PRELIMINARY DETERMINATION

PERMIT MODIFICATION

Turkey Trot Landfill, LLC
2328 Mannish Ryan Road
Citronelle, Alabama 36522

Turkey Trot Landfill
Permit No. 65-05

February 1, 2024

Bunnell-Lammons Engineering, Inc. and SCS Engineers has submitted to the Alabama Department of Environmental Management (ADEM), on behalf of Turkey Trot Landfill, LLC, an application for modification of the Solid Waste Disposal Facility Permit for the Turkey Trot Landfill (Permit No. 65-05). The modification involves revising the groundwater monitoring plan for the abandonment of groundwater monitoring wells GWC-7 and GWC-9 and the installation of replacement groundwater monitoring wells GWC-7R and GWC-9R. Furthermore, the modification proposes the utilization of refractory brick mixed with sand as a base material for haul roads and the tipper pad. All other permit conditions remain unchanged.

A public comment period was announced by the Department on XXXXXXXXXX and ended on XXXXXXXXXXXX. The draft permit and application was available for inspection at the Alabama Department of Environmental Management and electronically via www.adem.alabama.gov/newsEvents/publicNotices.cnt. The Department received no comments during the comment period.

The Land Division has determined that the application for permit modification complies with the requirements of ADEM's Administrative Code Division 13 regulations for a municipal solid waste landfill.

Technical Contact:

Mr. Blake Holden
Solid Waste Engineering Section
Land Division
(334) 274-4248

ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

SOLID WASTE DISPOSAL FACILITY PERMIT

PERMITTEE:	**Turkey Trot Landfill, LLC**
FACILITY NAME:	**Turkey Trot Landfill**
FACILITY LOCATION:	**Sections 3, 4, 9 & 10, Township 2 North, Range 2 West in Washington County, Alabama. The total permitted area is 299.80 acres with approximately 170.23 acres approved for disposal.**
PERMIT NUMBER:	**65-05**
PERMIT TYPE:	**Municipal Solid Waste**
WASTE APPROVED FOR DISPOSAL:	**Nonhazardous solid wastes, noninfectious putrescible and nonputrescible wastes including but not limited to household garbage, industrial waste, construction and demolition debris, commercial waste, appliances, tires, trees, limbs, stumps, sludge, paper and other similar type materials. Special waste approved by ADEM may also be accepted.**
APPROVED WASTE VOLUME:	**Maximum Average Daily Volume of waste is 4000 tons per day.**
APPROVED SERVICE AREA:	**States of Alabama, Georgia, Tennessee, Mississippi, and Florida**

In accordance with and subject to the provisions of the Alabama Solid Wastes Recyclable Materials Management Act, as amended, Code of Alabama 1975, §§ 22-27-1 to 22-27-27 ("SWRMMA"), the Alabama Environmental Management Act, as amended, Code of Alabama 1975, §§ 22-22A-1 to 22-22A-15, and rules and regulations adopted thereunder, and subject further to the conditions set forth in this permit, the Permittee is hereby authorized to dispose of the above-described solid wastes at the above-described facility location.

ISSUANCE DATE:	**August 17, 2020**
EFFECTIVE DATE:	**August 17, 2020**
MODIFICATION DATE:	**XXXXXXXXXX**
EXPIRATION DATE:	**August 16, 2030**

Alabama Department of Environmental Management

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
SOLID WASTE PERMIT

Permittee:	Turkey Trot Landfill, LLC 2328 Mannish Ryan Road Citronelle, Alabama 36522
Landfill Name:	Turkey Trot Landfill
Landfill Location:	Sections 3, 4, 9 & 10, Township 2 North, Range 2 West Washington County, Alabama
Permit Number:	65-05
Landfill Type:	Municipal Solid Waste

Pursuant to the Alabama Solid Wastes & Recyclable Materials Management Act, Code of Alabama 1975, §§ 22-27-1, *et seq*., as amended, and attendant regulations promulgated thereunder by the Alabama Department of Environmental Management (ADEM), this permit is issued to Turkey Trot Landfill, LLC (hereinafter called the Permittee), to operate a solid waste disposal facility, known as the Turkey Trot Landfill.

The Permittee must comply with all terms and conditions of this permit. This permit consists of the conditions set forth herein (including those in all attachments), and the applicable regulations contained in ADEM Admin. Code 335-13-1 through 335-13-16 of the ADEM Administrative Code (referred to as the "ADEM Admin. Code" or "335-13"). Rules cited are set forth in this document for the purpose of Permittee reference. A Rule that is cited incorrectly in this document does not constitute grounds for noncompliance on the part of the Permittee. Applicable ADEM Administrative Codes are those that are in effect on the date of issuance of this permit or the revisions approved after permit issuance.

This permit is based on the information submitted to the Department on March 21, 2019, for permit renewal, and on February 1, 2024, for modification, and as amended, known as the Permit Application (hereby incorporated by reference and hereinafter referred to as the Application). Inaccuracies found in this information could lead to the termination or modification of this permit and potential enforcement action. The Permittee must inform the Department of deviations from or changes in the information in the Application that would affect the Permittee's ability to comply with the applicable ADEM Admin. Code or permit conditions.

This permit is effective as of August 17, 2020, modified on XXXXXXXXXX, and shall remain in effect until August 16, 2030, unless suspended or revoked.

_____ _____

Alabama Department of Environmental Management Date Signed

SECTION I. STANDARD CONDITIONS.

A. Effect of Permit

The Permittee is allowed to dispose of nonhazardous solid waste in accordance with the conditions of this permit and ADEM Admin. Code Division 13. Issuance of this permit does not convey property rights of any sort or an exclusive privilege, nor does it authorize the injury to persons or property, the invasion of other private rights, or the infringement of state or local laws or regulations. Except for actions brought under Code of Alabama 1975, §§22-27-1, *et seq*., as amended, compliance with the conditions of this permit shall be deemed to be compliance with applicable requirements in effect as of the date of issuance of this permit and future revisions.

B. Permit Actions

This permit may be suspended, revoked or modified for cause. The filing of a request for a permit modification or the notification of planned changes or anticipated noncompliance on the part of the Permittee, and the suspension or revocation does not stay the applicability or enforceability of permit condition.

C. Severability

The provisions of this permit are severable, and if a provision of this permit, or the application of a provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

D. Definitions

For the purpose of this permit, terms used herein shall have the same meaning as those in ADEM Admin. Code Division 13, unless this permit specifically provides otherwise; where terms are not otherwise defined, the meaning associated with such terms shall be as defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term.

1. "EPA" means the United States Environmental Protection Agency.

2. "Permit Application" means all permit application forms, design plans, operational plans, closure plans, technical data, reports, specifications, plats, geological and hydrological reports, and other materials which are submitted to the Department in pursuit of a solid waste disposal permit.

E. Duties and Requirements

1. Duty to Comply

The Permittee must comply with all conditions of this permit except to the extent and for the duration such noncompliance is authorized by a variance granted by the Department. Any permit noncompliance constitutes a violation of Code of Alabama 1975, §§22-27-1 et seq., as amended, and is grounds for enforcement action, permit suspension, revocation, modification, and/or denial of a permit renewal application.

2. Duty to Reapply

If the Permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the Permittee must apply for and obtain a new permit. The renewal application must be submitted to the Department at least 180 days before this permit expires.

3. Permit Expiration

This permit and all conditions therein will remain in effect beyond the permit's expiration date if the Permittee has submitted a timely, complete application as required by Section I.E.2., and, through no fault of the Permittee, the Department has not made a final decision regarding the renewal application.

4. Need to Halt or Reduce Activity Not A Defense

It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity to maintain compliance with the conditions of this permit.

5. Duty to Mitigate

In the event of noncompliance with this permit, the Permittee shall take all reasonable steps to minimize releases to the environment and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment.

6. Proper Operation and Maintenance

The Permittee shall at all times properly operate and maintain all facilities and systems of control (and related appurtenances) that are installed or used by the Permittee to achieve compliance with the conditions of this permit.

7. Duty to Provide Information

If requested, the Permittee shall furnish to the Department, within a reasonable time, the information that the Department may reasonably need to determine whether cause exists for denying, suspending, revoking, or modifying this permit, or to determine compliance with this permit. If requested, the Permittee shall also furnish the Department with copies of records kept as a requirement of this permit.

8. Inspection and Entry

Upon presentation of credentials and other documents as may be required by law, the Permittee shall allow the employees of the Department or their authorized representative to:

a. Enter at reasonable times the Permittee's premises where the regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit.

b. Have access to and copy, at reasonable times, the records that must be kept under the conditions of this permit.

c. Inspect, at reasonable times, the facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit.

d. Sample or monitor, at reasonable times, the substances or parameters at a location for the purposes of assuring permit compliance or as otherwise authorized by Code of Alabama 1975, §§22-27-1 *et seq*.

9. Monitoring, Corrective Actions, and Records

a. Samples and measurements taken for the purpose of monitoring or corrective action shall be representative of the monitored activity. The methods used to obtain representative samples to be analyzed must be the appropriate method from ADEM Admin. Code 335-13-4 or the methods as specified in the Application attached hereto and incorporated by reference. Laboratory methods must be those specified in Standard Methods for the Examination of Water and Wastewater (American Public Health Association, latest edition), Methods for Chemical

Analysis of Water and Wastes (EPA-600/4-79-020), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA Publication SW-846, latest edition), other appropriate EPA methods, or as specified in the Application. All field tests must be conducted using approved EPA test kits and procedures.

b. The Permittee shall retain records, at the location specified in Section I.I., of all monitoring, or corrective action information, including all calibration and maintenance records, copies of all reports and records required by this permit, and records of all data used to complete the application for this permit for a period of at least three years from the date of the sample, measurement, report or record or for periods elsewhere specified in this permit. These periods may be extended by the request of the Department at any time and are automatically extended during the course of an unresolved enforcement action regarding this facility.

c. Records of monitoring and corrective action information shall include.

i. The exact place, date, and time of sampling or measurement.

ii. The individual(s) and company who performed the sampling or measurements.

iii. The date(s) analyses were performed.

iv. The individual(s) and company who performed the analyses.

v. The analytical techniques or methods used.

vi. The results of such analyses.

d. The Permittee shall submit all monitoring and corrective action results at the interval specified elsewhere in this permit.

10. Reporting Planned Changes

The Permittee shall notify the Department, in the form of a request for permit modification, at least 120 days prior to a change in the permitted service area, increase in the waste received, or change in the design or operating procedure as described in this permit, including planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

11. Transfer of Permit

This permit may be transferred to a new owner or operator. All requests for transfer of permits shall be in writing and shall be submitted on forms provided by the Department. Before transferring ownership or operation of the facility during its operating life, the Permittee shall notify the new owner or operator in writing of the requirements of this permit.

12. Certification of Construction

Before the Permittee may commence disposal of waste in any new cell or phase:

a. The Permittee must submit a letter to the Department signed by both the Permittee and a professional engineer stating that the facility has been constructed in compliance with the permit.

b. The Department must inspect the constructed cells of phases unless the permittee is notified that the Department will waive the inspection.

c. The Permittee may not commence disposal activities in any new cells or phases until approval of the new cells or phases is granted by the Department.

13. Noncompliance

The Permittee shall report all instances of noncompliance with the permit at the time noncompliance is discovered.

14. Other Information

If the Permittee becomes aware that information required by the Application was not submitted or was incorrect in the Application or in a report to the Department, the Permittee shall promptly submit such facts or information. In addition, upon request, the Permittee shall furnish to the Department, within a reasonable time, information related to compliance with the permit.

F. Design and Operation of Facility

The Permittee shall maintain and operate the facility to minimize the possibility of a fire, explosion, or an unplanned sudden or nonsudden release of contaminants (including leachate and explosive gases) to air, soil, groundwater, or surface water, which could threaten human health or the environment.

G. Inspection Requirements

1. The Permittee shall comply with all requirements of ADEM Admin. Code r. 335-13-4-.21(1)(b).

2. The Permittee shall conduct random inspections of incoming loads.

3. Records of all inspections shall be included in the operating record.

H. Recordkeeping and Reporting

1. The Permittee shall maintain a written operating record at the location specified in Section I.I. The operating record shall include:

   a. Documentation of inspection and maintenance activities.

   b. Daily Volume reports.

   c. Personnel training documents and records.

   d. Solid/Hazardous Waste Determination Forms for Industrial Wastes, and the associated Department disposal approval correspondence for special wastes, industrial wastes, etc.

   e. Groundwater monitoring records.

   f. Explosive gas monitoring records.

   g. Surface water and leachate monitoring records. Monitoring is subject to the applicable conditions of Section VII. of the permit.

   h. Copies of this Permit and the Application.

   i. Copies of all variances granted by the Department, including copies of all approvals of special operating conditions (such as approvals for open burning,).

2. Quarterly Volume Report

Beginning with the effective date of this permit, the Permittee shall submit, within thirty (30) days after the end of each calendar quarter, a report summarizing the daily waste receipts for the previous (just ended) quarter. Copies of the quarterly reports shall be maintained in the operating record.

3. Monitoring and Corrective Action Reports

The Permittee shall submit reports on all monitoring and corrective action activities conducted pursuant to the requirements of this permit, including, but not limited to, groundwater, surface water, explosive gas and leachate monitoring. The groundwater monitoring shall be conducted in March and September of each year and the reports shall be submitted at least semi-annually. The reports should contain all monitoring results and conclusions from samples and measurements conducted during the sampling period. Explosive gas monitoring must be submitted on a quarterly basis, and the reports should be submitted to the Department and placed in the operating record within 30 days of the monitoring event. Copies of the semi-annual groundwater and quarterly explosive gas monitoring reports shall be maintained in the operating record.

4. Availability, Retention, and Disposition of Records

a. All records, including plans, required under this permit or ADEM Admin. Code Division 13 must be furnished upon request, and made available at reasonable times for inspection by an officer, employee, or representative of the Department.

b. All records, including plans, required under this permit or ADEM Admin. Code Division 13 shall be retained by the Permittee for a period of at least three years. The retention period for all records is extended automatically during the course of an unresolved enforcement action regarding the facility, or as requested by the Department.

c. A copy of records of waste disposal locations and quantities must be submitted to the Department and local land authority upon closure of the facility.

I. Documents to be Maintained by the Permittee

The Permittee shall maintain, at the landfill Turkey Trot Landfill the following documents and amendments, revisions and modifications to these documents until an engineer certifies closure.

1. Operating record.

2. Closure Plan.

J. Mailing Location

All reports, notifications, or other submissions which are required by this permit should be sent via signed mail (i.e. certified mail, express mail delivery service, etc.) or hand delivered to:

1. Mailing Address

Chief, Solid Waste Branch
Alabama Department of Environmental Management
P.O. Box 301463
Montgomery, AL 36130-1463

2. Physical Address

Chief, Solid Waste Branch
Alabama Department of Environmental Management
1400 Coliseum Blvd.
Montgomery, Alabama 36110-2400

K. Signatory Requirement

All applications, reports or information required by this permit, or otherwise submitted to the Department, shall be signed and certified by the owner as follows:

1. If an individual, by the applicant.

2. If a city, county, or other municipality or governmental entity, by the ranking elected official, or by a duly authorized representative of that person.

3. If a corporation, organization, or other legal entity, by a principal executive officer, of at least the level of Vice President, or by a duly authorized representative of that person.

L. Confidential Information

The Permittee may claim information submitted as confidential if the information is protected under Code of Alabama 1975 §22-39-18, as amended.

M. State Laws and Regulations

Nothing in this permit shall be construed to preclude the initiation of a legal action or to relieve the Permittee from the responsibilities, liabilities, or penalties established pursuant to an applicable state law or regulation.

SECTION II. GENERAL OPERATING CONDITIONS.

A. Operation of Facility

The Permittee shall operate and maintain the disposal facility consistent with the Application, this permit, and ADEM Admin. Code Division 13.

B. Open Burning

The Permittee shall not allow open burning without prior written approval from the Department and other appropriate agencies. A burn request should be submitted in writing to the Department outlining why that burn request should be granted. This request should include, but not be limited to, specifically what areas will be utilized, types of waste to be burned, the projected starting and completion dates for the project, and the projected days and hours of operation. The approval, if granted, shall be included in the operating record.

C. Prevention of Unauthorized Disposal

The Permittee shall follow the approved procedures for detecting and preventing the disposal of free liquids, regulated hazardous waste, PCB's, medical waste, and other unauthorized waste streams at the facility.

D. Unauthorized Discharge

The Permittee shall operate the disposal facility in such a manner that there will be no water pollution or unauthorized discharge. A discharge from the disposal facility or practice thereof may require a National Pollutant Discharge Elimination System permit under the Alabama Water Pollution Control Act.

E. Industrial and Medical Waste Disposal

The Permittee shall dispose of industrial process waste as required by ADEM Admin. Code Division 13, and as specified in the Application. The Permittee, prior to disposal of industrial waste and/or medical waste, shall obtain from each generator a written certification that the material to be disposed does not contain free liquids, regulated hazardous wastes, regulated medical waste, or regulated PCB wastes.

F. Boundary Markers

The Permittee shall ensure that the facility is identified with a sufficient number of permanent boundary markers that are at least visible from one marker to the next.

G. Certified Operator

The Permittee shall be required to have an operator certified by the Department on-site during hours of operation, in accordance with the requirements of ADEM Admin. Code 335-13-12.

SECTION III. SPECIFIC MSW LANDFILL REQUIREMENTS.

A. Waste Identification and Management

1. Subject to the terms of this permit, the Permittee may dispose of the nonhazardous solid wastes listed in Section III.B. Disposal of other waste streams is prohibited, except waste that is granted a temporary or one-time waiver by the Director.

2. The permitted facility boundary for the Turkey Trot Landfill is approximately 299.80 acres, with a municipal solid waste disposal area of 170.23 acres.

3. The maximum average daily volume of waste disposed at the facility, as contained in the permit application and approved by the Washington County Commission, shall not exceed 4000 tons per day. Should the average daily volume exceed this value by 20% or 100 tons per day, whichever is less, for two (2) consecutive quarters the Permittee shall be required to modify the permit in accordance with ADEM Admin. Code r. 335-13-5-.06(2)(b)2. An increase in the maximum average daily volume shall not be approved by the Department unless the Permittee has received local approval for the increased maximum average daily volume. The average daily volume shall be computed as specified by ADEM Admin. Code r. 335-13-4-.22(2)(g).

B. Waste Streams

The Permittee may accept for disposal of nonhazardous solid wastes, noninfectious putrescible and nonputrescible wastes including but not limited to household garbage, industrial waste, construction and demolition debris, commercial waste, appliances, tires, trees, limbs, stumps, sludge, paper and other similar type materials. Special waste approved by the Department may also be accepted.

C. Service Area

The service area for this landfill, as contained in the permit application and approved by the Washington County Commission is the States of Alabama, Georgia, Tennessee, Mississippi and Florida.

D. Special Waste

The Permittee may dispose of special wastes in accordance with ADEM Admin. Code Division 13.

1. Asbestos Waste. The Permittee shall dispose of asbestos waste in accordance with ADEM Admin. Code r. 335-13-4-.26.

2. Foundry Sand. The Permittee shall dispose of foundry waste in accordance with ADEM Admin. Code r. 335-13-4-.26.

3. Petroleum Contaminated Waste. The Permittee shall dispose of petroleum contaminated waste in accordance with ADEM Admin. Code r. 335-13-4-.26.

4. Municipal Solid Waste Ash. The Permittee shall dispose of municipal solid waste ash in accordance with ADEM Admin. Code r. 335-13-4-.26.

E. Liner Requirements

The Permittee shall install a composite liner system for the municipal solid waste disposal area as described in the Application. The facility will use either a regulatory liner system or an alternate liner system.

1. Regulatory Bottom Liner: 12" Protective Cover (Permeability of $< 1 \times 10^{-3}$ cm/sec)
Double-sided Geocomposite Drainage Media
60-mil HDPE FML Textured Geomembrane
24" Compacted Clay Liner (Permeability of $\leq 1 \times 10^{-7}$ cm/sec)

2. Alternate Bottom Liner: 12" Protective Cover (Permeability of $< 1 \times 10^{-3}$ cm/sec)
Double-sided Geocomposite Drainage Media
60-mil HDPE FML Textured Geomembrane
Geosynthetic Clay Liner (GCL)
12" Compacted Soil Liner (Permeability of $\leq 1 \times 10^{-5}$ cm/sec)

The base of the composite liner system shall be a minimum of five (5) feet above the highest measured groundwater level as determined by ADEM Admin. Code r. 335-13-4-.11(2)(a).

F Septic Tank Pumpings and Sewage Sludge

The Permittee shall not dispose of septic tank pumpings and/or sewage sludge unless specifically approved in writing by the Department.

G. Large Dead Animals and Highly Putrescible Wastes

The Permittee shall handle the disposal of large dead animals and/or highly putrescible waste as required by ADEM Admin. Code r, 335-13-4-.22(1)(j).

H. Cover Requirements

The Permittee shall cover all waste as required by ADEM Admin. Code Division 13. The municipal solid waste disposal area shall be covered with a minimum of six inches of compacted earth or other alternative cover material approved by the Department and listed in Section X, shall be added at the conclusion of each day's activities. The Permittee may utilize synthetic tarps, petroleum contaminated soil, and automobile shredder residue as an alternate daily cover. (See Section X.3., 4., 5.)

I. Waste Compaction

All waste shall be thoroughly compacted with adequate landfill equipment before the daily or weekly cover is applied. A completed daily cell shall not exceed eight feet in vertical thickness measured perpendicular to the slope of the preceding cell.

J. Daily Cells

All waste shall be confined to an area as small as possible within a single working face and spread to a depth not exceeding two feet prior to compaction, and such compaction shall be accomplished on a face slope not to exceed 4 to 1or as otherwise approved by the Department.

K. Security

The Permittee shall provide artificial and/or natural barriers, which prevent entry of unauthorized vehicular traffic to the facility.

L. All Weather Access Roads

The Permittee shall provide an all-weather access road to the dumping face that is wide enough to allow passage of collection vehicles.

M. Adverse Weather Disposal

The Permittee shall provide for disposal activities in adverse weather conditions.

N. Personnel

The Permittee shall maintain adequate personnel to ensure continued and smooth operation of the facility.

O. Equipment

The Permittee shall provide the landfill equipment as required by ADEM Admin. Code r. 335-13-4-.22(1)(f).

P. Environmental Monitoring and Treatment Structures

The Permittee shall provide protection and proper maintenance of environmental monitoring and treatment structures.

Q. Vector Control

The Permittee shall provide for vector control as required by ADEM Admin. Code Division 13.

R. Bulk or Noncontainerized Liquid Waste

The Permittee shall not dispose of bulk or noncontainerized liquid waste, or containers capable of holding liquids, unless the conditions of ADEM Admin. Code r. 335-13-4-.22(1)(k) are met.

S. Empty Containers

The Permittee shall render empty containers larger than normally found in household waste unsuitable for holding liquids prior to delivery to the landfill unit unless otherwise approved by the Department.

T. Other Requirements

The Department may enhance or reduce the requirements for operating and maintaining the landfill as deemed necessary by the Land Division.

U. Other Permits

The Permittee shall operate the landfill according to this and other applicable permits.

V. Scavenging and Salvaging Operations

The Permittee shall prevent scavenging and salvaging operations, except as part of a controlled recycling effort.

W. Signs

The Permittee shall provide a sign outlining instructions for use of the site. The sign shall be posted and have the information required by ADEM Admin. Code r. 335-13-4-.22(1)(i).

X. Litter Control

The Permittee shall control litter.

Y. Fire Control

The Permittee shall provide fire control measures.

SECTION IV. GROUNDWATER MONITORING REQUIREMENTS.

A. The Permittee shall install and/or maintain a groundwater monitoring system, as specified below.

1. The permittee shall maintain the groundwater monitoring wells and piezometers identified in Table IV.1 at the locations specified in the Application, and any other groundwater monitoring wells which are added during the active life and the post closure care period.

2. The Permittee shall maintain groundwater monitoring well GWA-1 as the background groundwater monitoring wells for the entire facility.

3. The Permittee shall install and maintain additional groundwater monitoring wells as necessary to assess changes in the rate and extent of a plume of contamination or as otherwise deemed necessary to maintain compliance with the ADEM Admin. Code Division 13.

4. Prior to installing additional groundwater monitoring wells, the Permittee shall submit a plan to the Department with a permit modification request specifying the design, location and installation of additional monitoring wells. This plan shall be submitted within 120 days prior to the installation which, at a minimum, shall include.

    a. Well construction techniques including proposed casing depths, proposed total depth, and proposed screened interval of well(s);

    b. Well development method(s);

    c. A complete analysis of well construction materials;

    d. A schedule of implementation for construction; and

    e. Provisions for determining the lithologic characteristics, hydraulic conductivity and grain-size distribution for the applicable aquifer unit(s) at the location of the new well(s).

5. The Permittee is approved for intra-well method for statistical analysis.

B. Groundwater Monitoring Requirements

1. The Permittee shall determine the groundwater surface elevation at each monitoring well and piezometer identified in Table IV.1 each time the well or piezometer is sampled and at least semi-annually throughout the active life and post-closure care period.

2. The Permittee shall determine the groundwater flow rate and direction in the first zone of saturation at least annually or each time groundwater is sampled and submit as required by ADEM Admin. Code Div. 13.

3. Prior to the initial receipt of waste at the facility, the Permittee shall sample, and analyze for the parameters listed in Appendix I of ADEM Admin. Code r. 335-13-4-.27, and/or any other parameters specified by the Department in Table IV. 2., in all monitoring wells identified in Section IV.A.2. to establish background water quality and/or as directed by ADEM Admin. Code r. 335-13-4-.27(2)(j) and ADEM Admin. Code r.335-13-4-.27(2)(a)(1).

4. The Permittee shall sample, and analyze all monitoring wells identified in Table IV.1 for the parameters listed in Appendix I of ADEM Admin. Code r. 335-13-4-.27(3), and/or any other parameters specified by the Department in Table IV.3, on a semi-annual basis throughout the active life of the facility and the post-closure care period in accordance with ADEM Admin. Code r. 335-13-4-.27(3). Sampling shall be conducted during March and September of each year, beginning with the effective date of this permit. The records and results of this sampling and analysis activity shall be submitted to the Department, within ninety (90) days of the date of sampling. Groundwater Monitoring shall be conducted according to the groundwater monitoring plan submitted February 1, 2024.

5. In addition to the requirements of Sections IV., B.1., B.2., B.3. and B.4., the Permittee shall record water levels, mean sea level elevation measuring point, depth to water, and the results of field tests for pH and specific conductance at the time of sampling for each well.

C. Sampling and Analysis Procedures

The Permittee shall use the following techniques and procedures when obtaining and analyzing samples from the groundwater monitoring wells described in Section IV.A. to provide a reliable indication of the quality of the groundwater.

1. Samples shall be collected, preserved, and shipped (when shipped off-site for analysis) in accordance with the procedures specified in the Application.

2. Samples shall be analyzed according to the procedures specified of the Application, Standard Methods for the Examination of Water and Wastewater (American Public Health Association, latest edition), Methods for Chemical Analysis of Water and Wastes (EPA-600/4-79-020), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA Publication SW-846, latest edition), or other appropriate methods approved by this Department. All field tests must be conducted using approved EPA test kits and procedures.

3. Samples shall be tracked and controlled using the chain-of-custody and QA/QC procedures specified in the Application.

D. Recordkeeping and Reporting Requirements

1. Recording of Results

For each sample and/or measurement taken pursuant to the requirements of this permit, the Permittee shall record the information required by Section I.E.9.c.

2. Recordkeeping

Records and results of all groundwater monitoring, sampling, and analysis activities conducted pursuant to the requirements of this permit shall be included in the operating record required by Section I.I.1.

E. Permit Modification

If the Permittee or the Department determines that the groundwater monitoring system no longer satisfies the requirements of ADEM Admin. Code r. 335-13-4-.14 or Section IV.A. of this permit, the Permittee must, within 120 days, submit an application for a permit modification to make necessary and/or appropriate changes to the system.

TABLE IV.1
GROUNDWATER MONITORING WELLS.

Monitoring Well Number	Top of Casing (feet msl)	Part Monitoring
	Upgradient Wells	
GWA-1	294.53	Entire Landfill
	Downgradient Wells	
GWC-1	245.14	Cell No.1
GWC-2R	241.64	Cell No.1
GWC-3	258.35	Cell No.1
GWC-4	240.72	Cell No.2
GWC-5	252.81	Cell No.1
GWC-6	254.66	Cell No.2
GWC-7	229.31	Abandoned
GWC-7R	232.80	Cell No.4
GWC-8	232.06	Cell No.2
GWC-9	229.65	Abandoned
GWC-9R	229.77	Cell No.5
GWC-10		Not Constructed
GWC-11	253.10	Cell No.5
GWC-12		Not Constructed
GWC-13		Not Constructed
GWC-14		Not Constructed
GWC-15		Not Constructed
GWC-16		Not Constructed
GWC-17		Not Constructed
GWC-18		Not Constructed
GWC-19		Not Constructed
GWC-19A		Not Constructed
GWC-20		Not Constructed
GWC-21		Not Constructed
GWC-22		Not Constructed
GWC-23		Not Constructed
GWC-24		Not Constructed
GWC-25		Not Constructed
GWC-26		Not Constructed
GWC-27		Not Constructed

GWC-28	Not Constructed
GWC-29	Not Constructed

TABLE IV.2.
BACKGROUND GROUNDWATER MONITORING

NOTE: The parameters in this Table are those listed in Appendix I of ADEM Admin. Code r. 335-13-4.

NOTE: The Permittee shall conduct a minimum of four independent sampling events as the initial sampling event, and analyze for the parameters listed above, in order to establish background water quality. Following the four independent events, the Permittee can submit a request, with justification, for the deletion of or change in these parameters.

TABLE IV.3.
SEMI-ANNUAL GROUNDWATER MONITORING PARAMETERS

NOTE: The parameters to be monitored for in this Table are those listed in Appendix I of ADEM Admin. Code r. 335-13-4 , and/or any other waste stream specific parameters.

SECTION V. GAS MONITORING REQUIREMENTS.

The Permittee must install and maintain an explosive gas monitoring system in accordance with ADEM Admin. Code Division 13.

SECTION VI. MUNICIPAL SOLID WASTE LANDFILL AIR EMISSIONS.

This landfill may be subject to ADEM Admin. Code Division 3 and the Federal Clean Air Act. Contact the ADEM Air Division for applicable requirements and permits.

SECTION VII. LEACHATE AND SURFACE WATER MANAGEMENT REQUIREMENTS.

The Permittee must collect and dispose of the leachate that is generated at the facility. The Permittee shall install a leachate collection system designed to maintain less than 12 inches (30 cm) depth of leachate over the liner. Prior to disposal, the permittee shall provide the Department with a letter from the receiving publicly or privately owned treatment works, approving the acceptance of the leachate. Discharges to publicly or privately owned treatment works may be subject to the requirements of the ADEM Water Division's State Indirect Discharge (SID) Program. The Permittee shall construct and maintain run-on and run-off control structures. Surface water discharges from drainage control structures shall be permitted through the ADEM Water Division's National Pollutant Discharge Elimination System (NPDES) Program.

The Permittee is granted permission to construct leachate storage tanks in phases. Initially the Permittee is required to construct a 250,000 gallons tank for leachate storage generated in cell 1 & Cell 2 of the landfill. Upon building future cells, a new leachate generation estimate shall be prepared, and tanks built to handle any new additional capacity. The Permittee is granted permission for recirculation of landfill leachate and leachate treatment concentrate from the leachate treatment facility. (See Section X.2.)

SECTION VIII. CLOSURE AND POST- CLOSURE REQUIREMENTS.

A. Final Cover

The landfill shall be closed in accordance with the approved application and ADEM Admin. Code Division 13. The final cover system shall consist of from bottom up an 18" layer of 1x10-5 cm/sec compacted soil, a 40

mil LLDPE liner, a composite drainage net, and 24 inches of vegetative soil layer (18 inches of soil and 6 inches of topsoil). The Permittee is approved to construct an alternate final cap system consisting of 18 inch thick infiltration layer from compacted onsite soil, 40-mil LLDPE geomembrane, geocomposite drainage layer (as described in the application), and 24 inches of vegetative (erosion) layer with a permeability of $1x10^{-3}$ cm/sec.

B. Vegetative Cover

The Permittee shall establish a vegetative or other appropriate cover within 90 days after completion of final grading requirements in the Application. Preparation of a vegetative cover shall include, but not be limited to, the placement of seed, fertilizer, mulch, and water.

C. Notice of Intent

The Permittee shall place in the operating record and notify the Department of their intent to close the landfill prior to beginning closure.

D. Completion of Closure Activities

The Permittee must complete closure activities of each landfill unit in accordance with the Closure Plan within 180 days of the last known receipt of waste.

E. Certification of Closure

Following closure of each unit, the Permittee must submit to the Department a certification, signed by an independent registered professional engineer, verifying the closure has been completed according to the Closure Plan.

F. Post-Closure Care Period

Post-closure care activities shall be conducted after closure of each unit throughout the life of this permit and continuing for a period of a minimum of thirty (30) years following closure of the facility. The Department may shorten or extend the post-closure care period applicable to the solid waste disposal facility.

G. Post-Closure Maintenance

The Permittee shall provide post closure maintenance of the facility to include regularly scheduled inspections. This shall include maintenance of the cover, vegetation, monitoring devices and pollution control equipment and correction of other deficiencies that may be observed by the Department. Monitoring requirements shall continue throughout the post closure period as determined by the Department unless all waste is removed and no unpermitted discharge to waters of the State have occurred.

H. Post-Closure Use of Property

The Permittee shall ensure that post closure use of the property never be allowed to disturb the integrity of the final cover, liner, or other components of the containment system. This shall preclude the growing of deep-rooted vegetation on the closed area.

I. Certification of Post-Closure

Following post-closure of each unit, the Permittee must submit to the Department a certification, signed by an independent registered professional engineer, verifying the post-closure has been completed according to the Post-Closure Plan.

J. Recording Instrument

The Permittee must provide documentation of compliance with the requirements of the Uniform Environmental Covenants Program in ADEM Admin. Code Division 335-5 and shall execute the following:

1. Record a notation onto the land deed within 90 days from the certification of closure. This notation shall state that the land has been used as a solid waste disposal facility, the name of the Permittee, type of disposal activity, location of the disposal facility and beginning and closure dates of the disposal activity.

2. File the covenant at the courthouse where the land deed is held, thirty (30) days of receipt of the covenant signed by ADEM's Land Division Chief.

3. The Permittee shall submit a certified copy of the recording instrument to ADEM within 120 days after permit expiration, revocation, or as directed by the Department as described in the Application.

K. Removal of Waste

If the Permittee or other person(s) wishes to remove waste, waste residues, the liner, or any contaminated soils, the owner must request and receive prior approval from the Department.

SECTION IX. FINANCIAL ASSURANCE

A. The Permittee shall maintain detailed written cost estimates, in current dollars, at the landfill office and on file with the Department in accordance with ADEM Admin. Code r. 335-13-4-.28.

B. All cost estimates must be updated annually as required by ADEM Admin Code r. 335-13-4-.28.

C. The Permittee must place a copy of the financial assurance mechanism along with other items required by ADEM Admin. Code r. 335-13-4-28. into the landfill operating record and submitted to the Department before the initial receipt of waste in the case of closure, post-closure care, or no later than 120 days after corrective action remedy has been selected.

D. The financial assurance mechanisms must ensure that funds will be available in a timely fashion when needed.

E. The financial assurance mechanisms must be legally valid, binding, and enforceable under state and federal law.

F. The Permittee shall demonstrate continuous compliance with ADEM Admin. Code r. 335-13-4-28. By providing documentation of financial assurance in at least the amount that equals or exceeds the cost estimate. Changes in the financial assurance mechanism must be approved by the Department.

G. The Permittee shall increase the closure, post-closure or corrective action cost estimates and the amount of financial assurance if changes in the closure, post-closure or correction action plans or landfill conditions increase the maximum cost.

H. The Permittee may reduce the amount of financial assurance by submitting justification and a revised estimate to the Department for approval.

SECTION X. VARIANCES AND SPECIAL AUTHORIZATIONS

1. The Permittee is granted special authorization to perform waste solidification at Turkey Trot Landfill. The solidification container is required to be inside the lined cell.

2. The Permittee is granted a variance allowing the recirculation of landfill leachate and leachate treatment concentrate from the leachate treatment facility. Leachate recirculation shall be conducted according to the approved Leachate Recirculation Plan submitted in the application. Leachate shall not be recirculated during or immediately after rainfall events. (See Section VII.)

3. The Permittee may utilize synthetic tarps as an alternate daily cover. The synthetic tarps used should be at least 50' x 50' or 50' x 75' and shall be LandPac Tarps by Pactec or an equivalent. The waste mass in its' entirety shall be covered using tarps and other approved cover materials when the tarps are not large enough. The Permittee shall be required to cover all active cells with six inches of earthen cover at the conclusion of each week's activities. (See Section III.H.)

4. The Permittee may utilize petroleum contaminated soil (PCS) as an alternate daily cover on interior slopes. The maximum petroleum contaminant level of the soil that will be used as alternative daily cover material should be 100 parts per million (ppm) of Total Petroleum Hydrocarbons (TPH). A minimum of six inches of PCS shall be applied as cover. PCS should be stockpiled within the cell away from daily traffic and operations in such a manner that rainwater runoff will not leave the limits of the lined cell area. The Permittee shall be required to cover all active cells with six inches of earthen cover at the conclusion of each week's activities. All exterior slopes shall be covered with soil in accordance with approved plans and the permit. (See Section III.H.)

5. The Permittee may utilize automobile shredder residue (ASR) as an alternate daily cover on interior slopes. A minimum of six inches of ASR shall be applied as cover. ASR should not be used during rainfall events or on exterior slopes where runoff from the ASR could leave the lined cell. The Permittee shall be required to cover all active cells with six inches of earthen cover at the conclusion of each week's activities. All exterior slopes shall be covered with soil in accordance with approved plans and the permit. (See Section III.H.)

6. The Permittee may utilize a mixture of sand and refractory brick as a base material for interior haul roads and the tipper pad. The Permittee shall be required to cover all areas where the base material mixture was used with six inches of earthen cover at the conclusion of each week's activities. The mixture of sand and refractory brick shall not be used on exterior slopes or roads.

Any variance granted by the Department may be terminated by the Department whenever the Department finds, after notice and opportunity for hearing, that the petitioner is in violation of any requirement, condition, schedule, limitation or any other provision of the variance, or that operation under the variance does not meet the minimum requirements established by state and federal laws and regulations or is unreasonably threatening the public health.

PERMIT APPLICATION

BUNNELL LAMMONS ENGINEERING

July 12, 2023 (Revised February 1, 2024)

Solid Waste Engineering Section
Solid Waste Branch, Land Division
Alabama Department of Environmental Management
P.O. Box 301463
Montgomery, AL 36130-1463

Attention: Mr. Blake Holden

Subject: **Revised Minor Modification Application Package**
Abandonment and Installation: GWC-7 and GWC-9
Used Refractory Brick Approval Request
Turkey Trot MSW Landfill
Washington County, Alabama
Solid Waste Facility Permit Number 65-05
BLE Project Number J23-5131-73

Dear Mr. Holden:

Bunnell-Lammons Engineering, Inc. (BLE) is pleased to submit this revised minor modification application package to the Alabama Department of Environmental Management (ADEM) on behalf of Turkey Trot Landfill, LLC. This revised minor modification application package was prepared at ADEM's verbal request dated February 1, 2024.

The package addresses the abandonment of existing groundwater monitoring wells GWC-7 and GWC-9 and replacement with groundwater monitoring wells GWC-7R and GWC-9R. The package also includes a request to add used refractory brick to the approved waste stream. All documents except the revised EMP have been previously submitted to ADEM. The following documents are enclosed as part of this application.

01. Completed Solid Waste Permit Application (ADEM Form 439) dated October 4, 2023. We note that the form includes the addition of used refractory brick and includes all the changes to the form requested by ADEM on September 28, 2023.
02. Copy of the cancelled check payable to ADEM in the amount of $3,275.
03. *Work Plan for Groundwater Monitoring Well Abandonment and Installation: GWC-7 and GWC-9* dated April 18, 2023 (BLE Project No. J23-5131-73). We note that the plan was approved by ADEM on August 10, 2023.
04. *Report of Groundwater Monitoring Well Abandonment and Replacement: GWC-7/GWC-7R & GWC-9/GWC-9R* dated September 28, 2023 (BLE Project No. J23-5131-73).
05. *July 12, 2023, Minor Permit Application Package Addendum, Haul Road/Tipper Pad(s) Base Material – Approval Request* dated August 17, 2023 (SCS Project No. 09222159.00).

06. *Environmental Monitoring Plan* dated January 16, 2024 (BLE Project No. J23-5131-74). We note that this revised EMP incudes all the changes as required in ADEM's email dated September 29, 2023.

We understand that these documents include the information required by ADEM to review and approve the minor modification.

If you have any questions, please do not hesitate to contact BLE at (864) 288-1265.

Sincerely,

BUNNELL LAMMONS ENGINEERING INC.

Andrew W. Alexander, P.G.
Consultant Geologist
Registered, AL #1431

Riley L. Blais
Project Geologist

Enclosed:
01 ADEM Form 439
02 Canceled Check
03 Work Plan
04 Well Installation Report
05 Used Refractory Brick Approval Request
06 Revised EMP

cc: Mr. Michael Guy, P.E. – EcoSouth
Ms. Heather Jones – ADEM
Ms. Dawn Autrey – ADEM
Mr. Eric Sanderson, P.E. – SCS Engineers

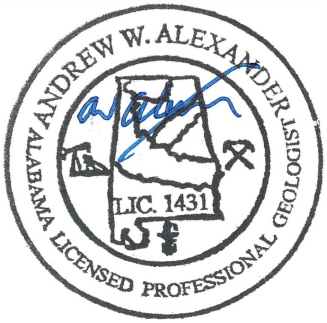
WORK PLAN FOR GROUNDWATER MONITORING WELL ABANDONMENT AND INSTALLATION: GWC-7 & GWC-9

TURKEY TROT MSW LANDFILL
WASHINGTON COUNTY, ALABAMA
SOLID WASTE PERMIT NUMBER 65-05

Prepared For:
EcoSouth Services of Mobile, LLC
2328 Mannish Ryan Road
Citronelle, Alabama 36522

BLE Project Number J23-5131-73

April 18, 2023



BUNNELL LAMMONS ENGINEERING
6004 Ponders Court | Greenville, SC 29615
864.288.1265 864.288.4330 info@blecorp.com
BLECORP.COM

BUNNELL LAMMONS ENGINEERING

April 18, 2023

Alabama Department of Environmental Management
Solid Waste Branch
1400 Coliseum Boulevard
Montgomery, Alabama 36110-2059

Attention: Mr. Blake Holden

Subject: **Work Plan for Groundwater Monitoring Well Abandonment and Installation: GWC-7 and GWC-9**
Turkey Trot MSW Landfill
Washington County, Alabama
Solid Waste Permit Number 65-05
BLE Project Number J23-5131-73

Dear Mr. Holden:

Bunnell-Lammons Engineering, Inc. (BLE) is pleased to submit this work plan to the Alabama Department of Environmental Management (ADEM) on behalf of EcoSouth Services of Mobile, LLC (ES). This work plan addresses the abandonment of existing groundwater monitoring wells GWC-7 and GWC-9 and replacement with groundwater monitoring wells GWC-7R and GWC-9R.

BACKGROUND INFORMATION

The Turkey Trot Municipal Solid Waste (MSW) Landfill is located in southern Washington County, Alabama (**Figure 1**). Cells No. 1, 2, 4, and 5A have been constructed.

There are eleven (11) groundwater monitoring wells at the site consisting of one (1) upgradient well (GWA-1) and ten (10) downgradient wells (GWC-1, GWC-2R, GWC-3, GWC-4, GWC-5, GWC-6, GWC-7, GWC-8, GWC-9, and GWC-11) [**Figure 2**]. The wells are set to intersect the groundwater in the Citronelle Formation, which is the primary uppermost sandy formation that overlies clayey formations at depth.

Historically, the semi-annual water quality sampling has been performed by Environmental Monitoring Services, LLC (EMS). In March 2023 EMS reported that monitoring wells GWC-7 and GWC-9 exhibited subsurface integrity issues. The dedicated pump is stuck in GWC-7 as the result of an assumed subsurface deflection. The dedicated pump is stuck in GWC-9 and further investigation revealed that the well is filled with sediment to approximately four (4) feet below top of casing. It is assumed that the GWC-9 subsurface well casing or screen is broken/separated which resulted in the infiltration of sediment. Both GWC-7 and GWC-9 require abandonment and replacement.

PROPOSED SCOPE OF SERVICS

The objectives of this project are to abandon two existing monitoring wells, install two replacement monitoring wells, develop the new monitoring wells, and prepare a report of the field activities. These objectives will be accomplished as follows.

Well Abandonment Procedures

The groundwater monitoring wells GWC-7 and GWC-9 will be abandoned in general accordance with the procedures recommended in ADEM's (Groundwater Branch) *Guidance for Well Abandonment*.

The construction of existing well GWC-7 is included in **Appendix A**. The surface completion of GWC-7 includes a 4-foot by 4-foot by 6-foot reinforced concrete block that was installed as part of a vertical extension of the well. The surface completion cannot be removed; therefore, the well will be abandoned in place with a 5% bentonite-cement grout. The grout will be emplaced with a tremie pipe continuously from the bottom of the well to the top of the casing. If a tremie pipe cannot be successfully inserted into the well, the grout will be emplaced via gravity.

The construction of existing well GWC-9 is included in **Appendix A**. Groundwater monitoring well GWC-9 is obstructed at approximately 4 feet below ground surface. The surface completion will be removed and the well will be overdrilled with hollow stem augers to the total depth of the original borehole (25 feet). The resulting borehole will be filled with a 5% bentonite-cement grout. The grout will be emplaced with a tremie pipe continuously from the bottom of the borehole to ground surface.

Well Installation Procedures

Wells GWC-7R and GWC-9R will be installed as close as practicable to GWC-7 and GWC-9, respectively. Based on information collected during the installation of GWC-7 and GWC-9, we have assumed that the depth of the GWC-7R will be approximately 20 feet and GWC-9R will be approximately 25 feet.

The borings will be advanced through the soils using conventional hollow-stem auger drilling techniques.

The groundwater monitoring wells will be constructed in accordance with the ADEM approved *Environmental Monitoring Plan* prepared by BLE, revised March 25, 2020. The top of each of the groundwater monitoring well's screened interval will be set slightly above the stabilized water table at the time of drilling, with approximately +/-9 feet of water in each well. Additionally, a soil sample collected from the screened interval depth of each well (3 total samples, one from each of the new monitoring wells set in soil and one sample of the filter pack sand used for well construction) will be tested in BLE's laboratory for grain size distribution in accordance with ASTM D-422 (soil) and ASTM D-1140 (filter pack).

Well Development

GWC-7R and GWC-9R will be developed in order to remove fine particles from the sand pack around the well screen. The well development will consist of the following:

1. place an electrical submersible pump, a manual hand pump, or bailer in the monitoring well;
2. purge groundwater from the well using the aforementioned pump or bailer; and
3. intermittently surge the well with a surge block.

Turbidity, pH, specific conductance, and temperature will be measured periodically during the well development. The wells will be developed until the turbidity has been reduced to 5 Nephelometric Turbidity Units (NTUs), or until further development no longer significantly reduces the turbidity.

Reporting

A report will be prepared upon completion of the abandonment and installation activities. The report will include a description of the field procedures, installation and abandonment results, and a map showing the surveyed groundwater monitoring well locations.

CLOSING

If this plan is acceptable, please provide verbal and/or written permission as soon as possible. If you have any questions, please do not hesitate to contact us at (864) 288-1265.

Sincerely,
BUNNELL-LAMMONS ENGINEERING, INC.

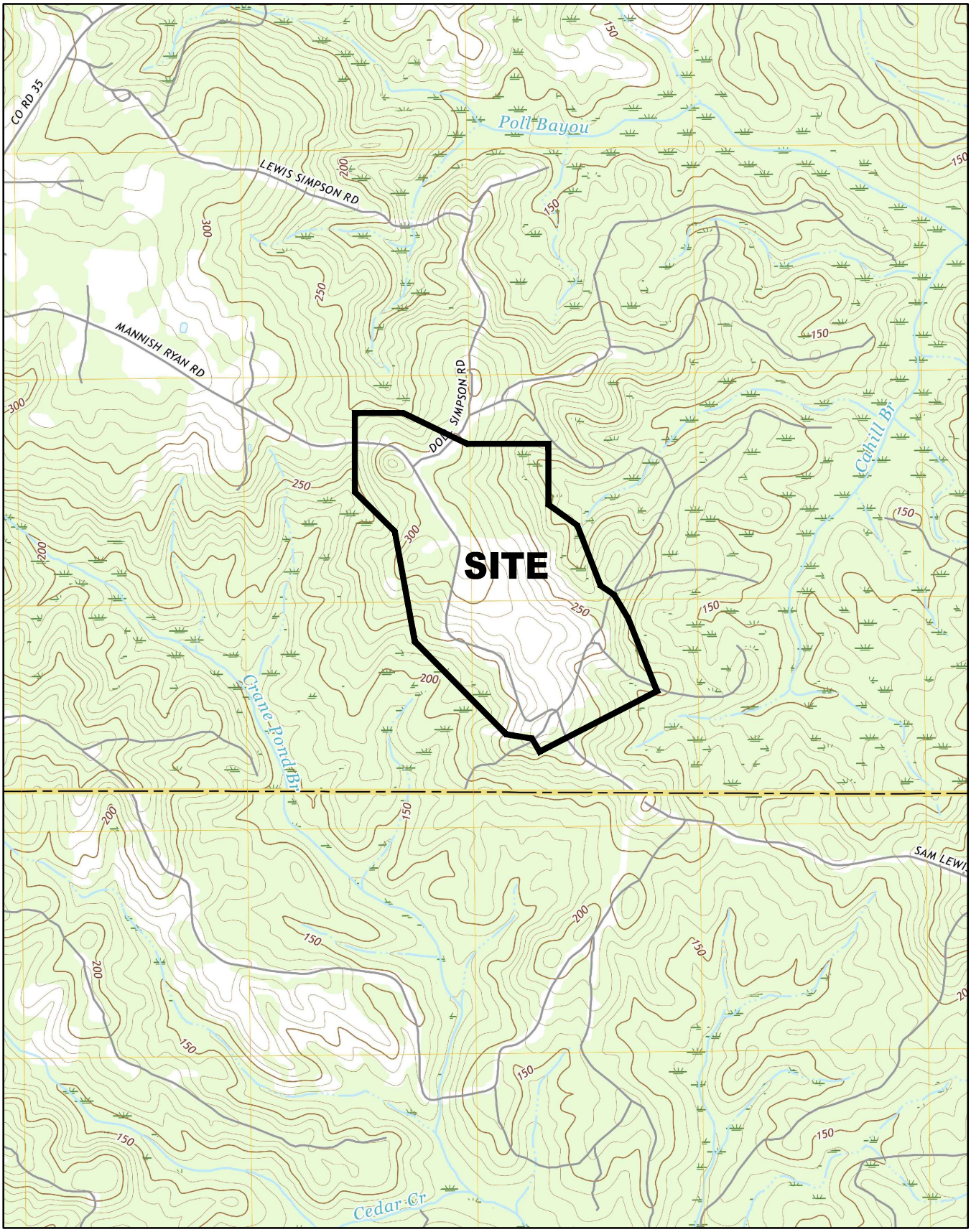
Riley L. Blais, G.I.T.
Staff Geologist

Andrew W. Alexander, P.G.
Consultant Geologist
Registered, Alabama #1431

cc: Michael Guy – EcoSouth
Jerry Cox – EcoSouth
Brandy Tiblier – ADEM

Attachments:
Figure 1 – Site Location Map
Figure 2 – Groundwater Monitoring Well Location Map
Appendix A – Groundwater Monitoring Well Boring Logs

FIGURES



2000 1000 0 2000 4000

APPROXIMATE SCALE IN FEET

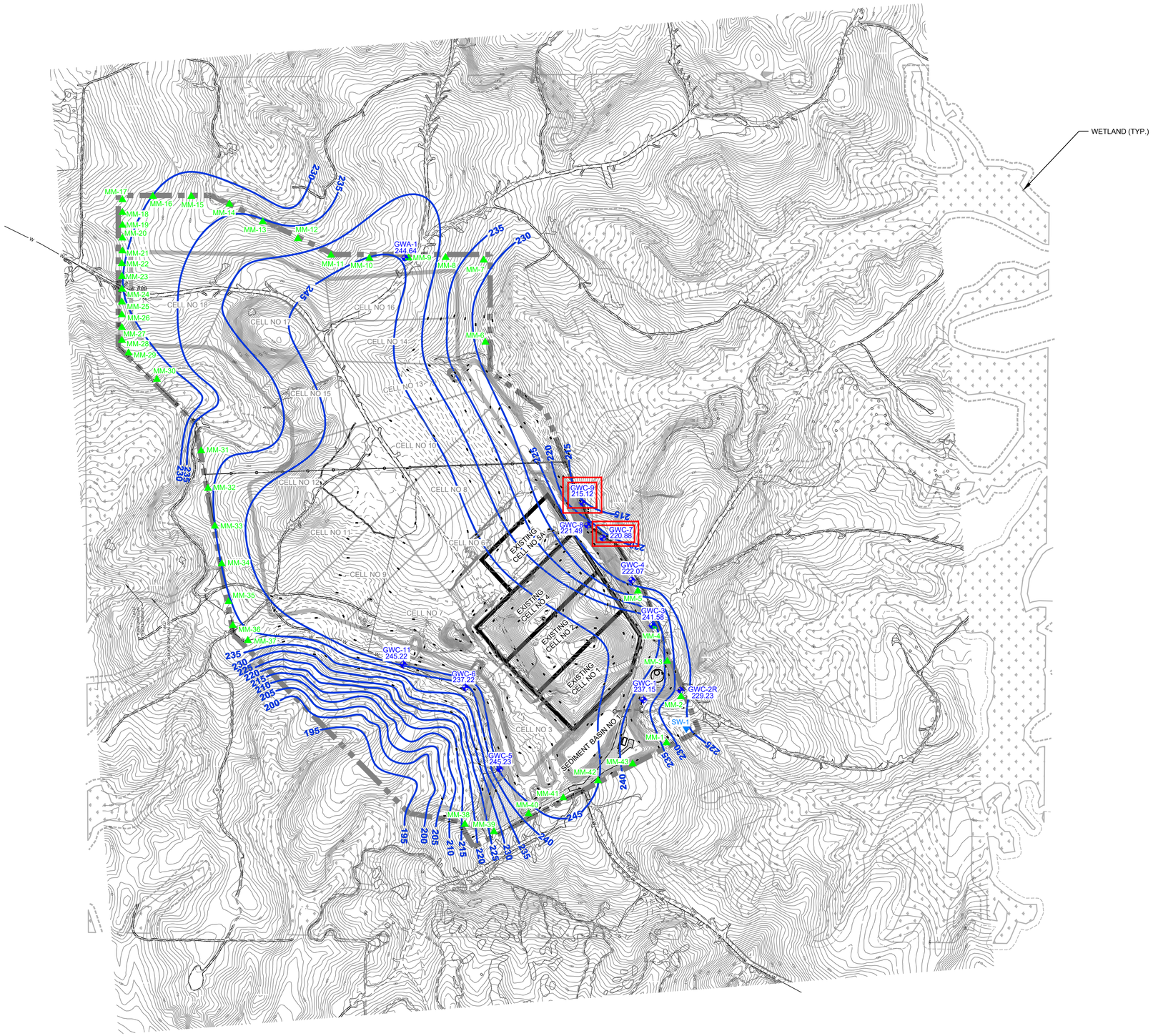
REFERENCE:
USGS TOPOGRAPHIC MAP, 7.5 MINUTE SERIES,
SIMS CHAPEL, AL. QUADRANGLE, 2020

DRAWN:	KLW	DATE:	4-18-23
CHECKED:	RLB	CAD:	TTLF73-SLM
APPROVED:	AWA	JOB NO:	J23-5131-73

BUNNELL LAMMONS ENGINEERING
6004 Ponders Court, Greenville, SC 29615
Phone: (864) 288-1265 Fax: (864) 288-4430

SITE LOCATION MAP
TURKEY TROT MSW LANDFILL
WASHINGTON COUNTY, ALABAMA

FIGURE
1



WELL/PROBE/PIEZOMETER LEGEND

GWC-1	SURVEYED LOCATION OF GROUNDWATER MONITORING WELL
SW-1	SURVEYED LOCATION OF SURFACE WATER MONITORING LOCATION
MM-1	SURVEYED LOCATION OF METHANE MONITORING BAREHOLE PUNCH LOCATION
GWC-7	LOCATION OF GROUNDWATER MONITORING WELL TO BE ABANDONED AND REPLACED

TOPOGRAPHIC/GEOLOGIC LEGEND

	SITE BOUNDARY LINE
	PROPOSED WASTE LIMITS
190	TOPOGRAPHIC SURFACE CONTOUR C. I. = 2 FEET
	UNPAVED ROADS
	TREE LINE
	WETLANDS AS MAPPED BY OTHERS
240	GROUNDWATER ELEVATION CONTOUR, CONTOUR INTERVAL = 5 FEET
231.81	GROUNDWATER ELEVATION, IN FEET
NM	WATER LEVEL NOT MEASURED

NOTE:

1. THE GENERAL CONFIGURATION OF THE WATER TABLE IS BASED ON THE GROUNDWATER CONTOURS PRESENTED ON FIGURES 6, 7, AND 8 IN THE SITE HYDROGEOLOGIC CHARACTERIZATION REPORT FOR THE PROPOSED TURKEY TROT MSW LANDFILL, DATED MAY 13, 2008 (BLE PROJECT NO. J07-5131-03), PLUS THE RECENT WATER LEVELS COLLECTED ON SEPTEMBER 6, 2022.

GENERAL MAP REFERENCE

400 200 0 400 800

APPROXIMATE SCALE IN FEET

REFERENCES:

1. FOR CELLS NO. 3, 5-10, EXISTING TOPOGRAPHIC SURVEY PREPARED BY SOUTHERN RESOURCES MAPPING CORPORATION DATED: FEBRUARY 9, 2017 AND ALL OTHER CONTOUR INFORMATION TAKEN FROM AERIAL TOPOGRAPHY PREPARED BY BECKOM AERIAL MAPPING DATED MARCH 2, 2007.
2. GROUNDWATER WELLS / BENCHMARKS SURVEYED BY WELLSTON ASSOCIATES LAND SURVEYORS, LLC, LETTER DATED: OCTOBER 5, 2010 AND SIGNED AND SEALED BY CARL B. LEWI P.L.S. ALABAMA LICENSE NO 29992. CONTRACTOR TO CONFIRM CONTROL BEFORE BEGINNING CONSTRUCTION.
3. WETLAND INFORMATION PROVIDED BY BARRY VITTOR AND ASSOCIATES INC. IN 2007.
4. BOUNDARY SURVEY PROVIDED BY THOMPSON ENGINEERING INC. DRAWING DATED: SEPTEMBER 7, 2007, SEALED BY D. BRAD BUSBY, P.L.S. ALABAMA LICENSE NO. 26951

REVISIONS		
No.	DESCRIPTION	BY

DRAWN:	KLW
CHECKED:	RLB
APPROVED:	AWA

DATE:	4-18-23
CAD FILE:	TTLF 73-GWMWLM
JOB NO:	J23-5131-73

BUNNELL LAMMONS ENGINEERING
6004 Ponders Court, Greenville, SC 29615
Phone: (864) 288-1255 Fax: (864) 288-4430

GROUNDWATER MONITORING WELL LOCATION MAP
TURKEY TROT MSW LANDFILL
WASHINGTON COUNTY, ALABAMA

FIGURE NO. 2

APPENDIX A

GROUNDWATER MONITORING WELL BORING LOGS

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWC-7

PROJECT: Turkey Trot Landfill | PROJECT NO.: J11-5131-23

CLIENT: Advanced Disposal Services, Inc. | START: 8-11-11 END: 8-15-11

LOCATION: Washington County, Alabama | ELEVATION: 231.3

DRILLER: Landprobe, J. Smith | LOGGED BY: M. Preddy

DRILLING METHOD: CME 75 Morooka; 8.25-inch OD hollow stem auger

DEPTH TO - WATER> INITIAL: ▽ 8.0 AFTER 24 HOURS: ▼ 10.20 CAVING>

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT (2 5 10 20 30 40 50 70 90)	MONITOR WELL INSTALLATION DETAILS
230 / 0	FILL				Neat cement, 0 to 6.40 feet
5					
225	Very loose, gray, wet, silty, fine to medium SAND				Bentonite seal, 6.40 to 8.10 feet
					Filter pack, sand 8.10 to 20.10 feet
10 ▼			2 2 2	●	
220	Loose, light brown, wet, slightly silty, fine SAND				
15			2 4 5	●	2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 9.85 to 19.85 feet
215					
20			3 3 4	●	Pipe cap
210	Boring terminated at 20.10 feet. Groundwater encountered at 8.0 feet at time of drilling and at 10.20 feet after 24 hours.				Total well depth, 20.10 feet
	A 6-inch PVC outer casing installed inside a 4-foot by 4-foot by 6-foot reinforced concrete box was installed around the 2-inch monitoring well for vertical extension to accomodate the placement of fill material. The annulus between the 2-inch monitoring well and 6-inch outer casing was filled with cement, and the annulus between the 6-inch outer casing and reinforced concrete box was filled with #57 stone.				SURFACE COMPLETION: 4.69-foot stick-up in a 4' x 4' concrete pad with a survey pin and stand-up steel cover
25					A vent hole was installed in the top of well casing
205					A weep hole was installed at the base of the steel cover
30					Ground surface elev. = 231.3 feet
200					Top of PVC casing elev. = 235.99 feet
					Survey pin elev. = 232.55 feet
35					Survey pin Northing = 419,848.66'
195					Survey pin Easting = 1,758,714.74'

GEOT_WELL 5131-23.GPJ 1/9/19

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWC-9

PROJECT: Turkey Trot MSW Landfill — PROJECT NO.: J19-5131-49

CLIENT: ADS — START: 3-5-19 END: 3-6-19

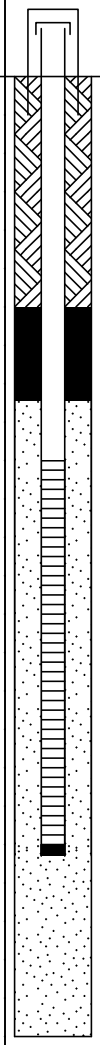
LOCATION: Citronelle, Alabama — ELEVATION: 226.23

DRILLER: EM Services, J. Williams — LOGGED BY: I. Irrizary

DRILLING METHOD: Geoprobe 7822 DT with 8.25-inch OD HSA

DEPTH TO - WATER> INITIAL: ▽ 15.2 AFTER 24 HOURS: ▼ 11.0 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT (2 5 10 20 30 40 50 70 90)
225 / 0	Very loose, yellow brown, slightly moist, medium to very fine, silty SAND			1 1 2
220 / 5	Loose, yellow brown, moist to wet, medium to very fine, silty SAND			2 4 4
215 / 10 ▼				3 4 4
210 / 15 ▽	Firm, yellow brown to gray, medium to fine, wet, silty SAND			6 6 13
205 / 20				
200 / 25	Borehole completed at 25.0 feet below ground surface. Groundwater encountered at 15.2 feet at time of drilling. Groundwater encountered at 11.0 feet 24 hours after time of drilling.			
195 / 30				
190 / 35				



MONITOR WELL INSTALLATION DETAILS

Grout, 0 to 6.0 feet

Bentonite seal, 6.0 to 8.43 feet

Filter pack, sand 8.43 to 25.0 feet

2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 10.0 to 20.0 feet

Pipe cap 0.3 feet
Total well depth, 20.3 feet

SURFACE COMPLETION

3.42-foot stick-up

4" x 4" stand-up locking steel protective cover with a 4' x 4' concrete pad at the base.

1/4-inch weep and vent holes installed in the steel cover and well casing, respectively.

Top of PVC casing elev. = 229.65'

Ground surface elev. = 226.23'

Northing = 420,121.84'

Easting = 1,758,556.07'

GEOT_WELL 5131-49.GPJ 4/1/19

KEY TO SOIL CLASSIFICATIONS AND CONSISTENCY DESCRIPTIONS

BUNNELL-LAMMONS ENGINEERING, INC.
GREENVILLE, SOUTH CAROLINA

Penetration Resistance* Blows per Foot	Relative Density
SANDS	
0 to 4	Very Loose
5 to 10	Loose
11 to 20	Firm
21 to 30	Very Firm
31 to 50	Dense
over 50	Very Dense

Penetration Resistance* Blows per Foot	Consistency
SILTS and CLAYS	
0 to 2	Very Soft
3 to 4	Soft
5 to 8	Firm
9 to 15	Stiff
16 to 30	Very Stiff
31 to 50	Hard
over 50	Very Hard

*ASTM D 1586

Particle Size Identification

Boulder: Greater than 300 mm
Cobble: 75 to 300 mm
Gravel:
Coarse - 19 to 75 mm
Fine - 4.75 to 19 mm
Sand:
Coarse - 2 to 4.75 mm
Medium - 0.425 to 2 mm
Fine - 0.075 to 0.425 mm
Silt & Clay: Less than 0.075 mm

KEY TO DRILLING SYMBOLS


Grab Sample


Split Spoon Sample


Undisturbed Sample

NR = No reaction to HCL

NA = Not applicable

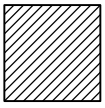
NS = No sample

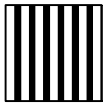

Groundwater Table at Time of Drilling

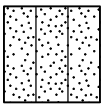

Groundwater Table 24 Hours after Completion of Drilling

KEY TO SOIL CLASSIFICATIONS

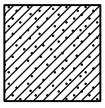

Well-graded Gravel
GW

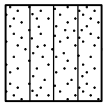

Low Plasticity Clay
CL

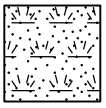

Clayey Silt
MH


Silty Sand
SM

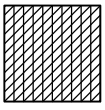

Poorly-graded Gravel
GP

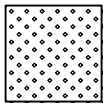

Sandy Clay
CLS

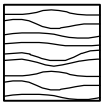

Sandy Silt
MLS


Topsoil
TOPSOIL

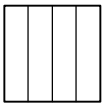

Partially Weathered Rock
BLDRCBBL

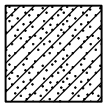

Silty Clay
CL-ML

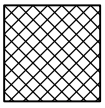

Sand
SW

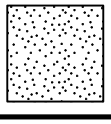

Liquid Sludge
SLUDGE

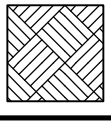

High Plasticity Clay
CH

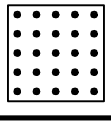

Silt
ML


Clayey Sand
SC


Fill
FILL


Poorly Graded Sand
SP


Bedrock
BEDROCK


Waste
WOOD

August 17, 2023
File No. 09222159.00

Mr. Blake Holden
Solid Waste Engineering Section
Solid Waste Branch, Land Division
Alabama Department of Environmental Management
P.O. Box 301463
Montgomery, AL. 36130-1463

Subject: **July 12, 2023, Minor Permit Application Package Addendum**
Haul Road/Tipper Pad(s) Base Material - Approval Request
Turkey Trot Landfill
Solid Waste Disposal Facility Permit No. 65-05

Dear Mr. Holden

Bunnell-Lammons Engineering, Inc. (BLE), on behalf of EcoSouth Services, LLC. (EcoSouth), submitted a Minor Permit Application Package dated July 12, 2023, regarding the abandonment and replacement of certain groundwater monitoring wells at the Turkey Trot Landfill. In addition to the July 12, 2023, Minor Permit Modification request provided by BLE, SCS Engineers (SCS), on behalf of EcoSouth, requests approval to utilize the mixture of sand and refractory brick as a base material for interior haul roads and/or tipper pad(s).

The mixture of sand and refractory brick has proven to be an effective base material for interior haul roads and/or tipper pad(s). The refractory brick will only be utilized as a base material for haul roads and/or tipper pad(s) within the lined cell area. The waste approval associated with refractory brick intended for disposal at the Turkey Trot Landfill is attached to this request.

Please contact Eric Sanderson at (334) 332-8402 or via email at esanderson@scsengineers if you have any questions or need additional information regarding this request.

Sincerely,

Eric Sanderson, P.E.
Project Director
SCS Engineers

Bernadette G. Sarmiento, P.E.
Project Manager
SCS Engineers

cc: Joe Burkel EcoSouth
Toby Bishop EcoSouth

Encl. Waste Approval – Used Refractory Brick

LANCE R. LEFLEUR
DIRECTOR

Kay Ivey
GOVERNOR

Alabama Department of Environmental Management
adem.alabama.gov

1400 Coliseum Blvd. 36110-2400 ▪ Post Office Box 301463
Montgomery, Alabama 36130-1463
(334) 271-7700 ▪ FAX (334) 271-7950

4/3/2023

Delivered Via Email to Joe Burkel

RE: Waste Certification
Used Refractory Brick

The Alabama Department of Environmental Management has reviewed your waste certification received on 3/31/2023 and has assigned a Certification Number for this waste as shown below.

Waste Profile #: VA0913	SSAB Alabama Inc
Certification #: SW-053125-E013	12400 Hwy 43 N
Expiration Date of Certification: 5/31/2025	Axis, AL

In your certification you requested one or more landfills be approved to receive your waste. Based on our review of the waste and the landfills requested, the waste is approved for disposal in the following landfills:

Axis Industrial Landfill-Lined cell	49-21
Turkey Trot Landfill	65-05

You should provide this approval letter to the landfill(s) listed above and contact the landfill to determine any special handling requirements for this waste prior to delivery to the landfill. According to ADEM regulations, the landfill may not receive this waste unless it has received a waste certification approval. For waste generated on a routine basis (not a one-time occurrence), another written certification for this waste stream should be submitted to ADEM prior to the expiration date listed above or at any time the process producing the waste changes. Each submittal should include a completed Solid Waste Profile Sheet, any supporting documentation including current analytical, and the appropriate fee. Current analytical consists of analysis performed within the past six months.

If at any time before the expiration date of this certification, new analysis of the waste is performed, the new results will supersede any prior analysis from the time the samples are taken. If the new analysis indicates the waste is still non-hazardous, the waste may continue to be disposed of at the landfill listed above until the expiration date of this certification. If the new analysis indicates the waste is hazardous, this certification is revoked. Each time new analysis is performed on the waste, copies of the analytical results should be provided to ADEM and the landfill until this certification expires. The generator should not dispose of the waste prior to the receipt and review of the sampling results. Furthermore, this approval letter does not exempt SSAB Alabama Inc from complying with all applicable requirements of the ADEM Administrative Code. If you have any questions concerning this approval or the approval process, please contact Ms. Cala Obenauf at 334-271-7824.

Sincerely,

Brent A. Watson

Brent A. Watson, Chief
Compliance and Enforcement Section
Land Division

BAW/cjo

Birmingham Branch
110 Vulcan Road
Birmingham, AL 35209-4702
(205) 942-6168
(205) 941-1603 (FAX)

Decatur Branch
2715 Sandlin Road, S.W.
Decatur, AL 35603-1333
(256) 353-1713
(256) 340-9359 (FAX)

Mobile Branch
2204 Perimeter Road
Mobile, AL 36615-1131
(251) 450-3400
(251) 479-2593 (FAX)

Mobile-Coastal
3664 Dauphin Street, Suite B
Mobile, AL 36608
(251) 304-1176
(251) 304-1189 (FAX)

PERMIT APPLICATION
SOLID WASTE DISPOSAL FACILITY
ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
(Submit in Triplicate)

1. **Facility type:**
   - [X] **Municipal Solid Waste Landfill (MSWLF)**
   - [ ] **Industrial Landfill (ILF)**
   - [ ] **Construction and Demolition Landfill (C/DLF)**
   - [ ] **CCR Landfill (CCRLF)**
   - [ ] **CCR Surface Impoundment (CCRSI)**
   - [ ] **Other (explain)**_____

2. **Facility Name** Turkey Trot Landfill

3. **Applicant/Permittee:**

   Name: Turkey Trot Landfill, LLC

   Address: 2328 Mannish Ryan Road
   Citronelle, Alabama 36522

   Telephone: (251) 654-3242

   If applicant/permittee is a Corporation, please list officers:

   Joseph Burkel - CEO
   Marye McMeans - CFO

4. **Location: (include county highway map or USGS map)**

   Township 02N **Range** 02W
   Section 3, 4, 9, & 10 **County** Washington

5. **Land Owner:**

   Name: Turkey Trot Landfill, LLC

   Address: 2328 Mannish Ryan Road
   Citronelle, Alabama 36522

   Telephone: (251) 654-3242

   (Attach copy of agreement from landowner if applicable.)

6. **Contact Person:**

Name Mr. Michael Guy, P.E.

Position or Affiliation Director of Environmental Compliance

Address: 2328 Mannish Ryan Road
Citronelle, Alabama 36522

Telephone: (251) 654-3242

7. **Size of Facility:** 299.80 **Acres**

Size of Disposal Area(s): 170.23 **Acres**

8. **Identify proposed service area or specific industry that waste will be received from:**

States of Alabama, Georgia, Tennessee, Mississippi, and Florida.

9. **Proposed maximum average daily volume to be received at landfill (choose one):**

4,000 **Tons/Day** _____ **Cubic Yards/Day**

10. **List all waste streams to be accepted at the facility (i.e., household solid waste, wood boiler ash, tires, trees, limbs, stumps, etc.):**

nonhazardous solid wastes, noninfectious putrescible and nonputrescible wastes including but not limited to household garbage, industrial wastes, construction and demolition debris, commercial wastes, appliances, tires, trees, limbs, stumps, sludge, paper and other similar type materials.

Special wastes include asbestos waste, foundry sand, petroleum contaminated wastes, municipal solid waste ash, and used refractory brick.

SIGNATURE (Responsible official of permit applicant):

_____ **TITLE:** Vice President of Post Collections

Tony Bishop **DATE:** 2023-10-04

(please print or type name)

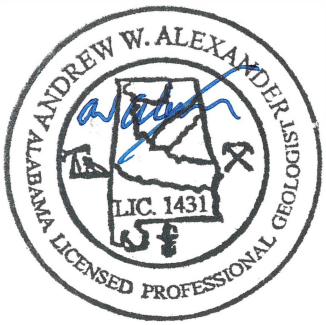
REPORT OF GROUNDWATER MONITORING WELL ABANDONMENT AND REPLACEMENT: GWC-7/ GWC-7R & GWC-9/GWC-9R

TURKEY TROT MSW LANDFILL
WASHINGTON COUNTY, ALABAMA
SOLID WASTE PERMIT NUMBER 65-05

Prepared For:
EcoSouth Services of Mobile, LLC
2328 Mannish Ryan Road
Citronelle, Alabama 36522

BLE Project Number J23-5131-73

September 28, 2023



BUNNELL LAMMONS ENGINEERING
6004 Ponders Court | Greenville, SC 29615
864.288.1265 864.288.4330 info@blecorp.com
BLECORP.COM

BUNNELL LAMMONS ENGINEERING

September 28, 2023

EcoSouth Services of Mobile, LLC
2328 Mannish Ryan Road
Citronelle, Alabama 36522

Attention: Michael Guy, P.E.

Subject: **Report of Groundwater Monitoring Well Abandonment and Replacement: GWC-7/GWC-7R and GWC-9/GWC-9R**
Turkey Trot MSW Landfill
Washington County, Alabama
Solid Waste Permit Number 65-05
BLE Project Number J23-5131-73

Dear Mr. Guy:

As authorized on April 12, 2023 by EcoSouth Services of Mobile, LLC (ES), Bunnell-Lammons Engineering, Inc. (BLE) has performed the abandonment and replacement of two groundwater monitoring wells (GWC-7 and GWC-9) at the Turkey Trot MSW Landfill in Washington County, Alabama. The objective of this project was to abandon and replace groundwater monitoring wells GWC-7 and GWC-9 which were damaged. The enclosed report includes a summary of the project information, services performed, and presents the results obtained.

Sincerely,

BUNNELL LAMMONS ENGINEERING INC.

Riley Blais, G.I.T.
Staff Hydrogeologist

Andrew W. Alexander, P.G.
Consultant Hydrogeologist
Registered, AL No. 1431

cc: Blake Holden – ADEM
Dawn Autrey – ADEM
Heather Jones – ADEM

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 PROJECT INFORMATION

The Turkey Trot Municipal Solid Waste (MSW) Landfill is located in southern Washington County, Alabama (**Figure 1**). Cells No. 1, 2, 4, and 5 have been constructed.

There are eleven (11) groundwater monitoring wells at the site consisting of one (1) upgradient well (GWA-1) and ten (10) downgradient wells (GWC-1, GWC-2R, GWC-3, GWC-4, GWC-5, GWC-6, GWC-7R, GWC-8, GWC-9R, and GWC-11) [**Figure 2**]. The wells are set to intersect the groundwater in the Citronelle Formation, which is the primary uppermost sandy formation that overlies clayey formations at depth.

Historically, the semi-annual water quality sampling has been performed by Environmental Monitoring Services, LLC (EMS). In March 2023 EMS reported that monitoring wells GWC-7 and GWC-9 exhibited subsurface integrity issues. The dedicated pump was stuck in GWC-7 as the result of an assumed subsurface deflection. The dedicated pump was stuck in GWC-9 and further investigation revealed that the well was filled with sediment to approximately four (4) feet below top of casing. It was assumed that the GWC-9 subsurface well casing or screen is broken/separated which resulted in the infiltration of sediment. Both GWC-7 and GWC-9 required abandonment and replacement.

On behalf of ES, BLE submitted a work plan titled *Work Plan for Groundwater Monitoring Well Abandonment and Installation: GWC-7 and GWC-9* to the Alabama Department of Environmental Management (ADEM) on April 25, 2023. The work plan was subsequently reviewed by ADEM with no modifications required. ADEM requested ES prepare and submit a minor modification application package which included the work plan for approval. The minor mod was submitted by BLE on behalf of ES on July 12, 2023. ADEM verbally informed ES on July 26, 2023 that work could be performed prior to issuance of the permit. ADEM issued a letter on August 10, 2023 approving the work plan.

This report provides documentation of the abandonment and installation activities.

2.0 FIELD EXPLORATION

2.1 General

Field activities were performed on August 2-4, 2023. Personnel from EMS of Woodstock, Georgia, performed the monitoring well abandonment and installation activities. Mr. Michael Guy of ES documented the abandonment and installations and provided the information to BLE. A registered surveyor from Rowe Engineering and Surveying of Mobile, Alabama was retained by ES to survey the new monitoring well locations for horizontal and vertical control (survey data attached in **Appendix A** and summarized on **Table 1**). It is noted that GWC-7R is labeled as Well No. 2 and GWC-9R is listed as Well No. 1 on the surveyor's report.

The abandoned and replaced monitoring well locations are shown on **Figure 2**.

2.2 Well Abandonment

The groundwater monitoring wells, GWC-7 and GWC-9 were abandoned in general accordance with the procedures recommended in ADEM's (Groundwater Branch) *Guidance for Well Abandonment* and BLE's work plan.

2.2.1 GWC-7 Abandonment

The surface completion of GWC-7 included a 4-foot by 4-foot by 6-foot reinforced concrete block that was installed as part of a vertical extension of the well. The surface completion could not be removed; therefore, the well was abandoned in place. The abandonment procedures for groundwater monitoring well GWC-7 consisted of the following:

1. Locate GWC-7 in the field.
2. Measure the total depth and check for obstructions using a weighted tag line (the pump could not be removed. No other obstructions were observed in GWC-7 prior to abandonment).
3. Tremie grout the PVC casing continuously from the bottom of the casing to the top of casing with a 5% bentonite-cement grout.

2.2.2 GWC-9 Abandonment

Groundwater monitoring well GWC-9 was obstructed at approximately 4 feet below ground surface. The abandonment procedures for groundwater monitoring well GWC-9 consisted of the following:

1. Locate GWC-9 in the field.
2. Remove the protective steel cover and concrete pad.
3. Measure the total depth and recheck for obstructions using a weighted tag line. The pump could not be removed. The top of the pump was measured at 17.34 feet below ground surface.
4. Tremie grout the PVC casing continuously from the bottom of the casing to ground surface with a 5% bentonite-cement grout.

The locations of the abandoned groundwater monitoring wells are shown on **Figure 2**.

2.3 Monitoring Well GWC-7R and GWC-9R Installation

2.3.1 Drilling Procedures

The borings for GWC-7R and GWC-9R were drilled as close as practicable (within 10 feet) to GWC-7 and GWC-9, respectively. The borings were performed using a Geoprobe 6620 drilling rig employing hollow stem augers. The down-hole equipment was steam cleaned prior to drilling activities.

The soil borings were advanced by twisting a continuous flight of steel, 8.25-inch outer diameter (OD), hollow-stem augers into the soil. The borehole for GWC-7R was terminated at 20 feet below ground surface and the borehole for GWC-9R was terminated at 25 feet below ground surface.

The soil descriptions recorded on the boring log in **Appendix B** are based on visual examination by the well driller (Matthew Young from EMS). The descriptions conform to the Unified Soil Classification System (USCS). A sieve analysis was performed (via ASTM Method D-422) on soil samples collected from the depth of each groundwater monitoring well's screened interval. The soil laboratory results are included in **Appendix C**.

2.3.2 Subsurface Conditions

The site is geologically located in the Coastal Plain Geologic Province in southwestern Alabama north of Mobile Bay. The near-surface geologic units include the *Pliocene-Pleistocene Citronelle Formation* underlain by *Miocene Series undifferentiated* sediments.

The *Pliocene-Pleistocene Citronelle Formation*, which includes white, yellow and red sand and gravel, overlies the Miocene sediments in the southern part of Washington County and forms the northwest-southeast striking ridge through the site. Limonite pebbles and lenses of limonite cemented sand occur locally in weathered exposures.

Underlying the *Citronelle Formation* are sediments of the Miocene Series undifferentiated, which crop out in a large part of Washington County and Mobile County. The unit has been reported to be from about 300 to 1000 feet thick in Washington County and consists of light-gray and varicolored clay, varicolored sand, gravel, marl, and sandstone.

In general, monitoring wells GWC-7R and GWC-9R were set to intersect groundwater in the *Citronelle Formation*.

2.3.3 Groundwater Monitoring Well Installation

A groundwater monitoring well was installed in each of the boreholes after the soil sampling and drilling were completed. The as-built well locations are shown in **Appendix A** and **Figure 2**. Groundwater monitoring well construction diagrams are included with the lithologic logs in **Appendix B**.

A sieve analysis was performed (via ASTM Method D-1140) on the filter pack sand. The soil laboratory results are included in **Appendix C**. The filter pack materials were found to be suitable for the formation materials encountered in each screen zone, an well as the well screen used for construction.

Each groundwater monitoring well consists of 2-inch diameter polyvinyl chloride (PVC; Johnson Schedule 40, NSF-rated) casing with flush-threaded joints installed in 8.25-inch nominal diameter boreholes. The bottom 10-foot section of each well is a manufactured well screen with 0.010-inch wide machined slots

with a 0.40-foot long sediment trap threaded onto the bottom of the screen section. In the borehole annulus of each well, silica filter sand (Filtersil) was placed around the outside of the pipe up to above the top of the well screen. A layer of hydrated bentonite (HolePlug 3/8th-inch diameter chips) was installed on top of the filter sand backfill to seal the monitoring well at the intended depth. The remaining borehole annulus was then grouted to the surface with a 5% bentonite-cement grout mixture.

The surface completion of each well consists of a PVC cap, a lockable 4" x 4" x 5' standup protective steel cover, and a 4-foot by 4-foot concrete pad at the base of the steel cover. Additionally, each well was constructed with a vent hole in the PVC casing near the top of the well, a weep hole near the base of the outer protective steel cover, pea gravel inside of the outer protective steel cover, and a survey pin in the concrete pad. An identification post painted blue was installed next to each well with its corresponding well number.

2.3.4 Monitoring Well Development

The monitoring wells were purged and developed to reduce the groundwater turbidity to the lowest practical level utilizing conventional development techniques (surging and pumping) for approximately 1 hour each. Wells GWC-7R and GWC-9R had relative high yields and approximately 115 gallons and 80 gallons of groundwater were purged from the wells, respectively. Turbidity was measured during the well development using a Hach 2100Q Portable (or similar) Turbidimeter. The wells had very high initial turbidity but were developed until further development did not substantially reduce turbidity levels. The final turbidity values achieved were 3 NTUs in GWC-9 and 0 NTUs in GWC-9R. A summary of the well development is attached in **Appendix D**.

3.0 QUALIFICATIONS OF REPORT

The activities and evaluative approaches used in this scope of work are consistent with those normally employed in hydrogeological and environmental assessments of this type. Our evaluation of site conditions has been based on our understanding of the site and project information and the data provided to BLE.

This report has been prepared on behalf of and exclusively for the use of EcoSouth Servies of Mobile, LLC. This report and the findings contained herein shall not, in whole or in part, be used or relied upon by any other party (excluding ADEM) without BLE's prior written consent.

4.0 CLOSING

We appreciate the opportunity to work with EcoSouth Services on this project. Please contact us at (864) 288-1265 if you have any questions or comments.

TABLES

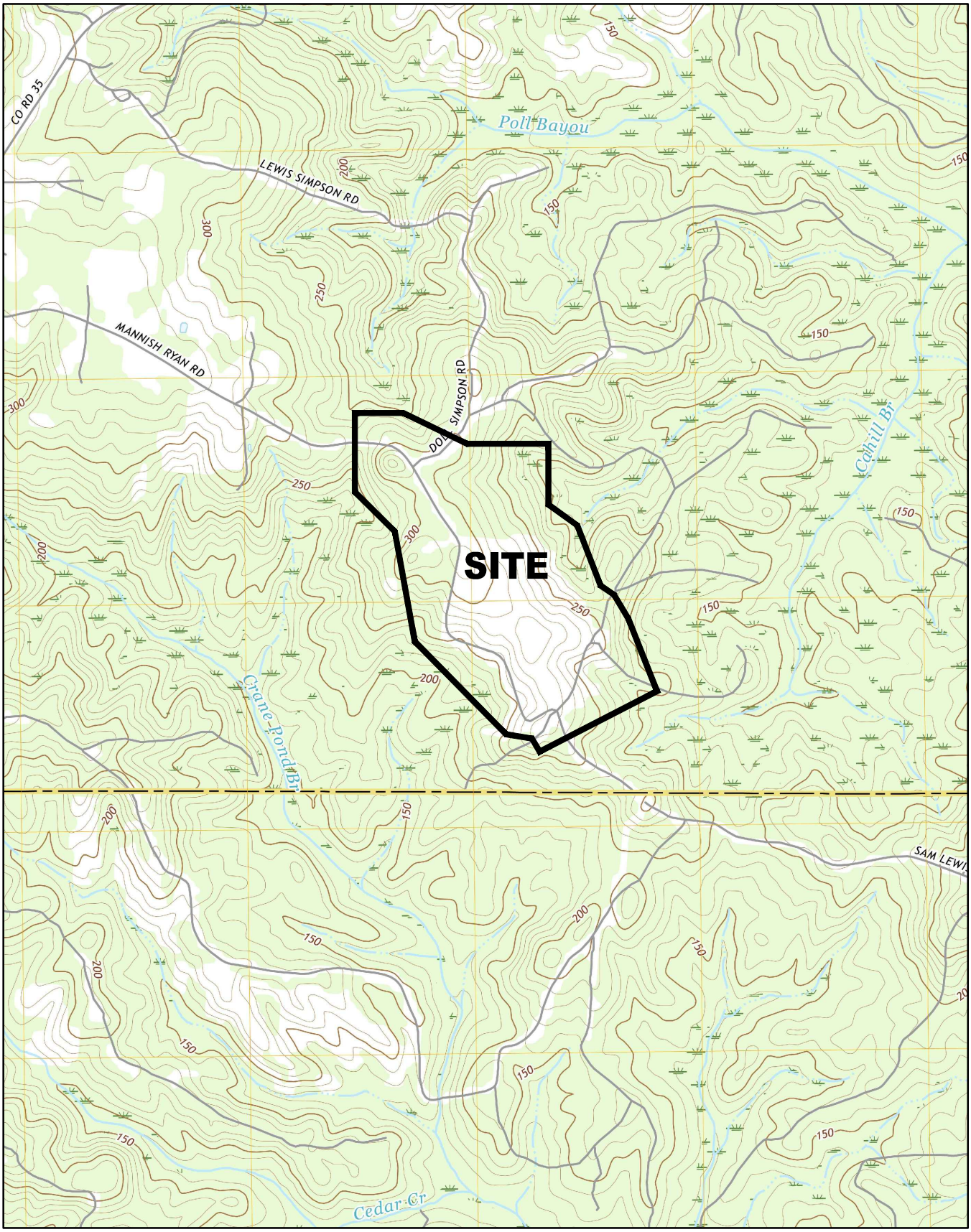
Table 1
Groundwater Monitoring Well Construction Well Data
Turkey Trot MSW Landfill
Washington County, Alabama
Solid Waste Permit Number 65-05
BLE Project Number J23-5131-73

Monitoring Point	Northing	Easting	TOC Elevation (ft)	GS Elevation (ft)	Well Depth (below GS)	Screen Depth (below GS)	Screen Length (ft)	Date Installed
GWA-1	422,037.48	1,757,168.73	294.53	291.61	58.49	48.2 - 58.2	10.0	7/16/2010
GWC-1	418,582.05	1,759,033.91	245.14	242.14	18.42	8.2 - 18.2	10.0	7/22/2010
GWC-2	Abandoned March 6, 2019							
GWC-2R	418,656.02	1,759,322.87	241.64	238.36	25.40	15.2 - 25.2	10.0	2/28/2018
GWC-3	419,161.99	1,759,102.38	258.35	255.53	28.54	18.3 - 28.3	10.0	7/21/2010
GWC-4	419,515.45	1,758,943.30	240.77	237.50	22.75	12.5 - 22.5	10.0	8/15/2011
GWC-5	418,040.50	1,757,907.87	252.81	250.14	15.84	5.6 - 15.6	10.0	7/16/2010
GWC-6	418,676.50	1,757,640.88	254.66	251.60	18.95	8.7 - 18.7	10.0	8/15/2011
GWC-7	Abandoned August 3, 2023							
GWC-7R	419,844.41	1,758,711.10	232.80	229.43	19.3	8.9 - 18.9	10.0	8/3/2023
GWC-8	419,945.09	1,758,595.73	238.12	233.10	22.6	12.4 - 22.4	10.0	8/15/2011
GWC-9	Abandoned August 3, 2023							
GWC-9R	420,127.28	1,758,550.31	229.77	226.72	24.1	13.7 - 23.7	10.0	8/2/2023
GWC-11	418,855.63	1,757,153.85	253.10	249.19	15.3	5.0 - 15.0	10.0	3/6/2019

Notes:
Survey data for GWA-1, GWC-1, GWC-3, and GWC-5 performed by Wellston Associates, Dated October 5, 2010
Survey data for GWC-2R performed by Wellston Associates, dated April 19, 2018
Survey data for GWC-4, GWC-6, GWC-7, and GWC-8 provided by Wellston Associates, dated December 1, 2011
Survey data for GWC-7R and GWC-9R provided by Rowe Engineering & Surveying, dated August 30, 2023
Vertical datum is referenced to NAVD88
TOC - Top of Casing
GS - Ground Surface
All depths shown are in FEET.

Prepared By: RLB
Checked By: ZJD

FIGURES



2000 1000 0 2000 4000

APPROXIMATE SCALE IN FEET

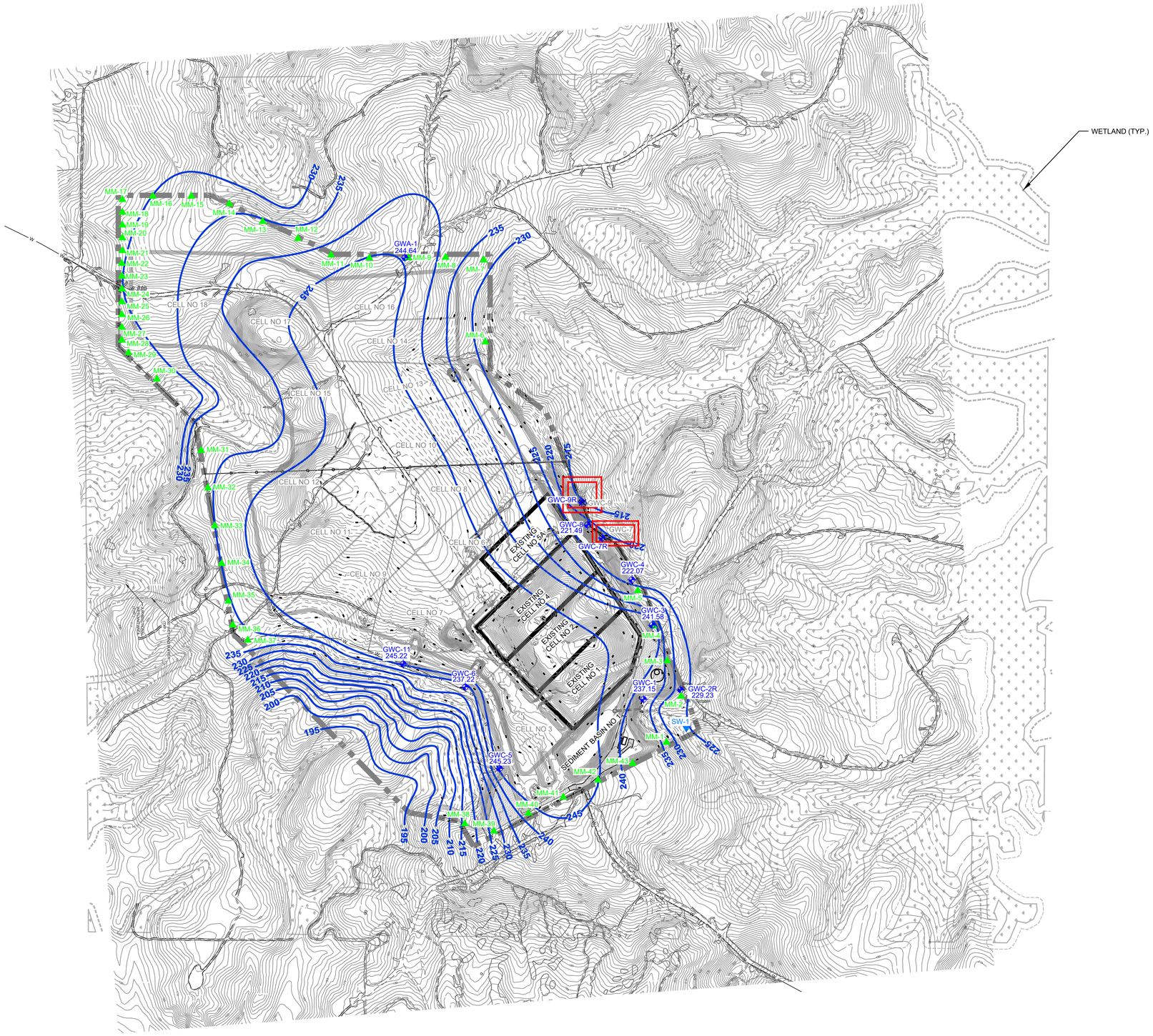
REFERENCE:
USGS TOPOGRAPHIC MAP, 7.5 MINUTE SERIES,
SIMS CHAPEL, AL. QUADRANGLE, 2020

DRAWN:	KLW	DATE:	4-18-23
CHECKED:	RLB	CAD:	TTLF73-SLM
APPROVED:	AWA	JOB NO:	J23-5131-73

BUNNELL LAMMONS ENGINEERING
6004 Ponders Court, Greenville, SC 29615
Phone: (864) 288-1265 Fax: (864) 288-4430

SITE LOCATION MAP
TURKEY TROT MSW LANDFILL
WASHINGTON COUNTY, ALABAMA

FIGURE
1



WELL/PROBE/PIEZOMETER LEGEND

GWC-1	SURVEYED LOCATION OF GROUNDWATER MONITORING WELL
SW-1	SURVEYED LOCATION OF SURFACE WATER MONITORING LOCATION
MM-1	SURVEYED LOCATION OF METHANE MONITORING BAREHOLE PUNCH LOCATION
GWC-7	LOCATION OF GROUNDWATER MONITORING WELLS ABANDONED AND REPLACED

TOPOGRAPHIC/GEOLOGIC LEGEND

	SITE BOUNDARY LINE
	PROPOSED WASTE LIMITS
190	TOPOGRAPHIC SURFACE CONTOUR C. I. = 2 FEET
	UNPAVED ROADS
	TREE LINE
	WETLANDS AS MAPPED BY OTHERS
240	GROUNDWATER ELEVATION CONTOUR, CONTOUR INTERVAL = 5 FEET
231.81	GROUNDWATER ELEVATION, IN FEET
NM	WATER LEVEL NOT MEASURED

NOTE:

1. THE GENERAL CONFIGURATION OF THE WATER TABLE IS BASED ON THE GROUNDWATER CONTOURS PRESENTED ON FIGURES 6, 7, AND 8 IN THE SITE HYDROGEOLOGIC CHARACTERIZATION REPORT FOR THE PROPOSED TURKEY TROT MSW LANDFILL, DATED MAY 13, 2008 (BLE PROJECT NO. J07-5131-03), PLUS THE RECENT WATER LEVELS COLLECTED ON SEPTEMBER 6, 2022.

GENERAL MAP REFERENCE

400 200 0 400 800

APPROXIMATE SCALE IN FEET

REFERENCES:

1. FOR CELLS NO. 3, 5-10, EXISTING TOPOGRAPHIC SURVEY PREPARED BY SOUTHERN RESOURCES MAPPING CORPORATION DATED: FEBRUARY 9, 2017 AND ALL OTHER CONTOUR INFORMATION TAKEN FROM AERIAL TOPOGRAPHY PREPARED BY BECKOM AERIAL MAPPING DATED MARCH 2, 2007.
2. GROUNDWATER WELLS / BENCHMARKS SURVEYED BY WELLSTON ASSOCIATES LAND SURVEYORS, LLC, LETTER DATED: OCTOBER 5, 2010 AND SIGNED AND SEALED BY CARL B. LEVI P.L.S. ALABAMA LICENSE NO 29992. CONTRACTOR TO CONFIRM CONTROL BEFORE BEGINNING CONSTRUCTION.
3. WETLAND INFORMATION PROVIDED BY BARRY VITTOR AND ASSOCIATES INC. IN 2007.
4. BOUNDARY SURVEY PROVIDED BY THOMPSON ENGINEERING INC. DRAWING DATED: SEPTEMBER 7, 2007, SEALED BY D. BRAD BUSBY, P.L.S. ALABAMA LICENSE NO. 26951
5. SURVEY FOR GWC-7R AND GWC-9R PERFORMED BY ROWE ENGINEERING & SURVEYING, DATED AUGUST 24, 2023., SEALED BY CECIL HUDSON, P.L.S. ALABAMA LICENSE NO 29983

REVISIONS		
No.	DESCRIPTION	BY

DRAWN:	KLW
CHECKED:	RLB
APPROVED:	AWA

DATE:	8-31-23
CAD FILE:	TITLE 73-GWMWLM
JOB NO:	J23-5131-73

BUNNELL LAMMONS ENGINEERING
6004 Ponders Court, Greenville, SC 29615
Phone: (864) 288-1265 Fax: (864) 288-4430

GROUNDWATER MONITORING WELL LOCATION MAP
TURKEY TROT MSW LANDFILL
WASHINGTON COUNTY, ALABAMA

FIGURE NO. **2**

APPENDIX A
As-Built Survey Data

ROWE
ENGINEERING & SURVEYING

August 30, 2023

EcoSouth Services of Mobile
10863 Hwy 43 N
Creola, AL 36525

Site: Turkey Trot
Field Date: 8-24-2023

We have surveyed new monitoring wells at the above site and found the following:

WELL NO. 1

Description	Northing	Easting	Elevation	Latitude	Longitude
TOP CASING	420127.279	1758550.305	229.77	31°-09'-12.278"	88°-10'-16.198"
CONC	420127.279	1758550.305	227.26	31°-09'-12.278"	88°-10'-16.198"
GS	420127.279	1758550.305	226.72	31°-09'-12.278"	88°-10'-16.198"

WELL NO. 2

Description	Northing	Easting	Elevation	Latitude	Longitude
TOP CASING	419844.407	1758711.096	232.80	31°-09'-09.488"	88°-10'-14.328"
CONC	419844.407	1758711.096	230.12	31°-09'-09.488"	88°-10'-14.328"
GS	419844.407	1758711.096	229.43	31°-09'-09.488"	88°-10'-14.328"

The vertical datum is referenced to NAVD 88 Geoid 18. Horizontal datum is referenced to Alabama State Plane West Zone (2011).

Yours very truly,
ROWE ENGINEERING & SURVEYING

Cecil T. Hudson, PLS
Alabama Licensed Professional Land Surveyor
Registration No. 29983

ALABAMA LICENSED No. 29983 PROFESSIONAL LAND SURVEYOR CECIL T. HUDSON

Zeke-Trice, LLC
dba Rowe Engineering & Surveying
3502 Laughlin Drive, Suite B
Mobile, Alabama 36693
(251) 666-2766
www.roweengineering.com

APPENDIX B
Boring Log and Installation Diagrams

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWC-7R

PROJECT: Turkey Trot MSW Landfill | PROJECT NO.: J23-5131-73

CLIENT: EcoSouth Services | START: 8-3-23 END: 8-3-23

LOCATION: Citronelle, Alabama | ELEVATION: 229.43

DRILLER: EM Services, Matthew Young | LOGGED BY: M. Young

DRILLING METHOD: Geoprobe 6620 with 8" OD Hollow Stem Auger

DEPTH TO - WATER> INITIAL: 15.0 AFTER 24 HOURS: 11.31 CAVING>

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
225 / 5	Brown fine SAND		Grout, 0 to 6.5 feet
	Tan, brown fine SAND		Bentonite seal, 6.5 to 8.5 feet
220 / 10	Tan, brown, silty fine SAND		Filter pack: Sand, 8.5 to 20.0 feet
			2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 8.9 to 18.9 feet
215 / 15	Tan, brown, wet, silty fine SAND		
210 / 20	Boring terminated at 20.0 feet below ground surface. Groundwater encountered at 15.0 feet below ground surface at time of drilling and at 11.31 feet 24 hours after drilling.		Pipe cap Total well depth, 19.3 feet
205 / 25			SURFACE COMPLETION 3.37 feet of stickup in a 4' x 4' concrete pad with a survey pin and protective steel cover. Top of PVC casing elevation = 232.80 feet Ground elevation = 229.43 feet
200 / 30			Northing: 419,844.407 feet Easting: 1,758,711.096 feet
195 / 35			
190			

GEOT_WELL NO SAMPLE 5131-73.GPJ 9/27/23

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWC-9R

PROJECT: Turkey Trot MSW Landfill | PROJECT NO.: J23-5131-73

CLIENT: EcoSouth Services | START: 8-2-23 END: 8-2-23

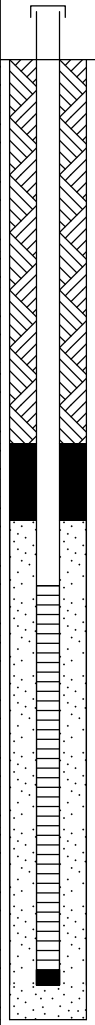
LOCATION: Citronelle, Alabama | ELEVATION: 226.72

DRILLER: EM Services, Matthew Young | LOGGED BY: M. Young

DRILLING METHOD: Geoprobe 6620 with 8" OD Hollow Stem Auger

DEPTH TO - WATER> INITIAL: 15.0 AFTER 24 HOURS: 15.58 CAVING>

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE
225 / 0	Tan, fine SAND	
5	Tan, orange, silty fine SAND	
220 / 10	Tan, orange, silty fine SAND	
215 / 15	Tan, orange, wet, silty fine SAND	
210 / 20	Tan, wet, silty fine SAND	
205 / 25	Boring terminated at 25.0 feet below ground surface. Groundwater encountered at 15.0 feet below ground surface at time of drilling and at 15.58 feet 24 hours after drilling.	
200 / 30		
195 / 35		
190		



MONITOR WELL INSTALLATION DETAILS

Grout, 0 to 10.0 feet

Bentonite seal, 10.0 to 12.0 feet

Filter pack: Sand, 12.0 to 24.1 feet

2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 13.7 to 23.7 feet

Pipe cap
Total well depth, 24.1 feet

SURFACE COMPLETION
3.05 feet of stickup in a 4' x 4' concrete pad with a survey pin and protective steel cover.

Top of PVC casing elevation = 229.77 feet

Ground elevation = 226.72 feet

Northing: 420,127.279 feet

Easting: 1,758,550.305 feet

GEOT_WELL NO SAMPLE 5131-73.GPJ 9/27/23

APPENDIX C
Soil Laboratory Testing Data

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.1	19.7	74.6	5.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2	100.0		
3/8	99.6		
#10	99.5		
#20	97.8		
#40	79.8		
#60	36.9		
#100	11.5		
#200	5.2		

* (no specification provided)

Material Description

Light brown silty f-m SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5247 D_{85}= 0.4661 D_{60}= 0.3293
D_{50}= 0.2935 D_{30}= 0.2265 D_{15}= 0.1675
D_{10}= 0.1409 C_u= 2.34 C_c= 1.11

Classification

USCS= AASHTO=

Remarks

Source of Sample: GWC **Depth:** 16-17
Sample Number: GWC-7R **Date:**

Bunnell Lammons Engineering, Inc.

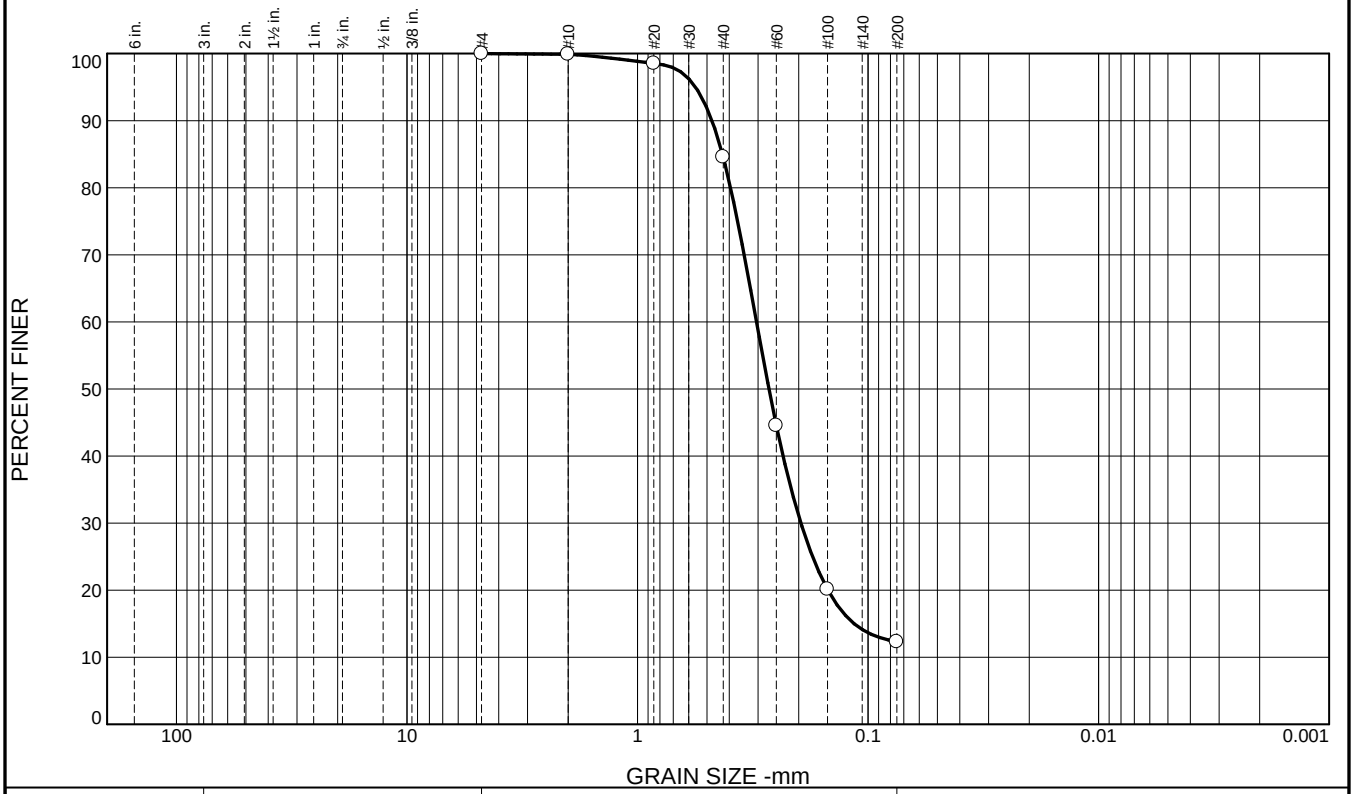
Greenville, SC

Client: EcoSouth Services of Mobile, LLC
Project: TTLF Groundwater Well Install

Project No: J23-5131-73 **Figure**

Tested By: JM **Checked By:** DM

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	15.3	72.3	12.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#20	98.5		
#40	84.6		
#60	44.5		
#100	20.1		
#200	12.3		

* (no specification provided)

Material Description

Light brown silty f-m SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4756 D_{85}= 0.4282 D_{60}= 0.3047
D_{50}= 0.2690 D_{30}= 0.1956 D_{15}= 0.1148
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: GWC **Depth:** 23-24
Sample Number: GWC-9R **Date:**

Bunnell Lammons Engineering, Inc.

Greenville, SC

Client: EcoSouth Services of Mobile, LLC
Project: TTLF Groundwater Well Install

Project No: J23-5131-73 **Figure**

Tested By: JM **Checked By:** DM

BUNNELL LAMMONS ENGINEERING

LABORATORY % FINER #200 DETERMINATION

(ASTM D1140)

SAMPLE ID.	DEPTH (FT)		TOTAL WEIGHT (g)	WEIGHT RET. #200 (g)	% FINER #200
Filter Pack	-	-	303.8	303.5	0.1

JOB NAME: TTLF GROUNDWATER WELL INSTALL
JOB NO.: J23-5131-73
DATE: 8/17/2023

TESTED BY: JOHN MATHEW
CHECKED BY: DANNY MARKER

APPENDIX D
Monitoring Well Development Logs

MONITORING WELL DEVELOPMENT LOG

DATE	**8/4/2023**	**TOTAL WELL DEPTH (TWD); TOP OF CASING =**	22.62 1/100 ft
PERSONNEL	**M. Young**	**DEPTH TO GROUND WATER (DGW) =**	14.68 1/100 ft
SITE	**Turkey Trot Landfill**	**LENGTH OF WATER COLUMN (LWC) = TWD - DGW =**	7.9 1/100 ft
JOB #	**J23-5131-73**	**1 CASING VOLUME (CV) = LWC x 0.17 =**	1.35 gallons
WELL ID	**GWC-7R**	**NUMBER CV REMOVED =**	85.20 CV
		TOTAL VOLUME OF WATER REMOVED =	115.0 gallons
		METHOD OF WELL DEVELOPMENT =	Pump & Surge
		WELL YIELD =	High

TIME	ELAPSED DEV. TIME (hrs)	VOLUME PURGED event (gallons)	VOLUME PURGED total (gallons)	SURGE	WATER TEMP (C)	pH (units)	SPECIF. COND. (µmho/cm)	TURBIDITY (NTU)	COLOR (subjective)	PURGING METHOD
10:38	0	5.0	5.0	yes	26.6	6.18	778	>1100	Tan	Pump
10:40	0:02	5.0	10.0	-	26.6	6.21	802	>1100	Tan	Pump
10:43	0:05	5.0	15.0	-	26.6	6.21	799	>1100	Tan/Brown	Pump
10:47	0:09	5.0	20.0	-	26.6	6.22	800	>1100	Tan/Brown	Pump
10:50	0:12	5.0	25.0	-	26.6	6.22	810	355	Tan	Pump
10:53	0:15	5.0	30.0	-	26.6	6.22	831	159	Tan	Pump
10:55	0:17	5.0	35.0	-	26.6	6.22	832	64	Tan	Pump
10:58	0:20	5.0	40.0	yes	26.6	6.22	833	>1100	Tan	Pump
11:00	0:22	5.0	45.0	-	26.6	6.24	831	>1100	Tan	Pump
11:03	0:25	5.0	50.0	-	26.6	6.22	837	>1100	Tan	Pump
11:06	0:28	5.0	55.0	-	26.6	6.22	836	302	Tan	Pump
11:08	0:30	5.0	60.0	yes	26.8	6.24	838	>1100	Tan	Pump
11:12	0:34	5.0	65.0	-	26.6	6.22	835	>1100	Tan	Pump
11:14	0:36	5.0	70.0	-	26.6	6.22	865	>1100	Tan	Pump
11:16	0:38	5.0	75.0	-	26.6	6.22	867	121	Tan	Pump
11:19	0:41	5.0	80.0	-	26.6	6.22	867	27	Tan	Pump
11:21	0:43	5.0	85.0	-	26.6	6.22	865	15	Tan	Pump
11:24	0:46	5.0	90.0	-	26.6	6.22	862	15	Clear	Pump
11:27	0:49	5.0	95.0	-	26.6	6.22	866	9	Clear	Pump
11:30	0:52	5.0	100.0	-	26.6	6.22	863	7	Clear	Pump
11:32	0:54	5.0	105.0	-	26.6	6.22	863	5	Clear	Pump
11:35	0:57	5.0	110.0	-	26.6	6.22	862	3	Clear	Pump
11:38	1:00	5.0	115.0	-	26.6	6.22	863	3	Clear	Pump

MONITORING WELL DEVELOPMENT LOG

DATE	**8/4/2023**	**TOTAL WELL DEPTH (TWD); TOP OF CASING =**	26.72 1/100 ft
PERSONNEL	**M. Young**	**DEPTH TO GROUND WATER (DGW) =**	11.54 1/100 ft
SITE	**Turkey Trot Landfill**	**LENGTH OF WATER COLUMN (LWC) = TWD - DGW =**	15.18 1/100 ft
JOB #	**J23-5131-73**	**1 CASING VOLUME (CV) = LWC x 0.17 =**	2.6 gallons
WELL ID	**GWC-9R**	**NUMBER CV REMOVED =**	31 CV
		TOTAL VOLUME OF WATER REMOVED =	80.0 gallons
		METHOD OF WELL DEVELOPMENT =	Pump & Surge
		WELL YIELD =	High

TIME	ELAPSED DEV. TIME (hrs)	VOLUME PURGED event (gallons)	VOLUME PURGED total (gallons)	SURGE	WATER TEMP (C)	pH (units)	SPECIF. COND. (µmho/cm)	TURBIDITY (NTU)	COLOR (subjective)	PURGING METHOD
8:23	0	0.0	0.0	-	-	-	-	-	-	-
8:25	0:02	2.0	2.0	yes	23.9	5.27	123	>1100	Orange	Pump
8:27	0:04	3.0	5.0	-	23.9	5.35	125	>1100	Orange	Pump
8:29	0:06	3.0	8.0	-	23.8	5.36	130	378	Tan, Orange	Pump
8:31	0:08	2.0	10.0	-	23.8	5.39	133	359	Tan, Orange	Pump
8:34	0:11	5.0	15.0	-	23.8	5.40	132	163	Tan	Pump
8:37	0:14	5.0	20.0	-	23.8	5.40	131	12	Tan	Pump
8:40	0:17	5.0	25.0	-	23.8	5.43	130	251	Tan	Pump
8:43	0:20	5.0	30.0	-	23.8	5.41	131	29	Tan	Pump
8:46	0:23	5.0	35.0	-	23.8	5.42	131	5	Clear	Pump
8:50	0:27	5.0	40.0	yes	23.8	5.42	129	>1100	Orange	Pump
8:54	0:31	5.0	45.0	-	23.8	5.42	135	>1100	Orange	Pump
8:58	0:35	5.0	50.0	-	23.8	5.41	130	805	Orange	Pump
9:04	0:41	5.0	55.0	-	23.8	5.42	127	6	Clear	Pump
9:06	0:43	5.0	60.0	-	23.8	5.43	126	6	Clear	Pump
9:08	0:45	5.0	65.0	-	23.8	5.43	126	13	Tan	Pump
9:11	0:48	5.0	70.0	-	23.8	5.42	125	3	Clear	Pump
9:14	0:51	5.0	75.0	-	23.8	5.43	125	2	Clear	Pump
9:17	0:54	5.0	80.0	-	23.8	5.43	125	0	Clear	Pump

ENVIRONMENTAL MONITORING PLAN

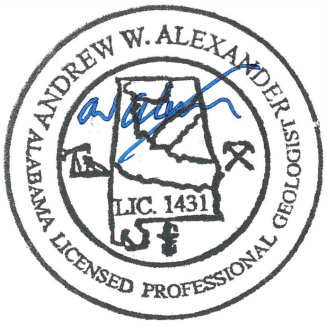
TURKEY TROT MSW LANDFILL
WASHINGTON COUNTY, ALABAMA
SOLID WASTE PERMIT NUMBER 65-05

ecosouth services

Prepared For:
Turkey Trot Landfill, LLC
2328 Mannish Ryan Road
Citronelle, Alabama 36522

BLE Project Number J23-5131-74

January 16, 2024



BUNNELL LAMMONS ENGINEERING
6004 Ponders Court | Greenville, SC 29615
864.288.1265 864.288.4330 info@blecorp.com
BLECORP.COM

BUNNELL LAMMONS ENGINEERING

January 16, 2024

Turkey Trot Landfill, LLC
2328 Mannish Ryan Road
Citronelle, Alabama 36522

Attention: Mr. Michael Guy, P.E.

Subject: **Environmental Monitoring Plan**
Turkey Trot MSW Landfill
Washington County, Alabama
Solid Waste Permit Number 65-05
BLE Project Number J23-5131-74

Mr. Guy:

Bunnell-Lammons Engineering, Inc. is pleased to present this Environmental Monitoring Plan (EMP) for the Turkey Trot Landfill MSW Landfill in Washington County, Alabama. This plan is being submitted in general accordance with Alabama Division of Environmental Management (ADEM) Administrative Code 335-13-4-.27 (groundwater), 335-13-4-.17 (surface water), 335-13-4-.16 (methane gas), and as outlined in the facility's D&O Plan.

We appreciate the opportunity to serve as your geological consultant on this project and look forward to working with you on future projects. If you have any questions, please contact us at (864) 288-1265.

Sincerely,

BUNNELL LAMMONS ENGINEERING INC.

Riley L. Blais
Project Hydrogeologist

Andrew W. Alexander, P.G.
Consultant Hydrogeologist
Registered, Alabama No. 1431

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 BACKGROUND INFORMATION

The Turkey Trot Municipal Solid Waste (MSW) Landfill is located on an approximate 299.80-acre tract of land in south-central Washington County, Alabama. The site is located just north of the Washington-Mobile County line in Sections 3, 4, 9 and 10 of Township 2 North, Range 2 West (**Figure 1**). The facility is owned and operated by Turkey Trot Landfill, LLC.

The facility's current EMP titled ***Environmental Monitoring Plan, Turkey Trot MSW Landfill, Washington County, Alabama***, revised March 25, 2020 was prepared by BLE (Project No. J07-5131-03). As part of a Minor Mod submitted for the facility in July 2023, the Alabama Department of Environmental Management (ADEM) requested that the facility prepare an update to the 2020 EMP.

This revised EMP has been prepared to include procedures and locations for groundwater, surface water, and methane gas monitoring as required by ADEM Rules 335-13-4-.27 (groundwater), 335-13-4-.17 (surface water), and 335-13-4-.16 (methane gas). The EMP is designed to detect and quantify contamination, as well as to measure the effectiveness of engineered disposal systems. The groundwater, surface water, and methane gas monitoring network for this site has been designed to provide an early warning of disposal system failure. The groundwater monitoring well locations, surface water sampling locations, and methane monitoring locations are presented on **Figure 2**. The facility will seek ADEM approval for future modifications or perform modifications as directed by ADEM.

Coal combustion residual (CCR) waste has not been placed in the Turkey Trot Landfill to date. Turkey Trot Landfill, LLC and EcoSouth Services of Mobile, LLC (ES) do not intend to accept CCR waste at the Turkey Trot landfill at this time; however, if CCR waste is intended for placement in the landfill in the future, this EMP will be updated accordingly for CCR waste (Chapter 335-13-15-.06) and approved by ADEM before the waste can be accepted for disposal.

2.0 GEOLOGIC CONDITIONS

Geologic conditions for this site summarized herein are described in the *Site Hydrogeologic Characterization Report* (SHCR), *Proposed Turkey Trot MSW Landfill, Washington County, Alabama* dated April, 2008 (BLE Project Number J07-5131-03).

The thick sequence of Tertiary sediments underlying the study area includes the *Miocene Series undifferentiated*, which is overlain by the *Citronelle Formation,* and younger *alluvial/low terrace deposits*. Sediments of the *Miocene Series undifferentiated* have been reported to be from about 300 to 1000 feet thick in Washington County and consists of light-gray and varicolored clay, varicolored sand, gravel, marl, and sandstone. The *Pliocene-Pleistocene Citronelle Formation* includes white, yellow and red sand and gravel, which overlies the Miocene sediments in the upland portions of the site. Limonite pebbles and lenses of limonite cemented sand occur locally in weathered exposures.

Geologic units strike northwestward and dip southwestward about 40 feet per mile in Washington and surrounding counties, except where affected by folding and faulting. Inactive structural geologic features in the region include the Jackson Fault, the Hatchetigbee Anticline, the Mobile Graben and Fault Zone, and McIntosh Salt Dome. Several of the faults resulted from historic deep-seated salt dome movements. Oil and gas production is present in the Citronelle Field of Mobile and Washington Counties within one mile southwest of the subject site. Oil reserves are present within the Rodessa Formation at approximately 11,000-12,000 feet below ground surface.

The major aquifer in the in the vicinity of the site is the *Miocene-Pliocene Aquifer*. In general, the stabilized water table aquifer at the site is primarily composed of the sand aquifer that is prominent across the site. The configuration of the water table is generally a subdued replica of the ground topography with flow generally radial around the central topographic ridge. Recharge to the water table aquifer occurs in the upland portions of the site. Shallow groundwater discharges to the drainage features and wetlands near the site's boundary. These drainage features flow either to the southwest (merging with the southeastward flowing Crane Pond Branch) or to the north and east toward Cahill Branch(merging with the eastward flowing Poll Bayou). A perched zone of water with limited extent is present in the central portion of the site where a discontinuous clay layer is present.

The number, location, and placement of monitoring wells are recommended herein based on the geologic and hydrogeologic site characteristics described in the SHCR report.

3.0 GROUNDWATER MONITORING PLAN

The groundwater monitoring plan (GWMP) will define the relevant point of compliance, well locations, well construction, and phasing of well installation with cell construction. ADEM requirements for the groundwater monitoring system are included in Rule 335-13-4-.27.

3.1 DETECTION MONITORING FREQUENCY

Detection monitoring at the facility is scheduled to occur semi-annually, typically each March and September. Detection monitoring will occur during the active life of the facility and also during the post-closure care period.

Background sampling of the wells prior to the landfill opening are required in order to establish a statistical database. Background sampling includes collection of a minimum of four independent samples from each groundwater monitoring well during the first semi-annual sampling period. As new cells are constructed, at least one sampling event will be conducted for each well prior to waste acceptance in the newly constructed cell.

3.2 FIELD QUALITY ASSURANCE / QUALITY CONTROL

It is the responsibility of the Operator to ensure the reliability of the analytical data gathered during the monitoring program. Field instruments that the sampler uses will be calibrated prior to field use and recalibrated in the field each day. The calibrations will be recorded in the field logbook as stated in Section 3.4 of this plan.

A trip blank should be part of each sampling event. A trip blank is collected when VOCs are of concern and is used to determine if sample handling and shipping has compromised sample integrity. The samples are filled in the laboratory with DI water. The samples are placed in the cooler with the collected groundwater samples and returned to the laboratory for analysis. The trip blank test results are not used to correct the sample results, but are reported as-is.

A field blank should be collected with each sampling event. A field blank should be collected when weather or environmental conditions are unstable during groundwater sampling (high winds, rain, heavy equipment operation). The field blank samples consist of pouring DI water into sample containers immediately after groundwater sample collection. The analysis of the field blank sample will be used to determine if air particulates may have altered the collected groundwater samples.

In selecting a laboratory to conduct analyses of groundwater samples it will be the Operator's responsibility to ensure that the laboratory of choice is exercising a proper Quality Assurance / Quality Control (QA/QC) program. The laboratory must be Alabama certified. The approved EPA test methods contain within them the requirement to run a spiked sample to determine percent recovery. This will be a part of the lab report. Additional quality control such as method blanks and duplicates are also described in the test method and will be included in the laboratory work agreement. The laboratory QA/QC program will be a part of this Plan. Quality assurance procedures are time consuming and increase the cost of testing, but the facility will be regulated based on the results and it is the Operator's advantage to employ the best qualified laboratory.

3.3 GROUNDWATER MONITORING WELL PURGING PROCEDURE

Water standing in a well prior to sampling may not be representative of in-situ groundwater quality. Therefore, the standing water should be removed so that water that is representative of the formation can enter the well. If possible, purging and sampling should be conducted from the anticipated cleanest (i.e., least contaminated location) to the most contaminated location.

Prior to purging, a new plastic sheet, such as a painter's drop cloth, should be placed around the well as a work area. The protective well casing should then be unlocked. The measuring tape and electronic water level indicator used for well depth and water levels measurements should be brought to the plastic sheet. Note that the measuring tape and electronic water level indicator should be pre-cleaned in the laboratory and wrapped in foil or otherwise protected. New latex or nitrite gloves should be donned. The well cap should then be unlocked, removed and placed top-down on a corner of the plastic sheet.

Next, well depth and water level measurements should be made. To measure well depth measure from the reference point at the top of the well casing to the bottom of the well with the weighted measuring tape. Alternatively, well depth may be obtained from data provided on the well construction logs. Water level measurements should then be measured from the reference point at the top of the well casing to the water surface with an electronic water level indicator. Well depth measurements should be made to the nearest 0.10 foot and water level measurements should be made to the nearest 0.01 foot. Groundwater elevations in wells which monitor the same waste management area should be made within a 48-hour period.

The volume of water to be evacuated should then be calculated using the following procedure:

1. Subtract the depth to water from the total well depth to obtain the height of the volume of water in the well (h).

2. Multiply h times the appropriate conversion factor to obtain the volume of water in the well in gallons:

    - For a 2-inch inside diameter well, h x 0.1623 = Volume (gal)
    - For a 4-inch inside diameter well, h x 0.6528 = Volume (gal)

Note that the weighted measuring tape and/or electronic water level indicator should be cleaned between wells by rinsing in deionized water, followed by a thorough rinse with a non-phosphate laboratory grade detergent solution, followed by a rinse in deionized water. The equipment should then be allowed to air dry and wrapped in foil for use at the next well.

Next, a bailer or positive gas displacement bladder pump will be used to purge each well. The procedure for well evacuation will depend on the yield of the well. An adequate purge is typically achieved when three to five well volumes have been removed. For low yield wells, attempts should be made to avoid purging them to dryness. However, if a well is unintentionally purged to dryness, this generally constitutes an adequate purge and the well can be sampled following a sufficient recovery. It is preferable that dedicated positive gas displacement Teflon bladder pumps, portable pumps, or peristaltic pumps be used for purging and sampling (see Low Flow Purging / Sampling Procedure). However, if they cannot be used, stainless steel sampling bailers or disposal Teflon bailers may be used.

3.3.1 Purging with a Bailer

1. Bring two dishpans and a measuring container to the work area and line one dishpan with aluminum foil.

2. Bring the bailer, which has been pre-cleaned in the laboratory and wrapped in foil (or an unopened disposable Teflon bailer) to the work area. Unwrap the bailer without touching it.

3. Bring the roll of bailer cord, which has been covered in foil (or unopened plastic) to the work area.

4. The bailer-handler and helper should don new nitrile or latex gloves.

5. Then end of the bailer rope is tied to the top of the bailer. Use foil where needed to ensure that the rope does not touch any item while in use.

6. The bailer is lifted and lowered carefully into the well until it is submerged.

7. The bailer is slowly raised from the water in a hand over hand manner and the rope is allowed to fall into the dishpan lined with foil or gathered in hand.

8. Pour groundwater from the bailer into the measuring container. Repeat the bailing procedure until three to five well volumes have been evacuated. If the bailer touches the container, line the lip with aluminum foil.

9. If the well goes dry before 3 volumes are obtained, then sampling should occur when the well has recovered sufficiently to provide a sample volume. Sampling should occur in accordance with Section E, Groundwater Monitoring Well Sampling Procedure, as soon as adequate volume has recovered.

10. The rope is untied from the bailer and the portion used is cut off for discard.

11. The used gloves, used rope, bailer foil, dishpan foil and the plastic sheet are rolled up and discarded in an appropriate manner.

3.3.2 Low Flow/Low Volume Method

Alternatively, positive gas displacement Teflon bladder pumps, portable pumps or a peristaltic pump may also be used for purging and sampling. Pumps should be made of PVC or stainless steel with internal Teflon bladders. Prior to purging, pumps should be placed mid-way in the wetted screen interval with minimum disturbance to the well. After the pump has been installed, the pump can be operated by pulsing air into the bladder with an air compressor and pump controller unit, which is used to vary discharge to the desired flow rate. Only inert material on the pumps will come into contact with the samples.

During purging, measurements of purge rate, pH, temperature, turbidity and specific conductance should be measured at periodic intervals and recorded in the bound field book as discussed in Section D, Field Records – Evacuation. Groundwater quality is considered stable and ready for sample collection when the

indicator parameters have shown no increasing or decreasing trends for three consecutive readings in a row as follows:

- ± 0.1 for pH
- ± 3% for specific conductance
- ± 10% for DO, turbidity and temperature

Final turbidity readings should be stable and, if possible, below 10 NTUs.

3.4 FIELD RECORDS – EVACUATION

A bound field book containing numbered pages or a separate field log for each well should be maintained by the sample collector to record all pertinent information regarding the evacuation and sampling of monitor wells. This recorded information is necessary to maintain well sampling data and should become part of the analytical report. The sample collector should sign and date each page of the field book or the log. The following data should be determined as follows and recorded upon the evacuation of each well:

1. Sample collector's name, date, and time that evacuation was initiated and completed.
2. Name of the facility, city and state.
3. Well Identification (i.e., monitor well number, code or name).
4. Well depth and water level depth.
5. Well casing inside diameter.
6. The calculated well volume.
7. Total gallons evacuated (well yield).
8. Water level following evacuation, to the nearest 0.01 foot.
9. Method of Evacuation (type of bailer, pump, etc.).
10. Measurements of purge rate, pH, temperature, turbidity and specific conductance during purging along with the time of each measurement.
11. Any comments or information pertaining to the condition of the well such as no cap, broken casing, grout deterioration, etc.
12. Calibration records for field instruments utilized by the samplers.

3.5 GROUNDWATER MONITORING WELL SAMPLING PROCEDURE

Once the well has been adequately purged and field parameters have stabilized, samples should be collected according to the following procedure:

1. Prior to sample collection, the sampler and helper should don new nitrile or latex gloves.

2. A helper may unscrew the appropriate sample caps and place them aside without touching the interiors or dislodging any Teflon discs inside the caps.

3. The samples are poured into the bottles and are filled to the top without headspace. A helper can hold the bottle and be responsible for recapping without touching the interior of the cap and screwing down tightly. It is not good practice to leave samples in the sun; rather they should be removed to the ice chest as soon as possible.

4. The organic samples are the most delicate and should be collected first. A sample for volatile analysis should be filled so that the vial has a meniscus. A cap will be used to close the vial so that no bubbles can be seen when the sample vial is inverted. The volatile samples are always collected in pairs. The other organic samples usually require two or three 1-liter bottles without preservative and these should be collected next, also without headspace.

5. Groundwater samples will not be field filtered. However, if excessive turbidity becomes a problem, a sample may be collected for dissolved metals to demonstrate that metals detections are related to turbidity. The dissolved metals sample should be collected immediately following the volatile samples in order to minimize sample turbidity. The dissolved metal samples will be filtered in the laboratory and preserved with HNO3.

6. Finally, preserved samples should be collected, taking great care that the acids and salts in the bottles do not contact the helper's gloves and thus pass into other caps and bottles. A list of preservatives and holding times is presented in Attachment 1. Do not allow the bailer to touch sample bottles, or allow rope ends or gloved fingers to contact the sample well water while pouring.

7. The remaining sample bottles should now be carried to the ice chest to be labeled, placed in the ice chest, and chilled with ice.

8. The labels can be pre-filled out leaving less work and time delay at the site. The label will have:

    - Name of facility
    - Date and time of sampling
    - Sample description
    - Sampler's name

    Additionally, each sample bottle should be marked with an identification (ID) number using a glass-marking crayon which is resistant to water. Bottle caps are good places to add an ID. This is a precaution in case labels get wet or come off during transport.

9. The well cap is replaced securely and the protective well casing should be locked.

10. The rope is untied from the bailer and used rope is discarded.

11. The used gloves, used rope, bailer foil, Teflon bailers, dishpan foil and the plastic sheet are folded up and discarded in an appropriate manner after each groundwater monitoring well has been sampled.

12. Proceed to the next well. Repeat.

Note that it is good practice to take an extra set of sample bottles to the field in case of breakage or accidental contamination. Also note that all waste derived from sampling activities (gloves, bailers, etc.) will be disposed of in accordance with all local, state and federal guidelines.

3.6 FIELD RECORDS – SAMPLING

An accurate and thorough field log (**Appendix A**), which will contain specific information concerning the evacuation and sampling of the groundwater monitoring wells, will be maintained. The following information will be recorded on the field log at the time of sampling:

1. Collector's name, date and time of sampling.

2. Sample identification number.

3. Measurement of pH, temperature, turbidity and specific conductance at the time of sample collection.

4. Method of sample collection – type of bailer, pump, etc.

5. Sample characteristics – Color, turbidity, odor, sediment, surface oil, etc.

6. Weather conditions at the time of sampling.

7. Any additional field observations, comments or recommendations.

3.7 CHAIN-OF-CUSTODY

Custody and protection of samples is an important legal consideration. As few people as possible should handle the samples. The sampler is personally responsible for collected samples and will be able to attest to the integrity of samples until transfer. If samples are placed in a vehicle, it will be kept locked. Any cooler will be locked or located in a place which is locked and is accessible only to responsible officials. A custody seal will be affixed to the cooler if the samples are to be shipped. Upon check-in at the laboratory, the condition of the custody seals will be attested.

A chain-of-custody form will be used to document the handling of the samples from the moment of collection until testing. The ID of each sampling point will be recorded on the form. Note that several bottles collected for different parameters will have the same ID number if they come from one sampling point. The form will be taken into the field and filled out at each well (at least time and sample number) before proceeding to the next well. The form will contain the facility name, date of sampling and name of

the collector. Each transfer of custody is recorded with an appropriate signature, date and time. If the samples are to be shipped, they will be sealed. The driver for a courier service (if used) will sign the custody form or the courier will be indicated on the COC, and a bill of lading will be secured.

3.8 DETECTION MONITORING PARAMETERS

Groundwater samples should be tested in the field for pH, specific conductance, temperature, and turbidity. Groundwater samples will be analyzed in the laboratory for the inorganic and organic constituents in Rule 335-13-4-App I: Constituents for Detection Monitoring and **Table 1**. Groundwater samples will not be field-filtered prior to laboratory analysis. The preservation procedures and holding times specified in **Appendix B** should be utilized.

3.9 LABORATORY REQUIREMENTS

The recommended minimum requirements for the laboratory are as follows and in **Appendix B**:

- Maintain preservation of the samples via refrigeration.
- Log-in samples and record pertinent information such as the condition of samples, the sample container and sample seals.
- Maintain the external Chain-of-Custody form as well as the in-house or intra-lab Chain-of-Custody if the laboratory does not maintain controlled access.
- Analyses should be performed within prescribed holding times:
    - Record date and time of analyses.
    - Identify methods of analyses and any extraction methods;
    - Use only methods which are approved by the project manager and are acceptable to the involved regulatory agency, if known.

The lab should employ good analytical practices and techniques such as:

- Clean all glassware and analytical tools, e.g. pipettes, syringes, etc.
- Use analytical reagent grade chemicals and traceable certified standards.
- Use distilled and/or deionized water with a conductivity of 1.0 µmhos/cm or less, “organic free” where necessary.
- Analysts should be adequately trained with special emphasis on laboratory safety. New analysts should become thoroughly familiarized with all laboratory safety procedures and equipment.
- Servicing of the analytical instrumentation should occur frequently and records of the servicing should be maintained.

A quality assurance/quality control (QA/QC) Program should be maintained. At a minimum, the quality assurance/quality control program should include the following components:

- Calibration of laboratory instruments to within acceptable EPA and/or manufacturer’s limits and frequencies.
- Documented inspection, maintenance, and servicing of all laboratory instruments and applicable equipment.
- Use of reference standards and quality control samples (blanks, spikes, duplicates, etc.).
- Use of thorough, documented QC procedures to monitor accuracy and precision of data.

- Regular participation in external laboratory evaluations (e.g. EPA Performance Audit Program).
- Continuous in-house training program.
- Maintenance of laboratory notebooks for each analytical method and copies of all analytical reports. All raw data produced should be checked for validity before reported and permanently stored.

3.10 ANALYTICAL REPORTS

All analytical reports will be complete with analytical data, sample ID, sample source, date sampled, date received, parameters tested, results, date extracted (if applicable) and analyzed, analyst, referenced methodologies, QC data such as percent recovery of matrix spikes and duplicate results, field logs, analysis request forms, and chain-of-custody forms. Signed copies of the monitoring results are required.

3.11 REPORTING

Within 90 days after the date(s) of sampling, the operator will submit a semi-annual report to the Department. Additionally, no more than 30 days after receipt of the analytical data, it should be determined whether there has been a statistically significant increase (SSI) over background at each well. Statistical analysis should be conducted in accordance with *Section 4.0, Statistical Analysis Plan*. Semi-annual reports should contain the information specified in the March 2011 Alabama Groundwater Monitoring Reporting Guidance for Solid Waste Facilities including field reports, analytical reports, results of statistical analysis of the groundwater data, groundwater flow rates, a groundwater elevation contour map which includes flow directions and recommendations based on the results of the groundwater monitoring.

4.0 STATISTICAL ANALYSIS PLAN

4.1 UPDATING BACKGROUND DATA

Background data for statistical evaluations will be updated approximately every two (2) years in general accordance with the procedures outline in Chapter 5.3.2 of the *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* [Unified Guidance] (March 2009 or latest version). The background well at the facility will be periodically tested using a Wilcoxon rank-sum test and/or appropriate trend test to evaluate if background groundwater conditions have changed substantially since the previous update. If no statistically significant trend has been calculated from the recently collected background data, the data may be added to the background pool.

4.2 OUTLIER ANALYSIS

Outlier analysis will be performed every two years in conjunction with the background updates using the screening tools and formal tests described in Chapter 12 of the Unified Guidance. The screening tools include probability plots (Section 12.1) and box plots (Section 12.2). The formal tests include Dixon's test (Section 12.3) and Rosner's test (Section 12.4). Outliers will only be selected for removal if they meet the specified criteria and following the rationale provided in Section 5.2.3, Section 6.3.3, and Chapter 12 of the Unified Guidance.

4.3 STATISTICAL ANALYSIS AND REGULATORY PATHWAY

In order to determine whether the groundwater is receiving contamination from the site, it is necessary to compare the results from each semi-annual event to the background data. Statistical analysis of the groundwater data will begin after the background sampling events (N=1 through N=4) have taken place and after each subsequent semi-annual event. Statistical analysis will be performed in accordance with Rule 335-13-4-.27(2)(k-m). Several inherent variabilities can affect the laboratory results and these inherent variabilities should be considered:

- The sampling technique will vary somewhat from event to event even under ideal conditions.
- The aquifer will contain a certain quantity of elements.
- The laboratory test itself can vary slightly.
- Seasonal variations can result in slightly different chemical constituents in the water samples.
- Turbidity of the sample can affect the results.

A method which identifies significant variance exceeding the inherent deviation will be used. Upon receipt of data from each semi-annual event, the statistical database will be updated. Four methods of statistical analysis may be performed on the data. The method used will depend on the number of detected concentrations and the distribution of the data for a specific compound. Techniques for performing statistical analysis will follow the Unified Guidance. The performance criteria specified in this Guidance Document is consistent with Rule 335-13-4-.27(2)(m). Selection of the statistical test to be used is based on the following:

- If greater than 50% of the data are not detected, non-parametric Prediction Limits may be performed.
- If less than 50% of the data are not detected, Normal Prediction Limits may be performed.
- Other statistical methods may be performed, if they meet the performance requirements of the EPA Unified Guidance.

Within 30 days after receiving the analytical report(s), it will be determined whether there has been an SSI over background at each well. If it is determined that there is an SSI over background concentrations, ADEM will be notified within 14 days of the finding and a copy of the notification should be placed in the operating record. A demonstration may be made that a source other than the landfill caused the detects or that the SSI resulted from natural variation in groundwater quality or from an error in sampling, analysis or statistical evaluation. This demonstration will be certified by a qualified groundwater scientist and will be submitted to ADEM. If the demonstration, or other response acceptable to ADEM has not been made within 90 days, an assessment monitoring program that conforms with Rule 335-13-4-.27(4)(a) through (j) should be initiated.

Statistical testing to determine the requirement for corrective action may include a confidence interval (or other test approved by ADEM) to be utilized for any constituent with a validated SSI to determine if the constituent is detected at statistically significant levels above the groundwater protection standard in accordance with Rule 335-13-4-.27(4)(g).

Within 14 days after determining that a constituent is detected at statistically significant levels above the groundwater protection standard the owner or operator must place a note in the operating record identifying the constituents that have exceeded the groundwater protection standards and notify the department and all other local government officials that the notice has been placed in the operating record in accordance with Rule 335-13-4-.27(4)(g)1-2.

Additionally, the owner or operator must either perform the assessment actions, notification actions, and corrective measures defined in Rule 335-13-4-.27(4)(g)3(i-iv) or may demonstrate that a source other than the landfill caused the contamination or that the SSI resulted from natural variation in groundwater quality or from an error in sampling, analysis or statistical evaluation. This demonstration will be certified by a qualified groundwater scientist and will be submitted to ADEM. Until a successful demonstration has been made, the owner or operator must comply with Rule 335-13-4-.27(4)(g), including initiating an assessment of corrective measures.

Within 90 days of finding that any of the constituents listed in Appendix II or ADEM approved alternative list have been detected at a statistically significant level exceeding the groundwater protection standards the owner or operator should initiate an assessment of corrective measures (corrective action) in general accordance with Rule 335-13-4-.27(5)(a-d). Such an assessment must be completed within a reasonable period of time.

5.0 GROUNDWATER MONITORING WELL INSTALLATION PROCEDURE

5.1 INTRODUCTION

In accordance with 335-13-4-.27(2)(a), groundwater monitoring wells should be designed to yield groundwater samples from the first saturated zone. The groundwater monitoring network should contain at least one well that represents the quality of background groundwater that has not been affected by leakage from the landfill and the monitoring network should be sufficient to represent the quality of groundwater passing the relevant point of compliance.

5.2 RELEVANT POINT OF COMPLIANCE

The relevant point of compliance has been established less than 150 meters from the boundary of the cells. The determination of the relevant point of compliance was based on the following factors:

- The hydrogeologic characteristics of the facility and the surrounding land;
- The anticipated physical/chemical characteristics of the leachate;
- The direction of groundwater flow;
- The proximity and direction of groundwater users;
- The availability of alternative drinking water supplies; and
- Public health, safety, and welfare effects.

5.3 GROUNDWATER MONITORING WELL LOCATIONS

Thirty-one groundwater monitoring wells will make up the groundwater monitoring system and their locations are indicated on **Figure 2** titled *Environmental Monitoring Network*. One upgradient monitoring well (GWA-1) will serve as a background well at the site. Thirty downgradient monitoring wells (GWC-1 through GWC-29, and GWC-19A) will be required to monitor groundwater quality downgradient of the landfill units. A summary of the existing groundwater monitoring wells is presented in **Table 2** and boring logs / well construction diagrams for existing monitoring wells are included in **Appendix C**. The monitoring wells will be installed in phases as new landfill cells are constructed. The downgradient locations have been selected based on the configuration of the water table, associated groundwater flow directions, and proposed cell sump locations.

The existing and proposed monitoring well locations are discussed below:

GROUNDWATER MONITORING WELL	EXISTING AND PROPOSED LOCATIONS AND JUSTIFICATIONS
GWA-1 (Existing)	Upgradient monitoring well set to intersect the water table in the Sand Aquifer north of Cell No. 16. The well location intersects groundwater flow upgradient of the landfill units at the northern property boundary. The well was installed in conjunction with initial cell construction at the facility.

GROUNDWATER MONITORING WELL	EXISTING AND PROPOSED LOCATIONS AND JUSTIFICATIONS
GWC-1 (Existing)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer south of Cell No. 1, the leachate tanks, and Sediment Basin No. 1. The well location is based on the local eastward groundwater flow direction from Cell No. 1 and Sediment Basin No. 1. The well was installed in conjunction with Cell No. 1 construction.
GWC-2R (Existing)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer southeast of the leachate tanks. The well location is based on the local eastward groundwater flow direction from the leachate tanks. Well GWC-2 was installed in conjunction with Cell No. 1 construction and was replaced with well GWC-2R in 2018.
GWC-3 (Existing)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer east of Cell No. 1. The well location is based on the local eastward groundwater flow direction from the Cell No. 1 sump. The well was installed in conjunction with Cell No. 1 construction.
GWC-4 (Existing)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer east of Cell No. 2. The well location is based on the local eastward groundwater flow direction from the Cell No. 2 sump. The well was installed in conjunction with Cell No. 2 construction.
GWC-5 (Existing)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer west of Cell No. 3. The well location is based on the local westward groundwater flow direction from the Cell No. 3 sump. The well was installed in conjunction with Cell No. 1 construction.
GWC-6 (Existing)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer west of Cell No. 7. The well location is based on the local westward groundwater flow direction from Cell No. 7. The well was installed in conjunction with Cell No. 2 construction.
GWC-7 (Abandoned) GWC-7R (Existing)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer east of Cell No. 4. The well location is based on the local eastward groundwater flow direction from the Cell No. 4 sump. The well was installed in conjunction with Cell No. 2 construction.
GWC-8 (Existing)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer east of Cells No. 4 and 5. The well location is based on the local eastward groundwater flow direction from Cells No. 4 and 5. The well was installed in conjunction with Cell No. 2 construction.

GROUNDWATER MONITORING WELL	EXISTING AND PROPOSED LOCATIONS AND JUSTIFICATIONS
GWC-9 (Abandoned) GWC-9R (Existing)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer east of Cell No. 5. The well location is based on the local eastward groundwater flow direction from the Cell No. 5 sump. The well was installed in conjunction with Cell No. 5 construction.
GWC-10 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer east of Cell No. 6. The well location is based on the local eastward groundwater flow direction from the Cell No. 6 sump. The well should be installed in conjunction with Cell No. 6 construction.
GWC-11 (Existing)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer southwest of Cell No. 7. The well location is based on the local southwestward groundwater flow direction from Cell No. 7. The well was installed in conjunction with Cell No. 5 construction.
GWC-12 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer southwest of Cell No. 7. The well location is based on the local southwestward groundwater flow direction from the Cell No. 7 sump. The well should be installed in conjunction with Cell No. 6 construction.
GWC-13 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer west of Cell No. 7. The well location is based on the local southwestward groundwater flow direction from the Cell No. 9 sump. The well should be installed in conjunction with Cell No. 8 construction.
GWC-14 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer east of Cell No. 8. The well location is based on the local eastward groundwater flow direction from the Cell No. 8 sump. The well should be installed in conjunction with Cell No. 8 construction.
GWC-15 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer northeast of Cell No. 10. The well location is based on the local northeastward groundwater flow direction from the Cell No. 10 sump. The well should be installed in conjunction with Cell No. 8 construction.
GWC-16 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer southwest of Cell No. 11 and south of Sediment Basin No. 2. The well location is based on the local southwestward groundwater flow direction from the Cell No. 11 sump. The well should be installed in conjunction with Cell No. 11 construction.
GWC-17 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer between Cell No. 12 and Sediment Basin No. 2. The well location is based on the local westward groundwater flow direction from Cells No. 11 and 12. The well should be installed in conjunction with Cell No. 11 construction.

GROUNDWATER MONITORING WELL	EXISTING AND PROPOSED LOCATIONS AND JUSTIFICATIONS
GWC-18 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer between Cell No. 12 and Sediment Basin No. 2. The well location is based on the local westward groundwater flow direction from the Cell No. 12 sump. The well should be installed in conjunction with Cell No. 11 construction.
GWC-19 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer northeast of Cell No. 13. The well location is based on the local northeastward groundwater flow direction from the Cell No. 13 sump. The well should be installed in conjunction with Cell No. 10 construction.
GWC-19A (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer east of Cell No. 14. The well location is based on the local northeastward groundwater flow direction from the Cell No. 14 sump. The well should be installed in conjunction with Cell No. 10 construction.
GWC-20 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer west of Cells No. 12 and 15. The well location is based on the local westward convergent groundwater flow direction from Cells No. 12 and 15. The well should be installed in conjunction with Cell No. 11 construction.
GWC-21 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer west of Cell No. 15. The well location is based on the local westward convergent groundwater flow direction and the Cell No. 15 sump. The well should be installed in conjunction with Cell No. 15 construction.
GWC-22 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer southwest of Cell No. 17. The well location is based on the local westward convergent groundwater flow direction from Cell No. 17. The well should be installed in conjunction with Cell No. 15 construction.
GWC-23 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer east of Cell No. 16. The well location is based on the local eastward convergent groundwater flow direction from the Cell No. 16 sump. The well should be installed in conjunction with Cell No. 14 construction.
GWC-24 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer west of Cells No. 17 and 18. The well location is based on the local westward groundwater flow direction and the Cell No. 17 sump. The well should be installed in conjunction with Cell No. 17 construction.
GWC-25 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer west of Cell No. 18. The well location is based on the local westward groundwater flow direction and the Cell No. 18 sump. The well should be installed in conjunction with Cell No. 17 construction.

GROUNDWATER MONITORING WELL	EXISTING AND PROPOSED LOCATIONS AND JUSTIFICATIONS
GWC-26 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer west of Cell No. 18 and Sediment Basin No. 3. The well location is based on the local northwestward groundwater flow direction from Cell No. 18. The well should be installed in conjunction with Cell No. 17 construction.
GWC-27 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer north of Cell No. 18 and Sediment Basin No. 3. The well location is based on the local northwestward groundwater flow direction from Cell No. 18 and Sediment Basin No. 3. The well should be installed in conjunction with Cell No. 17 construction.
GWC-28 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer north of Cell No. 17. The well location is based on the local northward to convergent northwestward groundwater flow direction from Cell No. 17. The well should be installed in conjunction with Cell No. 17 construction.
GWC-29 (Proposed)	Downgradient monitoring well set to intersect the water table in the Sand Aquifer north of Cell No. 16. The well location is based on the local northward to convergent northwestward groundwater flow direction from Cell No. 16. The well should be installed in conjunction with Cell No. 14 construction.

5.4 SPACING AND NUMBER OF MONITORING WELLS

The monitoring well locations were selected to intercept groundwater flow upgradient and downgradient from the landfill cells. Areas downgradient of cell sumps, leachate tanks, and convergent groundwater flow areas were targeted for monitoring. The spacing of the downgradient monitoring wells range from approximately 138 to 731 feet (average approximately 432 feet).

The number of downgradient monitoring wells (30) is sufficient to provide representative groundwater quality samples of the groundwater in the uppermost aquifer flowing past the relevant point of compliance. One upgradient monitoring well will be located north of the landfill cells.

5.5 MONITORING WELL CONSTRUCTION

Prior to installation of any groundwater monitoring well, in accordance with 335-13-4-.27(2)(c)(2) and Section IV.A.3 of the landfill's Solid Waste Disposal Facility Permit, a plan outlining the well installation, design, construction, etc. will be submitted to ADEM. The plan must be submitted a minimum of 90 days prior to the installation and must be approved by ADEM.

A geologist who is registered in the state of Alabama will oversee the groundwater monitoring well installation and a drilling contractor will perform the installation. The monitoring wells will be constructed in accordance with the "Design and Installation of Groundwater Monitoring Wells in Aquifers," ASTM Subcommittee D18.21 on Groundwater Monitoring. A typical well construction diagram is included in the D&O Plan, Sheet 26 of 31 titled *Miscellaneous Details* as Detail 8 (**Appendix D**).

Groundwater monitoring wells are designed to monitor the groundwater in the uppermost aquifer at the site. The top of the screened interval of each well should be set slightly below (approximately ±2 feet) the stabilized water table at the time of drilling, which will allow for seasonal variations in the water levels, as well as potentially lower water levels on site as a result of the upland recharge area being covered with waste cells.

The groundwater monitoring well will consist of 2-inch PVC casing (Schedule 40 with flush-threaded joints) inserted into a 6-inch (or larger) diameter borehole. The bottom 10-foot section of each well will be a manufactured well screen with 0.010-inch wide slots.

Washed filter-sand will be placed in the borehole annulus around the outside of the well screen, to approximately two feet above the top of the screen interval. The sand backfill will be used to stabilize the formation and to help yield a less turbid groundwater sample.

A two foot (minimum thickness) thick bentonite seal will be installed on top of the sand backfill to seal the monitoring well at the desired level. The remaining borehole annulus will be grouted to the surface with a cement/bentonite grout mixture. Each well will be constructed with a vent hole in the top of the PVC casing and a weep hole near the base of the outer protective steel cover. A 4-ft by 4-ft concrete pad will be constructed at the ground-surface for each well. A lockable PVC cap and a protective stickup-mounted steel cover will be placed over each well. Permanent well labels will be affixed to the protective surface casing.

5.6 MONITORING WELL DEVELOPMENT

Newly constructed wells will be developed to remove particulates that are present in the well due to construction activities, and to interconnect the well with the aquifer. Development of new monitoring wells will be performed no sooner than 24 hours after well construction. Wells may be developed with disposable bailers, a mechanical well developer, or other approved method. A surge block may be used as a means of assessing the integrity of the well screen and riser. In the event a pump is employed, the design of the pump will be such that any groundwater that has come into contact with air is not allowed to drain back into the well. Each well will be developed until sediment-free water with stabilized field parameters (i.e., temperature, pH, and specific conductance) is obtained.

Well development equipment (bailers, pumps, surge blocks) and any additional equipment that contacts subsurface formations will be decontaminated prior to on-site use, between consecutive on-site uses, and/or between consecutive well installations.

Samples withdrawn from the facility's monitoring wells should be clay and silt-free; therefore, existing wells may require redevelopment from time to time based upon observed turbidity levels during sampling activities. If redevelopment of an existing monitoring well is required, it will be performed in a manner similar to that used for a new well.

5.7 PHASING OF WELL INSTALLATION

The groundwater monitoring system for the landfill is shown on **Figure 2** *Environmental Monitoring Network*. Once constructed, the groundwater monitoring system will include 31 groundwater monitoring wells as follows:

- One upgradient monitoring well (GWA-1); and
- Thirty downgradient monitoring wells (GWC-1 through GWC-29, and GWC-19A).

The schedule for monitoring well installation is shown on **Figure 2** and is summarized on the following table.

Cell Construction	Monitoring Well Installation
Cell No. 1	GWA-1 (with initial cell to be constructed at facility), GWC-1, GWC-2R, GWC-3, GWC-5
Cell No. 2	GWC-4, GWC-6, GWC-7R, GWC-8
Cell No. 5	GWC-9R, GWC-11
Cell No. 6	GWC-10, GWC-12
Cell No. 8	GWC-13, GWC-14, GWC-15
Cell No. 10	GWC-19, GWC-19A
Cell No. 11	GWC-16, GWC-17, GWC-18, GWC-20
Cell No. 14	GWC-23, GWC-29
Cell No. 15	GWC-21, GWC-22
Cell No. 17	GWC-24, GWC-25, GWC-26, GWC-27, GWC-28

5.8 REPORTING

A report documenting the well installation including boring logs, well diagrams and field procedures, will be submitted to ADEM within 60 days of well installation, development and survey completion.

6.0 SURFACE WATER MONITORING PLAN

6.1 INTRODUCTION

Surface water monitoring will be performed to supplement the groundwater monitoring at the facility, and to evaluate surface water discharge from the on-site drainage features required in Rule 335-13-4-.17. This surface water monitoring plan (SWMP) will define the monitoring locations, phasing of sampling locations with sediment basin construction, parameters for analysis, frequency, and procedures and techniques for sample collection. Included in the SWMP are the surface water monitoring system, sampling and analysis program, and reporting requirements.

In accordance with ADEM Rule 335-13-4-.01(2)(a) regarding the discharges of surface water into the waters of the State, a National Pollutant Discharge Elimination System (NPDES) General Permit (ALG160000) has been obtained for the facility. Reporting and sampling requirements in accordance with this Permit will be maintained by the facility and are separate from the SWMP provided below.

6.2 SAMPLING LOCATIONS

Three surface water sampling locations will be established at the site and are shown on **Figure 2**. The locations include three downgradient locations consisting of SW-1, SW-2, and SW-3. The schedule for implementation of surface water sampling is also shown on **Figure 2** and is summarized on the following table.

Sediment Basin Construction	Initiate Surface Water Sampling	Justification
Basin No. 1	SW-1	Downgradient surface water location south of Basin No. 1 and along a topographic drainage feature.
Future Basin No. 2	SW-2	Downgradient surface water location at the outfall of Sediment Basin No. 2.
Future Basin No. 3	SW-3	Downgradient surface water location at the outfall of Sediment Basin No. 3.

In addition to surface water points SW-1, SW-2, and SW-3, temporary sediment traps shown on the sequence sheets of the D&O Plan will also be sampled for the same parameters as SW-1, SW-2, and SW-3 (where they are present). These temporary sediment traps will be installed and removed as cell construction proceeds and will only be sampled when they are active. They will be sampled at the same frequency as SW-1, SW-2, and SW-3.

6.3 SAMPLING PROCEDURE

Generally, automated or semi-automated samplers or other manual devices accessible from the banks of a stream or surface-water body should be used to collect surface water samples whenever possible. If naturally occurring conditions inhibit this method of sample collection, the sample may be obtained by wading up-current (and downstream) of the sampling station. The sample should be collected in an area representative of minimal turbulence and aeration. Because sample containers may be dipped by hand into the stream, extreme care will be employed to avoid contamination into the mouth of the container. If pre-preserved sample containers are used, the sampler should be careful not to displace the preservative from a pre-preserved sample container.

The following procedures are recommended for extraction and subsequent collection of surface-water samples when sampling at in-stream locations:

6.3.1 Dipping Using a Sample Container

1. Hold the bottle near the base with one hand, and with the other, remove the cap being careful not to dislodge any Teflon discs inside the cap.

2. Push the sample container into the water (mouth down) and tilt up towards the current to fill. A depth of about six inches is satisfactory. Great care should be taken to avoid breaching the surface while filling the container.

3. During times of little current movement, move the container slowly through the water laterally.

4. During times of extreme drought when the stream depths are too shallow to allow submersion of the sample container, a pool may be scooped out of the channel bottom and allowed to clear prior to sampling. However, sampling will not be conducted when stream flow conditions are below the 7-day, 10-year minimum flow (7Q10) condition.

5. Containers should be filled with sample and are filled to the top without headspace and without bubbles. The bottle should be recapped without touching the interior of the cap. It is not good practice to leave samples in the sun; rather they should be removed to the ice chest as soon as possible.

6. The organic samples are the most delicate and should be collected first. A sample for volatile analysis should be filled so that the vial has a meniscus. A cap will be used to close the vial so that no bubbles can be seen when the sample vial is inverted. The volatile samples are always collected in pairs. The other organic samples usually require two or three 1-liter bottles without preservative and these should be collected next, also without headspace. Finally, preserved samples should be collected, taking great care that the acids and salts in the bottles do not contact the helper's gloves and thus pass to other caps and bottles. Do not allow the bailer to touch sample bottles, or allow rope ends or gloved fingers to contact the sample well water while pouring.

7. The remaining sample bottles should now be carried to the ice chest to be labeled, placed in the ice chest, and chilled with ice.

8. The labels can be pre-filled out leaving less work and time delay at the site. The label should have:
    - Name of facility
    - Date of sampling and time
    - Sample description (surface water location)
    - Sampler's name

    Additionally, each sample bottle will be marked with an identification (ID) number using a glass-marking crayon which is resistant to water. Bottle caps are good places to add an ID. This is a precaution in case labels get wet or come off during transport.

6.3.2 Sampling From a Flowing Outfall

1. Hold the bottle near the base with one hand, and with the other, remove the cap being careful not to dislodge any Teflon discs inside the cap.

2. Hold the container underneath the outfall and allow the container to be filled to the top without headspace. The bottle should be recapped without touching the interior of the cap. It is not good practice to leave samples in the sun; rather they should be removed to the ice chest as soon as possible.

3. The organic samples are the most delicate and should be collected first. A sample for volatile analysis should be filled so that the vial has a meniscus. A cap will be used to close the vial so that no bubbles can be seen when the sample vial is inverted. The volatile samples are always collected in pairs. The other organic samples usually require two or three 1-liter bottles without preservative and these should be collected next, also without headspace. Finally, preserved samples should be collected, taking great care that the acids and salts in the bottles do not contact the helper's gloves and thus pass to other caps and bottles.

4. The remaining sample bottles should now be carried to the ice chest to be labeled, placed in the ice chest, and chilled with ice.

5. The labels can be pre-filled out leaving less work and time delay at the site. The label may have:
    - Name of facility
    - Date of sampling and time
    - Sample description (surface water location)
    - Sampler's name

    Additionally, each sample bottle may be marked with an ID number using a glass-marking crayon which is resistant to water. Bottle caps are good places to add an ID. This is a precaution in case labels get wet or come off during transport.

6.4 CHAIN OF CUSTODY

Custody and protection of samples is an important legal consideration. As few people as possible should handle the samples. The sampler is personally responsible for collected samples and will be able to attest to the integrity of samples until transfer. If samples are placed in a vehicle, it will be kept locked. Any cooler will be locked or located in a place which is locked and is accessible only to responsible officials. A custody seal will be affixed to the cooler if the samples are to be shipped. Upon check-in at the laboratory, the condition of the custody seals will be attested.

A chain-of-custody form will be used to document the handling of the samples from the moment of collection until testing. The identification number (ID) of each sampling point will be recorded on the form. Note that several bottles collected for different parameters will have the same ID number if they come from one sampling point. The form will be taken out to the field and is filled out at each sampling point (at least time and sample number) before proceeding to the next sampling point. The form will contain the facility name,

date of sampling and name of the collector. Each transfer of custody is recorded with an appropriate signature, date and time. If the samples are to be shipped, they will be sealed. The driver for a courier service (if used) will sign the custody form or the courier will be indicated on the COC, and a bill of lading will be secured.

6.5 FIELD AND LABORATORY QUALITY ASSURANCE/QUALITY CONTROL

It is the responsibility of the sampling contractor to ensure the reliability of the analytical data gathered during the monitoring program. The field and laboratory Quality Assurance/Quality Control will be in accordance with Section 3.2: Field Quality Assurance/Quality Control and Section 3.9: Laboratory Requirements.

6.6 MONITORING PARAMETERS AND FREQUENCY

Surface water samples will be tested in the field for pH, specific conductance, dissolved oxygen, temperature and turbidity. Surface water samples will be analyzed in the laboratory for the inorganic and organic constituents contained in 335-14-4: Appendix I Constituents for Detection Monitoring, and as summarized in the Water Quality Monitoring Matrix (**Table 1**).

The surface water locations will be sampled on a semi-annual basis (per phasing schedule shown above). If there is no discharge at the time of monitoring, the location will be marked as "Dry" in the semi-annual monitoring report.

This surface water sampling and analysis program is being used to supplement the groundwater monitoring system for the facility and is separate from the NPDES sampling and reporting requirements; therefore, groundwater MCLs and PQLs will be referenced. Surface water samples will not be field-filtered. If excessive turbidity becomes an issue, the samples may also be tested for dissolved metal as a demonstration that metal detections are related to turbidity. The water will be tested in the laboratory for the Drinking Water Standard total metals and VOCs (ADEM Appendix I list) in accordance with the designated methods. The detection limits for the individual constituents shall be the lowest PQL that can be reliably achieved, within specified limits of precision and accuracy during routine laboratory operating conditions**.**

6.7 REPORTING

Surface water results will be submitted to ADEM as part of the semi-annual groundwater reports.

7.0 LANDFILL GAS MONITORING PLAN

7.1 INTRODUCTION

The objective of the Landfill Gas Monitoring Plan (LFGMP) is to detect the lateral movement of potentially explosive gases in the subsoil and along man-made migration pathways toward on-site and off-site structures. The information gathered from gas monitoring stations will be used to evaluate the potential explosive hazard of methane gas accumulations within the explosive limits of 5 - 15 percent by volume.

7.2 MONITORING NETWORK DESIGN AND PHASING OF INSTALLATION

Landfill gas monitoring points have been established on site between the landfill units and the facility boundary. Since groundwater is a vertical barrier for potential methane gas migration, areas selected for monitoring are along the facility boundary where streams, wetlands, and sediment ponds are not present.

Methane monitoring will be conducted at 43 bar-hole punch locations (MM-1 through MM-43), two on-site structures (MM-44 [scalehouse], and MM-45 [ROCHEM building [not in use]), and culverts/drop inlets once they are constructed. The bar-hole punch locations are spaced approximately 300 feet apart in the northern and southern portions of the facility. In the northwestern portion of the site (locations MM-17 through MM-29), the bar-hole punch locations are spaced 100 feet apart due to residences located as close as approximately 600 feet west of the facility. The locations of the methane monitoring locations are indicated on **Figure 2** titled *Environmental Monitoring Network*. All bar-hole punch locations will be established by a licensed surveyor and marked with identification posts prior of the completion of the first waste cell to be constructed at the facility.

LANDFILL GAS MONITORING LOCATION	PROPOSED LOCATION AND JUSTIFICATION
MM-1 to MM-5 and MM-38 to MM-43	Property boundary in the southern portion of the facility.
MM-6 to MM-11	Property boundary in the northeastern portion of the facility.
MM-12 to MM-30	Property boundary in the northwestern portion of the facility.
MM-31 to MM-37	Property boundary in the western portion of the facility.
MM-44	On-site structure (scale house).
MM-45	On-site structure (ROCHEM building [not in use].
Culverts/drop inlets	All culverts, upon construction.

7.3 GAS MONITORING SCHEDULE

Gas monitoring stations will be established by land surveyors and marked with a permanent station marker. For the purpose of detecting migration of potentially explosive gas from the landfill, the following monitoring schedule will be implemented:

1. Upon commencement of active operations and quarterly prior-to-closure.

2. Quarterly for at least 30 years during the post-closure care period or until demonstration is made to ADEM that methane gas no longer presents a threat to the environment.

3. Each monitoring event is to include observations for stressed vegetation due to methane gas movement. If present, areas around and beyond stressed vegetation will be monitored with a bar punch to determine if gas is moving off site.

4. Monitoring in, beneath, and around site structures will be a part of each screening event.

7.4 BARHOLE PUNCH MONITORING PROCEDURE

Screening at each monitoring station will consist of initially forming a small diameter hole (1" hole with a minimum depth of four feet into the soil). This will be achieved by utilizing a punch bar or small auger (manual or gas power). At most locations, this hole should remain open for sufficient time to allow for collection and measurement of gases within the soil. If the hole tends to collapse, a small temporary perforated pipe will be placed in the hole. The bar-hole will be sealed at the ground surface for 30 to 60 minutes.

After punching the bar-hole, an air sample from the bar-hole will be withdrawn and analyzed with a combustible gas indicator. The combustible gas indicator shall provide direct readings of methane concentrations (0 - 100% methane by volume). Percent of methane by volume and percent of oxygen will be recorded on approved ADEM forms along with pertinent data such as ambient air temperatures and weather for a permanent record. Should initial reading yield an exceedance, the bar-hole will be sealed at the ground surface for 30 to 60 minutes and then retested. Both initial test and retest should be reported.

Each gas monitoring event will include monitoring of all on-site structures. Readings of percent methane by volume, percent LEL and percent oxygen will be obtained inside, beneath, and around structures. Any other installations such as a scale pit will also be monitored. Readings obtained will be recorded in the field and reported to ADEM as described below in **Section 7.8** and **Section 7.9**.

7.5 STRUCTURE MONITORING PROCEDURE

Each explosive gas monitoring event will also include screening inside, beneath and around all on-site structures, in culverts, under bridges, drop inlets and any other place that is conducive to gas accumulation. Readings of percent methane by volume, percent LEL, and percent O_2 will be obtained at each point and readings will be recorded on the approved ADEM form.

7.6 QUALITY ASSURANCE AND CONTROL PROCEDURES

The following quality assurance and control procedures will be implemented.

Landfill gas will be analyzed using a combustible gas indicator, such as an E.G. Gascope, Model 62S, manufactured by Mine Safety Appliances Co., Decatur, Ga., (or equivalent). The combustible gas indicator will be calibrated according to the manufacture's specifications prior to the landfill gas survey.

Air samples from the bar-hole punches will be withdrawn and analyzed with the combustible gas indicator. The combustible gas indicator will provide direct readings of methane concentrations (0-100% methane and 0-100% LEL). Percent of methane and percent of LEL will be recorded, along with pertinent data such as ambient air temperatures, barometric pressure, subsurface pressure, weather conditions, and soil moisture conditions for a permanent record.

Each gas survey will include screening at on-site structures. Monitoring in on-site structures will be conducted at times when the dilution of indoor air is minimized and the concentration of soil gas is expected to be at its highest concentration. Recommended sampling locations within structures include: basements, crawl spaces, ceiling areas, and around subsurface utility lines such as service or electrical connections. Reading of percent methane and percent LEL will be recorded on forms along with pertinent data such as ambient air temperatures, barometric pressure, and weather conditions.

7.7 METHANE GAS SAFETY GUIDELINES

The following guidelines should be followed when at a landfill in the presence of potentially dangerous gases:

- No person should enter a vault or a trench on a landfill without first checking for the presence of methane gas. The person entering the vault or trench should wear a safety harness with a second person standing by to pull him or her to safety.

- Anyone installing vent wells in a landfill should wear a safety rope to prevent falling into the borehole. Open holes should be covered when they are left unattended.

- Smoking should be prohibited on the landfill, especially where drilling, excavating or installation of equipment is taking place or where gas is venting from the landfill.

- Collected gas from a mechanically evacuated system should always be cleared to minimize air pollution and any potential explosion or fire hazard.

- Methane gas in a concentration of 5 to 15 percent is an explosive mixture. Gas accumulations should be monitored in enclosed structures to ensure that explosive conditions are avoided and, if detected, appropriate action is taken to avoid a source of ignition and to vent the structure.

Personnel working on a landfill must be provided training regarding the danger posed by landfill gases. Personnel operating safety equipment around the landfill must be thoroughly trained in its use and have a clear understanding of the meaning of observations made with the monitoring equipment. Monitoring equipment must also be periodically calibrated to ensure continued accuracy in the results.

7.8 EVALUATING AND REPORTING OF MONITORING RESULTS

Interpretation of quarterly sampling for methane gas will be as follows:

1. Methane gas concentrations shall not exceed 25 percent (25%) of the lower explosive limit (LEL) (1.25% methane by volume) in facility structures.

2. Methane gas concentrations shall not exceed the lower explosive limit (5% methane by volume) at the facility boundaries.

Results of methane gas monitoring will be submitted to ADEM quarterly within 30 days of the methane monitoring event.

Upon findings of methane gas migration, a contingency plan including the following will be implemented:

1. Verification of explosive gas concentrations by immediate retesting.

2. Upon verifications of readings above the 25 percent (25%) of the LEL in facility structures or the LEL at facility boundaries, immediate notifications to ADEM and appropriate local public safety authorities such as the local health district, fire department, and police department will be given. Structures within 300 feet of the site boundary where the reading was at LEL will be tested for methane.

3. The monitoring frequently of the subject soil gas station(s) will be increased from quarterly monitoring to a frequency determined appropriate by ADEM until such time that the problem is corrected or determined not to pose a significant threat to the environment and public health and safety.

4. The need for methane gas control systems will be assessed upon validated finding of methane gas migration and appropriate recommendations implemented. A remediation plan as required by Rule 335-13-4-.16 will be prepare, submitted to ADEM, and implemented.

7.9 REPORTING

Methane gas monitoring results will be submitted to ADEM within 30 days of the methane monitoring event.

8.0 REFERENCES

Bunnell-Lammons Engineering, Inc. [BLE], 2008, *Site Hydrogeologic Characterization Report* (SHCR), *Proposed Turkey Trot MSW Landfill, Washington County, Alabama*, BLE Project Number J07-5131-03.

TABLES

Table 1
Current Water Quality Monitoring Matrix
Turkey Trot MSW Landfill
Washington County, Alabama
Solid Waste Permit Number 65-05
BLE Project Number J23-5131-74

		March	September
	Station ID	*Analytical Suite*	*Analytical Suite*
Background Well	GWA-1	A-1	A-1
Compliance Wells	GWC-1	A-1	A-1
	GWC-2R	A-1	A-1
	GWC-3	A-1	A-1
	GWC-4	A-1	A-1
	GWC-5	A-1	A-1
	GWC-6	A-1	A-1
	GWC-7R	A-1	A-1
	GWC-8	A-1	A-1
	GWC-9R	A-1	A-1
	GWC-11	A-1	A-1
Surface Water	SW-1	A-1	A-1
Quality Control	Trip Blank	A-1 VOC	A-1 VOC
	Field Blank	A-1	A-1
	Duplicate [1 Sample]	A-1	A-1

Notes:
A-1 = Appendix I VOCs and Total Metals (Plus Mercury)
A-1 VOC = Appendix 1 VOCs Only
All sample locations analyzed for field parameters (pH, specific conductivity, temperature, and turbidity).

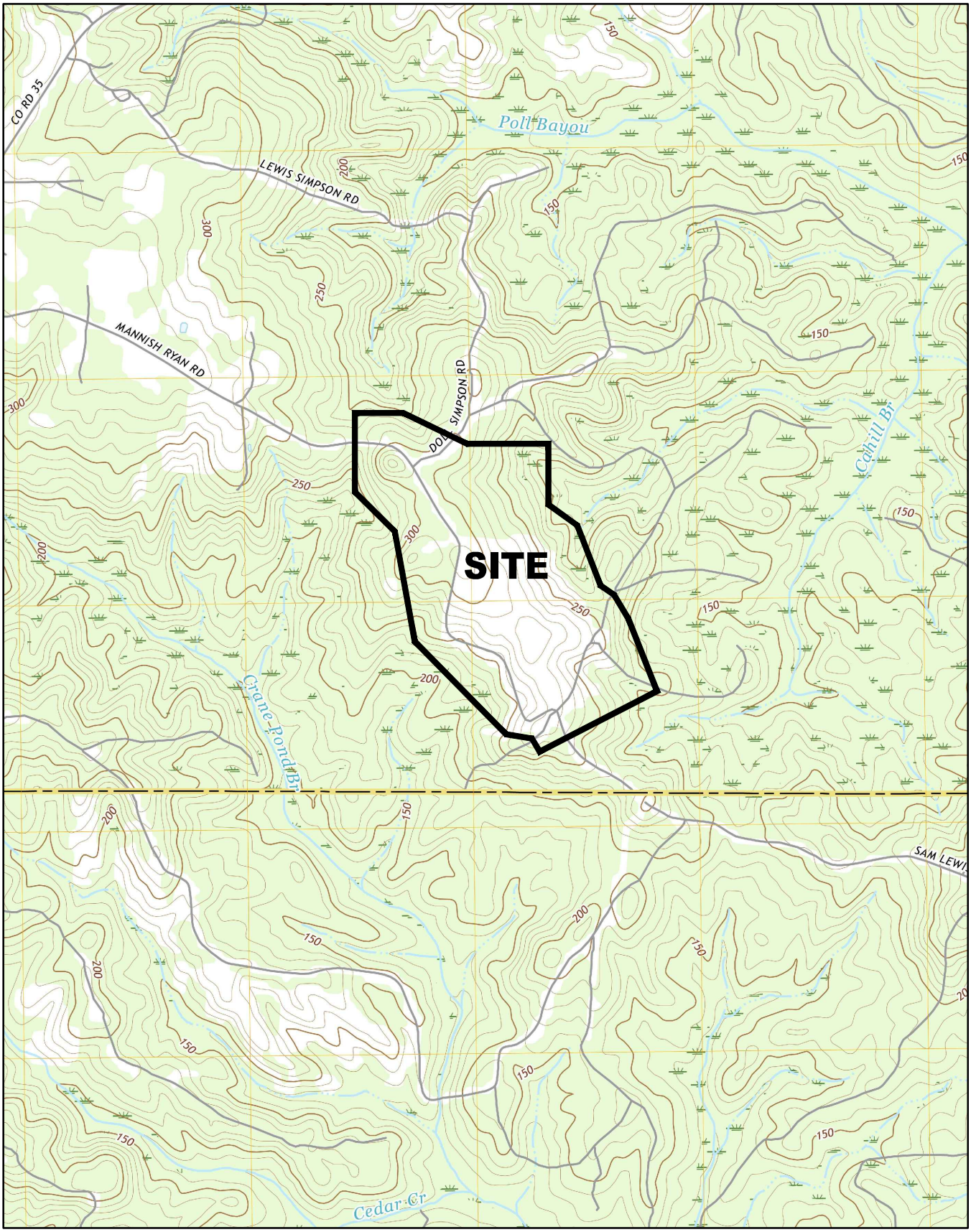
Table 2
Groundwater Monitoring Well Construction Data
Turkey Trot MSW Landfill
Washington County, Alabama
Solid Waste Permit Number 65-05
BLE Project Number J23-5131-74

Monitoring Point	Northing	Easting	TOC Elevation (ft)	GS Elevation (ft)	Well Depth (below GS)	Screen Depth (below GS)	Screen Length (ft)	Date Installed
GWA-1	422,037.48	1,757,168.73	294.53	291.61	58.49	48.2 - 58.2	10.0	7/16/2010
GWC-1	418,582.05	1,759,033.91	245.14	242.14	18.42	8.2 - 18.2	10.0	7/22/2010
GWC-2	Abandoned March 6, 2019							
GWC-2R	418,656.02	1,759,322.87	241.64	238.36	25.40	15.2 - 25.2	10.0	2/28/2018
GWC-3	419,161.99	1,759,102.38	258.35	255.53	28.54	18.3 - 28.3	10.0	7/21/2010
GWC-4	419,515.45	1,758,943.30	240.77	237.50	22.75	12.5 - 22.5	10.0	8/15/2011
GWC-5	418,040.50	1,757,907.87	252.81	250.14	15.84	5.6 - 15.6	10.0	7/16/2010
GWC-6	418,676.50	1,757,640.88	254.66	251.60	18.95	8.7 - 18.7	10.0	8/15/2011
GWC-7	Abandoned August 3, 2023							
GWC-7R	419,844.41	1,758,711.10	232.80	229.43	19.3	8.9 - 18.9	10.0	8/3/2023
GWC-8	419,945.09	1,758,595.73	238.12	233.10	22.6	12.4 - 22.4	10.0	8/15/2011
GWC-9	Abandoned August 3, 2023							
GWC-9R	420,127.28	1,758,550.31	229.77	226.72	24.1	13.7 - 23.7	10.0	8/2/2023
GWC-11	418,855.63	1,757,153.85	253.10	249.19	15.3	5.0 - 15.0	10.0	3/6/2019

Notes:
Survey data for GWA-1, GWC-1, GWC-3, and GWC-5 performed by Wellston Associates, Dated October 5, 2010
Survey data for GWC-2R performed by Wellston Associates, dated April 19, 2018
Survey data for GWC-4, GWC-6, GWC-7, and GWC-8 provided by Wellston Associates, dated December 1, 2011
Survey data for GWC-7R and GWC-9R provided by Rowe Engineering & Surveying, dated August 30, 2023
Vertical datum is referenced to NAVD88
TOC - Top of Casing
GS - Ground Surface
All depths shown are in FEET.

Prepared By: RLB
Checked By: ZJD

FIGURES



2000 1000 0 2000 4000

APPROXIMATE SCALE IN FEET

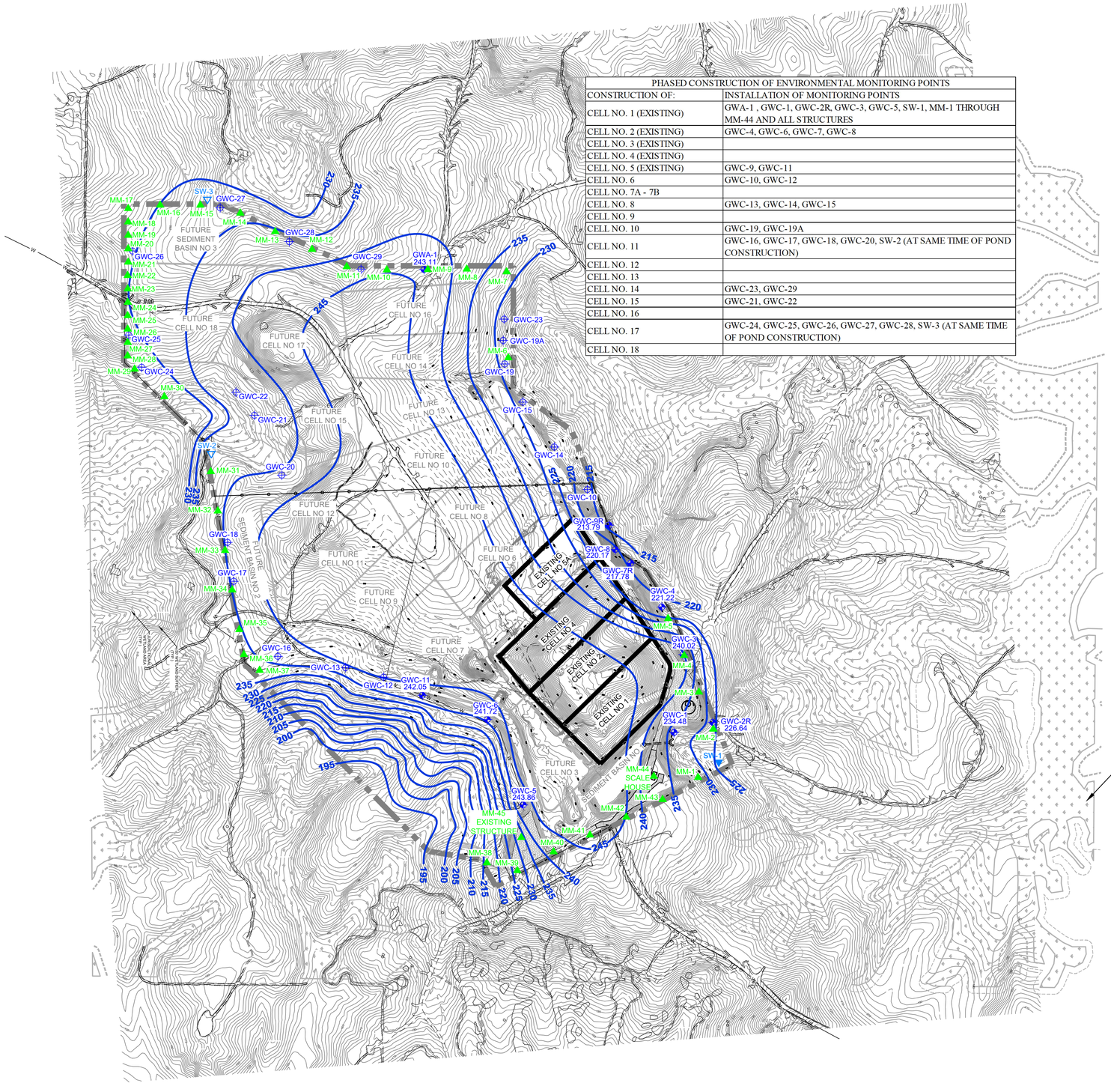
REFERENCE:
USGS TOPOGRAPHIC MAP, 7.5 MINUTE SERIES,
SIMS CHAPEL, AL. QUADRANGLE, 2020

DRAWN:	KLW	DATE:	11-6-23
CHECKED:	ZJD	CAD:	TTLF-74SLM
APPROVED:	AWA	JOB NO:	J23-5131-74

BUNNELL LAMMONS ENGINEERING
6004 Ponders Court, Greenville, SC 29615
Phone: (864) 288-1265 Fax: (864) 288-4430

SITE LOCATION MAP
TURKEY TROT MSW LANDFILL
WASHINGTON COUNTY, ALABAMA

FIGURE
1



PHASED CONSTRUCTION OF ENVIRONMENTAL MONITORING POINTS	
CONSTRUCTION OF:	INSTALLATION OF MONITORING POINTS
CELL NO. 1 (EXISTING)	GWA-1 , GWC-1, GWC-2R, GWC-3, GWC-5, SW-1, MM-1 THROUGH MM-44 AND ALL STRUCTURES
CELL NO. 2 (EXISTING)	GWC-4, GWC-6, GWC-7, GWC-8
CELL NO. 3 (EXISTING)	
CELL NO. 4 (EXISTING)	
CELL NO. 5 (EXISTING)	GWC-9, GWC-11
CELL NO. 6	GWC-10, GWC-12
CELL NO. 7A - 7B	
CELL NO. 8	GWC-13, GWC-14, GWC-15
CELL NO. 9	
CELL NO. 10	GWC-19, GWC-19A
CELL NO. 11	GWC-16, GWC-17, GWC-18, GWC-20, SW-2 (AT SAME TIME OF POND CONSTRUCTION)
CELL NO. 12	
CELL NO. 13	
CELL NO. 14	GWC-23, GWC-29
CELL NO. 15	GWC-21, GWC-22
CELL NO. 16	
CELL NO. 17	GWC-24, GWC-25, GWC-26, GWC-27, GWC-28, SW-3 (AT SAME TIME OF POND CONSTRUCTION)
CELL NO. 18	

WELL LEGEND

- GWC-1 — SURVEYED GROUNDWATER MONITORING WELL LOCATION
- GWC-29 — PROPOSED GROUNDWATER MONITORING WELL LOCATION
- SW-1 — SURVEYED SURFACE WATER MONITORING LOCATION
- SW-2 — PROPOSED SURFACE WATER MONITORING LOCATION
- MM-1 — SURVEYED METHANE MONITORING BAREHOLE PUNCH LOCATION

TOPOGRAPHIC/GEOLOGIC LEGEND

- SITE BOUNDARY LINE
- PROPOSED WASTE LIMITS
- EXISTING WASTE LIMITS
- 190 — TOPOGRAPHIC SURFACE CONTOUR C. I. = 2 FEET
- UNPAVED ROADS
- TREE LINE
- WETLANDS AS MAPPED BY OTHERS
- 240 — GROUNDWATER ELEVATION CONTOUR, CONTOUR INTERVAL = 5 FEET
- 231.81 — GROUNDWATER ELEVATION, IN FEET
- NM — WATER LEVEL NOT MEASURED

NOTE:

1. THE GENERAL CONFIGURATION OF THE WATER TABLE IS BASED ON THE GROUNDWATER CONTOURS PRESENTED ON FIGURES 6, 7, AND 8 IN THE SITE HYDROGEOLOGIC CHARACTERIZATION REPORT FOR THE PROPOSED TURKEY TROT MSW LANDFILL, DATED MAY 13, 2008 (BLE PROJECT NO. J07-5131-03), PLUS THE RECENT WATER LEVELS COLLECTED ON SEPTEMBER 11, 2022.

GENERAL MAP REFERENCE

400 200 0 400 800

APPROXIMATE SCALE IN FEET

REFERENCES:

1. FOR CELLS NO. 3, 5-10, EXISTING TOPOGRAPHIC SURVEY PREPARED BY SOUTHERN RESOURCES MAPPING CORPORATION DATED: FEBRUARY 9, 2017 AND ALL OTHER CONTOUR INFORMATION TAKEN FROM AERIAL TOPOGRAPHY PREPARED BY BECKOM AERIAL MAPPING DATED MARCH 2, 2007.
2. GROUNDWATER WELLS / BENCHMARKS SURVEYED BY WELLSTON ASSOCIATES LAND SURVEYORS, LLC, LETTER DATED: OCTOBER 5, 2010 AND SIGNED AND SEALED BY CARL B. LEVI P.L.S. ALABAMA LICENSE NO 29992. CONTRACTOR TO CONFIRM CONTROL BEFORE BEGINNING CONSTRUCTION.
3. WETLAND INFORMATION PROVIDED BY BARRY VITTOR AND ASSOCIATES INC. IN 2007.
4. BOUNDARY SURVEY PROVIDED BY THOMPSON ENGINEERING INC. DRAWING DATED: SEPTEMBER 7, 2007, SEALED BY D. BRAD BUSBY, P.L.S. ALABAMA LICENSE NO. 26951.
5. SURVEY FOR GWC-7R AND GWC-9R PERFORMED BY ROWE ENGINEERING & SURVEYING, DATED AUGUST 24, 2023., SEALED BY CECIL HUDSON, P.L.S. ALABAMA LICENSE NO 29983.
6. PROPOSED SURFACE WATER AND GROUNDWATER MONITORING WELL LOCATIONS FROM SHEET 25 OF 31A OF THE D&O PLAN PREPARED BY HODGES, HARBIN, NEWBERRY, AND TRIBBLE INC. DATED MAY 2008, REVISED MARCH 1, 2019

ANDREW W. ALEXANDER
LIC. 1431
ALABAMA LICENSED PROFESSIONAL GEOLOGIST

REVISIONS		
No.	DESCRIPTION	BY

DRAWN:	KLW
CHECKED:	RLB
APPROVED:	AWA

DATE:	1-16-24
CAD FILE:	TITLE 74-EMP
JOB NO:	J23-5131-74

BUNNELL LAMMONS ENGINEERING
6004 Ponders Court, Greenville, SC 29615
Phone: (864) 288-1265 Fax: (864) 288-4430

ENVIRONMENTAL MONITORING NETWORK
TURKEY TROT MSW LANDFILL
WASHINGTON COUNTY, ALABAMA

FIGURE NO. 2

APPENDIX A

EXAMPLE FIELD LOG

EXAMPLE FIELD LOG

Site Name _____ Location _____
Collector _____ Method of evac.
Sample Point ID _____ (type of bailer, pump, etc.) _____

EVACUATION: Date/Time: _____ Well Depth (ft.) _____
Water Level Depth, Ft.: _____ Well Volume (gal.) _____
Casing Diameter, In.: _____ Total Gallons evac. _____
Well level after evac., Ft.: _____ Complete – Date/Time _____

SAMPLING Collector: _____ Well Collection Sequence # _____
Initiated Date/Time _____ Well Stick-up (ft.) _____ Water Level Depth (ft.) _____

Completed Date/Time _____ Method of Sample Collection: _____

Time (Military)								
Volume Purged (gallons)								
Purge Rate (gpm)								
pH (S.U.)								
Specific Conductance (umhos/cm)								
Water Temp (°C)								
Turbidity (NTU)								

GENERAL INFORMATION:

Weather Conditions at time of sampling:_____
Sample Characteristics: _____
Analyte Type Collection Order, Sample Containers, Volumes, Preservatives, and Tests to be Performed: _____
_____
_____
_____
Comment and Observations:_____
_____
Recommendations: _____
_____
_____

Certification:

_____ _____
Signed Date

APPENDIX B

PRESERVATION PROCEDURES AND HOLDING TIMES

TABLE 1
PRESERVATION PROCEDURES AND HOLDING TIMES

Parameter	EPA Method for Groundwater	Recommended Container	Preservative Indicators of Groundwater Contamination	Holding Time	Volume Required for One Analysis
pH	150.1/9045C	P,G	N/A	Field/15 minutes	25 ml
Specific Conductance	120.1/9050A	P,G	N/A	Field/28 days	100 ml
TOC	415.1/9060	G, amber, Teflon-lined cap	HCL/H2SO4	28 days	1000 ml
TOX	9020B	G, amber, Teflon-lined cap	H2SO4	7 days	1000ml
Chloride	9250 / 9251 / 9253	P,G	Cool 4°C	28 days	200 ml
Antimony	7040/7041/6020/6010	P	HNO3	6 months	500 ml
Arsenic	7060A/7061A/6020/6010	P	HNO3	6 months	500 ml
Barium	7080A/7081/6020/6010	P	HNO3	6 months	500 ml
Beryllium	7090/7091/6020/6010	P	HNO3	6 months	500 ml
Cadmium	7130/7131A/6020/6010	P	HNO3	6 months	500 ml
Chromium	7190/7191/6020/6010	P	HNO3	6 months	500 ml
Cobalt	7200/7201/6020/6010	P	HNO3	6 months	500 ml
Copper	7210/7211/6020/6010	P	HNO3	6 months	500 ml
Lead	7420/7421/6020/6010	P	HNO3	6 months	500 ml
Mercury	7470	P	HNO3	6 months	500 ml
Nickel	7520/7521/6020/6010	P	HNO3	6 months	500 ml
Selenium	7740/7741A/6020/6010	P	HNO3	6 months	500 ml
Silver	7760A/7761/6020/6010	P	HNO3	6 months	500 ml
Thallium	7840/7841/6020/6010	P	HNO3	6 months	500 ml
Vanadium	7910/7911/6020/6010	P	HNO3	6 months	500 ml
Zinc	7950/7951/6020/6010	P	HNO3	6 months	500 ml
Dissolved Metals	Same as above	P	Acidify HNO3	6 months	500 ml
Fluoride	9214	P	N/A	28 days	300 ml
Nitrate / Nitrite	353.2	P,G	H2SO4	28 days	200 ml
Volatile Organics	8260B	G, Teflon-lined cap	HCL	14 days	4-40 ml
Pesticides	8081A/8082/8241A	G, Teflon-lined cap	N/A	7 days	2-1,000 ml
Herbicides	8151A	G, Teflon-lined cap	N/A	7 days	2-1,000 ml
PCB	8082	G, Teflon-lined cap	N/A	7 days	2-1,000 ml
SVOC	8270C	G, Teflon-lined cap	N/A	7 days	2-1,000 ml
Cyanide	335.2/9010B/9012A/9014	P,G	NaOH	14 days*	500 ml
Oil & Grease	1664	G	H2SO4	28 days	2-1,000 ml
Phenols	8270C/9065	G	H2SO4	7 days/28 days	2-1,000 ml

*Unless sulfide is present, then 24 hours (see lab method) P=Polyethylene G=Glass

APPENDIX C

BORING LOGS /
WELL CONSTRUCTION DIAGRAMS

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWA-1

PROJECT: Turkey Trot Landfill — PROJECT NO.: J10-5131-13

CLIENT: Advanced Disposal Services, Inc. — START: 7-15-10 END: 7-16-10

LOCATION: Washington County, Alabama — ELEVATION: 291.61

DRILLER: Landprobe, R. Banks — LOGGED BY: R. Smith

DRILLING METHOD: CME 750X ATV; 8-1/4 inch OD hollow stem auger

DEPTH TO - WATER> INITIAL: ▽ 47.25 AFTER 24 HOURS: ▼ 45.95 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT (2 5 10 20 30 40 50 70 90)
290 / 0	Loose, reddish-brown, slightly moist, silty, fine to medium SAND		1 2 3	
5 / 285				
10 / 280	Loose, light reddish-brown and yellow, slightly moist, silty, fine to medium SAND		2 2 3	
15 / 275			2 3 3	
20 / 270	Firm, light yellowish-brown with light gray, slightly moist, clayey, silty, fine SAND		3 6 8	
25 / 265			4 6 8	
30 / 260	Firm, light reddish-brown, slightly moist, clayey, silty, fine SAND		7 8 12	
35 / 255	Very firm, light reddish-brown to yellowish-brown, slightly moist, silty, fine to medium SAND		8 11 14	
	Very firm, very light gray, slightly moist, slightly silty, fine to		8 11 13	

MONITOR WELL INSTALLATION DETAILS

SURFACE COMPLETION
2.92-foot stick-up in a 4' x 4' concrete pad with a survey pin and stand-up steel cover

A vent hole was installed in the top of well casing

A weep hole was installed at the base of the steel cover

Ground surface elev. = 291.61 feet

Top of PVC casing elev. = 294.53 feet

Survey pin elev. = 291.85 feet

Survey pin Northing = 422,037.48'

Survey pin Easting = 1,757,168.73'

Grout, 0 to 42.5 feet

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWA-1

PROJECT: Turkey Trot Landfill — PROJECT NO.: J10-5131-13

CLIENT: Advanced Disposal Services, Inc. — START: 7-15-10 END: 7-16-10

LOCATION: Washington County, Alabama — ELEVATION: 291.61

DRILLER: Landprobe, R. Banks — LOGGED BY: R. Smith

DRILLING METHOD: CME 750X ATV; 8-1/4 inch OD hollow stem auger

DEPTH TO - WATER> INITIAL: ▽ 47.25 AFTER 24 HOURS: ▼ 45.95 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT (2 5 10 20 30 40 50 70 90)	MONITOR WELL INSTALLATION DETAILS
250	medium SAND				
45	Firm, very light tan with some red, moist, slightly silty, fine to medium SAND		4 5 10		Bentonite seal, 42.5 to 47.5 feet
245					Filter pack, sand 47.5 to 60.0 feet
50	Firm to very firm, very light gray with some tan, moist to wet, slightly silty, fine to medium SAND		3 8 12		
240					
55			3 9 12		2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 48.24 to 58.24 feet
235					
60			6 12 14		Pipe cap
					Total well depth, 58.49 feet
230	Boring terminated at 60.0 feet. Groundwater encountered at 47.25 feet at time of drilling and at 45.95 feet after 24 hours.				
65					
225					
70					
220					
75					
215					

GEOT_WELL 5131-13.GPJ 1/9/19

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWC-1

PROJECT: Turkey Trot Landfill — PROJECT NO.: J10-5131-13

CLIENT: Advanced Disposal Services, Inc. — START: 7-21-10 END: 7-22-10

LOCATION: Washington County, Alabama — ELEVATION: 242.14

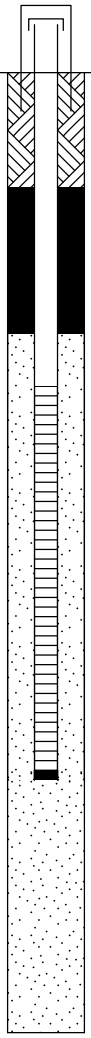
DRILLER: Landprobe, R. Banks — LOGGED BY: R. Smith

DRILLING METHOD: CME 750X ATV; 8-1/4 inch OD hollow stem auger

DEPTH TO - WATER> INITIAL: ▽ 15 AFTER 24 HOURS: ▼ 7.2 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT (2 5 10 20 30 40 50 70 90)
240 / 0	Very loose, light yellowish-brown, slightly moist, slightly silty, fine to medium SAND			1, 2, 2
235 / 5				
	Loose, very light gray with some tan, moist to wet, slightly silty, fine to medium SAND			1, 3, 4
230 / 10				
	Firm, light gray, moist to wet, slightly silty, fine to medium SAND			2, 4, 10
225 / 15				
	Stiff to very stiff, light gray to very light gray with some tan, slightly moist, silty CLAY			3, 6, 8
220 / 20				
				4, 8, 12
215 / 25	Boring terminated at 25 feet. Groundwater encountered at 15.0 feet at time of drilling and at 7.2 feet after 24 hours.			
210 / 30				
205 / 35				

MONITOR WELL INSTALLATION DETAILS



- Grout, 0 to 3.0 feet
- Bentonite seal, 3.0 to 6.8 feet
- Filter pack, sand 6.8 to 25.0 feet
- 2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 8.17 to 18.17 feet
- Pipe cap
- Total well depth, 18.42 feet
- SURFACE COMPLETION: 3.0-foot stick-up in a 4' x 4' concrete pad with a survey pin and stand-up steel cover
- A vent hole was installed in the top of well casing
- A weep hole was installed at the base of the steel cover
- Ground surface elev. = 242.14 feet
- Top of PVC casing elev. = 245.14 feet
- Survey pin elev. = 242.50 feet
- Survey pin Northing = 418,582.05'
- Survey pin Easting = 1,759,033.91'

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWATER WELL NO. GWC-2R

PROJECT: Turkey Trot MSW Landfill | PROJECT NO.: J18-5131-45

CLIENT: ADS | START: 2-26-18 END: 2-28-18

LOCATION: Washington County, Alabama | ELEVATION: 238.36

DRILLER: EMS; M. Young | LOGGED BY: I. Irizarry

DRILLING METHOD: Geoprobe 6620DT with 6.25 inch Hollow Stem Auger

DEPTH TO - WATER> INITIAL: ▽ 12 AFTER 24 HOURS: ▼ 9.3 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
235 / 5	Light yellowish-brown with some red, slightly moist, slightly clayey, silty, fine to medium SAND		Grout, 0 to 9.45 feet
230 / 10	Very light gray with some yellow, slightly moist, silty CLAY		Bentonite seal, 9.45 to 11.0 feet Filter pack, sand 11.0 to 25.5 feet
225 / 15	Very light gray with some yellow, slightly moist, silty CLAY		2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 15.2 to 25.2 feet
220 / 20	Very light gray with some yellow, slightly moist, silty CLAY		
215 / 25	Very light gray with some red, slightly moist, silty CLAY		Pipe cap 0.2 feet Total well depth, 25.4 feet
	Boring terminated at 25.5 feet.		**SURFACE COMPLETION** 3.28-foot stick-up in a 4x4 concrete pad with a survey pin and stand-up steel cover A vent hole was installed in the top of well casing A weep hole was installed at the base of the steel cover
210 / 30			Ground surface elev. = 238.36
205 / 35			Top of PVC casing elev. =241.64
			Survey pin elev. = 238.56
200			PVC Casing Northing = 418656.02
			PVC Casing Easting =1759322.87

GEOT_WELL NO SAMPLE 5131-45.GPJ 6/28/18

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWC-3

PROJECT: Turkey Trot Landfill — PROJECT NO.: J10-5131-13

CLIENT: Advanced Disposal Services, Inc. — START: 7-20-10 END: 7-21-10

LOCATION: Washington County, Alabama — ELEVATION: 255.53

DRILLER: Landprobe, R. Banks — LOGGED BY: R. Smith

DRILLING METHOD: CME 750X ATV; 8-1/4 inch OD hollow stem auger

DEPTH TO - WATER> INITIAL: ▽ 20.0 AFTER 24 HOURS: ▼ 16.2 CAVING>

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT (2 5 10 20 30 40 50 70 90)
255 / 0	Very loose, light yellowish-brown with some red, slightly moist, slightly silty, fine to medium SAND			1 2 2
250 / 5				
245 / 10	Loose, light yellowish-brown, slightly moist, silty, fine to medium SAND			1 2 4
240 / 15				1 3 3
235 / 20	Firm, gray with some red, slightly moist, silty CLAY			2 2 4
230 / 25	Firm, light yellowish-brown with some red, fine to medium slightly sandy, silty CLAY			1 2 4
225 / 30				1 3 3
220 / 35	Boring terminated at 30.0 feet. Groundwater encountered at 20.0 feet at time of drilling and at 16.2 feet after 24 hours.			

MONITOR WELL INSTALLATION DETAILS

Grout, 0 to 11.5 feet

Bentonite seal, 11.5 to 15.25 feet

Filter pack, sand 15.25 to 30.0 feet

2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 18.29 to 28.29 feet

Pipe cap

Total well depth, 28.54 feet

SURFACE COMPLETION

2.82-foot stick-up in a 4' x 4' concrete pad with a survey pin and stand-up steel cover

A vent hole was installed in the top of well casing

A weep hole was installed at the

GEOT_WELL 5131-13.GPJ 1/9/19

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWC-3

PROJECT: Turkey Trot Landfill — PROJECT NO.: J10-5131-13

CLIENT: Advanced Disposal Services, Inc. — START: 7-20-10 END: 7-21-10

LOCATION: Washington County, Alabama — ELEVATION: 255.53

DRILLER: Landprobe, R. Banks — LOGGED BY: R. Smith

DRILLING METHOD: CME 750X ATV; 8-1/4 inch OD hollow stem auger

DEPTH TO - WATER> INITIAL: ▽ 20.0 AFTER 24 HOURS: ▼ 16.2 CAVING>

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT (2 5 10 20 30 40 50 70 90)	MONITOR WELL INSTALLATION DETAILS
215 / 0					base of the steel cover Ground surface elev. = 255.53 feet Top of PVC casing elev. = 258.35 feet Survey pin elev. = 255.75 feet Survey pin Northing = 419,161.99' Survey pin Easting = 1,759,102.38'
210 / 45					
205 / 50					
200 / 55					
195 / 60					
190 / 65					
185 / 70					
180 / 75					

GEOT_WELL 5131-13.GPJ 1/9/19

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWC-4

PROJECT: Turkey Trot Landfill — PROJECT NO.: J11-5131-23

CLIENT: Advanced Disposal Services, Inc. — START: 8-10-11 END: 8-15-11

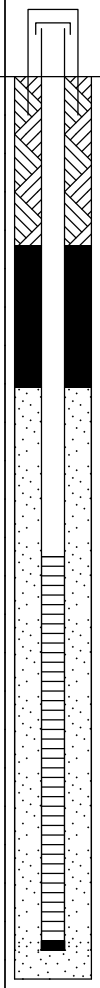
LOCATION: Washington County, Alabama — ELEVATION: 237.5

DRILLER: Landprobe, J. Smith — LOGGED BY: M. Preddy

DRILLING METHOD: CME 75 Morooka; 8.25-inch OD hollow stem auger

DEPTH TO - WATER> INITIAL: ▽ 13 AFTER 24 HOURS: ▼ 15.52 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT (2 5 10 20 30 40 50 70 90)
235 / 0	No topsoil Loose, light brown, dry to slightly moist, slightly silty, fine SAND		2, 2, 3	
5				
230			2, 2, 4	
10				
225	Loose, light gray and yellowish-brown, wet, very silty, fine SAND		3, 4, 6	
15				
220	Very stiff, light gray, moist, fine sandy, silty CLAY		3, 8, 12	
20				
215	Hard, orange and gray, slightly moist, silty, fine to medium sandy CLAY		6, 12, 19	
25	Boring terminated at 23.5 feet. Groundwater encountered at 13.0 feet at time of drilling and at 15.52 feet after 24 hours.			
210				
30				
205				
35				
200				



MONITOR WELL INSTALLATION DETAILS

Neat cement, 0 to 4.40 feet

Bentonite seal, 4.40 to 8.10 feet

Filter pack, sand 8.10 to 23.50 feet

2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 12.50 to 22.50 feet

Pipe cap

Total well depth, 22.75 feet

SURFACE COMPLETION
3.27-foot stick-up in a 4' x 4' concrete pad with a survey pin and stand-up steel cover

A vent hole was installed in the top of well casing

A weep hole was installed at the base of the steel cover

Ground surface elev. = 237.5 feet

Top of PVC casing elev. = 240.77 feet

Survey pin elev. = 237.91 feet

Survey pin Northing = 419,515.45'

Survey pin Easting = 1,758,943.30'

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWC-5

PROJECT: Turkey Trot Landfill — PROJECT NO.: J10-5131-13

CLIENT: Advanced Disposal Services, Inc. — START: 7-15-10 END: 7-16-10

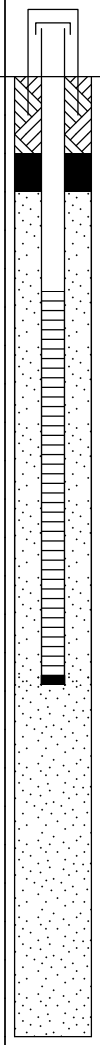
LOCATION: Washington County, Alabama — ELEVATION: 250.14

DRILLER: Landprobe, R. Banks — LOGGED BY: M. Preddy

DRILLING METHOD: CME 750X ATV; 8-1/4 inch OD hollow stem auger

DEPTH TO - WATER> INITIAL: ▽ 21.6 AFTER 24 HOURS: ▼ 4.90 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT (2 5 10 20 30 40 50 70 90)
245 — 5	Loose, light yellowish-brown, slightly moist, slightly silty, fine to medium SAND		2 3 4	
240 — 10	Very stiff, yellowish-brown and gray, slightly moist, slightly fine to medium sandy, silty CLAY		3 7 9	
235 — 15	Firm, yellowish-brown, gray and dark reddish-brown, very moist, silty, clayey, fine to medium SAND		4 8 10	
230 — 20	Stiff, dark reddish-brown, moist, fine to medium sandy, silty CLAY		3 5 8	
225 — 25	Stiff, gray, very moist, silty CLAY		3 4 7	
	Boring terminated at 25 feet. Groundwater encountered at 21.6 feet (and rising) at time of drilling and at 4.90 feet after 24 hours. The boring caved at 19.0 feet.			
220 — 30				
215 — 35				



MONITOR WELL INSTALLATION DETAILS

- Grout, 0 to 2.0 feet
- Bentonite seal, 2.0 to 3.0 feet
- Filter pack, sand 3.0 to 25.0 feet
- 2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 5.59 to 15.59 feet
- Pipe cap
- Total well depth, 15.84 feet

SURFACE COMPLETION

2.67-foot stick-up in a 4' x 4' concrete pad with a survey pin and stand-up steel cover

- A vent hole was installed in the top of well casing
- A weep hole was installed at the base of the steel cover
- Ground surface elev. = 250.14 feet MSL
- Top of PVC casing elev. = 252.81 feet MSL
- Survey pin elev. = 250.24 feet MSL
- Survey pin Northing = 418,040.50'
- Survey pin Easting = 1,757,907.87'

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWWATER MONITORING WELL NO. GWC-6

PROJECT: Turkey Trot Landfill | PROJECT NO.: J11-5131-23

CLIENT: Advanced Disposal Services, Inc. | START: 8-10-11 END: 8-15-11

LOCATION: Washington County, Alabama | ELEVATION: 251.6

DRILLER: Landprobe, J. Smith | LOGGED BY: M. Preddy

DRILLING METHOD: CME 75 Morooka; 8.25-inch OD hollow stem auger

DEPTH TO - WATER> INITIAL: ▽ 8 AFTER 24 HOURS: ▼ 7.85 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT (2 5 10 20 30 40 50 70 90)
250 / 0	TOPSOIL			
	Firm, very light brown and reddish-brown, slightly moist, silty, fine SAND		3 5 8	
245 / 5				
	▼ Loose, orange, wet, silty, fine SAND		4 4 5	
240 / 10				
	Loose, very light brown, wet, slightly silty, fine SAND		4 4 6	
235 / 15				
			WOH 2 3	WOH
230 / 20	Firm, gray and yellowish-brown, moist, silty CLAY			
	Boring terminated at 20.0 feet. Groundwater encountered at 8.0 feet at time of drilling and at 7.85 feet after 24 hours.			
225 / 25				
220 / 30				
215 / 35				

MONITOR WELL INSTALLATION DETAILS

- Neat cement, 0 to 2.50 feet
- Bentonite seal, 2.50 to 6.70 feet
- Filter pack, sand 6.70 to 20.00 feet
- 2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 8.70 to 18.70 feet
- Pipe cap
- Total well depth, 18.95 feet

SURFACE COMPLETION

3.06-foot stick-up in a 4' x 4' concrete pad with a survey pin and stand-up steel cover

A vent hole as installed in the top of the well casing

A weep hole was installed at the base of the steel cover

Ground surface elev. = 251.6 feet

Top of PVC casing elev. = 254.66 feet

Survey pin elev. = 251.94 feet

Suvey pin Northing = 418,676.50'

Survey pin Easting = 1,757,640.88'

GEOT_WELL 5131-23.GPJ 1/9/19

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWC-7R

PROJECT: Turkey Trot MSW Landfill | PROJECT NO.: J23-5131-73

CLIENT: EcoSouth Services | START: 8-3-23 END: 8-3-23

LOCATION: Citronelle, Alabama | ELEVATION: 229.43

DRILLER: EM Services, Matthew Young | LOGGED BY: M. Young

DRILLING METHOD: Geoprobe 6620 with 8" OD Hollow Stem Auger

DEPTH TO - WATER> INITIAL: ▽ 15.0 AFTER 24 HOURS: ▼ 11.31 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
225 / 5	Brown fine SAND		Grout, 0 to 6.5 feet
	Tan, brown fine SAND		Bentonite seal, 6.5 to 8.5 feet
220 / 10	Tan, brown, silty fine SAND		Filter pack: Sand, 8.5 to 20.0 feet
			2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 8.9 to 18.9 feet
215 / 15	Tan, brown, wet, silty fine SAND		
210 / 20	Boring terminated at 20.0 feet below ground surface. Groundwater encountered at 15.0 feet below ground surface at time of drilling and at 11.31 feet 24 hours after drilling.		Pipe cap Total well depth, 19.3 feet
205 / 25			SURFACE COMPLETION 3.37 feet of stickup in a 4' x 4' concrete pad with a survey pin and protective steel cover. Top of PVC casing elevation = 232.80 feet Ground elevation = 229.43 feet Northing: 419,844.407 feet Easting: 1,758,711.096 feet
200 / 30			
195 / 35			
190			

GEOT_WELL NO SAMPLE 5131-73.GPJ 9/27/23

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWC-8

PROJECT: Turkey Trot Landfill — PROJECT NO.: J11-5131-23

CLIENT: Advanced Disposal Services, Inc. — START: 8-11-11 END: 8-15-11

LOCATION: Washington County, Alabama — ELEVATION: 233.1

DRILLER: Landprobe, J. Smith — LOGGED BY: M. Preddy

DRILLING METHOD: CME 75 Morooka; 8.25-inch OD hollow stem auger

DEPTH TO - WATER> INITIAL: ▽ 10.71 AFTER 24 HOURS: ▼ 10.77 CAVING>

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT (2 5 10 20 30 40 50 70 90)	MONITOR WELL INSTALLATION DETAILS
230 / 0	FILL				Neat cement, 0 to 5.83 feet
5					
225	Loose, light brown, very moist, silty, fine SAND		3 3 3		Bentonite seal, 5.83 to 10.10 feet
10					Filter pack, sand 10.10 to 24.2 feet
220	Very loose, dark gray, wet, silty, fine SAND		2 2 2		
15					
215	Firm to loose, light brown, wet, slightly silty, fine to medium SAND		3 9 10		2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 12.35 to 22.35 feet
20					
210			2 4 6		Pipe cap
					Total well depth, 22.60 feet
25	Boring terminated at 24.2 feet. Groundwater encountered at 10.71 feet at time of drilling and at 10.77 feet after 24 hours.				SURFACE COMPLETION: 5.02-foot stick-up in a 4' x 4' concrete pad with a survey pin and stand-up steel cover
205	A 6-inch PVC outer casing installed inside a 4-foot by 4-foot by 6-foot reinforced concrete box was installed around the 2-inch monitoring well for vertical extension to accomodate the placement of fill material. The annulus between the 2-inch monitoring well and 6-inch outer casing was filled with cement, and the annulus between the 6-inch outer casing and reinforced concrete box was filled with #57 stone.				A vent hole as installed in the top of well casing
30					A weep hole was installed at the base of the steel cover
200					Ground surface elev. = 233.1 feet
35					Top of PVC casing elev. = 238.12 feet
195					Survey pin elev. = 234.50 feet
					Survey pin Northing = 419,945.09'
					Survey pin Easting = 1,758,595.73'

GEOT_WELL 5131-23.GPJ 1/9/19

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWC-9R

PROJECT: Turkey Trot MSW Landfill | PROJECT NO.: J23-5131-73

CLIENT: EcoSouth Services | START: 8-2-23 END: 8-2-23

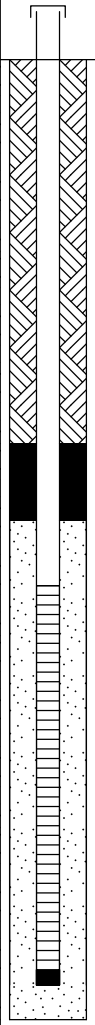
LOCATION: Citronelle, Alabama | ELEVATION: 226.72

DRILLER: EM Services, Matthew Young | LOGGED BY: M. Young

DRILLING METHOD: Geoprobe 6620 with 8" OD Hollow Stem Auger

DEPTH TO - WATER> INITIAL: 15.0 AFTER 24 HOURS: 15.58 CAVING>

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE
225 / 0	Tan, fine SAND	
5	Tan, orange, silty fine SAND	
220 / 10	Tan, orange, silty fine SAND	
215 / 15	Tan, orange, wet, silty fine SAND	
210 / 20	Tan, wet, silty fine SAND	
205 / 25	Boring terminated at 25.0 feet below ground surface. Groundwater encountered at 15.0 feet below ground surface at time of drilling and at 15.58 feet 24 hours after drilling.	
200 / 30		
195 / 35		
190		



MONITOR WELL INSTALLATION DETAILS

Grout, 0 to 10.0 feet

Bentonite seal, 10.0 to 12.0 feet

Filter pack: Sand, 12.0 to 24.1 feet

2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 13.7 to 23.7 feet

Pipe cap
Total well depth, 24.1 feet

SURFACE COMPLETION
3.05 feet of stickup in a 4' x 4' concrete pad with a survey pin and protective steel cover.

Top of PVC casing elevation = 229.77 feet

Ground elevation = 226.72 feet

Northing: 420,127.279 feet

Easting: 1,758,550.305 feet

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWC-11

PROJECT: Turkey Trot MSW Landfill — PROJECT NO.: J19-5131-49

CLIENT: ADS — START: 3-5-19 END: 3-6-19

LOCATION: Citronelle, Alabama — ELEVATION: 249.19

DRILLER: EM Services, J. Williams — LOGGED BY: I. Irrizary

DRILLING METHOD: Geoprobe 7822 DT with 8.25-inch OD HSA

DEPTH TO - WATER> INITIAL: ▽ 12.32 AFTER 24 HOURS: ▼ 3.60 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT (2 5 10 20 30 40 50 70 90)
245 / 5	Very loose, brown, moist to wet, medium to fine, silty SAND		WOH 1 1	WOH
240 / 10	Loose, yellow brown to gray, wet, medium to fine, silty SAND		3 3 3	
235 / 15	Firm, dark yellow, brown, wet, medium to very fine silty SAND		3 4 7	
230 / 20	Firm, gray brown to yellow brown, medium to fine sandy CLAY		3 3 4	
225 / 25	Boring terminated at 20.0 feet below ground surface. Groundwater encountered at 12.32 feet at time of drilling. Groundwater encountered at 3.60 feet 24 hours after time of drilling.			
220 / 30				
215 / 35				
210				

MONITOR WELL INSTALLATION DETAILS

Grout, 0 to 2.0 feet

Bentonite seal, 2.0 to 4.0 feet

Filter pack, sand 4.0 to 20.0 feet

2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 5.0 to 15.0 feet

Pipe cap 0.3 feet
Total well depth, 15.3 feet

SURFACE COMPLETION
3.91-foot stick-up

4" x 4" stand-up locking steel protective cover with a 4' x 4' concrete pad at the base.

1/4-inch weep and vent holes installed in the steel cover and well casing, respectively.

Top of PVC casing elev. = 253.10'

Ground surface elev. = 249.19'

Northing = 418,855.63'

Easting = 1,757,153.85'

GEOT_WELL 5131-49.GPJ 4/1/19

KEY TO SOIL CLASSIFICATIONS AND CONSISTENCY DESCRIPTIONS

BUNNELL-LAMMONS ENGINEERING, INC.
GREENVILLE, SOUTH CAROLINA

Penetration Resistance* Blows per Foot	Relative Density
SANDS	
0 to 4	Very Loose
5 to 10	Loose
11 to 20	Firm
21 to 30	Very Firm
31 to 50	Dense
over 50	Very Dense

Penetration Resistance* Blows per Foot	Consistency
SILTS and CLAYS	
0 to 2	Very Soft
3 to 4	Soft
5 to 8	Firm
9 to 15	Stiff
16 to 30	Very Stiff
31 to 50	Hard
over 50	Very Hard

*ASTM D 1586

Particle Size Identification

Boulder: Greater than 300 mm
Cobble: 75 to 300 mm
Gravel:
Coarse - 19 to 75 mm
Fine - 4.75 to 19 mm
Sand:
Coarse - 2 to 4.75 mm
Medium - 0.425 to 2 mm
Fine - 0.075 to 0.425 mm
Silt & Clay: Less than 0.075 mm

KEY TO DRILLING SYMBOLS


Grab Sample


Split Spoon Sample


Undisturbed Sample

NR = No reaction to HCL

NA = Not applicable

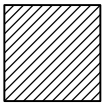
NS = No sample

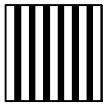

Groundwater Table at Time of Drilling

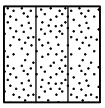

Groundwater Table 24 Hours after Completion of Drilling

KEY TO SOIL CLASSIFICATIONS

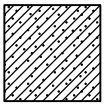

Well-graded Gravel
GW

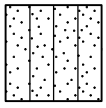

Low Plasticity Clay
CL

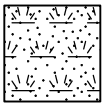

Clayey Silt
MH


Silty Sand
SM

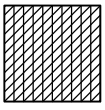

Poorly-graded Gravel
GP

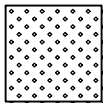

Sandy Clay
CLS

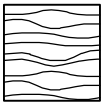

Sandy Silt
MLS


Topsoil
TOPSOIL

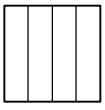

Partially Weathered Rock
BLDRCBBL

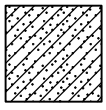

Silty Clay
CL-ML

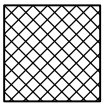

Sand
SW

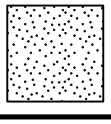

Liquid Sludge
SLUDGE

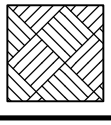

High Plasticity Clay
CH

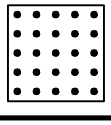

Silt
ML


Clayey Sand
SC


Fill
FILL


Poorly Graded Sand
SP

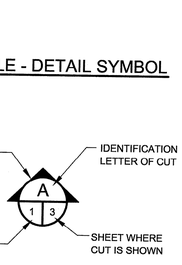

Bedrock
BEDROCK


Waste
WOOD

APPENDIX D

DESIGN AND OPERATION PLAN
SHEET 26 of 31

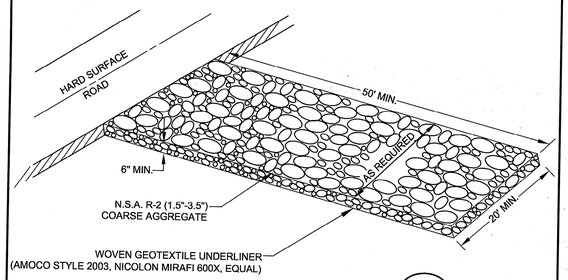
1



EXAMPLE - DETAIL SYMBOL

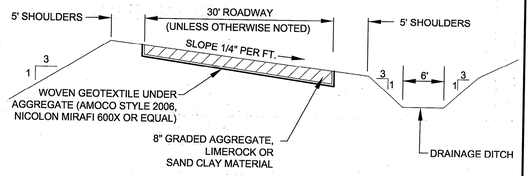
EXAMPLE - SECTION SYMBOL

2



CONSTRUCTION EXIT (CEP)

3

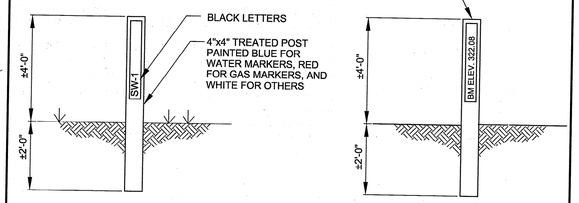


ALL WEATHER ACCESS ROAD SECTION

4

NARRATIVE

GWC = GROUNDWATER MONITORING WELL - DOWN GRADIENT
GWA = GROUNDWATER MONITORING WELL - UP GRADIENT
SWC = SURFACE WATER MONITORING POINT - DOWN GRADIENT
SWA = SURFACE WATER MONITORING POINT - UP GRADIENT
MM = METHANE MONITORING PROBE / BAREHOLE PUNCH
-EDGE OF CELL
-EDGE OF LINER
-LEACHATE CLEANOUT
-WASTE BUFFER
-FORCE MAIN



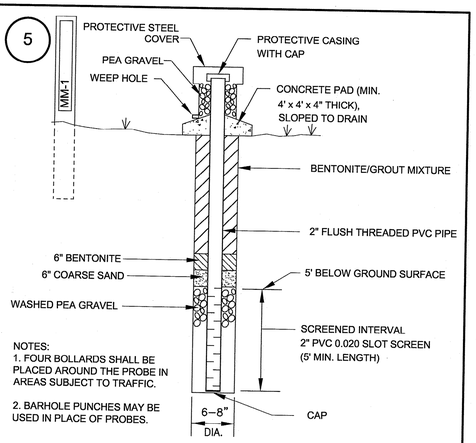
NOTE: OTHER MARKER DESIGNS MAY BE UTILIZED AT THE OPERATOR'S DISCRETION.

MARKERS SHALL BE PLACED ON 300' CENTERS ALONG EDGE OF LINER AND AT CELL CORNERS.

BUFFERS SHALL BE MARKED AT SPACING NOT TO EXCEED 500' AND AT CORNERS.

SURVEY CONTROL AND MONITORING MARKER

5



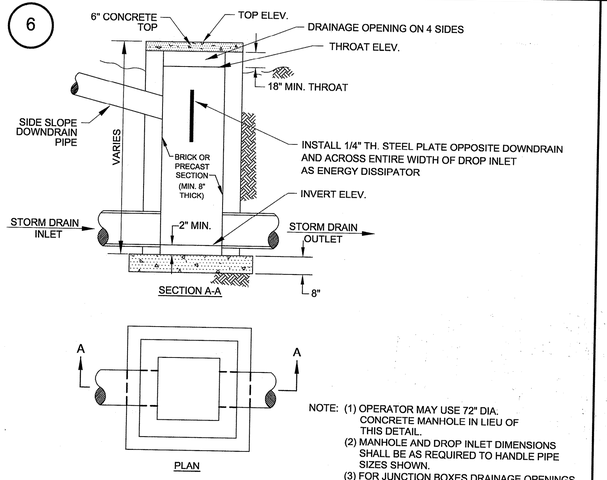
NOTES:
1. FOUR BOLLARDS SHALL BE PLACED ARQUND THE PROBE IN AREAS SUBJECT TO TRAFFIC.

2. BARHOLE PUNCHES MAY BE USED IN PLACE OF PROBES.

NOTE: BARHOLES MAY ALSO BE USED.

METHANE GAS MONITORING PROBE (TYP.)

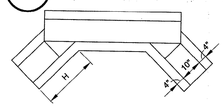
6



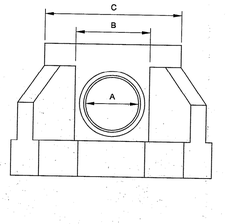
NOTE: (1) OPERATOR MAY USE 72" DIA. CONCRETE MANHOLE IN LIEU OF THIS DETAIL.
(2) MANHOLE AND DROP INLET DIMENSIONS SHALL BE AS REQUIRED TO HANDLE PIPE SIZES SHOWN.
(3) FOR JUNCTION BOXES DRAINAGE OPENINGS WILL BE REMOVED.

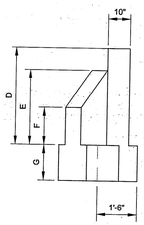
DROP INLET

7



"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"
12"	1'-8"	4'-0"	2'-6"	1'-8"	1'-2"	1'-3"	1'-7"
15"	2'-0"	4'-4"	2'-10"	2'-0"	1'-3"	1'-3"	1'-7"
18"	2'-4"	4'-8"	3'-2"	2'-4"	1'-4"	1'-3"	1'-7"
24"	2'-10"	5'-2"	3'-8"	2'-10"	1'-5"	1'-4"	2'-1"
30"	3'-6"	5'-10"	4'-4"	3'-6"	1'-9"	1'-6"	2'-5"
36"	4'-0"	6'-4"	4'-10"	4'-0"	2'-0"	1'-8"	2'-11"
42"	4'-6"	6'-10"	5'-4"	4'-6"	2'-3"	2'-0"	3'-6"
48"	5'-2"	7'-6"	6'-0"	5'-2"	2'-6"	2'-0"	4'-0"
54"	5'-9"	8'-1"	6'-7"	5'-9"	2'-9"	2'-0"	4'-6"
60"	6'-4"	8'-8"	7'-2"	6'-4"	3'-0"	2'-2"	5'-0"
72"	(AS APPROVED BY MANUFACTURER)						
84"	(AS APPROVED BY MANUFACTURER)						
96"	(AS APPROVED BY MANUFACTURER)						

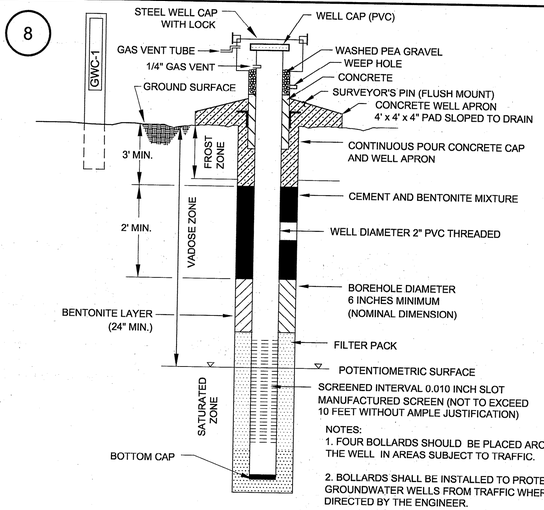




NOTES:
1. PRECAST CONSTRUCTION SHALL MEET THE REQUIREMENTS OF THE ALA. D.O.T. AND ASTM C-478.
2. REINFORCING STEEL SHALL BE A MINIMUM OF #4 6 ⓒ C.E.W.
3. FOR TWIN PIPES, DOUBLE DIMENSIONS "B" AND "C."

CONCRETE HEADWALL

8

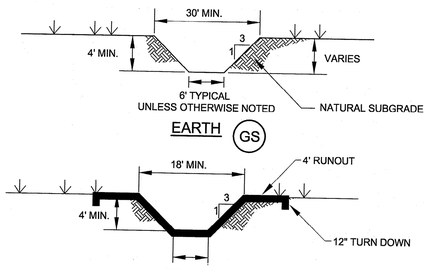


NOTES:
1. FOUR BOLLARDS SHOULD BE PLACED AROUND THE WELL IN AREAS SUBJECT TO TRAFFIC.

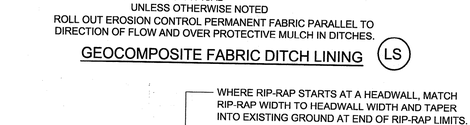
2. BOLLARDS SHALL BE INSTALLED TO PROTECT GROUNDWATER WELLS FROM TRAFFIC WHERE DIRECTED BY THE ENGINEER.

GROUND WATER MONITORING WELL (TYP.)

9

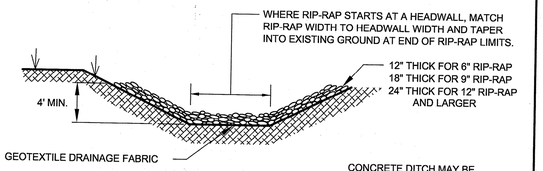


EARTH (GS)



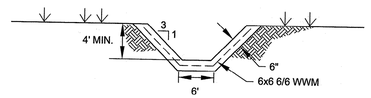
UNLESS OTHERWISE NOTED
ROLL OUT EROSION CONTROL PERMANENT FABRIC PARALLEL TO DIRECTION OF FLOW AND OVER PROTECTIVE MULCH IN DITCHES.

GEOCOMPOSITE FABRIC DITCH LINING (LS)



RIP-RAP DITCH (RS)

CONCRETE DITCH MAY BE UTILIZED IN LIEU OF RIP-RAP DITCH AT OPERATOR'S DISCRETION

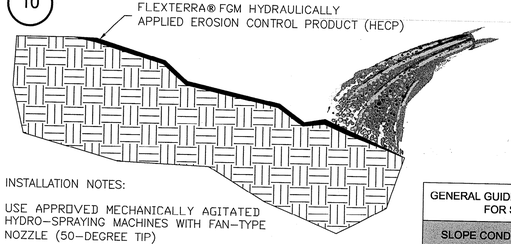


NOTE: AT UPSTREAM END OF CONCRETE DITCH, PROVIDE 12" TURNDOWN.

PERMANENT CONCRETE DITCH (LS)

DRAINAGE DITCH SECTIONS

10



INSTALLATION NOTES:

USE APPROVED MECHANICALLY AGITATED HYDRO-SPRAYING MACHINES WITH FAN-TYPE NOZZLE (50-DEGREE TIP)

FOR MAXIMUM PERFORMANCE, APPLY FGM IN A 2 STEP PROCESS:

1. APPLY SEED, FERTILIZER AND OTHER SOIL AMENDMENTS WITH A SMALL AMOUNT OF FLEXTERRA® FGM FOR VISUAL METERING

2. MIX AND APPLY 50 LB OF FGM PER 125 GALLONS OF WATER OVER FRESHLY SEEDED SURFACES AND DO NOT LEAVE SEEDED SURFACES UNPROTECTED; CONFIRM LOADING RATES WITH EQUIPMENT MANUFACTURER

TO ACHIEVE OPTIMUM SOIL SURFACE COVERAGE, APPLY FGM FROM OPPOSING DIRECTIONS

GENERAL GUIDELINES FOR APPLICATION RATES FOR SLOPE INSTALLATIONS

SLOPE CONDITION	APPLICATION RATE
≤ 3H:1V	3000 LB/ACRE
> 3H:1V AND ≤ 2H:1V	3500 LB/ACRE
> 2H:1V AND ≤ 1H:1V	4000 LB/ACRE
> 1H:1V	4500 LB/ACRE
BELOW ECB OR TRM	1500 LB/ACRE
AS INFILL FOR TRM	3500 LB/ACRE

PLEASE NOTE THAT THE INFORMATION PRESENTED HEREIN IS GENERAL INFORMATION ONLY. IT IS FOR CONCEPTUAL USE ONLY AND NOT INTENDED TO BE USED FOR CONSTRUCTION. WHILE EVERY EFFORT HAS BEEN MADE TO ENSURE ITS ACCURACY, THIS INFORMATION SHOULD NOT BE USED FOR A SPECIFIC APPLICATION WITHOUT INDEPENDENT PROFESSIONAL EXAMINATION AND VERIFICATION OF ITS SUITABILITY, APPLICABILITY AND ACCURACY.

Flexterra®

IECA ECTC

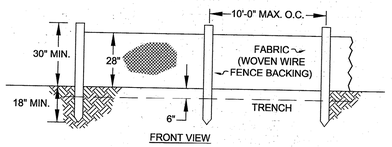
FLEXTERRA® FGM PROFILE VIEW – SLOPE DETAIL

FILE NAME: Flexterra Profile View – Slope Detail.dwg
CONTACT NUMBER: 800-508-8681
WEB SITE: www.profileproducts.com
DRAWN BY: MDR DATE: 4/4/07
CHECKED BY: MST DATE: 4/5/07

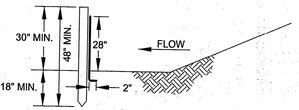
Profile® Your Trusted Partner In Soil Solutions™

SCALE: NOT TO SCALE
SHEET 1 OF 1

11



FRONT VIEW

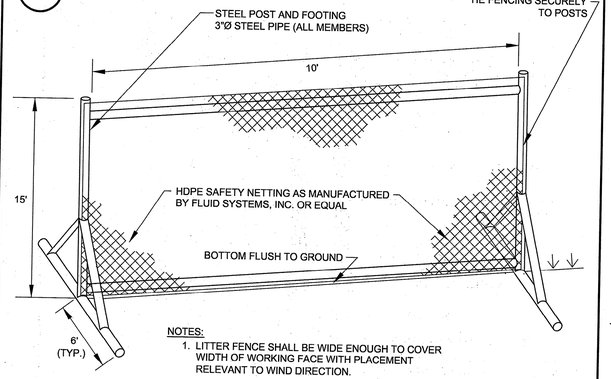


SIDE VIEW

NOTES:
1. USE 36" D.O.T. APPROVED FABRIC.
2. USE STEEL POSTS ONLY.
3. SILT FENCE SHALL BE INSTALLED AND MAINTAINED AS SPECIFIED IN THE " ALABAMA HANDBOOK FOR EROSION CONTROL, SEDIMENT CONTROL, AND STORM WATER MANAGEMENT ON CONSTRUCTION SITES AND URBAN AREAS ."
4. FLOWS MAY NECESSITATE THE PLACEMENT OF HAY BALES IN FRONT OF FILTER FABRIC.

TYPE A - SILT FENCE (SB)

12



NOTES:
1. LITTER FENCE SHALL BE WIDE ENOUGH TO COVER WIDTH OF WORKING FACE WITH PLACEMENT RELEVANT TO WIND DIRECTION.

2. LITTER FENCE WILL BE USED AS NECESSARY, AND THE LOCATION IS SUBJECT TO CHANGE. THEREFORE THE LITTER FENCE IS NOT SHOWN ON ANY PLAN SHEETS.

3. LITTER FENCE MAY ALSO BE INSTALLED TO POSTS THAT ARE SET INTO GROUND FOR STABILITY PURPOSES.

LITTER FENCE

ALABAMA LICENSED NO. 24638 PROFESSIONAL ENGINEER WILLIAM M. STUBBS 5/20/08

ALABAMA REGISTERED No. 16060 PROFESSIONAL ENGINEER WILLIAM F. HODGES

MISCELLANEOUS DETAILS

DESIGN AND OPERATION PLAN
TURKEY TROT LANDFILL

FOR

TURKEY TROT LANDFILL, LLC

WASHINGTON COUNTY, ALABAMA

HODGES, HARBIN, NEWBERRY & TRIBBLE, INC.
CONSULTING ENGINEERS
(478) 743-7175
(478) 743-1703(FAX)
484 MULBERRY ST. - STE. 265
MACON, GEORGIA 31201

PROJ. NO.	1210-157-01	DWG.	TROT-D1
SCALE	NOT TO SCALE	EDIT	5-19-08
DATE	MAY 2008	SHEET	26 OF 31

Washington County Alabama - 2023

Property Record Card

Print Close

Parcel Info

Parcel Number			Delta Pin #	Exempt	
410203000000100000			21293		
Subdivision					
Neighborhood	01LTT L				
District	**City**	**S-T-R**	**Acreage**	**Lot Size**	**Deed B/P/D**
11	COUNTY	03-02N-02W	2		0594-0000470-8/3/2021
Brief Description	BEG SW COR OF SEC 3 T2N R2W; TH E 590; TH N 147; TH W 590; T H S 147 TO PBO				

Owner

Name	TENSAW LAND & TIMBER CO.		
Mailing Addr	3511 MONTLIMAR PLAZA DR MOBILE, AL 366090	**Physical Addr**	0

Values

Land Total:	**$1,000.00**
Building Total:	**$0.00**
Appraised Value:	**$1,000.00**
Yrly Tax:	**$2.6 for 2023**

Tax History

Tax Year	Date Paid	Amount Paid
2023	//	**$0.00**

Washington County Alabama - 2023

Property Record Card Print Close

Parcel Info

Parcel Number	Delta Pin #	Exempt
410210000000100000	21358	

Subdivision					
Neighborhood	01LTT P				
District	**City**	**S-T-R**	**Acreage**	**Lot Size**	**Deed B/P/D**
11	COUNTY	10-02N-02W	407		0594-0000410-8/3/2021
Brief Description	BEG NE COR OF SEC 10 T2N R2W; TH S 5400; TH W 2359 TO E ROW OF MANNISH RYAN RD; TH NWLY ALG ROW 1731; TH NELY 987; TH NW LY 3255; TH N 916; TH E 4083 TO POB				

Owner

Name	EVERGREEN TIMBERCO AL LLC		
Mailing Addr	C O RESOURCE MANAGEMENT 5605 WOODBINE RD PACE, FL 32571	**Physical Addr**	0

Values

Land Total:	**$709,800.00**
Building Total:	**$0.00**
Appraised Value:	**$709,800.00**
Yrly Tax:	**$789.5 for 2023**

Tax History

Tax Year	Date Paid	Amount Paid
2023	//	**$0.00**

Washington County Alabama - 2023

Property Record Card Print Close

Parcel Info

Parcel Number	Delta Pin #	Exempt
410209000000300000	21356	

Subdivision					
Neighborhood	01LTT U				
District	**City**	**S-T-R**	**Acreage**	**Lot Size**	**Deed B/P/D**
11	COUNTY	09-02N-02W	504		0594-0000410-8/3/2021
Brief Description	BEG SE COR OF SEC 9; TH N 1333; TH NWLY 4030; TH N 719; TH W 823; TH S 693; TH W 1307; TH S 340; TH W 875; TH N 1045; TH W 444; TH S 5317; TH E 5343 TO POB				

Owner

Name	TAMARACK TIMBERCO AL LLC		
Mailing Addr	C O RESOURCE MANAGEMENT 5605 WOODBINE RD PACE, FL 32571	**Physical Addr**	0

Values

Land Total:	**$879,000.00**
Building Total:	**$0.00**
Appraised Value:	**$879,000.00**
Yrly Tax:	**$977.4 for 2023**

Tax History

Tax Year	Date Paid	Amount Paid
2023	//	**$0.00**