Alternative Source Demonstration: Nickel - Addendum

Metro Waste Authority
Metro Park East
Former Constructed Wetlands Treatment System

Permit No. 77-SDP-01-72P

Submittal Date: June 26, 2024

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Certification

I hereby certify that this report was prepared by me or under my direct personal supervision and that I am a qualified groundwater scientist based on the requirements noted in IAC 567—113.10(1)”d”.

6/26/2024

Richard Wilson | Date

Pages or sheets covered by this signature:

All

Certification page (PE or ground water scientist signature) ***113.10(1)“d”***

For the purposes of this rule, a “qualified groundwater scientist” means a scientist or an engineer who has received a baccalaureate or postgraduate degree in the natural sciences or engineering and has sufficient training and experience in groundwater hydrology and related fields demonstrated by state registration, professional certifications, or completion of accredited university programs that enable that individual to make sound professional judgments regarding groundwater monitoring, contaminant fate and transport, and corrective action.

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Table of Contents

List of Attachments

1 Background Information and Understanding

The Metro Waste Authority's (MWA's) Metro Park East (MPE) Landfill is located approximately ten miles east of Des Moines, Iowa and five miles south of Mitchellville, Iowa. It is located in Sections 1 and 2, Township 78 North, Range 22 West, in Polk County, Iowa. The Site is bounded by State Highway 163 to the north, State Highway 316 to the west, 128th Street to the east, and 6th Avenue and 3rd Avenue to the south.

The MPE Landfill includes both Phase I and Phase II Municipal Solid Waste Landfill (MSWLF) units. The MPE site also includes the former Constructed Wetlands Treatment System (CWTS), which is located south of the closed Phase I MSWLF unit. The CWTS was used to treat leachate and irrigate a prairie with the treated liquid. It included a pre-application lagoon, west storage lagoon, and aeration lagoon. The CWTS ceased operation in May 2012 and was decommissioned beginning in 2014. Monitoring points are located downgradient of these structures to evaluate groundwater quality. Groundwater monitoring associated with the former CWTS is the primary focus of this alternative source demonstration (ASD).

Statistical analysis of the fall 2023 compliance sampling data indicated a statistically significant increase (SSI) at the former CWTS groundwater monitoring network, in accordance with Iowa Administrative Coade (IAC) 113.10(5)c, using the 1-of-2 verification sampling method. Monitoring well MW-66 was sampled during the fall 2023 compliance sampling event conducted on September 20 and 21, 2023, and nickel was detected at a concentration that exceeded the interwell upper prediction limit (UPL). Monitoring well MW-66 was resampled during a verification sampling event conducted on December 5, 2023, and the nickel concentration again exceeded the interwell UPL. A site map depicting general characteristics of the MPE facility and the location of site monitoring wells is included as **Figure 1, Attachment A**. A notification of the SSI dated January 10, 2024, was submitted to the Iowa Department of Natural Resources (IDNR).

Based on a review of site activities and groundwater data, an ASD, dated March 13, 2024, was developed which indicated the elevated nickel concentrations were not the result of a release from the former CWTS or the leachate holding ponds upgradient of monitoring point MW-66 but is the result of natural variability in groundwater quality at the facility.

In a letter dated May 31, 2024, IDNR provided the following comment in response to the March 13, 2024 ASD:

> *"The demonstration was performed to evaluate whether recent measured levels of nickel at monitoring well MW-66 are naturally occurring. While the explanation given appears to be plausible the DNR requests that the permit holder consider the potential impact to groundwater in this area that may have occurred due to a leak in the west storage lagoon noted in calendar year 2001 (see Release Response Activities report (Document No. 21277), dated March 30, 2001, as submitted by Barker Lemar Engineering Consultants).*

> *The Release Response Activities report indicated nickel concentration levels at the lagoon underdrain (UO-4) of 0.144 mg/L for the sample collected on January 22, 2001. The investigation determined an apparent leak from the lagoon indicated by unusually high flows at lagoon underdrain outlet UO-4. Lagoon repairs were documented in the report entitled Liner Repair Activities (Document No. 55826), dated October 22, 2001, as submitted by Barker Lemar Engineering Consultants. However, the outlet of UO-4 appears to be near monitoring well MW-66 (about 40 feet), and thus warrants further evaluation.*

The purpose of this document is to be an addendum to the March 13, 2024, ASD and address IDNR's comments in the letter dated May 31, 2024.

1.1 West Storage Lagoon Release Summary

Based on the information provided in the Response Activities Report (Document No. 21277), dated March 30, 2001, during a routine semiannual inspection of the CWTS on March 9, 2001, the flow at the outlet for groundwater underdrain UO-4 was more than expected. Groundwater underdrain UO-4 is installed beneath the aeration and storage ponds for the former CWTS. The locations of the aeration and storage ponds at the CWTS site and other general site features during the March 2001 release are depicted on **Sheet 1** and **Sheet 2, Attachment B**. MWA personnel installed a pumping system at the UO-4 outlet and directed fluid back into the storage lagoon. The underdrain was scoped via a camera and sewer dyes were used to locate the leak in the lagoon liner. Personnel investigating the release concluded the source was the pipe boot on the effluent line in the storage lagoon. It was believed that ice formed in the pond and bonded to the 24-inch corrugated riser pipe. The lagoon level rose which caused the ice to rise. The bonded ice to the riser pipe caused the effluent piping to rise up and eventually cause a failure on the liner. **Sheet 3, Attachment B** indicates the approximate location of the torn liner and the identified release from the pond.

As noted in the Liner Repair Activities (Document No. 55826), dated October 22, 2001, a tear was observed in the boot around the leachate discharge pipe and a small channel was eroded through the underlying clay liner until it intersected with the underlying groundwater underdrain system. This direct connection caused fluid from the pond to enter the underdrain system which flowed and discharged out at UO-4. Since the underdrain system consists of perforated pipe and coarse drainage material encompassing the pipe, the fluid may have infiltrated into subsurface soils immediately adjacent to portions of the underdrain system prior to discharging at the UO-4 outlet.

Repair activities were conducted on the lagoon liner and pipe boot. Repair activities were completed on September 21, 2001.

1.2 UO-4 Groundwater Monitoring Historical Summary

Based on readily available, historical laboratory analytical data, there are limited results for groundwater samples collected from monitoring location UO-4. It appears the groundwater underdrain UO-4 has had little to no flow historically with the exception of the period when the storage lagoon was leaking. The initial sample collected from underdrain UO-4 was on January

22, 2001. As noted in the Quarterly CWTS Well Monitoring report dated March 30, 2001 (Document No. 21276), the flow from UO-4 was low, but constant for the January 2001 sampling event. This flow was potentially the initial discharge that was leaking through the liner tear. The last sample collected from underdrain UO-4 was on October 8, 2001 which occurred after the liner repair activities. Nickel concentrations measured in samples collected from underdrain UO-4 are summarized on the following **Table 1**.

Table 1: Underdrain UO-4 Historical Nickel Concentrations

Date	Nickel Concentration [1] (mg/L)
1/22/2001	0.144
3/9/2001	0.130
3/10/2001	0.126
10/8/2001	0.0100

mg/L = milligrams per liter

[1]Total nickel concentrations were analyzed for each sample with the exception of the 10/8/2001 sample which was analysis of a dissolved sample.

2 MW-66 Proximity to 2001 Release

Monitoring well MW-66 was installed at the site on October 22, 2013. The monitoring well was installed to be a supplemental monitoring point to UO-4 and GU-18 for the CWTS. **Sheet 4, Attachment B** depicts the location of monitoring well MW-66 relative to the storage and aeration lagoons and underdrain system. Monitoring well MW-66 is located approximately 160 feet from where the liner tear occurred in 2001. Monitoring well MW-66 is located approximately 95 to 160 feet relative to the perforated laterals and coarse drainage material of the underdrain system. Based on the general, historical groundwater flow direction interpolated at the site, monitoring well MW-66 is downgradient to crossgradient relative to the underdrain system and the location of the liner tear that occurred in 2001.

3 Horizontal Groundwater Flow Modeling

Historical groundwater flow direction has been to the northwest in the area of the CWTS and monitoring well MW-66. This is depicted on **Figure 2, Attachment A** for the September 2023 groundwater monitoring event at the site. Based on the groundwater elevations calculated for monitoring wells MW-66 and MW-31R during the September 2023 monitoring event, the horizontal groundwater hydraulic gradient is 0.0567 feet of groundwater elevation per foot of horizontal distance (ft/ft). As detailed in the 2020 MSW Landfill Permit Renewal Application dated September 2020, horizontal hydraulic conductivity in glacial till sediments near the CWTS portion of the facility is approximately 2.36×10^{-4} centimeters per second (cm/sec) which is equivalent to approximately 0.669 feet per day (ft/day). The bulk horizontal flow velocity is calculated via the following equation:

$$V_h = K_h * i_h$$

Whereas: V_h = Bulk Horizontal Flow Velocity (ft/day)
K_h = Horizontal Hydraulic Conductivity (ft/day)
i_h = Horizontal Groundwater Gradient (ft/ft)

Based on the September 2023 calculated hydraulic gradient and the in situ hydraulic conductivity measured at monitoring wells at the site, the bulk horizontal flow velocity is approximately 0.0379 ft/day.

Assuming hydraulic gradient conditions are not significantly variable over time and that the September 2023 calculated values are comparable to historical conditions, the calculated bulk horizontal flow velocity of 0.0379 ft/day was utilized to model a potential contaminant that readily flows with groundwater. Based on this flow rate, the number of days were calculated for a potential contaminant to travel from the location of the liner tear or the UO-4 underdrain system to MW-66. Utilizing the date of March 9, 2001 as an approximate time for when the fluid was released from the lagoon, approximate dates were calculated for when potential impacts would be observed at monitoring well location MW-66 based on the calculated travel time for groundwater. The results are summarized on **Table 2**.

Table 2: Groundwater Travel Time: Release/Underdrain System to MW-66

Separation Distance (feet)	Approximate Travel time (days)	Approximate Date to Detect Impacts at MW-66 Location
95	2,505	January 2008
160	4,220	September 2012

Approximate Travel Time = Separation Distance divided by Bulk Horizontal Flow Velocity (0.0379 ft/day)

Detection date calculated relative to March 9, 2001 estimated release date.

Assuming the repair on the storage lagoon ceased any further fluid release and that groundwater flow continued to be consistent based on the assumptions discussed prior, then there might be a point in time when the bulk of a plume from the release has passed the location of monitoring well MW-66. Utilizing the date of September 21, 2001 as an approximate time for when the release ceased from the storage lagoon, approximate dates were calculated for when the potential bulk of the release had passed monitoring well location MW-66. These results are summarized on **Table 3**.

Table 3: Groundwater Travel Time: Release/Underdrain System to MW-66

Separation Distance (feet)	Approximate Travel time (days)	Approximate Date when Bulk Impacts have Passed at MW-66 Location
95	2,505	July 2008
160	4,220	April 2013

Approximate Travel Time = Separation Distance divided by Bulk Horizontal Flow Velocity (0.0379 ft/day)

Approximate date when bulk of impact has passed MW-66 location is calculated relative to September 21, 2001 end of repair date.

4 Recent Groundwater Concentrations – MW-66

The spring 2024 semiannual compliance monitoring event was conducted at the CWTS monitoring locations on May 8, 2024. The full statistical analysis and reporting on the data obtained during the May 2024 monitoring event will be submitted via an upcoming spring statistical analysis report. For monitoring well MW-66, the constituents detected above laboratory reporting limits are summarized on **Table 4**.

Table 4: MW-66 Groundwater Analytical Results - 05/08/2024 Monitoring Event

Constituent	Concentration (mg/L)
Arsenic	0.000549 J
Barium	0.0280

mg/L = milligrams per liter

J = Laboratory analytical flag indicated the result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.

Nickel was below laboratory reporting limits (<0.00500 mg/L) in the groundwater sample collected from MW-66 during the May 2024 compliance monitoring event.

5 Conclusions

The west storage lagoon for the former CWTS had a release of treated leachate in 2001 due to a leak in the liner. The leaked leachate eroded the underlying clay liner until it reached the groundwater underdrain system. The leaked leachate traveled through the underdrain system and was discharging at monitoring point UO-4. The liner was repaired in September 2001. Elevated concentrations of nickel were detected in water samples collected from UO-4 during the period from January 2001 through October 2001. UO-4 has generally been noted to have no flow, however, in 2001, there was flow noted at UO-4. It is believed the fluid discharging in 2001 at UO-4 was due to the leak through the storage lagoon liner.

Based on a simplified groundwater flow model, bulk impacts from the release would likely have been observed at monitoring well location MW-66 during the period from January 2008 through April 2013. However, monitoring well MW-66 was not installed until October 2013. Early data when a plume may have been most likely detected is limited at monitoring well location MW-66. As depicted on the time-series provided in the March 13, 2024 ASD for nickel, early results were low or below laboratory reporting limits. The elevated concentrations for nickel that were identified as potential SSIs were observed in late 2023 which is approximately 22 years after the liner was repaired at the storage lagoon. Volatile organic compounds have not been detected above laboratory reporting limits in groundwater samples collected at monitoring well MW-66 since it was installed, and the metal concentrations that have been detected above laboratory reporting limits are generally indicative of natural background concentrations at the MPE facility.

The May 2024 groundwater analytical results for monitoring well MW-66 indicated nickel was below laboratory reporting limits. This decrease appears to be related to natural variability at the site and not due to a release from the leachate storage or aeration lagoons. In addition, other monitored constituents detected in the May 2024 groundwater sample from MW-66 did not indicate a potential release from the former CWTS and storage and aeration lagoons.

6 Recommendations

Following evaluation of historical groundwater data and site activities, the former CWTS is not considered the source that is contributing to the elevated nickel concentrations measured at monitoring well MW-66 in samples collected in late 2023. The increased concentration of nickel observed in late 2023 is likely natural variability in groundwater. Since these elevated nickel concentrations at monitoring well MW-66 are not related to a release from the former CWTS, it is recommended that monitoring well MW-66 remain in the detection monitoring program.

Attachment A

Figures

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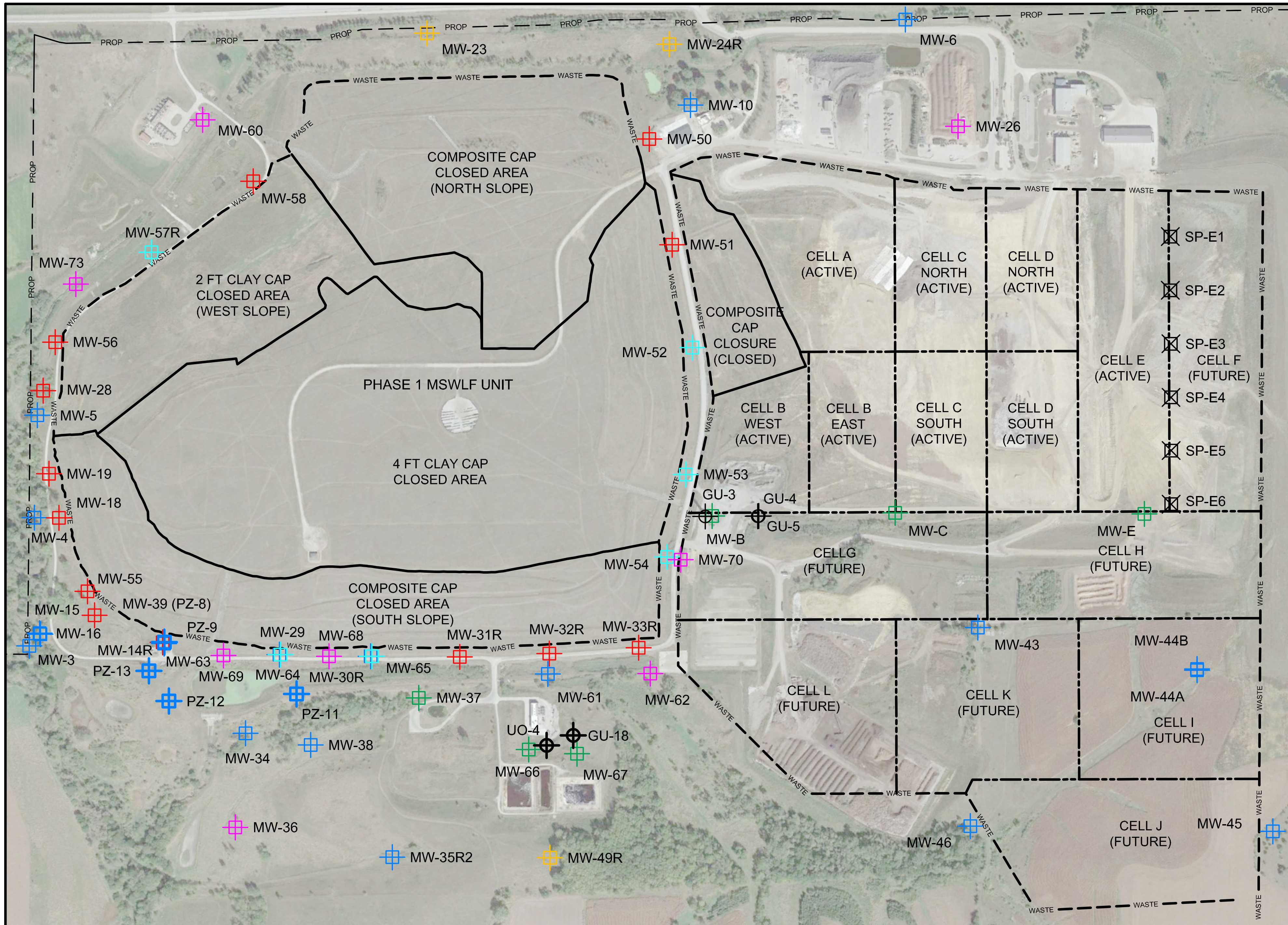

N

700 0 700 1400

SCALE IN FEET

PHASE I MSWLF UNIT WELL NETWORK	
WELL ID	CURRENT MONITORING PROGRAM
MW-14	ASSESSMENT/CAMP
MW-18	ASSESSMENT
MW-19	ASSESSMENT
MW-23	BACKGROUND
MW-24R	BACKGROUND
MW-28	ASSESSMENT
MW-29	CORRECTIVE ACTION/CAMP
MW-30R	CORRECTIVE ACTION/CAMP
MW-31R	ASSESSMENT/CAMP
MW-32R	ASSESSMENT/CAMP
MW-33R	ASSESSMENT/CAMP
MW-39	ASSESSMENT
MW-50	ASSESSMENT
MW-51	ASSESSMENT
MW-52	CORRECTIVE ACTION/CAMP
MW-53	CORRECTIVE ACTION/CAMP
MW-54	CORRECTIVE ACTION/CAMP
MW-55	ASSESSMENT
MW-56	ASSESSMENT
MW-57R	CORRECTIVE ACTION/CAMP
MW-58	ASSESSMENT/CAMP
GU-3A	TREATED AS LEACHATE
MW-60	CAMP
MW-62	CAMP
MW-68	CAMP
MW-69	CAMP
MW-70	CAMP
MW-73	CAMP
PZ-13	CAMP

PHASE II MSWLF UNIT WELL NETWORK	
WELL ID	CURRENT MONITORING PROGRAM
MW-26	SUPPLEMENTAL
MW-67	DETECTION
MW-B	DETECTION
MW-C	DETECTION
MW-E	DETECTION
GU-3	DETECTION
GU-4	DETECTION
GU-5	DETECTION
GU-18	DETECTION

FORMER CWTS WELL NETWORK	
WELL ID	CURRENT MONITORING PROGRAM
MW-49R	BACKGROUND
MW-37	DETECTION
MW-66	DETECTION
UO-4	DETECTION
MW-36	BORON TREND

NOTES:

1. AERIAL PHOTO PROVIDED ON JUNE 30, 2021.
2. MONITORING WELLS MW-20, MW-21, MW-22R, MW-47, MW-59, MW-71 AND MW-72 ARE ABANDONED AND NOT SHOWN ON THE FIGURE.

LEGEND

PERMITTED EDGE OF WASTE

CELL BOUNDARY

PROPERTY LINE

ASSESSMENT MONITORING WELL

BACKGROUND MONITORING WELL

DETECTION MONITORING WELL

CAMP/DELINEATION WELL

CORRECTIVE ACTION WELL

WELL - WATER LEVEL ONLY

GROUNDWATER UNDERDRAIN

GROUNDWATER STAND PIPE

Metro Waste Authority

METRO WASTE AUTHORITY
METRO PARK EAST
PHASE I & PHASE II MSWLF UNITS

SITE MAP

DATE OCTOBER 2023

FIGURE 1

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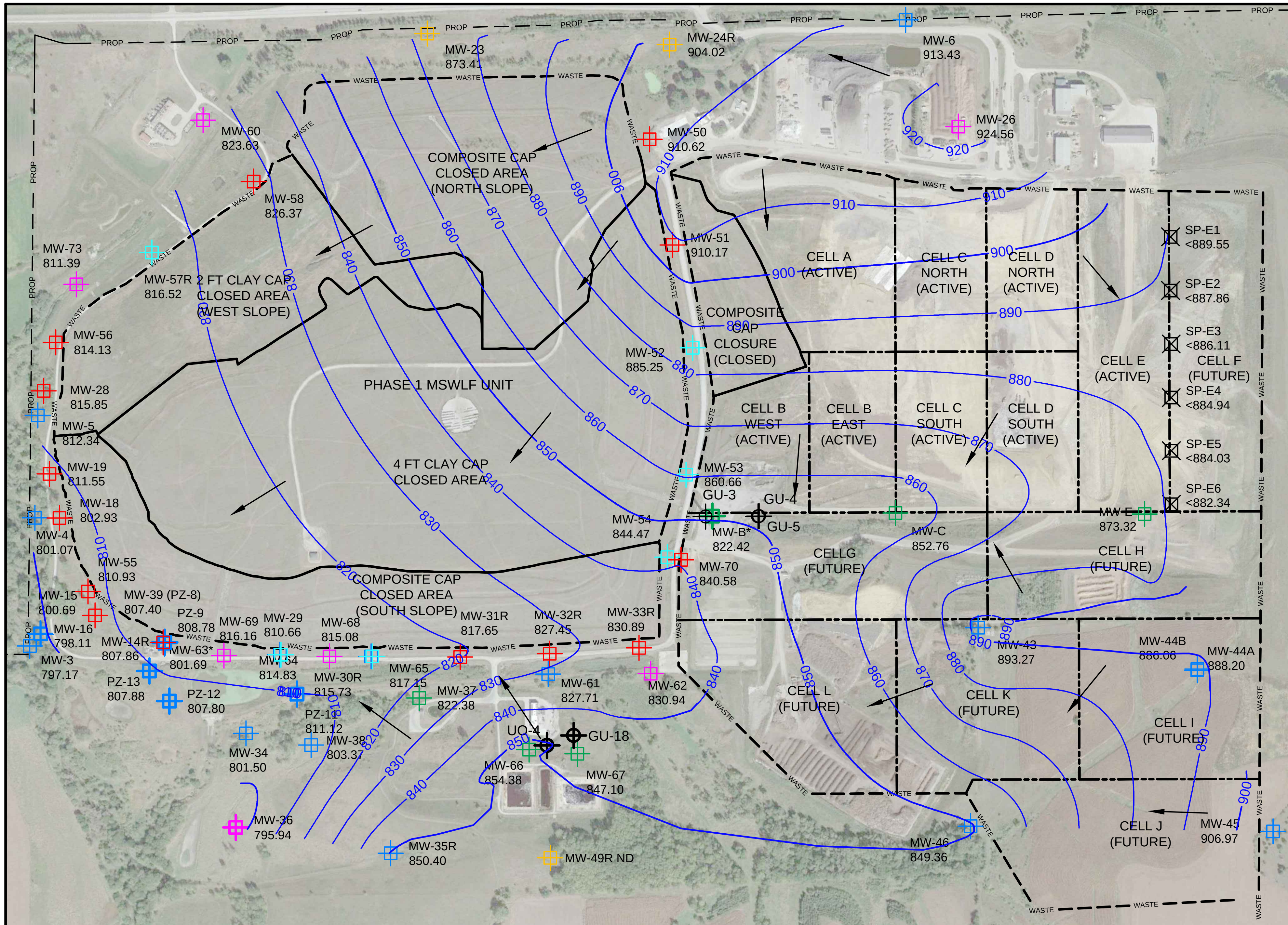

N

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SCALE IN FEET

PHASE I MSWLF UNIT WELL NETWORK

WELL ID	CURRENT MONITORING PROGRAM
MW-14	ASSESSMENT/CAMP
MW-18	ASSESSMENT
MW-19	ASSESSMENT
MW-23	BACKGROUND
MW-24R	BACKGROUND
MW-28	ASSESSMENT
MW-29	CORRECTIVE ACTION/CAMP
MW-30R	CORRECTIVE ACTION/CAMP
MW-31R	ASSESSMENT/CAMP
MW-32R	ASSESSMENT/CAMP
MW-33R	ASSESSMENT/CAMP
MW-39	ASSESSMENT
MW-50	ASSESSMENT
MW-51	ASSESSMENT
MW-52	CORRECTIVE ACTION/CAMP
MW-53	CORRECTIVE ACTION/CAMP
MW-54	CORRECTIVE ACTION/CAMP
MW-55	ASSESSMENT
MW-56	ASSESSMENT
MW-57R	CORRECTIVE ACTION/CAMP
MW-58	ASSESSMENT/CAMP
GU-3A	TREATED AS LEACHATE
MW-60	CAMP
MW-62	CAMP
MW-68	CAMP
MW-69	CAMP
MW-70	CAMP
MW-73	CAMP
PZ-13	CAMP

PHASE II MSWLF UNIT WELL NETWORK

WELL ID	CURRENT MONITORING PROGRAM
MW-26	SUPPLEMENTAL
MW-67	DETECTION
MW-B	DETECTION
MW-C	DETECTION
MW-E	DETECTION
GU-3	DETECTION
GU-4	DETECTION
GU-5	DETECTION
GU-18	DETECTION

FORMER CWTS WELL NETWORK

WELL ID	CURRENT MONITORING PROGRAM
MW-49R	BACKGROUND
MW-37	DETECTION
MW-66	DETECTION
UO-4	DETECTION
MW-36	BORON TREND

NOTES:

1. AERIAL PHOTO PROVIDED ON JUNE 30, 2021.
2. MONITORING WELL MW-B AND MW-63 WERE NOT USED FOR GENERATION OF CONTOURS DUE TO ANOMALOUS ELEVATIONS.
3. GROUNDWATER STANDPIPES SP-E1 THROUGH SP-E6 WERE DRY DURING THE SEPTEMBER 2023 SAMPLING EVENT. THE BOTTOM OF CASING HAS BEEN USED FOR CONTOUR GENERATION. GROUNDWATER IS ANTICIPATED TO BE BELOW THESE PROVIDED ELEVATIONS.
4. MONITORING WELLS WITH NO CORRESPONDING GROUNDWATER ELEVATION DID NOT HAVE STATIC WATER LEVEL MEASURED DURING THE SAMPLING EVENT.

LEGEND

- PERMITTED EDGE OF WASTE
- CELL BOUNDARY
- PROPERTY LINE
- 990 GROUNDWATER CONTOUR
- INFERRED GROUNDWATER CONTOUR
- FLOW DIRECTION
- ASSESSMENT MONITORING WELL
- BACKGROUND MONITORING WELL
- DETECTION MONITORING WELL
- CAMP/DELINEATION WELL
- CORRECTIVE ACTION WELL
- WELL - WATER LEVEL ONLY
- GROUNDWATER UNDERDRAIN
- GROUNDWATER STAND PIPE

ND = NOT DETECTED

Metro Waste Authority

HDR

METRO WASTE AUTHORITY
METRO PARK EAST
PHASE I & PHASE II MSWLF UNITS

SEPTEMBER 2023 GROUNDWATER CONTOURS

DATE: OCTOBER 2023

FIGURE: 2

Attachment B

Historical Supporting Documentation

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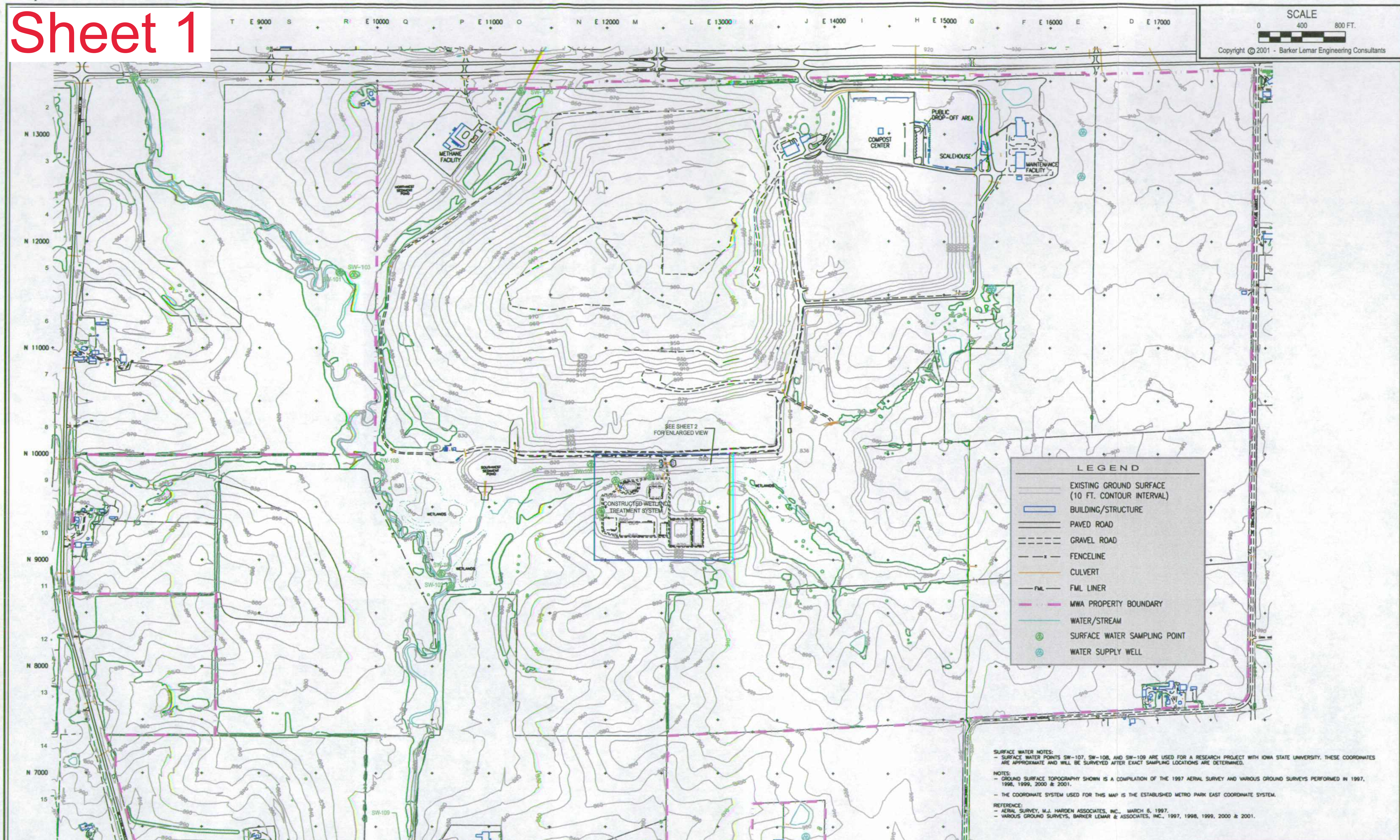
Sheet 1



REVISION:	DATE:	DESCRIPTION:
1	00/00/00	
2		
3		
4		

METRO PARK EAST LANDFILL
MITCHELLVILLE, IOWA
PROJECT NO. METRO 01005
DRAWING DATE: MARCH, 2001

EXISTING SITE MAP

BARKER LEMAR
ENGINEERING CONSULTANTS
1300 Cummins Road, Suite 201 - Des Moines, Iowa - 50315
Phone: 515.256.8814 - Fax: 515.256.0152 - www.barkerlemar.com

SHEET
1

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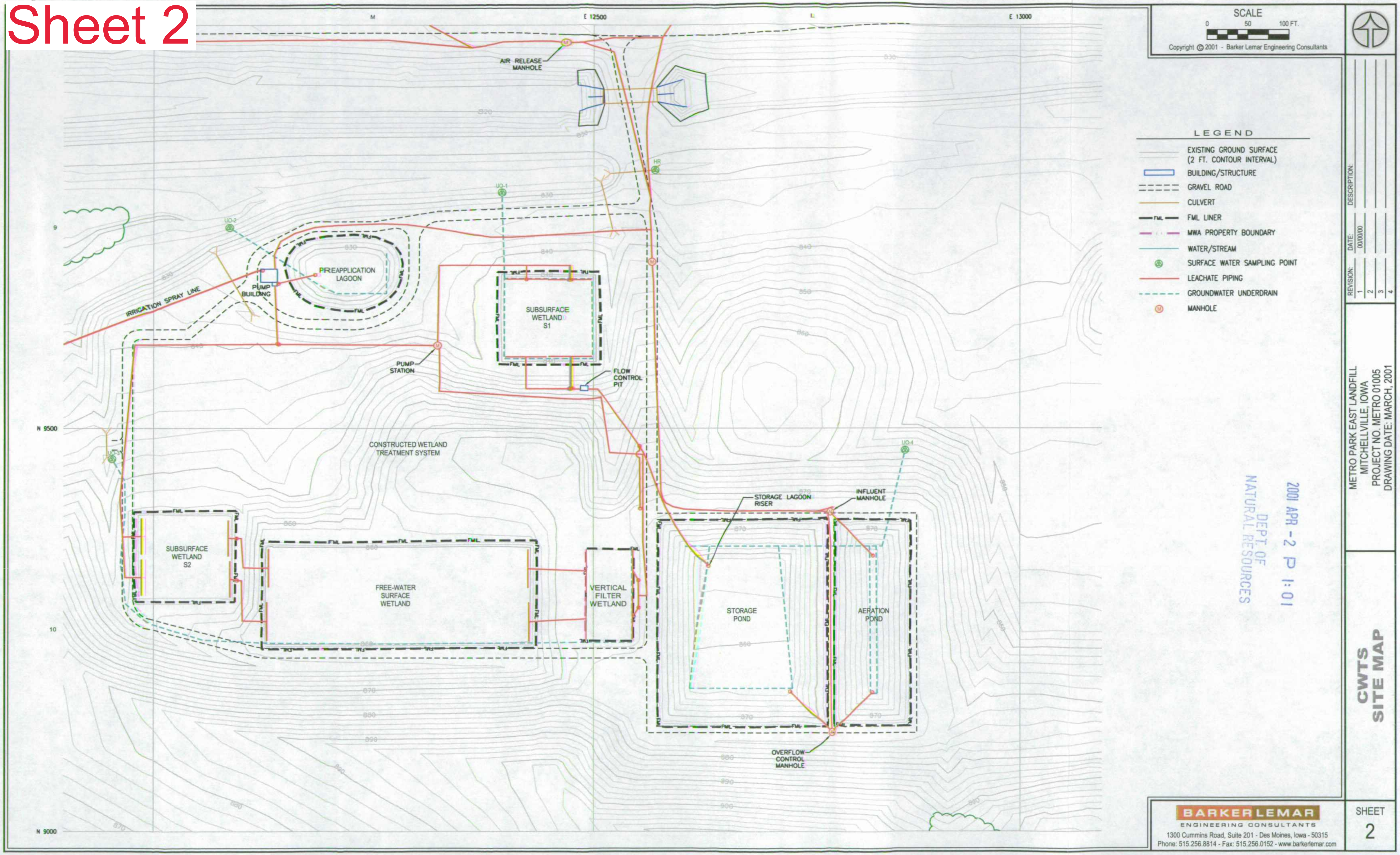
Sheet 2



SCALE
0
50
100 FT.
Copyright © 2001 - Barker Lemar Engineering Consultants
LEGEND
EXISTING GROUND SURFACE (2 FT. CONTOUR INTERVAL)
BUILDING/STRUCTURE
GRAVEL ROAD
CULVERT
FML LINER
MWA PROPERTY BOUNDARY
WATER/STREAM
SURFACE WATER SAMPLING POINT
LEACHATE PIPING
GROUNDWATER UNDERDRAIN
MANHOLE
E 12500
E 13000
N 9500
N 9000
AIR RELEASE MANHOLE
PREAPPLICATION LAGOON
PUMP BUILDING
IRRIGATION SPRAY LINE
SUBSURFACE WETLAND S1
PUMP STATION
FLOW CONTROL PIT
CONSTRUCTED WETLAND TREATMENT SYSTEM
SUBSURFACE WETLAND S2
FREE-WATER SURFACE WETLAND
VERTICAL FILTER WETLAND
STORAGE LAGOON RISER
INFLUENT MANHOLE
STORAGE POND
AERATION POND
OVERFLOW CONTROL MANHOLE
2001 APR -2 P 1:01
DEPT. OF NATURAL RESOURCES
REVISION:
DATE:
DESCRIPTION:
METRO PARK EAST LANDFILL
MITCHELLVILLE, IOWA
PROJECT NO. METRO 01005
DRAWING DATE: MARCH, 2001
CWTS SITE MAP
BARKER LEMAR
ENGINEERING CONSULTANTS
1300 Cummins Road, Suite 201 - Des Moines, Iowa - 50315
Phone: 515.256.8814 - Fax: 515.256.0152 - www.barkerlemar.com
SHEET
2

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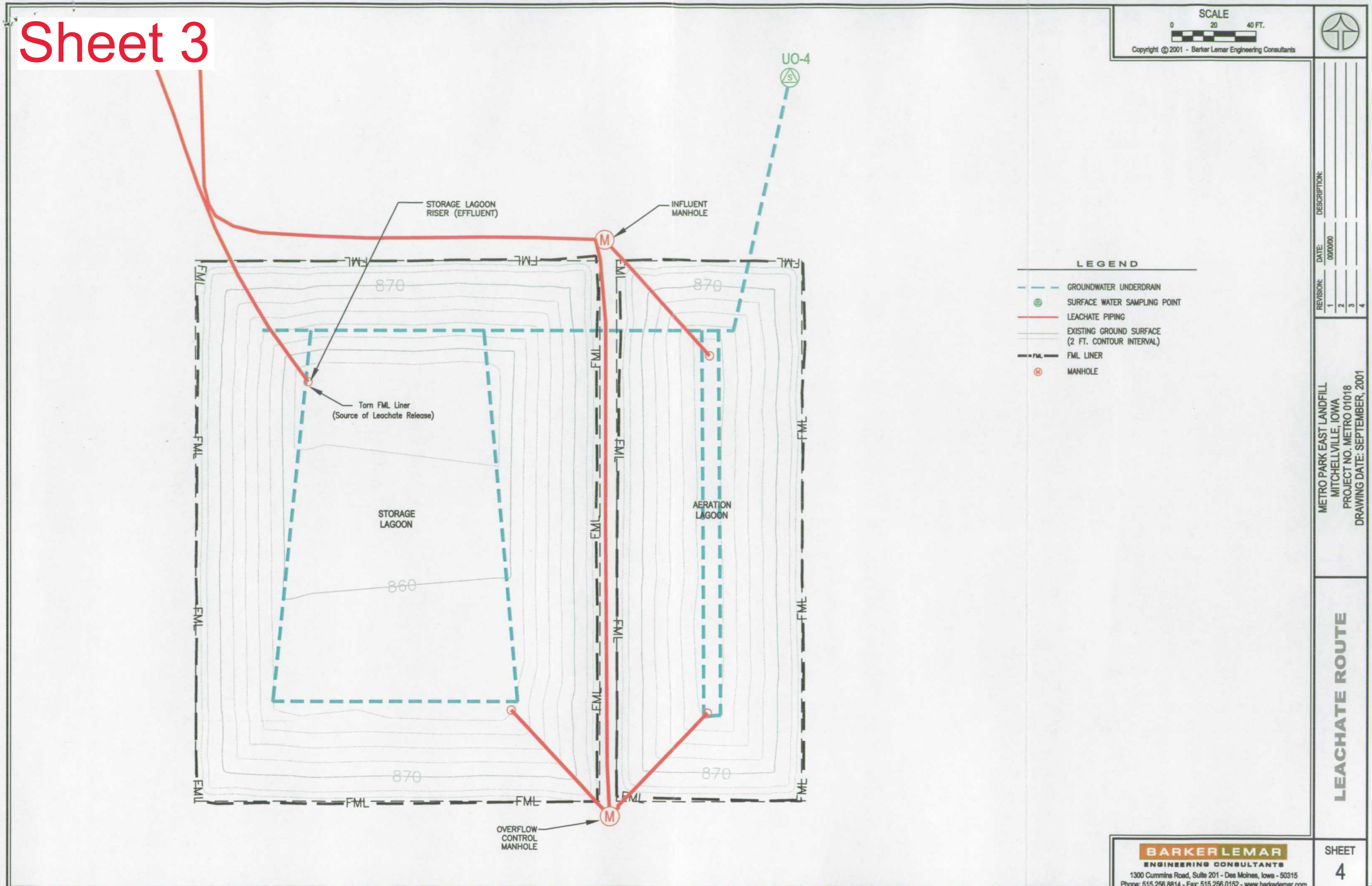
Sheet 3



SCALE
0 20 40 FT.
Copyright © 2001 - Barker Lemar Engineering Consultants
UO-4
STORAGE LAGOON RISER (EFFLUENT)
INFLUENT MANHOLE
Torn FML Liner (Source of Leachate Release)
STORAGE LAGOON
AERATION LAGOON
OVERFLOW CONTROL MANHOLE
870
860
FML
LEGEND
GROUNDWATER UNDERDRAIN
SURFACE WATER SAMPLING POINT
LEACHATE PIPING
EXISTING GROUND SURFACE (2 FT. CONTOUR INTERVAL)
FML LINER
MANHOLE
REVISION: DATE: DESCRIPTION:
1 00/00/00
2
3
4
METRO PARK EAST LANDFILL
MITCHELLVILLE, IOWA
PROJECT NO. METRO 01018
DRAWING DATE: SEPTEMBER, 2001
LEACHATE ROUTE
BARKER LEMAR
ENGINEERING CONSULTANTS
1300 Cummins Road, Suite 201 - Des Moines, Iowa - 50315
Phone: 515.256.8814 - Fax: 515.256.0152 - www.barkerlemar.com
SHEET
4

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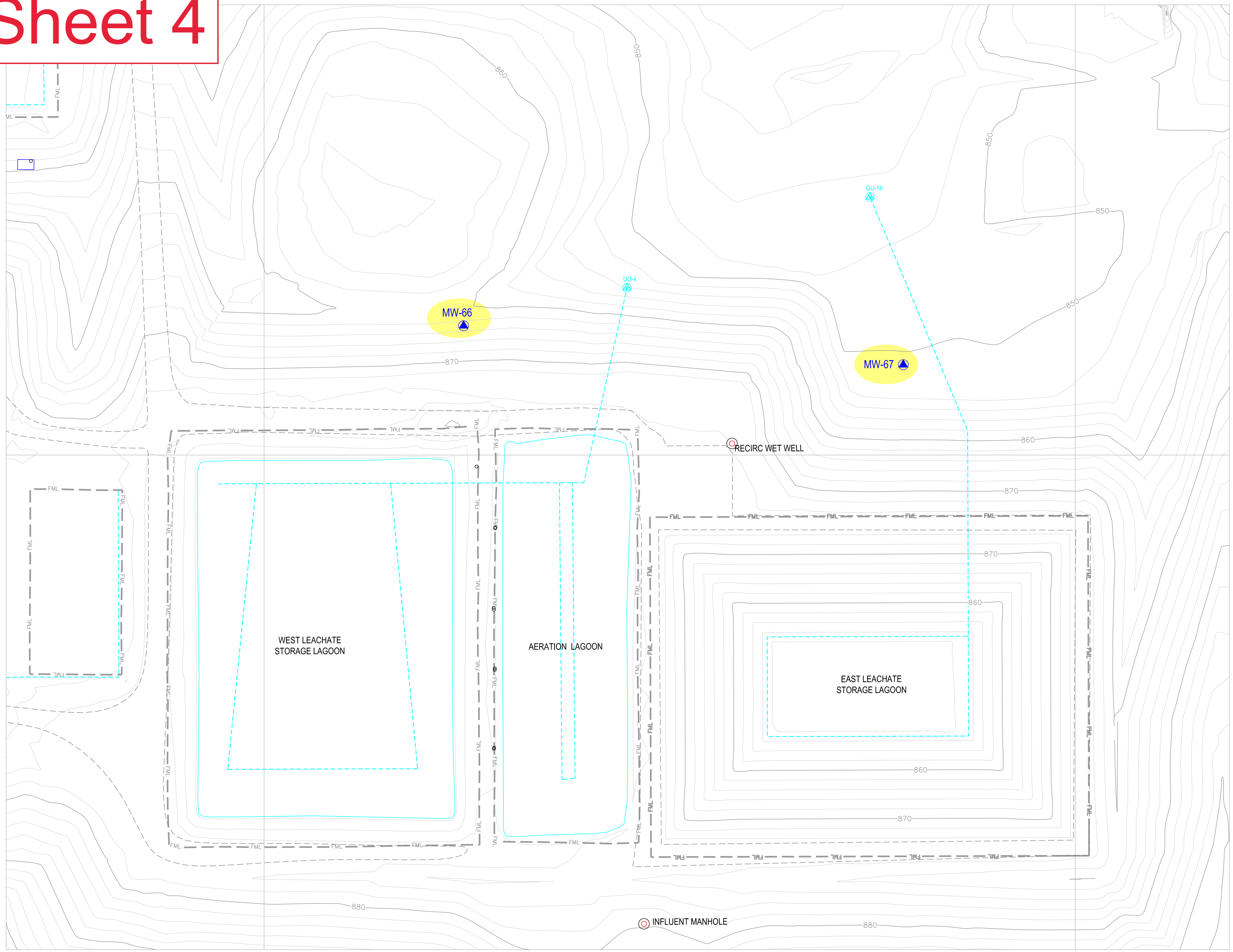
Sheet 4



SCALE
0 30 60

LEGEND

- NEW MONITORING WELL LOCATION
- GROUNDWATER CONTROL SYSTEM DISCHARGE
- GROUNDWATER CONTROL SYSTEM
- GROUND SURFACE CONTOUR
- PAVED ROADWAY
- GRAVEL ROADWAY
- MANHOLE
- FML LINER LOCATION

REVISION:	DATE:	DESCRIPTION:
1		
2		
3		
4		

METRO PARK EAST LANDFILL
MITCHELLVILLE, IOWA
PROJECT NO. METRO 14002
DRAWING DATE: NOVEMBER 2013

NOTES:
GROUND SURFACE TOPOGRAPHY SHOWN IS A COMPILATION OF THE 2012 AERIAL SURVEY AND VARIOUS TOPOGRAPHIC SURVEYS PERFORMED IN 2012 AND 2013.

THE COORDINATE SYSTEM USED FOR THIS MAP IS THE NAD IOWA STATE PLANE SOUTH ZONE (1402) (SNYDER & ASSOCIATES, INC., JUNE 2010).

NEW MONITORING WELLS

Metro Waste Authority

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Phone: 515.256.8814 - Fax: 515.256.0152 - www.barkerlemar.com

FIGURE
1