MARYLAND DEPARTMENT OF THE ENVIRONMENT

Land and Materials Administration • Solid Waste Program
1800 Washington Boulevard • Suite 605 • Baltimore Maryland 21230-1719
410-537-3315 • 800-633-6101 x3315 • www.mde.maryland.gov

Groundwater Discharge Permit Application
For Unlined Rubble Landfills

Authority: Title 9, Environment Article, Annotated Code of Maryland, and Code of Maryland Regulations (COMAR) 26.08.04

Application for: ☐ **New Permit** ☒ **Renewal Permit**

Existing Permit No. 2018-GWD-2096 **Issued Date:** 01 / 31 / 2019 **Expiration Date:** 01 / 30 / 2024

Applicant's Legal Name: Maryland-National Capital Park and Planning Commission, Montgomery Parks

Applicant's Status: ☐ Individual ☐ Corporation ☒ Government ☐ Other: ________________

Corporation or Government Federal Tax Identification No.: 52-6001550

Maryland State Department of Assessments and Taxation (SDAT) ID No.: 05-00268527
Please note that a business/entity must be registered to do business in Maryland before a permit can be issued. The business or entity's information provided in this application must match the information in the SDAT register.

Proof of workers' compensation coverage is required under § 1-202 of the Environment Article. Please provide one of the following:
(1) A copy of a Certificate of Compliance issued by the Maryland Workers' Compensation Commission; or
(2) Workers' Compensation Insurance Policy/Binder Number: Self Insured

Applicant's Mailing Address: Montgomery Parks, 2425 Reedie Drive **City:** Wheaton **State:** MD **Zip Code:** 20902

Applicant's Telephone No.: (301) 962-1349 **Facsimile No.:** ( ) ________ -________________

Emergency Contact Name & Title: Geoffrey Mason, Principal Natural Resources Specialist **Telephone No.:** (301) 962-1349

Facility/Site Name: Layhill/Bonifant Rubble Landfill

Facility/Site Address: 1201 Bonifant Rd. **City:** Silver Spring **State:** MD **Zip Code:** 20904

County: Montgomery **Maryland Grid Coordinates:** 1304000 E / 522500 N

County Zoning Map No.: 220NW01 **Lot/Parcel No.:** P490 **Deed/Liber/Folio No.:** 6560/269

State Legislative District: 14 **Local Council/Election District:** 4

Bay Tributary Watershed Code: 02140205 Anacostia River **Latitude/Longitude (Deg/Min/Sec):** 39-06-00/77-02-00

Site Acreage: 16 acres **Landfill Acreage:** 9 acres

Nature of Business (describe briefly): Rubble landfill was closed in 2001 and capped in fall of 2002.

List Other Environmental Permits Held For the Site: (e.g., NPDES-surface water; PSD-air emissions; RCRA-hazardous waste, etc).

None

Wastewater (Leachate) Description:

Rainwater or groundwater percolating through the landfill cells. Cells were capped in 2002 so most flow should be groundwater.

Flow Calculations:

Less than 100 gallons per year.

Groundwater Characteristics

See attached groundwater monitoring report submitted to MDE.

Map Of The Facility

This application must be accompanied by a copy of a U.S. Geological Survey topographical map or road map with a scale of 1" = 2000 feet, showing the exact location of the facility.

By signing this form, I the applicant or duly authorized representative, do solemnly affirm under the penalties of perjury that the contents of this application are true to the best of my knowledge, information, and belief. I hereby authorize the representatives of MDE to have access to the site of the facility for inspection and to records relating to this application at any reasonable time. I acknowledge that depending on the type of facility applied for, other permits or approvals may be required.

Geoffrey Mason
Signature of Applicant

10/31/23
Date

Geoffrey Mason
Applicant's Name (Print)

Principal Natural Resources Specialist
Title

This Notice is provided pursuant to §10-624 of the State Government Article of the Maryland Code. The personal information requested on this form is intended to be used in processing your application. Failure to provide the information requested may result in your application not being processed. You have the right to inspect, amend, or correct this form. The Maryland Department of the Environment ("MDE") is a public agency and subject to the Maryland Public Information Act. This form may be made available on the Internet via MDE's website and is subject to inspection or copying, in whole or in part, by the public and other governmental agencies, if not protected by Federal or State law.

Privacy Act Notice: This Notice is provided pursuant to the Federal Privacy Act of 1974, 5 U.S.C. §552.a. Disclosure of your Social Security Number or Federal Employer Identification Number on this application is mandatory pursuant to the provisions of §1-203 (2003), Environment Article, Annotated Code of Maryland, which requires the MDE to verify that an applicant for a permit has paid all undisputed taxes and unemployment insurance. Social Security or Federal Employer Identification Numbers will not be used for any purposes other than those described in this Notice.

Instructions for Completing the Groundwater Discharge Permit Application For Unlined Rubble Landfills

INTRODUCTION

Section 9-322 of the Environment Article, Annotated Code of Maryland, requires that a permit be obtained to discharge any pollutant into surface or ground waters of the State. "Discharge" means the addition, introduction, leaking, spilling, or emitting of any pollutant to State waters or the placing of any pollutant in a location where it is likely to pollute. Unlined rubble landfills are required by MDE to obtain a Groundwater Discharge Permit.

You are required to supply information concerning the quality of rainwater percolating through the rubble landfill cell floor. MDE will evaluate your completed application and notify you of any additional requirements if necessary.

WASTEWATER (LEACHATE) DESCRIPTION

Provide a description of the process(es) generating the wastewater (leachate) discharge through the landfill cell floor.

FLOW CALCULATIONS

Determine the daily average volume of wastewater (leachate) discharged through the landfill cell floor. The volume must be reported in gallons per day.

GROUNDWATER CHARACTERISTICS

Attach a list of the parameters being sampled in the groundwater, their Practical Quantitation Limits (PQL), and a copy of the latest laboratory analysis report for these parameters. Groundwater samples must be representative of the quality of the groundwater at the facility. Sample collection, transportation, storage and analysis shall be performed in accordance with a plan approved by MDE. MDE reserves the right to require additional groundwater sampling and analysis if necessary.

For questions regarding this application, please contact MDE at (410) 537-3315.

DEPARTMENT OF FINANCE

Marc Elrich
County Executive

Michael J. Coveyou
Director

July 25, 2023

Re: Certificate of Insurance – Maryland National Capital Park and Planning Commission

Dear Sir or Madam:

Enclosed is a certificate of insurance showing insurance coverage for Maryland National Capital Park and Planning Commission (M-NCPPC) as a member of the Montgomery County Self-Insurance Program. Article 20-37 of the Montgomery County Code, which regulates the program, restricts legal defense to members of the Fund and does not allow for outside entities. ***The County Code prohibits the naming of any other entities (i.e. Certificate Holder) as an additional insured under the coverage it provides.***

The certificate of insurance shows policy limits as follows: general liability coverage in amounts of $800,000 aggregate and $400,000 each occurrence; Automobile Liability at $30,000 per person, $60,000 per accident bodily injury and $15,000 property damage, and State of Maryland statutory limits for workers' compensation. These are the maximum limits of liability for which the Montgomery County Self-Insurance Program is responsible, as determined by the Local Government Tort Claims Act, as amended.

If there are any questions, please contact me at (240) 777-8920.

Sincerely,

Sam Mynatt
Insurance Manager

Attachment: Acord 25

Division of Risk Management

101 Monroe Street, 15th Floor. Rockville, Maryland 20850

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 07/25/2023

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER

Montgomery County, Maryland
Self Insurance Program
101 Monroe Street, 15th Floor
Rockville MD 20850

CONTACT NAME: Sam Mynatt, Insurance Manager
PHONE (A/C, No, Ext): 240-777-8920
FAX (A/C, No):
E-MAIL ADDRESS:

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : Montgomery County Self Insurance Program	
INSURER B :	
INSURER C :	
INSURER D :	
INSURER E :	
INSURER F :	

INSURED

Maryland National Capital Park & Planning Commission
(M-NCPPC)
6611 Kenilworth Avenue
Riverdale MD 20737

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	☑ COMMERCIAL GENERAL LIABILITY; ☐ CLAIMS-MADE ☑ OCCUR; GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☐ PRO-JECT ☐ LOC; OTHER:	N	N	Self Insured / County Law	07/01/2023	07/01/2024	EACH OCCURRENCE	$ 400,000
							DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$
							GENERAL AGGREGATE	$ 800,000
							PRODUCTS - COMP/OP AGG	$
								$
A	AUTOMOBILE LIABILITY; ☐ ANY AUTO; ☑ OWNED AUTOS ONLY; ☐ SCHEDULED AUTOS; ☐ HIRED AUTOS ONLY; ☐ NON-OWNED AUTOS ONLY	N	N	Self Insured / County Law	07/01/2023	07/01/2024	COMBINED SINGLE LIMIT (Ea accident)	$
							BODILY INJURY (Per person)	$ 30,000
							BODILY INJURY (Per accident)	$ 60,000
							PROPERTY DAMAGE (Per accident)	$ 15,000
								$
	☐ UMBRELLA LIAB ☐ OCCUR; ☐ EXCESS LIAB ☐ CLAIMS-MADE; ☐ DED ☐ RETENTION$						EACH OCCURRENCE	$
							AGGREGATE	$
								$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY; ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y / N: N; If yes, describe under DESCRIPTION OF OPERATIONS below	N / A	N	Self Insured / County Law	07/01/2023	07/01/2024	☑ PER STATUTE ☐ OTH-ER	
							E.L. EACH ACCIDENT	$ 100,000
							E.L. DISEASE - EA EMPLOYEE	$ 100,000
							E.L. DISEASE - POLICY LIMIT	$ 500,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CONFIRMATION OF COVERAGE - FOR INFORMATION ONLY - Maryland National Capital Park and Planning Commission's liability coverages

CERTIFICATE HOLDER

Maryland Department of the Environment
1800 Washington Boulevard
Water Mgmt. Admin./ Wastewater Permits Program
Baltimore MD 21230

CANCELLATION

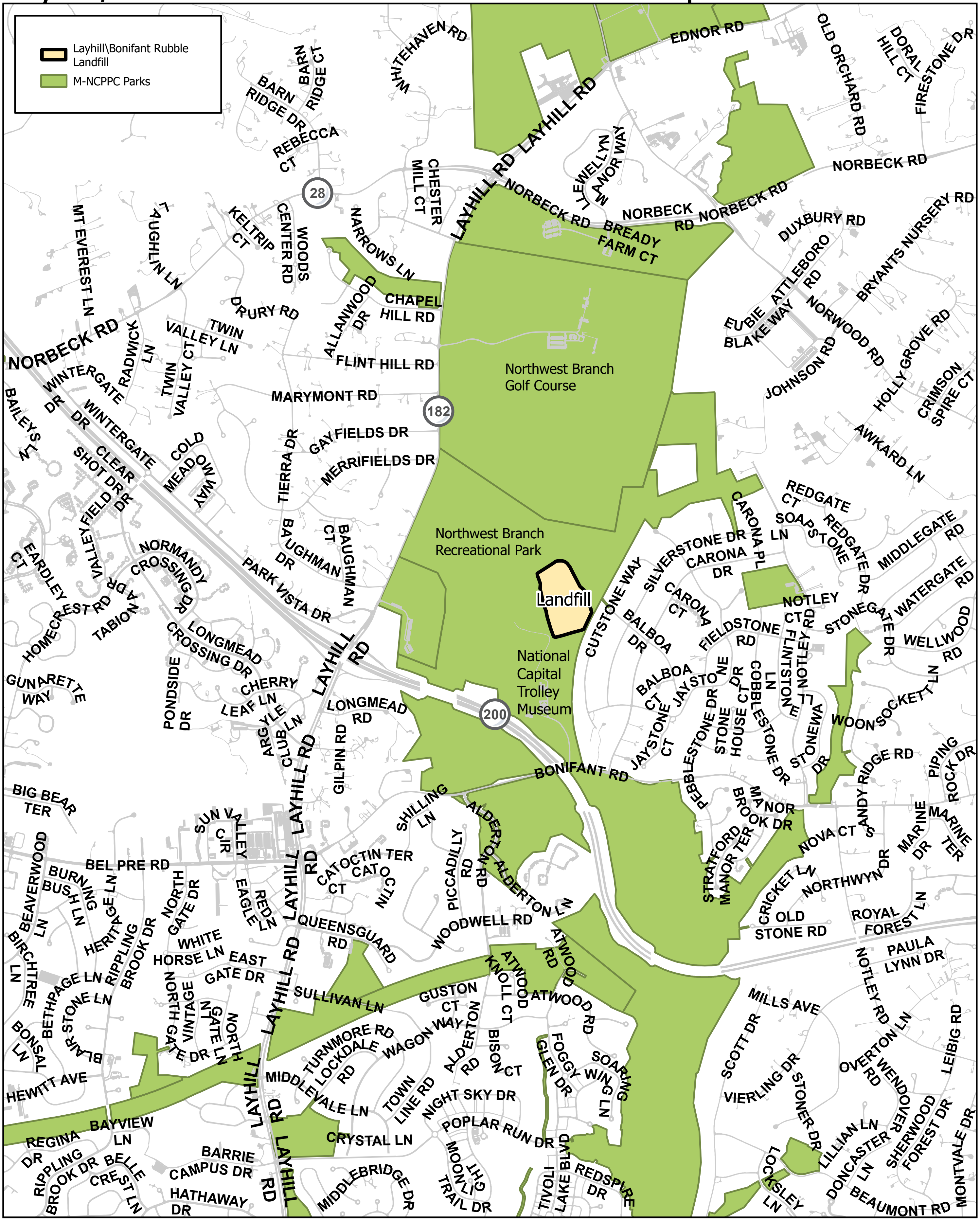
SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Sam Mynatt, Insurance Manager

Sam W. Mynatt

Layhill/Bonifant Rubble Landfill Location Map



1 inch equals 2,000 feet

N

Bonifant Road Rubble Landfill
Montgomery County, Maryland

GROUNDWATER MONITORING REPORT
1st SEMI-ANNUAL 2023

ARM Project 23010539

Prepared for:

Maryland-National Capital Park & Planning Commission
Department of Parks, Montgomery County
2425 Reedie Drive
Wheaton, MD 20902

Prepared by:

ARM Group LLC
9175 Guilford Road
Suite 310
Columbia, Maryland 21046

June 2023

1st SEMI-ANNUAL 2023 GROUNDWATER MONITORING REPORT

BONIFANT ROAD RUBBLE LANDFILL

Prepared for:

THE MARYLAND-NATIONAL CAPITAL PARK & PLANNING COMMISSION
Department of Parks, Montgomery County
2425 Reedie Drive
Wheaton, Maryland 20901

THE MARYLAND DEPARTMENT OF THE ENVIRONMENT
Solid Waste Operations Division
1800 Washington Boulevard
Baltimore, Maryland 21230

Prepared by:

ARM GROUP LLC
9175 Guilford Road, Suite 310
Columbia, Maryland 21046

ARM Project No. 23010539

JUNE 2023

Lauren Parker, G.I.T.
Project Geologist I

Stewart Kabis, P.G.
Q.A. Reviewer

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TABLES

ATTACHMENTS

1.0 EXECUTIVE SUMMARY

This Groundwater Monitoring Report, prepared by ARM Group LLC, documents the findings of the 1st semi-annual 2023 groundwater sampling event (Spring 2023 event) conducted on March 15th and March 16th, 2023 at the Bonifant Road Rubble Landfill (the Site). The Site is located in Silver Spring, Montgomery County, Maryland and owned by the Maryland-National Capital Park and Planning Commission. The contents of this 1st semi-annual 2023 Groundwater Monitoring Report include the analytical results of the groundwater sampling, documentation of field activities, and the results of the evaluation of groundwater analytical and potentiometric data collected for the Spring 2023 event.

Groundwater samples were collected from ten monitoring wells surrounding the six closed landfill cells located at the Site.

The analytical results indicate that there were no new MCL exceedances identified for the Spring 2023 event.

The concentration of nitrate in monitoring wells OB-1, MW-3, and MW-8 were measured in exceedance of the MCL during the Spring 2023 event. The nitrate concentrations in these wells have been measured above the MCL during each semi-annual event since the resumption of regular monitoring in Spring 2009. The only the exception was during the Fall 2022 sampling event when the samples were mistakenly not analyzed for nitrate due to a laboratory error. The elevated levels of nitrate in these wells are likely due to their proximity to the former sludge disposal area rather than continuing contributions from the landfilled area.

As part of the requisite data evaluation, the Spring 2023 analytical results were subject to a statistical analysis to identify any changes in water quality. The results from the statistical analysis indicate that several parameter concentrations in on-site monitoring wells are elevated with respect to background conditions. Elevated conditions above background have been observed over the historical record and are not necessarily indicative of continuing impacts to groundwater quality originating from the landfilled area.

The findings of the Spring 2023 event indicate that, in general, groundwater quality at the Site is not significantly changing. Moreover, constituent concentrations in the majority of groundwater monitoring wells have been stable since the resumption of semi-annual monitoring in March 2009. As elevated conditions above background groundwater quality still exist in each of the perimeter or downgradient monitoring wells, semi-annual sampling should continue in accordance with the *Groundwater Monitoring Plan*, approved by Maryland Department of the Environment (MDE) on June 17, 2019.

2.0 INTRODUCTION

2.1 PURPOSE

This 1st semi-annual 2023 Groundwater Monitoring Report documents the findings of the Spring 2023 event conducted at the Bonifant Road Rubble Landfill (the Site). The Site is located in Silver Spring, Montgomery County, Maryland and owned by the Maryland-National Capital Park and Planning Commission (M-NCPPC). This report was prepared by ARM Group LLC (ARM) on behalf of M-NCPPC. The activities described herein have been completed in accordance with the requirements set forth in the Code of Maryland Regulations (COMAR) 26.04.07.09.F and Groundwater Discharge Permit No. 2018-GWD-2096. The primary objectives of the monitoring program are to evaluate whether landfill leachate is affecting groundwater quality and to evaluate whether the conditions of the Groundwater Discharge Permit, referenced above, continue to be satisfied.

The following activities were performed for the Spring 2023 event at the Site and are documented in this report:

- the measurement of groundwater levels in the site monitoring wells;
- the construction of a groundwater contour map based on potentiometric elevations;
- the sampling of monitoring wells;
- the laboratory analysis of collected samples for monitoring parameters provided in Table I and Table II of Permit No. 2018-GWD-2096, i.e., volatile organic compounds (VOCs), total metals, and general chemistry parameters;
- the evaluation of analytical data, including comparisons to historical concentrations; and
- the statistical evaluation of groundwater analytical data.

2.2 SITE DESCRIPTION

The Bonifant Road Rubble Landfill is an inactive rubble landfill located north of Bonifant Road and adjacent to the National Capital Trolley Car Museum. The landfill is located on a 16-acre land parcel, of which the total landfilled area is approximately nine (9) acres. The landfilled area consists of six (6) landfill cells, and the surrounding buffer region is covered with grass and trees. Landfilling activities at the site commenced in 1962 and continued until July 2001. At this time, the site closure plan was designed, and a cap was installed over the six landfill cells in 2002.

The landfilled material at the site consists of construction and demolition debris, trees, stumps, brush, leaves, soil, rocks, and telephone poles. Adjacent to the western portion of the landfill, three retention ponds were constructed to manage storm water runoff from an area where sewage sludge disposal operations were previously performed.

3.0 SUMMARY OF SAMPLING EVENT

3.1 GROUNDWATER MONITORING NETWORK

The existing groundwater monitoring network consists of ten (10) monitoring wells. Background monitoring well OB-1 is located approximately a quarter-mile upgradient of the landfill in the southwest direction, monitoring wells MW-2 and MW-7 are located immediately upgradient of the capped landfill cells, and monitoring well MW-6 is located between two landfill cells in the center of the capped portion of the landfill. The remaining wells, MW-3, MW-4, MW-5, MW-8, MW-9 and MW-10, are installed around the perimeter of the landfill and are situated either cross-gradient or downgradient to the landfill cells. A topographic map of the site, detailing groundwater monitoring well locations, is provided as **Figure 1**.

The groundwater flow direction across the site is to the north-northwest. A groundwater contour map was constructed using potentiometric measurements made during the Spring 2023 event and is provided as **Figure 2**. Historical groundwater elevation levels are provided in **Table 1.**

3.2 SAMPLING PROCEDURE

All groundwater quality monitoring was performed in accordance with MDE and United States Environmental Agency (USEPA) guidelines. On March 15th and 16th, 2023, samples were collected from the ten monitoring wells. Prior to sampling, the ARM field personnel visually inspected the condition of the well's lock, protective outer casing, surface seal and surrounding vegetation. Following the visual inspection, a water level meter was used to measure the depth to water in the well, below the top of the inner casing. A submersible pump was then inserted into the well and lowered to the middle of the well's screened interval for the purpose of purging and sampling.

In order to facilitate low-flow purging, a flow-through cell was attached to the groundwater discharge tubing of the submersible pump, and several indicator parameters were monitored to establish stabilization time. Groundwater was purged from the well at a rate less than or equal to 500 milliliters per minute (ml/min). Readings were taken on indicator parameters every five minutes with a multi-parameter water quality meter. The monitored parameters included temperature, pH, specific conductance, oxidation-reduction potential, dissolved oxygen, and turbidity. The depth to water was also recorded in order to prevent significant drawdown of the water level. Groundwater purging continued until stabilization, as specified in the *Groundwater Monitoring Plan*, of the parameters had occurred for three consecutive readings over a 15-minute period. The sampling record and the measured depth to water for each well are included in **Attachment A.**

Prior to sampling, all required sample containers were labeled and readied for sample collection. Once the water quality parameters had stabilized, the groundwater samples were collected into laboratory provided sample containers. Immediately prior to the first vial being filled at each location, the time of sampling was noted and all sample containers for the sample location were assigned the same sampling time. The sample containers were filled directly from the discharge tubing without allowing the tubing to touch the rim or inside of the containers. The groundwater was allowed to flow gently down the inside of the sample containers so that no air bubbles were generated. Immediately following sample collection, the samples were stored in coolers with ice before being transferred to the laboratory under a completed chain-of-custody. Sampling logs are provided as **Attachment A.**

Following the completion of sampling at each well, all down-hole equipment was decontaminated, using a mild detergent solution wash, and then rinsed with deionized water. All non-dedicated materials were disposed of accordingly.

3.3 LABORATORY ANALYSIS

After sample collection, all groundwater samples were delivered on ice via lab courier, along with a signed chain-of-custody, to ALS Environmental (ALS) of Middletown, Pennsylvania, an ARM subcontractor, for analysis. Samples were analyzed in accordance with approved EPA methods by ALS for the parameters included on Table I (VOCs) and Table II (Elements and Indicator Parameters) of Groundwater Discharge Permit No. 2018-GWD-2096.

Summary tables showing the historical analytical data (Spring 2009 event through the Spring 2023 event) for the on-site monitoring wells are provided in **Attachment B**. The laboratory analytical reports for the Spring 2023 event are included as **Attachment C**.

3.3.1 Quality Assurance/Quality Control (QA/QC)

Field and Laboratory QA/QC utilized during the most recent sampling event included collection and analysis of a:

- Trip Blank – A trip blank consists of reagent water that is transported to the sampling site and returned to the laboratory of origin without being opened. This serves as a check on sample contamination originating from sample transport, shipping, and laboratory sources. The holding time for the trip blank begins when received by the laboratory, unless otherwise specified by the client, such as time filed samples were collected.

- Field Blank – A field blank consists of reagent water that is transported to the sampling site, transferred from one vessel to another at the site, and preserved with the appropriate reagents. This serves as a check on sample contamination arising from ambient conditions during sampling and laboratory sources.

- Field Duplicate – Duplicate field samples are collected at a rate of one per sample event. Duplicates are two separate samples collected at a given location side by side or one immediately after the other. Co-located samples provide intra-laboratory precision information for the entire measurement system; including sample collection, homogeneity, handling, shipping, storage, preparation, and analysis. The field duplicate is a "blind duplicate," meaning the sample location and collection time are not labeled on sample containers or the chain of custody. A comparison of detected parameter concentrations is included in **Attachment C.**

One trip blank was collected for each day of sampling. A field blank was also collected on March 16th. The trip blanks were analyzed for Table I parameters while the field blank was analyzed for Table I and Table II parameters. Laboratory analytical reports and QA/QC data summaries are provided in **Attachment C** to this report. **Table C1** of **Attachment C** provides a summary of parameters detected in the QA/QC blanks. Bromomethane and iodomethane were detected in the March 15th trip blank. All of the samples collected that day had comparable concentrations of those parameters, and as such were given B flags during data review. Ammonia, bromomethane, iodomethane, iron, and sodium were detected in the field blank collected on March 16th. There were a few samples collected on the same day that had parameter detections at similar concentrations to those from the field blank. These parameter detections were given B flags during data review.

During this event the blind duplicate was collected from groundwater monitoring location MW-7. An analysis was performed to calculate the relative percent difference (RPD) of analyte concentrations in duplicate samples to obtain an estimate of laboratory method precision. This analysis was performed for all analytes detected above the RL in the duplicate samples and is presented on **Table C2** of **Attachment C**. The RPDs for most of the detected groundwater constituents were below 20%, with the exception of total dissolved solids (31%) and turbidity (24%). It is important to note that the duplicates are collected in succession (not simultaneously) and are not mixed together to homogenize the groundwater. As such, it is possible to have variations in concentrations for a few analytes between the duplicate samples. Overall, the agreement between the duplicates samples is acceptable.

4.0 COMPARISON TO GROUNDWATER STANDARDS

Upon receipt of the analytical data, parameters detected in each well were evaluated and compared to the established USEPA National Primary (MCLs) and Secondary (SMCLs) Drinking Water Standards. MCLs have been established based upon health concerns, whereas SMCLS are based upon aesthetic concerns, such as, taste, color, and odor. The first time a parameter is detected at a concentration exceeding its respective MCL at a particular monitoring well, a resample is performed, per permit requirements, to confirm the initial value. When a resample event is performed, both the original and confirmation sample concentrations are presented in the chemical results tables; however, only the confirmation value is used in the data analysis.

Table 2 summarizes parameters in exceedance of their respective MCLs/SMCLs. There were no new MCL exceedances identified for the Spring 2023 event; accordingly, verification sampling did not occur during this event.

Concentration of nitrate in monitoring wells OB-1, MW-3, MW-8 were measured in exceedance of the MCL during the Spring 2023 event. Nitrate concentrations in these wells have been measured above the MCL during each semi-annual event since the resumption of regular monitoring in Spring 2009, with the exception of Fall 2022 when OB-1 and MW-3 were not analyzed for nitrate due to laboratory errors. The elevated levels of nitrate in these wells are likely due to their proximity to the former sludge disposal area rather than continuing contributions from the landfilled area.

5.0 STATISTICAL ANALYSIS

The historical set of analytical data from July 1999 through the March 2023 event was used to perform a statistical evaluation of groundwater conditions at the Site in accordance with the *Groundwater Monitoring Plan*. The detailed results of the statistical analyses are included as **Attachment D.**

5.1 OBJECTIVE

Groundwater monitoring data at each downgradient monitoring well are analyzed to determine if parameter levels are exceeding background water quality conditions. This is performed by statistically analyzing the existing groundwater monitoring data. In addition, time-series plots were created for parameter concentrations exceeding various criteria. The analyses serve to aid in identifying changes in groundwater quality attributable to the landfill.

5.2 ASSESSING DATA DISTRIBUTION – NORMALITY

Two tests recommended in the 2009 USEPA Unified Guidance Document for the assessment of environmental data distribution are applicable to the data collected at site; the Shapiro-Wilk and the Shapiro-Francia methods. The Shapiro-Wilk method tests for normality of the background data set with less than 50 measurements per parameter. The Shapiro-Francia method tests normality of the background data set that has 50 or more measurements per parameter.

If the data do not follow a normal distribution, the data are transformed, and the appropriate normality test (Shapiro-Wilk or Shapiro-Francia) is performed again to determine if the background data follow a log-normal distribution. Transformation is performed by substituting in the natural logarithm of the original data. If the transformed data are normally distributed, the background data distribution is log-normal and parametric statistical methods are appropriate for the transformed data.

For background data where the distribution is neither normal nor log-normal, or for data sets where the percentage of non-detects is greater than 50%, non-parametric statistical methods are used for analyses. Historical concentrations measured from July 1999, the first sampling event where background well OB-1 was sampled, to August 2021 were used to access data normality distribution.

5.3 TOLERANCE LIMITS

To determine if the concentration of a given parameter in a downgradient well is elevated compared to upgradient concentrations, tolerance limits (TL) were established. A TL is a tool used to determine statistical differences from background. TLs established from background data represent the upper limit which will contain at least 95% of the distribution of observations in background with 95% confidence. If the concentration of a given parameter in a downgradient well exceeds its established tolerance limit, a statistically significant increase (SSI) over background groundwater quality exists. A tolerance interval, rather than a TL, is used to assess statistically significant changes from background for pH concentrations. The tolerance interval is simply a two-sided TL; instead of an upper limit, it uses a range of concentrations for comparison. A tolerance interval is preferred for pH since a decrease or an increase in concentration can represent a change in groundwater quality associated with the landfill.

The type of test used to calculate a tolerance limit for a given parameter is dependent on how the sample data are distributed. If background data are normally or log-normally distributed, the parametric TL test is used. The parametric TL is established using the following equation:

$TL = \bar{x} + \kappa \times s$, where:

$\bar{x} =$ background mean,

K = one-sided normal tolerance factor, and

s = background standard deviation

The one-sided normal tolerance factor is a tabulated value and is a function of the sample size, desired coverage (95%), and desired confidence level (95%).

For background data that are not normally or log-normally distributed, or where the percentage of non-detects is greater than 50%, the non-parametric TL method of analysis is used. A very basic test, the non-parametric TL simply compares each individual down-gradient concentration to the maximum concentration in background samples.

Historical concentrations, measured from July 1999 to March 2023 in background well OB-1, were used to develop the TLs. A TL is calculated for each parameter detected in the most recent sampling event. **Table 3** summarizes the statistical analysis performed on background data set and presents the TLs calculated for each detected parameter. **Table 4** summarizes TL exceedances in cross-gradient and downgradient wells. If a downgradient concentration exceeds the TL or falls outside the tolerance interval, this indicates a statistically significant change from background for that particular parameter. Statistical worksheets are provided as **Attachment D** to this report.

All statistical procedures were performed using the ChemStat® statistical analysis software (version 6.3.0.2, Starpoint Software, Inc., ©1996-2013). For the purposes of statistical evaluation, any parameter concentration not detected above the laboratory limit of detection (LOD) was replaced with a value of one-half of the associated laboratory limit of quantitation (LOQ).

6.0 SUMMARY OF RESULTS

As indicated in **Table 2**, there was at least one exceedance of an MCL or an SMCL in each of the groundwater samples collected. MCLs have been established based upon health concerns, whereas SMCLs are based upon aesthetic concerns, such as taste, color, and odor.

MCL exceedances exist for nitrate in three wells: OB-1, MW-3, and MW-8. The presence of the MCL exceedance for nitrate in the upgradient well OB-1 indicates that elevated nitrate levels above the MCL are a site-specific condition and not necessarily indicative of a landfill contribution..

SMCL exceedances were observed for:

- iron: MW-6 and MW-7;
- manganese: MW-2, MW-4, MW-5, MW-6, MW-7, and MW-9; and
- turbidity: MW-2, MW-6, and MW-7.

Tolerance limits, established from historical concentrations measured in background well OB-1, were exceeded for several Table II parameters in the downgradient wells. A TL exceedance for a parameter concentration in a downgradient monitoring well indicates that the concentration of that parameter is statistically elevated above upgradient conditions. As indicated on **Table 4**, the following metals, VOCs, and geochemistry parameters exceeded their respective tolerance limits in two or more wells:

- Alkalinity
- Ammonia
- Barium
- Bromomethane
- Calcium
- Chloride
- Cobalt
- Hardness
- Iron
- Manganese
- Nickel
- pH
- Potassium
- Sodium
- Specific Conductance
- Total Dissolved Solids
- Turbidity

Manganese was detected above the background TL in each downgradient well. TL exceedances were also observed for: beryllium in MW-2; sulfate in MW-3; chemical oxygen demand, vanadium, and zinc in MW-6; iodomethane in MW-7; and methyl tertiary butyl ether in MW-9.

There was a notable parameter increase during the Spring 2023 sampling event. The concentration of ammonia in MW-4 was the highest concentration detected in this well since the

Fall 2010 sampling event. The concentration of ammonia in MW-4 will be closely monitored during future sampling events.

For each parameter concentration exceeding an MCL, SMCL, or TL for a particular monitoring well, a time-series plot was created detailing that parameter's concentration over the sampling record for the past five years, beginning with the Fall 2018 event. Time-series plots are provided with this report as **Attachment E**.

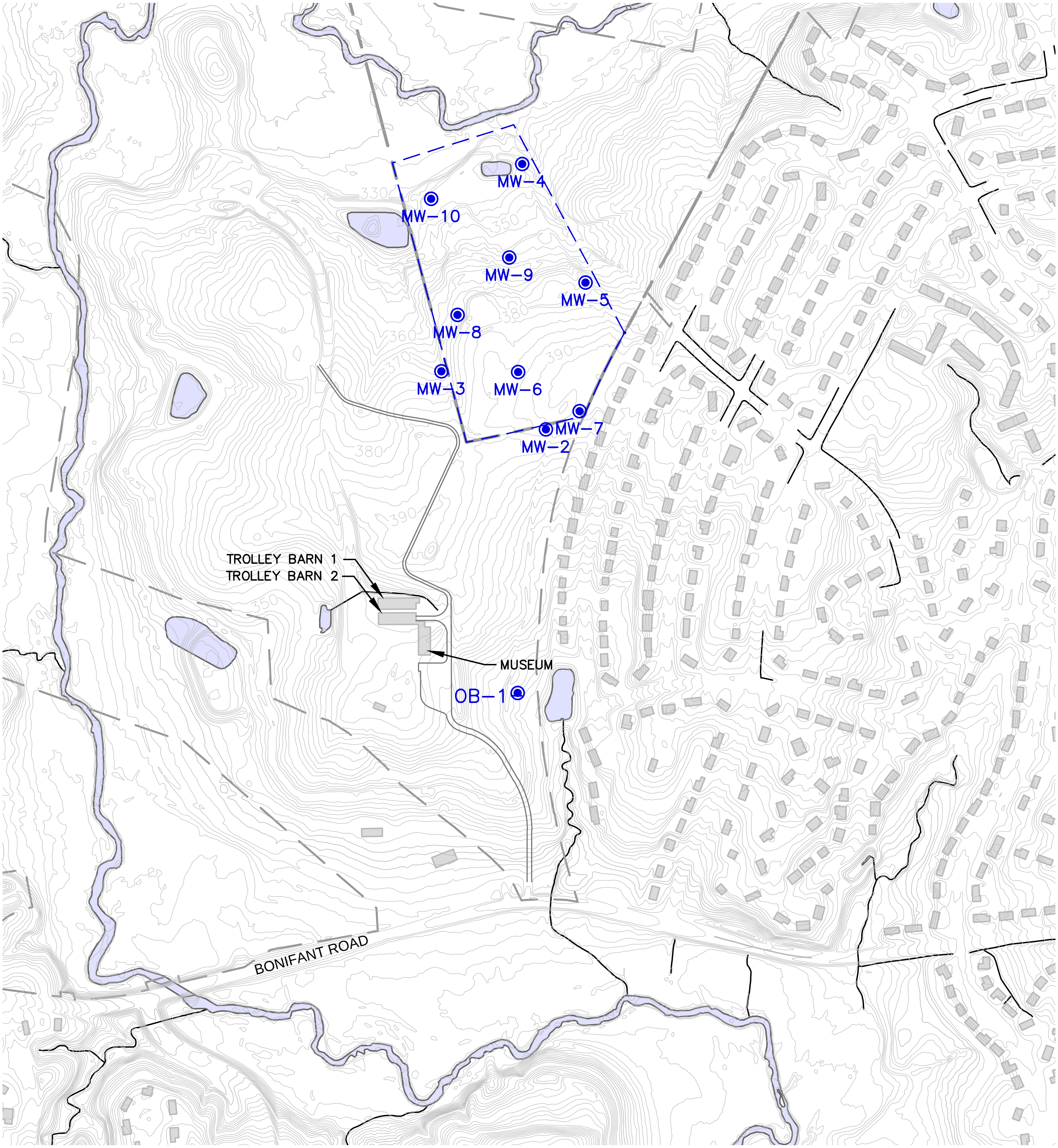
7.0 CONCLUSIONS AND RECOMMENDATIONS

The only MCL exceedance identified during the Spring 2023 event was for nitrate in monitoring wells OB-1, MW-3, and MW-8. With regards to the nitrate exceedances, these monitoring wells vary in location, being either upgradient, cross gradient, or downgradient of the landfilled area; however, each of these wells is located adjacent to the historical sludge disposal area. The nitrate concentrations elevated above the MCL in these wells are likely due to the proximity to the former sludge disposal area, rather than continuing contributions from the landfilled area.

The results from the statistical analysis indicate that a number of parameter concentrations in on-site monitoring wells are elevated with respect to background conditions (tolerance limit exceedances). Elevated conditions above background have been observed over the historical record; however, these conditions are not necessarily indicative of continuing impacts to groundwater quality originating from the landfilled area. Parameter concentrations identified as TL exceedances are generally consistent with historical levels observed since regular semi-annual sampling resumed in March 2009.

Based on the data evaluation and statistical analysis of the Spring 2023 event results, groundwater quality at the Bonifant Road Rubble Landfill overall does not appear to be appreciably changing. As elevated conditions above background groundwater quality still exist in each of the perimeter or downgradient monitoring wells, semi-annual sampling for the parameters listed in Table I and Table II of Groundwater Discharge Permit No. 2018-GWD-2096 should continue in accordance with the requirements of the Permit and the *Groundwater Monitoring Plan*, dated June 2019.

FIGURES



LEGEND

LANDFILL AREA BOUNDARY

GROUNDWATER MONITORING WELL

200 100 0 200 400

GRAPHIC SCALE IN FEET

N

Site Location Map

Bonifant Rubble Landfill
Montgomery County, MD

Spring 2023	Scale: 1" = 200'	23010539

ARM Group LLC
Engineers and Scientists

Figure
1

\\ARMGroup.lcl\CorpData\Projects\2008\M08149 MNCPPC Redmond_Drwg\GW 2015\Fall\M08149 GW Fall 2015_Figure 1.dwg Plotted: September 9, 2015

LEGEND

GROUNDWATER MONITORING WELL

GROUNDWATER ELEVATION CONTOUR (FT AMSL)

MW-6
360.27 WELL NAME AND GROUNDWATER ELEVATION (FT AMSL)

GROUNDWATER FLOW DIRECTION

LANDFILL BOUNDARY

GROUNDWATER ELEVATIONS MEASURED MARCH 15 AND MARCH 16, 2023

Figure 2	GROUNDWATER CONTOUR MAP June 2023		ARM Project 23010539	ARM Group LLC Engineers and Scientists
	Bonifant Landfill	Montgomery County, MD	0 75 150 300 SCALE IN FEET	

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TABLES

Table 1 - Groundwater Elevations (ft amsl)

Monitoring Event	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
March-2009	363.05	355.46	328.4	358.59	358.74	363.94	350.63	347.05	324.67
September-2009	363.77	356.12	328	357.41	359.9	364.83	352.47	347.98	324.22
March-2010	368.17	360.79	332.92	360.92	361.62	368.45	356.92	356.27	328.44
September-2010	364.95	357.44	328.24	357.88	360.98	366.06	352.78	348.12	324.82
March-2011	365.01	357.59	330.89	359.88	360	365.85	352.84	354.33	326.78
September-2011	362.13	355.75	328.24	358.15	359.31	362.8	351.37	349.21	324.86
March-2012	366.97	359.43	331.38	359.83	361.44	366.4	354.97	351.3	327.25
September-2012	360.78	353.12	326.68	355.26	358.68	361.9	348.89	344.38	322.72
March-2013	364.11	356.68	331.12	359.73	359.23	364.45	352.62	351.89	327.22
August-2013	363.84	356.1	328.66	357.95	359.84	364.7	352.48	347.96	324.95
March-2014	365.09	357.46	332.49	360.09	359.18	365.07	350.97	353.57	327.69
September-2014	366.26	358.75	330.05	358.71	361.79	366.91	354.25	350.01	327.03
March-2015	367.15	359.84	331.9	360.03	NM	367.56	354.94	354.71	327.88
August-2015	366.14	358.02	328.94	358.04	NM	366.76	353.94	349.58	325.7
May-2016	367.17	359.61	332.33	360.41	361.33	367.42	355.42	354.93	328.12
September-2016	364.23	356.25	NM	357.58	360.32	365.08	352.35	348.02	324.62
March-2017	360.87	352.84	327.26	357.58	357.17	361.92	348.31	344.73	323.62
August-2017	360.7	352.18	328.31	357	356.93	361.59	348.92	347.46	324.78
March-2018	359.15	351.17	328.98	358.45	355.95	360.97	348.05	349.69	325.51
September-2018	363.61	354.8	331.93	359.61	NM	363.99	351.96	356.64	328.08
March-2019	371.1	363.17	333.71	361.19	362.83	371.05	359.25	356.4	329.45
August-2019	366.74	358.84	328.71	358.27	362.1	367.64	353.8	348.87	325.25
March-2020	366.62	358.3	330.38	359.54	360.81	367.2	353.57	351.01	327.51
August-2020	365.62	356.7	329.37	358.53	360.73	366.46	352.53	349.8	325.91
March-2021	369.63	361.45	332.34	370.39	362.65	370.02	356.81	353.93	328.19
August-2021	366.07	357.77	329.5	358.46	358.86	NM	352.87	350.57	326.29
March-2022	366.63	358.35	330.75	359.38	361.22	367.43	353.45	350.63	326.89

NM: Not Measured

Monitoring Event	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
September-2022	365.5	357.05	328.96	357.77	361.11	366.68	352.75	349.04	325.37
March-2023	365.31	357.07	330.28	357.13	360.27	366.06	352.48	350.02	326.46
Minimum	359.15	351.17	326.68	355.26	355.95	360.97	348.05	344.38	322.72
Maximum	371.1	363.17	333.71	370.39	362.83	371.05	359.25	356.64	329.45
Average	365.05	357.18	330.03	359.10	360.12	365.69	352.85	350.62	326.22

NM: Not Measured

Table 2
MCL/SMCL Exceedances

	Parameter	Unit	Result	MCL	SMCL
Sample Location: ***OB-1***					
	Nitrate	mg/L	22.8	10	---
Sample Location: ***MW-2***					
	Manganese	mg/L	0.39	---	0.05
	Turbidity	NTU	12	---	5
Sample Location: ***MW-3***					
	Nitrate	mg/L	10.8	10	---
Sample Location: ***MW-4***					
	Manganese	mg/L	0.23	---	0.05
Sample Location: ***MW-5***					
	Manganese	mg/L	0.23	---	0.05
Sample Location: ***MW-6***					
	Iron	mg/L	1.5	---	0.3
	Manganese	mg/L	0.14	---	0.05
	Turbidity	NTU	39	---	5
Sample Location: ***MW-7***					
	Iron	mg/L	0.43	---	0.3
	Manganese	mg/L	0.54	---	0.05
	Turbidity	NTU	8.6	---	5
Sample Location: ***MW-8***					
	Nitrate	mg/L	27.3	10	---
Sample Location: ***MW-9***					
	Manganese	mg/L	1.7	---	0.05

Table 3
Statistical Summary of Detected Parameters

Parameter	unit	Number of Measurements	% Non-Detects	Max Detected Value	Parameter Distribution	Tolerance Limit	Detected in Background (OB-1) March 2023?
Acetone	µg/L	32	90.6%	4.3	non-normal	4.3	no
Alkalinity, Total	mg/L	41	0.0%	73.7	non-normal	73.7	**YES**
Ammonia-N	mg/L	40	82.5%	0.21	non-normal	0.21	no
Barium	mg/L	41	14.6%	0.049	Normal	0.044	**YES**
Beryllium	mg/L	30	86.7%	0.00012	non-normal	0.00012	no
Bromomethane	µg/L	30	96.7%	0.92	non-normal	0.92	**YES**
Cadmium	mg/L	41	75.6%	0.003	non-normal	0.003	no
Calcium	mg/L	30	0.0%	40.3	Normal	41.6	**YES**
Chemical Oxygen Demand	mg/L	40	62.5%	40	non-normal	40	**YES**
Chloride	mg/L	41	0.0%	48.3	non-normal	48.3	**YES**
Chlorobenzene	µg/L	32	100%	0.5	non-normal	0.5	no
Chromium	mg/L	41	19.5%	0.01	non-normal	0.01	**YES**
Cobalt	mg/L	30	100%	0.0028	non-normal	0.0028	no
Copper	mg/L	41	53.7%	0.14	non-normal	0.14	no
Hardness	mg/L	41	0.0%	207	Normal	211.6	**YES**
Iodomethane	µg/L	30	96.7%	0.97	non-normal	0.97	**YES**
Iron	mg/L	41	53.7%	0.37	non-normal	0.37	no
Lead	mg/L	39	74.4%	0.019	non-normal	0.019	no
Magnesium	mg/L	41	0.0%	40.96	non-normal	40.96	**YES**
Manganese	mg/L	30	73.3%	0.0065	non-normal	0.0065	no
Mercury	mg/L	40	100%	0.00025	non-normal	0.00025	no
Methyl-tert-butyl ether	µg/L	24	100%	0.5	non-normal	0.5	no
Nickel	mg/L	30	3.3%	0.006	Normal	0.0055	**YES**
Nitrate as N	mg/L	39	0.0%	43.2	non-normal	43.2	**YES**
pH	s.u.	41	0.0%	5.21 - 7.88	non-normal	5.21 - 7.88	**YES**
Potassium	mg/L	41	9.8%	2.3	non-normal	2.3	**YES**
Sodium	mg/L	41	2.4%	11.32	non-normal	11.32	**YES**
Specific Conductance	umhos/cm	41	0.0%	500	non-normal	500	**YES**
Sulfate	mg/L	40	5.0%	74.44	non-normal	74.44	**YES**
Total Dissolved Solids	mg/L	41	0.0%	460	Normal	428.5	**YES**
Turbidity	*NTU*	*40*	*15.0%*	*8.7*	*log-normal*	*2.4*	**YES**
Vanadium	mg/L	30	56.7%	0.0046	non-normal	0.0046	no
Zinc	*mg/L*	*38*	*10.5%*	*0.11*	*log-normal*	*-2.5*	**YES**

Italics indicates that parameter distribution is log-normally distributed, tolerance limit is derived from log-transformed data.

Table 4 - TL Exceedances

Sample Location	Parameter	Unit	Result	TL
MW-2				
	Barium	mg/L	0.3	0.044
	Beryllium	mg/L	0.00098	0.00012
	Bromomethane	ug/L	1.4	0.92
	Chloride	mg/L	61.1	48.3
	Cobalt	mg/L	0.018	0.0028
	Manganese	mg/L	0.39	0.0065
	Nickel	mg/L	0.014	0.0055
	Sodium	mg/L	26.8	11.32
	Turbidity	NTU	12	10.71
MW-3				
	Barium	mg/L	0.062	0.044
	Chloride	mg/L	112	48.3
	Manganese	mg/L	0.037	0.0065
	Potassium	mg/L	3	2.3
	Sodium	mg/L	74.8	11.32
	Specific Conductance	umhos/cm	755	500
	Sulfate	mg/L	105	74.44
	Total Dissolved Solids	mg/L	454	428.5
MW-4				
	Ammonia-N	mg/L	0.331	0.21
	Barium	mg/L	0.053	0.044
	Manganese	mg/L	0.23	0.0065
	Sodium	mg/L	26.1	11.32

Table 4 - TL Exceedances (continued)

	Parameter	Unit	Result	TL
Sample Location: *MW-5*				
	Alkalinity, Total	mg/L	321	73.7
	Calcium	mg/L	46.3	41.6
	Manganese	mg/L	0.23	0.0065
	pH	pH_Units	8.13	5.21 - 7.88
	Sodium	mg/L	76.1	11.32
	Specific Conductance	umhos/cm	656	500
Sample Location: *MW-6*				
	Alkalinity, Total	mg/L	76	73.7
	Ammonia-N	mg/L	0.503	0.21
	Chemical Oxygen Demand	mg/L	65	40
	Iron	mg/L	1.5	0.37
	Manganese	mg/L	0.14	0.0065
	Potassium	mg/L	12.8	2.3
	Turbidity	NTU	39	10.71
	Vanadium	mg/L	0.0055	0.0046
	Zinc	mg/L	0.29	0.083
Sample Location: *MW-7*				
	Bromomethane	ug/L	1	0.92
	Cobalt	mg/L	0.0085	0.0028
	Iodomethane	ug/L	0.99	0.97
	Iron	mg/L	0.43	0.37
	Manganese	mg/L	0.54	0.0065
	Nickel	mg/L	0.012	0.0055

Table 4 - TL Exceedances (continued)

	Parameter	Unit	Result	TL
Sample Location: *MW-8*				
	Barium	mg/L	0.13	0.044
	Calcium	mg/L	64.4	41.6
	Chloride	mg/L	70.3	48.3
	Hardness	mg/L	284	211.6
	Manganese	mg/L	0.022	0.0065
	Potassium	mg/L	5.4	2.3
	Sodium	mg/L	19	11.32
	Specific Conductance	umhos/cm	731	500
	Total Dissolved Solids	mg/L	490	428.5
Sample Location: *MW-9*				
	Alkalinity, Total	mg/L	224	73.7
	Barium	mg/L	0.15	0.044
	Calcium	mg/L	64.3	41.6
	Chloride	mg/L	49.4	48.3
	Hardness	mg/L	289	211.6
	Manganese	mg/L	1.7	0.0065
	Methyl Tertiary Butyl Ether	ug/L	0.52	0.5
	pH	pH_Units	7.97	5.21 - 7.88
	Potassium	mg/L	3.5	2.3
	Sodium	mg/L	32.5	11.32
	Specific Conductance	umhos/cm	709	500

Table 4 - TL Exceedances (continued)

	Parameter	Unit	Result	TL
Sample Location: ***MW-10***				
	Alkalinity, Total	mg/L	79	73.7
	Barium	mg/L	0.12	0.044
	Manganese	mg/L	0.016	0.0065
	pH	pH_Units	7.9	5.21 - 7.88
	Potassium	mg/L	2.9	2.3
	Sodium	mg/L	13.4	11.32