

# Soil Gas Monitoring Investigation Report

## Bridgeton Landfill

AUGUST 21, 2020

PROJECT NUMBER 209-4201603

### PRESENTED TO

---

#### **Bridgeton Landfill, LLC**

13570 Saint Charles Rock Road  
Bridgeton, MO 63044

### SUBMITTED BY

---

Cornerstone Environmental Group, LLC  
4200 Cantera Drive, Suite 102  
Warrenville, IL 60555

P +1.877.294.9070  
F +1.877.845.1456  
tetrattech.com

### REPORT CERTIFICATION

---

The material and data in this report were prepared under the supervision and direction of the undersigned.



**08/21/2020**

Thomas A. Bilgri, P.E.  
Manager – Biogas Engineering

Date



**08/21/2020**

Mark Torresani, P.E.  
Certifying Engineer

Date

## TABLE OF CONTENTS

---

<b>1.0</b>	<b>INTRODUCTION</b> .....	<b>1-1</b>
<b>2.0</b>	<b>EXISTING SITE CONDITIONS</b> .....	<b>2-1</b>
<b>3.0</b>	<b>MONITORING SUMMARY</b> .....	<b>3-1</b>
3.1	Monitoring Locations and Construction .....	3-1
3.2	Local Geology .....	3-2
3.3	Monitoring Procedures.....	3-3
3.4	Monitoring Results .....	3-3
3.4.1	Wellfield Operations.....	3-4
3.4.2	Weather Influence.....	3-4
3.5	Monitoring Point Decommissioning .....	3-5
<b>4.0</b>	<b>PROPOSED ACTIONS</b> .....	<b>4-1</b>
<b>5.0</b>	<b>SUBMITTALS</b> .....	<b>5-1</b>
5.1	Methane Gas Investigation Report .....	5-1
5.2	Schedule .....	5-1
<b>6.0</b>	<b>LIMITATIONS</b> .....	<b>6-1</b>

## APPENDIX SECTIONS

---

### APPENDICES

Appendix 1	Facility Plan
Appendix 2	Work Plan Area
Appendix 3	Monitoring Point Locations
Appendix 4	Monitoring Point Installation
Appendix 5	Monitoring Equipment
Appendix 6	Summary of Monitoring Data
Appendix 7	Interim Monitoring Point Decommissioning

## ACRONYMS/ABBREVIATIONS

---

Acronyms/Abbreviations	Definition
BGS	Below Ground Surface
CAP	Corrective Action Plan
GCCS	Gas Collection and Control System
HDPE	High-Density Polyethylene
"WC	Inches of Water Column
LFG	Landfill Gas
MDNR	Missouri Department of Natural Resources
MGP	Methane Gas Policy
MSL	Mean Sea Level
SVE	Soil Vapor Extraction
TMP	Temporary Monitoring Probe
WMP	Waste Management Program

## 1.0 INTRODUCTION

This Investigation Report outlines the results of a soil gas investigation executed adjacent to the Bridgeton Landfill, as proposed in the Soil Gas Monitoring Work Plan submitted, via email on December 31, 2019 and via hard copy on January 15, 2020, to the Missouri Department of Natural Resources (MDNR) and St. Louis County (County). The Work Plan was developed in accordance with the *MDNR Solid Waste Management Program Methane Gas Policy (2017), Section III.A (MGP)* and was approved by the MDNR on February 20, 2020, in a letter from Charlene S. Fitch, P.E. (Chief, Engineering Section) to Erin Fanning (Bridgeton Landfill Division Manager).

The Bridgeton Landfill is a closed solid waste disposal facility that has experienced sub-surface landfill gas (LFG) movement, specifically in the vicinity of perimeter temporary monitoring probes TMP-1S, TMP-3S and TMP-3M.



## 2.0 EXISTING SITE CONDITIONS

The Bridgeton Landfill is located at 13570 St. Charles Rock Road, Bridgeton, Missouri. The municipal solid waste (MSW) landfill operating under MSW Permit 118912 and County Permit 0418, encompasses approximately 50 acres with approximately 240 feet below the ground surface. The waste is located in two distinct areas known as the North and South Quarries. Waste deposition ceased on December 31, 2004. See Appendix 1 for the Facility Plan.

The existing gas collection and control system (GCCS) has been constructed in all portions of the disposal area permitted under Solid Waste Permit 118912 and consists of vertical extraction wells and additional collection points installed within and adjacent to the landfill as remediation efforts connected via a combination of buried and exposed HDPE header and lateral piping and a condensate management system. LFG extracted via the GCCS is currently combusted at a centralized flare station.

The disposal area has installed a clay final cover system, and over the entire South Quarry Area and the majority of the North Quarry Area, an additional Ethylene Vinyl Alcohol (EVOH) cover has been installed. This EVOH-lined area covers approximately 28.2 acres. The combination of the GCCS and the final cover system serves to control both sub-surface lateral gas movement and landfill gas odors.

A series of perimeter gas monitoring probes and temporary monitoring probes have previously been installed to monitor the potential for LFG movement away from the limits of waste placement. The existing LFG monitoring locations in this portion of the site are shown in Appendix 2.

This Investigation Report is specific to the conditions noted in temporary monitoring probes TMP-1S, TMP-3S and TMP-3M. Methane has previously been detected in temporary monitoring probes TMP-1S, TMP-3S and TMP-3M, and is assumed to be from LFG, though isotopic analyses have not been conducted to determine if there is a secondary or tertiary source of combustible gas local to these probes. These probes are located generally in the southwestern corner of the property, between the limits of waste placement and Boenker Lane. Modifications to the existing GCCS components, including the addition of collection points and the continued tuning of vacuum application to the existing GCCS, have not, to date, mitigated the presence of methane gas within probes TMP-1S, TMP-3S and TMP-3M.

There is currently no appearance of an imminent threat to the public or the environment from observed methane concentrations at the noted locations. Monitoring points between probes TMP-1S, TMP-3S and TMP-3M and potential off-site receptors indicates that methane is not moving extensively and appears to be generally confined to the area adjacent to probes TMP-1S, TMP-3S and TMP-3M.

## 3.0 MONITORING SUMMARY

### 3.1 MONITORING LOCATIONS AND CONSTRUCTION

An interim monitoring system was installed to define the pathway(s) that may be allowing LFG to travel from the waste mass to probes TMP-1S, TMP-3S and TMP-3M. These monitoring points are spaced through the area based upon the current understanding of the site geology, infrastructure and potential natural and man-made gas transmission pathways that may exist, in accordance with MGP Section III.2.a. A Site Plan delineating the interim monitoring points is provide as Appendix 3.

Boring logs (Appendix 4) indicate that the bedrock surface is approximately thirty-five feet below ground surface, with sand lenses layered with silt/clay layers observed. TMP-1S and TMP-3S were reportedly screened from about five feet below ground surface to the top of the bedrock surface, with TMP-3M's screen starting at about the bedrock surface.

Known or suspected utilities were field identified by hydro-excavation or other means prior to installation of the monitoring points to avoid any conflicts with existing underground structures. The monitoring points were installed by Bulldog Drilling (Dupo, IL) utilizing a Hydraulic Soil Probe (HSP), with installation taking place between 4/24/2020 and 5/14/2020. Installations were completed in conformance with MDNR 10 CSR 23-4.060, and the installations were documented by Feezor Engineering, Inc. (Springfield, IL). Thirty-five (35) monitoring points were installed. Construction records of the interim monitoring point installation are provided in Appendix 4 and are summarized as follows:

Table 1 - Monitoring Point Summary

Point ID	Ground Surface Elevation (MSL)	Approximate Screened Interval (BGS)
BRP1001S	460.39	13-23
BRP1001D	460.39	25-29
BRP1002S	46.012	16-20
BRP1002M	460.17	23-26.5
BRP1002D	460.19	28-29.2
BRP1003S	459.95	11.7-14.7
BRP1003D	460.13	18-20
BRP1004	458.2	25-35
BRP1005S	459.94	15.5-23
BRP1005M	460.07	25-30
BRP1005D	459.77	31-33
BRP1006S	456.49	14-19
BRP1006M	456.44	25-30
BRP1006D	456.34	31-33
BRP1007S	456.49	15.5-19

BRP1007M	456.73	22-30
BRP1007D	456.42	31.34
BRP1008S	456.16	22.5-30
BRP1008D	456.07	31.5-39
BRP1009S	455.73	11.5-19
BRP1009D	455.91	24-30.5
BRP1010S	456.88	9.5-19.5
BRP1010M	456.80	21.5-30
BRP1010D	456.81	31-31.5
BRP1011S	455.36	23.5-26
BRP1011M	455.32	26.5-36.5
BRP1011D	455.23	38-41.5
BRP1012S	455.03	11.5-16.5
BRP1012D	455.13	21.5-31.5
BRP1013S	454.23	13-15.5
BRP1013UM	454.18	18-27
BRP1013LM	454.15	28-34
BRP1013D	454.03	35-39
BRP1014S	453.19	10-15
BRP1014D	453.13	19-30.5

The initial boring at each location was advanced to the bedrock surface and logged to identify the local stratigraphy and potential monitoring zone elevations. The methane concentration in each of these initial borings was observed at five (5) foot intervals to denote elevations at which methane was present in the soil structure. A screened probe interval was installed at or near the interface with the bedrock layer and the overburden to determine whether soil gas may be moving along this discrete zone. Supplemental borings were installed adjacent to the initial boring, targeting elevations where high-permeable zones, such as sand and gravel seams, were observed since these strata are more preferential to gas transmission than silts and clays or where methane was detected in the initial boring.

### 3.2 LOCAL GEOLOGY

The project area lies within Quaternary-age silt-capped alluvial deposits of interbedded clays and silts that generally coarsen downward to well-sorted sands and gravels. The alluvial deposits, sourced by the Missouri River, overlie Mississippian-age limestone bedrock that exhibits varying degrees of weathering at the contact surface. Quaternary terrace and loess deposits of predominantly silts and clayey silts are located at the higher elevations immediately southeast of the project area.

Perched groundwater occurs within the sands and gravels, and a considerable amount of groundwater is likely stored in the clays and silts. The less permeable clays and silts likely behave as lenticular, discontinuous

aquitards that limit vertical groundwater flow between the coarser units. This hydrogeological environment formed the basis for the design/installation of multiple screened probes at the sampled locations.

The alluvial deposits sampled immediately prior to installations of the project probes have been divided into four general lithological units that overlie the weathered limestone. From the top down, the units have been designated, for the project, as the Upper Clay, the Upper Sand, the Lower Clay, and the Lower Sand. The Upper Clay is characterized primarily by deposits of soft to medium stiff silty clay with interbedded lenses of silt. The Upper Sand is characterized primarily by fine-grained sand and clayey silt; the Upper Sand unit is not present at all of the probe locations. The Lower Clay is characterized by a plastic clay unit that contains appreciable silt in its upper half. The Lower Clay abruptly contacts the Lower Sand unit beneath it. The Lower Sand unit is generally comprised of silty, fine- to medium-grained, dense, well-sorted sand with occasional bands of plastic clay.

For a review of the local geologic conditions, including boring logs, please refer to Appendix 4.

### 3.3 MONITORING PROCEDURES

---

Monitoring of the probes was conducted by trained site personnel or by contract monitoring personnel approximately twice weekly from May 19, 2020 to July 22, 2020, utilizing an Elkins Earthworks Envision (Appendix 5). Per 10 CSR 80-3.010(14)(C)4, monitoring data was provided to the WMP electronically within one week of sample collection, and included:

- *Parameters*
  - *Sustained Static Pressure*
  - *Sustained Methane (CH<sub>4</sub>) Concentration by Volume*
  - *Sustained Carbon Dioxide (CO<sub>2</sub>) Concentration by Volume*
  - *Sustained Oxygen (O<sub>2</sub>) Concentration by Volume*
  - *Sustained Balance Gas Concentration by Volume*
  - *Barometric Pressure*
  - *Water Level in Well (Depth in Feet Below Surface of Well)*

### 3.4 MONITORING RESULTS

---

A summary of the monitoring data previously provided to WMP, focusing on both tabular and graphic results for methane (CH<sub>4</sub>) and pressure, are provided as Appendix 6. The data indicates the likely pathway(s) for LFG movement are along the corridor generally defined by probes:

- *BRP1007S and BRP1007M*
- *BRP1010M*
- *BRP1009D*
- *BRP1008S and BRP1008D*
- *BRP1011M and BRP1011D*

These points exhibited either a pressure greater than 5"WC or a methane concentration greater than 5%CH<sub>4</sub> (by volume) at some point during the monitoring period. There is some correlation between elevated pressure and methane concentrations, specifically:

- *BRP1007M on 6/9, 6/18, 7/2, 7/9 and 7/22*

- *BRP1010M on 6/25 7/9 and 7/22, and*
- *BRP1011M on 7/2 7/9 and 7/22*

The balance of the monitoring points shows little correlation between elevated pressure and methane concentration readings.

Points BRP1007M, BRP1010M and BRP1011M appear to be directly influenced by LFG moving from the disposal area, while the balance of the points may be further from the original source of LFG or are realizing methane concentrations as a result of diffusive gas movement through less permeable soils versus convective gas movement through more permeable soils.

### 3.4.1 Wellfield Operations

An operational review of highlighted dates does not indicate any major wellfield adjustments on or about those dates that would have had an impact on the monitoring points, per interviews with site monitoring personnel. One component that was projected as a potential influence on the condition of the monitoring probes was the operation of liquids extraction pumps in the southwest corner of the disposal area. This includes pumps in the following LFG extraction wells:

- *GEW-18B*
- *GEW-116*
- *GEW-117*
- *GEW-118*
- *GEW-120*
- *GEW-121*
- *GEW-133*
- *GEW-234*
- *GEW-235*

Site technicians noted the pump at well *GEW-116* was down for maintenance on 6/16 - 6/17 and 7/14 - 7/15 and that the pump at well *GEW-18B* was down for maintenance on 7/15 - 7/16. The balance of the well pumps were reported as being generally operational throughout the monitoring period.

The monitoring data indicates a general increase in both methane concentration and pressure on 6/18, immediately following one of the *GEW-116* pump downtime periods, but no corresponding monitoring changes for the other noted downtime periods was observed. This infers that well pumping operations may be contributory to the movement of LFG in the local perimeter soils, but that are not likely a direct cause of LFG movement.

### 3.4.2 Weather Influence

A review of weather data also shows little correlation between elevated methane concentration and /or pressure and ambient temperature, wind speed or barometric pressure, with elevated readings present in both periods of falling and rising temperature, wind speed or barometric pressure conditions. See Appendix 6, chart Weather Data – 1 for the observed trends during the monitoring period.

There does appear to be some correlation between rainfall and elevated monitoring point readings, with most periods of elevated readings following a period of rainfall by three to four days. This indicates that surface water infiltration may be inducing a fluctuation in the saturation level of the permeable strata, which in turn may cause an apparent increase in monitoring pressure and/or concentration. The monitoring data is inconsistent on an areal basis, however, with elevated monitoring conditions occurring at different points after rain events.

### **3.5 MONITORING POINT DECOMMISSIONING**

---

The interim monitoring points were decommissioned in accordance with 10 CSR 23-4 on July 24, 2020 by Bulldog Drilling. The borings were sealed with bentonite slurry grout via tremie and all extensions above the ground surface were removed. Soil was placed over the monitoring points to restore the area to pre-construction conditions. Documentation of the decommissioning is provided as Appendix 7.

## 4.0 PROPOSED ACTIONS

Based upon the data acquired during the monitoring period and a review of site conditions, it is proposed to install a Soil Vapor Extraction (SVE) system to directly target the permeable zones that appear most impacted by either induced positive pressure or elevated methane concentrations. By curtailing gas movement at these locations, it is projected that gas impacts on perimeter temporary monitoring probes TMP-1S, TMP-3S and TMP-3M will be mitigated.

The intent of the SVE system will be to provide controlled vacuum for active gas extraction to the permeable zones identified. Vacuum and gas flow will be adjusted as needed to remove gas from these permeable zones, before it has an opportunity to move into the vicinity of TMP-1S, TMP-3S and TMP-3M.

## 5.0 SUBMITTALS

### 5.1 METHANE GAS INVESTIGATION REPORT

The monitoring data has been trended in terms of both the relative pressure and concentration over time as well as the spatial distribution of data. The intent of this report is to identify the extents and magnitude of the methane pressures and concentrations in the area of concern. The analysis of this information provides the basis for identifying the pathway(s) by which gas is moving from the disposal area to the TMPs and to develop an effective plan to mitigate sub-surface gas movement in this area

The monitoring results are compiled into this Methane Gas Investigation Report, in accordance with MGP Section III.B. Upon review of the data by the MDNR, and concurrence on the results of the monitoring, included in this report, Bridgeton Landfill, LLC will develop an Action Plan for the mitigation of methane at probes TMP-1S, TMP-3S and TMP-3M.

### 5.2 SCHEDULE

Upon approval of this Investigation Report by WMP, Bridgeton Landfill, LLC will develop a Corrective Action Plan for review by WMP, according to this (proposed) schedule:

Proposed Day	Action	Actual Date
1	Begin monitoring point construction	4/24/2020
5	Complete monitoring point construction	5/14/2020
5	Begin monitoring	5/19/2020
45	Complete monitoring	7/22/2020
60	Complete removal of monitoring points	7/24/2020
90	Submit Methane Gas Investigation Report to WMP	8/21/2020
45 days after WMP approval	Submit Corrective Action Plan to WMP	TBD

A schedule for execution of the Corrective Action Plan will developed as part of the Corrective Action Plan and will be subsequently initiated by WMP approval of the proposed Plan. Following submittal and approval of this Corrective Action Plan, additional activities regarding these mitigation activities will be documented in the Quarterly LCAP reports.



## 6.0 LIMITATIONS

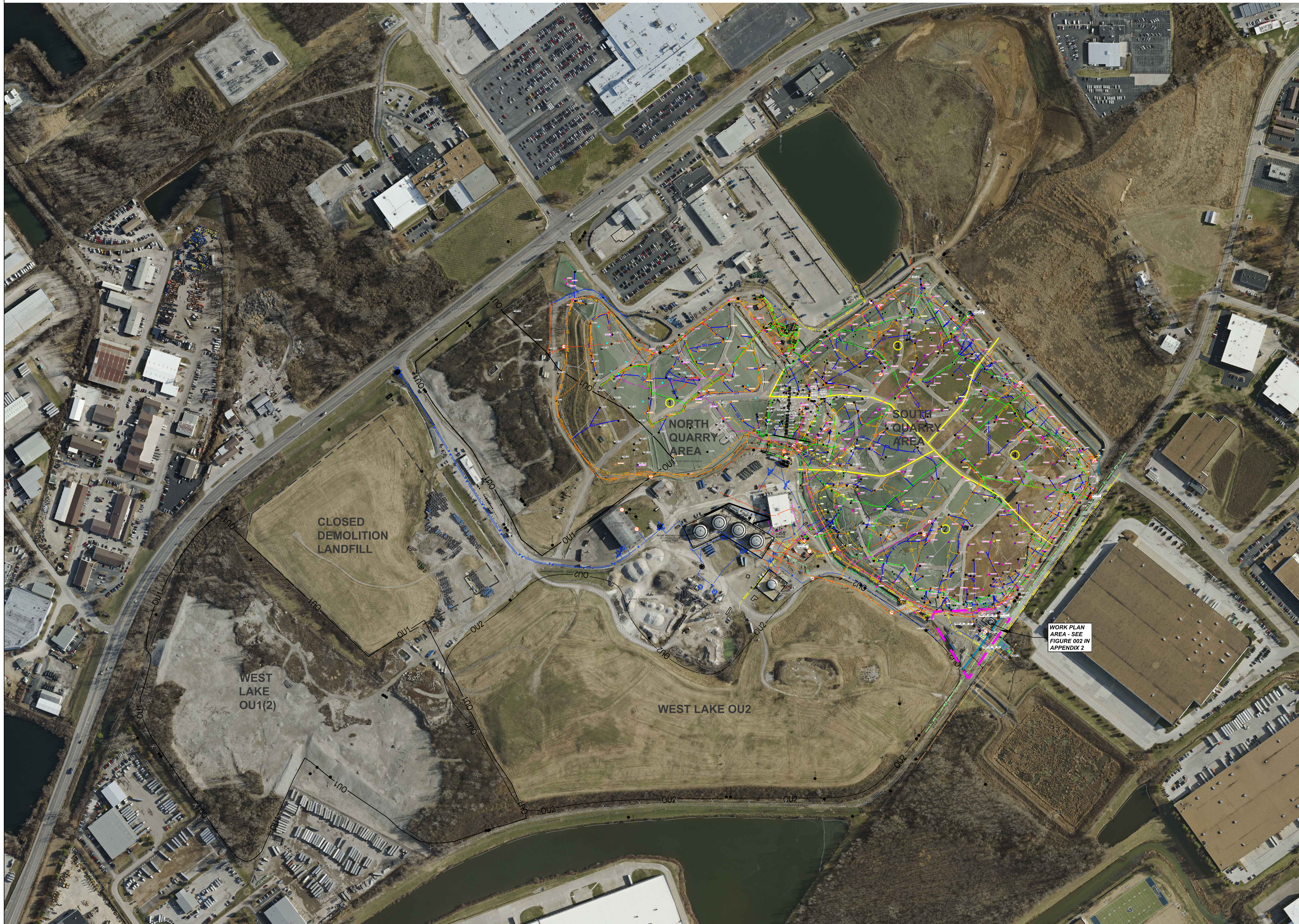
The work product included in the attached was undertaken in full conformity with generally accepted professional consulting principles and practices and to the fullest extent as allowed by law we expressly disclaim all warranties, express or implied, including warranties of merchantability or fitness for a particular purpose. The work product was completed in full conformity with the contract with our client and this document is solely for the use and reliance of our client (unless previously agreed upon that a third party could rely on the work product) and any reliance on this work product by an unapproved outside party is at such party's risk.

The work product herein (including opinions, conclusions, suggestions, etc.) was prepared based on the situations and circumstances as found at the time, location, scope and goal of our performance and thus should be relied upon and used by our client recognizing these considerations and limitations. Cornerstone Environmental Group, LLC shall not be liable for the consequences of any change in environmental standards, practices, or regulations following the completion of our work and there is no warrant to the veracity of information provided by third parties, or the partial utilization of this work product.

## APPENDIX 1

### FACILITY PLAN





**LEGEND**

---	SOLID WASTE BOUNDARY
○	QUARRY WALL
---	WEST LAKE AREA 1
---	WEST LAKE AREA 2
○	GAS MONITORING PROBE
○	TEMPORARY GAS MONITORING PROBE
●	PIEZOMETER MONITORING WELL
●	GAS EXTRACTION WELL
▲	INTERCEPTOR TRENCH SUMP
●	SURFACE EXTRACTION WELL
●	PERIMETER GAS EXTRACTION WELL
○	LFG ISOLATION VALVE
○	LEACHATE ISOLATION VALVE
○	FLOW METER
○	GRIT CHAMBER
○	LIFT STATION
○	CONDENSATE SUMP
○	CONDENSATE TRAP/HEADER CONNECTION SUMP
○	LEACHATE COLLECTION SUMP
○	HORIZONTAL COLLECTION SUMP
○	PERIMETER SUMP
○	LEACHATE COLLECTION SUMP
○	SURFACE COLLECTOR
○	TEMPERATURE MONITORING PROBE
○	SUBSURFACE RCP WELLS
○	TRENCH SUMP
○	INTERCEPTION TRENCH RISER
○	PERIMETER LEACHATE RISER
○	WELL HEAD RISER
○	WELL BORE BOOT
○	TRENCH SUMP
○	OVER LINER TIE IN POINT
○	GAS INTERCEPTOR WELL
○	GAS INTERCEPTOR WELL/HEAT EXTRACTION POINT
○	CLEAN OUT
○	GAS EXTRACTION WELL WITH 4" STINGER
○	EXTRACTION POINT - ABANDONED
○	EXTRACTION POINT - TEMPORARILY DECOMMISSIONED
○	CONTAINMENT SUMP PUMP STATION FOR TOE STRIP DRAIN
○	DOWNSLOPE STRIP DRAIN COLLECTOR 6" RISER STUB
①	QUADRANT #
○	POWER PANEL
---	QUARRY WALL
---	LEACHATE COLLECTION PIPING
---	DUAL CONTAINED LCS FORCEMAIN (SIZE VARIES)
---	DUAL CONTAINED PERIMETER FORCEMAIN (SIZE VARIES)
---	LEACHATE COLLECTION PIPING (SIZE VARIES)
---	TOE DRAIN
---	4" PERFORATED TRENCH DRAIN
---	BUBBLE SUCKER
---	AIR LINE
---	AIR LINE (PRESSURIZED BELOW GROUND)
---	BURIED LFG COLLECTION PIPING (SIZE VARIES)
---	2" ABOVE GROUND LFG COLLECTION LATERAL PIPING
---	4" ABOVE GROUND LFG COLLECTION LATERAL PIPING
---	6" ABOVE GROUND LFG COLLECTION LATERAL PIPING
---	8" ABOVE GROUND LFG COLLECTION LATERAL PIPING
---	10" ABOVE GROUND LFG COLLECTION LATERAL PIPING
---	12" ABOVE GROUND LFG COLLECTION LATERAL PIPING
---	18" ABOVE GROUND LFG COLLECTION HEADER PIPING
---	24" ABOVE GROUND LFG COLLECTION LATERAL PIPING
---	2" PRESSURIZED AIR / 2" FORCEMAIN IN COMMON TRENCH
---	A/FM
---	ABOVEGROUND ELECTRIC LINE
---	OVERHEAD ELECTRIC LINE
---	UNDERGROUND ELECTRIC LINE
---	SANITARY SEWER
---	MSD DISCHARGE FORCEMAIN
---	WATERMAIN
---	NATURAL GAS LINE
---	FIBER OPTIC LINE
---	TELEPHONE
---	FENCE LINE
---	INTERCEPTOR TRENCH
---	HEAT EXTRACTION EFFLUENT PIPING
---	HEAT EXTRACTION INFLUENT PIPING
---	WORK PLAN AREA

SCALE - 1" = 200'

**NOTES:**  
 • AERIAL TOPOGRAPHY PROVIDED BY COOPER AERIAL SURVEYS CO. AND IS DATED DECEMBER 12, 2018

**DISCLAIMER:**  
 THE EXISTENCE AND APPROXIMATE LOCATION OF UTILITIES KNOWN TO EXIST, AS SHOWN ON THESE DRAWINGS ARE BASED ON THE BEST INFORMATION PROVIDED TO FEI AT THE TIME OF THIS SUBMITTAL. THIS INFORMATION HAS BEEN PROVIDED TO FEI AS-IS AND FEI EXPRESSLY DISCLAIMS ANY REPRESENTATION OR WARRANTY AS TO THE COMPLETENESS OR ACCURACY OF THE INFORMATION FOR ANY USE. IT IS THE RESPONSIBILITY OF ANY PARTIES PERFORMING WORK TO VERIFY THE EXISTENCE, LOCATION AND STATUS OF ANY FACILITY. SUCH VERIFICATION INCLUDES DIRECT CONTACT WITH THE LISTED UTILITIES.

<b>PREPARED BY:</b>  3377 Hollenberg Dr. Bridgeton, MO 63044 Ph: 217-483-3118 Missouri State Certificate Of Authority #: E-200912213	<b>PROJECT:</b> BRIDGETON LANDFILL SOIL GAS MONITORING WORK PLAN BRIDGETON, ST. LOUIS COUNTY, MO	<b>PREPARED FOR:</b> BRIDGETON LANDFILL, LLC 13570 ST. CHARLES ROCK ROAD BRIDGETON, MISSOURI 63044	<b>DESIGNED BY:</b> AMR <b>APPROVED BY:</b> DRP <b>DATE:</b> 12/12/18 <b>DSN:</b> 001 <b>APV:</b>
---	---	---	---

**FACILITY PLAN**

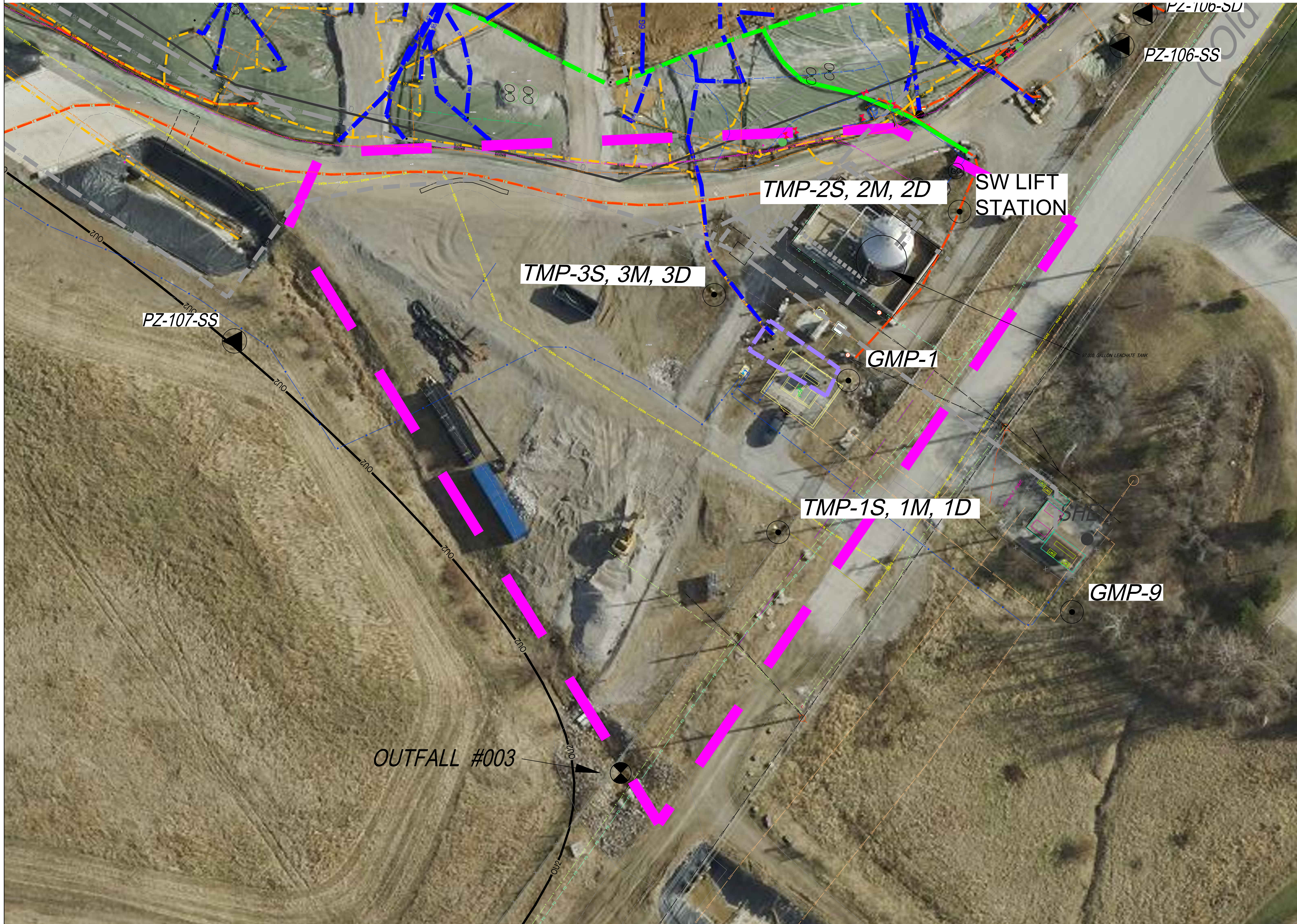
PROJECT NUMBER: BT-129-19 | FILE PATH: C:\Users\amr\Desktop\Bridgeton Landfill\Soil Gas Monitoring\Bridgeton Landfill SoG Work Plan\Facility Plan.dwg



## APPENDIX 2

### WORK PLAN AREA





LEGEND	
	SOLID WASTE BOUNDARY
	QUARRY WALL
	WEST LAKE AREA 1
	WEST LAKE AREA 2
	GAS MONITORING PROBE
	TEMPORARY GAS MONITORING PROBE
	PIEZOMETER MONITORING WELL
	GAS EXTRACTION WELL
	INTERCEPTOR TRENCH SUMP
	SURFACE EXTRACTION WELL
	PERIMETER GAS EXTRACTION WELL
	LFG ISOLATION VALVE
	LEACHATE ISOLATION VALVE
	FLOW METER
	GRIT CHAMBER
	LIFT STATION
	CONDENSATE SUMP
	CONDENSATE TRAP/HEADER CONNECTION SUMP
	LEACHATE COLLECTION SUMP
	HORIZONTAL COLLECTION SUMP
	PERIMETER SUMP
	LEACHATE COLLECTION SUMP
	SURFACE COLLECTOR
	TEMPERATURE MONITORING PROBE
	SUBSURFACE RCP WELLS
	TRENCH SUMP
	INTERCEPTION TRENCH RISER
	PERIMETER LEACHATE SUMP
	WELL HEAD RISER
	WELL BORE BOOT
	TRENCH SUMP
	OVER LINER TIE IN POINT
	GAS INTERCEPTOR WELL
	GAS INTERCEPTOR WELL/HEAT EXTRACTION POINT
	CLEAN OUT
	GAS EXTRACTION WELL WITH 4" STINGER
	EXTRACTION POINT - ABANDONED
	EXTRACTION POINT - TEMPORARILY DECOMMISSIONED
	CONTAINMENT SUMP PUMP STATION FOR TOE STRIP DRAIN
	DOWNSLOPE STRIP DRAIN COLLECTOR 6" RISER STUB
	QUADRANT #
	POWER PANEL
	QUARRY WALL
	LEACHATE COLLECTION PIPING
	DUAL CONTAINED LCS FORCEMAIN (SIZE VARIES)
	DUAL CONTAINED PERIMETER FORCEMAIN (SIZE VARIES)
	LEACHATE COLLECTION PIPING (SIZE VARIES)
	TOE DRAIN
	4" PERFORATED TRENCH DRAIN
	BUBBLE SUCKER
	AIR LINE
	AIR LINE (PRESSURIZED BELOW GROUND)
	BURIED LFG COLLECTION PIPING (SIZE VARIES)
	2" ABOVE GROUND LFG COLLECTION LATERAL PIPING
	4" ABOVE GROUND LFG COLLECTION LATERAL PIPING
	6" ABOVE GROUND LFG COLLECTION LATERAL PIPING
	8" ABOVE GROUND LFG COLLECTION LATERAL PIPING
	10" ABOVE GROUND LFG COLLECTION LATERAL PIPING
	12" ABOVE GROUND LFG COLLECTION LATERAL PIPING
	18" ABOVE GROUND LFG COLLECTION LATERAL PIPING
	24" ABOVE GROUND LFG COLLECTION LATERAL PIPING
	2" PRESSURIZED AIR / 2" FORCEMAIN IN COMMON TRENCH
	A/FM
	ABOVEGROUND ELECTRIC LINE
	OVERHEAD ELECTRIC LINE
	UNDERGROUND ELECTRIC LINE
	SANITARY SEWER
	MSD DISCHARGE FORCEMAIN
	WATERMAIN
	NATURAL GAS LINE
	FIBER OPTIC LINE
	TELEPHONE
	FENCE LINE
	INTERCEPTOR TRENCH
	HEAT EXTRACTION EFFLUENT PIPING
	HEAT EXTRACTION INFLUENT PIPING
	WORK PLAN AREA
	PROPOSED GEOPROBE LOCATION



**DISCLAIMER:**  
 THE EXISTENCE AND APPROXIMATE LOCATION OF UTILITIES KNOWN TO EXIST, AS SHOWN ON THESE DRAWINGS ARE BASED ON THE BEST INFORMATION PROVIDED TO FEI AT THE TIME OF THIS SUBMITTAL. THIS INFORMATION HAS BEEN PROVIDED TO FEI AS-IS AND FEI EXPRESSLY DISCLAIMS ANY REPRESENTATION OR WARRANTY AS TO THE COMPLETENESS OR ACCURACY OF THE INFORMATION FOR ANY USE. IT IS THE RESPONSIBILITY OF ANY PARTIES PERFORMING WORK TO VERIFY THE EXISTENCE, LOCATION AND STATUS OF ANY FACILITY. SUCH VERIFICATION INCLUDES DIRECT CONTACT WITH THE LISTED UTILITIES.

NOTES: • AERIAL TOPOGRAPHY PROVIDED BY COOPER AERIAL SURVEYS CO. AND IS DATED DECEMBER 12, 2018		PROJECT BRIDGETON LANDFILL SOIL GAS MONITORING WORK PLAN BRIDGETON, ST. LOUIS COUNTY, MO		PREPARED FOR BRIDGETON LANDFILL, LLC. 13570 ST. CHARLES ROCK ROAD BRIDGETON, MISSOURI 63044		DESIGNED BY: AMR APPROVED BY: DRP		DRAWING # <b>002</b>	
PREPARED BY <b>FEEZOR</b> ENGINEERING, INC. 3377 Holmberg Dr. Bridgeton, MO 63044. Ph: 217-483-3118 Missouri State Certificate Of Authority #: E-200912213		PROJECT NUMBER: BT-129-19   FILE PATH: C:\Users\amr\Desktop\Phase 2\Engineering\Bridgeton\10-14887-19\1017\Soil Gas\Work Plan\Figure		WORK PLAN AREA		REVISIONS:		DATE   DSN   APV	