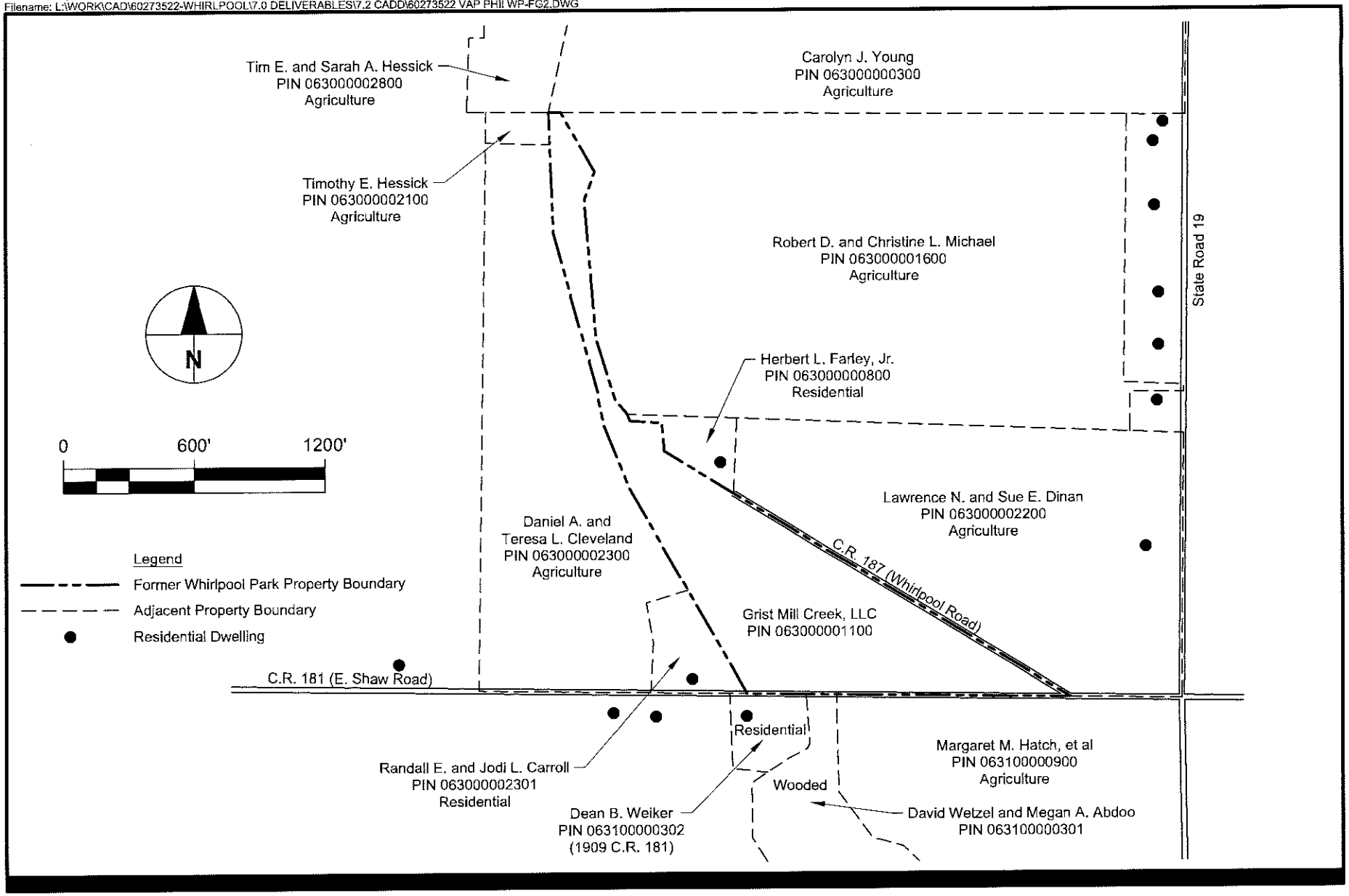

VAP PHASE II WORK PLAN
FORMER WHIRLPOOL PARK

PROPERTY MAP

AECOM

Project No.: 60273522.3 Date: 2012-12-20

Figure: 2

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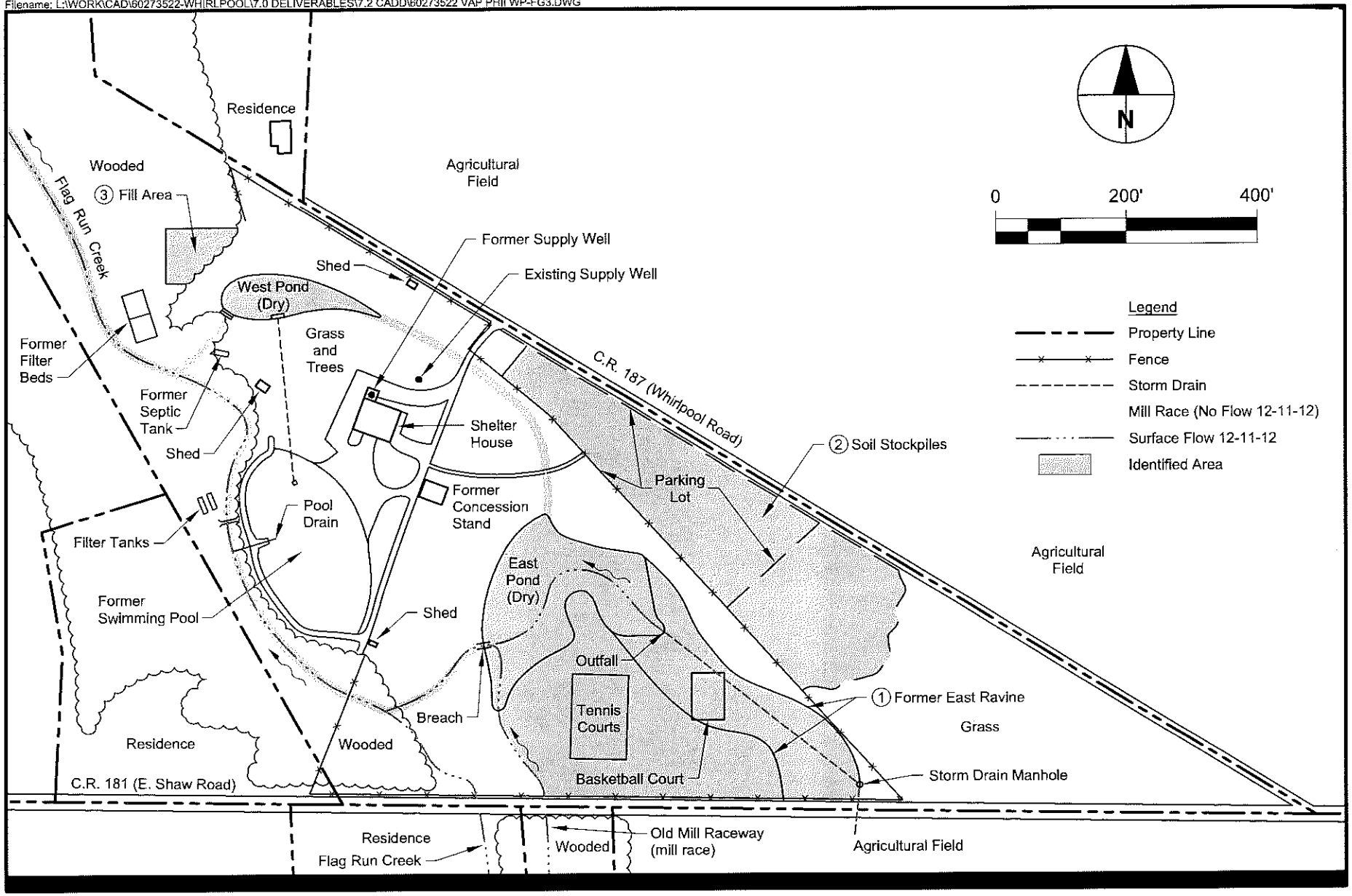

VAP PHASE II WORK PLAN
FORMER WHIRLPOOL PARK

IDENTIFIED AREA MAP

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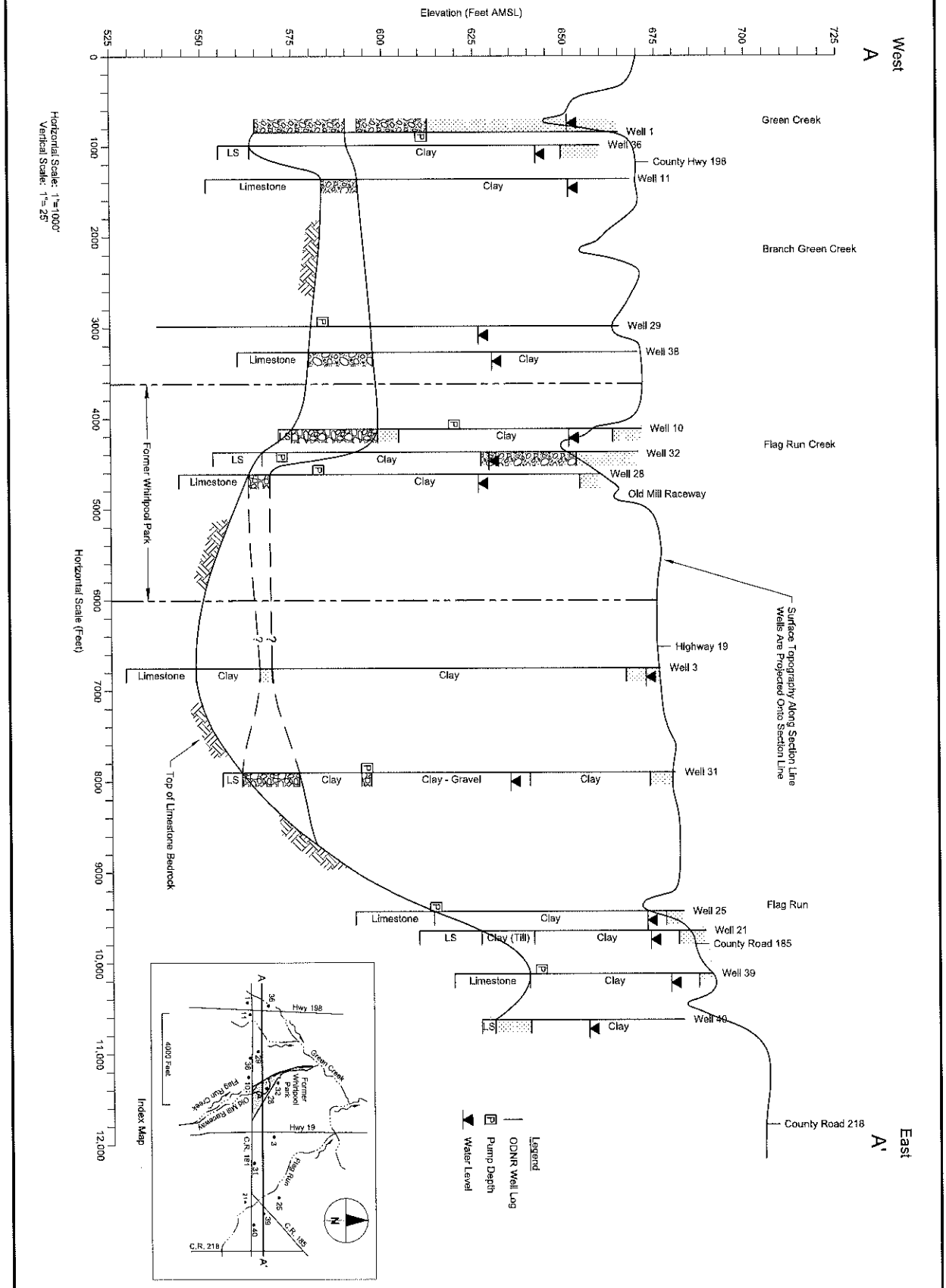

VAP PHASE II WORK PLAN
FORMER WHIRLPOOL PARK

REGIONAL GEOLOGIC CROSS SECTION

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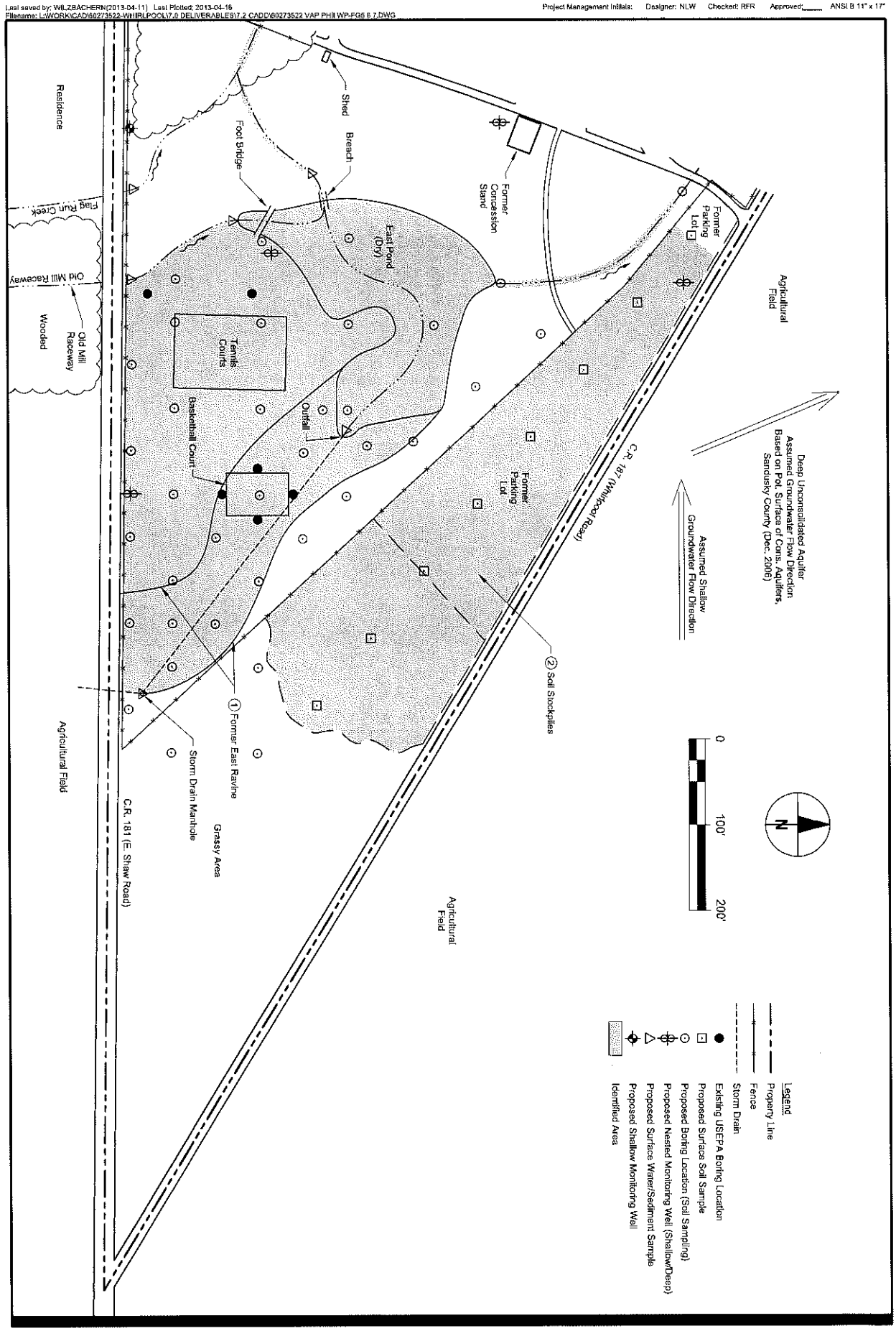

VAP PHASE II WORK PLAN
FORMER WHIRLPOOL PARK

PROPOSED SAMPLE LOCATION MAP
EAST HALF SOUTH TRIANGLE

AECOM

Project No.: 60273522.3 Date: 2013-04-16

Figure: 5

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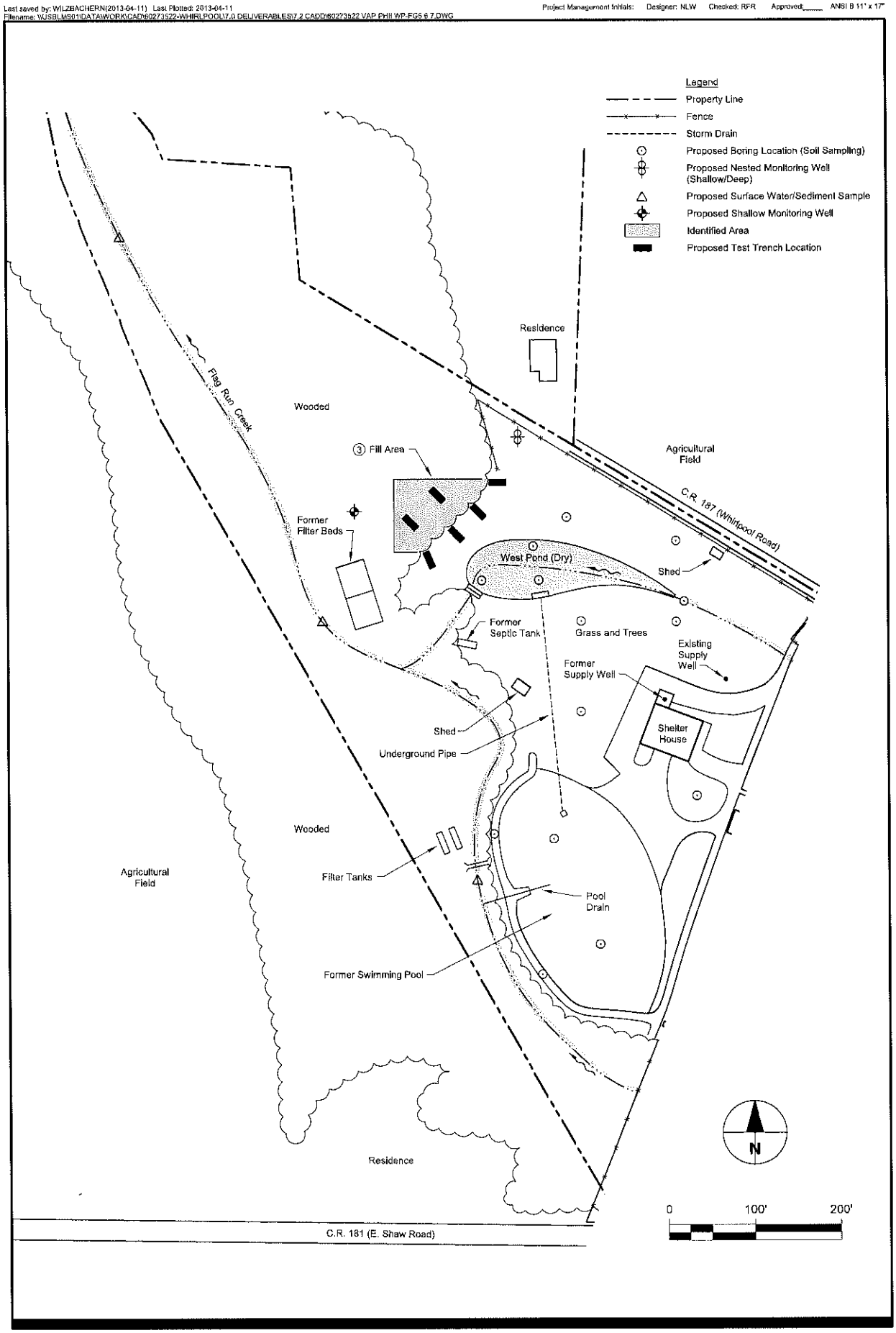

VAP PHASE II WORK PLAN
FORMER WHIRLPOOL PARK

PROPOSED SAMPLE LOCATION MAP
WEST HALF SOUTH TRIANGLE

AECOM

Project No.: 60273522.3 Date: 2013-04-11

Figure: 6

Tables

TABLE 1
APPLICABLE STANDARDS SUMMARY

Former Whirlpool Park
County Road 187, Green Springs, Ohio 43410

Identified Area Number	Descriptive Name	Potential COC	Media	Completed Pathways	On/Off Property?	Point of Compliance	Applicable Standard
1	Former East Ravine	VOCs, SVOCs, TAL Metals, pesticides and herbicides, PCBs	Soil	Direct Contact	On	Upper 10 ft	Residential Direct Contact
			Soil	Direct Contact	On	Unsaturated Zone	Construction worker direct contact
			Soil	Vapor Intrusion	On	Unsaturated Zone	Site-specific risk -based
			Soil	Leaching to Groundwater	On	Unsaturated Zone	LBSVs
			Soil	Ecological	On	Upper 4 ft	OEPA Eco RA Guidance - April 2008
			GW	Potable	On	To Be Determined	To Be Determined
			GW	Potable	Off	To Be Determined	To Be Determined
			GW	Non-Potable	On	To Be Determined	To Be Determined
			GW	Non-Potable	Off	To Be Determined	To Be Determined
			GW	GW to Surface Water	On	To Be Determined	To Be Determined
			GW	GW to Surface Water	Off	To Be Determined	To Be Determined
			GW	Vapor Intrusion	On	To Be Determined	Site-specific risk -based
			GW	Vapor Intrusion	Off	To Be Determined	Site-specific risk -based
			Surface Water	Non-Potable Use	On	Outside Mixing Zone Criteria	WQS per 3745-1-12
			Surface Water	Non-Potable Use	Off	Outside Mixing Zone Criteria	WQS per 3745-1-12
			Surface Water	Ecological	On	Outside Mixing Zone Criteria	WQS per 3745-1-12
			Surface Water	Ecological	Off	Outside Mixing Zone Criteria	WQS per 3745-1-12
			Sediment	Direct Contact	On	Sediment Depth	Residential Direct Contact
			Sediment	Direct Contact	Off	Sediment Depth	Residential Direct Contact
			Sediment	Ecological	On	Upper 6 inches	OEPA Eco RA Guidance - April 2008
			Sediment	Ecological	Off	Upper 6 inches	OEPA Eco RA Guidance - April 2008

TABLE 1
APPLICABLE STANDARDS SUMMARY

Former Whirlpool Park
County Road 187, Green Springs, Ohio 43410

Identified Area Number	Descriptive Name	Potential COC	Media	Completed Pathways	On/Off Property?	Point of Compliance	Applicable Standard
2	Soil Stockpiles	Asbestos, lead, mercury	Soil	Direct Contact	On	Upper 10 ft	Residential Direct Contact
			Soil	Direct Contact	On	Unsaturated Zone	Construction worker direct contact
			Soil	Leaching to Groundwater	On	Unsaturated Zone	LBSVs
			Soil	Ecological	On	Upper 4 ft	OEPA Eco RA Guidance - April 2008
			GW	Potable	On	To Be Determined	To Be Determined
			GW	Potable	Off	To Be Determined	To Be Determined
			GW	Non-Potable	On	To Be Determined	To Be Determined
			GW	Non-Potable	Off	To Be Determined	To Be Determined
			GW	GW to Surface Water	On	To Be Determined	To Be Determined
			GW	GW to Surface Water	Off	To Be Determined	To Be Determined
			Surface Water	Non-Potable Use	On	Outside Mixing Zone Criteria	WQS per 3745-1-12
			Surface Water	Non-Potable Use	Off	Outside Mixing Zone Criteria	WQS per 3745-1-12
			Surface Water	Ecological	On	Outside Mixing Zone Criteria	WQS per 3745-1-12
			Surface Water	Ecological	Off	Outside Mixing Zone Criteria	WQS per 3745-1-12
			Sediment	Direct Contact	On	Sediment Depth	Residential Direct Contact
			Sediment	Direct Contact	Off	Sediment Depth	Residential Direct Contact
			Sediment	Ecological	On	Upper 6 inches	OEPA Eco RA Guidance - April 2008
			Sediment	Ecological	Off	Upper 6 inches	OEPA Eco RA Guidance - April 2008

TABLE 1
APPLICABLE STANDARDS SUMMARY

Former Whirlpool Park
County Road 187, Green Springs, Ohio 43410

Identified Area Number	Descriptive Name	Potential COC	Media	Completed Pathways	On/Off Property?	Point of Compliance	Applicable Standard
3	Fill Area	VOCs, SVOCs, TAL Metals, pesticides and herbicides, PCBs	Soil	Direct Contact	On	Upper 10 ft below fill depth	Residential Direct Contact
			Soil	Direct Contact	On	Unsaturated Zone	Construction worker direct contact
			Soil	Vapor Intrusion	On	Unsaturated Zone	Site-specific risk -based
			Soil	Leaching to Groundwater	On	Unsaturated Zone below fill depth	LBSVs
			Soil	Ecological	On	Upper 4 ft below fill depth	OEPA Eco RA Guidance - April 2008
			GW	Potable	On	To Be Determined	To Be Determined
			GW	Potable	Off	To Be Determined	To Be Determined
			GW	Non-Potable	On	To Be Determined	To Be Determined
			GW	Non-Potable	Off	To Be Determined	To Be Determined
			GW	GW to Surface Water	On	To Be Determined	To Be Determined
			GW	GW to Surface Water	Off	To Be Determined	To Be Determined
			GW	Vapor Intrusion	On	To Be Determined	Site-specific risk -based
			GW	Vapor Intrusion	Off	To Be Determined	Site-specific risk -based
			Surface Water	Non-Potable Use	On	Outside Mixing Zone Criteria	WQS per 3745-1-12
			Surface Water	Non-Potable Use	Off	Outside Mixing Zone Criteria	WQS per 3745-1-12
			Surface Water	Ecological	On	Outside Mixing Zone Criteria	WQS per 3745-1-12
			Surface Water	Ecological	Off	Outside Mixing Zone Criteria	WQS per 3745-1-12
			Sediment	Direct Contact	On	Sediment Depth	Residential Direct Contact
			Sediment	Direct Contact	Off	Sediment Depth	Residential Direct Contact
			Sediment	Ecological	On	Upper 6 inches	OEPA Eco RA Guidance - April 2008
			Sediment	Ecological	Off	Upper 6 inches	OEPA Eco RA Guidance - April 2008

GDC - Generic direct contact
SSG - Subslab gas
WOE - Weight of evidence
SSRB - Site-specific risk-based
LBSvs - Leach-based soil values
GLB - Generic leach-based standard
VIGS - Vapor intrusion generic screening level
GUPUS - Generic unrestricted potable use standard

TABLE 2
SAMPLING PLAN SUMMARY

Former Whirlpool Park
County Road 187, Green Springs, Ohio 43410

Media		IA #1		IA #2		IA #3		Potential Off-Site Source
		EU #1	EU #2	EU #1	EU #2	EU #1	EU #2	
Soil	Borings*	41	9	---	---	---	---	---
	PCBs	246	54	---	---	---	---	---
	Full Scan**	20	4	---	---	6	---	---
	Surface Sample - Asbestos, lead, mercury	---	---	8	3	---	---	---
Groundwater***	Shallow MW	4	---	1	---	1		1
	Deep MW	4	---	1	---	---		---
	Full Scan	8	---	1	---	1		1
Surface Water	Full Scan	---	9	---	---	---	Same as IA #1, EU #2	---
Sediment	Full Scan	---	18	---	---	---	Same as IA #1, EU #2	---

* Assume average depth = 12 ft below ground surface
**Full scan = VOCs, SVOCs, TAL Metals, pesticides and herbicides and PCBs
*** Minimum number of groundwater samples.

Appendix A

IA Preliminary Exposure Pathway Summaries

Appendix A
Preliminary Exposure Pathway Summary

Former Whirlpool Park
County Road 187, Green Springs, Ohio 43410

Identified Area: #1 - *Former East Ravine – VOCs, SVOCs, TAL Metals, pesticides and herbicides, PCBs*				
Potentially Affected Medium: Transport Mechanism	**Location of COCs**	**Requires Further Evaluation?**	**Receptors for Pathways or Explanation for Eliminating Pathway From Further Evaluation**	**Completed Pathway**
Soils: Direct Contact	*On Property*	☑ Yes ☐ No	Resident and construction worker	
	Off Property	☐ Yes ☑ No	No migration off-site via unsaturated soil.	
Soils: Vapor Intrusion to Indoor Air	*On Property*	☑ Yes ☐ No	Potential future dwelling	
	Off Property	☑ Yes ☐ No	Potential future dwelling	
Soils: Leaching to Ground Water	*On Property*	☑ Yes ☐ No	Potable-Use Groundater	
	Off Property	☐ Yes ☑ No	No migration off-site via unsaturated soil.	
Soils: Ecological	*On Property*	☑ Yes ☐ No	Significant ecological resources may exist on the property.	
	Off Property	☐ Yes ☑ No	No migration off-site via unsaturated soil.	
Ground Water: Potable	*On Property*	☑ Yes ☐ No	On-site potable use	
	Off Property	☑ Yes ☐ No	Off-site potable use	
Ground Water: Vapor Intrusion Indoor Air	*On Property*	☑ Yes ☐ No	To be determined by groundwater sampling results.	
	Off Property	☑ Yes ☐ No	To be determined by groundwater sampling results.	
Ground Water: Non-potable	*On Property*	☑ Yes ☐ No	Potential non-potable use and construction worker	
	Off Property	☑ Yes ☐ No	Potential non-potable use	
Ground Water: to Surface Water	*On Property*	☑ Yes ☐ No	Flag Run Creek	
	Off Property	☑ Yes ☐ No	Flag Run Creek	
Surface Water: Potable	*On Property*	☐ Yes ☑ No	Flag Run Creek not a PWS per OAC 3745-1-12	
	Off Property	☐ Yes ☑ No	Flag Run Creek not a PWS per OAC 3745-1-12	
Surface Water: Non-Potable Use	*On Property*	☑ Yes ☐ No	Flag Run Creek a AWS/IWS per OAC 3745-1-12	
	Off Property	☑ Yes ☐ No	Flag Run Creek a AWS/IWS per OAC 3745-1-12	
Surface Water: Ecological	*On Property*	☑ Yes ☐ No	Flag Run Creek a WWH per OAC 3745-1-12	
	Off Property	☑ Yes ☐ No	Flag Run Creek a WWH per OAC 3745-1-12	
Sediments: Direct Contact	*On Property*	☑ Yes ☐ No	Flag Run Creek a Primary Contact Recreation per OAC 3745-1-12	
	Off Property	☑ Yes ☐ No	Flag Run Creek a Primary Contact Recreation per OAC 3745-1-12	
Sediments: Ecological	*On Property*	☑ Yes ☐ No	Flag Run Creek a WWH per OAC 3745-1-12	
	Off Property	☑ Yes ☐ No	Flag Run Creek a WWH per OAC 3745-1-12	
Other Pathway	*On Property*	☐ Yes ☑ No	No other pathways have been identified.	
	Off Property	☐ Yes ☑ No	No other pathways have been identified.	

Appendix A
Preliminary Exposure Pathway Summary

Former Whirlpool Park
County Road 187, Green Springs, Ohio 43410

Identified Area: #2 - *Soil Stockpiles – Asbestos, lead, mercury*

Potentially Affected Medium: Transport Mechanism	Location of COCs	Requires Further Evaluation?	Receptors for Pathways or Explanation for Eliminating Pathway From Further Evaluation	Completed Pathway
Soils: Direct Contact	*On Property*	☑ Yes ☐ No	Resident and construction worker	
	Off Property	☐ Yes ☑ No	No migration off-site via unsaturated soil.	
Soils: Vapor Intrusion to Indoor Air	*On Property*	☐ Yes ☑ No	No dwelling within 100 ft of IA	
	Off Property	☐ Yes ☑ No	No dwelling within 100 ft of IA	
Soils: Leaching to Ground Water	*On Property*	☑ Yes ☐ No	Potable-Use Groundater	
	Off Property	☐ Yes ☑ No	No migration off-site via unsaturated soil.	
Soils: Ecological	*On Property*	☑ Yes ☐ No	Significant ecological resources may exist on the property.	
	Off Property	☐ Yes ☑ No	No migration off-site via unsaturated soil.	
Ground Water: Potable	*On Property*	☑ Yes ☐ No	On-site potable use	
	Off Property	☑ Yes ☑ No	Off-site potable use	
Ground Water: Vapor Intrusion Indoor Air	*On Property*	☐ Yes ☑ No	No dwelling within 100 ft of IA	
	Off Property	☐ Yes ☑ No	No dwelling within 100 ft of IA	
Ground Water: Non-potable	*On Property*	☑ Yes ☐ No	Potential non-potable use and construction worker	
	Off Property	☑ Yes ☐ No	Potential non-potable use	
Ground Water: to Surface Water	*On Property*	☑ Yes ☐ No	Flag Run Creek	
	Off Property	☑ Yes ☐ No	Flag Run Creek	
Surface Water: Potable	*On Property*	☑ Yes ☐ No	Flag Run Creek not a PWS per OAC 3745-1-12	
	Off Property	☑ Yes ☐ No	Flag Run Creek not a PWS per OAC 3745-1-12	
Surface Water: Non-Potable Use	*On Property*	☑ Yes ☐ No	Flag Run Creek a AWS/IWS per OAC 3745-1-12	
	Off Property	☑ Yes ☐ No	Flag Run Creek a AWS/IWS per OAC 3745-1-12	
Surface Water: Ecological	*On Property*	☑ Yes ☐ No	Flag Run Creek a WWH per OAC 3745-1-12	
	Off Property	☑ Yes ☐ No	Flag Run Creek a WWH per OAC 3745-1-12	
Sediments: Direct Contact	*On Property*	☑ Yes ☐ No	Flag Run Creek a Primary Contact Recreation per OAC 3745-1-12	
	Off Property	☑ Yes ☐ No	Flag Run Creek a Primary Contact Recreation per OAC 3745-1-12	
Sediments: Ecological	*On Property*	☑ Yes ☐ No	Flag Run Creek a WWH per OAC 3745-1-12	
	Off Property	☑ Yes ☐ No	Flag Run Creek a WWH per OAC 3745-1-12	
Other Pathway	*On Property*	☐ Yes ☑ No	No other pathways have been identified.	
	Off Property	☐ Yes ☑ No	No other pathways have been identified.	

Appendix A
Preliminary Exposure Pathway Summary

Former Whirlpool Park
County Road 187, Green Springs, Ohio 43410

Identified Area: #3 - *Fill Area – VOCs, SVOCs, TAL Metals, pesticides and herbicides, PCBs*

Potentially Affected Medium: Transport Mechanism	Location of COCs	Requires Further Evaluation?	Receptors for Pathways or Explanation for Eliminating Pathway From Further Evaluation	Completed Pathway
Soils: Direct Contact	*On Property*	☑ Yes ☐ No	Resident and construction worker	
	Off Property	☐ Yes ☑ No	No migration off-site via unsaturated soil.	
Soils: Vapor Intrusion to Indoor Air	*On Property*	☑ Yes ☐ No	Potential future dwellings	
	Off Property	☑ Yes ☐ No	Potential future dwellings	
Soils: Leaching to Ground Water	*On Property*	☑ Yes ☐ No	Potable-Use Groundater	
	Off Property	☐ Yes ☑ No	No migration off-site via unsaturated soil.	
Soils: Ecological	*On Property*	☑ Yes ☐ No	Significant ecological resources may exist on the property.	
	Off Property	☐ Yes ☑ No	No migration off-site via unsaturated soil.	
Ground Water: Potable	*On Property*	☑ Yes ☐ No	On-site potable use	
	Off Property	☑ Yes ☑ No	Off-site potable use	
Ground Water: Vapor Intrusion Indoor Air	*On Property*	☑ Yes ☐ No	To be determined by groundwater sampling results.	
	Off Property	☑ Yes ☐ No	To be determined by groundwater sampling results.	
Ground Water: Non-potable	*On Property*	☑ Yes ☐ No	Potential non-potable use and construction worker	
	Off Property	☑ Yes ☐ No	Potential non-potable use	
Ground Water: to Surface Water	*On Property*	☑ Yes ☐ No	Flag Run Creek	
	Off Property	☑ Yes ☐ No	Flag Run Creek	
Surface Water: Potable	*On Property*	☐ Yes ☑ No	Flag Run Creek not a PWS per OAC 3745-1-12	
	Off Property	☐ Yes ☐ No	Flag Run Creek not a PWS per OAC 3745-1-12	
Surface Water: Non-Potable Use	*On Property*	☑ Yes ☐ No	Flag Run Creek a AWS/IWS per OAC 3745-1-12	
	Off Property	☑ Yes ☐ No	Flag Run Creek a AWS/IWS per OAC 3745-1-12	
Surface Water: Ecological	*On Property*	☑ Yes ☐ No	Flag Run Creek a WWH per OAC 3745-1-12	
	Off Property	☑ Yes ☐ No	Flag Run Creek a WWH per OAC 3745-1-12	
Sediments: Direct Contact	*On Property*	☑ Yes ☐ No	Flag Run Creek a Primary Contact Recreation per OAC 3745-1-12	
	Off Property	☑ Yes ☐ No	Flag Run Creek a Primary Contact Recreation per OAC 3745-1-12	
Sediments: Ecological	*On Property*	☑ Yes ☐ No	Flag Run Creek a WWH per OAC 3745-1-12	
	Off Property	☑ Yes ☐ No	Flag Run Creek a WWH per OAC 3745-1-12	
Other Pathway	*On Property*	☐ Yes ☑ No	No other pathways have been identified.	
	Off Property	☐ Yes ☑ No	No other pathways have been identified.	