953608

CERCLA PRELIMINARY ASSESSMENT

REPORT

for

ELECTRO PLATING SERVICES

945 EAST 10 MILE ROAD

MADISON HEIGHTS, Michigan 48071

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PRELIMINARY ASSESSMENT
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Section 1.0 Introduction

The United States Environmental Protection Agency (U.S. EPA) discovered the Electro Plating Services (EPS) site (Site) into the Superfund Site Assessment process on January 24, 2018. The U.S. EPA tasked the Michigan Department of Environmental Quality (MDEQ) to conduct a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Preliminary Assessment (PA) of the Site as a result of a Pre-CERCLA Screening report completed by the MDEQ and signed by the U.S. EPA on January 24, 2018. The authority for this work was granted through a Cooperative Agreement (Assistance ID No.: V-05E005844-06). The National Oil and Hazardous Substances Pollution Contingency Plan (Title 40 of the Code of Federal Regulations, Part 300) requires a PA be performed on all sites entered into the CERCLA Superfund Site Assessment process.

The Site is a former electroplating shop that operated from 1967 to 2016. Operations included copper, tin, bronze, cadmium, nickel, chromium, gold, silver, zinc, and lead plating. These operations left behind other wastes such as sodium cyanide and trichloroethylene (TCE) (Tetra Tech 2018; U.S. EPA 2018b; U.S EPA and Lippert 2017). TCE was documented to be stored in drums dating back to at least 1994 and was used as a degreaser back to at least 2004 (SEMS 2018).

The address of the EPS company is 945 East 10 Mile Road in the city of Madison Heights, Oakland County, Michigan. The Site is composed of five parcels, a large building with four levels (main electroplating operations), and two smaller buildings located to the west on East Ten Mile Road. The main plant building takes up the two east-most parcels. Immediately west of the main plant is an open area at 937 East 10 Mile Road, formerly a building that was demolished by order of the city of Madison Heights. The area of the Site is about 0.75 acres and includes the parcels at 901, 925, 937, 945, and 959 East 10 Mile Road. The Site is located in a heavily populated residential, commercial, and industrial area with a major interstate highway less than 100 feet to the north.

The PA is performed under the authority of CERCLA and is the initial investigatory step in the CERCLA Superfund process. The PA involves a limited scope investigation that collects readily available information. The PA is designed to distinguish between sites that pose little or no threat to human health and the environment and those that require further investigation. The PA may also support emergency response activities and public information needs.

If the findings of the PA determine that further investigation is warranted, the Site will continue to progress through the Superfund investigative process and undergo a CERCLA Site Inspection (SI). The SI will further evaluate threats to human health and the environment and collect additional data for further evaluation in the Superfund process. This evaluation may be accomplished through the collection and analysis of waste and environmental media samples to determine whether hazardous substances are present at the Site and are migrating to the surrounding environment and potential human and environmental targets. The SI provides the necessary information required to determine if the Site qualifies for possible inclusion on the National Priorities List or if the Site should be designated as No Further Remedial Action Planned (NFRAP) in the Superfund process. At any time throughout the Superfund

evaluation process, the Site may be designated as NFRAP, be referred to another state or federal cleanup program, or be recommended for further Superfund action.

As part of this PA work, the MDEQ collected file information from various sources. These included the MDEQ Waste Management and Radiological Protection Division (WMRPD) Southeast Michigan district, MDEQ Remediation and Redevelopment Division (RRD) Superfund, U.S. EPA Superfund online sources, and general internet sources.

Section 2.0 Site Background

Section 2.1 Site Description

The Site is located near the southeast corner of Oakland County in southeast Michigan. Macomb County is only half a mile east of the Site, while Wayne County is about two miles south. See Figure 1. The most common address used for the Site is 945 East 10 Mile Road, in the city of Madison Heights, but the Site is composed of five parcels, each with a separate address, as shown in Figure 2. According to Oakland County's Property Gateway (Oakland County 2018), the 945 address is only associated with parcel 25-24-380-024, the parcel number for the west half of the main electroplating operations building. The five addresses associated with the Site are, from west to east, 901, 925, 937, 945, and 959 East 10 Mile Road. The location coordinates at the center of the main plant building are 42.476500° latitude and -83.096361° longitude (Tetra Tech 2018). The Site is situated in a residential, commercial, and industrial area and bordered by I-696, a major east-west freeway just 100 feet to the north.

Operational areas of the 0.75-acre Site include four buildings and a vacant lot, as shown in Figure 2 and as outlined below:

- The main electroplating operations took place in the east-most building, which has three floors and a basement (Tetra Tech 2018). The table below summarizes what operations took place, the removal actions completed, and approximate locations of wastes:

Floor	Operational Uses, Removal, Location
3rd	Tool and equipment storage area, and a limited number of small containers with hazardous waste. Containers/waste removed. No additional activities completed due to unsafe conditions.
2nd	A portion of the wastewater treatment vats were stored on the second floor. A lab area is in the northern part. Container storage areas and a filter press were in the central part. Plating areas with plating lines, vats, and other containers were in the west part.
1st	Small office and a tool shop. Wastewater treatment vats were located in the central part.
Basement	One concrete pit in the central part; one earthen pit in the eastern portion at a depth below ground level of about 12 feet.

- Just to the west of the main building is a vacant lot, now a surfaced parking lot, which was previously a building owned by EPS. The former building was also associated with plating activities. The building was demolished prior to removal activities, as ordered by the city of Madison Heights.

- The next lot to the west contains a one-story warehouse building, which contained a small office in the southwest part of the building. The rest of the building was used for chemical storage.

- The next two lots to the west include two buildings used for equipment storage. These were not part of any removal activity.

- Access to the Site is not limited. No fencing is present around any part of the Site. Large boulders have been placed along East 10 Mile Road between the main electroplating building and the warehouse building to limit vehicular access. Pedestrian access into the vacant lot and areas surrounding the buildings is not limited. Windows and some doors have been boarded up along East 10 Mile Road.

The topography of the Site is relatively flat, according to Google Earth. The land surface elevation along East 10 Mile Road is 631 feet above sea level. The vacant parcel rises to 632 feet in the middle and then falls again to 631 feet along Heights Drive. The surface of Height Drive seems to be between 630 feet on the west side of the Site and falling to 629 feet on the east side.

Within the 4-mile Target Distance Limit (TDL), the land elevation slopes from the highest elevation in the west toward the east and then north-northeast (MDEQ 2002). A watershed divide is located about 2.7 miles west of the Site, where the elevation is about 666 feet along the divide. The land surface slopes downward from there toward the east and the Site. From the Site, the land surface seems to drop more toward the north-northeast, where the elevation lowers to about 610 feet at Bear Creek Drain.

This north-northeastern direction seems to be influenced by a sub-watershed of the Clinton River, which is oriented in the south-southwest to north-northeast direction. The topographic surface, shallow groundwater table surface, and the Clinton River and its tributaries generally slope in this direction from the Site. The sub-watershed partially within the 4-mile TDL and including the Site connects beyond the 4-mile TDL to four subsequent sub-watersheds of the Clinton River and eventually empties into the northern part of Lake St. Clair.

Section 2.2 Site History

According to U.S. EPA and Lippert (2017), the following history is known:

> "Electro-Plating Service, Inc. (EPS) incorporated in 1967, and manufactured-electroplated metals or formed products at the Site until the Michigan Department of Environmental Quality (MDEQ) ordered it to cease operations on December 21, 2016. EPS conducted various types of electroplating operations, including copper, tin, bronze, cadmium, nickel, chrome, gold, silver, zinc, and lead plating. The operations at the EPS facility resulted in the generation and storage of large quantities of hazardous waste, including cyanide, chromium, nickel chloride, trichloroethene (TCE or trichloroethylene), and various acids and bases [Administrative Record Document #22]."

Section 2.3 Regulatory Status

On August 26, 1993, the Michigan Department of Natural Resource's (MDNR) Environmental Response Division (ERD) Southeast Michigan District proposed a state score for the Site of 20 out of a maximum possible score of 48 (MDEQ 2013). The scoresheet stated the point of release of heavy metals observed in a green liquid as being a pit, and that soil was suspected of being contaminated. The population density of the area was listed as 6,673 persons per square mile, and Halfman School was listed as being located within one half mile from the Site.

Prior to 1995, the MDNR included environmental programs in addition to natural resources management programs. The MDEQ came into being in 1995 pursuant to Executive Order No. 1995-18, which transferred environmental regulatory programs from the MDNR to the newly created MDEQ. See the webpage historical reference at MDEQ (2018c).

The MDEQ's WMRPD, who managed the federal Resource Conservation and Recovery Act (RCRA) program for the state, documented over 20 years of compliance actions between 1996 and 2016 at the Site (Tetra Tech 2018). The RCRA ID number is MID 042 444 687 (MDEQ 2016; U.S. EPA and Lippert 2017). These compliance actions were associated with the treatment, storage, and disposal of hazardous wastes by EPS. On April 10, 2010, the MDEQ executed a consent order to resolve significant hazardous waste violations, but by 2016 EPS had not yet resolved the violations. Throughout much of 2016, the MDEQ and the Madison Heights Fire Department (MHFD) conducted several inspections at the Site. On June 6, 2016, the MDEQ issued a violation notice regarding mismanagement of wastes and hazardous wastes. EPS did not respond, and the MDEQ and MHFD subsequently conducted another inspection on November 15, 2016. This inspection found:

- unstable flooring on the plating bath level;
- an estimated 5,000 containers holding liquid or solid waste and processed chemicals with most improperly stored, some leaking, open, and corroded;
- containers of acids, bases, metal oxides, cyanide, and chlorinated solvents;
- incompatible chemicals stored together;
- a pit in the basement containing liquids from the plating baths; and
- sludge excavated from the pit and surrounded by a berm reportedly made from hazardous waste chromium from the pit.

In December 2016, the MDEQ issued a second violation notice to EPS and the Michigan Department of Health and Human Services determined conditions at the Site posed an imminent and substantial hazard to the public health. On December 21, 2016, the MDEQ issued an Order to Cease and Desist Operations. On December 22, 2016, the MDEQ formally requested the U.S. EPA to conduct a time-critical removal at the Site.

The U.S. EPA conducted a removal action from April 17, 2017 to December 29, 2017 (Tetra Tech 2018; U.S. EPA 2017). Of special interest during this removal action is what

was found and removed from two pits in the basement. One was a concrete pit covered by large metal plates. That pit contained cyanide liquids and sludge. Several totes containing cyanide were located nearby. The field crew observed rainwater from holes in the building roof to cause the totes to overflow into the concrete pit. The cyanide waste was removed and properly disposed off-site. The pit was triple rinsed, filled and compacted with crushed concrete and fines. A second earthen pit was located directly beneath the plating level above, which was reportedly dug by the owner of EPS. The pit contained green wastewater with hazardous levels of chromium. The pit was pumped out and the wastewater properly disposed off-site. The pit was then filled and compacted with crushed concrete and fines. Hazardous substances found in these pits could have potentially released into the soil under the building as well as to shallow groundwater. If released to groundwater under the building, hazardous and volatile substances such as TCE could have migrated to nearby active businesses or private residences and potentially affected human targets there via subsurface intrusion. Wastes removed and disposed off-site, but potentially released into soil or groundwater due to documented leaks and poor containment, include the following hazardous substances: ammonia, cadmium, chromium, cyanide, chromium and cyanide liquids, gasoline, lead, mercury, nickel, silver, toluene, TCE, used oil, xylenes, and zinc.

Section 3.0 Past Environmental Investigations

In November and December 1993, Environmental Consulting & Technology, Inc. (ECT) conducted a soil and groundwater investigation in the earthen pit, and along East 10 Mile Road, as well as along Heights Drive (formerly I-696 Service Drive) (ECT 1994). ECT submitted a report to the ERD in the Southeast Michigan District office of the MDNR in March of 1994. ECT collected the following samples with the results shown:

Samples	Location	Results
9 samples from 5 hand auger soil borings	earthen clay pit located in the basement of the main electroplating building	No volatile organic compounds (VOCs), but **chromium (VI), cyanide, and Michigan 10 metals found above Act 307 cleanup criteria (Criteria)**
3 soil boring samples and 1 groundwater sample	along East 10 Mile Road	Only VOC detected in soil was xylenes but considerably below Criteria; all inorganics below Criteria; all VOCS in groundwater non-detect (ND); for ground- water, no background da available, but **chromium (VI), barium, cadmium, copper, and silver exceeded current state groundwater surface water interface Criteria**
2 soil boring samples and 2 groundwater samples	along Heights Drive (then I-696 Service Drive).	All VOCs in soil ND; but **cadmium and total chromium in soil potentially greater than 3x background**; all VOCS in groundwater ND; for ground-water, no background data available, but **chromium (VI), barium, cadmium, copper, lead, silver, and zinc exceeded current groundwater surface water interface Criteria**

ECT found the soil in the earthen pit to be gray clay with a trace of medium sand, but no sand seams. No significant groundwater was found in the pit. ECT concluded that: 1) the clay pit soils were not contaminated above any state cleanup standards at the time, 2) soil in a soil boring sample at the northeast corner of the main plant building exceeded state cleanup standards for total chromium and cadmium, 3) chromium (VI) was detected in the three monitoring wells installed, and 4) the groundwater may not be an aquifer as defined in Public Act 307 of 1982, as amended, which was in effect at the time.

On December 2, 1994, ECT conducted a soil and groundwater investigation at the Site (ECT 1995). Soil samples from the earthen pit found cadmium, copper, lead, and zinc significantly above background and above Type B criteria, but below direct contact criteria in effect at the time. The lean lacustrine clay soil in the pit was considered to be of a low hydraulic conductivity, which should restrict the migration of contaminants. ECT collected five groundwater samples in an area about one third the distance from the northeast corner of the main plant building and the northwest corner, and midway between the building and the I-696 Service Drive, now Heights Drive. Four inorganics were found to be significantly above background:

- Chromium (VI) up to 1,049 milligrams per liter (mg/L) (backgrounds of 2.6 to 5.1 mg/L),
- Cadmium up to 0.449 mg/L (background at 0.003 mg/L),
- Total chromium up to 1,174 mg/L (backgrounds between 2 and 8 mg/L), and
- Lead up to 0.167 mg/L (background at non-detect or <0.1 mg/L).

In addition, they determined the local shallow groundwater to be flowing towards the northeast.

On February 17, 1995, ECT collected six soil samples from the floor of the earthen pit in the basement of the main electroplating building. Four soil samples were analyzed using the Synthetic Precipitation Leaching Procedure for metals. Two soil samples were analyzed using the appropriate U.S. EPA SW-846 methods for total metals. The soil was field classified as a lean gray clay with a trace of silt.

On December 30, 2016, the U.S. EPA and Sustainment and Restoration Services, LLC (SRS) conducted a removal site assessment in the main electroplating building (Tetra Tech 2018). The other buildings were not accessible at the time. They found the same conditions noted above during the various inspections, but also holes in the roof and windows allowing for uncontrolled access to the Site and stained/damaged concrete floors in the basement. The U.S. EPA and SRS collected seventeen soil, sludge, and liquid samples, with 11 of those analyzed for the toxicity characteristic leaching procedure (TCLP). The samples were compared to limits found in Title 40 of the U.S. Code of Federal Regulations (40 CFR) Part 261. Nine of the TCLP samples found at least one metal above the toxicity criteria. The following analytes and compound exceeded their toxicity criteria as follows:

- Cadmium exceeded its 1.0 mg/L or parts per million (ppm) toxicity criterion in five samples up to 210 ppm,
- Chromium exceeded its 5.0 mg/L toxicity criterion in seven samples up to 60,000 ppm,
- Lead exceeded its 5.0 mg/L toxicity criterion in six samples up to 1,000 ppm,
- Silver exceeded its 5.0 mg/L toxicity criterion in three samples up to 94 ppm, and
- TCE exceeded its 0.5 mg/L toxicity criterion in one sample at 89 ppm.

In addition, six samples had low pH, ranging from 1.0 to 1.9, and one sample found cyanide at 0.95 ppm. Based on the results above, including potential threats of release, uncontrolled access, nearby private residences and active businesses, site wastes were considered to pose a substantial threat to the public health, welfare, or the environment. Therefore, the U.S. EPA concluded a time-critical removal action was necessary to mitigate the threat.

On July 5, 2017, U.S. EPA contractor Tetra Tech completed four soil borings on the west and north sides of the main plant building (Tetra Tech 2018). Two borings were completed on the west side of the building but not sampled. Two borings were completed on the north side and were sampled. Chromium (VI) exceeded the U.S. EPA Removal Management Level of 630 ppm in both borings. Chromium (VI) exceeded the state nonresidential direct contact criterion of 9,200 ppm in one boring. See Figure 3 for the boring locations and the relevant details.

Section 4.0 Sources

Based on documented investigations, numerous historical sources of hazardous substance releases were present, two present sources are known to remain, and one or more potential sources may be present.

Historically, an estimated 5,000 containers were found holding liquid or solid waste and process chemicals with most being improperly stored, leaking, open, or badly corroded. File information suggests that most of these releases migrated into the basement level of the main plant building and eventually into the earthen pit found there (see SEMS 2018, Administrative Record item #15, where the earthen pit had been receiving leakage from plating liquids). Releases from these sources is assumed, but the quantities released is unknown. See Section 2.3 above.

A recent investigation documented contaminated soils in subsurface samples on the north side of the building and in an earthen pit present in the basement of the main plant building. These two sources are noted in Section 4.1 below.

Potential soil contamination is possible in the vacant lot west of the main plant building. See Section 4.2 below.

Section 4.1 Known Sources

<u>Contaminated Soils</u>

1) Contaminated Subsurface Soil on North Side of Main Plant Building
    a. Estimated volume = 100 cubic yards, Tier C.
    b. Hazardous substances = chromium (VI), cadmium, lead, toluene, ethylbenzene, and total xylenes.
    c. Observed release into native soil with low hydraulic conductivity, estimated to be 2.66×10^{-5} centimeters per second, similar to silty clay or glacial till.

2) Residual Contaminated Soil Under Building in Earthen Pit
    a. Estimated volume = 100 cubic yards, Tier C.
    b. Hazardous substances = cyanide, mercury, benzene, toluene, ethylbenzene, TCE, and chromium (VI).
    c. Observed release to soil confirmed since the organics and chromium (VI) are not naturally occurring.

Tanks and Containers other than Drums

3) Potential Releases of Wastes Found in Main Plant
    a. Estimated Quantity = 100,000 pounds.
    b. Hazardous substances = acetone, ammonia, benzene, chromium, cyanide, ethylbenzene, mercury, toluene, TCE, xylenes, and zinc.
    c. Observed releases of hazardous substances and waste documented during the removal action completed by the U.S. EPA.

Section 4.2 Potential Sources

Contaminated Soils

4) Potential shallow soil contamination in vacant lot west of main plant
    a. Estimated area = 6,000 square feet, Tier D.
    b. Hazardous substances = chromium (VI), cyanide.
    c. Potential release to ground surface in the past, however appears to be covered by asphalt or concrete, limiting the likelihood of potential contaminants migrating via overland flow or runoff.

Section 5.0 Pathway Discussions

Section 5.1 Groundwater Migration

Few groundwater sources for drinking water exist within the 4-mile TDL. Only one public water supply well, in the 1- to 2-mile ring northwest of the Site, is using groundwater as a drinking water source, serving 554 persons in Wynstone Subdivision (MDEQ 2016). That well is unlikely to be affected by contaminants from the Site since shallow groundwater at the Site flows toward the northeast. There are no drinking water wells at the Site from which to evaluate Level I or Level II concentrations. The nearest known water well is used by the Hazel Park Racing Association and is located about a half mile east-southeast of the Site, as shown in Figure 4. All other sources for drinking water for the entire 4-mile TDL area around the Site are supplied by surface water intakes (MDEQ 1999). All other communities within the 4-mile TDL get their water from Detroit or the Southeastern Oakland County Water Authority. The latter buys their water from Detroit, which gets it from surface water sources with intakes in the Detroit River and Lake Huron. There are no wellhead protection areas within the TDL.

The most toxic and mobile hazardous substances available to the groundwater pathway documented at the Site and attributable to the Site are cyanide and TCE. The known sources of hazardous substance releases summarized in Section 4.1 can migrate into groundwater, and potentially those listed in Section 4.2. A shallow groundwater water table is documented in the area below the shallower unsaturated soil.

Groundwater sampling in 1994 just outside the northeast corner of the building plant determined an observed release of chromium (VI) at a concentration of 1,048 mg/l. No background sample was collected at the time, but since chromium (VI) is not naturally occurring, it is assumed to be significantly above background. Because of the confirmed observed release to groundwater, there exists the potential for a continued release, especially since the remaining sources are not significantly contained.

The soils of the area around the Site are variable, composed of a nearly level glacial lake plain made up of sandy, loamy, and clayey soils (Feenstra 1980, p 1). The shallow, Quaternary geology is composed of primarily lacustrine (lake) sand and gravel drift at the Site in addition to lacustrine clay and silt 2 to 4 miles from the Site (MNFI and MDNR 1998a) with several former glacial lake shorelines found in the area (MNFI and MDNR 1998b). The drift at the Site is about 140 feet thick lake plain clays with some interbedded sand and gravel (Mozola 1953, Figure 2, p 114). A recent soil boring completed at the EPS Site found sand and gravel fill to about 7 feet deep, followed by wet sandy clay or wet sand to 10 feet, followed by stiff clay to 12 feet (Tetra Tech 2018; see also Figure 3 in this report).

The drift in the entire 4-mile TDL area of the Site is generally not an aquifer but may include thin interbedded sand and gravel aquifers at depth (MDEQ 2004c; Mozola 1953). According to Rheaume (1991), the area is characterized by moderately thick, low-yielding, glacial lacustrine clay that overlies low-yielding Devonian and Mississippian

shale and sandstone bedrock containing highly mineralized water, which are generally incapable of yielding adequate ground-water supplies. Due to this lack of groundwater sources, the area relies heavily on surface water sources from Lake Huron and the Detroit River. A groundwater investigation at the Site (ECT 1995) included a slug test on two of the three monitoring wells at the Site to estimate a hydraulic conductivity (K) for the Site. They found that the K value of the lean lacustrine clay is estimated at 2.66×10^{-5} centimeters per second, which ECT concluded restricts the migration of contaminants due to the low K value of the clay.

According to the MDEQ network Geographic Information System (GIS) shapefiles showing water table elevation contours and surface water features, shallow groundwater flows across the 4-mile TDL area of the Site from the west towards the east and then towards the northeast. An investigation conducted at the Site found shallow groundwater to be flowing toward the northeast (ECT 1995).

The bedrock surface below the drift in close proximity to the Site is the Antrim Shale, which is not considered an aquifer (MDEQ bedrock shapefile on department network drive). Three other bedrock formations are located within the 4-mile TDL. The first is the Bedford Shale, which is also not considered an aquifer, followed by the Berea Sandstone, which is a marginal aquifer, then the Traverse Group formation, which is considered a good aquifer.

The estimated population using groundwater for drinking water within a 4-mile radius of the Site is detailed in the table below:

Distance from Site	**Estimated population served by private wells**	**Estimated population served by municipal wells**
0 – ¼ Mile	0	0
¼ - ½ Mile	0	0
½ - 1 Mile	0	0
1 – 2 Mile	0	554
2 – 3 Mile	0	0
3 – 4 Mile	0	0
Total	0	554

Section 5.2 Surface Water Migration

The Site is located just less than a mile from Sharkey Drain and Kutchey Drain, open drains within the Clinton River watershed. These two surface water bodies, although called drains, appear in electronic maps of MDEQ GIS surface water layers and the Michigan Surface Water Information Management System website (MDEQ and MDNR 2019) as permanent surface water bodies, symbolized by solid blue lines. They appear

as blue lines not connected to other permanent, flowing surface waters in the Clinton River watershed. According to November 2018, e-mail communications with staff of the MDEQ Water Resources Division, they indicate that both drains connect to permanent, flowing surface waters via below ground storm sewer drains. The two open drains appear to meet one of the hazard ranking system (HRS) section 4.0.2 rivers category definitions as "man-made ditches only insofar as they perennially flow into other surface water." As these open drains flow perennially through the below ground connecting storm sewer drains, they appear to meet the definition.

Contaminants could potentially reach tributaries of the Clinton River via overland flow through storm water drains. If a release had occurred at the ground surface, contaminants could migrate over the ground surface into nearby storm sewers known to exist along East 10 Mile Road. The storm sewer along East 10 Mile Road connects to Kutchey Drain within a mile of the Site, which connects to Bear Creek Drain and Red Run Drain, eventually draining into the Clinton River. However, upon examination of the MDEQ Site files and Administrative Record files from the U.S. EPA, near-ground sampling results showing a release of hazardous substances to the ground surface are not available and thus cannot be documented. In addition, the vacant lot west of the main plant building appears to be surfaced with asphalt or concrete and thus the underlying soil, even if contaminated, would not be available for migration via overland flow or runoff. Due to the lack of data to support an observed released via overland flow, this component of the surface water pathway is considered only a slight potential. If a release did occur, however, the probable point of entry (PPE) would be after migrating through a storm sewer at the connection with Bear Creek Drain east of the Site. See Figure 5, 15-mile TDL Map.

The MDEQ has documentation of a release to shallow groundwater, which could potentially migrate via groundwater into area surface waters. Shallow groundwater from the Site is known to flow towards the northeast (ECT 1995; MDEQ water table elevation contours in network GIS) in the direction of Sharkey Drain. Groundwater venting into surface waters, HRS Section 4.2.1.1 requires eligible surface waters to be within 1 mile of one or more sources at the Site and have a containment factor value of greater than 0. Sharkey Drain is less than a mile from sources at the Site and seems to fit the definition of "man-made ditches." Sharkey Drain is where the PPE for potentially venting groundwater is located, as shown in Figure 5. Sharkey Drain connects to Bear Creek Drain via a known below-ground storm sewer drain (Red Run 2014), which flows into the Red Run Drain, which eventually flows into the Clinton River.

Surface waters are not located adjacent to the Site, but the closest surface water with a potential for release via venting groundwater is an open drain known as Sharkey Drain, located about ¾ miles northeast of the Site. See Figure 5. A report by Zorn and Seelbach stated the Clinton River is "the lower mainstem and its tributaries, the North Branch and Red Run, had naturally unstable and low summer flows and received little groundwater because they drained areas of impermeable soils" (Francis and Haas, 2006, p 12). Thus, although there is a potential for contaminants entering the surface water via groundwater, impermeable soils of the area result in slow recharge of area

surface waters including the Red Run Drain. According to flood zone maps, no flooding occurs at Sharkey Drain, or at the Bear Creek Drain until about 2 miles downstream. See Figure 5.

The waste with the highest toxicity or bioaccumulation characteristics in surface water associated with these sources seems to be mercury. Mercury is not frequently mentioned in Site files but has been reported in the waste stream during removal.

Potential surface water targets include food chain organisms and environmental populations. There are no drinking water intakes in the Clinton River within the 15-mile TDL. Therefore, there is no drinking water threat for this pathway. Fish populations in the Red Run Drain are highly degraded due to poor water quality and poor habitat (Francis and Haas 2006, p. 50). However, one pound of fish consumed per year is assumed. A few wetlands can be found within the 15-mile TDL, with an estimated 5.8 miles of wetland frontage. No Level I or Level II concentrations can be assumed at this time.

Section 5.3 Soil Exposure and Subsurface Intrusion

No known hazardous substances at or within 2 feet of the ground surface have been documented. The MDEQ has documented releases to soil, but at depths of 3.5 to 9 feet. The soil exposure component of this pathway is only considered as a potential. Due to documented releases in deeper soil near the main plant building, release to soil at or near the ground surface is considered as a potential.

VOCs can cause indoor air exposures in regularly occupied structures. The MDEQ and the U.S. EPA have documented VOCs in Site waste, soil, and groundwater. VOCs are known to be associated with contaminated soil in two of the sources noted in the Section 4.0 Sources.

To evaluate the subsurface intrusion component of the Soil Exposure and Subsurface Intrusion pathway, three areas of assumed exposure are used:

- An Area of Observed Exposure (AOE) is assumed to be an area within 200 feet of the two sources. The AOE is assumed to include targets at possible Level I (AOE1) concentrations in indoor air samples at regularly occupied residences and active places of employment. The AOE1 contains a potential five residents and four full-time workers. The number of residents was calculated by counting the number of houses within the 200 feet distance and multiplying by 2.32 persons per household average for Madison Heights.
- Another AOE is assumed to extend farther from the Site, a distance of ¼ mile, in the approximate direction or groundwater flow towards the northeast. This AOE2 is assumed to contain indoor air samples at possible Level II concentrations. The number of potential residents is approximately 172 and no workers.
- Another area is assumed to extend from the ¼ mile distance to a ½ mile distance. This area is referred to as the Area of Subsurface Contamination (ASC). The ASC is an area

where potential exposure to regularly occupied structures above groundwater contaminated with VOCs is present and attributable to the Site. This area contains approximately 348 residents and 100 full-time workers.

Several factor categories were assumed or documented. An observed exposure is assumed since soil sample results indicate releases significantly above background and are attributable to the Site. TCE was used to evaluate the Site due to its high toxicity/degradation value. Level I, Level II, and potential targets were use as summarized above. No resources such as a church, library, or tribal organization were found within the AOEs and the ASC.

Section 5.4 Air Migration

Since no known hazardous substances have been documented being released to the air, this migration pathway is only considered a potential. Potential for gas migration is present due to releases of VOCs from sources to soils. Particulate migration is not very likely due to buildings and covered surfaces.

The approximate population affected in the air migration pathway within a 4-mile radius of the Site is detailed in the table below:

Distance from Site	Estimated population
0 – ¼ Mile	994
¼ - ½ Mile	2,826
½ - 1 Mile	11,633
1 – 2 Mile	48,491
2 – 3 Mile	71,237
3 – 4 Mile	93,074
Total	228,255

Section 6.0 Summary

The MDEQ was tasked by the U.S. EPA to evaluate the current and potential impacts to surrounding human populations and environmental resources through the groundwater; surface water; soil exposure/subsurface intrusion; and air pathways and to use this evaluation to determine the status of the Site in the Superfund process. This evaluation was based on existing file information and research of the Site's potential contaminant sources.

Three known sources areas were identified, as described in Section 4.0 Sources. The first source area on the north side of the main plant building is documented to contain releases of chromium (VI), cadmium, lead, toluene, ethylbenzene, and total xylenes. Some of these hazardous substances were also documented as releases to soil inside the main plant building, another source area, suggesting they migrated north through the building and into soil next to the building on the north side. The second source, inside the building in an earthen pit, also contained cyanide, mercury, and TCE, in addition to the hazardous substances found in soil on the north side of the building. The third source is the tanks and containers in the main plant which contained acetone, ammonia, benzene, chromium, cyanide, ethylbenzene, mercury, toluene, TCE, xylenes and zinc. A potential source of contaminated soil is located at the vacant lot just west of the main plant. That area has a potential for release of chromium (VI) and cyanide due to the historical mismanagement of hazardous substances.

Releases to soil and groundwater at the Site have been documented. Hazardous substances noted to be released included metals such as chromium (VI), and TCE.

The groundwater migration pathway does not appear to be a significant pathway. Only one public supply well could be identified at a distance of about 2 miles to the northwest of the Site. Shallow, contaminated groundwater at the Site was not documented to be migrating in that direction. Shallow groundwater was calculated to be flowing in the northeast direction, not towards the public supply well.

The surface water migration pathway is potentially of concern if contaminated groundwater migrated and vented into storm drains and a nearby surface water body. This could be the case with Sharkey Drain, located about ¾ miles to the northeast of the Site. Sharkey Drain connects to Bear Creek Drain by a known below ground drain. Contaminants could vent into surface water where bioaccumulation in fish or other food chain organisms could occur. Fish populations within the first several miles of the 15-mile TDL are quite degraded due to poor water quality and poor habitat. Due to slow groundwater recharge to surface waters within the TDL because of clayey soil, little groundwater would discharge to surface water. Because of these factors, the surface water pathway is not likely to be a significant pathway.

The Soil Exposure and Subsurface Intrusion pathway could be significant, but due to a lack of available and appropriate analytical data, assumptions were made for this evaluation. The Soil Exposure component of this pathway only applies to shallow soil or waste within 2 feet of the ground surface. Little data is available for this component, but

it remains a potential. To more rigorously evaluate the Subsurface Intrusion component of this pathway, needed data would include: 1) indoor air samples from regularly occupied structures, 2) soil gas samples near regularly occupied structures, 3) extent of a groundwater plume, if present, and 4) background samples. Based on the assumptions made in the bulleted paragraphs in Section 5.3, the Subsurface Intrusion component could be a significant pathway of exposure to persons living or working in regularly occupied structures.

The air pathway was not considered significant due to the lack of documented hazardous substances released to this pathway.

Section 7.0 References

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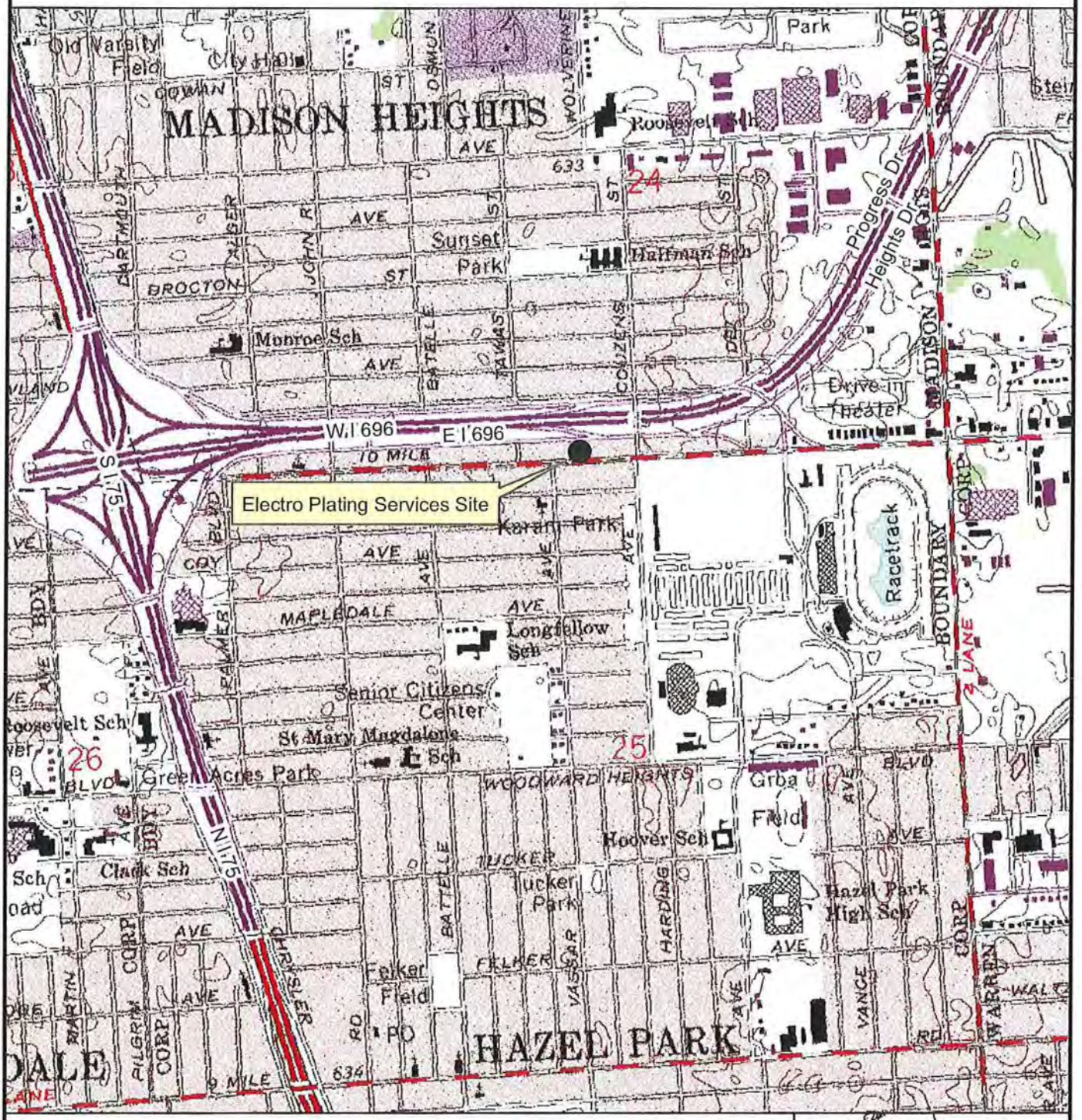
Figures

FIGURE 1
SITE LOCATION



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MIN000507243

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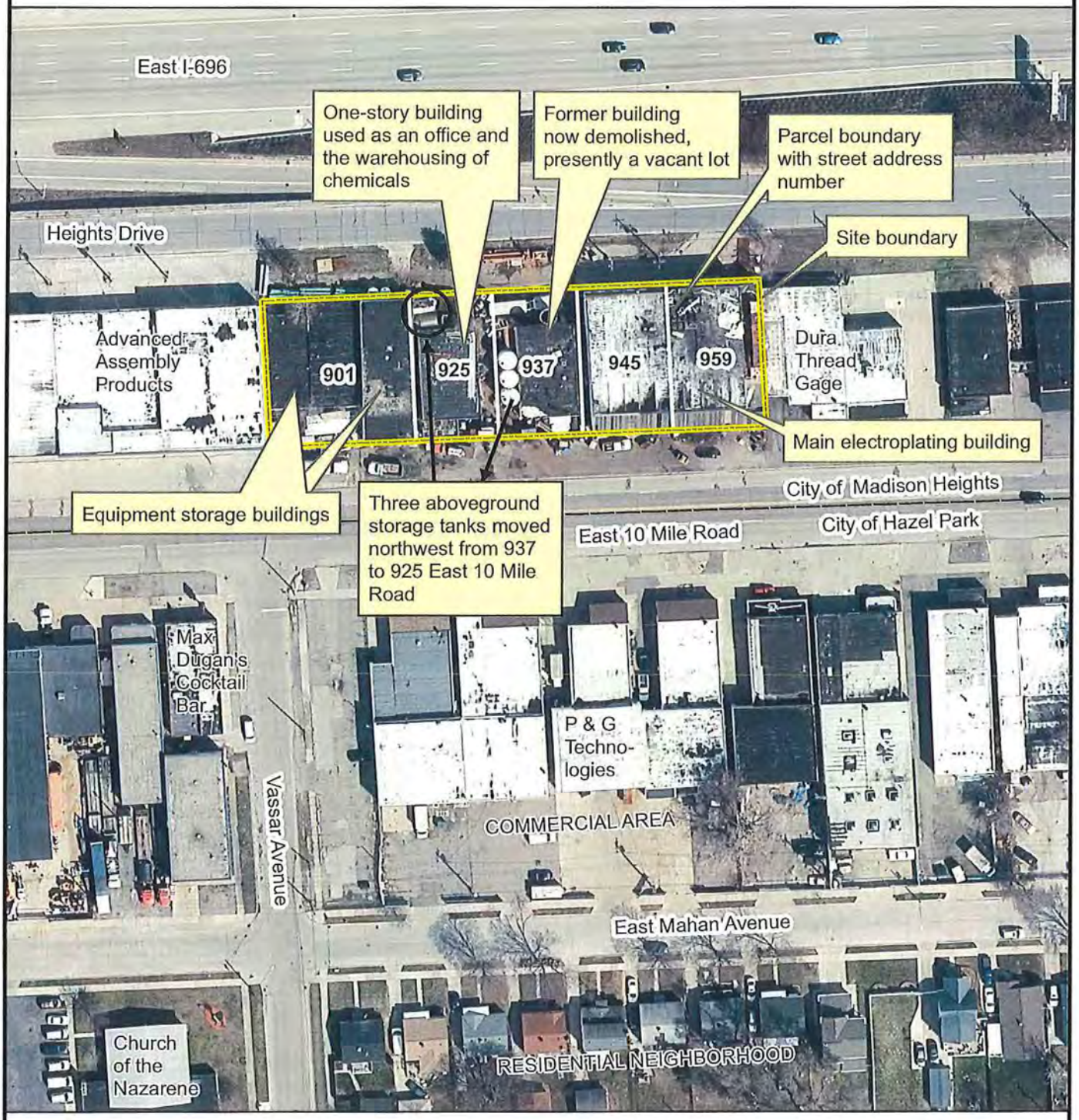
Compiled by JES, 10/22/18
Source: USGS 7.5 Minute Topographic Quadrangle Map, Highland Park, 1968, Photorevised 1983.

FIGURE 2
SITE FEATURES



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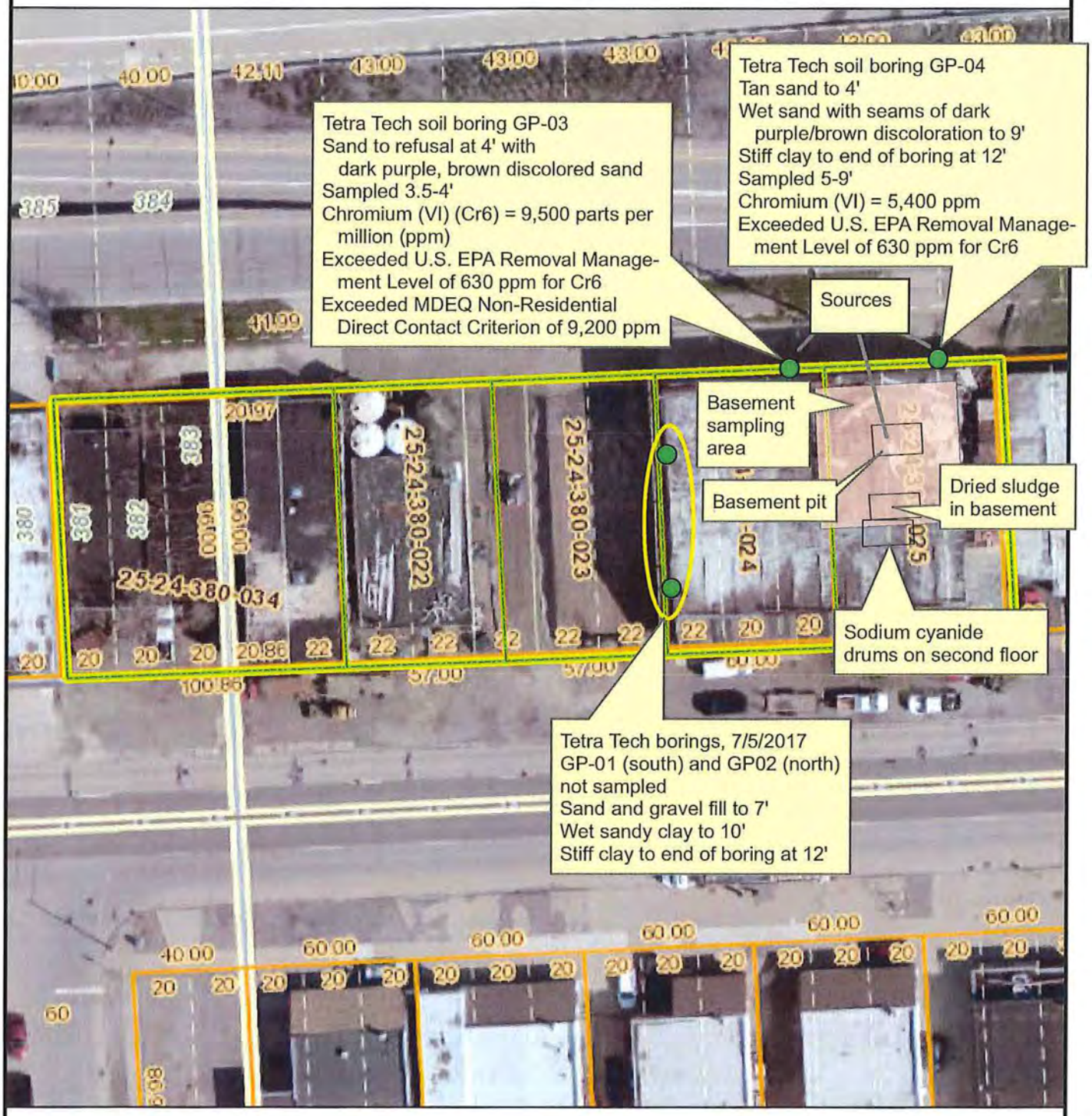
Compiled by JES, 10/24/18
(revised by JES, 1/14/19)
Sources: 2015 aerial imagery; road names from the MapImage Viewer network server; Tetra Tech (2018); Google Earth

FIGURE 3
SITE FEATURE DETAILS AND MOST RECENT SOIL INVESTIGATION



Site boundary

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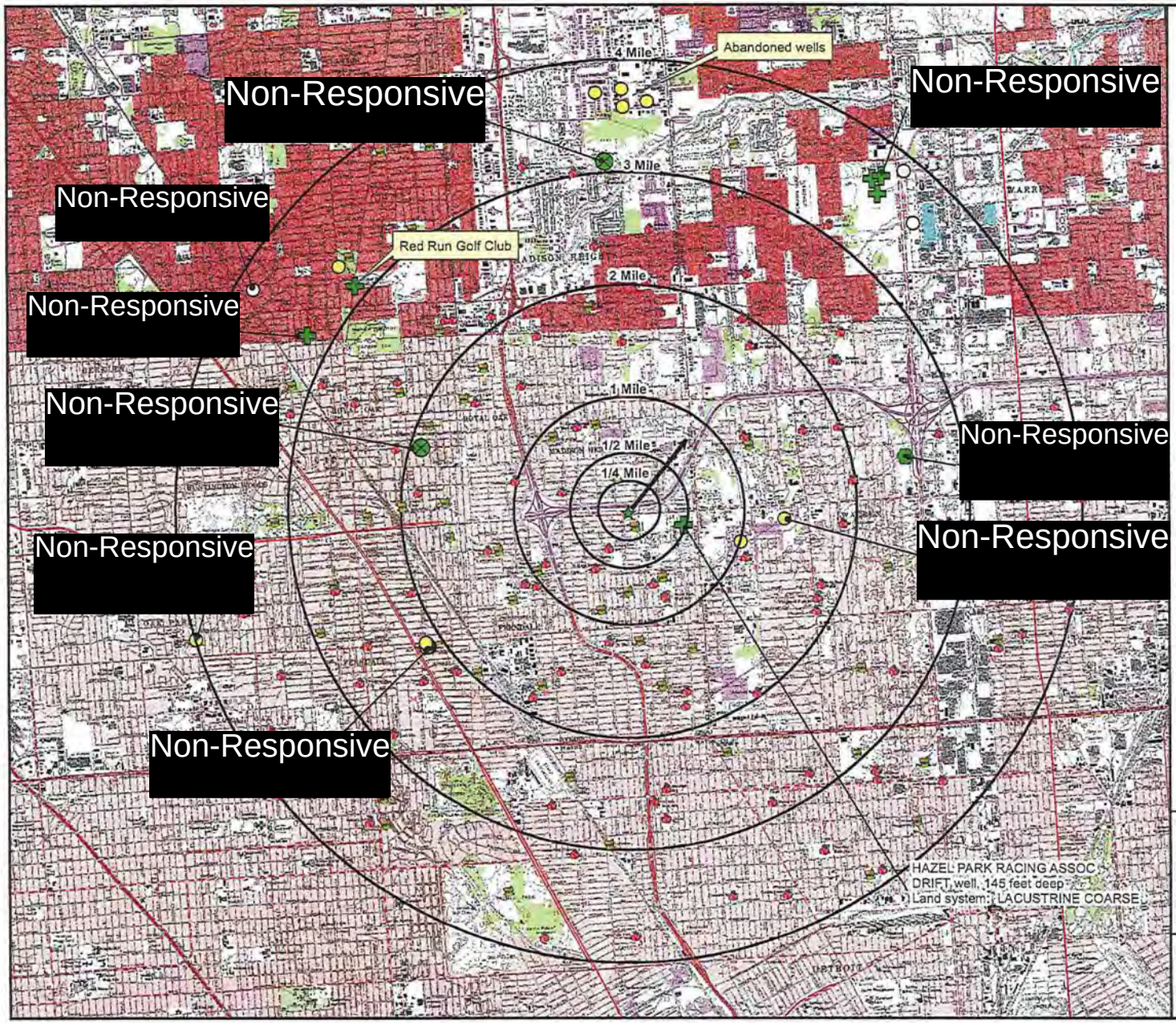

FIGURE 4
4-MILE RADIUS MAP

Legend

- Site location
- Park
- School
- Type 1 public well
- Irrigation well
- Industrial well
- Other well
- Unknown well
- Shallow groundwater /potential plume flow direction

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0 1 2 Miles

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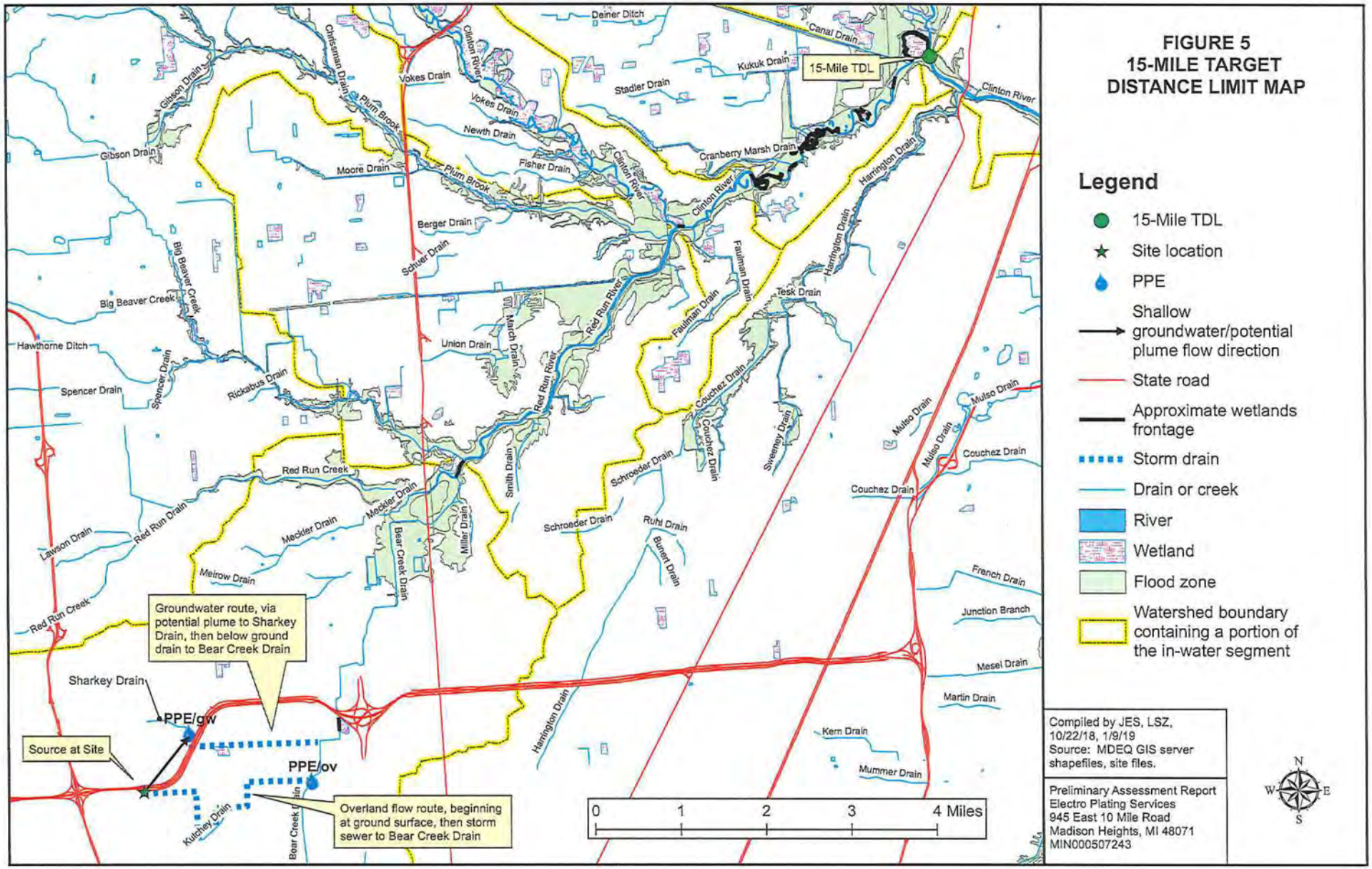

FIGURE 5
15-MILE TARGET DISTANCE LIMIT MAP

Legend

- 15-Mile TDL
- Site location
- PPE
- Shallow groundwater/potential plume flow direction
- State road
- Approximate wetlands frontage
- Storm drain
- Drain or creek
- River
- Wetland
- Flood zone
- Watershed boundary containing a portion of the in-water segment

Compiled by JES, LSZ, 10/22/18, 1/9/19
Source: MDEQ GIS server shapefiles, site files.

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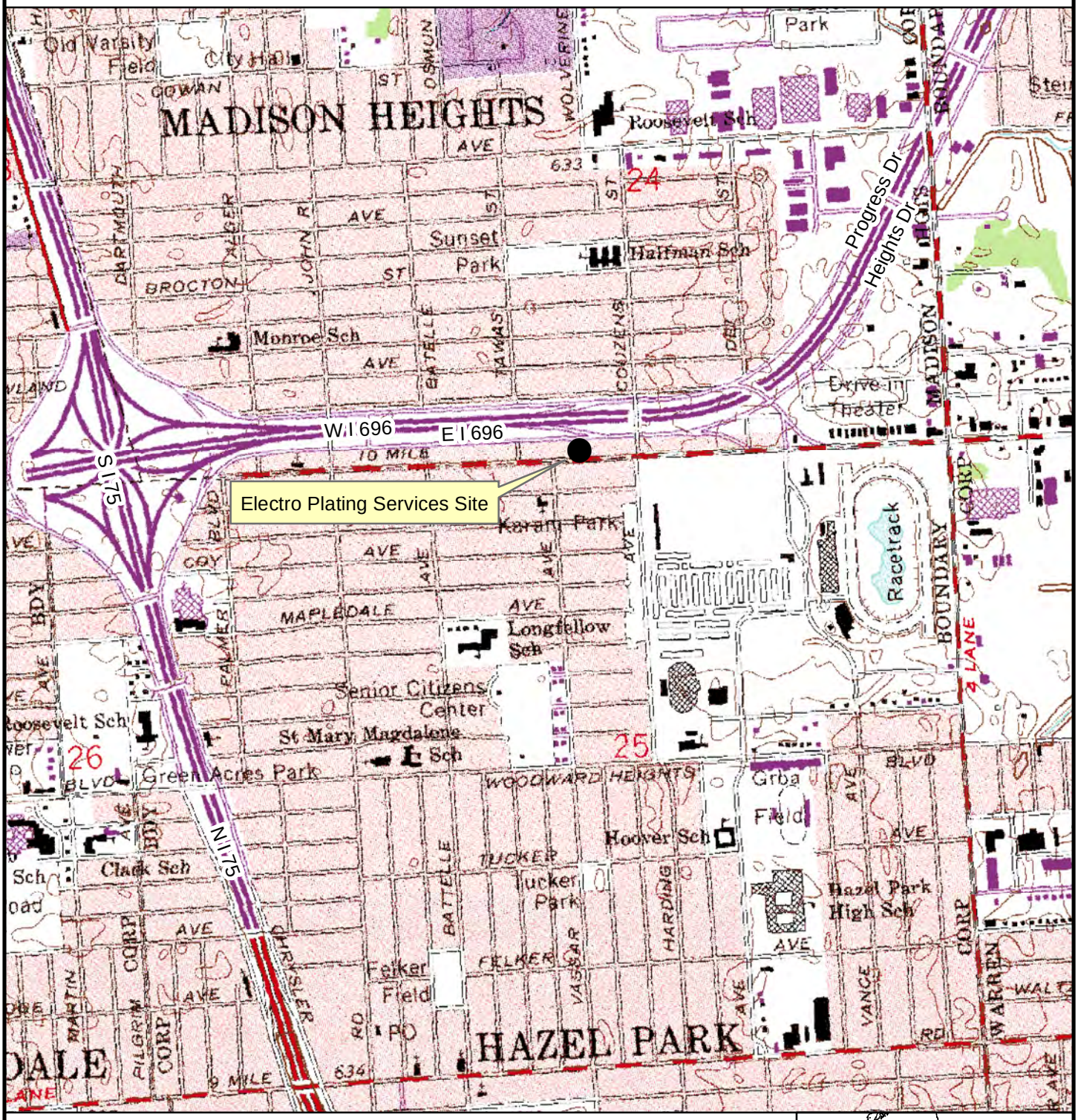

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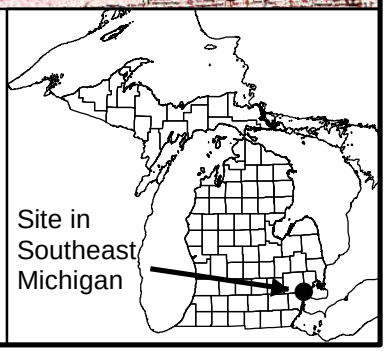

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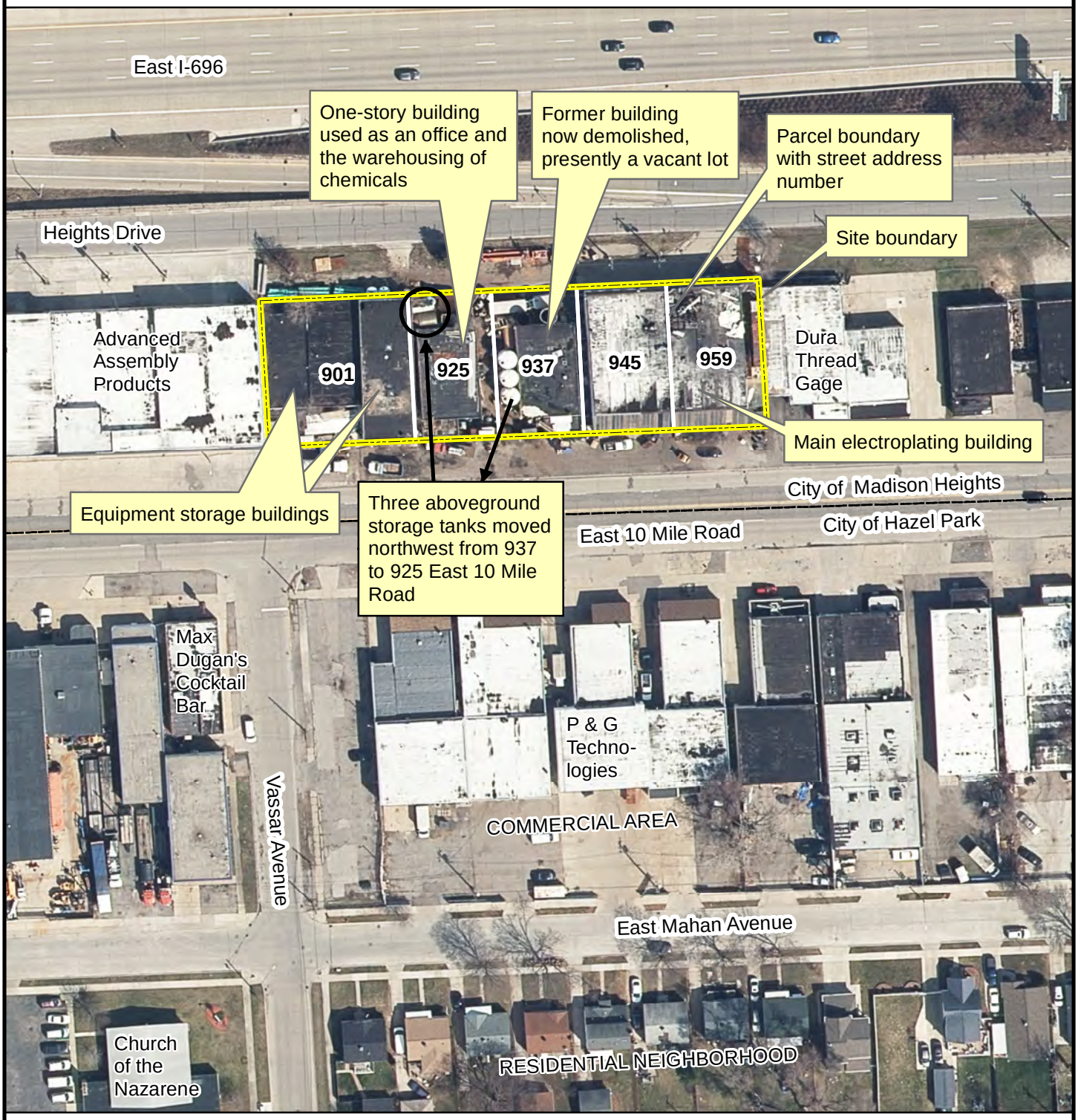

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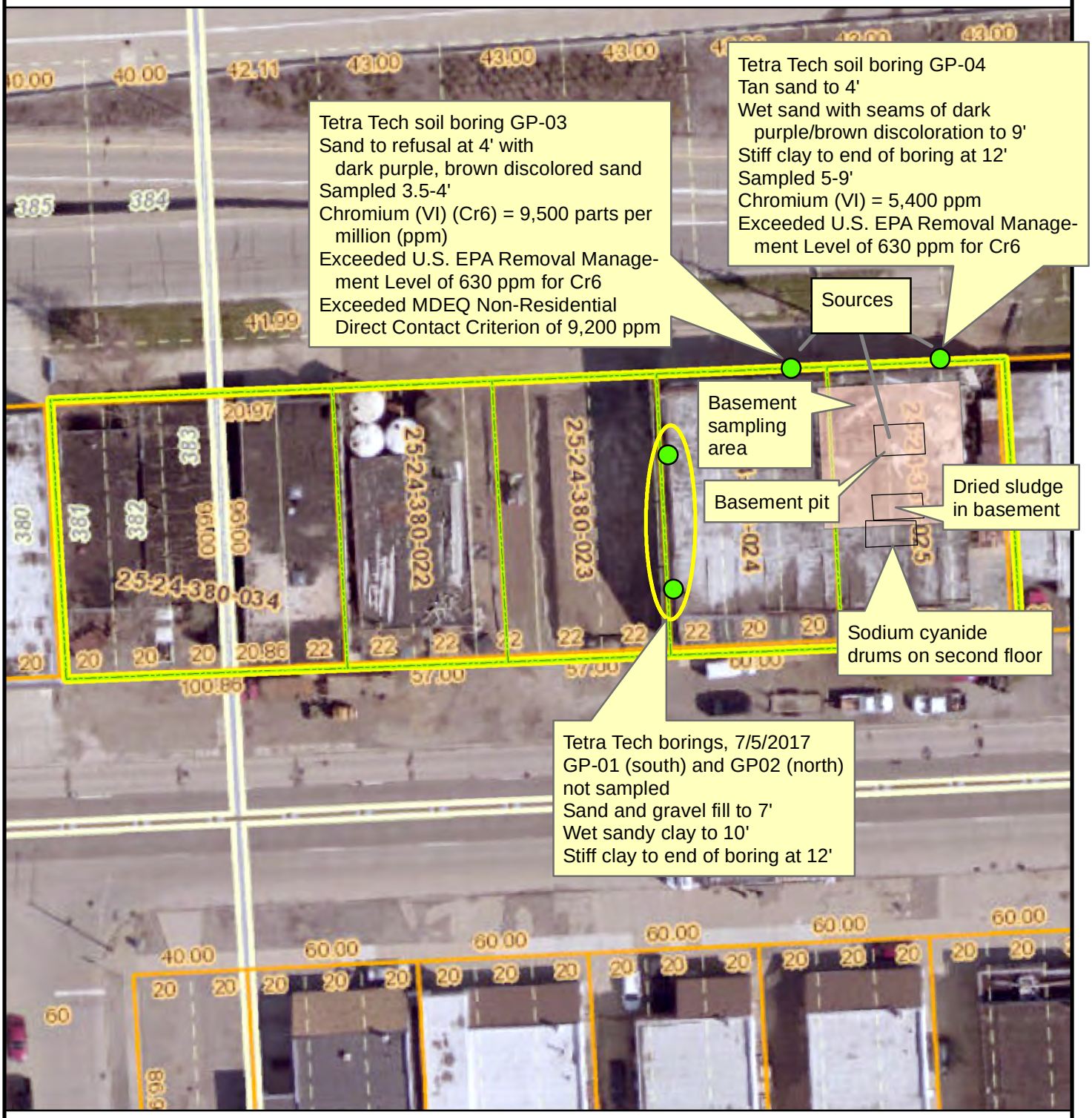

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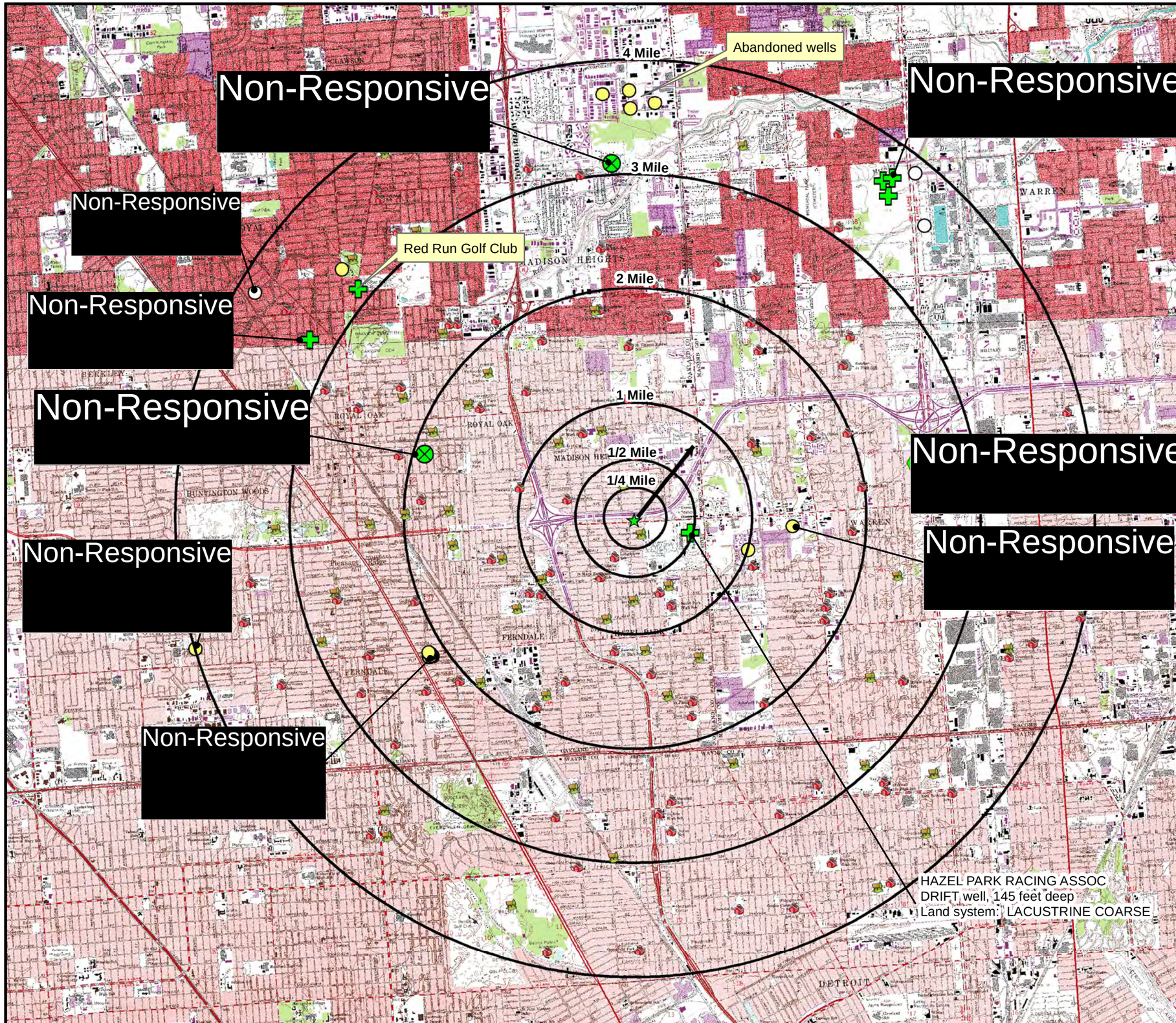
FIGURE 4
4-MILE RADIUS MAP



Legend

- Site location
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- Other well
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N W E S

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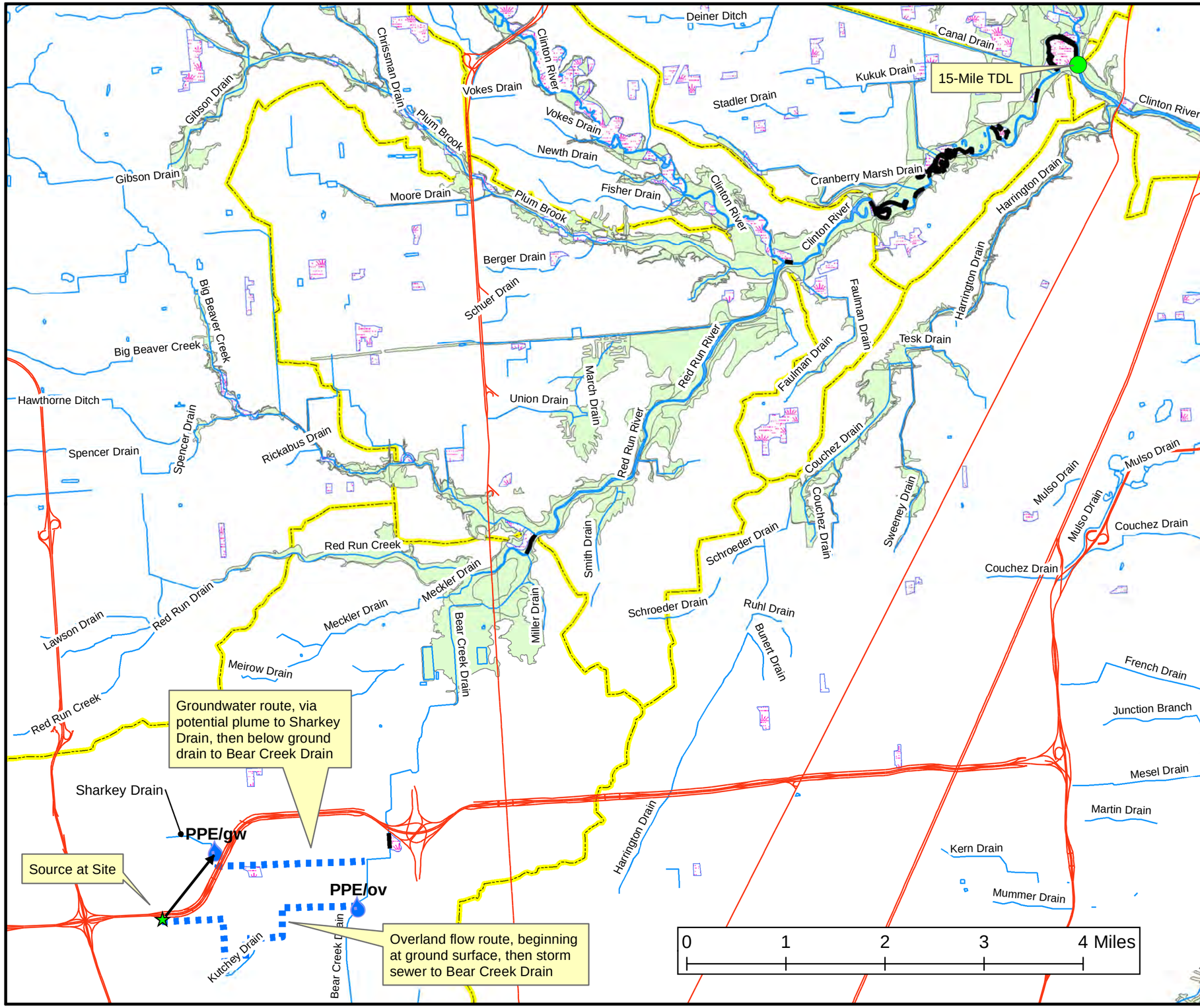
15-MILE TARGET DISTANCE LIMIT MAP



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