

ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES

**U.S. EPA Brownfield
Revolving Loan Fund (RLF) Cooperative Agreement (CA)# BF-00E48101-B
Indiana Brownfields Program**

**Chesterfield Homes Property
201 Anderson Road
Chesterfield, Madison County, Indiana
April 2019**

This Analysis of Brownfield Cleanup Alternatives (ABCA) was cooperatively prepared by the Indiana Brownfields Program (Program), the Town of Chesterfield, and Industrial Waste Management Consulting Group, LLC (IWM Consulting) as a requirement for utilizing United States Environmental Protection Agency (U.S. EPA) Revolving Loan Fund (RLF) monies to remediate a brownfield. The Chesterfield Homes Property (EPA ACRES ID: 230541 and Indiana Brownfield Site ID: 4170207) located at 201 Anderson Road in Chesterfield, Madison County, Indiana (Site) is currently a vacant former automobile refueling station and service. The Site operations included the storage of petroleum products and potentially hazardous substances. Five (5) gasoline underground storage tanks (USTs) were reportedly closed-in-place on the west/northwest portion of the Site in the late 1970s. Former automobile refueling and/or repair operations at the Site are believed to be the primary source of volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), and/or lead contamination in soil and groundwater at the Site. This ABCA presents remedial alternatives considered to mitigate potential exposure to contaminated soil and groundwater associated with the historical release(s). Site redevelopment is expected to include commercial use of the property.

Site Details

Site Name: Chesterfield Homes Property
201 Anderson Road
Chesterfield, Madison County, Indiana

Property Owner: Town of Chesterfield Indiana
17 Veterans Boulevard
Anderson, Indiana 46017

Site Representative: Ms. Deborah Dunham
Town Clerk/Treasurer
Town of Chesterfield
17 Veterans Boulevard
Anderson, Indiana 46017

Summary of Previous Site Activities

Site History

Historical review indicates the Site was utilized for agricultural or residential purposes prior to the 1960s. The Site was developed as a gasoline service station in 1961, which operated through 1977. Gasoline USTs utilized in the northwest quarter of the Site were reportedly emptied and filled with sand in 1977. The Site was utilized as an auto repair facility from 1977 to 1983. The Site has remained vacant since 1983, when the former Site building burnt down. The Site consists of five (5) parcels. Ownership of Parcel 1 (48-12-10-400-270.000-035) was transferred from Hecht Property Management LLC to Samy Messiah on December 7, 2007 and Hecht Property Management LLC acquired the property on November 26, 2002. Ownership of Parcel 2 (48-12-10-400-269.000-035) was transferred from Brent Shepherd to the Town of Chesterfield on October 12, 2018 and Brent Shepherd purchased the property from Chesterfield Homes, Inc. on April 29, 2002. Ownership of Parcel 3 (48-12-10-400-268.000-035) was transferred from Brent Shepherd and Tom Shepherd to the Town of Chesterfield on August 8, 2018, and Brent Shepherd and Tom Shepherd purchased the property from Chesterfield Homes, Inc. on April 29, 2002. Ownership of Parcel 4 (48-12-10-400-267.000-035) was transferred from 95 TCI to the Town of Chesterfield on October 12, 2018 and 95 TCI purchased the property from Chesterfield Homes, Inc. on March 27, 1997. Ownership of Parcel 5 (48-12-10-400-266.000-035) was transferred from Brent Shepherd to the Town of Chesterfield on August 8, 2018 and Brent Shepherd purchased to property from Chesterfield Homes, Inc. on April 29, 2002.

Previous Environmental Assessments/Environmental Investigations

Environmental conditions at the Site were assessed between 2016 and 2017. Historical environmental assessments and investigations of the Site were documented in the following reports, which are described below.

1. IWM Consulting Group, LLC, 2016, Phase I Environmental Site Assessment
2. IWM Consulting Group, LLC, 2017, Phase II Environmental Site Assessment

IWM Consulting Group, LLC, Phase I Environmental Assessment Report, June 29, 2016

The following Recognized Environmental Concerns (RECs) were identified by IWM Consulting Group during a 2016 Phase I Environmental Site Assessment (ESA).

- A gasoline filling station was located on the Site from the 1960s to the 1970s. Details of the operations at the filling station are not readily available, and no documentation is available concerning the disposition of USTs associated with the filling station. According to the former primary Site owner, the USTs (reportedly only containing gasoline) were emptied and filled with sand in the late 1970s, but he has no documentation regarding the UST closure. Furthermore, he stated that a soil sample collected from the median north of the Site in approximately 1990 or 1991, revealed petroleum impacted soil just north of the Site.
- An auto repair facility occupied the Site from the late 1970s through 1983.

IWM Consulting Group, LLC, Phase II Environmental Site Assessment Report, June 9, 2017

Site investigation activities were conducted by IWM Consulting to further investigate the RECs identified in the June 2016 Phase I. A geophysical survey and ten (10) soil borings (VP-GP1 through VP-GP10) were proposed by IWM Consulting for the Phase II ESA. Rationales for each sampling location were summarized in a *Sampling and Analysis Plan* (SAP) developed by IWM Consulting. Details of the investigation outlined by IWM Consulting in the SAP are provided below.

- A geophysical survey was intended to identify any unmarked private utilities and to assess if additional USTs, product supply lines, hydraulic lifts, sumps, drains, or other features of concern may be present on the Site.
- Borings VP-GP1 through VP-GP3 were intended to investigate the UST area.
- Borings VP-GP4 and VP-GP5 were intended to investigate a former fuel dispenser island on the north side of the Site.
- Borings VP-GP6 was intended to investigate a former fuel dispenser island on the east side of the Site.
- Boring VP-GP7 and VP-GP8 were intended to investigate a potential waste oil UST located in the former building.
- Boring VP-GP9 was intended to investigate the former service bay within the footprint of the former building.
- Boring VP-GP10 was intended to evaluate reported historic off-Site soil contamination north of the Site.

According to the Phase II ESA report, the limited site investigation was conducted largely in accordance with the SAP, with the exception of one (1) groundwater sample that could not be collected by low-flow sampling and had to be collected as a grab sample utilizing a disposable bailer. Two (2) soil samples collected from each boring were analyzed for VOCs, PAHs, lead, and percent moisture. Groundwater samples were also collected from each boring and analyzed for VOCs, PAHs, lead scavenger 1,2-dibromoethane (EDB), and lead. The following results and conclusions were provided by IWM Consulting in the Phase II ESA report.

- Five (5) USTs with associated vent lines were detected with the ground penetrating radar (GPR) on the west side of the Site. These USTs were reportedly abandoned in place in 1977.
- Groundwater flow was calculated to be towards the west.
- Adsorbed naphthalene was observed in the subsurface soil in a boring located south of the UST pit, which is present east of the former building, at concentrations exceeding the Indiana Department of Environmental Management (IDEM) *Remediation Closure Guide* (RCG) Residential Migration to Groundwater Screening Level (MTGSL). Based upon visual observations and photoionization detector (PID) readings, the impacts do not appear to extend beyond a depth of 12 feet below ground surface (bgs).

- Dissolved n-propylbenzene, naphthalene, and lead are present in two (2) groundwater samples exceeding the RCG Residential Tap Groundwater Screening Levels (Res TAP GWSLs). A soil boring located south of the UST pit exhibited n-propylbenzene, naphthalene, and total lead concentrations exceeding the respective RCG Residential Tap GWSLs, and a boring located on the north central portion of the Site exhibited n-propylbenzene and naphthalene concentrations exceeding the respective RCG Residential Tap GWSLs.
- Based upon the soil and groundwater analytical data obtained at the Site during this investigation, it appears historical releases of petroleum hydrocarbons from the USTs have adversely impacted limited areas of the Site.
- The impacted areas of the Site are located in the central portion and north central portions of the Site near the UST cavity and northern-most fuel dispenser.

Summary of Site Characterization

The following summary of results and conclusions is supported by the Site investigations.

1. The Site is located in Section 10, Township 19 North, Range 8 East in Madison County as shown on **Figure 1**. The Site consists of five (5) parcels encompassing a total of approximately 0.81 acres and is improved with an asphalt lot with a concrete pad associated with a previous building in the southwest quarter of the Site and former fuel pump dispenser islands located in the north and east sections of the Site. The western portion of the Site contains trees and grass. Properties in the immediate Site vicinity are occupied by residences, former industrial facilities, commercial retail facilities, and a school.
2. Historical review shows the Site was occupied by an automobile refueling service station from 1961 to 1977, then an automobile repair facility from 1977 through 1983. The Site operations included the storage of petroleum products and potentially hazardous substances.
3. The nearest surface water feature to the Site is Chesterfield Branch, located approximately 3,500 feet east, and down-gradient of the Site. Other surface water features near the Site include the White River, located approximately 1.5 miles north of the Site.
4. Previous environmental investigations conducted at the Site indicate that shallow groundwater beneath the Site is present in silty clays and sandy clays, with some sand layers, present at depths of 6.5 to 10 feet bgs during drilling. Groundwater flow was determined to be towards the west beneath the Site. This groundwater is not used as a source of potable water for the Site or surrounding properties. Potable water for the Town of Chesterfield is obtained mainly from groundwater wells located approximately one-quarter mile southeast of the Site. According to IDEM, the Site is not located within a regulated wellhead protection area.
5. Five (5) historical USTs reportedly storing gasoline were reportedly closed-in-place in 1977. No releases from the USTs were reported and the USTs are unregistered.

6. VOCs, PAHs, and/or lead at concentrations exceeding the respective RCG screening levels are present in soil and/or groundwater in the central and north-central portions of the Site. See boring locations VP-GP3 and VP-GP5 on **Figure 2**.

Summary of Remedial Alternatives

1. Alternative 1 – No action.
2. Alternative 2 – Chemical injections.
3. Alternative 3 – Source (UST) excavation and disposal followed by oxidant application.

Remedial Action Objectives

Environmental conditions at the Site and current land use suggest that the following human exposure routes represent potential risks for the indicated media and potentially exposed populations:

1. Direct contact with impacted subsurface soil or groundwater by on-Site workers or future construction workers performing maintenance or excavation; and,
2. Ingestion of groundwater by future users of water wells that might be drilled at the Site.

Two (2) aspects of the Site are identified as needing corrective action based on the results of the Site investigation. The IDEM RCG provides numeric remedial action objectives in the form of screening levels (SLs) for the relevant exposure routes and land uses. Land use at the Site is currently zoned commercial, and is expected to remain so for the foreseeable future; however, redevelopment plans for the Site have not been finalized and it is possible that the Site may be rezoned. Soil or groundwater media exceeding applicable SLs include the following:

1. Subsurface soil media to variable depths that exceed one (1) or more RCG Res MTGSLs; and
2. Groundwater media that exceed one (1) or more RCG Res TAP GWSLs.

Analysis of Remedial Alternatives

The remedial action alternatives considered were evaluated using the following criteria:

(1) Effectiveness

- a. The degree to which the toxicity, mobility, and volume of the contamination is expected to be reduced.
- b. The degree to which a remedial action option, if implemented, will protect public health, safety and welfare and the environment over time.
- c. Taking into account any adverse impacts on public health, safety and welfare and the environment that may be posed during the construction and implementation period until case closure.

(2) Implementability

- a. The technical feasibility of constructing and implementing the remedial action option at the site or facility.
- b. The availability of materials, equipment, technologies and services needed to conduct the remedial action option.
- c. The administrative feasibility of the remedial action option, including activities and time needed to obtain any necessary licenses, permits or approvals; the presence of any federal or state, threatened or endangered species; and the technical feasibility of recycling, treatment, engineering controls, disposal or naturally occurring biodegradation; and the expected time frame needed to achieve the necessary restoration.

(3) Cost

- a. The following types of costs are generally associated with the remedial alternatives:
 - Capital costs, including both direct and indirect costs; Initial costs, including design and testing costs.
 - Annual operation and maintenance costs.

Remedial Alternatives

1. *Alternative 1 – No Action:* If no action is taken at the Site, the impacted soil will remain on the Site and it will not be a developable property. Additionally, if the Site is not secured, it is possible that the general public could come into direct contact with the impacted soils, thus creating a potential environmental, health, and welfare liability for the Town of Chesterfield. This option is considered the least environmentally protective and the impacts to the environment will continue for years to come.
 - a. **Effectiveness** – None: This option does not decrease the toxicity, mobility, or volume of the contamination and does not protect human health, safety, welfare, or the environment.
 - b. **Implementability** – Easy: There are no required actions or technology necessary to implement this option.
 - c. **Cost** – None: This option does not require ongoing operation or maintenance costs. Any deficit incurred would be in the form of loss of potential income from redevelopment.
2. *Alternative 2 – Chemical Injections:* The advantage of chemical injections is that they can be targeted, performed in relatively little time, do not require ongoing maintenance, and promote natural degradation of subsurface contaminants in-situ. However, the effectiveness of chemical injections is highly variable and the contaminant concentrations may rebound once the introduced chemicals are spent without contaminant source removal.

Chemical oxidation and enhanced bioremediation reagents would be injected into the soils and groundwater beneath the Site in order to try and reduce the soil mass and dissolved groundwater concentrations. There are a variety of chemical oxidants that may be utilized to accomplish reduction of contaminant concentrations in soil and groundwater.

- a. **Effectiveness** – Low to moderate: This method is effective under the right soil conditions. Further assessment activities would need to be performed to determine the appropriate chemical or mixture of chemicals to use at the Site.
 - b. **Implementability** – Easy: The Site is currently vacant, so no operations would be interrupted.
 - c. **Cost** – Moderate, depending on the selected chemical(s): Costs would include implementation of the chemical injections followed by several quarters of groundwater monitoring to verify the effectiveness of the treatment.
3. *Alternative 3 – Source (UST) Excavation and Disposal followed by Oxidant Application:* The advantage of the source excavation and disposal portion of this option is that it expeditiously addresses the environmental concerns with respect to the hazardous substances adsorbed to the subsurface soil and removes the impacted soil from the Site. The excavation areas can focus on source areas or only areas with the highest contaminant concentrations and alleviates any long-term effects with managing direct contact with the subsurface soil.

Confirmatory soil samples will be obtained from the base and sidewalls of the excavation to document the soil conditions post-excavation. Once the excavation has been adequately performed to appropriate screening levels, a chemical oxidant such as Oxygen Release Compound® would be applied to the base of the excavation to treat residual soil and groundwater contamination.

Additionally, four (4) monitoring wells will be installed to monitor remedial effectiveness of groundwater conditions at the Site. The monitoring wells will be properly installed and developed and groundwater samples will be collected quarterly for four (4) quarters using low-flow sampling techniques and field-filtration.

- a. **Effectiveness** – High: This method eliminates potential future direct contact risks with impacted surface soil.
- b. **Implementability** – Easy: The Site is currently vacant, so no operations would be interrupted.
- c. **Cost** – Moderate: Costs would include soil disposal, confirmation sampling, imported limestone, compaction of imported limestone, and installation and monitoring of wells.

Remedial Alternatives with Respect to Climate Change Conditions

An evaluation of several climate change consequences (e.g., rising sea level, increased frequency and intensity of flooding and/or extreme weather events, etc.) indicates that the Site is not likely to be materially affected by such conditions.

Recommendation for Site Remedy

The most feasible and appropriate cleanup alternative is Alternative 3 (Targeted Excavation and Disposal). This remedial approach immediately remediates and removes areas with the highest contaminant concentrations and expeditiously minimizes potential exposure pathways. The approach promotes redevelopment of the Site by cleaning up the Site to levels below RCG SLs and it is the most health protective option for future Site occupants and construction workers.

Decision Document

A decision document will be issued at the close of the public comment period with additional details on the selected alternative for site remedy. The decision document will serve as a notice to proceed with federally funded remediation activities and will be available in the local information repository for public review, along with this Site ABCA and other Site-related documents.

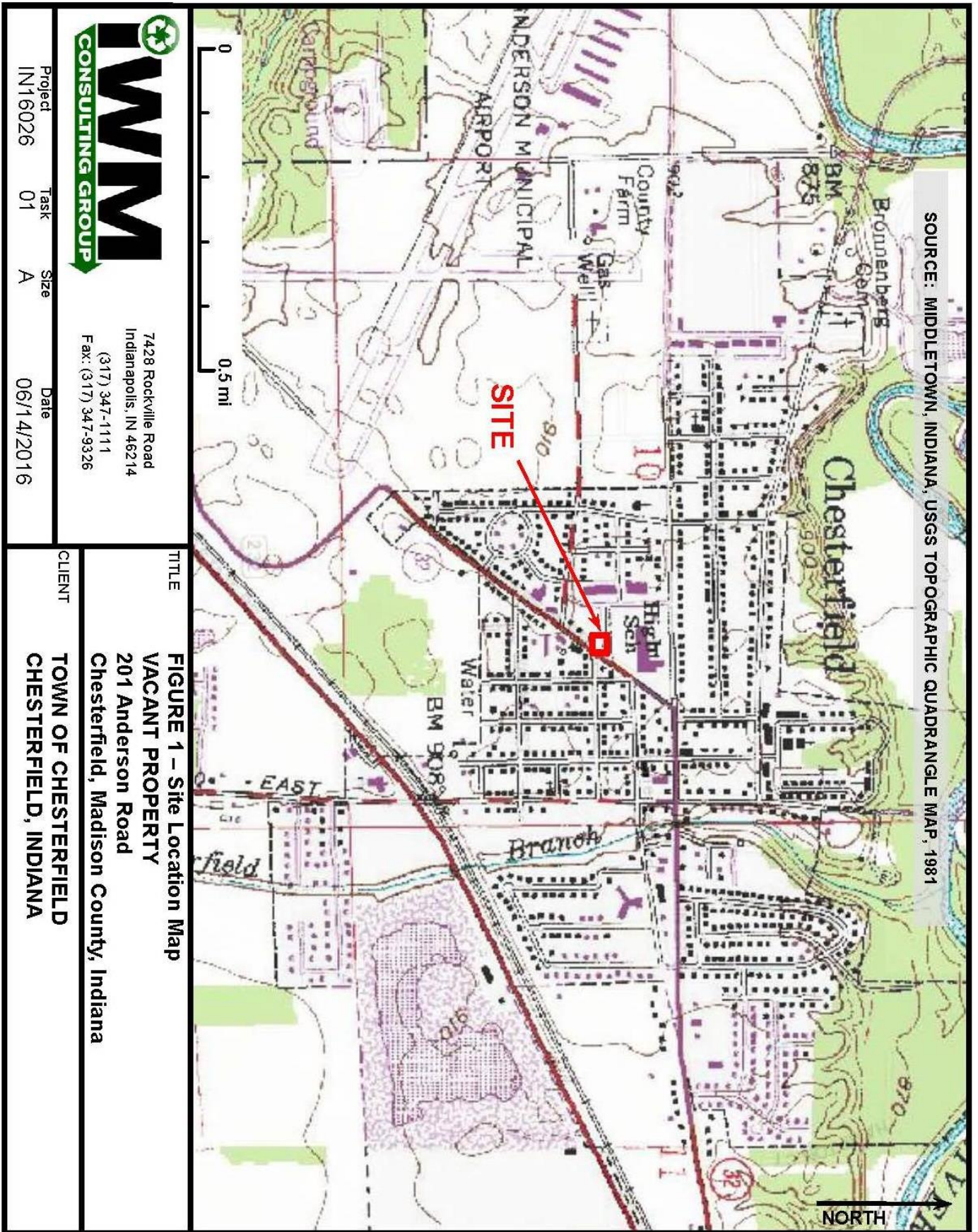


FIGURE 1

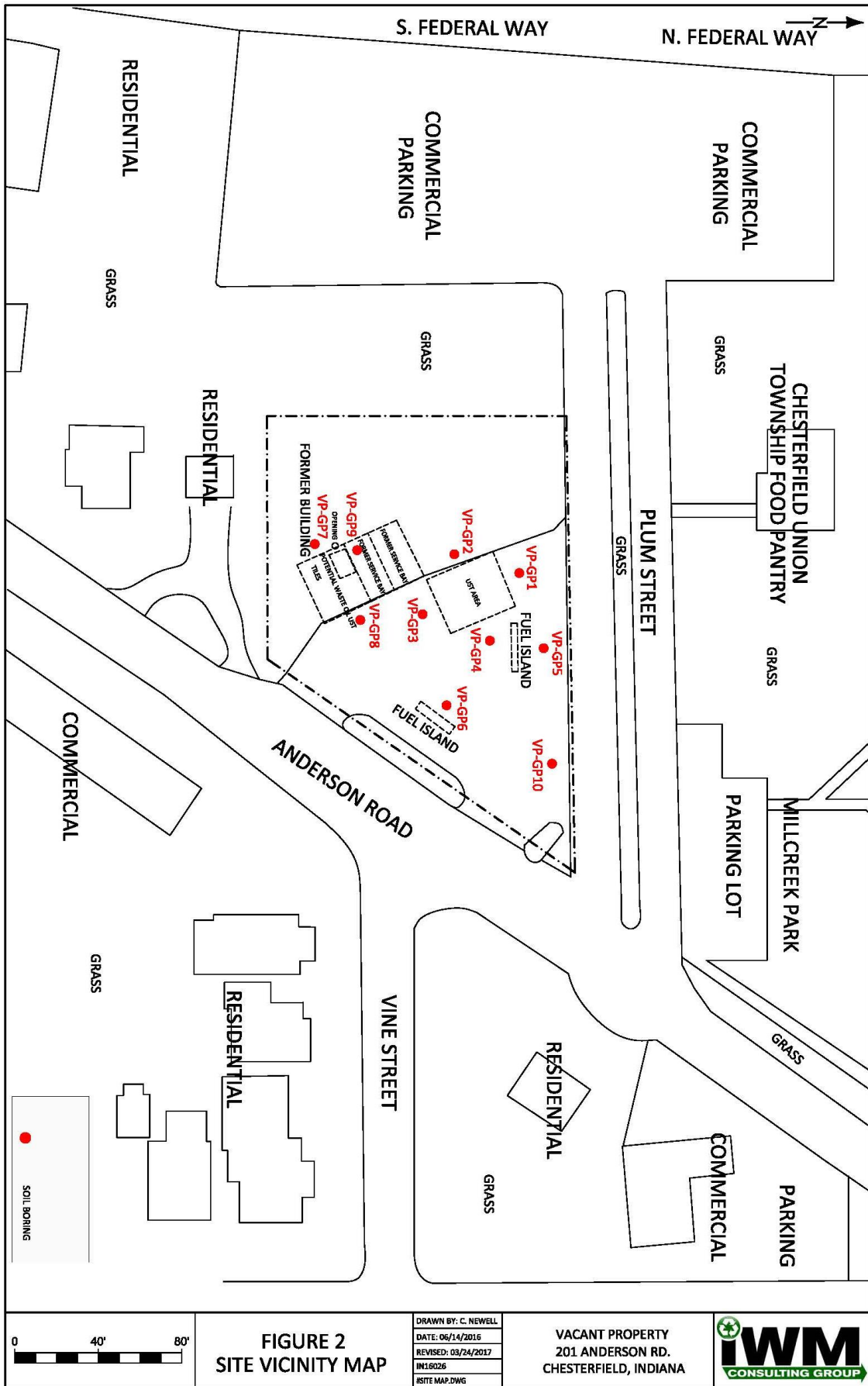


FIGURE 2