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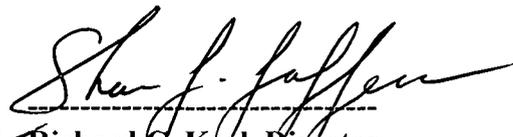
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**FOURTH FIVE-YEAR REVIEW REPORT FOR  
WASTE DISPOSAL ENGINEERING SUPERFUND SITE  
ANOKA COUNTY, MINNESOTA**



**Prepared by**

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*for*   
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*April 26, 2013*  
Date

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## LIST OF ACRONYMS

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
C3	Cryogenic, Condensate, and Compression system to remove vapor-phase contaminants
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Closed Landfill Program
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
FS	Feasibility Study
FYR	Five-Year Review
GIS	Geographic Information System
HBV	Health-Based Value (non-promulgated MDH value)
HRL	Health Risk Limit (promulgated MDH standard for private drinking water supplies)
ICs	Institutional Controls
ICIAP	Institutional Controls Implementation and Assurance Plan
LTS	Long-Term Stewardship
MCES	Metropolitan Council Environmental Services
MCL	Maximum Contaminant Level (Federal standard for public drinking water supplies)
MCLG	Maximum Contaminant Level Goal (Federally established level of a contaminant in drinking water below which there is no known or expected risk to health)
MDH	Minnesota Department of Health
MERLA	Minnesota Environmental Response and Liability Act
Minn. Rule	Minnesota Administrative Rule
MN	Minnesota
MOA	Memorandum of Agreement
MPCA	Minnesota Pollution Control Agency
MW	Monitoring Well
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance

OU	Operable Unit
PCB	Polychlorinated Biphenyl
ppb	Parts per Billion
ppm	Parts per Million
PRP	Potentially Responsible Party
RA	Remedial Action
RAL	Recommended Allowable Limit (State of Minnesota health-based limit for private drinking water supplies, precursor to the HRL)
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act of 1976
RD	Remedial Design
RFRA	Request for Response Action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SARA	Superfund Amendments and Reauthorization Act of 1986
Site	Waste Disposal Engineering Superfund Site
UECA	Uniform Environmental Covenants Act
UU/UE	Unlimited Use and Unrestricted Exposure
VOC	Volatile Organic Compound
WDE	Waste Disposal Engineering

## EXECUTIVE SUMMARY

The United States Environmental Protection Agency (EPA) has conducted the fourth Five-Year Review (FYR) at the Waste Disposal Engineering Superfund site (Site) located in the City of Andover, Anoka County, Minnesota. The purpose of a FYR is to review site cleanup information to determine if a remedy is and will continue to be protective of human health and the environment. The triggering action for this statutory FYR was the signing of the previous FYR report on April 30, 2008.

The Site is located between Crosstown Boulevard NW and Hanson Boulevard NW. Land use near the Site consists of a mix of residential, recreational, and open-space uses. The Waste Disposal Engineering Landfill accepted mixed municipal wastes for disposal from 1963 to 1983. From 1972 to 1974, hazardous wastes were disposed into a pit in the landfill. The landfill contains approximately 2.4 million cubic yards of waste and the current waste footprint covers approximately 73 acres. Waste disposal at the landfill caused groundwater contamination.

In 1987, EPA, with the concurrence of MPCA, signed a Record of Decision (ROD) selecting a remedy for the Site which included constructing and operating a Site-wide multi-layer landfill cover, a passive landfill gas control system, and a Site-wide contaminated groundwater extraction and treatment system and, with respect to the hazardous waste pit, constructing a slurry wall around the pit and installing and operating an extraction well inside the slurry wall. The ROD did not separate the Site into Operable Units (OUs), but the Site is tracked by EPA as two OUs: landfill cap and groundwater. The ROD was implemented by Potentially Responsible Parties (PRPs). Since 1995 the Site has been operated and maintained by MPCA as part of its Closed Landfill Program. The MPCA continues to upgrade landfill systems as needed, including upgrading to an active landfill gas control system. All required institutional controls (ICs) for the Site were put in place and EPA declared the Site as Site-Wide Ready for Anticipated Use in 2008.

Upon review, EPA finds that the remedy at the WDE Site currently protects human health and the environment because the remedy has been constructed in accordance with the requirements of the ROD, enhancements to the remedy have been implemented including an active landfill gas control, and the remedy is functioning as intended; source control measures, including the vapor extraction system implemented in the hazardous waste pit since the last five year review, are reducing volatile source material and, along with the landfill cap, reducing leachate production. Groundwater is being contained and treated. Groundwater monitoring has demonstrated a slow downward trend in concentration of certain contaminants and stable concentrations of others. Exposure pathways that could result in unacceptable risk are being controlled. Existing Site uses are consistent with the objectives of the land- and groundwater-use restrictions and ICs remain in place and are effective.

### Five-Year Review Summary Form

SITE IDENTIFICATION		
<b>Site Name:</b> Waste Disposal Engineering		
<b>EPA ID:</b> MND980609119		
<b>Region:</b> 5	<b>State:</b> MN	<b>City/County:</b> Andover/Anoka
SITE STATUS		
<b>NPL Status:</b> Deleted		
<b>Multiple OUs?</b> Yes	<b>Has the site achieved construction completion?</b> Yes	
REVIEW STATUS		
<b>Lead agency:</b> EPA		
<b>Author name (Federal or State Project Manager):</b> Leah Evison		
<b>Author affiliation:</b> EPA		
<b>Review period:</b> 10/10/2012 – 4/10/2013		
<b>Date of site inspection:</b> 10/10/2012		
<b>Type of review:</b> Statutory		
<b>Review number:</b> 4		
<b>Triggering action date:</b> 4/30/2008		
<b>Due date (five years after triggering action date):</b> 4/30/2013		

**Five-Year Review Summary Form (continued)**

**Issues/Recommendations**

**OU(s) without Issues/Recommendations Identified in the Five-Year Review:**

*1 and 2*

**Protectiveness Statements**

<i>Operable Unit:</i> 1 (Groundwater)	<i>Protectiveness Determination:</i> Protective
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*Protectiveness Statement:*

The remedy at OU 1 is protective of human health and the environment. The groundwater exposure pathways that could result in unacceptable risks are being controlled by the slurry wall and vapor extraction system associated with the hazardous waste pit, and the wider-area contaminated groundwater capture and treatment system. Institutional controls for groundwater are in place and effective.

<i>Operable Unit:</i> 2 (Landfill)	<i>Protectiveness Determination:</i> Protective
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*Protectiveness Statement:*

The remedy at OU 2 is protective of human health and the environment. The exposure pathways that could result in unacceptable risks are being controlled by the landfill cap and landfill gas control system. The remedial action objectives of controlling contact with exposed waste and potential volatile emissions, and of minimizing contaminant releases from landfill wastes to the upper sand aquifer, are being met. Institutional controls for the landfill are in place and effective.

## Site-wide Protectiveness Statement

*Protectiveness Determination:*

Protective

*Protectiveness Statement:*

The remedy at the WDE Site currently protects human health and the environment because the remedy has been constructed in accordance with the requirements of the ROD, enhancements to the remedy have been implemented including an active landfill gas control, and the remedy is functioning as intended; source control measures, including the vapor extraction system implemented in the hazardous waste pit since the last five year review, are reducing volatile source material and, along with the landfill cap, reducing leachate production. Groundwater is being contained and treated. Groundwater monitoring has demonstrated a slow downward trend in concentration of certain contaminants and stable concentrations of others. Exposure pathways that could result in unacceptable risk are being controlled. Existing Site uses are consistent with the objectives of the land- and groundwater-use restrictions and ICs remain in place and are effective.

## I. INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The United States Environmental Protection Agency (EPA) prepares FYR reports pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121 and the National Contingency Plan (NCP). CERCLA 121 states:

*“If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.”*

EPA interpreted this requirement further in the NCP; 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which states:

*“If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such actions no less often than every five years after the initiation of the selected remedial action.”*

EPA conducted a FYR of the remedy implemented at the Waste Disposal Engineering Superfund Site (Site) in the City of Andover, Anoka County, Minnesota. The Record of Decision (ROD) did not separate the Site into designated portions or “Operable Units” (OUs), but the Site is tracked by EPA as two OUs. Groundwater-related activities are tracked as OU 1 and landfill cap-related activities are tracked as OU 2. MPCA is the lead agency for developing and implementing the remedy for the Site and manages the Site under its Closed Landfill Program. Under the terms of EPA’s agreement with MPCA, EPA conducts FYRs for sites in the Closed Landfill Program. MPCA has reviewed all supporting documentation and provided input to EPA during the FYR process.

This is the fourth FYR for the Waste Disposal Engineering Superfund site. The triggering action for this statutory review is the completion date of the previous FYR report. A FYR is required at the Site because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

## II. PROGRESS SINCE THE LAST REVIEW

Tables 1 and 2 below summarize the protectiveness determinations and progress made on implementing the recommendations from the FYR report EPA completed in 2008.

**Table 1. Protectiveness Determinations/Statements from the 2008 FYR Report**

<b>OU</b>	<b>Protectiveness Determination</b>	<b>Protectiveness Statement</b>
1 and 2	Short-term Protective	The remedy at the WDE site currently protects human health and the environment in the short term because the remedy has been constructed in accordance with the requirements of the ROD; the remedy is functioning as designed; source control measures are significantly reducing leachate production and providing containment of contaminated groundwater; and, a reduction in contaminant concentrations in groundwater has been observed. The remedy is expected to be protective of human health and the environment in the long-term upon attainment of groundwater cleanup levels, and in the interim, exposure pathways that could result in unacceptable risk are being controlled. Monitoring has demonstrated that concentrations of many contaminants have declined to levels that are close to or below HRLs. Long-term trends show significant and adequate improvements in groundwater quality.

(see next page for Table 2)

**Table 2. Status of Recommendations from the 2008 FYR Report**

OU	Issue	Recommendations/ Follow-up Actions	Party Respon- sible	Over- sight Party	Original Mile-stone Date	Current Status	Com- pletion Date (if appli- cable)
1	Contaminant levels in groundwater at and near the hazardous waste pit are still above Site cleanup standards	Complete the site study that is currently underway to identify recommendation to expedite the cleanup	State	EPA	9/30/2008	Completed	5/14/2010
1	Waste fill material at and near the hazardous waste pit continues to supply contaminants to groundwater	Re-start EW-9. Consider other remedy alternatives in the area to address contamination below the pit	State	EPA	9/30/2008	Completed	5/14/2010
1	Benzene, vinyl chloride and tetrahydrofuran are still present at unacceptable concentration at and near the Site, especially at the pit	Monitor VOCs on a quarterly basis. Monitor general parameters on an annual basis. Monitor any new extraction wells that may be installed at the pit monthly.	State	EPA	VOCs quarterly until 2012; general parameters annually until 2013; new pit wells monthly until 2010	Completed	5/14/2010
1	Arsenic is still present at unacceptable concentration at and near the Site	Collect oxidation-reduction data at wells with elevated arsenic concentration	EPA/ State	EPA	Quarterly until 2012	Ongoing	N/A

Additional information regarding previous recommendations for the hazardous waste pit is below:

- In 2008, MPCA, with contractor support, conducted further investigation of the hazardous waste pit and encountered high levels of volatile organic compounds (VOCs) in vadose zone gases in certain areas. In order to ensure that air emissions would not exceed acceptable limits, MPCA temporarily disconnected one of the gas extraction wells

inside the pit from the landfill-wide gas extraction system and began a pilot study for vapor extraction and treatment in the pit.

- In 2009, MPCA, with contractor support, performed two borings from the landfill surface to the base of the pit with continuous sampling. Several drums were encountered during drilling. The base of the pit was found to consist of a coarse sand layer overlying an apparent clay liner. Free liquid was encountered in both borings above the clay liner. This liquid was removed and analyzed. The liquid contained a variety of VOCs, but no polychlorinated biphenyls (PCBs).
- In 2009, a pilot vapor extraction system was designed and installed to remove VOCs from the pit, known as a cryogenic, condensate, and compression (C3) system. The C3 system extracted contaminant vapor and cooled and condensed it into a liquid. The pilot system was connected to the previously-disconnected gas extraction well and operated from November 2009 to May 2010.
- The liquid extracted by the C3 system contained high concentrations of VOCs and was drummed and shipped off-site where it was blended with fuel and burned in boilers for energy.
- In 2010, a second parallel C3 system compressor was operated in an effort to increase the flow rate. Production rates varied during the test period due to mechanical and weather conditions, but by 2010, a total of 1,688 gallons of liquid had been removed by the C3 system.
- In general, the C3 pilot study indicated that VOCs can be effectively removed from the pit with the gas extraction system. The study concluded that production could be increased by winterizing the system and increasing extraction and treatment flow rates.

Additional information regarding previous recommendations for groundwater monitoring is below:

- Groundwater monitoring has been conducted regularly during the period of this FYR, including VOCs, arsenic, manganese, and general parameters.
- Oxidation-reduction data are collected quarterly at monitoring wells containing arsenic. Results indicate that there may be reducing conditions at the location of these monitoring wells due to leachate releases near the landfill and due to the proximity to surface water at the location near the creek.

### **Remedy Implementation Activities**

Major remedy implementation activities during the period of this FYR include:

- From 2008 to 2010, MPCA, with contractor support, conducted the hazardous waste pit investigation and treatment described above.

- In 2010, MPCA shut down the landfill gas-to-energy system which had been installed in 2007. This was necessary due to continued presence of contaminant characteristics that made operation of the gas-to-energy system difficult to maintain and costly to operate. MPCA continued use of the enclosed flare for safe burn-off of the landfill gas.
- In 2012, pre-treatment for removal of PCBs was added for groundwater extracted from beneath the base of the hazardous waste pit. After pre-treatment, this groundwater joins the treatment system used for other extraction wells.
- In January 2013, MPCA began operation of a full-scale C3 system for removal of contaminants from the hazardous waste pit. At the time of this FYR, the system continues to remove approximately 35 gallons/day of highly contaminated vapor condensate.

There are a wide variety of ICs currently in place for the Site, as listed in Table 3A found in Appendix A to this FYR. In addition, Table 3B, also found in Appendix A, lists the ICs by land unit to which the IC applies. Appendix A also includes maps showing the areas to which the ICs apply. No ICs needed to be updated during the period of this FYR. The ICs for both land and groundwater have been effective during the period of this FYR and MPCA has not noted any breaches of the ICs during this period.

Although not ICs, other informational devices have been implemented and updated at the Site during the period of this FYR. In 2011, MPCA updated its Groundwater Areas of Concern and Methane Gas Area of Concern maps (Appendix B). MPCA develops these maps and associated descriptions to inform potential well drillers and the public of potential concerns, and to assist local government with land use planning in areas surrounding the Site.

The Site property is currently owned by Anoka County. Currently the County is in the process of transferring site ownership to the State of Minnesota with administration by MPCA.

EPA designated the Site as Site-Wide Ready for Anticipated Use (SWRAU) on February 11, 2008.

## **System Operation/Operation and Maintenance Activities**

### ***Landfill Cover System***

A multilayer landfill cap was installed in 1992. The cap consists of a 24-inch clay layer overlain by sand, clean fill, and vegetated topsoil. Total cap thickness is approximately six feet. The cap is inspected for erosion or other damage and repairs are made when and where necessary to maintain integrity. MPCA's field representative is on-Site regularly to observe landfill conditions. Maintenance is provided by a MPCA contractor and includes maintaining proper slopes for positive drainage of the fill area, periodic mowing to control woody vegetation, and other cap maintenance procedures.

### ***Landfill Gas Control System***

The landfill currently includes an active gas collection and treatment system that includes 54 gas collection wells and 27 gas probes to monitor that no off-site gas migration is occurring. The gas is transported through underground piping to an on-site enclosed flare where it is safely burned. The gas probes are located around the landfill perimeter and are concentrated more densely in

areas where residential neighborhoods are closest to the landfill. An MPCA contractor conducts regular operation and maintenance (O&M) for the gas collection and treatment system and monitors the gas probes. The contractor also monitors the liquid level in the gas extraction wells to ensure that gas extraction is not impeded by the presence of perched leachate. Gas monitoring results are discussed in the Data Review section of this FYR report and a data table and probe location map are found in Appendix B of this FYR report.

### ***Groundwater Containment and Treatment System***

Groundwater is extracted from a network of eight extraction wells. MPCA performed a well spacing assessment based on a three-dimensional groundwater flow model in 2006 that demonstrated successful capture of the groundwater plume. Extraction system operation remains consistent with that model.

Extracted groundwater is sampled at several points throughout its flow path to determine its eventual fate. Groundwater that meets drinking water standards is directed to an on-site infiltration basin and allowed to infiltrate back into Site groundwater. Groundwater from the extraction well near the hazardous waste pit is pre-treated to remove PCBs before being combined with groundwater from other extraction wells. Groundwater that contains lower levels of contaminants is piped directly to a Metropolitan Council Environmental Services (MCES) wastewater pumping station adjacent to the Site, where it is piped to the public wastewater treatment system. Groundwater that contains higher levels of contaminants is pumped to the bottom of an on-site retention basin for pre-treatment. In the retention basin the water is treated by aeration until it reaches a level of contamination that is acceptable for discharge to the MCES system. O&M is performed regularly by an MPCA contractor for the groundwater treatment system. An MPCA contractor also conducts groundwater monitoring as described below.

### ***Groundwater Monitoring System***

The groundwater monitoring system currently includes a system of 94 monitoring wells. Currently an MPCA contractor samples groundwater at the Site quarterly. Samples are analyzed for a wide variety of contaminants, including VOCs, semi-volatile organic compounds (SVOCs) and metals. Groundwater monitoring results are discussed in the Data Review section of this FYR report and a map showing the locations of groundwater extraction and monitoring wells is found in Appendix B of this FYR report.

## **III. FIVE-YEAR REVIEW PROCESS**

### **Administrative Components**

Although MPCA has long-term care responsibility for the Site, EPA led the FYR process in accordance with the terms of the agreement between the two agencies. The FYR was led by Leah Evison, EPA Remedial Project Manager. Jean Hanson (Land Manager), Peter Tiffany (Engineer), Ingrid Verhagen (Hydrologist) and John Moeger (Fiscal Coordinator) of MPCA assisted in the review.

This FYR, which began on October 10, 2012, consisted of the following components:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection; and
- Five-Year Review Report Development and Review.

### **Community Notification and Involvement**

EPA notified the community that the FYR process was being initiated by publishing a notice in the local newspaper, the *Anoka County Shopper*, on February 6, 2013. The notice stated that the FYR was beginning and invited the public to submit comments to EPA. It also stated that the results of the FYR would be published in a report that will be made available on EPA's web site and at MPCA's offices at 520 Lafayette Road North, St. Paul, Minnesota.

Recent community involvement opportunities included a MPCA presentation in 2012 to a local high school and a City Council work group regarding the history and status of the Site and its relationship to the development of environmental ethics. The MPCA plans to present this information on an annual basis if resources allow.

### **Document Review**

This FYR consisted of a review of relevant documents including O&M records, landfill gas and groundwater monitoring data, ICs and technical reports. Applicable groundwater cleanup standards, as listed in the December 1987 ROD were also reviewed.

### **Data Review**

#### ***Landfill gas***

Methane gas is an odorless gas produced when landfill wastes decompose. Methane can be explosive in confined spaces such as basements when mixed in air. Before a fire or explosion can occur, three conditions must be met simultaneously. A fuel (methane) and oxygen (air) must exist in certain proportions, along with an ignition source, such as a spark or flame. The lower explosive limit, or level of gas which must be present for an explosion to occur if other conditions are met, for methane is 5%.

Methane gas at this Site is monitored through a series of 27 gas probes that surround the landfill. The locations of gas probes and gas probe monitoring results are found in Appendix B to this FYR report. Methane gas has not been detected at any level in any location for the last several years.

Prior to 2011, methane concentrations of 0.1% to 0.2% were reported in several probes located west of the landfill. Detections at these levels are not considered to be evidence of landfill gas and are within the level of accuracy of the monitoring instrument. Prior to 2011, apparent detections of methane at a concentration of 0.1% to 0.4 % were reported sporadically in one gas probe located to the southeast of the landfill. This level is well below the lower explosive limit. The safety of nearby residences also is assured by the presence of a second gas probe located

between this location and the closest residence. This second gas probe has consistently shown no detectable methane.

The methane gas monitoring results at the Site demonstrate that operation of the active gas control system is successfully controlling potential exposure to landfill gas at the Site.

### ***Hazardous Waste Pit***

During the early 1970s, a 240-ft long by 90-ft wide by 20-ft deep hazardous waste pit was constructed on top of the landfill. From 1972 to 1974 approximately 6,600 containers of various hazardous waste materials reportedly were disposed of into the pit. As part of the Site remedy, a bentonite slurry wall was constructed around the pit with its base in contact with a clay layer that underlies the pit. A leachate extraction well (EW-9) was constructed within the slurry wall that surrounds the hazardous waste pit and screened on top of a gray silt unit that is 15 feet below of the pit. (Two additional leachate extraction wells, EW-14 and EW-15, were also constructed inside the slurry wall, but it was found that they did not allow pumping at a high enough rate, so these two are not operated.) A gas extraction well was also constructed and operates within the pit. To the extent technically feasible, the extraction wells are operated with the goal of creating and maintaining an inward gradient across the slurry wall. This is only partly feasible due to the configuration of the underlying clay layer and the high rate of bio-fouling caused by the characteristics of the wastes at this location.

Hydraulic gradients are measured continuously at four locations around the pit using nested monitoring wells. During the period of this FYR, the gradient across the slurry wall has been variable. For example, at well nest NW-1, the gradient was outward from November to December 2011 but was inward throughout 2012. The gradient at well nest NW-2 was outward during 2012. At well nest NW-3, the gradient was inward from October 2011 through April 2012 and was outward for the remainder of 2012. At well nest NW-4, gradients have also been outward during 2011-2012. MPCA continues to operate the extraction wells beneath the pit at the highest rates practicable.

As described above, during 2008 to 2010, MPCA conducted additional studies of the pit and removed significant contaminant mass using a pilot C3 vapor extraction system. In January 2013, MPCA began operation of a full-scale C3 system for removal of contaminants from the hazardous waste pit. At the time of this FYR, the system continues to remove approximately 35 gallons/day of highly contaminated vapor condensate. Over the coming years, the C3 vapor extraction system is expected to reduce pit vapor levels significantly. At that time, MPCA plans to consider partial or full removal of the pit contents in order to decrease overall life and expense of the remedial systems.

### ***Groundwater***

The contaminant plume in groundwater at this Site exists beneath the landfill in the upper sand aquifer and extends approximately 700 feet to the north of the landfill in the direction of groundwater flow (see map in Appendix B). The groundwater contamination plume is bounded on the north by Coon Creek and is prevented from moving further north by a groundwater extraction system located predominantly along the south boundary of Coon Creek. Private wells in the area were sampled annually for 10 years and found to be free of contamination.

Groundwater-monitoring results at the Site are compared to the cleanup standards established in the ROD. These standards are State of Minnesota Health Risk Limits (HRLs), a promulgated

State drinking water standard for residential wells, and federal primary maximum contaminant levels (MCLs) under the Safe Drinking Water Act. Concentrations of a variety of organic contaminants and arsenic exceed cleanup standards in groundwater beneath the landfill. In general, long-term groundwater monitoring has demonstrated a slow downward trend in concentration of certain contaminants in certain locations (e.g., arsenic at Well W-7 and benzene in multiple wells). Long-term trends of other contaminants (e.g., manganese and vinyl chloride) have generally been stable through time. This mix of trends is typical of a landfill such as this Site that continues to produce leachate. As the waste further degrades, contaminant concentrations in groundwater are expected to decline. However, certain contaminants that are produced by degradation of other contaminants (e.g., vinyl chloride) may increase in groundwater prior to a longer-term decrease.

Currently, four contaminants (arsenic, benzene, manganese, and vinyl chloride) exceed their respective cleanup standards at locations beyond the landfill waste boundary. These locations are all captured by the groundwater extraction system. A table showing current MCLs and HRLs for contaminants of concern (COCs) beyond the landfill waste boundary is found below. Graphs showing trends and tables showing drinking water exceedances for these COCs are found in Attachment B to this FYR report.

**Table 3. Current Groundwater Cleanup Standards for COCs Beyond the Landfill Waste Boundary**

COC	MCL (ppb)	HRL (ppb)
Arsenic	10	NA*
Benzene	5	2
Manganese	NA**	100
Vinyl Chloride	2	0.2

\*There is no HRL for arsenic, but MDH recommends that waste containing more than 10 ppb not be consumed over the long-term.

\*\*There is no primary MCL for manganese.

From 2008 through 2012, most contaminant levels in groundwater at the Site do not show discernible trends. This is expected for a landfill of this age that is still producing significant quantities of leachate. Contaminant concentrations are in general highest in groundwater extracted from the hazardous waste pit and lowest at groundwater extraction wells away from the landfill. Recent monitoring results for arsenic, benzene, manganese and vinyl chloride are summarized below.

#### Arsenic

Leachate extracted from beneath the hazardous waste pit in recent years has contained arsenic at concentrations up to 57 parts per billion (ppb), which exceeds the MCL of 10 ppb. Arsenic also intermittently exceeds the MCL at groundwater monitoring wells in the plume that extends beyond the landfill. At most of these locations there is no clear trend in arsenic concentrations during the period of this FYR. At one location north of the landfill near Coon Creek, there has

been an increasing trend in recent years. Ongoing analysis of redox conditions at this location and others indicates that changes in subsurface geochemical conditions (reducing vs. oxidizing environment) may be affecting the amount of arsenic in groundwater in this area. However, sample results indicate that there is no adverse impact to Coon Creek. Surface water samples do not exceed Aquatic Life Standards for Class 2B Waters for arsenic.

### Benzene

Leachate extracted from the hazardous waste pit in recent years has contained benzene at concentrations up to 66 ppb, which exceeds the MCL of 5 ppb and the HRL of 2 ppb. Benzene is also found at high concentrations at Well W-32A located on the landfill 400 feet down-gradient of the pit, likely indicating that leachate is leaving the pit during periods of outward hydraulic gradient. Benzene also exceeds the MCL and HRL at two monitoring wells to the northeast of the landfill, where it is captured by extraction wells.

### Manganese

Leachate extracted from the hazardous waste pit also contains the highest concentrations of manganese found at the Site and significantly exceeds the HRL. There is no primary MCL for manganese. Groundwater north of the landfill also contains relatively high concentrations of manganese. Shallow monitoring wells near Coon Creek show variable trends in manganese concentration as the creek seasonally changes from a gaining to a losing stream. Coon Creek is also sampled regularly for manganese and since August 2011 samples up-stream and down-stream of the landfill have exceeded the health risk limit for manganese.

### Vinyl Chloride

Vinyl chloride exceeds the MCL of 2 ppb at two wells: the extraction well in the pit (5 ppb in 2012) and one monitoring well northeast of the landfill (11 ppb in 2011) in an area captured by the groundwater treatment system. Vinyl chloride exceeds the HRL of 0.2 ppb at additional wells, also within the capture area. Vinyl chloride is produced from the degradation of other organic compounds and may be expected to increase with time in a degrading groundwater plume. In general, as seen in the graph in Appendix B, there is no trend for vinyl chloride in most wells at this time.

### Discharge Compliance

After pre-treatment, the extracted groundwater is discharged to the public wastewater treatment system. Compliance with discharge standards is measured by sampling contaminated groundwater as it enters and exits the on-site treatment system. The system has been in compliance with discharge standards during the period of this FYR.

### **Site Inspection**

EPA and MPCA inspected the Site on October 10, 2012, in support of the FYR. In attendance were Leah Evison, EPA, and Peter Tiffany, MPCA. The purpose of the inspection was to assess the protectiveness of the remedy. No ponds were observed on the landfill surface which would indicate significant settlement. The landfill vegetated cover showed evidence of having been cut. No maintenance issues were observed with regard to the operation of the landfill or gas collection and treatment system or the groundwater monitoring system. The fence surrounding the landfill was in good repair. Signs are placed at regular intervals on the landfill perimeter

fence and front gate. Additional warning signs indicating thin ice are in place on the fence that surrounds the aerated water treatment basin.

### **Interviews**

During the FYR process, no formal interviews were conducted because no changes have occurred at the Site since the last FYR that could adversely impact human health or the environment.

## **IV. TECHNICAL ASSESSMENT**

**Question A:** Is the remedy functioning as intended by the decision documents?

Yes. In the major respects, the remedy is functioning as intended by the decision documents. However, as explained below, certain upgrades and modifications are not reflected in the decision document.

A cap meeting Resource Conservation and Recovery Act (RCRA) standards was constructed for the landfill and is properly maintained. The remedy required a passive gas venting system, which was installed and operated for four years. In 1998, this was upgraded to an active gas extraction system which is also operating successfully.

Groundwater extraction wells were installed in the upper sand aquifer and are effectively containing the plume. The ROD anticipated groundwater treatment using air stripping and/or carbon adsorption with discharge to Coon Creek, but also recognized that final decisions about treatment and disposal would be made during design. Current treatment includes granulated activated carbon treatment for one extraction well containing PCBs and treatment in an aeration pond for other contaminants. Treated water is discharged to the MCES public sewerage system. Treatment and discharge standards are being met.

A clay slurry wall was constructed around the hazardous waste pit with leachate extraction from beneath the pit and gas extraction from within the pit. The ROD anticipated that pumping in the pit would allow an inward hydraulic gradient to be maintained across the slurry wall. Pumping has created an inward gradient during some periods in some locations; however, it has been technically infeasible to attain an inward gradient at all times. In response, MPCA has installed C3 vapor extraction system in the pit and is removing a significant contaminant mass from the pit. Contamination that escapes the pit is contained and treated in the groundwater treatment system.

O&M procedures, as implemented, will maintain the effectiveness of the remedies. O&M costs have steadily decreased during the period of this FYR from \$560,802 per year in 2008 to \$354,134 per year in 2012. Cost savings were due to discontinuation of the maintenance-intensive gas-to-energy system in 2010. MPCA continues to monitor the site for possible optimization and cost savings.

Access controls, including fencing, warning signs, and monitoring well locks, are in place and are effectively preventing exposure to contaminated materials. ICs are also in place and effective in preventing exposure. No other actions are necessary to ensure that threats are addressed.

**Question B:** Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Yes.

The ROD established groundwater cleanup goals as HRLs and MCLs rather than a numerical value and MPCA compares groundwater monitoring results to current standards.

No new exposure pathways have been discovered at the Site and standardized risk assessment methodologies have not changed in a way that could affect the protectiveness of the remedy. The groundwater plume is not a potential source of vapor intrusion into buildings because land use above the portion of the plume that extends beyond the waste boundary is **open space** and contaminant concentrations in this area are low. In addition, Coon Creek acts as a hydraulic barrier to any potential vapor movement north of the creek. A new contaminant (PCBs) appeared in leachate from one extraction well located within the landfill waste footprint and is being successfully treated. The area covered by the groundwater plume is under the responsibility and control of MPCA and the plume does not extend to areas of residential or other uses. The remedy is progressing as expected towards meeting RAOs.

**Question C:** Has any other information come to light that could call into question the protectiveness of the remedy?

No.

No other information has come to light that could call into question the protectiveness of the remedy. Groundwater monitoring results and monitoring of hydraulic gradients across the slurry wall suggest that the hazardous waste pit is not entirely contained at that location. However, MPCA is successfully capturing and treating this contamination using the groundwater extraction and treatment system and continues to significantly reduce contaminant mass in the pit using the vapor extraction system.

### **Technical Assessment Summary**

The remedial actions for the Site are functioning as intended in most respects. The landfill cap is successfully containing the waste and the gas extraction system is successfully preventing exposure to landfill gases. The groundwater extraction and treatment system is successfully containing and treating landfill leachate and the groundwater plume. A slurry wall encloses the hazardous waste pit, although it has been technically infeasible to maintain an inward hydraulic gradient at all times. Significant contaminant mass is being removed from the pit by a vapor extraction system and contaminants which escape the pit are contained and treated by the groundwater treatment system. The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection are still valid. ICs are in place and effective. No other information has come to light that could call into question the protectiveness of the remedy.

## **V. ISSUES/RECOMMENDATIONS AND FOLLOW-UP ACTIONS**

No issues and recommendations for follow-up action were identified at the Site that affect protectiveness of the remedy. Under the management of the MPCA's Closed Landfill Program,

the MPCA continues to monitor the Site and implement technical improvements, reduce cost, and implement energy conservation and sustainability measures as they are identified by the CLP.

One issue that does not affect protectiveness but should be resolved is the need to update the decision document to reflect the change from a passive to an active gas collection system and to reflect other technical changes to the groundwater treatment and discharge system.

## VI. PROTECTIVENESS STATEMENTS

<b>Protectiveness Statements</b>	
<i>Operable Unit:</i> 1	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The remedy at OU 1 is protective of human health and the environment. The groundwater exposure pathways that could result in unacceptable risks are being controlled by the slurry wall and vapor extraction system associated with the hazardous waste pit, and the wider-area contaminated groundwater capture and treatment system. Institutional controls for groundwater are in place and effective.	
<i>Operable Unit:</i> 2	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The remedy at OU 2 is protective of human health and the environment. The exposure pathways that could result in unacceptable risks are being controlled by the landfill cap and landfill gas control system. The remedial action objectives of controlling contact with exposed waste and potential volatile emissions, and of minimizing contaminant releases from landfill wastes to the upper sand aquifer, are being met. Institutional controls for the landfill are in place and effective.	

### Site-wide Protectiveness Statement

*Protectiveness Determination:*

Protective

*Protectiveness Statement:*

The remedy at the WDE Site currently protects human health and the environment because the remedy has been constructed in accordance with the requirements of the ROD, enhancements to the remedy have been implemented including an active landfill gas control, and the remedy is functioning as intended; source control measures, including the vapor extraction system implemented in the hazardous waste pit since the last five year review, are reducing volatile source material and, along with the landfill cap, reducing leachate production. Groundwater is being contained and treated. Groundwater monitoring has demonstrated a slow downward trend in concentration of certain contaminants and stable concentrations of others. Exposure pathways that could result in unacceptable risk are being controlled. Existing Site uses are consistent with the objectives of the land- and groundwater-use restrictions and ICs remain in place and are effective.

## VII. NEXT REVIEW

EPA will complete the next FYR at the Waste Disposal Engineering Superfund site five years from the completion date of this review.

## APPENDIX A – EXISTING SITE INFORMATION

### A. SITE CHRONOLOGY

**Table 1: Site Chronology**

Date	Event
1963 to 1971	Site operated as an open dump
1971 to 1983	Site operated as a landfill
6/19/82	Removal Assessment performed
9/8/83	Final listing on National Priorities List
Feb. 1984	MPCA revokes landfill operating permit
Mar. 1984 - Apr. 1984	EPA, MPCA and 12 PRPs enter into Administrative Consent Order (AOC) for RI/FS
12/31/87	RI/FS completed
12/31/87	ROD signed
8/23/91	Unilateral Administrative Order (UAO) for RD/RA issued
8/31/91	Remedial Design begins
Oct. 1992	Groundwater containment design complete
10/8/92	Remedial Action start
Oct. 1992 - Sept. 1993	Groundwater containment construction
12/7/92	Cap design completed
10/26/93	Consent Decree entered for payment of past costs
August 1994	Cap construction completed
8/9/94	EPA / MPCA Final Inspection date
March 1995	Approval of air stripping treatment technology for groundwater
June 1995	Air stripping system construction completed
8/10/95	Certification of Completion of Remedial Construction issued
9/27/95	Preliminary Close Out Report issued
6/5/96	NPL deletion (per agreement between EPA and MPCA related to the CLP)
1998	Active gas extraction system installed
3/25/99	First FYR report issued
2002	Treatment pond installed for groundwater treatment
4/30/03	Second FYR report issued
2004	Three additional groundwater extraction wells installed
2006	City of Andover adopts Closed Landfill Restricted zoning ordinance for Site property
2006 – 2009	Additional hazardous waste pit investigations conducted
2007	Gas-to-energy system constructed
2/11/08	EPA declares site Site-Wide-Ready-for-Anticipated Use
4/30/08	Third FYR report issued
2009 – 2010	Pilot C3 vapor extraction system operated in hazardous waste pit
Nov 2010	Gas-to-energy system shut down and converted to enclosed flare system
2012	Groundwater treatment for PCBs added to extraction well near hazardous waste pit
Jan 2013	Full-scale C3 vapor extraction system begins operation in hazardous waste pit

## **B. BACKGROUND**

### **Physical Characteristics**

The Waste Disposal Engineering Superfund site (Site) is located at T32N, R24W, Section 27, at 14437 Crosstown Boulevard in the City of Andover (formerly Grow Township), Anoka County, Minnesota. The Site property is in a portion of Andover that contains residential, commercial, and industrial land use, approximately 15 miles north of the City of Minneapolis. The site property covers 114 acres and the landfill covers approximately 73 acres. The maximum thickness of waste is 40 feet. The landfill contains nearly 2.5 million cubic yards of waste.

The Site is situated within the Anoka Sand Plain. The area consists of a glacial outwash plain characterized by low relief, poor external drainage, and fine, sandy soil. The topography is gently rolling to flat.

### **Hydrology**

The Site is situated on the south side of Coon Creek, which discharges into the Mississippi River approximately 11 river miles downstream from the Site. The current Site landfill cover controls Site run-off to adequately prevent threats to the creek or wetland areas near the Site. Shallow groundwater beneath the Site is present at a depth of approximately 20 feet below ground surface and generally flows north/northeast beneath the landfill. Areas of wetland are also present near the Site.

### **Land and Resource Use**

The Site is bounded on the southwest by a residential neighborhood and on the south by a community center and ball field. Coon Creek runs through a vegetated area to the north of Site, with residential neighborhoods further to the north. To the northwest, the Site is bounded by Anoka County Road 18 (Crosstown Boulevard). Along the eastern edge of the Site are two overlapping easements, United Power Association (45 feet wide) and Northern States Power Company (150 feet wide), and Hanson Boulevard.

The upper sand aquifer that has been affected by landfill contaminants is not used in the area of the Site. Homes in the area are connected to the potable drinking water supply provided by the Metropolitan Council Environmental Services (MCES). Under MCES oversight, the City of Andover uses deeper groundwater wells located approximately one mile north of the Site. Water is extracted and treated before it is distributed throughout the City of Andover. Pumping by the City of Andover's drinking water wells does not affect the groundwater containment system at the Site. The site groundwater extraction and treatment system has been shown to be effective in capturing contaminated groundwater and leachate that has traveled from the waste into groundwater. No contamination has been detected in private wells.

### **History of Contamination**

The Site operated as an open dump from 1963 to 1971, and as a landfill from 1971 until 1983. By 1964, the dump covered only three acres. In 1970, the landfill had expanded to cover 41 acres, and by 1983 to its present day size of 73 acres. The dump was purchased by Waste Disposal Engineering (WDE) in 1968. In 1971, WDE constructed a pit in the landfill for

hazardous waste disposal. The hazardous waste pit operated until 1974 and the landfill operated until 1984.

The pit received hazardous wastes from November 1972 to January 1974. The base of the pit was specified to be an 18-inch layer of clay overlain by a six-inch bituminous layer and six inches of crushed limestone. Approximately 6,600 containers (ranging from 1 gallon pail to 55 gallon drums) holding a wide variety of wastes (acids, caustics, waste paints, spent solvents, plating sludges, cyanides) are thought to have been disposed in the pit. An undetermined quantity of hazardous waste, much of it as bulk loads, was also disposed throughout the landfill. Based on interviews and government files, approximately 3.2 million gallons of hazardous waste are thought to have been disposed at the Site.

Much of the landfill was covered by lime sludge obtained from the Minneapolis Drinking Water Treatment Plant. The lime sludge consists of very fine particles of lime that yields a clay-like substance. The sludge thickness ranges from three to six feet (average of four feet). Additional lime sludge was stockpiled on ten acres immediately southeast of the area of refuse disposal.

### **Initial Response**

The MPCA ordered the hazardous waste pit closed effective February 1, 1974. MPCA and EPA made requests to the owner/operator of the landfill to undertake a remedial investigation and propose appropriate remedial measures. No investigations or proposals for appropriate remedial measures were received. In January 1983, the Minnesota Department of Health (MDH) issued a drinking water well advisory in portions of the City of Andover due in part to the hazardous substances disposed of at the Site. EPA listed the Site on the NPL on September 8, 1983.

In 1984, EPA and MPCA entered into a Consent Order with nine PRPs requiring the PRPs to complete a RI/FS. Three more PRPs subsequently joined the Consent Order. A Remedial Investigation/Feasibility Study was conducted at the Site from 1984 through 1987.

### **Basis for Taking Action**

The basis for taking action at the site was the presence of multiple contaminants in shallow groundwater and landfill wastes at the site. Hazardous substances that were found in soil and groundwater include: 1,1-dichloroethane, 1,2-dichloroethene, 1,1,2-trichlorotrifluoroethane, 1,1,1-trichloroethane, methyl ethyl ketone, methyl isobutylketone, dichloroethane, toluene, xylene, methylene chloride, acetone, tetrahydrofuran, 1,1-dichloropropene, benzene, dibromochloromethane, 1,1,2-trichloroethane, 1,1,2,2-tetrachloroethane, trichloroethene, 1,3-dichloropropene, ethylbenzene, cumene, and ethyl ether. The primary human health threats included potential ingestion of contaminated groundwater, ingestion of or dermal exposure to contaminants in leachate seeps, Coon Creek, the upper sand groundwater, and direct contact with exposed wastes and leachate on-site. In addition, landfill gas (consisting primarily of methane) had the potential to migrate from the Site and is a potential explosive hazard to persons living and/or working in buildings near the Site.

Surface water and sediment were sampled but were found not to be pathways of concern at the Site for human health or the environment. VOCs were not detected and the Aquatic Life Standards for Class 2B Water were not exceeded for any of the VOCs or metals. However,

Coon Creek is not an attractive sport fishing stream and MPCA discourages use of the creek in the vicinity of the Site as an extra level of protection.

The Site groundwater flow regime is such that groundwater contaminants could discharge into Coon Creek if not intercepted. The lower sand aquifer did not show any adverse impacts from contaminants at the time of the remedy decision, but actions were needed to ensure its continued protection.

## **C. REMEDIAL ACTIONS**

### **Remedy Selection**

The ROD for the Site was signed on December 31, 1987. Remedial Action Objectives (RAOs) stated in the ROD include:

- Control potential dust and/or volatilized chemical emissions;
- Control contact with lime sludge;
- Control contact with exposed waste/leachate;
- Minimize contaminant releases to the upper sand aquifer;
- Eliminate or minimize contaminant releases to Coon Creek;
- Reduce the probability of incompatible waste reactions;
- Control the effects of possible reactions that may occur;
- Control future exposure to the contaminated upper sand aquifer;
- Protect the lower sand aquifer by controlling the vertical gradient and the impact of heavier than water non-aqueous phase liquid (NAPL) accumulation; and
- Control of soil gas migration.

The remedy selected to achieve these remedial objectives include the following major components:

- Lime sludge cap meeting Resource Conservation and Recovery Act (RCRA) technical performance standards;
- Groundwater extraction wells in the upper sand aquifer between Coon Creek and the landfill;
- Clay slurry wall around the pit with pumping inside the wall;
- Institutional controls to prohibit upper sand aquifer wells at the site and just north of Coon Creek and to prohibit lower sand aquifer wells near the landfill;
- Carbon adsorption treatment of extracted groundwater (air stripping or a combination is possible based on design);
- Discharge of treated extracted groundwater to Coon Creek; and
- Monitoring, including geophysical work around the site to locate heavier-than-water non-aqueous phase liquid monitoring, to assure the effectiveness of the remedy.

The standards used for selecting contaminants of concern for groundwater are HRLs and MCLs. HRLs are health-based standards developed for each of a list of contaminants in groundwater by the MDH.

## **Remedy Implementation**

### ***Groundwater***

The original groundwater containment and treatment system was constructed in 1992 and 1993. By 1995, a series of ten extraction wells were in use at the Site. Wells extract contaminated groundwater flowing from the Site before it reaches Coon Creek. Extracted groundwater is pumped to the bottom of an on-site retention basin and is retained to allow for treatment. Extracted groundwater is sampled at several points throughout its flow path to determine its eventual fate. Groundwater that is within acceptable drinking water standards is re-directed to an on-site infiltration basin and allowed to infiltrate back into Site groundwater. Groundwater that contains contaminants at levels between drinking water and MCES standards is retained in the treatment basin and treated by aeration until acceptable MCES standards are achieved. Once acceptable MCES standards are achieved, treated groundwater is pumped from the retention basin to an MCES station adjacent to the Site and travels through an MCES pipeline to the public wastewater treatment system. The landfill does not have a liner or a leachate collection system because it was constructed initially as a dump. The leachate travels from the waste into the groundwater and is captured by the groundwater treatment system.

In 2012, MPCA added treatment for PCBs to groundwater extracted from the hazardous waste pit.

### ***Landfill Cap and Slurry Wall***

The current landfill cap and slurry wall were constructed in 1994. The landfill cap reduces contaminant loading to the groundwater beneath the landfill by preventing precipitation from leaching into waste fill material. The slurry wall is located around the hazardous waste pit and is intended to contain or reduce the flow of groundwater that has higher concentrations of contaminants.

### ***Landfill Gas Collection***

The gas extraction system consists of a network of 54 gas extraction wells placed in the landfill, connected to common header pipes and a blower which draws landfill gas from the gas extraction wells. This system is designed to remove volatile compounds from the waste and combust them with the methane in an enclosed flare. This active gas extraction system was installed in 1998 and replaced the passive gas vents that were previously on-site. MPCA added a Landfill Gas-To-Energy system in 2007. This system operated for three years. It was shut down in November 2010 due to contaminant characteristics that made the Gas-To-Energy system difficult to maintain and costly to operate. After shut-down, the system continued combusting gas in the enclosed flare.

Landfill gas migration is currently monitored with 27 landfill gas monitoring probes. Liquid level monitoring of the gas extraction wells also occurs to determine if any well is blinded by perched leachate. Condensate flows by gravity to a central low point and then is pumped as needed to the on-site groundwater treatment basin.

EPA signed a Preliminary Closeout Report (PCOR) on September 27, 1995 to document that remedy construction was completed at the Site.

EPA removed the Site from the NPL on June 5, 1996. Since contaminants remain at the Site above levels that allow unlimited use and unrestricted exposure, EPA continues to conduct five-year reviews to ensure that the Site remedy remains protective of human health and the environment.

The tables on the following pages summarize the ICs which are currently in place for the Site. Maps depicting the areas covered by the ICs are found in Appendix B to this FYR.

**Table 3A - Institutional Controls Summary Table**  
**Waste Disposal Engineering Landfill; Andover, Minnesota**

Media, Engineered Controls and Areas that do not support UU/UE* for Current Conditions	IC Objective	IC Instrument Implemented **
<u>Landfill waste area (see Fig. 7).</u> Engineered controls for the landfill waste area consist of a constructed hazardous waste landfill cover.	ICs to prohibit interfering with the landfill cover integrity and on-site remedy components, including components of the extraction and treatment systems for the hazardous waste pit, contaminated groundwater, and landfill gas.	Implemented: - Minn.Stat. §115B.39 through §115B.46 - Ordinance 19P - Minn. Stat. §115B.412, Subd.9 - WDE Land Use Plan, March 30, 2006. - Amended zoning map (CLR Zoning) ***
<u>Hazardous waste pit within the landfill area (generally depicted by the box on Fig. 5).</u> Engineered controls for the hazardous waste pit within the landfill consist of a clay slurry wall around the pit, operation of interior gradient extraction wells, and treatment of extracted groundwater.	ICs to prohibit interfering with the landfill cover integrity and on-site remedy components, including components of the extraction and treatment systems for the hazardous waste pit, contaminated groundwater, and landfill gas.	Implemented: - Minn.Stat. §115B.39 through §115B.46 - Ordinance 19P - Minn. Stat. §115B.412, Subd.9 - WDE Land Use Plan, March 30, 2006. - Amended zoning map (CLR zoning) ***
<u>Contaminated groundwater throughout the landfill area.</u> Engineered controls consist of an on-site upper aquifer groundwater extraction and treatment system between the northeast corner of the landfill waste and Coon Creek (off-site).	ICs to prohibit interfering with the landfill cover integrity and on-site remedy components, including components of the extraction and treatment systems for the hazardous waste pit, contaminated groundwater, and landfill gas	Implemented: - Minn.Stat. §115B.39 through §115B.46 - Ordinance 19P - Minn. Stat. §115B.412, Subd.9 - WDE Land Use Plan, March 30, 2006. - Amended zoning map (CLR zoning) ***
<u>Landfill gas throughout the landfill area.</u> Engineered controls consist of an on-site passive landfill gas collection and treatment system. Active landfill gas controls were added after construction was completed. Monitoring demonstrates that ARARs are achieved at the site boundary.	ICs to prohibit interfering with the landfill cover integrity and on-site remedy components, including components of the extraction and treatment systems for the hazardous waste pit, contaminated groundwater, and landfill gas.	Implemented: - Minn.Stat. §115B.39 through §115B.46 - Ordinance 19P - Minn. Stat. §115B.412, Subd.9 - WDE Land Use Plan, March 30, 2006. - Amended zoning map (CLR Zoning) ***
<u>Landfill gases at the boundary of the landfill and on adjacent property.</u> Based on post-construction monitoring data, landfill gas levels achieve ARARs at and beyond the landfill boundary; therefore, no ROD-	No ROD-specified IC objective/mechanism on adjacent properties since the areas adjacent to the landfill were not expected to be adversely affected by landfill gas.	Implemented: - Roth Entities Memorandum of Institutional Controls - 1999 Deed Conditions and Restrictions - Ordinance 19P - Minn. Stat. §115B.412, Subd.9

**Table 3A - Institutional Controls Summary Table**  
**Waste Disposal Engineering Landfill; Andover, Minnesota**

<b>Media, Engineered Controls and Areas that do not support UU/UE* for Current Conditions</b>	<b>IC Objective</b>	<b>IC Instrument Implemented **</b>
specified landfill gas remedy components are applicable to adjacent properties.		- 2006 WDE Land Use Plan.
<u>Upper aquifer: contamination extends from the northeast edge of the Site, crossing Coon Creek on the Hupp property (see Fig. 6).</u> The landfill remedy will reduce the source of upper aquifer contamination.	IC prohibits using the upper aquifer and constructing extraction wells in this aquifer, on the northeast adjacent property to and beyond Coon Creek.	Implemented: - Declaration of Restrictive Covenants
<u>Lower aquifer: No significant contamination found extending both northeast from the Site onto the Hupp Property and south from the Site onto the Roth Entities Properties.</u> The lower aquifer adjacent to the landfill is protected from contamination by prohibiting lower aquifer extraction on the landfill and on adjacent near-by properties. This preserves the lower aquifer's artesian qualities, isolating it from landfill contaminants.	ROD recommends "considering" ICs to prohibit lower aquifer extraction wells in areas that may impact the flow of contaminants in the upper aquifer.	Implemented: -Roth Entities Memorandum of Institutional Controls. - Ordinance 19P - Minn. Stat. §115B.412, Subd.9. - 2006 WDE Land Use Plan.

\* Unlimited Use / Unlimited Exposure

\*\* **Current Compliance:** Based on inspections and interviews, EPA is not aware of any Site uses on the landfill or wells installed within the groundwater restricted area. The ICs appear to be functioning as intended.

\*\*\* A current zoning map for the City of Andover can be found at the following Internet web site:  
[http://www.ci.andover.mn.us/index.asp?Type=B\\_BASIC&SEC=%7BF205FD14-F591-474D-A9F2-B3A9A06DA5BB%7D&DE=%7BD6E9FFB0-BE57-4C95-B63F-E24FFB162FD2%7D](http://www.ci.andover.mn.us/index.asp?Type=B_BASIC&SEC=%7BF205FD14-F591-474D-A9F2-B3A9A06DA5BB%7D&DE=%7BD6E9FFB0-BE57-4C95-B63F-E24FFB162FD2%7D)

**Table 3B - Institutional Controls Summarized By Areal Extent**  
**Waste Disposal Engineering Landfill; Andover, Minnesota**

Institutional Control Name	Date(s) Implemented	Type of Control	Total Acres
Roth Entities Memorandum of Institutional Controls.	November 16, 1993	<u>Proprietary Control:</u> Recorded by property owner, Roth Entities on property.	110 acres, south of the site. See Figure 9.
Tax Forfeiture.	Approximately 1995	<u>Governmental Control:</u> Through tax forfeiture, the landfill is owned by, and 110 acres south of the landfill were owned by Minnesota.	224 acres, consisting of 114 acres for the landfill and 110 acres south of the landfill. See Figures 6 and 9.
Landfill Cleanup Agreement Document # 1203355.	October 1995	<u>Governmental Control:</u> Anoka County administers the landfill while MPCA controls the site pursuant to the Landfill Cleanup Act, Minn. Stat. '115B.39-115B.46 (1996). The Landfill Cleanup Act authorized the MPCA to enter into the Landfill Cleanup Agreement with U.S. EPA whereby MPCA assumed all future responsibility for the landfill, except for CERCLA mandated provisions.	100 acres. See Figure 6.
City of Andover Municipal Code, Ordinances 19P, 19N.	January 16, 1996	<u>Governmental Control.</u>	250 acres on and surrounding the landfill. See Figure 8.
MPCA's WDE Land Use Plan.	March 30, 1996	<u>Governmental Control:</u> Developed under authority granted through Minn. Stat. §115B.412, Subd.9. The statute requires local zoning to conform to the plan. MPCA's WDE Land Use Plan designates the landfill as "Closed Landfill Restricted" providing for "open space with no public use or development," while allowing development of adjacent lands.	114 acres. See Figures 6, 8, and 9.
Deed Conditions and Restrictions.	January 20, 1999	<u>Proprietary Control:</u> Filed by the State prior to transferring ownership for development, of 107 acres south of the landfill.	107 acres. The State retained 3.3 acres. See Figure 9.
Declaration of Restrictive Covenants; entered into by property owner(s) William G. Hupp and Kathleen M. Hupp with Nature Properties, LLC.	November 27, 2001	<u>Proprietary Control:</u> Restricting ground and surface water use.	13.8 acres, northeast of and adjacent to the northern border of the landfill. See Figure 6.
Amended zoning map.	Current Version: March 2007	<u>Governmental Control.</u>	114 acres. See Figure 10.

## **APPENDIX B – NEW SITE INFORMATION**

### **Figures**

1. Location of Methane Gas Probes
2. Methane Gas Area of Concern
3. Location Groundwater Extraction and Monitoring Wells
4. Groundwater Area of Concern and Plume Boundary – Upper Sand Aquifer
5. Groundwater Area of Concern – Lower Sand Aquifer
6. Groundwater Trends – Arsenic
7. Groundwater Trends – Benzene
8. Groundwater Trends – Vinyl Chloride.

### **Tables**

1. Methane Gas Probe Results (Jan 2008 – Mar 2012)
2. Recent Methane Gas Probe Results (Apr 2012 – Jan 2013)
3. MCL Exceedances of Arsenic in Groundwater

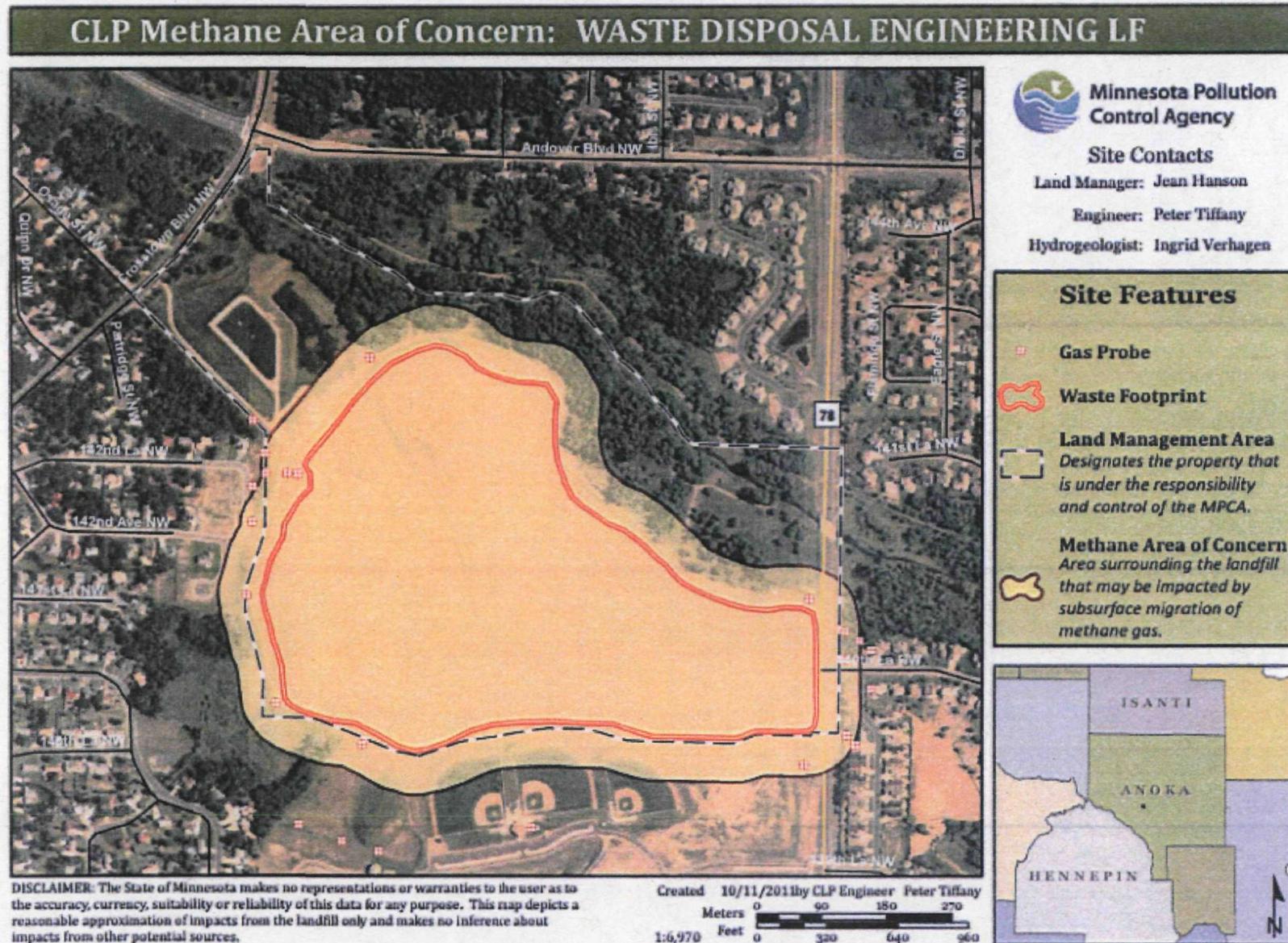
### **Attachment**

1. Institutional Control Maps

Figure 1. Location of Methane Gas Probes



Figure 2. Methane Gas Area of Concern (Updated 10/11/11)



## **Explanation of a Methane Gas Area of Concern (MGAOC)**

MPCA defines the MGAOC as the area of land surrounding a mixed municipal solid waste (MSW) landfill waste footprint where the presence of certain activities, such as construction of enclosed structures, may be impacted or precluded by subsurface migration of methane gas. Methane gas is an odorless gas produced when MSW decomposes, and can be explosive in confined spaces such as basements when mixed in air. The MGAOC is used to inform the public about the risks to current and future land owners regarding certain uses they may want to consider.

### **Methane Gas Area of Concern around WDE Landfill**

Soils in the vicinity of the WDE Landfill are generally fine sands in the higher elevations or muck soils in the lower elevations. Depth to the groundwater table is approximately 5 to 10 feet below ground surface. The landfill waste footprint is about 70 acres and contains approximately 2,400,000 cubic yards of waste. The nearest residence is located approximately 200 feet west of the waste footprint, though several other residences have been built within 500 feet of the landfill over the years.

A low permeability multilayer soil cover system was installed in 1993. An active gas extraction system with 54 vertical gas extraction wells connected to an enclosed blower/flare unit was installed in 1998. There are 27 gas monitoring probes located around the perimeter of the site. With the exception of three gas probes that have had methane readings just above the detection limit of the instrument, the remaining gas monitoring probes located around the site have had zero percent methane measured in them for more than 5 years, indicating that there likely is no gas migrating off the property. However, based on the highly permeable soils in the area, the high water table, the large mass of waste present in the landfill, the potential for an extended shutdown of the gas extraction system due to unforeseen circumstances, and recognizing the potential for gas to migrate under seasonal low permeable (frozen) conditions, the MGAOC extends 200 feet beyond the waste footprint.

### **Existing Land Use Controls**

Local ordinances exist and should be checked for applicability to control the building of structures within the MGAOC.

Figure 3. Location of Groundwater Extraction and Monitoring Wells

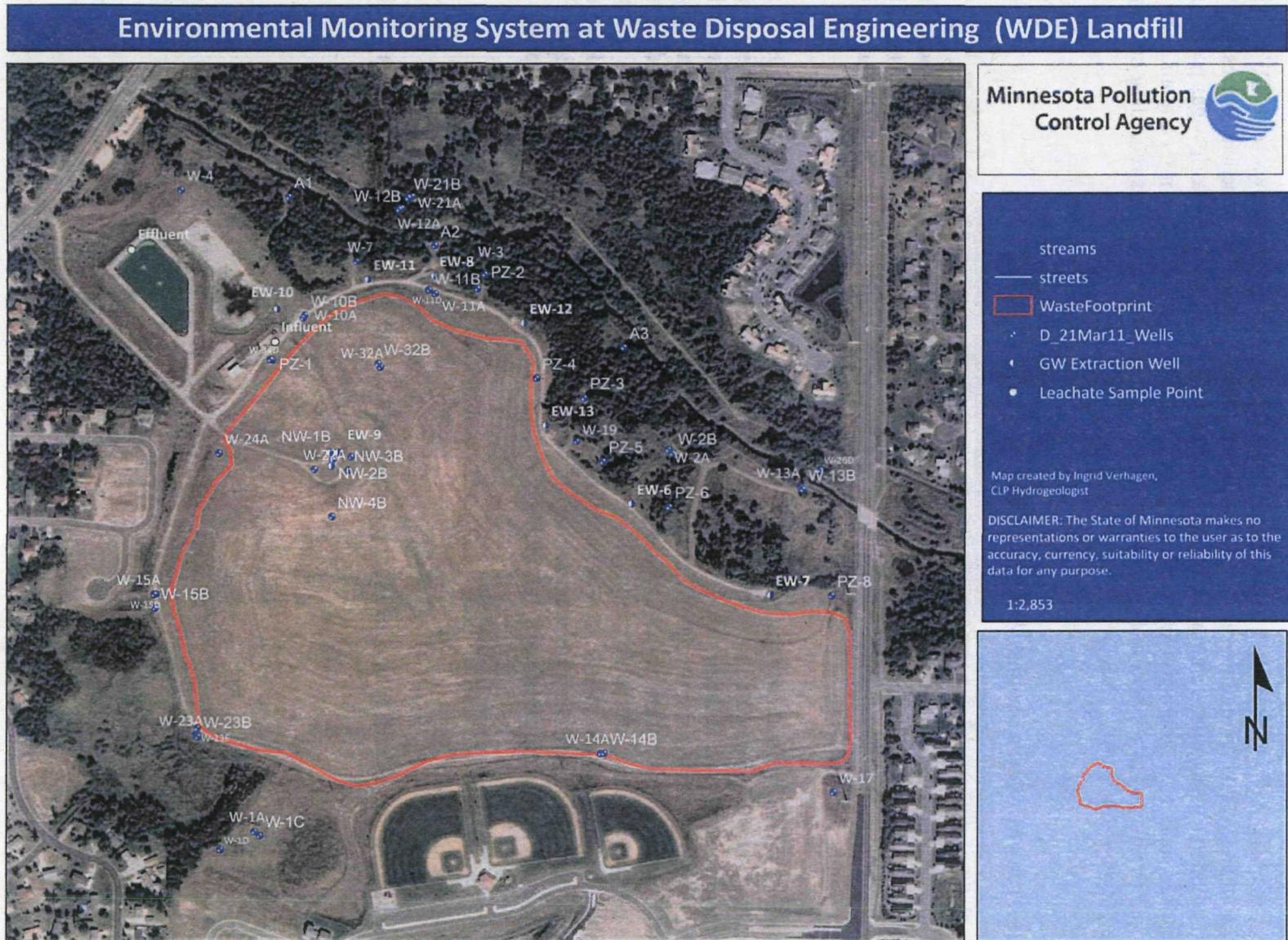


Figure 4. Groundwater Area of Concern – Shallow Sand Aquifer (Updated 8/11/11)

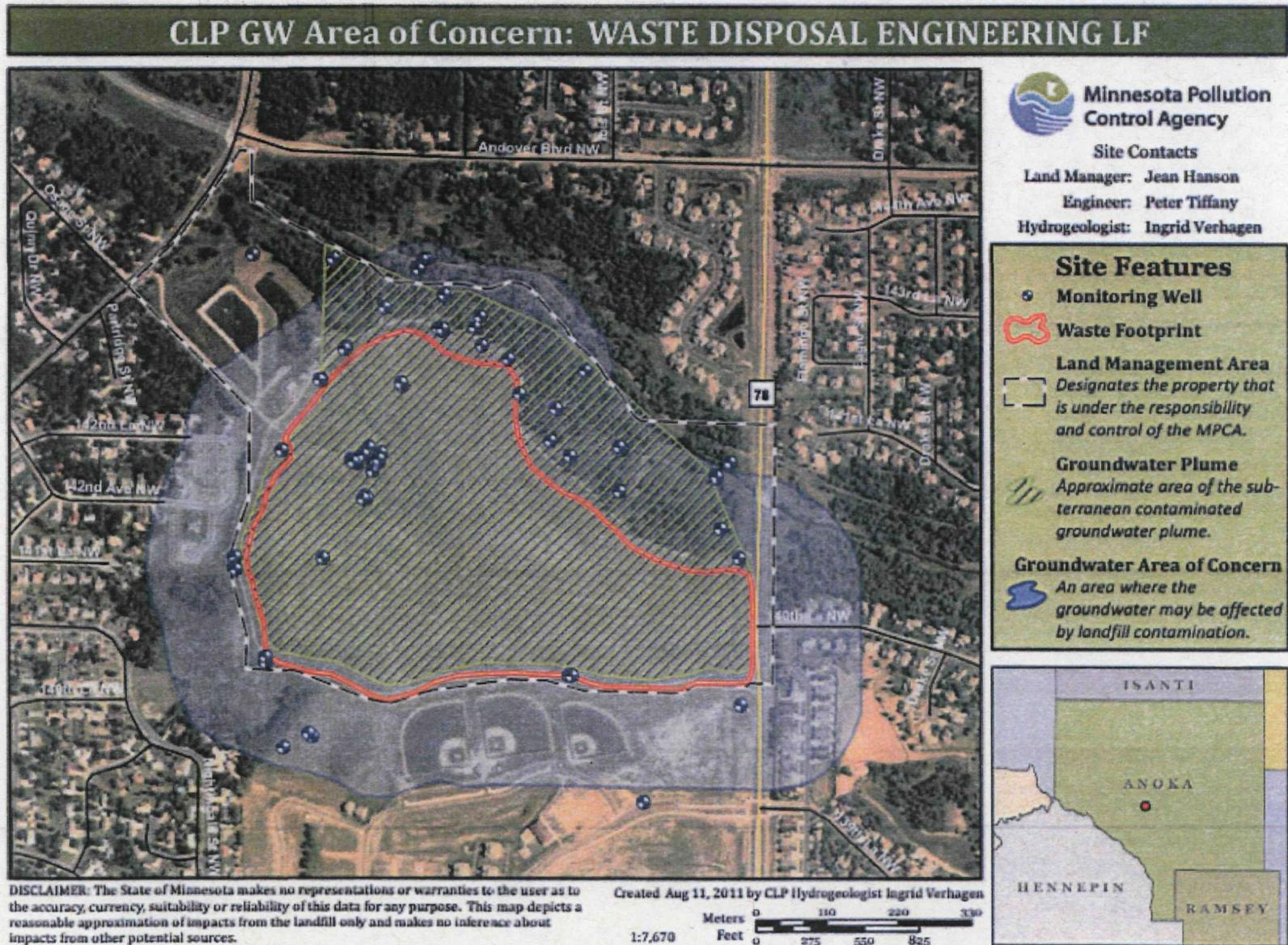
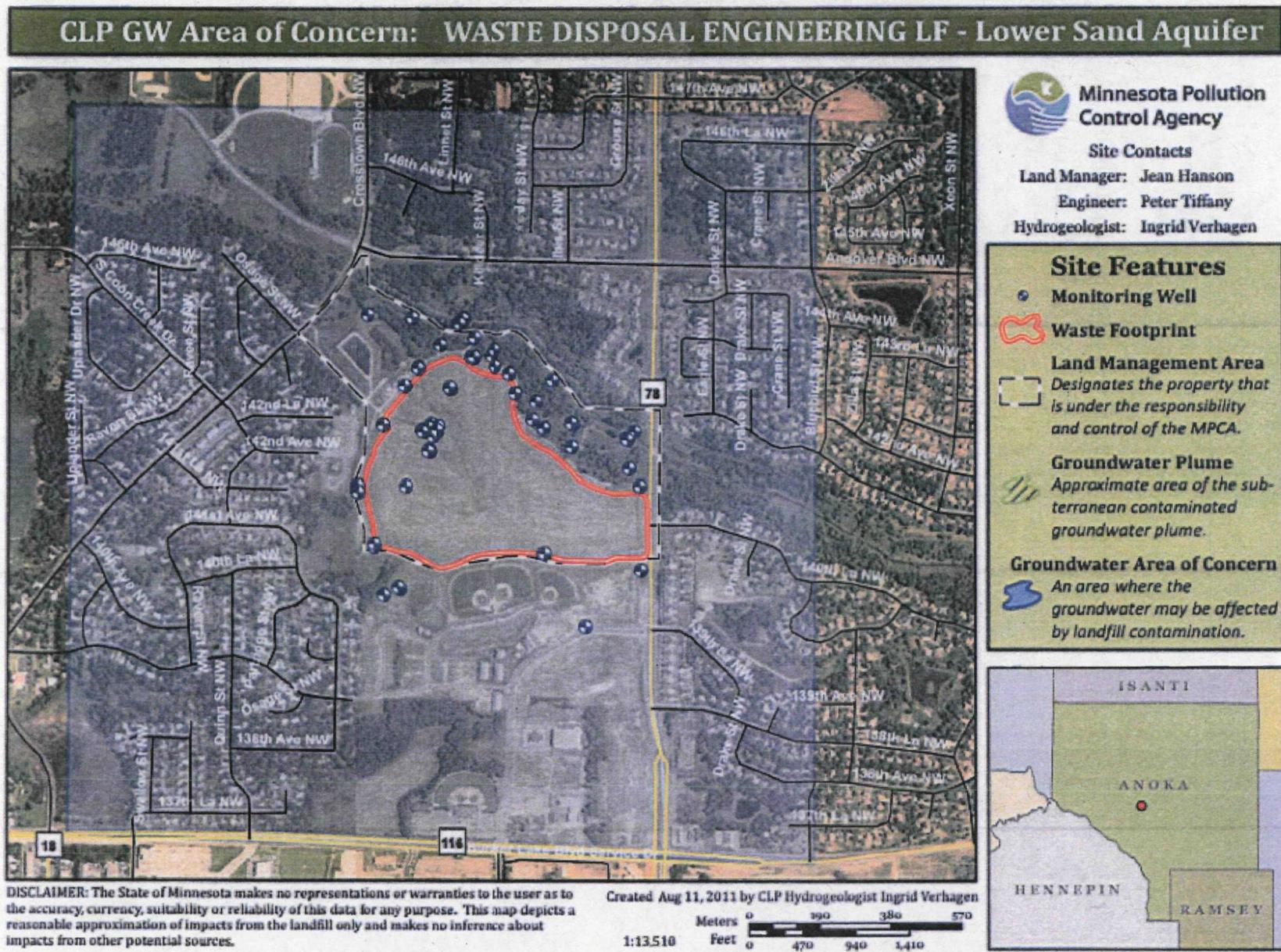


Figure 5. Groundwater Area of Concern – Lower Sand Aquifer (no contaminant plume)



## **Explanation of Groundwater Areas of Concern (GWAOC)**

MPCA defines GWAOCs as the areas of land surrounding a landfill where the presence of activities that require the use of groundwater may be impacted or precluded by contamination from the landfill, or may cause the groundwater flow direction to change thereby impacting the user or others nearby. The GWAOC is used to inform the public about the current and potential risks to users of groundwater contaminated by the landfill. In most circumstances this area is not equidistant around the site.

### **Groundwater Areas of Concern around Waste Disposal Engineering Landfill**

There are approximately 94 monitoring wells around Waste Disposal Engineering Landfill that assist in defining the groundwater area of concern. There are two aquifers at the site that are part of the Anoka sand plain. The surficial aquifer is the Upper Sand Aquifer and it is separated from the Lower Sand Aquifer (LSA) by clay till. Depth to the water table in the Upper sand varies from 5 to 20 feet. Groundwater flow in the Upper sand aquifer is to the north and northwest with discharge to Coon Creek. Flow in the LSA is to the west. The LSA is greater than 110 feet deep around the site.

Contaminants of concern at the edge of the creek include arsenic, vinyl chloride, benzene and manganese. The groundwater contamination plume is bounded on the north by Coon Creek and by a groundwater extraction system along the south boundary of Coon Creek that provides a barrier to contamination traveling farther to the north. Private wells west of the landfill were sampled yearly, for 10 years, and found to be free of VOC contamination; indicating that the remediation system at the landfill was preventing downward migration of the plume.

A new contaminant of concern in the remediation system discharge was detected in April 2011. The source of Aroclor 1242 (a PCB) was traced to the extraction well beneath the hazardous waste pit (EW-9). EW-9 was taken off-line and the treatment system discharge did not detect PCBs. In order to operate EW-9 in the future a system to remove PCBs was designed.

There are two groundwater areas of concern around Waste Disposal Engineering Landfill. The water table aquifer area of concern is the institutional control implemented through an ordinance by the City of Andover that was originally a groundwater control of the use of ground water within 500 feet of the waste limit. This area covers 173 acres. The second area of concern implemented by City ordinance concerns the restriction of the use of the LSA as a potential water supply and covers 988 acres.

### **Existing Land Use Controls**

Minn. Rules Chapter 4725.4450, subp. 1 and 2 establishes a minimum installation distance for a water-supply well from mixed municipal solid waste of 300 feet, and 600 feet where the well is not constructed through a confining layer such as clay or shale.

The Minnesota Department of Health regulates the construction of wells (Minnesota Statutes, Chapter 103I and Minnesota Rules, Chapter 4725) within the GWAOC.

Other State statutes or local ordinances may exist and should be checked for applicability to control the use of groundwater within the GWAOC.

Fig. 6 Groundwater Trends - Arsenic (ppb)

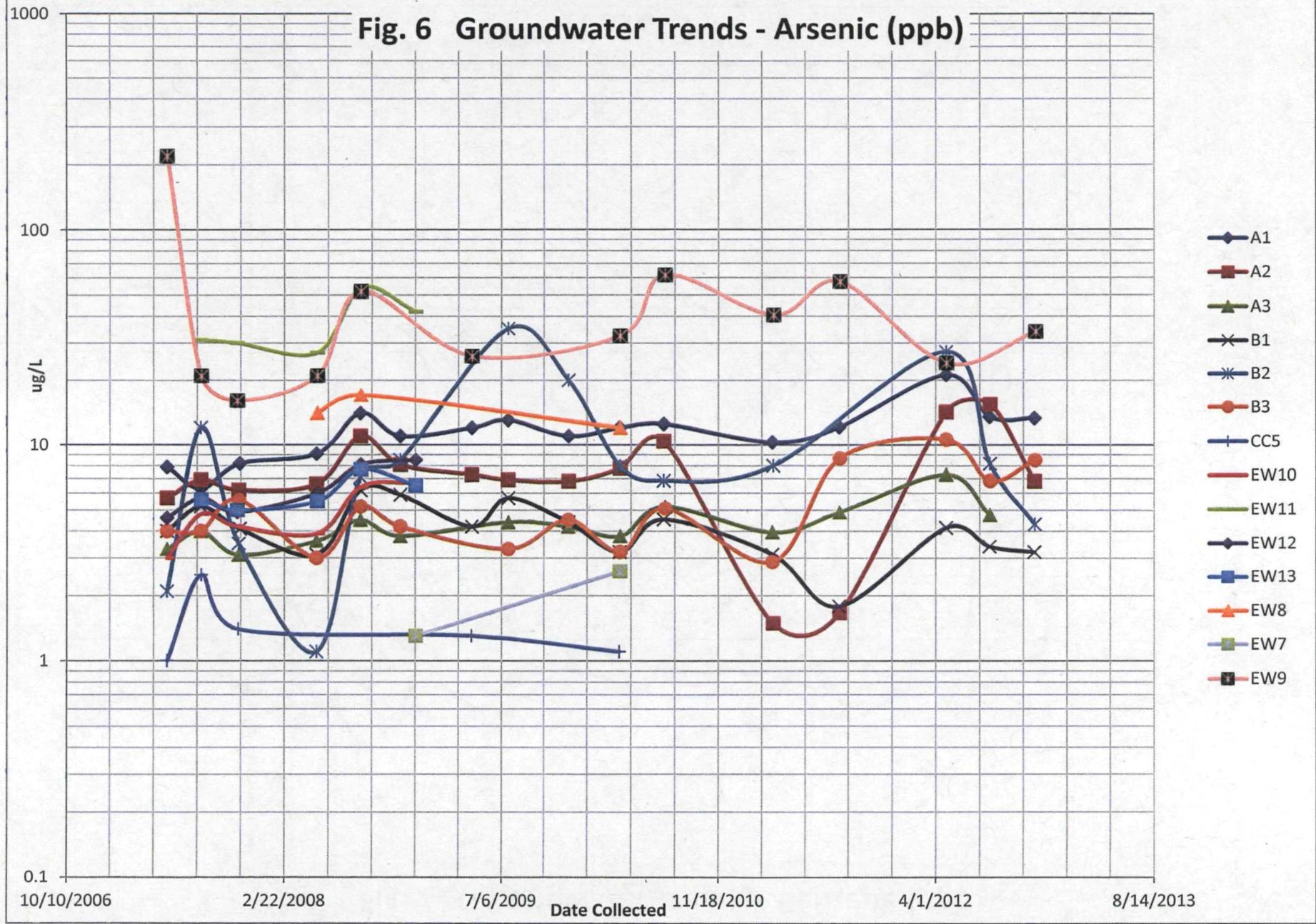


Fig. 7 Groundwater Trends - Benzene (ppb)

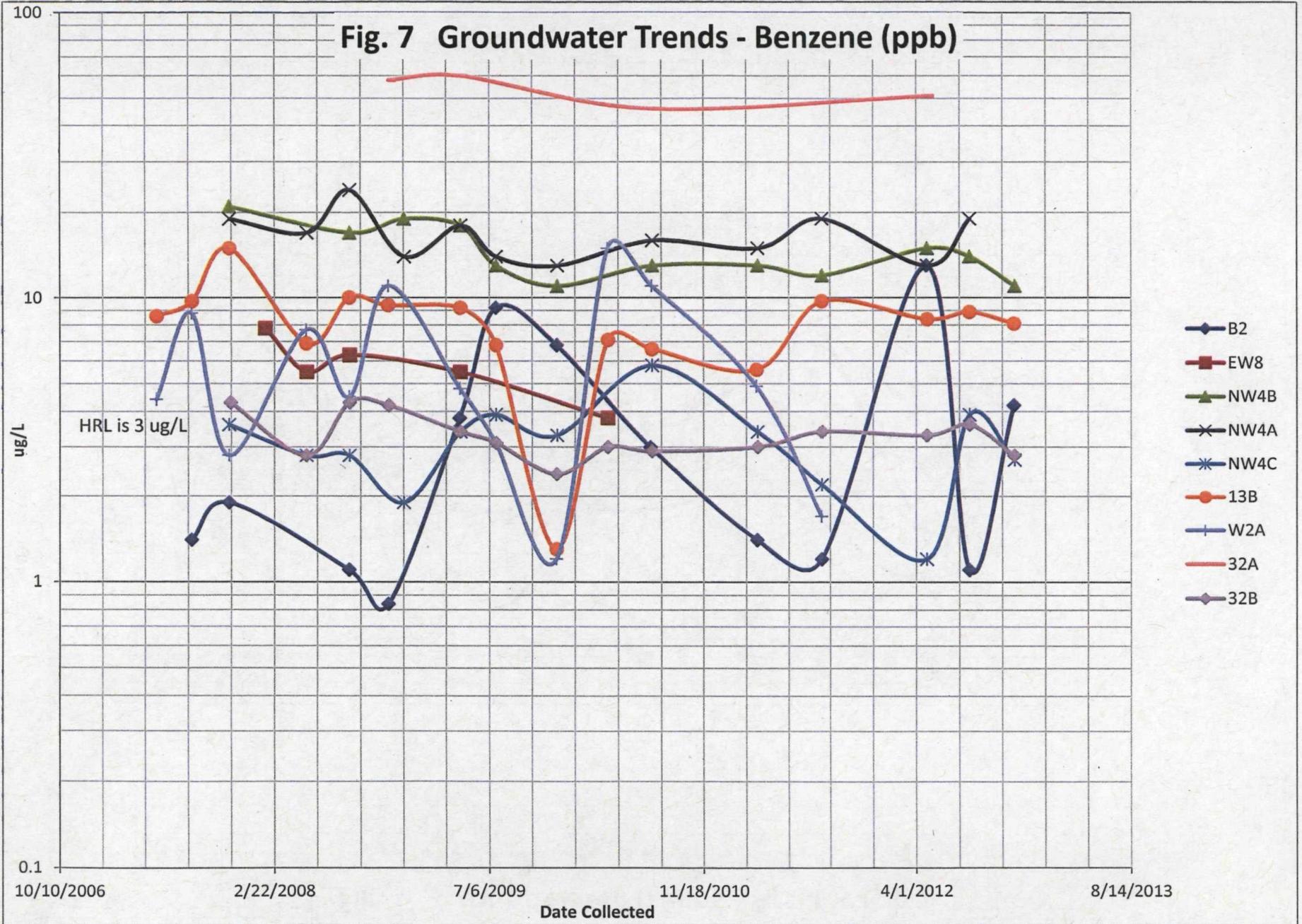


Fig. 8 Groundwater Trends - Vinyl Chloride (ppb)

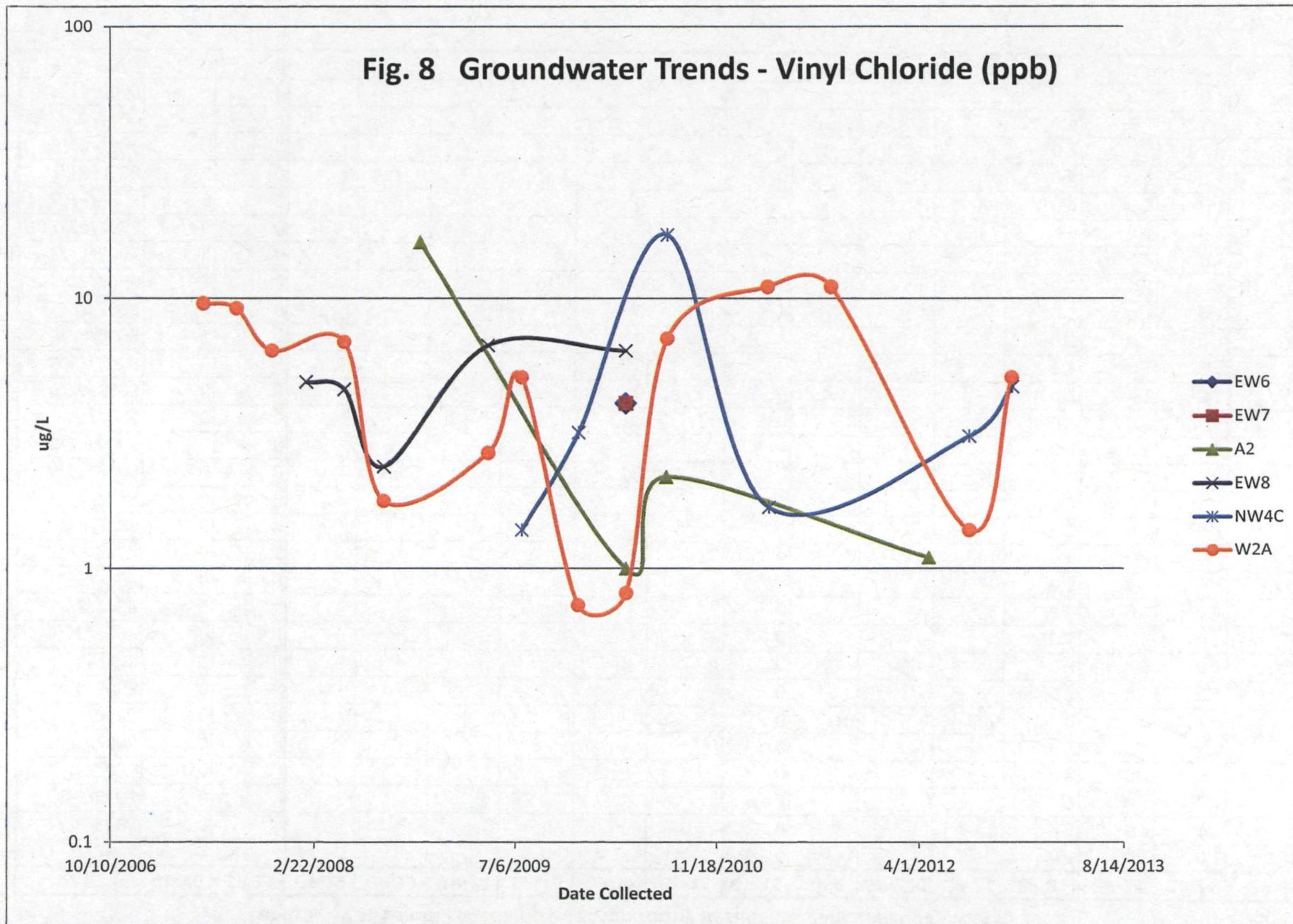


Table 1. WDE Landfill Methane Gas Monitoring Results (%) January 2008 - March 2012

DATE	GP-10	GP-11	GP-12	GP-13	GP-14	GP-16	GP-17	GP-18	GP-19	GP-2	GP-20B	GP-21	GP-22	GP-23	GP-24	GP-25
1/11/2008	0								0				0.3	0.2	0.1	0
1/23/2008	0								0				0.3	0.2	0.1	0
2/5/2008	0								0				0.2	0.1	0.1	0
2/18/2008	0								0				0.1	0.1	0.1	0
3/5/2008	0								0				0.1	0.1	0	0
3/31/2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
4/10/2008	0								0				0.2	0.2	0.1	0.1
4/24/2008	0								0				0.3	0.2	0.1	0.1
5/15/2008	0								0				0.1	0.1	0.1	0
5/28/2008	0								0				0.2	0.1	0.1	0
6/5/2008	0	0					0						0.3	0.2	0.1	0
6/25/2008	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.1	0.1	0
7/9/2008	0	0					0						0.2	0.1	0.1	0
7/24/2008	0	0					0						0.3	0.2	0.1	0
8/15/2008	0	0					0						0.2	0.2	0.1	0
8/27/2008	0	0					0						0.3	0.2	0.1	0
9/11/2008	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.2	0.1	0
9/24/2008	0	0					0						0.2	0.2	0.1	0
10/7/2008	0	0					0						0.2	0.1	0.1	0
10/20/2008	0	0					0						0.3	0.2	0.1	0
11/7/2008	0	0					0						0.2	0.1	0.1	0
11/18/2008	0	0					0						0.2	0.1	0.1	0
12/11/2008	0	0					0						0.3	0.2	0.1	0
12/24/2008	0	0					0						0.3	0.1	0.1	0
1/9/2009	0	0					0						0.4	0.2	0.1	0
2/10/2009	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.2	0.1	0
3/20/2009													0.3	0.1	0	0
4/3/2009													0.3	0.1	0.1	0
5/15/2009													0.3	0.1	0.1	0
6/17/2009	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.1	0.1	0







**Table 2. WDE Landfill Methane Gas Monitoring Results (April 2012 - January 2013)**

PROBE	DATE	RESULT (%)
GP-9	4/12/2012	0
GP-9	6/9/2012	0
GP-9	7/12/2012	0
GP-9	7/30/2012	0
GP-9	11/5/2012	0
GP-9	11/19/2012	0
GP-9	8/7/2012	0
GP-9	8/23/2012	0
GP-9	10/1/2012	0
GP-9	10/19/2012	0
GP-9	1/3/2013	0
GP-9	1/23/2013	0
GP-9	9/12/2012	0
GP-9	9/27/2012	0
GP-9	12/4/2012	0
GP-9	12/21/2012	0
GP-7(B)	6/9/2012	0
GP-7(B)	9/12/2012	0
GP-7(B)	12/21/2012	0
GP-7(A)	6/9/2012	0
GP-7(A)	9/12/2012	0
GP-7(A)	12/21/2012	0
GP-6(B)	4/12/2012	0
GP-6(B)	6/9/2012	0
GP-6(B)	7/12/2012	0
GP-6(B)	7/30/2012	0
GP-6(B)	11/5/2012	0
GP-6(B)	11/19/2012	0
GP-6(B)	8/7/2012	0
GP-6(B)	8/23/2012	0
GP-6(B)	10/1/2012	0

PROBE	DATE	RESULT (%)
GP-6(B)	10/19/2012	0
GP-6(B)	1/3/2013	0
GP-6(B)	1/23/2013	0
GP-6(B)	9/12/2012	0
GP-6(B)	9/27/2012	0
GP-6(B)	12/4/2012	0
GP-6(B)	12/21/2012	0
GP-6(A)	4/12/2012	0
GP-6(A)	6/9/2012	0
GP-6(A)	7/12/2012	0
GP-6(A)	7/30/2012	0
GP-6(A)	11/5/2012	0
GP-6(A)	11/19/2012	0
GP-6(A)	8/7/2012	0
GP-6(A)	8/23/2012	0
GP-6(A)	10/1/2012	0
GP-6(A)	10/19/2012	0
GP-6(A)	1/3/2013	0
GP-6(A)	1/23/2013	0
GP-6(A)	9/12/2012	0
GP-6(A)	9/27/2012	0
GP-6(A)	12/4/2012	0
GP-6(A)	12/21/2012	0
GP-5	4/12/2012	0
GP-5	6/9/2012	0
GP-5	7/12/2012	0
GP-5	7/30/2012	0
GP-5	11/5/2012	0
GP-5	11/19/2012	0
GP-5	8/7/2012	0
GP-5	8/23/2012	0

PROBE	DATE	RESULT (%)
GP-5	10/1/2012	0
GP-5	10/19/2012	0
GP-5	1/3/2013	0
GP-5	1/23/2013	0
GP-5	9/12/2012	0
GP-5	9/27/2012	0
GP-5	12/4/2012	0
GP-5	12/21/2012	0
GP-4	6/9/2012	0
GP-4	9/12/2012	0
GP-4	12/21/2012	0
GP-29	4/12/2012	0
GP-29	6/9/2012	0
GP-29	7/12/2012	0
GP-29	7/30/2012	0
GP-29	11/5/2012	0
GP-29	11/19/2012	0
GP-29	8/23/2012	0
GP-28	8/23/2012	0
GP-29	12/4/2012	0
GP-29	12/21/2012	0
GP-28	12/4/2012	0
GP-28	12/21/2012	0
GP-28	6/9/2012	0
GP-27	6/9/2012	0
GP-29	8/7/2012	0
GP-29	10/1/2012	0
GP-29	10/19/2012	0
GP-29	1/3/2013	0
GP-29	1/23/2013	0
GP-29	9/12/2012	0

PROBE	DATE	RESULT (%)
GP-29	9/27/2012	0
GP-28	4/12/2012	0
GP-28	7/12/2012	0
GP-28	7/30/2012	0
GP-28	11/5/2012	0
GP-28	11/19/2012	0
GP-28	8/7/2012	0
GP-28	10/1/2012	0
GP-28	10/19/2012	0
GP-28	1/3/2013	0
GP-28	1/23/2013	0
GP-28	9/12/2012	0
GP-28	9/27/2012	0
GP-27	4/12/2012	0
GP-27	7/12/2012	0
GP-27	7/30/2012	0
GP-27	11/5/2012	0
GP-27	11/19/2012	0
GP-27	8/7/2012	0
GP-27	8/23/2012	0
GP-27	10/1/2012	0
GP-27	10/19/2012	0
GP-27	1/3/2013	0
GP-27	1/23/2013	0
GP-27	9/12/2012	0
GP-27	9/27/2012	0
GP-27	12/4/2012	0
GP-27	12/21/2012	0
GP-26	4/12/2012	0
GP-26	6/9/2012	0
GP-26	7/12/2012	0
GP-26	7/30/2012	0
GP-26	11/5/2012	0

PROBE	DATE	RESULT (%)
GP-26	11/19/2012	0
GP-26	8/7/2012	0
GP-26	8/23/2012	0
GP-26	10/1/2012	0
GP-26	10/19/2012	0
GP-26	1/3/2013	0
GP-26	1/23/2013	0
GP-26	9/12/2012	0
GP-26	9/27/2012	0
GP-26	12/4/2012	0
GP-26	12/21/2012	0
GP-25	4/12/2012	0
GP-25	6/9/2012	0
GP-25	7/12/2012	0
GP-25	7/30/2012	0
GP-25	11/5/2012	0
GP-25	11/19/2012	0
GP-25	8/7/2012	0
GP-25	8/23/2012	0
GP-25	10/1/2012	0
GP-25	10/19/2012	0
GP-25	1/3/2013	0
GP-25	1/23/2013	0
GP-25	9/12/2012	0
GP-25	9/27/2012	0
GP-25	12/4/2012	0
GP-25	12/21/2012	0
GP-24	4/12/2012	0
GP-24	6/9/2012	0
GP-24	7/30/2012	0
GP-23	7/12/2012	0
GP-23	7/30/2012	0
GP-24	7/12/2012	0

PROBE	DATE	RESULT (%)
GP-24	11/5/2012	0
GP-24	11/19/2012	0
GP-24	8/7/2012	0
GP-24	8/23/2012	0
GP-24	10/1/2012	0
GP-24	10/19/2012	0
GP-24	1/3/2013	0
GP-24	1/23/2013	0
GP-24	9/12/2012	0
GP-24	9/27/2012	0
GP-24	12/4/2012	0
GP-24	12/21/2012	0
GP-23	4/12/2012	0
GP-23	6/9/2012	0
GP-23	11/5/2012	0
GP-23	11/19/2012	0
GP-23	8/7/2012	0
GP-23	8/23/2012	0
GP-23	10/1/2012	0
GP-23	10/19/2012	0
GP-23	1/3/2013	0
GP-23	1/23/2013	0
GP-23	9/27/2012	0
GP-22	9/12/2012	0
GP-22	9/27/2012	0
GP-23	9/12/2012	0
GP-23	12/4/2012	0
GP-23	12/21/2012	0
GP-22	4/12/2012	0
GP-22	6/9/2012	0
GP-22	7/12/2012	0
GP-22	7/30/2012	0
GP-22	11/5/2012	0

PROBE	DATE	RESULT(%)
GP-22	11/19/2012	0
GP-22	8/7/2012	0
GP-22	8/23/2012	0
GP-22	10/1/2012	0
GP-22	10/19/2012	0
GP-22	1/3/2013	0
GP-22	1/23/2013	0
GP-22	12/4/2012	0
GP-22	12/21/2012	0
GP-21	6/9/2012	0
GP-21	9/12/2012	0
GP-21	12/21/2012	0
GP-20B	6/9/2012	0
GP-20B	9/12/2012	0
GP-20B	12/21/2012	0
GP-2	6/9/2012	0
GP-2	9/12/2012	0
GP-2	12/21/2012	0
GP-19	4/12/2012	0
GP-19	6/9/2012	0
GP-19	7/12/2012	0
GP-19	7/30/2012	0
GP-19	11/5/2012	0
GP-19	11/19/2012	0
GP-19	8/7/2012	0
GP-19	8/23/2012	0
GP-19	10/1/2012	0
GP-19	10/19/2012	0
GP-19	1/3/2013	0
GP-19	1/23/2013	0
GP-19	9/12/2012	0
GP-19	9/27/2012	0
GP-19	12/4/2012	0
GP-19	12/21/2012	0

PROBE	DATE	RESULT (%)
GP-18	6/9/2012	0
GP-18	9/12/2012	0
GP-18	12/21/2012	0
GP-16	6/9/2012	0
GP-14	6/9/2012	0
GP-13	6/9/2012	0
GP-10	4/12/2012	0
GP-12	6/9/2012	0
GP-11	6/9/2012	0
GP-10	6/9/2012	0
GP-10	7/12/2012	0
GP-10	7/30/2012	0
GP-10	11/5/2012	0
GP-10	11/19/2012	0
GP-10	8/7/2012	0
GP-10	8/23/2012	0
GP-10	10/1/2012	0
GP-10	10/19/2012	0
GP-17	6/9/2012	0
GP-17	9/12/2012	0
GP-17	12/21/2012	0
GP-16	9/12/2012	0
GP-16	12/21/2012	0
GP-14	9/12/2012	0
GP-14	12/21/2012	0
GP-13	9/12/2012	0
GP-13	12/21/2012	0
GP-12	9/12/2012	0
GP-12	12/21/2012	0
GP-11	9/12/2012	0
GP-11	12/21/2012	0
GP-10	1/3/2013	0
GP-10	1/23/2013	0
GP-10	9/12/2012	0

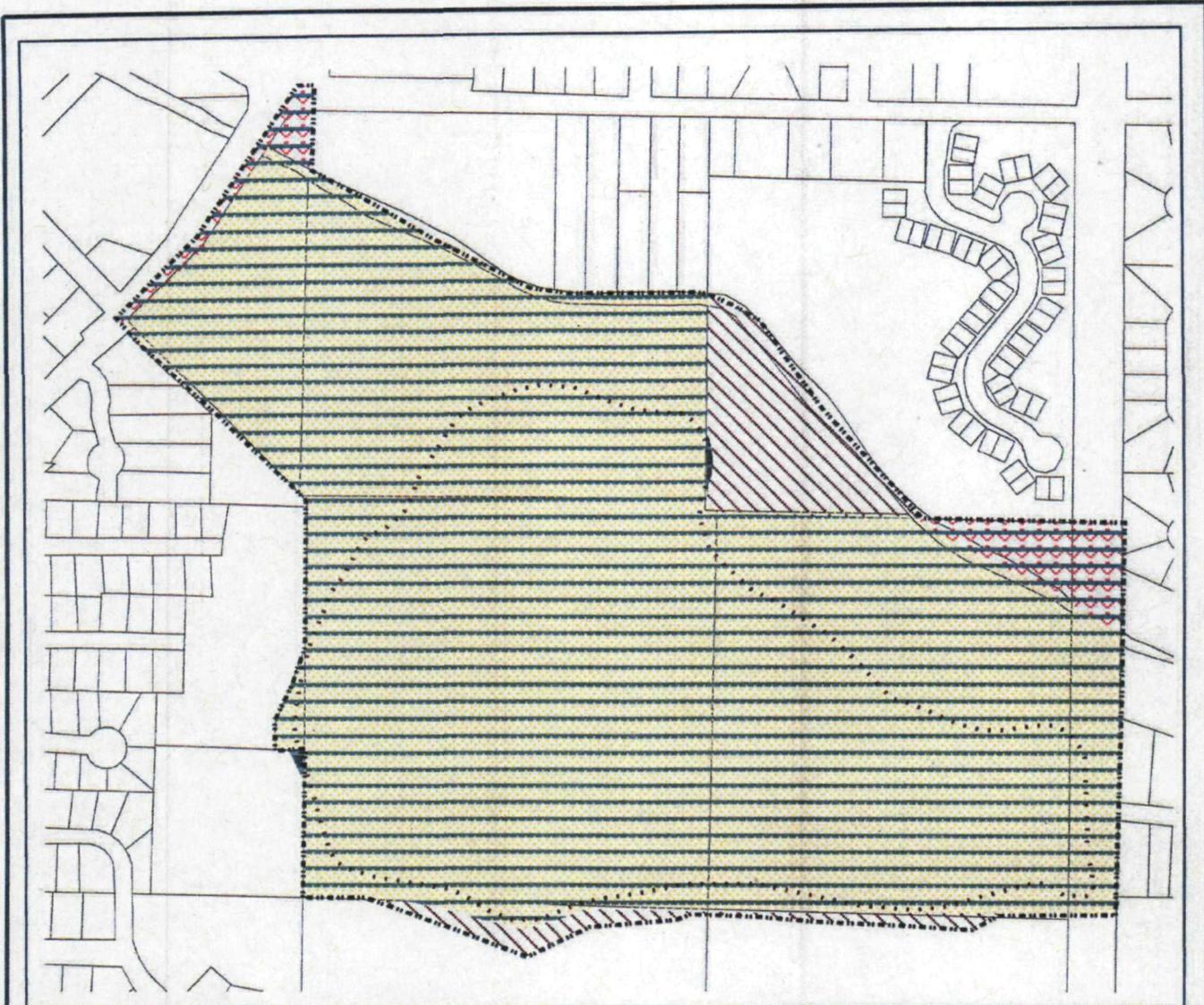
PROBE	DATE	RESULT (%)
GP-10	9/27/2012	0
GP-10	12/4/2012	0
GP-10	12/21/2012	0

**Table 3. Groundwater Monitoring Results for Arsenic  
(MCL exceedances 2011-2012)**

<b>WELL</b>	<b>SAMPLE DATE</b>	<b>RESULT (ug/L)</b>
W-2A	8/24/2011	33.5
W-2A	8/1/2012	15.4
W-7	3/24/2011	14.2
W-7	8/23/2011	20.1
W-7	4/24/2012	12.8
W-7	8/2/2012	16.1
W-7	11/14/2012	17
W-19	3/24/2011	13.4
W-19	4/24/2012	31.5
W-19	8/2/2012	30
W-19	11/13/2012	30
EW-9	3/25/2011	40.5
EW-9	8/25/2011	57.5
EW-9	4/25/2012	24.1
EW-9	11/15/2012	33.9
NW-3A	3/25/2011	29.1
NW-3A	8/25/2011	46.1
NW-3A	4/25/2012	50.3
NW-3A	8/2/2012	42.6
NW-3A	11/14/2012	35.4
A1	3/22/2011	10.3
A1	8/23/2011	12.1
A1	4/24/2012	21.2
A1	8/1/2012	13.5
A1	11/12/2012	13.3
A2	4/24/2012	14.2
A2	8/2/2012	15.4
B2	4/24/2012	27.3
B3	4/24/2012	10.6

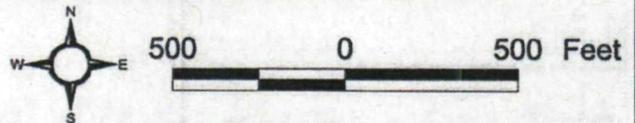
## **Attachment 1**

### **Institutional Controls Maps**



## Landfill Cleanup Agreement: Document # 1203355

 Site boundary      Parcel boundaries  
 Refuse boundary



### Landfill Cleanup Agreement

-  "Tax-Forfeited Property": No structures without MPCA approval. Any structure must protect from infiltration of landfill gas. No equipment or materials placed without MPCA approval, except outside fence in Hanson Blvd ROW. No public access or development except in Hanson Blvd ROW (except for existing easements.) No groundwater extraction other than remediation (does not apply to existing wells.) Dewatering for public works must have MPCA approval. No installation of drinking water wells without MPCA approval. No installation of utilities west of Hanson Blvd without MPCA approval. Expansion or reconstruction of Hanson Blvd needs MPCA approval. All restrictions must pass to future owners.
-  "WDE Qualified Facility": County shall not plant trees or shrubs that might disturb the landfill cap.
-  "Excluded Property": Land that is part of the WDE facility property but is excluded from most of the restrictions of the Landfill Cleanup Agreement.
-  Land defined in Landfill Cleanup Agreement as "WDE Qualified Facility", but not included in descriptions of "Tax-Forfeited Property" or "Excluded Property".
-  WDE lands (according to URS survey, 2003), but not included in Landfill Cleanup Agreement's legal description of "WDE Qualified Facility"

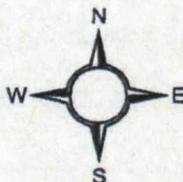
Figure 4



## Refuse Limits, with 200' and 500' zones

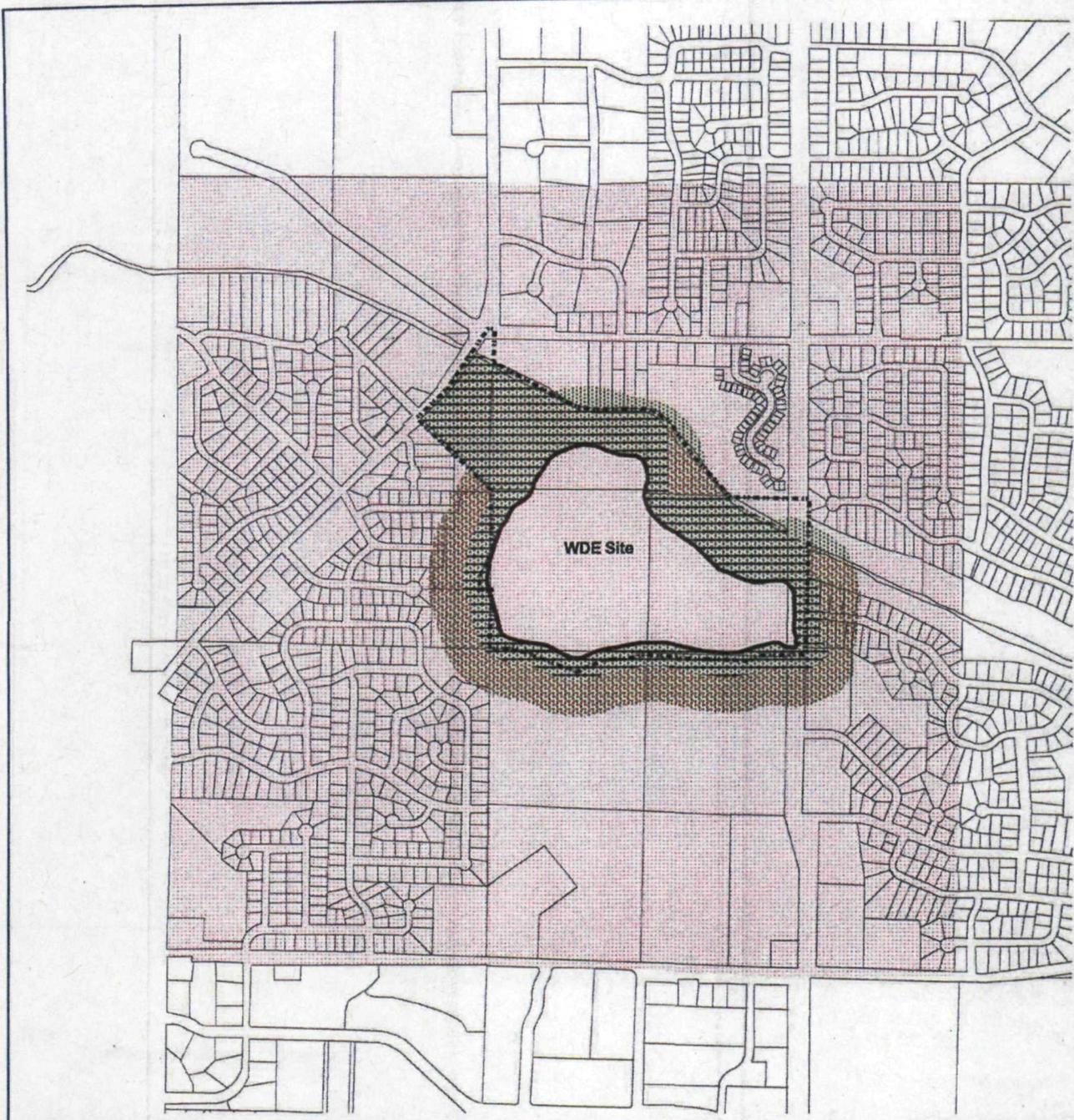
-  Site boundary
-  Waste boundary
-  Parcel boundaries
-  Wetland
-  200' from refuse limit, and additional property as shown in City of Andover Ordinance 19, Exhibit A.
-  500' from refuse limit, and additional property as shown in City of Andover Ordinance 19, Exhibit A.

800 0 800 Feet



Source: City of Andover,  
URS Corporation survey,  
2003

Figure 5



# Andover City Ordinance 19



Site boundary



Refuse boundary



200' Buffer from refuse boundary, and additional property as shown in Ordinance 19, Exhibit A. No enclosed structures.



200'-500' Buffer from refuse boundary, and additional property as shown in Ordinance 19, Exhibit A, excluding areas north of Coon Creek. Enclosed structures must include soil gas monitoring probe and explosive gas monitor.



500' Buffer from refuse boundary, and additional property as shown in Ordinance 19, Exhibit A. No groundwater extraction from Upper Sand Aquifer. Does not apply to existing wells, as long as no material increase in water extracted and drinking water meets standards.



No groundwater extraction from the Lower Sand Aquifer without prior written approval of Commissioner. Does not apply to repair/replacement of existing wells if no material increase in water extracted and drinking water meets standards.



Parcel boundaries

1200 0 1200 Feet



Source: City of Andover

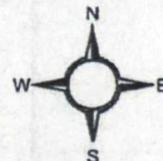
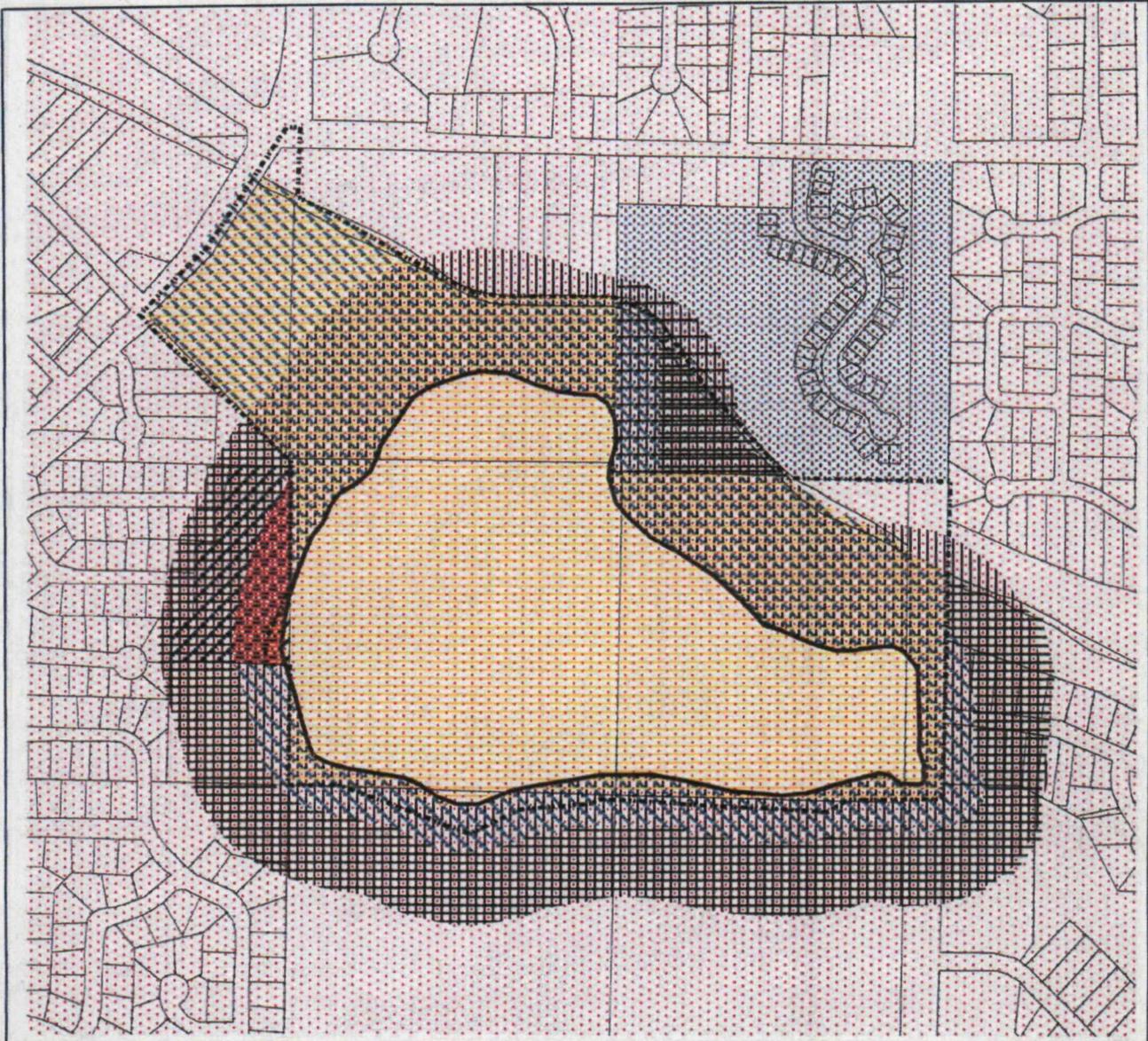


Figure 6



## All Development Restrictions

(See legend on other page.)

-  Site boundary
-  Refuse boundary
-  Parcel boundaries

500 0 500 Feet

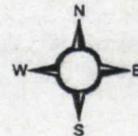


Figure 8a

# All Development Restrictions

## Legend

### Andover City Ordinance 19

 200' from refuse boundary: No enclosed structures.

 200'-500' from refuse boundary, except areas north of Coon Creek: Enclosed structures must include soil gas monitoring probe and explosive gas monitor.

 No extraction of groundwater from Lower Sand Aquifer without prior MPCA permission, except existing wells.

 500' from refuse boundary: No extraction of groundwater from Upper Sand Aquifer except for remediation. (Does not apply to existing wells.) Dewatering for public works must have prior MPCA approval.

### Windschitl Access Agreement

 200' from refuse boundary: No construction of any kind other than city road to connect with 142nd Lane NW. No underground utility construction without MPCA approval.

 Windschitl Property and Disputed Property: No installation of wells for groundwater extraction from the Upper Sand Aquifer. No extraction from Lower Sand Aquifer. Gas monitoring equipment required for any enclosed structure.

### Landfill Cleanup Agreement

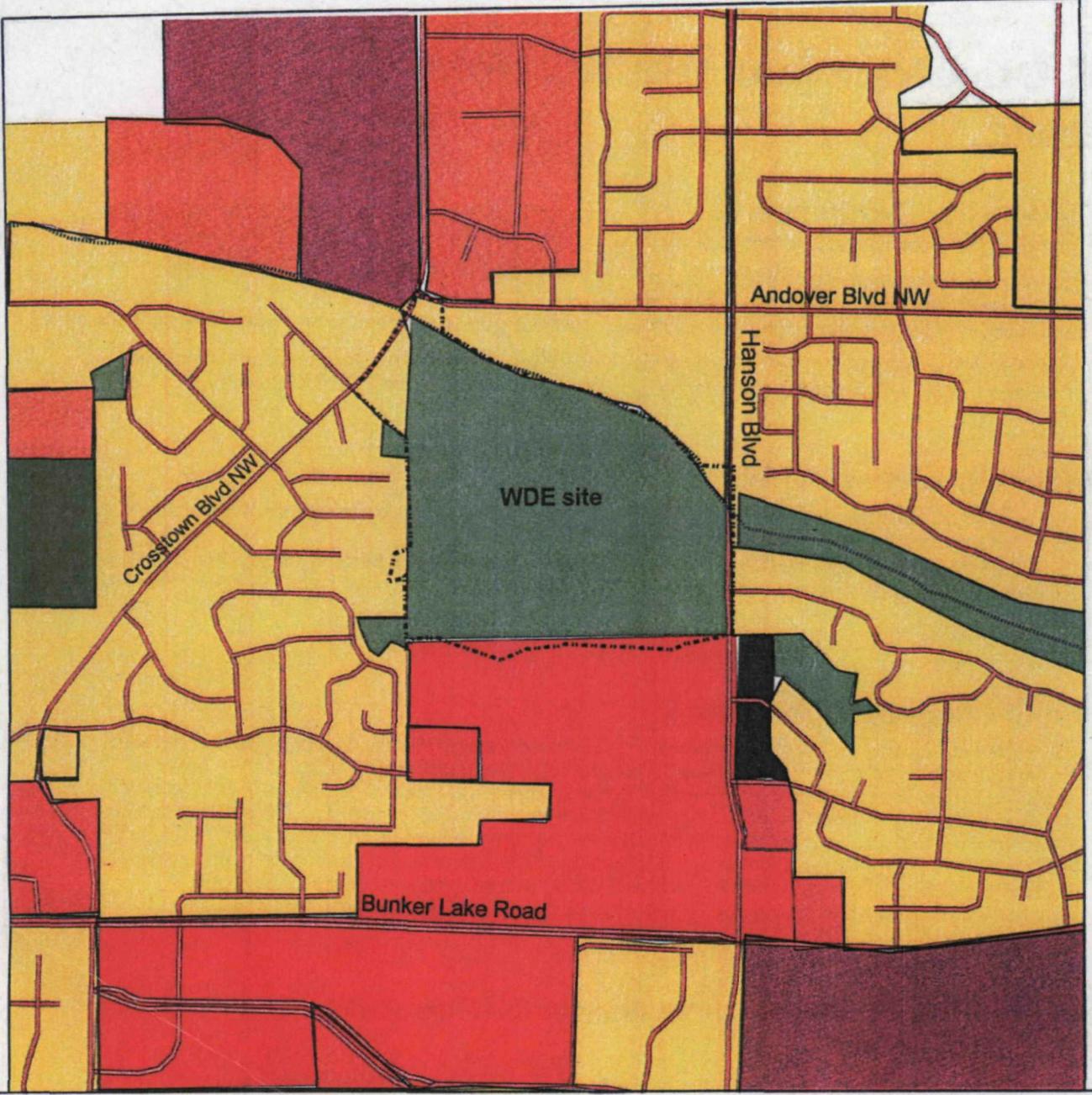
 Tax-Forfeited Property: Any structure approved by the Commissioner shall be constructed so as to protect the occupants from infiltration of landfill gas. County shall not construct on TFP without MPCA approval. No public access or development of TFP except in Hanson Blvd ROW (except as defined in existing easements). No planting that might disturb the cap. No groundwater extraction except remediation (except existing wells). Dewatering for public works must have MPCA approval. No new drinking wells without prior MPCA approval. No installation of utilities on west of Hanson Blvd without MPCA approval. Reconstruction or expansion of Hanson Blvd needs MPCA approval. Restrictions must be passed on to any subsequent owners.

 Tax-Forfeited Property within Hanson Blvd ROW: Work permits required. No fence shall encroach.

### Declaration of Restrictive Covenants for Hupp and Nature's Properties

 500' from refuse boundary: No groundwater extraction from Upper Sand Aquifer without prior MPCA approval.

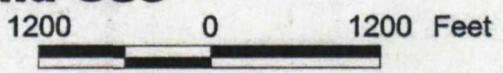
 No groundwater extraction from Lower Sand Aquifer without prior MPCA approval



### Comprehensive Plan: Guided Land Use

- Coon Creek
- Site boundary
- Local street
- Open Space
- Agricultural
- Limited Commercial/ Medium Density

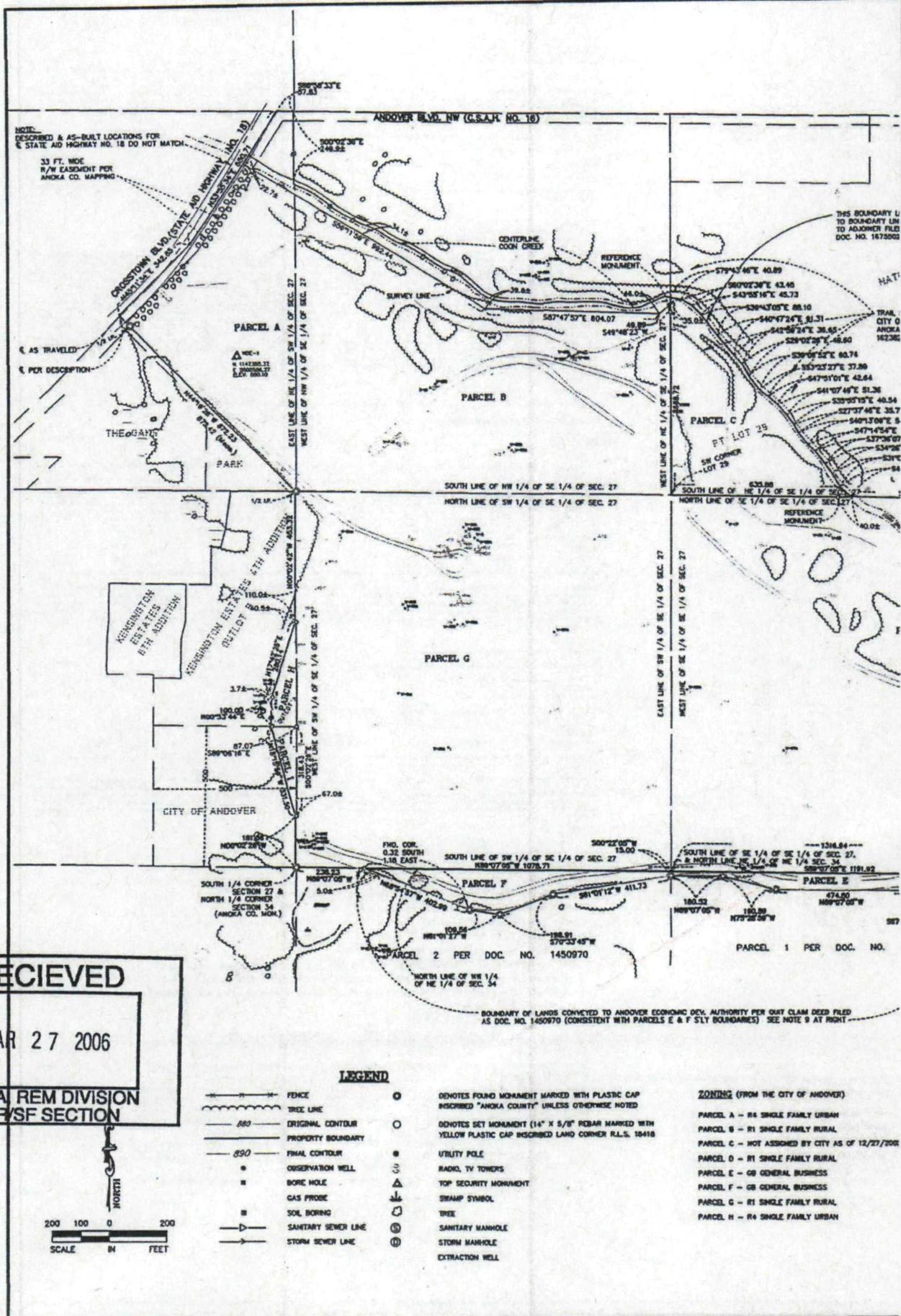
- Neighborhood Commercial
- Urban Residential High Density
- Transitional Residential
- Urban Residential Low Density
- Public
- General Commercial



Source: City of Andover  
January 2003



Figure 9



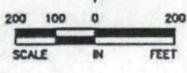
NOTE:  
DESCRIBED & AS-BUILT LOCATIONS FOR  
STATE AID HIGHWAY NO. 18 DO NOT MATCH

33 FT. WIDE  
R/W EASEMENT PER  
ANKOKA CO. MAPPING

AS TRAVELED  
PER DESCRIPTION

THIS BOUNDARY LINE TO BOUNDARY LINE TO ADJACENT PLOT DOC. NO. 1675002

**RECEIVED**  
 MAR 27 2006  
 MPCAL REM DIVISION  
 PLF/SF SECTION



**LEGEND**

- |  |                     |  |  |
|--|---------------------|--|--|
|  | FENCE               |  | ○ DENOTES FOUND MONUMENT MARKED WITH PLASTIC CAP INSCRIBED "ANKOKA COUNTY" UNLESS OTHERWISE NOTED          |
|  | TREE LINE           |  | ○ DENOTES SET MONUMENT (14" X 5/8" REBAR MARKED WITH YELLOW PLASTIC CAP INSCRIBED LAND CORNER R.L.S. 10418 |
|  | ORIGINAL CONTOUR    |  | ● UTILITY POLE   |
|  | PROPERTY BOUNDARY   |  | ⊙ RADIO, TV TOWERS   |
|  | FINAL CONTOUR       |  | ⊕ TOP SECURITY MONUMENT  |
|  | OBSERVATION WELL    |  | ⊖ SWAMP SYMBOL   |
|  | BORE HOLE           |  | ⊗ TREE   |
|  | GAS PROBE           |  | ⊕ SANITARY MANHOLE   |
|  | SOIL BORING         |  | ⊕ STORM MANHOLE  |
|  | SANITARY SEWER LINE |  | ⊕ EXTRACTION WELL  |
|  | STORM SEWER LINE    |  |  |

- ZONING (FROM THE CITY OF ANDOVER)**
- PARCEL A - R4 SINGLE FAMILY URBAN
  - PARCEL B - R1 SINGLE FAMILY RURAL
  - PARCEL C - NOT ASSIGNED BY CITY AS OF 12/27/2005
  - PARCEL D - R1 SINGLE FAMILY RURAL
  - PARCEL E - G8 GENERAL BUSINESS
  - PARCEL F - G8 GENERAL BUSINESS
  - PARCEL G - R1 SINGLE FAMILY RURAL
  - PARCEL H - R4 SINGLE FAMILY URBAN

BOUNDARY OF LANDS CONVEYED TO ANDOVER ECONOMIC DEV. AUTHORITY PER QUIT CLAIM DEED FILED AS DOC. NO. 1450970 (CONSISTENT WITH PARCELS E & F SLY BOUNDARIES) SEE NOTE 9 AT RIGHT

