INTERIM RESPONSE
ENVIRONMENTAL MONITORING PLAN

Old Plank Road Landfill

1100 Old Plank Road
Milford, Michigan

Prepared by:

AMEC-BCI Engineers & Scientists, Inc.
10503 Citation Drive, Suite 600
Brighton, Michigan 48116

BCI Project No. H3608.15

July 2011

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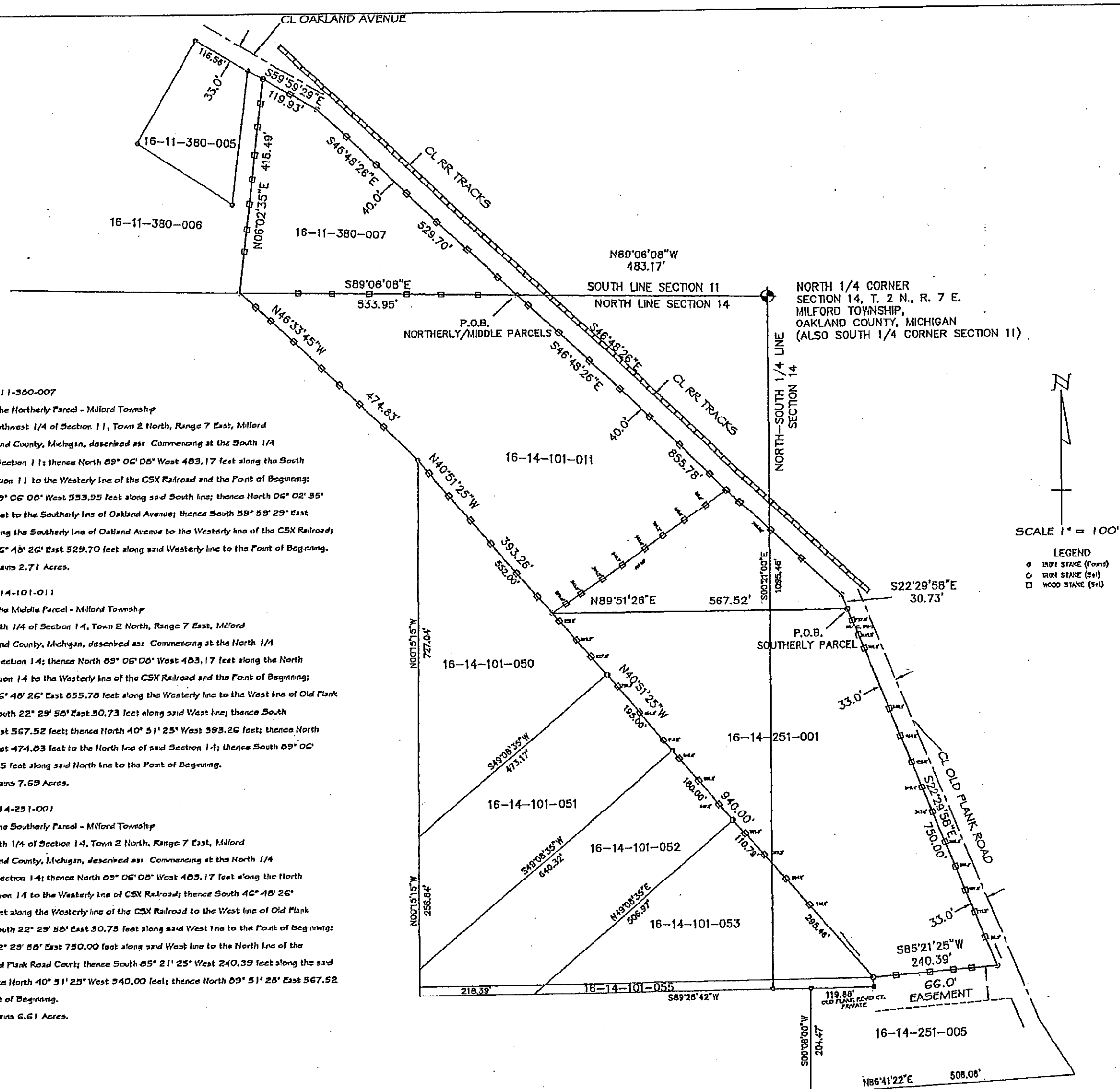
ATTACHMENT A

LEGAL DESCRIPTION AND SURVEY OF THE CSX PROPERTY



Parcel #63-16-11-380-007

Description of the Northerly Parcel - Milford Township

Part of the Southwest 1/4 of Section 11, Town 2 North, Range 7 East, Milford Township, Oakland County, Michigan, described as: Commencing at the South 1/4 corner of said Section 11; thence North 89° 06' 08" West 483.17 feet along the South line of said Section 11 to the Westerly line of the CSX Railroad and the Point of Beginning; thence North 89° 06' 08" West 533.95 feet along said South line; thence North 06° 02' 35" East 416.48 feet to the Southerly line of Oakland Avenue; thence South 59° 59' 29" East 119.93 feet along the Southerly line of Oakland Avenue to the Westerly line of the CSX Railroad; thence South 46° 48' 26" East 529.70 feet along said Westerly line to the Point of Beginning.

This Parcel contains 2.71 Acres.

Parcel #63-16-14-101-011

Description of the Middle Parcel - Milford Township

Part of the North 1/4 of Section 14, Town 2 North, Range 7 East, Milford Township, Oakland County, Michigan, described as: Commencing at the North 1/4 corner of said Section 14; thence North 89° 06' 08" West 483.17 feet along the North line of said Section 14 to the Westerly line of the CSX Railroad and the Point of Beginning; thence South 46° 48' 26" East 855.78 feet along the Westerly line to the West line of Old Plank Road; thence South 22° 29' 58" East 30.73 feet along said West line; thence South 89° 51' 28" West 567.52 feet; thence North 40° 51' 25" West 393.26 feet; thence North 46° 33' 45" West 474.83 feet to the North line of said Section 14; thence South 89° 06' 08" East 533.95 feet along said North line to the Point of Beginning.

This Parcel contains 7.69 Acres.

Parcel #63-16-14-251-001

Description of the Southerly Parcel - Milford Township

Part of the North 1/4 of Section 14, Town 2 North, Range 7 East, Milford Township, Oakland County, Michigan, described as: Commencing at the North 1/4 corner of said Section 14; thence North 89° 06' 08" West 483.17 feet along the North line of said Section 14 to the Westerly line of CSX Railroad; thence South 46° 48' 26" East 855.78 feet along the Westerly line of the CSX Railroad to the West line of Old Plank Road; thence South 22° 29' 58" East 30.73 feet along said West line to the Point of Beginning; thence South 22° 29' 58" East 750.00 feet along said West line to the North line of the Easement for Old Plank Road Court; thence South 85° 21' 25" West 240.39 feet along the said North line; thence North 40° 51' 25" West 940.00 feet; thence North 89° 51' 28" East 567.52 feet to the Point of Beginning.

This Parcel contains 6.61 Acres.

THOMAS STARR

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SURVEYING SERVICES FOR
GANNETT FLEMING OF MICHIGAN, INC.
CSX TRANSPORTATION INC.
MILFORD, MICHIGAN
1100 OLD PLANK ROAD

project number: 02059
sheet number: 1 of 1

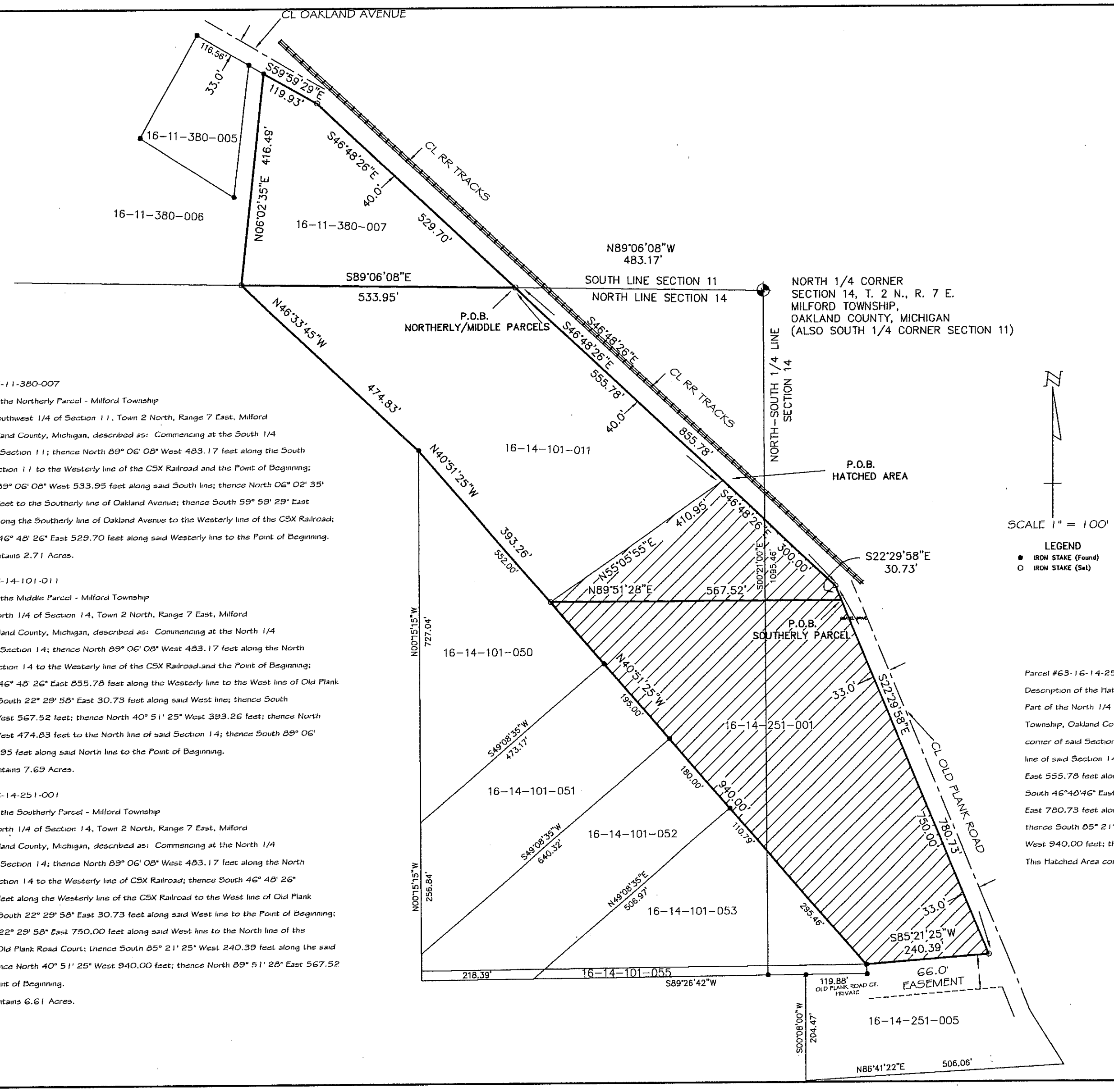
drawn by: B.E.M. — date: 6-02
checked by: T.S. — date: 6-02

meyers, bueche & nies, inc.
civil engineers/surveyors
505-507 baldwin street
jenison, mi. 49428
616-457-5030

revisions	by	date
Additional Stake Lines	BEM	11-03
Added Descriptions	BEM	7-03

ATTACHMENT B

LEGAL DESCRIPTION AND SURVEY OF THE LANDFILL PROPERTY



Parcel #63-16-11-380-007

Description of the Northerly Parcel - Milford Township

Part of the Southwest 1/4 of Section 11, Town 2 North, Range 7 East, Milford Township, Oakland County, Michigan, described as: Commencing at the South 1/4 corner of said Section 11; thence North 89° 06' 08" West 483.17 feet along the South line of said Section 11 to the Westerly line of the CSX Railroad and the Point of Beginning; thence North 89° 06' 08" West 533.95 feet along said South line; thence North 06° 02' 35" East 416.49 feet to the Southerly line of Oakland Avenue; thence South 59° 59' 29" East 119.93 feet along the Southerly line of Oakland Avenue to the Westerly line of the CSX Railroad; thence South 46° 48' 26" East 529.70 feet along said Westerly line to the Point of Beginning.

This Parcel contains 2.71 Acres.

Parcel #63-16-14-101-011

Description of the Middle Parcel - Milford Township

Part of the North 1/4 of Section 14, Town 2 North, Range 7 East, Milford Township, Oakland County, Michigan, described as: Commencing at the North 1/4 corner of said Section 14; thence North 89° 06' 08" West 483.17 feet along the North line of said Section 14 to the Westerly line of the CSX Railroad and the Point of Beginning; thence South 46° 48' 26" East 855.78 feet along the Westerly line to the West line of Old Plank Road; thence South 22° 29' 58" East 30.73 feet along said West line; thence South 89° 51' 28" West 567.52 feet; thence North 40° 51' 25" West 393.26 feet; thence North 46° 33' 45" West 474.83 feet to the North line of said Section 14; thence South 89° 06' 08" East 533.95 feet along said North line to the Point of Beginning.

This Parcel contains 7.69 Acres.

Parcel #63-16-14-251-001

Description of the Southerly Parcel - Milford Township

Part of the North 1/4 of Section 14, Town 2 North, Range 7 East, Milford Township, Oakland County, Michigan, described as: Commencing at the North 1/4 corner of said Section 14; thence North 89° 06' 08" West 483.17 feet along the North line of said Section 14 to the Westerly line of CSX Railroad; thence South 46° 48' 26" East 855.78 feet along the Westerly line of the CSX Railroad to the West line of Old Plank Road; thence South 22° 29' 58" East 30.73 feet along said West line to the Point of Beginning; thence South 22° 29' 58" East 750.00 feet along said West line to the North line of the Easement for Old Plank Road Court; thence South 85° 21' 25" West 240.39 feet along the said North line; thence North 40° 51' 25" West 940.00 feet; thence North 89° 51' 28" East 567.52 feet to the Point of Beginning.

This Parcel contains 6.61 Acres.

Parcel #63-16-14-251-001 & Portion of 63-16-14-101-011

Description of the Hatched Area (Landfill Property)

Part of the North 1/4 of Section 14, Town 2 North, Range 7 East, Milford Township, Oakland County, Michigan, described as: Commencing at the North 1/4 corner of said Section 14; thence North 89° 06' 08" West 483.17 feet along the North line of said Section 14 to the Westerly line of CSX Railroad; thence South 46° 48' 26" East 555.78 feet along the Westerly line of the CSX Railroad to the Point of Beginning; thence South 46°48'46" East 300.00 feet to the West line of Old Plank Road; thence South 22° 29' 58" East 780.73 feet along said West line to the North line of the Easement for Old Plank Road Court; thence South 85° 21' 25" West 240.39 feet along the said North line; thence North 40° 51' 25" West 940.00 feet; thence North 55° 05' 55" East 410.95 feet to the Point of Beginning.

This Hatched Area contains 8.18 Acres.

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REV. PER REVIEW	SFP	8/4/09		
revisions	by	date		

meyers, bueche & nies, inc.
civil engineers/land surveyors
1551 richmond street
grand rapids, mi. 49504
616-457-5030

drawn by B.E.M.	sewer permit no. ___ date ___ / water permit no. ___ date ___
date 7-09	approved by ___ name ___ date ___
checked by R.A.M.	
date 7-09	revised in accordance w/construction records by ___ date ___

CSX TRANSPORTATION INC.
MILFORD, MICHIGAN
1100 OLD PLANK ROAD

project number 09059
sheet number 1 of 1

ATTACHMENT C

INTERIM RESPONSE ACTIVITY PLAN

INTERIM RESPONSE ACTIVITY PLAN

Old Plank Road Landfill

1100 Old Plank Road
Milford, Michigan

Prepared by:

AMEC-BCI Engineers & Scientists, Inc.
10503 Citation Drive, Ste. 600
Brighton, Michigan 48116

AMEC-BCI Project No. H3608.15

July 2011

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INTERIM RESPONSE ACTIVITY PLAN

EXECUTIVE SUMMARY

This Interim Response Activity Plan ("IRA Plan") is submitted to the Michigan Department of Environmental Quality ("MDEQ") by the "Settling Parties" to describe the interim response activities the Settling Parties will perform for the Old Plank Road Landfill ("OPRL") located at 1100 Old Plank Road in Milford, Michigan, pursuant to Part 201 of the 1994 Natural Resources and Environmental Protection Act ("NREPA"), Public Act 451 of 1994 (Part 201), and its rules. The "Settling Parties" are: the Village of Milford and Milford Township (collectively, "Milford") and CSX Transportation, Inc ("CSX"). The Settling Parties will be responsible for implementing those interim response activities set forth in this IRA Plan. Additional response activities that the MDEQ may deem necessary in the future to address the Landfill Property (as defined below), including but not limited to the design, installation and maintenance of an appropriate landfill cover or cap; possible additional monitoring and response activities related to landfill gas generated after a new cover/cap may be installed; and possible management of landfill contents (collectively, "Additional Response Activities"), are beyond the scope of the Settling Parties responsibility and this IRA Plan.

The filled portion of the OPRL Landfill Property lies within two parcels of real estate, designated as Parcel Identification Number (PIN) 16-14-251-001 and a portion of PIN 16-14-101-011, as shown on **Figure 1, Site Location Map**. **Exhibit 1, Legal Description and Survey of the Property**, presents the location of the Landfill Property. The Landfill Property is owned by CSX. CSX also owns PIN-16-11-380-007 which is located adjacent to and north of the Landfill Property (parcels designated as PIN 16-14-251-001, PIN 16-14-101-011 and PIN-16-11-380-007 are collectively considered the "CSX Property"). Milford and the Road Commission of Oakland County (RCOC) historically operated the OPRL as an open pit municipal dump as early as 1940 and later it was licensed under Michigan State Public Act 87. Operations ceased at the OPRL in approximately 1976. At that time, the OPRL was covered with several feet of granular soils.

The Landfill Property contains approximately 250,000-cubic yards of waste and is underlain by sand and gravel from the ground surface to depths up to 108-feet below ground surface (bgs). Groundwater within this sand and gravel deposit exists under unconfined conditions. Groundwater previously was used by homeowners located in the vicinity of and downgradient from the Landfill Property. While contaminants of concern were detected in certain residential wells downgradient of the Landfill Property, review of drinking water sample results from those wells indicates that the MDEQ Part 201 drinking water (DW) criteria were not exceeded. For the purposes of this IRA Plan, the Facility is defined as the Landfill Property and those places or area where hazardous substances released at the Landfill Property have come to be located in concentrations exceeding the generic residential cleanup criteria.

This IRA Plan is based on reports previously submitted to, and approved by, the MDEQ. These reports include a Remedial Investigation (RI) report, dated August 12, 2004, and a

Feasibility Study (FS), dated March 11, 2005, and additional groundwater sampling in August 2007.

The Settling Parties have implemented, or will implement the following interim response activities to address the relevant exposure pathways:

- implemented an institutional control (ordinance) to prohibit the use of groundwater at the Landfill Property and at those parcels located hydraulically downgradient from the Landfill Property;
- provided public water to serve the Landfill Property and properties located hydraulically downgradient from the Landfill Property;
- caused existing residential wells located hydraulically downgradient from the Landfill Property to be properly abandoned;
- recording a restrictive covenant to prohibit use of groundwater on the CSX Property;
- monitoring groundwater downgradient from the Landfill Property to demonstrate that groundwater remains in compliance with groundwater surface water criteria and to demonstrate that natural attenuation is occurring;
- installing three (3) additional landfill gas monitoring probes on the Landfill Property;
- monitoring the landfill gas probes located at and near the Landfill Property until such time as a landfill cover/cap is installed; and
- continuing to perform "due care" activities in accordance with MCL 324.20107a at the Landfill Property, by restricting access to the Landfill Property with perimeter fencing and posting of appropriate warning signs.

Impacts to drinking water have not been detected at concentrations in excess of the MDEQ drinking water (DW) criteria in the residential drinking water well samples. Nonetheless, to address the potential future threat to the local residents' drinking water, downgradient residential wells have been abandoned and an alternate, municipal source of drinking water has been provided to the residents. Providing the residents located downgradient from the Landfill Property with an alternate source of drinking water, implementing an institutional control which will restrict groundwater use, and abandonment of the existing residential water supply wells effectively eliminates the DW criteria exposure pathway. A long-term groundwater monitoring plan will be implemented with the existing monitor wells to document compliance with MDEQ groundwater/surface water (GSI) criteria and that natural attenuation is occurring.

This IRA Plan presents a risk based evaluation and strategies to remediate the Landfill Property by removing the potential for direct exposure to the fill using a restrictive covenant to control future use of the Landfill Property. These controls on the Landfill Property area will restrict future land use and ensure there will be no unacceptable exposure to the fill material. Groundwater monitoring, placing groundwater use restrictions on the Landfill Property, as well

as the CSX parcel located north of the Landfill Property, and implementing an institutional control will ensure there will be no unacceptable exposure to the impacted groundwater. In addition to these controls, the Settling Parties have also provided municipal water service to the Landfill Property and properties downgradient of the Landfill Property, abandoned existing residential wells, and installed a perimeter fence around the Landfill Property. Collectively, these controls are reliable, constructible, technically feasible, and attain an acceptable degree of control over the contents of the Landfill Property.

1.0 INTRODUCTION

The purpose of this IRA Plan is to describe the response activities to be performed by the Settling Parties to address the subsurface soil and groundwater impacts associated with the Facility. Reports completed for the Facility and approved by the MDEQ include the Remedial Investigation (RI) report, dated August 12, 2004, and the Feasibility Study (FS), dated March 11, 2005. Approval of the FS and consent to proceed with this IRA Plan were provided by the MDEQ in a letter, dated April 13, 2005, and at a meeting on August 21, 2008. By implementing this IRA Plan, the Settling Parties will have met their obligations for the Facility pursuant to Part 201 of the 1994 Natural Resources and Environmental Protection Act (NREPA), Public Act 451 of 1994. This IRA Plan summarizes all available data, presents a focused risk evaluation utilizing a presumptive remedy, and provides response activities for the Facility that are consistent with a limited residential clean-up in accordance with the provisions of Part 201. The presumptive remedial approach proposed in this IRA Plan is as follows:

- implemented an institutional control (ordinance) to prohibit the use of groundwater at the Landfill Property and at those parcels located hydraulically downgradient from the Landfill Property;
- provided public water to serve the Landfill Property and properties located hydraulically downgradient from the Landfill Property;
- caused existing residential wells located hydraulically downgradient from the Landfill Property to be properly abandoned;
- recording a restrictive covenant to prohibit use of groundwater on the CSX Property;
- monitoring groundwater downgradient from the Landfill Property to demonstrate that groundwater remains in compliance with groundwater-surface water criteria and to demonstrate that natural attenuation is occurring;
- installing three (3) additional landfill gas monitoring probes on the Landfill Property;
- monitoring the landfill gas probes located at and near the Landfill Property until such time as a landfill cover/cap is installed; and
- continuing to perform "due care" activities in accordance with MCL 324.20107a at the Landfill Property, by restricting access to the Landfill Property with perimeter fencing and posting of appropriate warning signs.

This closure strategy is protective of human health and the environment and consistent with anticipated future land uses. Additional Response Activities that MDEQ may deem necessary in the future to address the OPRL are not the responsibility of, will not be required of and will not be performed by the Settling Parties.

1.1 Site Location and Facility Description

The OPRL is located at 1100 Old Plank Road in Section 14 of Milford Township, Oakland County, Michigan. The Landfill Property is comprised of Parcel Identification Number

(PIN) 16-14-251-001 and a portion of parcel PIN 16-14-101-011. The Landfill Property is owned by CSX and is located south of downtown Milford within the Village of Milford. CSX also owns PIN-16-11-380-007, which is located adjacent to and north of Parcel PIN-16-14-101-11. **Figure 1, Site Location Map**, presents the location of the OPRL and the surrounding area. **Figure 2, Site Schematic**, presents the CSX Property boundary, the Landfill Property boundary, and the approximate location of the fill materials found in the Landfill Property portion of the CSX Property. **Exhibit 1, Legal Description and Survey of the Property**, presents the location of the Landfill Property.

The Landfill Property is located adjacent to a lightly populated residential area and is bounded by Old Plank Road on the east and Old Plank Court to the south. The CSX railway is located to the east-northeast of the Landfill Property and runs in a northwest-southeast direction. The Landfill Property is relatively flat and covered with brush, grass, and a few trees. Access to the Landfill Property is provided by a dirt road entryway off of Old Plank Road. A fence with gated access was constructed around the perimeter of the fill area by CSX in October and November 2003.

Under Part 201, the definition of a "Facility" includes any area, place or property where a hazardous substance in excess of the cleanup criteria for unrestricted residential use has been released, deposited, disposed of, or otherwise is located. The Facility includes, but is not limited to a former landfill that, based on borings and aerial photographs, contains approximately 250,000-cubic yards of waste. Review of soil and groundwater data collected as part of the RI indicates that the Landfill Property and surrounding area is underlain by sand and gravel from the ground surface to depths up to 108-feet below ground surface (bgs). Groundwater within this sand and gravel deposit exists under unconfined conditions and prior to connection to the Village of Milford municipal water supply groundwater wells were used by homeowners located in the vicinity of the Landfill Property. While no exceedances of the MDEQ Part 201 generic residential drinking water (DW) criteria were detected in the residential wells, volatile organic constituents (VOCs) have been detected in the past in groundwater monitor wells installed downgradient of the Landfill Property at concentrations that exceed the DW criteria. Shortly following the report of these exceedances, Milford offered bottled water to all downgradient residential parcels. An additional sampling survey was conducted in August 2007. In 2009, all residential wells located hydraulically downgradient from the Landfill Property were abandoned. A summary of the VOCs detected in the former residential wells and monitoring wells during the period March 2002 through March 2008 is presented on **Figure 3, Former Residential Well VOC Distribution Map,** and **Appendix A, Groundwater Analytical Data, respectively**.

1.2 Site Overview

Prior to 1939, sand and gravel were removed from the Landfill Property and adjacent area. The Village of Milford first leased the Landfill Property from the Pere Marquette Railroad (now CSX) in 1939 and Milford operated the landfill as an open pit dump for residential waste until the late 1960s. Milford turned over landfill operations to the RCOC in 1969. Records obtained by Milford from the RCOC, Oakland County Health Division (OCHD) and Michigan State Police document the unauthorized disposal of 55-gallon drums at the Landfill Property.

The RCOC compacted and covered the fill with 1 to 2-feet of sand and gravel and continued to operate the OPRL until operations ceased in approximately 1976.

1.3 Purpose and Scope of Work

The purpose of this IRA Plan is to incorporate the findings presented in the RI with the remedial alternatives presented in the FS to best address impacts to the soil and groundwater associated with the Landfill Property. This IRA Plan describes the response activities to be completed by the Settling Parties, as well as how these activities will meet the requirements of Part 201[1]. To do so, the following tasks were completed:

- identify which of the pathways, risks or conditions described in Rule (R) 532(7) are relevant and include an analysis of the source control measures
- document that cleanup criteria used are appropriate considering land use, activity patterns anticipated for the Landfill Property, and downgradient adjacent properties
- propose to the MDEQ that it make a finding under Section 20118(5) and (6) that the restriction of groundwater use, institutional controls, providing a municipal water supply, and groundwater monitoring are protective of human health and the environment
- provide a monitoring plan that describes the environmental monitoring activities to be undertaken by the Settling Parties

The following section provides a summary of the site characterization and criteria evaluation. A more detailed discussion of the Facility conditions, including the lithology and aquifer characteristics, can be found in the RI as approved by the MDEQ on December 14, 2004.

[1] If the MDEQ determines that Additional Response Activities are necessary, those activities are not the responsibility of, will not be required of and will not be performed by the Settling Parties.

2.0 SITE CHARACTERIZATION

The following sections provide a summary of the Facility and surrounding area conditions. The environmental media evaluated as part of the RI included groundwater, surface soil, subsurface soil, and landfill gas.

2.1 Site Hydrogeology

The lithology near the Landfill Property consists of interbedded sand and gravel deposits with localized seams of sandy clay. These coarse grained deposits vary from over 100-feet thick beneath the Landfill Property to less than 70-feet thick north of the Landfill Property. A glacial till deposit, consisting of a sandy to silty clay, was encountered beneath the sand and gravel deposits. Hydraulically, the glacial till represents the bottom of the unconfined aquifer and acts as a vertical barrier to groundwater flow. Groundwater flows to the northeast and discharges into the Huron River located an average of 1,200-feet north-northeast of the Landfill Property.

The average hydraulic gradient of the shallow part of the aquifer between MW-1-03 and the Huron River is 204-ft/year. The average hydraulic gradient of the deeper part of the aquifer between MW-1-03 and the Huron River is 289-ft/year. The vertical component of groundwater flow is downward at 0.002-ft/ft at OW-1A-03/MW-1-03, relatively flat 0.0005-ft/ft at OW-03-03/MW-3-03, and steeply upward at 0.053-ft/ft at OW-5-03/MW-5-03 as it approaches the Huron River. The locations of the monitor and observation wells are included on **Figure 4, Groundwater Sample Location Map**.

2.2 Groundwater Impacts

Groundwater sampling was completed, including most recently in August 2007, to delineate the lateral and vertical extent of groundwater impacts. Sampling activities included vertical aquifer sampling (VAS) at 10-foot intervals throughout the entire thickness of the aquifer and subsequent sampling of permanent monitor wells installed during the VAS activities. Groundwater samples were submitted for analysis of VOCs and aluminum, arsenic, barium, beryllium, cadmium, chromium, copper, iron, potassium, lead, magnesium, manganese, nickel, sodium, and vanadium (selected metals). Groundwater samples collected during the VAS activities were submitted for 24-hour turnaround analysis and used to determine the well screen depth for monitor well installation. The monitor wells were constructed such that the well screen depth was biased to the depth where the highest concentration of VOCs was recorded. At locations where VOCs were not detected, the monitor well screen was installed at the base of the unconfined aquifer at a depth similar to the majority of adjacent residential drinking water wells. The VAS soil boring locations and the corresponding permanent monitor wells are shown on **Figure 4**. Tables summarizing the groundwater analytical data obtained during the VAS and monitor well sampling activities are included in **Appendix A**.

2.2.1 Volatile Organic Parameters

Review of the groundwater analytical data included in **Appendix A** indicates that the constituents of primary concern are chlorinated volatile organic compounds (CVOCs). CVOCs are primarily derived from chlorinated solvents such as tetrachloroethene (PCE) and trichloroethylene (TCE). Compounds such as PCE and TCE are used in industry for cleaning and degreasing metal components. PCE and TCE will naturally degrade in an anaerobic environment to compounds such as dichloroethylene (DCE). DCE may then degrade further to vinyl chloride. Ultimately, these compounds will degrade to ethane, ethene, and carbon dioxide. The vertical distribution of the VOCs in groundwater, including CVOCs, detected during the VAS activities are presented in cross section on **Figure 5, Volatile Organic Compound Vertical Distribution Map A-A'**, and **Figure 6, Volatile Organic Compound Vertical Distribution Map B-B'**. The horizontal distribution of the VOCs detected in the permanent monitor wells is presented on **Figure 7, Horizontal Volatile Organic Compound Distribution Map in Groundwater**.

Review of the VAS and horizontal distribution of contaminants indicates the dissolved phase CVOCs were detected in the upper portion of the unconfined aquifer adjacent to and downgradient of the Landfill Property, between the Landfill Property and the Huron River. Review of the VAS groundwater analytical results collected at borings SB-03-03 and SB-9-04 adjacent to the Landfill Property exhibited the highest concentrations of TCE, cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE, chlorobenzene, and vinyl chloride.

The horizontal distributions of total VOCs, based on data collected in 2004 and the most recent sampling event completed in August of 2007, are presented as **Figures 8a and 8b, Estimated Extent of Total Volatile Organic Constituents in Groundwater - 2004 and 2007**, respectively. Reviews of **Figures 8a and 8b** indicate that the highest concentration of VOCs occurs at the boundary of the Landfill Property. The monitor wells farthest downgradient from the Landfill Property exhibited CVOCs either below the laboratory detection levels or below the Part 201 residential criteria. The former drinking water residential wells located downgradient of the Facility were tested routinely by the OCHD from May 2002 and later until these wells were abandoned in 2008. Review of **Figure 3** indicates that none of the former residential wells was impacted by VOCs above state or federal drinking water standards. As a precaution, Milford supplied bottled water to those downgradient residents who accepted it as their drinking water then provided a municipal water supply to these residents. The residential wells were subsequently properly abandoned by the property owners.

The behavior of chlorinated solvents in groundwater has been extensively researched and documented by numerous researchers such as Pankow (1995), Cohen (2000), and Fetter (1993). The decline in concentration of dissolved CVOCs noted downgradient of the Landfill Property during each sampling survey represents the most convincing evidence of ongoing natural attenuation. In addition, the decline of CVOCs between the 2004 and 2007 sampling survey in groundwater monitoring well MW-10-04 is further evidence of ongoing natural attenuation. Natural attenuation includes dispersion, dilution, adsorption, and biodegradation processes. In general, biodegradation of CVOCs is the most efficient process. Biodegradation occurs when

carbon is used as an electron donor and dissolved oxygen is consumed. Once the dissolved oxygen in the aquifer is consumed, anaerobic bacteria begin degrading the CVOCs under methanogenic, sulfate or nitrate reducing conditions.

2.2.2 Inorganic Parameters

A table comparing the inorganic groundwater quality results to the Part 201 criteria is included in **Appendix A**. Review of the inorganic groundwater data indicates that constituents of concern at the Facility are primarily iron and manganese. Aluminum was detected in excess of the Part 201 criteria in only one groundwater sample (SBW-04-03) collected from an interval of 44 to 49-feet bgs. Iron and manganese were detected in most groundwater samples both near the Landfill Property and downgradient from the Landfill Property.

Reducing groundwater conditions can affect the concentrations of manganese and iron present in the groundwater (Bjerg et al, 1995; Rugge and Christensen, 1995). The concentrations of dissolved manganese and iron are above Part 201 residential criteria adjacent to and downgradient from the Landfill Property. Elevated iron and manganese levels appear to be due to the reducing groundwater conditions.

2.2.3 Groundwater Additional Volatile Constituents

As part of the August 2007 groundwater sampling survey, groundwater samples collected from each groundwater monitoring well were submitted for additional volatile constituent analysis. The additional constituents analyzed included ethane, methane, and ethene. Review of **Appendix A** indicates that of these constituents, methane was detected in monitoring wells MW-02-03, MW-03-03, MW-4-03 MW-06-03, and MW-9-04. The maximum methane concentration detected was 44-micrograms per liter noted in MW-03-03. The methane concentrations detected in the groundwater monitoring wells did not exceed the MDEQ criteria. The presence of methane is additional evidence that degradation of CVOCs under methanogenic conditions is occurring.

2.3 Soil Impacts

Soil samples were collected by AMEC-BCI Engineers & Scientists, Inc. (AMEC-BCI) on and adjacent to the Landfill Property to determine background indicator parameter concentrations, to determine indicator parameter concentrations in the fill and/or cover material, and to define the approximate extent of the filled area. Additional surface soil samples were collected by the MDEQ during a site evaluation completed in 2002. The locations of soil samples collected by AMEC-BCI are included on **Figure 9, Soil Sample Location Map**. The analytical results for soil samples collected by AMEC-BCI and the MDEQ are summarized on tables included in **Appendix B, Soil Analytical Data**.

Comparison of the soil sampling results to Part 201 generic residential criteria indicates that constituents of concern at the Landfill Property are magnesium, iron, potassium, and sodium. Review of the results for the HP-10-03 (which is located between Old Plank Road and

the Landfill Property's boundary line) sample collected from fill material exhibits elevated concentrations of aluminum, arsenic, barium, beryllium, cadmium, chromium, copper, iron, potassium, lead, magnesium, manganese, nickel, sodium, and vanadium, as well as detections of several VOCs and CVOCs. Several of the constituents in the HP-10-03 sample exceed Part 201 criteria and are further described in Section 3.0.

The HP-10-03 soil sample was collected between 9 and 10-feet bgs near the western easement of Old Plank Road adjacent to the Landfill Property's boundary in the Old Plank Road right-of-way. This IRA Plan will assess the pathway and set forth a response activity to address the fill within the boundaries of the Landfill Property.

2.4 Landfill Gas

Landfill gas probes were installed during soil sampling activities around the perimeter of the Landfill Property. Landfill gas readings were intermittently collected over an eight-month period between September 2003 and April 2004 and more recently in August 2007. The locations of the gas probes are presented on **Figure 10, Landfill Gas Probe Location Map**. A table summarizing the gas readings is included as **Appendix C, Landfill Gas Readings**. Comparison of the landfill gas sampling results to Part 201 generic residential criteria reveal that methane levels above Part 201 criteria (1.25-percent by volume) were exhibited at GP-01-03, located in the right-of-way of Old Plank Road near the northeast corner of the Landfill Property's boundary. A maximum methane concentration of 4.1-percent by volume was recorded at this location during the September 26, 2003, monitoring event. Review of the landfill gas readings obtained from landfill gas probes installed along the CSX railroad easement (GP-06-03 through GP-08-04) indicates a maximum methane concentration of 0.2-percent by volume. These results indicate that levels have not exceeded criteria at any off-site location.

3.0 CLEANUP CRITERIA EVALUATION

The groundwater and soil impacts associated with the Facility were evaluated relative to the Part 201 cleanup criteria to determine the relevant exposure pathways for the Facility.

3.1 Groundwater Impacts

Review of the groundwater analytical data included in **Appendix A** indicates several exceedances of Part 201 cleanup criteria. Groundwater constituents that exceed Part 201 criteria are summarized on **Table 1, Groundwater Constituent Cleanup Criteria Comparison**.

Table 1
Groundwater Constituent Cleanup Criteria Comparison

Potential Exposure Pathway	Constituent Exceedences
Drinking Water Criteria	Iron, Manganese, Aluminum, cis-1,2-Dichloroethylene, Trichloroethylene, cis-1,2-Dichloroethylene, Vinyl Chloride
Direct Contact Criteria	None
Volatilization to Indoor Air Criteria	None
Groundwater-Surface Water Interface (GSI) Criteria	Vinyl Chloride*

*Vinyl chloride was detected immediately adjacent to the Landfill Property above GSI criteria, but did not exceed GSI criteria downgradient of the Landfill Property in groundwater monitoring wells located along Garden Road nearest the Huron River.

Based on results presented in **Table 1**, groundwater constituents were not detected at concentrations that exceed the generic direct contact or volatilization to indoor air cleanup criteria. Given the depth to groundwater and that the highest levels observed in the groundwater are one to two orders of magnitude below the generic direct contact and volatilization to indoor air criteria; those pathways were removed from further consideration and were not considered relevant to the development of this IRA Plan. The following sections provide a discussion of the potential DW criteria and GSI criteria exposure pathways.

3.1.1 Drinking Water Criteria

Review of **Figure 5** indicates that TCE, cis-1,2-DCE and vinyl chloride were detected at and adjacent to the Landfill Property at concentrations in excess of the DW criteria at depths between 30 to 60-feet bgs. Downgradient of the Landfill Property, DW criteria exceedances were noted at SB-8-04 for TCE at a depth of 25 to 30-ft bgs and for vinyl chloride at a depth of

37 to 49-feet bgs. SB-10-04, adjacent to Garden Road, had DW criteria exceedances for TCE at depths of 13 to 18-ft bgs and vinyl chloride at a depth of 39-ft bgs.

The permanent monitor well groundwater sample results included on **Figure 7** are generally consistent with the results obtained during the VAS sampling activities. TCE, cis-1,2-DCE, and vinyl chloride were detected at concentrations in excess of the DW criteria at MW-3-03, and TCE and cis-1,2-DCE were detected at concentrations in excess of the DW criteria at MW-9-04. Both wells are located adjacent to the Landfill Property. Vinyl chloride was detected during VAS activities and in the 2004 groundwater sampling survey in excess of the DW criteria at MW-10-04 near Garden Road. However, review of groundwater sample results from the August 2007 sampling survey did not indicate the presence of vinyl chloride nor any other VOCs in MW-10-04.

As indicated in Section 1.2.2, while DW criteria exceedances for VOCs were not observed at any of the former residential drinking water wells, the future potential threat to drinking water make the drinking water exposure pathway relevant. Therefore, the drinking water pathway is addressed as part of this IRA Plan.

3.1.2 Groundwater-Surface Water Interface Criteria

Review of the groundwater data included in **Appendix A** indicates the highest concentration of vinyl chloride was detected at SB-03-03 and MW-3-03, exceeding the GSI criteria. This monitor well is located immediately adjacent to the Landfill Property. If this constituent migrated and discharged at a surface water body at a concentration in excess of the GSI criteria, then GSI would be a relevant exposure pathway. The nearest surface water body to SB-03-03/MW-03-03 is the Huron River, located an average of 1,200-feet downgradient from the Landfill Property.

VAS was completed at five locations along Garden Road. This work involved the collection of groundwater samples from multiple depths at each location. Review of the analytical results did not indicate the presence of any constituent of concern at a concentration that exceeds the GSI criteria. Review of subsequent groundwater sampling survey results from monitor wells located hydraulically downgradient from the Landfill Property along Garden Road, including those collected in August 2007, also did not indicate the presence of vinyl chloride or any other constituent at a concentration that exceeds the GSI criteria. These groundwater monitor wells are located approximately 200 to 300-feet from the Huron River. In addition, review of sampling survey results of the former residential drinking water wells located downgradient from the Landfill Property did not exceed GSI criteria.

Groundwater monitor wells located along Garden Road were sampled for total metals. Review of these results indicates that the generic GSI criteria were not exceeded. The concentrations of constituents of concern exceeding the GSI criteria in groundwater were observed nearest the Landfill Property and not at locations along Garden Road. Natural attenuation processes appear to be occurring between the Landfill Property and Garden Road monitor wells located near the Huron River. The exceedances of GSI criteria near the Landfill

Property and plans to leave the waste in place represents a potential threat to the Huron River, establishing the GSI pathway as a relevant pathway. Therefore, the GSI pathway is addressed as part of this IRA Plan.

3.2 Soil Impacts

Review of the soil analytical data indicates several exceedances of Part 201 cleanup criteria within the Landfill Property boundary. Soil constituents that exceed Part 201 criteria are summarized on **Table 2, Soil Constituent Cleanup Criteria Comparison**.

Table 2
Soil Constituent Cleanup Criteria Comparison

Potential Exposure Pathway	Constituent Exceedences
Direct Contact Criteria	Beryllium, Lead
Soil Particulate Inhalation Criteria	Beryllium
Volatilization to Ambient Air Criteria	None
Volatilization to Indoor Air Criteria	None
Drinking Water Protection Criteria	Aluminum, Arsenic, Beryllium, Cadmium, Chromium, Iron, Lead, Magnesium, TCE
Groundwater-Surface Water Interface Protection Criteria	Beryllium, Cadmium, Copper, Ethyl Benzene, 1,2,4-Trimethybenzene, Xylenes

Review of **Table 2** indicates that no exceedances of the Part 201 soil volatilization to (ambient and indoor) air criteria (SVAC) are present at the Landfill Property and the SVAC pathway is not considered relevant to the Landfill Property. The proposed land use restrictions, when applied to the Landfill Property, will further prevent any potential of exposure assuming the waste could potentially volatize to air in excess of the SVAC criteria.

3.2.1 Drinking Water Protection Criteria

Residual VOCs and metals located in the soil and fill have the potential to leach to the groundwater beneath the Landfill Property. If the indicator parameters reach the groundwater at concentrations in excess of the DW criteria, ingestion of impacted groundwater is a potential exposure pathway.

As indicated on **Table 2**, concentrations of metals in excess of the DWP criteria have been detected in subsurface soil samples and in the surface soils collected at the Landfill Property by the MDEQ. Metal concentrations in excess of the DWP criteria include aluminum,

arsenic, beryllium, cadmium, chromium, iron, potassium, lead, and magnesium. TCE was also detected in the subsurface soil at a concentration that exceeds the DWP criteria.

Although the inorganic constituents have the potential to leach to groundwater, review of the groundwater sample results discussed in Section 3.1 and included in **Appendix A** do not demonstrate that this is occurring. However, TCE, detected at HP-10-03, has been detected in groundwater samples collected downgradient of the Landfill Property. Therefore, as noted in Section 3.1.1, the drinking water exposure pathway is relevant and will be addressed as part of this IRA Plan.

3.2.2 Direct Contact Criteria

Direct contact with the subsurface soils is an exposure pathway for utility workers or others involved in below grade work. Beryllium and lead exceed the soil direct contact (SDC) criteria in the HP-10-03 sample collected between 9 and 10-feet bgs near the Old Plank Road easement. SDC criteria exceedances were not observed in soil samples that were collected near the ground surface or in the surface soils.

CSX prepared and submitted a due care plan to the MDEQ and constructed a fence around the perimeter of the fill area in October and November 2003. Access is restricted and there are no plans to excavate soil on the Landfill Property; however, the SDC criteria exceedances were detected in the HP-10-03 soil sample collected near the Old Plank Road easement outside of the currently fenced area. Therefore, the SDC exposure pathway relative to utility workers along Old Plank Road is a relevant exposure pathway and will be addressed as part of this IRA Plan.

3.2.3 Groundwater-Surface Water Interface Protection Criteria

Residual VOCs and metals located in the Landfill Property soil and fill have the potential to leach to groundwater and be transported to surface water located hydraulically downgradient of the Landfill Property; therefore, if the indicator parameters migrate to a surface water body at concentrations in excess of the soil GSI protection criteria, then GSI is a relevant exposure pathway.

Metal concentrations in excess of the GSI have been detected in subsurface soil sample HP-10-03 collected between 9 and 10-feet bgs and at HP-11-03 between 4 and 5-feet bgs. Inorganic concentration exceedances of the GSI criteria include beryllium and cadmium, and VOCs detected in excess of the GSI criteria include ethyl benzene in HP-05-03 (9 to 10-feet bgs), as well as 1,2,4-trimethylbenzene and total xylenes in SBS-03-03 (9 to 10-feet bgs).

The surface water body nearest to the Landfill Property is the Huron River, located an average of 1,200-feet downgradient of the filled area. To evaluate the GSI pathway, AMEC-BCI sampled groundwater from monitor wells located along Garden Road for VOCs and both total and dissolved metals. Review of the groundwater sample results does not indicate an exceedance of the GSI criteria; however, certain inorganic constituents and VOCs were detected

in soil found at the Landfill Property that exceed the leaching to groundwater pathway. This pathway will be addressed by this IRA Plan.

3.2.4 Soil Particulate Inhalation Criteria

The Part 201 soil particulate inhalation (SPI) criteria is a potential exposure pathway for utility workers or others involved in below grade work, as well as from blowing dust particulate downwind of the Landfill Property. Review of the analytical data indicates that beryllium exceeds the SPI criteria in the HP-10-03 sample collected 9 to 10-feet bgs. SPI exceedances were not observed in soil samples that were collected near the ground surface or in the surface soil samples. Soil volatilization to indoor air and ambient air criteria were not exceeded in the samples collected.

Access to the Landfill Property is restricted and there are currently no plans to excavate. SPI criteria exceedances were not observed in the near surface soils and contaminated particulates are not expected to migrate off the Landfill Property and neither indoor air nor ambient air criteria have been exceeded; therefore, the pathway is not considered relevant.

3.2.5 Flammability and Explosivity

Landfill gas probes were installed during soil sampling activities around the perimeter of the Landfill Property. The locations of the gas probes are presented on **Figure 10** and a table summarizing the gas readings is included as **Appendix C**. Comparison of the landfill gas sampling results to Part 201 generic residential criteria indicates that methane levels above Part 201 criteria (1.25-percent by volume) were exhibited at HP-01-03 in the right-of-way of Old Plank Road near the northeast corner of the Landfill Property's boundary. However, review of the landfill gas readings obtained from gas probes installed along the CSX railroad easement northeast of HP-01-03 indicates no exceedances of the Part 201 criteria.

4.0 EVALUATION OF PROPOSED RESPONSE ACTIVITIES

Response activities to be implemented pursuant to this IRA Plan were developed considering the following potential exposure pathways.

Groundwater:

- drinking water pathway
- GSI pathway

Soil:

- leaching from soil to groundwater pathway is presumed relevant
- soil direct contact pathway is presumed relevant
- soil GSI protection pathway is presumed relevant
- flammability and explosivity pathway

As discussed in the FS, given these pathways, the most feasible and reasonable response activity approach includes a combination of the following actions.

4.1 Natural Attenuation/Alternate Water Supply

As previously noted, organic and inorganic constituents of concern were not detected at concentrations in excess of the DW criteria in any of the former residential drinking water well samples. However, to eliminate any future potential impact to these residential wells above the DW criteria, an alternate source of drinking water in the form of a municipal supply was provided to the residents. Prior to connecting properties to the Village of Milford municipal water supply, owners were required to properly abandon any existing groundwater wells on their property.

Providing the properties located downgradient from the Landfill Property with an alternate source of drinking water, placing resource use institutional controls (a restrictive covenant and local ordinance) on groundwater use at and downgradient from the Landfill Property, and the abandonment of the existing water supply wells effectively eliminate the DW criteria exposure pathway. A long-term environmental monitoring plan will be implemented using select existing monitor wells to document that the groundwater continues to be in compliance with GSI criteria (see **Appendix D, Interim Response Environmental Monitoring Plan**).

Exhibit 1 presents the location of the Landfill Property as well as five parcels of property identified as PIN 16-14-101-050, 16-14-101-051, 16-14-101-052, 16-14-101-053, and 16-14-251-005. These five parcels are located immediately upgradient and adjacent to the Landfill

Property. These parcels fall within the 800-foot isolation distance from a contaminant source as provided by Michigan Administrative Code, R325.1622, groundwater wells may only be installed in the future on these properties if the deviation from the minimum standard requirements are met (Michigan Administrative Code R325.1613). The Oakland County Health Division (OCHD), the permitting agency for Type IIb, Type III (Act 399, P.A. 1976 and all wells permitted as Part 127, Act 368, P.A. 1978), has added this 800-foot visual reference to its electronic permitting and geographic information system called E-Health. E-Health's built-in GIS viewer is spatially linked to a water well application through a unique tax ID number, thus, any field sanitarian responsible for reviewing a well permit application on any of these parcels will automatically be alerted to the buffer area and that individual permit conditions or restrictions need to be determined. At a minimum, special restrictions for these parcels include depth restrictions as well as the use of steel casing and neat cement. See Exhibit 3, OCHD correspondence, regarding the permitting process for these five parcels and OCHD's commitment to enforce the Village Ordinance.

4.2 Land Use and Resource Restrictions

A proposed restrictive covenant and an existing institutional control constitute land use restrictions intended to restrict exposure to groundwater and soil. The restrictive covenant and the institutional control are described below and are presented in **Appendix E, Restrictive Covenant and Institutional Control**.

CSX Property (including Landfill Property):

- A restrictive covenant assuring proper management of soils and prohibiting groundwater use, residential uses and any excavation or other activity including construction of below grade structures, will be recorded for the CSX Property.

CSX Property (including Landfill Property) and Properties Downgradient of the Landfill Property:

- An institutional control prohibiting the installation of wells and use of groundwater for properties located at, and downgradient of, the Landfill Property has been implemented as part of this IRA Plan. This institutional control consists of an ordinance that prohibits the use of groundwater.

Implementation of these response activities will meet the appropriate MDEQ land use based criteria, be cost effective, and apply acceptable engineering practices. A discussion regarding the implementation of the selected response activities is provided below.

5.0 IMPLEMENTATION DETAILS AND DOCUMENTATION

The following discussion regarding the implementation details and documentation of how the interim response activities set forth in this IRA Plan meet Part 201 criteria generally follows the suggested format and contents for remedial action plans pursuant to Part 201, Environmental Remediation, of the NREPA, Act 451 of 1994, as amended.

5.1 Description of How the Interim Remedial Actions will Meet the Act and Rules

The objective of this IRA Plan is to ensure that adequate measures are taken to prevent, minimize, or mitigate unacceptable risk to the human health, safety or the environment. The response activities that are part of this IRA Plan were selected to effectively isolate the existing contamination from area properties, provide an alternative water supply to area properties, monitor groundwater to document that the conditions meet the MDEQ criteria, ensure that future conditions are consistent with this IRA Plan, establish contingencies to address potential changes in Landfill Property conditions should a change occur, and establish institutional controls.

Institutional controls are an effective strategy to protect human health, safety, and the environment and will serve several purposes, including:

- notifying current and future users about the environmental conditions of the Landfill Property
- limiting use of the Landfill Property and property near the Landfill Property (including soil and groundwater) to prevent activities that could result in unacceptable exposures to receptors
- providing access to the MDEQ to verify that the use of the CSX Property remains consistent with the restrictions placed upon it by the institutional controls

The response activities will be appropriate for both current and future land use and community planning.

5.1.1 Alternative Water Supply and Institutional Controls

The Village of Milford's public water supply was extended to service the CSX Property, the Landfill Property and properties downgradient of the Landfill Property. As a condition precedent to connecting the properties to municipal water, property owners arranged for the proper abandonment of existing groundwater wells located on their property. These properties are also prohibited from groundwater use through the institutional control; i.e., ordinance passed by the Village of Milford. The institutional control restricts the use of the impacted groundwater pursuant to Section 20120b(4) or (5). The institutional control, institutional control area map, and table listing the affected parcels are presented in **Appendix E**.

5.1.2 Monitor Site Conditions

Appendix D was developed to document the natural attenuation of the impacted groundwater plume and observe the groundwater quality near the Huron River to demonstrate continued compliance with the GSI pathway. As a contingency, if the generic GSI pathway ever is exceeded due to Landfill Property conditions, a request will be made to the MDEQ to develop a site specific mixing zone determination using the groundwater data.

5.2 Response Activities are Appropriate for the Facility

The response activities selected pursuant to this IRA Plan for the Facility are protective of human health and appropriate for future land use of the Landfill Property and surrounding property. The Landfill Property and surrounding property is currently zoned residential. The properties located hydraulically downgradient of the Landfill Property utilize the Village of Milford's municipal water supply. The Village of Milford's wellhead protection area is not affected by the Facility. An institutional control consisting of an ordinance prohibiting the use of groundwater was placed on the individual properties downgradient of the Landfill Property. The deed restriction for the Landfill Property will prohibit residential use, below grade structures, restrict excavation, and prohibit groundwater use. Access to the Landfill Property has been restricted by the placement of a fence. These remedial actions address all the relevant pathways and are consistent with property use assumptions.

Information pertaining to zoning and zoning descriptions is presented in **Appendix F, Village of Milford Zoning Map and Zoning Descriptions**. Review of **Appendix F** indicates that the Landfill Property, adjacent parcels, and parcels located between the Landfill Property and the Huron River are zoned as single-family residential. The generic residential criteria were used for all the pathways as an initial screening and compared point by point to relevant generic criteria. The point-by-point comparison is the basis for the feasibility analysis and development of this IRA Plan.

5.3 Analysis of Source Controls

Source removal was evaluated in the FS. The removal of fill from the Landfill Property was determined not to be feasible. The analysis to install a barrier around the landfill to contain the groundwater was also determined to not be cost effective and was not retained as a final remedy. The age of the landfill and natural attenuation of contaminates in groundwater occurring downgradient of the Landfill Property indicates that the most feasible remedial alternative was to connect downgradient properties to the Village of Milford's municipal water system and implement an ordinance to prohibit the use of groundwater. The groundwater exposure hazard is effectively eliminated by providing and establishing an institutional control on properties located hydraulically downgradient from the Landfill Property.

A fence was constructed around the perimeter of the fill area in October and November 2003 by CSX to limit access to the area. The deed restriction for the CSX Property will prevent unacceptable future exposure to soil. Written notice to easement holders, utility franchise

holders of record, and operators of public utilities that serve the Landfill Property and right of way adjacent to the Landfill Property have been provided by CSX, where required.

5.4 Analysis of Generic Criteria

Analytical data collected during RI activities and August 2007 sampling survey activities were compared point by point to the MDEQ's generic residential criteria. The assumptions used were consistent with the assumptions used in the MDEQ technical support documents used to develop the generic criteria. There are no Facility specific conditions that result in the generic residential cleanup criteria not being protective of the environment. As previously stated, the primary pathways of concern consist of direct contact exposure to subsurface soils, ingestion of impacted groundwater, and GSI.

5.5 Discussion of Statistical Methods

The selected response activities to extend municipal water, place a deed restriction on the CSX Property, and implement an ordinance to prohibit groundwater use by properties hydraulically downgradient from the Landfill Property, did not require a statistical analysis. The application of a restrictive covenant and municipal ordinance (institutional control) will restrict access to groundwater.

5.6 Schedule

A breakdown of the scheduled interim response activities is set out as **Appendix G, Interim Response Activity Plan Implementation Schedule**.

5.7 Environmental Monitoring Plan

A landfill gas and groundwater monitoring plan is included as Appendix D.

5.8 Land Use Restrictions

A restrictive covenant will be placed on the CSX Property, including the Landfill Property, to prevent exposure to the fill material and prohibit groundwater use. An ordinance has been implemented for the area located hydraulically downgradient from the Landfill Property to prohibit groundwater use. The proposed restrictive covenant and implemented institutional control are included in **Appendix E**.

5.9 Operation and Maintenance Plan

The response activities outlined in this IRA Plan will require little ongoing operation and maintenance. Operation and maintenance of the expanded municipal water supply will be the responsibility of Milford and CSX. On a quarterly basis, the perimeter fencing of the Landfill Property will be inspected and as necessary repaired. In addition, the area in proximity to the

permanent markers will be inspected quarterly and cleared of excessive vegetation in order to ensure their visibility. If damage is noted to any of the monitoring wells, it will be repaired within 60 days.

5.10 Description of Interim Response Activities

Interim response activities implemented and those to be implemented at the Facility include the following:

- installed an alternate water supply to serve the CSX Property, Landfill Property and the properties located downgradient from the Landfill Property via an expanded Village of Milford municipal water supply system;
- implemented an institutional control (ordinance) to prohibit the use of groundwater at the Landfill Property and at those parcels located hydraulically downgradient from the Landfill Property;
- abandoned residential wells located hydraulically downgradient from the Landfill Property
- granting and recording a restrictive covenant to prohibit use of groundwater on the CSX Property;
- monitoring groundwater downgradient from the Landfill Property to demonstrate that groundwater remains in compliance with groundwater-surface water criteria and to show that natural attenuation is occurring;
- installing three additional landfill gas monitoring probes at the Landfill Property;
- monitoring gas probes located at and near the Landfill Property until such time as a landfill cover/cap is installed or until such need for the probes is demonstrated to be no longer necessary, whichever is sooner; and
- continue to perform "due care" activities in accordance with MCL 324.20107a at the Facility, by restricting access to the Landfill Property with perimeter fencing and posting of appropriate warning signs.

By providing an alternate source of drinking water to serve the CSX Property, Landfill Property, and properties located downgradient from the Landfill Property and implementing an ordinance prohibiting groundwater use, the drinking water exposure pathway has been effectively eliminated.

If groundwater monitoring activities identify an increase in contaminant concentration above the GSI criteria in the monitor wells located closest to the Huron River, attributable to the Landfill Property, the following contingency actions will be completed to address this issue:

- resample to confirm the detection above GSI criteria.

- if the GSI is exceeded and verified by follow-up sampling, conduct a mixing zone analysis and request a site specific mixing zone GSI value from the MDEQ.

In the event that there is a change to the current topography and geology of the Landfill Property or an adjacent property (except for a landfill cover or cap) that prevents the natural venting of methane such that concentrations of methane present in the groundwater and subsurface soil adjacent to and outside of the Landfill Property may exceed the applicable part 201 criteria for methane, the MDEQ may request that the Settling Parties install additional landfill gas monitoring probes. The location of the landfill gas monitoring probes will be limited to the CSX Property or a public road right-of-way.

5.11 Land Use is Consistent with Exposure Scenarios

As previously stated, the area adjacent to and hydraulically downgradient from the Landfill Property is zoned as single-family residential. Therefore, the generic residential criteria were used as a basis for this IRA Plan development. The Milford zoning maps and zoning descriptions are included in **Appendix F**.

The future use of the property adjacent to and downgradient from the Landfill Property is anticipated to remain residential; therefore, the projected use is consistent with the current zoning. The assumptions used in the remedial alternatives were based on residential land use and comparison of all Facility data to the MDEQ default residential cleanup criteria.

5.12 Land Use Controls - Unacceptable Exposures

A restrictive covenant and an institutional control are intended to restrict groundwater use for the affected properties to eliminate the groundwater ingestion exposure pathway and prohibit certain activities at the Landfill Property to eliminate soil exposure pathways.

5.13 Documentation of Easement Holder's Consent

As there are no easements for the Landfill Property, this item is not applicable.

5.14 Permanent Marker

Permanent markers as presented on Exhibit 2, Permanent Marker, will be placed at the entrance of the Landfill Property and one at the midpoint of each side of the waste mass (5 total markers). The markers will be made of bronze and placed on boulders or a concrete base. Each will present a map of the area referencing the Landfill Property restrictions. Milford, CSX, and the MDEQ will be identified as contacts.

5.15 Financial Assurance

The Settling Parties acknowledge that they have a continuing obligation to implement the interim response activities in accordance with this IRA Plan and to make available adequate funds to meet this obligation.

5.16 Compliance with Land and Resource Use Restrictions

Milford and CSX will document exposure controls through implementation and connection of municipal water and implementation of an institutional control; i.e., ordinance and restrictive covenant.

5.17 Environmental Monitoring Plan

As previously stated, the proposed groundwater and landfill gas monitoring plan is included in **Appendix D**.

5.18 Request the MDEQ to Find This IRA Plan Protective

Milford and CSX request that the MDEQ make a finding under Section 20118(5) and (6) that the MDEQ agrees the proposed interim response activities are protective of human heath and the environment. As previously outlined in Section 2.0 of this report, review of the data collected during RI activities indicates that in-situ biodegradation is occurring between the Landfill Property and the Huron River. The groundwater monitoring program, included as **Appendix D**, will document natural attenuation, demonstrate compliance with GSI, and document any changes in the groundwater quality. Because groundwater collected in the area of the Landfill Property exceeds either the Part 201 cleanup criteria screening levels published by the MDEQ in December 2002 or exceeds the state drinking water standards established pursuant to Section 325.1005 of the Safe Drinking Water Act, Act 399 of the Public Acts of 1976, including criteria for adverse aesthetic characteristics, the provision of alternate water supply, along with the deed restriction and institutional control presented in this IRA Plan, will reliably restrict the use of the aquifer pursuant to Section 20120b(4) or (5).

5.19 Groundwater Discharge Complies with Part 31

Review of the groundwater data included in **Appendix A** indicates that vinyl chloride has been detected at SB-03-03 and MW-3-03 adjacent to the Landfill Property in excess of the GSI criteria. The nearest surface water body to SB-03-03/MW-03-03 is the Huron River, located an average of 1,200-feet downgradient from the Landfill Property.

Subsequent VAS and groundwater monitor well sampling surveys along the groundwater flow path near Garden Road did not indicate the presence of vinyl chloride or any other constituent at a concentration that exceeds the GSI criteria. Garden Road is approximately 200-feet from the Huron River. In addition, monitor wells along Garden Road nearest the Huron River (MW-5-03, MW-6-03, and MW-10-04) were sampled for total metals and did not indicate

exceedances of the GSI criteria. Therefore, natural attenuation processes such as biodegradation and dilution are sufficient to address the GSI criteria pathway.

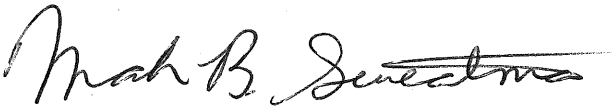
6.0 CONCLUSIONS

The Settling Parties conducted investigative actions at the Facility. Based on a review of the available information from these activities, it can be concluded that the data collected on and adjacent to the Landfill Property properly characterizes Facility conditions.

This IRA Plan sets forth the response activities to be performed by the Settling Parties to address the applicable exposure pathways and fully meet their remedial obligations pursuant to Part 201 of NREPA. This includes placing a deed restriction on future uses of the CSX Property to ensure there will be no unacceptable exposure to the landfill and eliminating exposure to impacted groundwater by providing municipal water, abandoning existing groundwater wells, and using the institutional control (ordinance) on the downgradient residential properties prohibiting the use of groundwater.

Using MDEQ's generic residential cleanup criteria to conduct a point-by-point comparison to the analytical data to screen pathways at the Facility resulted in a conservative estimate of risk at the Facility, residential properties downgradient from the Landfill Property, and the Huron River. Following the implementation of response activities described in this IRA Plan, the Facility area will surpass the remedial goals of the Michigan NREPA PA 451, Part 201.

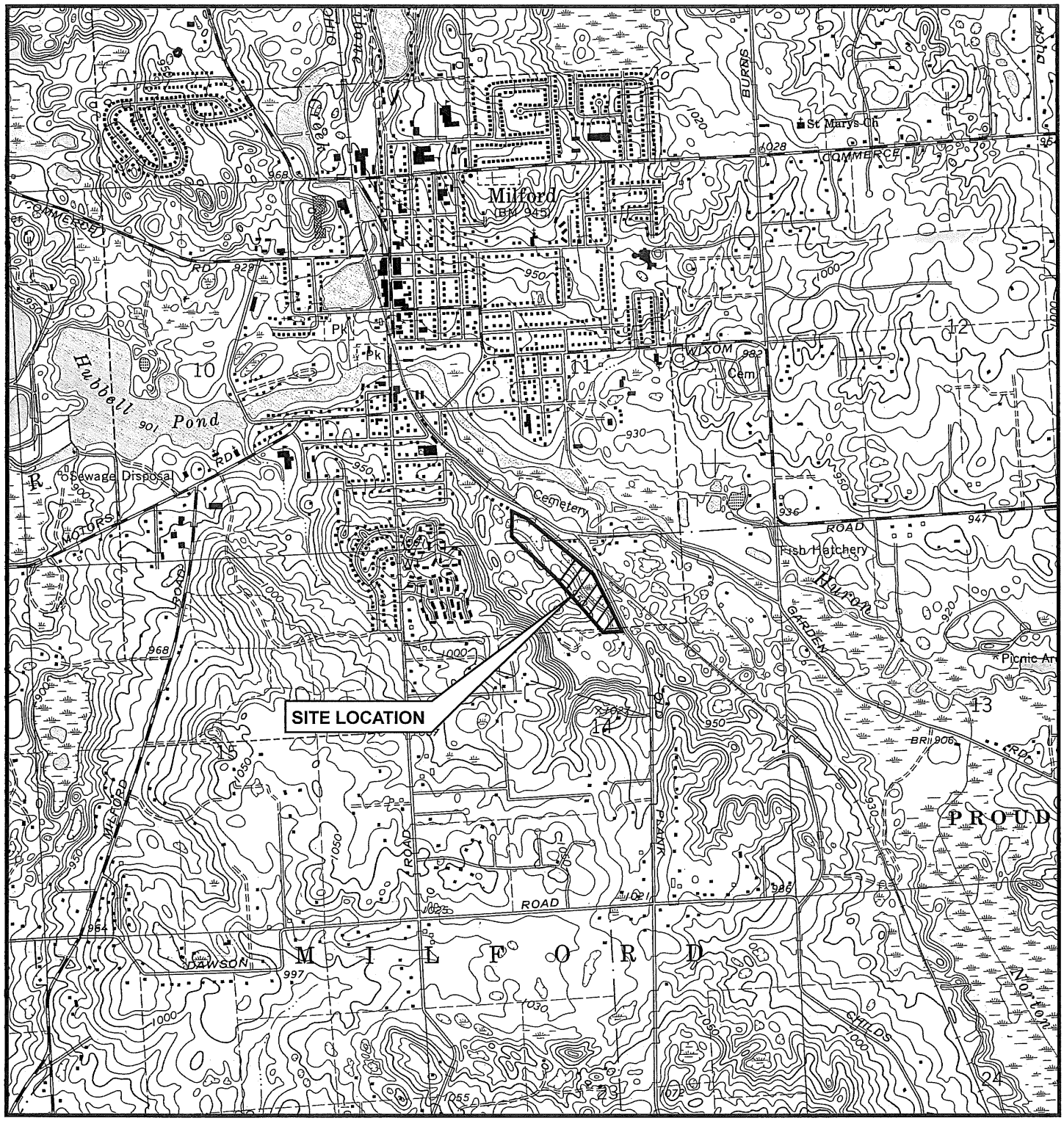
Respectfully submitted,



Mark B. Sweatman, CPG
Michigan Regional Manager

I:\Current Projects\3608 Old Plank Road\RAP\Response Activity Plan July 2011\Attachment C\Response Activity Plan_3_0711.DOC

FIGURES



N

Approximate Scale: 1-inch = 2,000-feet

0' 2,000'

Legend:

- Approximate CSX Property Boundary
- Approximate Landfill Property Boundary

Note:

1. Base Map: USGS Topographic Map, Milford, Michigan Quad., 7.5-Minute Series

Site Location Map

Old Plank Road Landfill
1100 Old Plank Road
Milford, Michigan

BCI engineers & scientists
5892 Sterling Drive
Howell, Michigan
Phone: (517) 545-2825

Legend

- Approximate CSX Property Boundary
- Approximate Extent of Landfill Property Boundary
- Approximate Extent of Old Plank Road Landfill (OPRL) Fill

Notes:

1. Base map provided by Desine, Inc. of Brighton, Michigan, and Envirographics of Hamburg, Michigan.
2. Approximate extent of fill derived from boring logs and site observations.

Scale:

1-Inch = 200-Feet

0' 200'

N

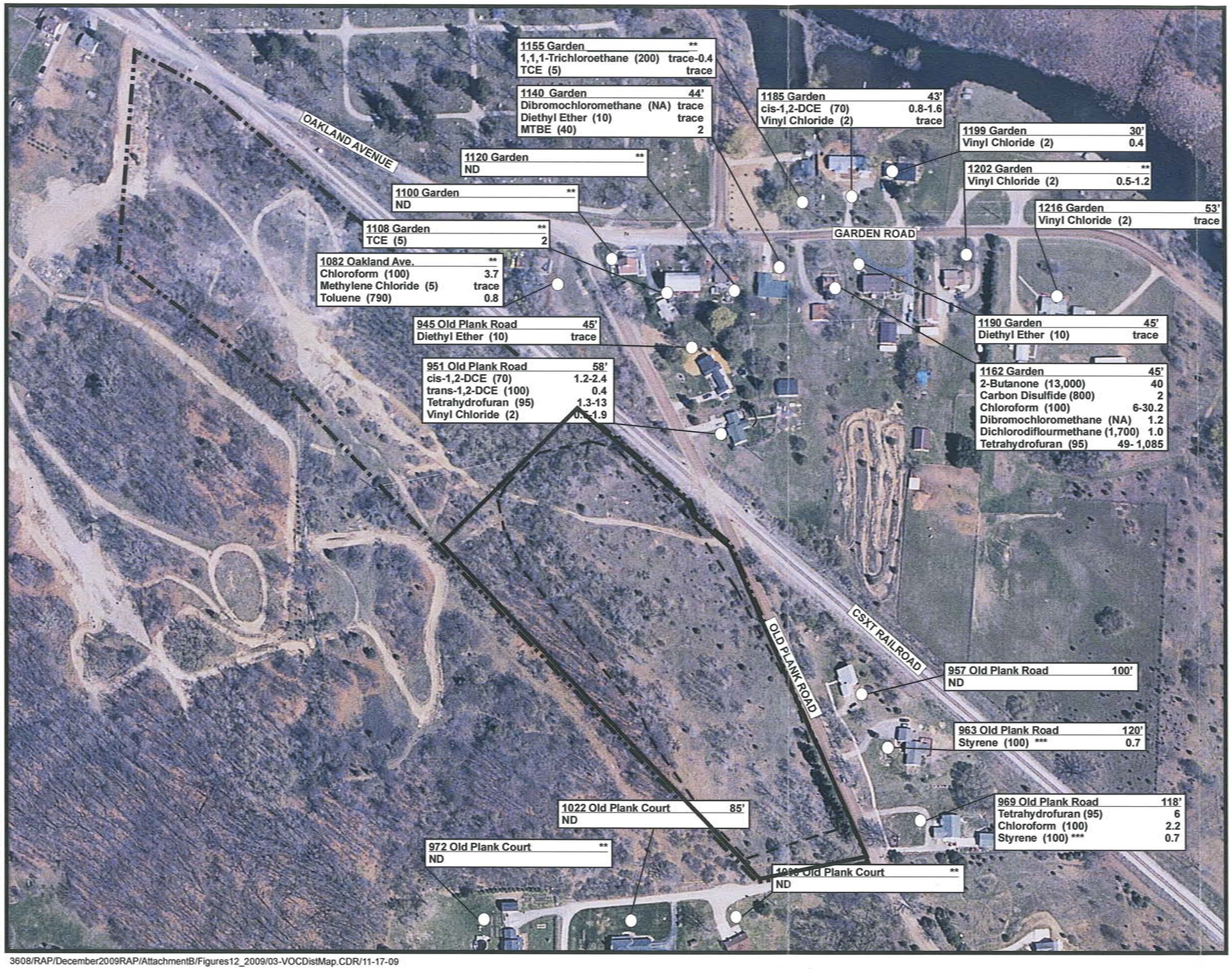
Site Schematic

Old Plank Road Landfill
1100 Old Plank Road
Milford, Michigan

BCI engineers & scientists
5892 Sterling Drive
Howell, Michigan
Phone: (517) 545-2825

3608/RAP/December2009RAP/AttachmentB/Figures12_2009/02-SiteMap.CDR/11-17-09

FIGURE 2



Legend

- Approximate Residential Well Location
- Approximate CSX Property Boundary
- Approximate Extent of OPRL Fill
- Approximate Extent of Landfill Property Boundary
- (2) MDEQ Drinking Water Protection Criteria (DWP)
- NA MDEQ DWP Not Available
- 45' Depth of Residential Well
- ** Depth of Well Unknown
- 0.7-2.1 Range of Detected Concentrations (ug/L) May 2002 to March 2008
- *** August 2006 samples affected by shipping containers.

Notes:

1. Base map provided by Desine, Inc. of Brighton, Michigan, and Envirographics of Hamburg, Michigan.
2. Approximate extent of fill derived from boring logs and site observations.
3. Residential wells sampled by Oakland County Health Division and the MDEQ.
4. Laboratory analytical data provided by the MDEQ. Concentrations in micrograms per liter (ug/L).
5. Locations of residential wells are approximate.
6. All residential wells have been properly abandoned.

Scale:

1-Inch = 200-Feet

0' 200'

N

Former Residential Well VOC Distribution Map

Old Plank Road Landfill
1100 Old Plank Road
Milford, Michigan

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5892 Sterling Drive
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Phone: (517) 545-2825

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FIGURE 3

Legend

- Monitor Well Location / VAS Soil Boring Location
- Observation Well Location
- Approximate CSX Property Boundary
- Approximate Extent of Landfill Property Boundary
- Approximate Extent of OPRL Fill
- Location of Vertical Contaminant Distribution Profile (Figures 5 & 6)

Notes:

1. Base map provided by Desine, Inc. of Brighton, Michigan, and Envirographics of Hamburg, Michigan.
2. Approximate extent of fill derived from boring logs and site observations.
3. Monitoring wells installed at VAS soil boring locations.
4. Observation wells used to determine vertical hydraulic gradient.
5. MW-7-04 not installed due to lack of VOCs detected during VAS activities.

Scale:

1-Inch = 200-Feet

0' 200'

N

Groundwater Sample Location Map

Old Plank Road Landfill
1100 Old Plank Road
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Howell, Michigan
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FIGURE 4

SOUTH

NORTH

SB-01-03 | SB-9-04 | SB-03-03 | Old Plank Road | CSXT RR | SB-8-04 | SB-10-04 | Garden Road | Huron River

ELEVATION IN FEET (MEAN SEA LEVEL)

940 | 920 | 900 | 880 | 860 | 840 | 820

FILL

FILL

SAND AND GRAVEL

SAND AND GRAVEL

SAND AND GRAVEL

SANDY SILT

SILTY CLAY

SILTY CLAY

SILTY CLAY

CLAYEY SAND

EOB

EOB

EOB

EOB

EOB

33-38' toluene 7 ug/l
xylenes 3 ug/l

49-54' toluene 2 ug/l

63-68' ND

78-83' ND

93-98' ND

104-109' ND

28-33' cis-1,2-DCE 21 ug/l
TCE 9 ug/l *
Vinyl Chloride 3 ug/l *

39' cis-1,2-DCE 70 ug/l
1,1-DCE 1 ug/l
trans-1,2-DCE 6 ug/l
TCE 50 ug/l *
Vinyl Chloride 2 ug/l

49' cis-1,2-DCE 210 ug/l *
1,1-DCE 3 ug/l
trans-1,2-DCE 22 ug/l
TCE 140 ug/l *
Vinyl Chloride 1 ug/l

59' cis-1,2-DCE 110 ug/l *
trans-1,2-DCE 7 ug/l
TCE 5 ug/l
Vinyl Chloride 15 ug/l *

69' cis-1,2-DCE 2 ug/l

79' ND

89' ND

99' ND

33-38' cis-1,2-DCE 76 ug/l *
Chlorobenzene 3 ug/l
trans-1,2-DCE 13 ug/l
Vinyl Chloride 50 ug/l */**

48-53' cis-1,2-DCE 10 ug/l
Vinyl Chloride 9 ug/l *

63-68' ND

78-83' ND

92-97' ND

25-30' cis-1,2-DCE 3 ug/l
TCE 11 ug/l *
Vinyl Chloride 2 ug/l

37' cis-1,2-DCE 2 ug/l
Chlorobenzene 2 ug/l
TCE 4 ug/l
Vinyl Chloride 4 ug/l *

49' cis-1,2-DCE 1 ug/l
Chlorobenzene 2 ug/l
Vinyl Chloride 5 ug/l *

59' cis-1,2-DCE 2 ug/l

69' cis-1,2-DCE 2 ug/l

79' ND

89' ND

99' ND

13-18' cis-1,2-DCE 2 ug/l
TCE 12 ug/l *

29' ND

39' vinyl chloride 12 ug/l *

49' ND

A

VIEW LOOKING WEST

A'

Legend:

EOB	End of Boring	ND = Not Detected
▼	Static Water Level	TCE = Tricloroethylene
	Well Screen	DCE = Dicloroethylene
		* = Exceeds DW Criteria
		** = Exceeds GSI Criteria

MDEQ Criteria:

	Drinking Water (DW) Criteria	Groundwater-Surface Water Interface (GSI) Criteria
Chlorobenzene	100	47
cis-1,2-DCE	70	620
trans-1,2-DCE	100	1,500
1,1-DCE	880	740
Toluene	790	140
TCE	5	200
Xylenes	280	35
Vinyl Chloride	2	15

Notes:

1. This profile is generalized. Soil contacts between borings and wells are inferred. For actual conditions, refer to original logs.
2. Surface elevations are referenced to mean sea level.
3. Groundwater levels were recorded on April 20, 2004, by personnel from Insight Environmental Services, Inc.
4. All indicator parameters in ug/L.

Scale:

Vertical:
1-Inch = 20-Feet
Horizontal:
1-Inch = 120-Feet

Volatile Organic Compound Vertical Distribution Map A-A'

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Milford, Michigan

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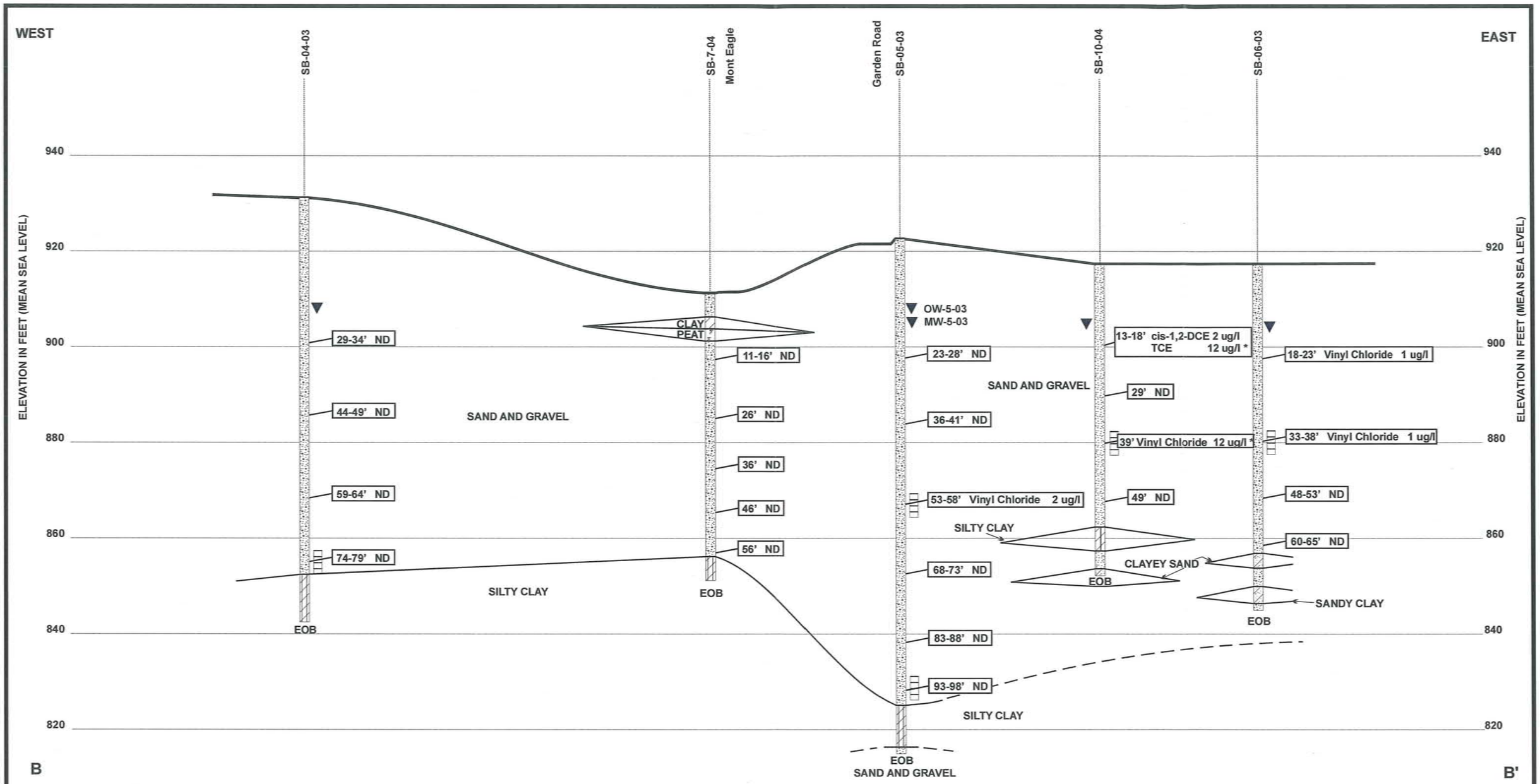
Phone: (517) 545-2825



Legend:

EOB	End of Boring	ND = Not Detected
▼	Static Water Level	TCE = Tricloroethylene
	Well Screen	DCE = Dicloroethylene
		* = Exceeds DW Criteria

MDEQ Criteria:

	Drinking Water (DW)Criteria	Groundwater-Surface Water Interface (GSI) Criteria
Cis-1,2-DCE	70	620
TCE	5	200
Vinyl Chloride	2	15

Notes:

1. This profile is generalized. Soil contacts between borings and wells are inferred. For actual conditions, refer to original logs.
2. Surface elevations are referenced to mean sea level.
3. Groundwater levels were recorded on April 20, 2004, by personnel from Insight Environmental Services, Inc.
4. All indicator parameters in ug/L.

Scale:

Vertical:
1-Inch = 20-Feet

Horizontal:
1-Inch = 120-Feet

Volatile Organic Compound Vertical Distribution Map B-B'

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Legend

- Monitor Well Location
- Approximate CSX Property Boundary
- Approximate Extent of Landfill Property Boundary
- Approximate Extent of OPRL Fill

MDEQ Criteria:

	Drinking Water (DW) Criteria	Groundwater-Surface Water Interface (GSI) Criteria
chlorobenzene	100	47
cis-1,2-DCE	70	620
trans-1,2-DCE	100	1,500
1,1-DCE	880	740
toluene	790	140
TCE	5	200
vinyl chloride	2	15

* = Exceeds DW Criteria

** = Exceeds GSI Criteria

Notes:

1. Base map provided by Desine, Inc. of Brighton, Michigan, and Envirographics of Hamburg, Michigan.
2. Approximate extent of fill derived from boring logs and site observations.
3. Monitoring well sampling events conducted on 9/4/03 and 4/20/04.

Scale:

1-Inch = 200-Feet

0' 200'

N

Horizontal Volatile Organic Compound Distribution Map In Groundwater

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FIGURE 7

Legend

- Groundwater Monitor Well Location
- Groundwater Observation Well Location
- Approximate CSX Property Boundary
- Approximate Extent of Landfill Property Boundary
- Approximate Extent of OPRL Fill
- (4) Sum of VOCs Detected in Groundwater Monitoring Well

Notes:

1. Base map provided by Desine, Inc. of Brighton, Michigan, and Envirographics of Hamburg, Michigan.
2. Total VOCs derived from the most recent groundwater monitoring well sample data (4/20/04 - 7/1/04).

Scale:

1-Inch = 200-Feet

0' 200'

N

Estimated Extent of Total Volatile Organic Constituents in Groundwater 2004

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FIGURE 8a

Legend

- Groundwater Monitor Well Location
- Groundwater Observation Well Location
- Approximate CSX Property Boundary
- Approximate Extent of Landfill Property Boundary
- Approximate Extent of OPRL Fill
- (4) Sum of VOCs Detected in Groundwater Monitoring Well

Notes:

1. Base map provided by Desine, Inc. of Brighton, Michigan, and Envirographics of Hamburg, Michigan.
2. Total VOCs derived from the most recent groundwater monitoring well sample data (8/8/07 - 8/9/07).

Scale:

1-Inch = 200-Feet

0' 200'

N

Estimated Extent of Total Volatile Organic Constituents in Groundwater 2007

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FIGURE 8b

Legend

- Soil Boring Soil Sample Location
- Hand Auger Boring Location (Background Soil Samples)
- Hydraulic Probe Sample Location
- Approximate CSX Property Boundary
- Approximate Extent of Landfill Property Boundary

Note:

1. Base map and boring locations provided by Desine, Inc. of Brighton, Michigan, and Envirographics of Hamburg, Michigan.

Scale:

1-Inch = 200-Feet

0' 200'

N

Soil Sample Location Map

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FIGURE 9

Legend

- Existing Gas Probe Location
- Approximate CSXT Railroad Property Boundary
- Approximate Extent of Landfill Property Boundary
- Approximate Extent of OPRL Fill
- Proposed Additional Gas Probe Locations

Notes:

1. Base map provided by Desine, Inc.
2. Approximate extent of fill derived from boring logs and site observations.

Scale:

1-Inch = 200-Feet

0' 200'

N

Landfill Gas Probe Location Map

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FIGURE 10