

MARCH 17, 2023



MUNICIPALITY OF TOA ALTA JANUARY 2023 MONTHLY REPORT  
Civ. No. 3:21-01087-DRD

N. AYALA  
TERRATEK ENGINEERING GROUP, PSC  
P.O. Box 367445 San Juan, PR 00936

## Contents

I.	DISTRIBUTION LIST .....	1
II.	REPORT ORGANIZATION .....	1
III.	Section 1: SUMMARY .....	2
IV.	SECTION 2: DETAIL INFORMATION OR SUPPORTING DOCUMENTATION OF EACH REQUIREMENT IN NEED OF COMPREHENSIVE DESCRIPTION OR STATUS DETAILS.....	4
A.	COMPLETED REQUIREMENTS .....	4
B.	ID 4: Intermediate Cover.....	5
C.	ID 6: Safety Barrier Fencing.....	7
V.	SECTION 3: PROJECTION OF NEXT MONTH ACTIVITIES .....	13
VI.	Section 4: Attachments.....	13



## I. DISTRIBUTION LIST

DOJ: [david.l.gordon@usdoj.gov](mailto:david.l.gordon@usdoj.gov)

EPA: [spielmann.lee@epa.gov](mailto:spielmann.lee@epa.gov)  
[plossl.carl@epa.gov](mailto:plossl.carl@epa.gov)  
[gonzalez.eduardo@epa.gov](mailto:gonzalez.eduardo@epa.gov)

DNER: [nildasanchez@drna.pr.gov](mailto:nildasanchez@drna.pr.gov)  
[mariavrodriguez@drna.pr.gov](mailto:mariavrodriguez@drna.pr.gov)

MTA: [carmelovazquez@drna.pr.gov](mailto:carmelovazquez@drna.pr.gov)

[carlos@cwlllegal.com](mailto:carlos@cwlllegal.com)  
[dbattle@cstlawpr.com](mailto:dbattle@cstlawpr.com)  
[jramirez@amrclaw.com](mailto:jramirez@amrclaw.com)  
[cagosto674@gmail.com](mailto:cagosto674@gmail.com)

## II. REPORT ORGANIZATION

As part of the USA-MTA Civ. No. 3:21-01087-DRD Stipulation and Preliminary Injunction Order, MTA shall prepare and submit monthly reports regarding the performance of its obligations under this Order until completion of the requirements of Paragraphs 3 through 10 of this Order. Each report shall cover the period ending on the last day of each month. Each report must be sent to DOJ, EPA, and DNER on or before the 15th day of the month following the reporting period. Each monthly report shall include:

- i. description of compliance with each requirement of this Order;
- ii. the volume, acreage and location of the Intermediate Cover that was applied;
- iii. the volume and disposition of leachate and leachate-contaminated stormwater collected;
- iv. results of any sampling analysis performed; and
- v. Notification of any noncompliance with this Order, including a statement describing the noncompliance and its underlying causes, and proposed measures and an implementation schedule to correct the noncompliance.

The monthly report is divided into four sections.

Section 1 presents a summary of the order requirements and the compliance status for each requirement. *Please note that Task ID's are not related to the order assigned paragraphs.*

Section 2 will include detail information or supporting documentation regarding the compliance status of each requirement in need of comprehensive description or status details.

Section 3 is a projection of next month activities.

Section 4 includes all the attachments included with the report.

### III. Section 1: SUMMARY

Municipality of Toa Alta Civ. No. 3:21-01087-DRD		
Reporting Period:	February 01 to 28, 2023	
Reporting Number:	07	
Reporting Official:	Nivia Ayala, PE/TerraTek	
Reporting Date:	3/18/2023	
Description of Compliance with each requirement of the Order		
ID	Requirement	Compliance Status
1	Daily Cover	Daily cover was completed prior to April 30, 2022.
2	Cessation of Waste Disposal	In-Compliance
3	Posting of Signs	In Compliance
4	Intermediate Cover	Intermediate cover was scheduled to start by October 1, 2022. In a meeting with DNER, MTA agreed to start intermediate cover task by July 01, 2023, to the top deck and including stormwater runoff chutes. After DNER approves, or approves with modifications or conditions, any MTA revised permanent closure plan, and if the approved plan includes a schedule for completion of Intermediate Cover, that schedule shall control. Please see Additional comment for ID 4 item.
5	Maintenance of Cover	Monthly Maintenance for applied daily cover is performed for compliance assurance. Please see Attachment 1 for Inspection reports.
6	Slope Stability	Short Term Controls were completed by May 1. 2022. Diversion works to prevent stormwater runoff on the top deck for entering the North Slope Area and erosion controls. Maintenance is performed monthly. Safety Barrier fencing was still pending installation during the reporting period, even though it has an active Purchase Order the supplier was not able to deliver the materials during the reporting period. Please see additional comments for ID 6 Item.
7	Leachate Management	Field work for the Survey of Leachate Seeps was completed on December 19, 2022. A new topographic map was prepared to georeferenced every leachate seepage identified (included as Attachment #2)
8	Stormwater Management	
8a	Short Term Controls	Catch basins, ditches, swales and channels were inspected weekly, when necessary, cleaned of accumulated debris and eliminate any observed standing/stagnant water. When applicable, catch basins, ditches, swales, and channels were periodically mowed and cleaned. The diesel tank secondary containment is inspected weekly, when necessary, cleaned of accumulated debris and eliminate any observed standing/stagnant water.

8b	Survey of Leachate Seeps	Completed on December 19, 2022. Report is included as Attachment #2
8c	Stormwater Management Plan	The H-H Study was completed on December 15, 2022. Presently we are on the design phase. With the information of the H-H Study a new set of structural controls will be designed to manage the stormwater regulatory requirements applicable to landfill facilities. A report will be completed by March 30, 2023.
8d	Discharges of Stormwater Not from Pond	N/A
8e	Discharge/Disposal of Pond Liquid	N/A
<b>Additional Requirements</b>		
	The volume, acreage, and location the Intermediate Cover that was applied.	N/A
	The volume and disposition of leachate contaminated stormwater collected.	None
	Results Of Any Sampling Analysis Performed	None
	Notification Of Noncompliance	Safety Barrier fencing was still pending installation during the reporting period, even though it has an active Purchase Order the supplier was not able to deliver the materials during the reporting period. MTA shall by January 1, 2023, submit for approval under Paragraph 11 a proposed Stormwater Management Plan. The required H-H study was completed and submitted with last month's report. At present, we are still working on the final infrastructure design in association with the Preliminary Closure Design and the Final Stormwater Management Plan will be submitted by March 30, 2023.

#### IV. SECTION 2: DETAIL INFORMATION OR SUPPORTING DOCUMENTATION OF EACH REQUIREMENT IN NEED OF COMPREHENSIVE DESCRIPTION OR STATUS DETAILS

##### A. COMPLETED REQUIREMENTS

###### **Access:**

Access is granted to the United States and the Commonwealth of Puerto Rico, and their employees, representatives and contractors, to conduct the necessary inspections and studies, including and the applicable records review to evaluate existing conditions, following the agreed terms in the Stipulation.

###### **Daily Cover:**

Daily Cover at the facility was completed on April 30, 2022. All areas of exposed waste were covered by Daily Cover.



###### **Cessation of Waste Disposal:**

The cessation of waste disposal at the facility was completed by March 30, 2022. However, as agreed in the Stipulation, the temporary storage of construction and

demolition (C&D) waste, bulk household waste (durable goods such as mattresses, furniture, and appliances), or yard waste (vegetation waste generated by land maintenance) for final disposal at a different landfill is active and been performed on a daily basis.

**Posting of Signs:**

A sign with a size of four feet by five feet was installed at the landfill entrance. See the attached picture.



**B. ID 4: Intermediate Cover**

As has been explained numerous times throughout the process, the Municipality needs the funding to perform several of the required tasks, commencing with the Intermediate Cover Task, as it is one of the more costly initial tasks to be performed. The following is a chronological order of the Municipality performed steps to negotiate and acquire the funds to perform this task:

Rural Development:

1. On May 18, 2020, the Municipality submitted a Notice of Intent to Rural Development requesting the award of funds under the Disaster Mitigation Assistance Grant for the landfill.
2. On September 4, 2020, the Municipality amended its request to include the landfill closure, post-closure activities and expansion.

3. On July 16, 2021, the Municipality received a Rural Development email confirming that all the required documents for the appropriate Disaster Mitigation Assistance Grant for the landfill was completed.
4. On August 22, 2022, the Municipality held a Public Hearing related to the grant funds requested.
5. USDA Rural Grant Program, MTA submitted a final Environmental Assessment to: Quiles, Danna - RD, San Juan, PR <danna.quiles@usda.gov>; Cabrera, Jose - RD, San Juan, PR <Jose.Cabrera@usda.gov>; Davila, Sandimary - RD, San Juan, PR <Sandimary.Davila@usda.gov>; Gonzalez, Melvin - RD, SAN JUAN, PR <Melvin.Gonzalez@usda.gov>. The document was submitted on September 30, 2022.
6. As of today, the Rural Development process is still on-going, but has not yet completed.

#### Department of Natural and Environmental Resources (DNER)

1. The DNER, during the EPA Public Hearing held on February 23, 2022, stated publicly and during the hearing that they would make available to the Municipality the required funds for the appropriate landfill closure.
2. As a result of DNER public comments, a meeting on March 24, 2022, between the Municipality, DNER and La Fortaleza was held to discuss the details related to the funds availability.
3. On March 31, 2022, the Municipality provided the required information by the DNER, including the schedule and cost estimate for said agency to prepare a Memorandum of Understanding (MOU) that would provide the necessary funds to the Municipality for the landfill's closure activities.
4. After continuous inquiries by the Municipality, the DNER on June 10, 2022, finally provided a draft MOU for the funds access. The Municipality issued its comments to the MOU on July 12, 2022.
5. A meeting was held on November 2, 2022, with Puerto Rico Office of Management and Budget, the DNER and MTA to discuss the extent of the DOJ requirements and DNER Closure Plan request. The purpose of the meeting also includes the addition of a transfer station located at the Landfill existing site.
6. A conference call was held on November 29, 2022 where PROMB required an additional cost spreadsheet including the cost of a transfer station design and construction.
7. As of today, and after significant follow-up efforts with the DNER, they have not responded with the definitive version of the MOU and the availability of funds.
8. An email was sent on December 5, 2022 to Ms. Maria V. Rodriguez, Anais Rodriguez Vega, Elid Ortega Orozco, Claribel Rivera following up regarding the MOU with the agency.



9. An email was sent on December 20, 2022 to Ms. Maria V. Rodriguez, Anais Rodriguez Vega, Elid Ortega Orozco, Claribel Rivera following up regarding the MOU with the agency.
10. An email was sent on January 24, 2023 to Ms. Maria V. Rodriguez, Anais Rodriguez Vega, Elid Ortega Orozco, Claribel Rivera following up regarding the MOU with the agency.
11. An email was received on January 27, 2023 from Ms. Maria V. Rodriguez (DNER) clarifying that any economical assistance to the Municipality was been handled by the Department of Budget and Management at the State level.
12. A letter dated, January 26, 2023, was directed to the MTA Mayor approving \$1.3M for planning and design of the closure activities. No disbursement has been received at this moment.
13. Currently, the Municipality is analyzing the different alternatives at their disposal to advance the execution of the required Intermediate Cover tasks.
14. Disbursement of the \$1.3M for planning and design was made in February 2023.
15. Additionally, MTA has already started the RFQ process for a Landfill Contractor

<b>Dates</b>	<b>Activities</b>
January 15, 2023	RFQ initial announcement.
February 15, 2023	Deadline for interested contractors to submit and present questions.
March 15, 2023	Due date for RFQs.
April 15-30, 2023	Deadline for Municipality evaluation and determination of RFQ.
May 15, 2023	Perform negotiations with applicable contractors (if necessary).
May 30, 2023	Final Determination of RFQ (if necessary).

Unfortunately, no contractor submitted a proposal for the RFQ. The Municipality is presently looking within the existing Municipality contractors and requesting proposals directly to individual contractors in order to find a service provider for this task.

16. A Closure Conceptual Design has been submitted to DNER on February 8, 2023. We have agreed with DNER to start top deck intermediate cover by July 1, 2023 and submit a complete Preliminary Closure Plan by November 15, 2023.

### C. ID 6: Safety Barrier Fencing

Presently, MTA is going over the contracting and finance process to contract the installation of the safety barrier. Materials are already on site. The shortage on the chain supply of these kind

of construction materials have a delay of three (3) months. As MTA is required to follow purchasing and finances municipal processes,

**Photos:**









## V. SECTION 3: PROJECTION OF NEXT MONTH ACTIVITIES

March 3, 2023	Weekly Inspection
Weekly Inspection	DNER Meeting to discuss Conceptual Closure Design.
March 10, 2023	
Weekly Inspection	March 24, 2023
March 15, 2023	Weekly Inspection
Due date for Intermediate Cover RFQs.	March 31, 2023
March 17, 2023	

These dates are subject to change.

## VI. Section 4: Attachments

Attachment 1: Weekly Inspections

Attachment 2: Leachate Seepage Report







Friday, February 3, 2023

**Approval Status**

Approved

**Nombre de la persona que hace la inspeccion**

Christian Villalta Calderón

**Email**

cristhianvillalta@gmail.com

**Fecha**

Friday, February 3, 2023

**Hora**

03:28 PM

**Condicion del Clima**

Soleado

**Esta la entrada limpia y libre de basura?**

Si

**Foto Entrada**



**Hay Personal en la caseta de seguridad?**

SI

**Cuantos camiones han llegado en el dia?**

8

**Fecha de la ultima verificacion del sistema de manejo de lixiviados Celda Sur?**

Friday, February 3, 2023

**Horas de operacion de la planta electrica**

8

**Datos de eventos de lluvia**

No hay datos disponibles de lluvia.

**Estan las areas verdes limpias y se ha realizado mantenimiento?**

SI

**Incluir Foto**



**Estan los diques limpios y sus  
valvulas cerradas con candado?**

SI

**Condicion de Cubierta Talud Norte**

Excelentes condiciones

**Incluir foto**



**Condicion Operacion Recibo de Escombros**

Necesita Limpieza

**Tomar foto**



**Equipos Operando**

Ninguno al momento de la inspección.

**Condicion de medidas de control de erosion y sedimentacion**

Buena

**Se pueden notar brotes de lixiviado?**

SI

**Añadir fotos deal area de brotes visibles**



**Añadir fotos deal area de brotes  
visibles**



**Condicion de los caminos internos**



Excelentes condiciones

**Condicion de areas de desvio de materiales**

Area completamente limpia.

**Signature**

**Approval Activity History**

Actor	Actions	Date
 Notification	Email sent. (Your request has been approved.) cristhianvillalta@gmail.com	Wednesday, February 8, 2023
 Nivia Ayala nayala@terratekpr.com	<div style="background-color: #e0ffe0; padding: 5px; display: inline-block;">Approve</div>	Wednesday, February 8, 2023



Friday, February 10, 2023

**Approval Status**

Approved

**Nombre de la persona que hace la inspeccion**

Christian Villalta Calderón

**Email**

cristhianvillalta@gmail.com

**Fecha**

Friday, February 10, 2023

**Hora**

04:00 PM

**Condicion del Clima**

Lloviendo

**Esta la entrada limpia y libre de basura?**

Si

**Foto Entrada**





**Hay Personal en la caseta de seguridad?**

SI

**Cuantos camiones han llegado en el dia?**

6

**Fecha de la ultima verificacion del sistema de manejo de lixiviados Celda Sur?**

Friday, February 10, 2023

**Horas de operacion de la planta electrica**

8

**Datos de eventos de lluvia**

No hay datos disponibles.

**Estan las areas verdes limpias y se ha realizado mantenimiento?**

SI

**Incluir Foto**



**Estan los diques limpios y sus  
valvulas cerradas con candado?**

SI

**Condicion de Cubierta Talud Norte**

Excelentes condiciones

**Incluir foto**



**Condicion Operacion Recibo de Escombros**

Necesita Limpieza

**Tomar foto**



**Equipos Operando**

Al momento no hay equipos operando.

**Condicion de medidas de control de erosion y sedimentacion**

Buena

**Se pueden notar brotes de lixiviado?**

SI

**Añadir fotos deal area de brotes visibles**



**Añadir fotos deal area de brotes  
visibles**



**Condicion de los caminos internos**



Excelentes condiciones

**Condicion de areas de desvio de materiales**

Area completamente limpia.

**Signature**

### Approval Activity History

Actor	Actions	Date
 Nivia Ayala nayala@terratekpr.com	<span>Approve</span>	Wednesday, February 15, 2023
 Notification	Email sent. (Your request has been approved.) cristhianvillalta@gmail.com	Wednesday, February 15, 2023



Friday, February 17, 2023

**Approval Status**

Approved

**Nombre de la persona que hace la inspeccion**

Christian Villalta Calderón

**Email**

cristhianvillalta@gmail.com

**Fecha**

Friday, February 17, 2023

**Hora**

03:20 PM

**Condicion del Clima**

Soleado

**Esta la entrada limpia y libre de basura?**

Si

**Foto Entrada**



**Hay Personal en la caseta de seguridad?**

SI

**Cuantos camiones han llegado en el dia?**

4

**Fecha de la ultima verificacion del sistema de manejo de lixiviados Celda Sur?**

Friday, February 17, 2023

**Horas de operacion de la planta electrica**

8

**Datos de eventos de lluvia**

No hay datos disponibles de llluvias registradas.

**Estan las areas verdes limpias y se ha realizado mantenimiento?**

SI

**Incluir Foto**





**Estan los diques limpios y sus valvulas cerradas con candado?**

SI

**Condicion de Cubierta Talud Norte**

Excelentes condiciones.

**Incluir foto**



**Condicion Operacion Recibo de Escombros**

Necesita Limpieza

**Tomar foto**



**Equipos Operando**

Ninguno al momento de inspección.

**Condicion de medidas de control de erosion y sedimentacion**

Buena

**Se pueden notar brotes de lixiviado?**

SI

**Añadir fotos deal area de brotes visibles**



**Añadir fotos deal area de brotes  
visibles**



**Condicion de los caminos internos**



Excelentes condiciones

**Condicion de areas de desvio de materiales**

Area completamente limpia.

**Signature**

### Approval Activity History

Actor	Actions	Date
 Nivia Ayala nayala@terratekpr.com	<span>Approve</span>	Friday, February 17, 2023
 Notification	Email sent. (Your request has been approved.) cristhianvillalta@gmail.com	Friday, February 17, 2023



Friday, February 24, 2023

**Approval Status**

Approved

**Nombre de la persona que hace la inspeccion**

Christian Villalta Calderón

**Email**

cristhianvillalta@gmail.com

**Fecha**

Friday, February 24, 2023

**Hora**

04:01 PM

**Condicion del Clima**

Soleado

**Esta la entrada limpia y libre de basura?**

Si

**Foto Entrada**



**Hay Personal en la caseta de seguridad?**

SI

**Cuantos camiones han llegado en el dia?**

4

**Fecha de la ultima verificacion del sistema de manejo de lixiviados Celda Sur?**

Friday, February 24, 2023

**Horas de operacion de la planta electrica**

8

**Datos de eventos de lluvia**

No hay registros disponibles de lluvia.

**Estan las areas verdes limpias y se ha realizado mantenimiento?**

SI

**Incluir Foto**



**Estan los diques limpios y sus  
valvulas cerradas con candado?**

SI

**Condicion de Cubierta Talud Norte**

Excelentes condiciones

**Incluir foto**

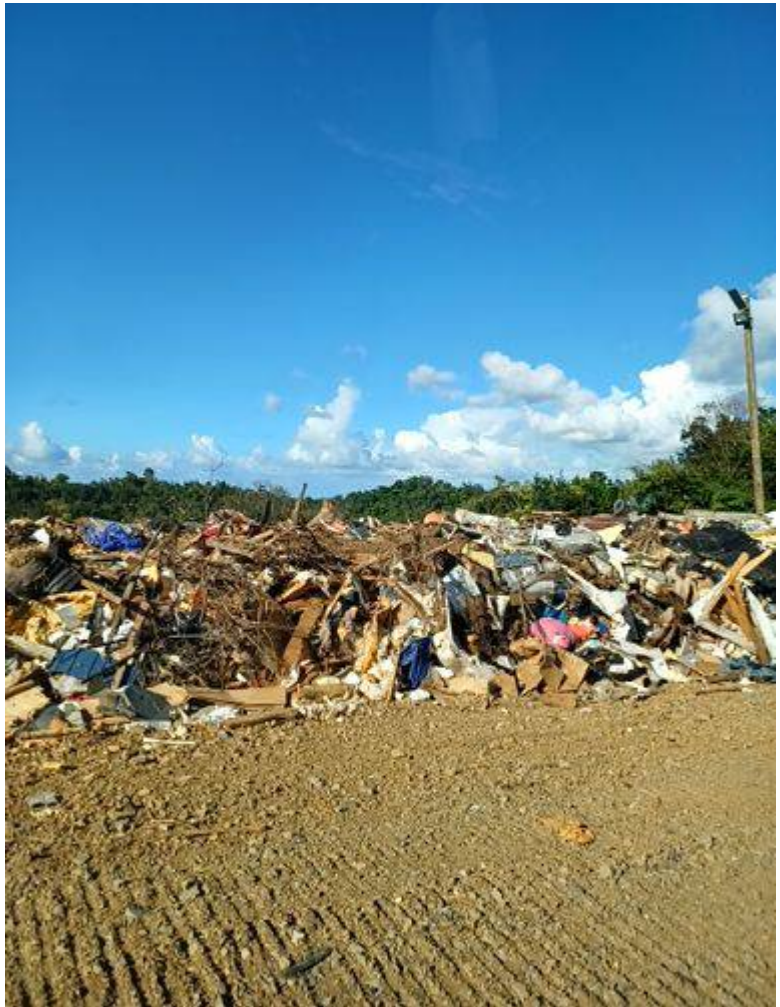




**Condicion Operacion Recibo de Escombros**

Necesita Limpieza

**Tomar foto**



**Equipos Operando**

No hay equipos operando.

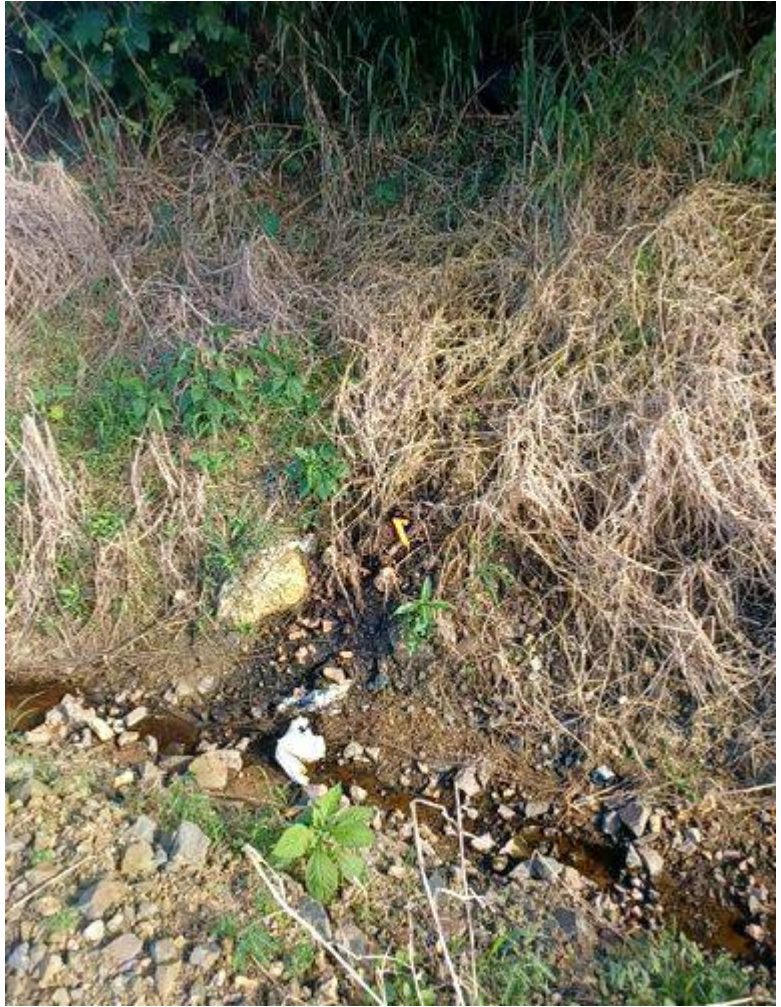
**Condicion de medidas de control de erosion y sedimentacion**

Buena

**Se pueden notar brotes de lixiviado?**

SI

**Añadir fotos deal area de brotes visibles**



**Añadir fotos deal area de brotes  
visibles**



**Condicion de los caminos internos**



Excelentes condiciones

**Condicion de areas de desvio de materiales**

Area completamente limpia.

**Signature**

**Approval Activity History**

Actor	Actions	Date
 Nivia Ayala nayala@terratekpr.com	<div style="background-color: #e0ffe0; padding: 5px; display: inline-block;">Approve</div>	Monday, March 6, 2023
 Notification	Email sent. (Your request has been approved.) cristhianvillalta@gmail.com	Monday, March 6, 2023



FEBRUARY 13, 2023



# SEEPAGE INVENTORY REPORT

TOA ALTA MUNICIPAL SOLID WASTE LANDFILL

PREPARED BY: NIVIA AYALA, PE  
TERRATEK ENGINEERING GROUP, PSC  
P.O. BOX 367445 SAN JUAN, PR 00936

# Contents

I.	INTRODUCTION.....	1
II.	BACKGROUND.....	1
III.	SITE SETTING AND HISTORY.....	1
IV.	REVIEW HISTORICAL DATA.....	3
A.	Leachate Generation Estimation .....	3
1.	Baseline Analysis.....	3
B.	Top Deck Capping .....	5
V.	SEEPAGE INVENTORY.....	6
VI.	DEVIATION DUE TO CURRENT FIELD CONDITIONS.....	34
VII.	GEOREFERENCE DRAWING .....	35

Figure 1	Site Location.....	2
Figure 2	Existing Conditions.....	3
Figure 3	Top Deck and Stormwater Down Chutes.....	5



## I. INTRODUCTION

As part of the USA-MTA Civ. No. 3:21-01087-DRD Stipulation and Preliminary Injunction Order, MTA shall prepare and submit for approval under Paragraph 11 a proposed Leachate Management Plan. The plan must describe engineered works and procedures that are designed to ensure at least a 90% reduction in releases of leachate from the unlined portion of the Landfill to the subsurface within two years after the Effective Date. The plan must involve engineered works and procedures, as necessary, to minimize the infiltration of leachate to the North Pond and South Pond. The plan must include a schedule, with milestones, for completion of all engineered works within 12 months after plan approval. To determine leachate release reductions, MTA shall use EPA's Hydrologic Evaluation of Landfill Performance ("HELP") Model. The Plan must include documentation and justification of all assumptions used.

## II. BACKGROUND

The Toa Alta Landfill consists of two sections: the lined area (approximately 4.4 acres) and the unlined area (approximately 30.3 acres). The unlined landfill overlies a limestone [aquifer and abuts an unconsolidated sand and gravel] aquifer into which the leachate drains. The site began accepting waste in the unlined cell of the landfill in 1966. A lined cell with a leachate collection system was constructed in 2006-2007. The collected leachate was managed offsite via hauling for treatment at the Puerto Nuevo Regional Treatment Plant. However, at the foot of the landfill slopes there are several releases of leachate at lined and unlined areas of the landfill cells. To determine leachate release reductions is essential to complete a Seepage Inventory.

## III. SITE SETTING AND HISTORY

The Toa Alta Municipal Solid Waste Landfill is situated at State Road PR-165, km 8.4, Contorno Ward, Toa Alta. According to the historical records for the Site waste deposition began in at least early 1970s. The Site accepted waste from the neighboring municipalities of Bayamón, Comerío,



Corozal and Naranjito. The Site consists of approximately 30.3 acres unlined cell and a 4.4 acre lined cell, referred as the South Cell. The complete site covers approximately 18 hectares (44.47 acres) and the total waste footprint was calculated as 12.26 hectares (30.3 acres). After February 25, 2021, the waste acceptance was limited to 12,500 cubic yards per month. Since April 1, 2022, the Landfill ceased disposing of waste. However, there is a temporary storage of construction and demolition (C&D) waste, bulk household waste (durable goods such as mattresses, furniture, and appliances), or yard waste (vegetation waste generated by land maintenance) in up to four roll-off containers at the Landfill prior to its shipment for final disposal at a different landfill.

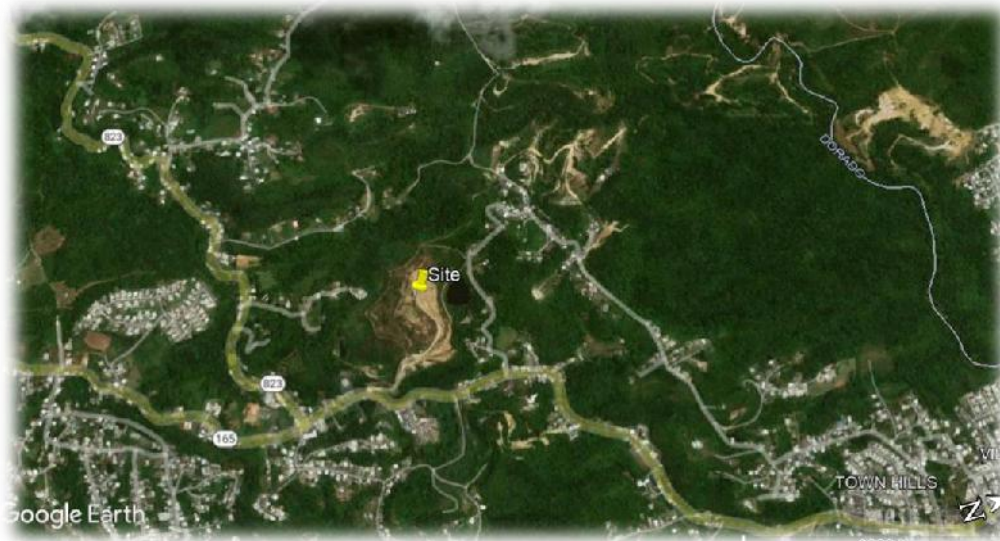


Figure 1 Site Location



*Figure 2 Existing Conditions*

## IV. REVIEW HISTORICAL DATA

### A. Leachate Generation Estimation

#### 1. Baseline Analysis

The USA-MTA Civ. No. 3:21-01087-DRD Stipulation and Preliminary Injunction Order requested a plan that describes engineered works and procedures that are designed to ensure at least a 90% reduction in releases of leachate from the unlined portion of the Landfill to the subsurface. The first step to evaluate the proposed engineered works to achieve the 90% reduction was to establish the baseline with the existing topography of the Site and no intermediate cover.

Modeling of the infiltration through the cover system and waste layers was carried out using the Visual HELP program by Schlumberger Water Services, based upon

the original Hydrologic Evaluation of Landfill Performance (HELP) model, developed for the USEPA by Schroeder et.al. 1994.

#### Existing Cover System

HELP model indicates that approximately 52537 cubic feet or 393000 gallons of leachate generated in 1 year.

With 12 in of Intermediate Cover System (1.0 x 10<sup>-5</sup> cm/sec. cover soil on top of existing cover) HELP model indicates that approximately 19448 cubic feet or 145480 gallons of leachate generated in 1 year.

See Attachment #3 for HELP Data.

**Based on the above-mentioned results it is possible to achieve a 63% reduction, only by applying intermediate cover to Site footprint.**

It is our understanding that to achieve a 90% reduction, we will have to execute the Closure Plan for the Site.

However, we can also introduce the collection of leachates by using the Leachate Interception System already presented to EPA. The test pilot will give us a good estimate of the amount of leachate that can be intercepted before gaining access to the surface water at the North Pond. This alternative would not reduce leachate generation but would seek to capture a significant fraction of leachate-impacted North Pond prior to discharge.

But we can calculate the Leachate Collection Line pipe capacity using the Manning's equation along with standard principles of pipe sizing design.

A 4-inch HDPE at a minimum 2% slope has the following capacity:

$$Q = (1.486/n) * A * R^{2/3} * S^{1/2}, \text{ where } n = 0.012 \text{ and } S = 0.02$$

$$Q = (1.486/0.012) * 0.0872 * 0.3011 * 0.1414 = 0.46 \text{ cfs}$$

## B. Top Deck Capping

The Site Top Deck has an area of approximately 4 acres, by applying a Styrene Acrylic Liquid Stabilizer after proper grading, we can achieve a temporary impermeability effect prior to final capping of the Site. We can reduce approximately 19397 gallons of leachate generation in 1 year. **Adding a 13% reduction of leachate generation.**

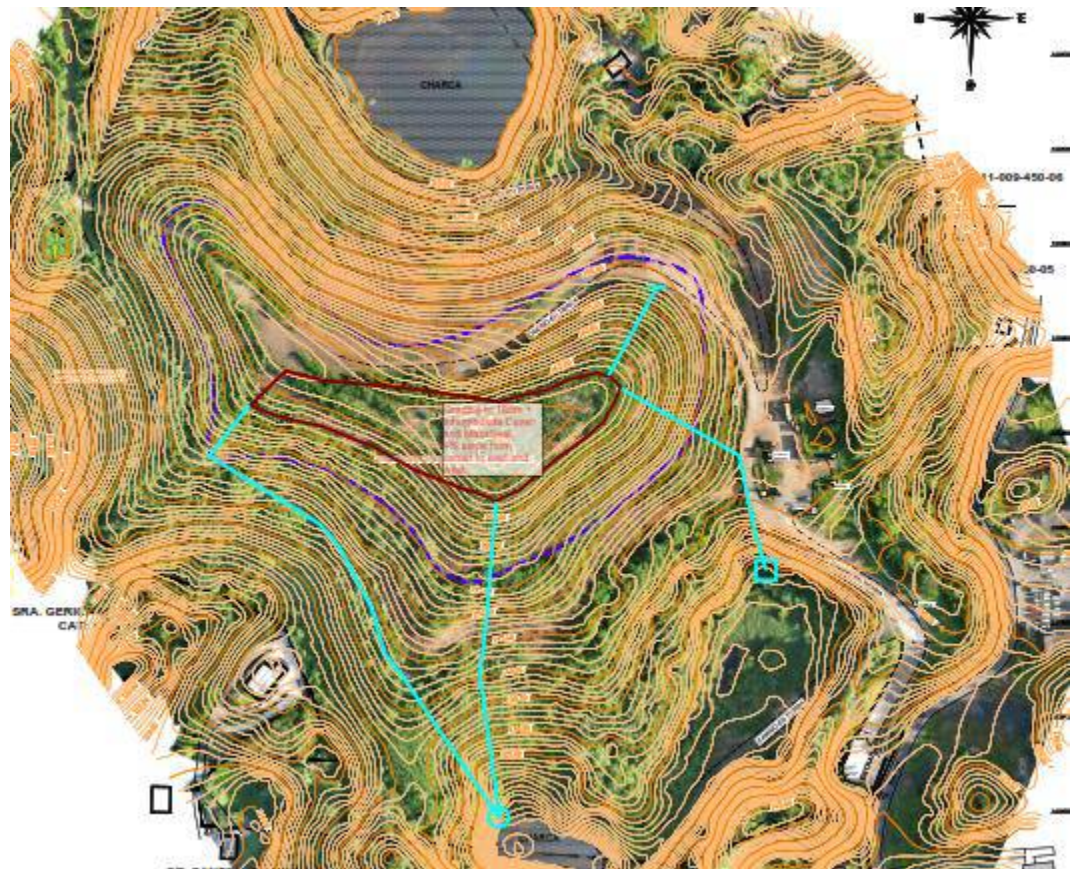













Figure 3 Top Deck and Stormwater Down Chutes

## V. SEEPAGE INVENTORY




Numerical order	POINT	DESCRIPTION	LOCATION	PICTURE
1	101	F101	<b>Latitude:</b> 18.371824 <b>Longitude: -</b> 66.2630779  <b>Northing:</b> 259607.683 <b>Easting:</b> 217992.552  <b>Elevation:</b> 141.17	
2	102	F102	<b>Latitude:</b> 18.3718781 <b>Longitude: -</b> 66.2631288  <b>Northing:</b> 259614.017 <b>Easting:</b> 217989.048  <b>Elevation:</b> 141.43	
3	103	F103	<b>Latitude:</b> 18.3718886 <b>Longitude: -</b> 66.263167  <b>Northing:</b> 259615.326 <b>Easting:</b> 217986.952  <b>Elevation:</b> 142.19	




	<b>POINT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>PICTURE</b>
4	104	F104	<b>Latitude:</b> 18.3719045 <b>Longitude: -</b> 66.2631587  <b>Northing:</b> 259617.073 <b>Easting:</b> 217985.610  <b>Elevation:</b> 142.33	
5	105	F105	<b>Latitude:</b> 18.3719141 <b>Longitude: -</b> 66.2631734  <b>Northing:</b> 259619.382 <b>Easting:</b> 217985.014  <b>Elevation:</b> 141.77	
6	106	F106	<b>Latitude:</b> 18.372034 <b>Longitude: -</b> 66.2631955  <b>Northing:</b> 259631.861 <b>Easting:</b> 217979.142  <b>Elevation:</b> 142.38	




	POINT	DESCRIPTION	LOCATION	PICTURE
7	107	F107	<b>Latitude:</b> 18.3723334 <b>Longitude: -</b> 66.2634658  <b>Northing:</b> 259664.996 <b>Easting:</b> 217954.490  <b>Elevation:</b> 138.76	
8	108	F108	<b>Latitude:</b> 18.3723773 <b>Longitude: -</b> 66.2635576  <b>Northing:</b> 259671.549 <b>Easting:</b> 217943.288  <b>Elevation:</b> 136.58	
9	109	F109	<b>Latitude:</b> 18.3724349 <b>Longitude: -</b> 66.2636854  <b>Northing:</b> 259676.734 <b>Easting:</b> 217929.300  <b>Elevation:</b> 135.78	




	POINT	DESCRIPTION	LOCATION	PICTURE
10	110	F110	<b>Latitude:</b> 18.3725034 <b>Longitude: -</b> 66.2638195  <b>Northing:</b> 259683.463 <b>Easting:</b> 217919.168  <b>Elevation:</b> 132.82	
11	111	F111	<b>Latitude:</b> 18.3724773 <b>Longitude: -</b> 66.2638943  <b>Northing:</b> 259684.808 <b>Easting:</b> 217906.588  <b>Elevation:</b> 130.44	
12	112	F112	<b>Latitude:</b> 18.3724792 <b>Longitude: -</b> 66.2639861  <b>Northing:</b> 259681.958 <b>Easting:</b> 217897.972  <b>Elevation:</b> 128.89	









	<b>POINT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>PICTURE</b>
13	113	F113	<b>Latitude:</b> 18.3724585 <b>Longitude: -</b> 66.2640166  <b>Northing:</b> 259680.667 <b>Easting:</b> 217893.661  <b>Elevation:</b> 127.95	
14	114	F114	<b>Latitude:</b> 18.372468 <b>Longitude: -</b> 66.2640659  <b>Northing:</b> 259680.163 <b>Easting:</b> 217888.097  <b>Elevation:</b> 126.70	
15	115	F116	<b>Latitude:</b> 18.3724448 <b>Longitude: -</b> 66.2641407  <b>Northing:</b> 259678.414 <b>Easting:</b> 217877.594  <b>Elevation:</b> 124.60	




	POINT	DESCRIPTION	LOCATION	PICTURE
16	116	F116	<b>Latitude:</b> 18.3724232 <b>Longitude: -</b> 66.2642279  <b>Northing:</b> 259677.160 <b>Easting:</b> 217872.095  <b>Elevation:</b> 123.57	
17	117	F117	<b>Latitude:</b> 18.372441 <b>Longitude: -</b> 66.2642698  <b>Northing:</b> 259676.107 <b>Easting:</b> 217867.871  <b>Elevation:</b> 123.24	
18	118	F118	<b>Latitude:</b> 18.3724162 <b>Longitude: -</b> 66.2643184  <b>Northing:</b> 259675.336 <b>Easting:</b> 217858.363  <b>Elevation:</b> 121.93	




	<b>POINT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>PICTURE</b>
19	119	F119	<b>Latitude:</b> 18.3724108 <b>Longitude: -</b> 66.2643921  <b>Northing:</b> 259674.404 <b>Easting:</b> 217853.496  <b>Elevation:</b> 121.58	
20	120	F220	<b>Latitude:</b> 18.3718886 <b>Longitude: -</b> 66.263167  <b>Northing:</b> 259674.295 <b>Easting:</b> 217851.557  <b>Elevation:</b> 121.34	
21	121	F221	<b>Latitude:</b> 18.3718886 <b>Longitude: -</b> 66.263167  <b>Northing:</b> 259674.184 <b>Easting:</b> 217848.096  <b>Elevation:</b> 120.63	

	POINT	DESCRIPTION	LOCATION	PICTURE
22	122	F222	<b>Latitude:</b> 18.372405 <b>Longitude: -</b> 66.2644689  <b>Northing:</b> 259673.874 <b>Easting:</b> 217845.769  <b>Elevation:</b> 120.49	
23	123	F223	<b>Latitude:</b> 18.3724187 <b>Longitude: -</b> 66.2645534  <b>Northing:</b> 259674.612 <b>Easting:</b> 217835.045  <b>Elevation:</b> 119.21	
24	124	F224	<b>Latitude:</b> 18.3724219 <b>Longitude: -</b> 66.2645792  <b>Northing:</b> 259674.931 <b>Easting:</b> 217832.621  <b>Elevation:</b> 119.16	




	<b>POINT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>PICTURE</b>
25	125	F225	<b>Latitude:</b> 18.3724079 <b>Longitude: -</b> 66.2646027  <b>Northing:</b> 259675.595 <b>Easting:</b> 217831.471  <b>Elevation:</b> 118.88	
26	126	F226	<b>Latitude:</b> 18.3724069 <b>Longitude: -</b> 66.2646174  <b>Northing:</b> 259676.092 <b>Easting:</b> 217827.867  <b>Elevation:</b> 119.13	
27	127	F227	<b>Latitude:</b> 18.3724139 <b>Longitude: -</b> 66.2646211  <b>Northing:</b> 259677.980 <b>Easting:</b> 217823.134  <b>Elevation:</b> 117.88	




	<b>POINT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>PICTURE</b>
28	128	F228	<b>Latitude:</b> 18.3724394 <b>Longitude: -</b> 66.2646728  <b>Northing:</b> 259678.936 <b>Easting:</b> 217819.417  <b>Elevation:</b> 118.17	
29	129	F229	<b>Latitude:</b> 18.3724623 <b>Longitude: -</b> 66.2647237  <b>Northing:</b> 259680.756 <b>Easting:</b> 217815.410  <b>Elevation:</b> 117.68	
30	130	F230	<b>Latitude:</b> 18.3724769 <b>Longitude: -</b> 66.2647573  <b>Northing:</b> 259681.828 <b>Easting:</b> 217812.338  <b>Elevation:</b> 117.48	




	<b>POINT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>PICTURE</b>
31	131	F231	<b>Latitude:</b> 18.3724709 <b>Longitude: -</b> 66.2647904  <b>Northing:</b> 259684.069 <b>Easting:</b> 217808.338  <b>Elevation:</b> 117.45	
32	132	F232	<b>Latitude:</b> 18.3724976 <b>Longitude: -</b> 66.2648233  <b>Northing:</b> 259685.796 <b>Easting:</b> 217805.250  <b>Elevation:</b> 117.28	
33	133	F233	<b>Latitude:</b> 18.3725135 <b>Longitude: -</b> 66.264882  <b>Northing:</b> 259686.561 <b>Easting:</b> 217804.016  <b>Elevation:</b> 117.30	




	POINT	DESCRIPTION	LOCATION	PICTURE
34	134	F234	<b>Latitude:</b> 18.3725154 <b>Longitude: -</b> 66.2648897  <b>Northing:</b> 259688.862 <b>Easting:</b> 217799.849  <b>Elevation:</b> 117.09	
35	135	F235	<b>Latitude:</b> 18.3725399 <b>Longitude: -</b> 66.2649189  <b>Northing:</b> 259689.534 <b>Easting:</b> 217798.191  <b>Elevation:</b> 116.91	
36	136	F236	<b>Latitude:</b> 18.3725489 <b>Longitude: -</b> 66.264939  <b>Northing:</b> 259690.908 <b>Easting:</b> 217795.443  <b>Elevation:</b> 117.23	









	<b>POINT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>PICTURE</b>
37	137	F237	<b>Latitude:</b> 18.372553 <b>Longitude: -</b> 66.2649735  <b>Northing:</b> 259692.987 <b>Easting:</b> 217794.116  <b>Elevation:</b> 116.86	
38	138	F238	<b>Latitude:</b> 18.3725749 <b>Longitude: -</b> 66.2649889  <b>Northing:</b> 259694.189 <b>Easting:</b> 217792.485  <b>Elevation:</b> 116.75	
39	139	F239	<b>Latitude:</b> 18.372601 <b>Longitude: -</b> 66.2650003  <b>Northing:</b> 259697.470 <b>Easting:</b> 217789.885  <b>Elevation:</b> 116.41	




	POINT	DESCRIPTION	LOCATION	PICTURE
40	140	F240	<b>Latitude:</b> 18.3726214 <b>Longitude: -</b> 66.2650526  <b>Northing:</b> 259700.240 <b>Easting:</b> 217786.607  <b>Elevation:</b> 116.48	
41	141	F241	<b>Latitude:</b> 18.3726577 <b>Longitude: -</b> 66.2650526  <b>Northing:</b> 259702.889 <b>Easting:</b> 217784.170  <b>Elevation:</b> 116.27	
42	142	F242	<b>Latitude:</b> 18.3726612 <b>Longitude: -</b> 66.2650627  <b>Northing:</b> 259705.598 <b>Easting:</b> 217782.678  <b>Elevation:</b> 116.21	




	POINT	DESCRIPTION	LOCATION	PICTURE
43	143	F243	<b>Latitude:</b> 18.3726984 <b>Longitude: -</b> 66.2650989  <b>Northing:</b> 259707.834 <b>Easting:</b> 2177803.843  <b>Elevation:</b> 115.93	
44	144	F244	<b>Latitude:</b> 18.3727175 <b>Longitude: -</b> 66.2651086  <b>Northing:</b> 259711.683 <b>Easting:</b> 217778.576  <b>Elevation:</b> 115.91	
45	145	F245	<b>Latitude:</b> 18.372748 <b>Longitude: -</b> 66.2651381  <b>Northing:</b> 259714.352 <b>Easting:</b> 217776.826  <b>Elevation:</b> 115.77	

	POINT	DESCRIPTION	LOCATION	PICTURE
46	146	F246	<b>Latitude:</b> 18.3727779 <b>Longitude: -</b> 66.2651455  <b>Northing:</b> 259725.359 <b>Easting:</b> 217771.288  <b>Elevation:</b> 115.18	
47	147	F247	<b>Latitude:</b> 18.3728912 <b>Longitude: -</b> 66.2652105  <b>Northing:</b> 259726.483 <b>Easting:</b> 217770.863  <b>Elevation:</b> 115.08	
48	148	F248	<b>Latitude:</b> 18.3729157 <b>Longitude: -</b> 66.2652079  <b>Northing:</b> 259744.587 <b>Easting:</b> 217761.943  <b>Elevation:</b> 113.24	




	<b>POINT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>PICTURE</b>
49	149	F249	<b>Latitude:</b> 18.3730516 <b>Longitude: -</b> 66.265285  <b>Northing:</b> 259750.421 <b>Easting:</b> 217759.211  <b>Elevation:</b> 112.81	
50	150	F250	<b>Latitude:</b> 18.3730898 <b>Longitude: -</b> 66.265291  <b>Northing:</b> 259753.327 <b>Easting:</b> 217757.891  <b>Elevation:</b> 112.54	
51	151	F251	<b>Latitude:</b> 18.3731458 <b>Longitude: -</b> 66.2653232  <b>Northing:</b> 259759.603 <b>Easting:</b> 217754.889  <b>Elevation:</b> 112.49	




	POINT	DESCRIPTION	LOCATION	PICTURE
52	152		<b>Latitude:</b> 18.3731795 <b>Longitude: -</b> 66.2652069	
53	200	F200	<b>Latitude:</b> 18.3720172 <b>Longitude: -</b> 66.2635137  <b>Northing:</b> 259628.484 <b>Easting:</b> 217947.300  <b>Elevation:</b> 149.44	
54	201	F201	<b>Latitude:</b> 18.3720242 <b>Longitude: -</b> 66.2635405  <b>Northing:</b> 259628.204 <b>Easting:</b> 217945.427  <b>Elevation:</b> 149.85	




	POINT	DESCRIPTION	LOCATION	PICTURE
55	202	F202	<b>Latitude:</b> 18.3720378 <b>Longitude: -</b> 66.2636029  <b>Northing:</b> 259630.089 <b>Easting:</b> 217940.301  <b>Elevation:</b> 149.86	
56	203	F203	<b>Latitude:</b> 18.3720499 <b>Longitude: -</b> 66.2636425  <b>Northing:</b> 259630.898 <b>Easting:</b> 217934.746  <b>Elevation:</b> 150.08	
57	204	F204	<b>Latitude:</b> 18.3720681 <b>Longitude: -</b> 66.2637062  <b>Northing:</b> 259631.761 <b>Easting:</b> 217932.767  <b>Elevation:</b> 149.95	




	POINT	DESCRIPTION	LOCATION	PICTURE
58	205	F205	<b>Latitude:</b> 18.3720569 <b>Longitude: -</b> 66.2637045  <b>Northing:</b> 259631.761 <b>Easting:</b> 217929.871  <b>Elevation:</b> 150.25	
59	206	F206	<b>Latitude:</b> 18.3720760 <b>Longitude: -</b> 66.2636736  <b>Northing:</b> 259632.496 <b>Easting:</b> 217929.085  <b>Elevation:</b> 149.80	
60	207	F207	<b>Latitude:</b> 18.3720413 <b>Longitude: -</b> 66.2637668  <b>Northing:</b> 259631.337 <b>Easting:</b> 217923.538  <b>Elevation:</b> 150.41	









	<b>POINT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>PICTURE</b>
61	208	F208	<b>Latitude:</b> 18.3720203 <b>Longitude: -</b> 66.2638232  <b>Northing:</b> 259629.005 <b>Easting:</b> 217916.946  <b>Elevation:</b> 150.58	
62	209	F209	<b>Latitude:</b> 18.3720280 <b>Longitude: -</b> 66.2638326  <b>Northing:</b> 259629.009 <b>Easting:</b> 217915.237  <b>Elevation:</b> 150.18	
63	210	F210	<b>Latitude:</b> 18.3719812 <b>Longitude: -</b> 66.2639006  <b>Northing:</b> 259624.284 <b>Easting:</b> 217907.562  <b>Elevation:</b> 150.44	




	POINT	DESCRIPTION	LOCATION	PICTURE
64	211	F211	<b>Latitude:</b> 18.3719599 <b>Longitude: -</b> 66.2638989  <b>Northing:</b> 259622.735 <b>Easting:</b> 217906.475  <b>Elevation:</b> 150.93	
65	212	F212	<b>Latitude:</b> 18.3718597 <b>Longitude: -</b> 66.2639958  <b>Northing:</b> 259613.499 <b>Easting:</b> 217894.388  <b>Elevation:</b> 151.85	
66	213	F213	<b>Latitude:</b> 18.3718447 <b>Longitude:</b> -66.26403747  <b>Northing:</b> 259611.412 <b>Easting:</b> 217890.562  <b>Elevation:</b> 151.97	

	<b>POINT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>PICTURE</b>
67	214	F214	<b>Latitude:</b> 18.3718377 <b>Longitude: -</b> 66.2640361  <b>Northing:</b> 259609.855 <b>Easting:</b> 217890.204  <b>Elevation:</b> 152.59	
68	215	F215	<b>Latitude:</b> 18.3718422 <b>Longitude: -</b> 66.2640699  <b>Northing:</b> 259608.053 <b>Easting:</b> 217888.450  <b>Elevation:</b> 152.86	
69	216	F216	<b>Latitude:</b> 18.3718218 <b>Longitude: -</b> 66.2641256  <b>Northing:</b> 259605.672 <b>Easting:</b> 217884.825  <b>Elevation:</b> 152.77	

	POINT	DESCRIPTION	LOCATION	PICTURE
70	217	F217	<b>Latitude:</b> 18.3717871 <b>Longitude: -</b> 66.2641471  <b>Northing:</b> 259602.636 <b>Easting:</b> 217881.763  <b>Elevation:</b> 153.21	
71	218	F218	<b>Latitude:</b> 18.3717728 <b>Longitude: -</b> 66.2641906  <b>Northing:</b> 259599.526 <b>Easting:</b> 217877.193  <b>Elevation:</b> 153.92	
72	219	F219	<b>Latitude:</b> 18.3717381 <b>Longitude: -</b> 66.2641839  <b>Northing:</b> 259598.583 <b>Easting:</b> 217876.300  <b>Elevation:</b> 154.07	

	POINT	DESCRIPTION	LOCATION	PICTURE
73	220	F220	<b>Latitude:</b> 18.3717321 <b>Longitude: -</b> 66.2642030  <b>Northing:</b> 259597.579 <b>Easting:</b> 217874.561  <b>Elevation:</b> 154.48	
74	221	F221	<b>Latitude:</b> 18.3717343 <b>Longitude: -</b> 66.2642161  <b>Northing:</b> 259597.597 <b>Easting:</b> 217873.745  <b>Elevation:</b> 154.23	
75	222	F222	<b>Latitude:</b> 18.3717193 <b>Longitude: -</b> 66.2642503  <b>Northing:</b> 259595.116 <b>Easting:</b> 217870.556  <b>Elevation:</b> 155.15	

	<b>POINT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>PICTURE</b>
76	223	F223	<b>Latitude:</b> 18.3716786 <b>Longitude: -</b> 66.2642812  <b>Northing:</b> 259591.368 <b>Easting:</b> 217865.150  <b>Elevation:</b> 155.77	
77	224	F224	<b>Latitude:</b> 18.3716439 <b>Longitude: -</b> 66.2643764  <b>Northing:</b> 259587.133 <b>Easting:</b> 217858.131  <b>Elevation:</b> 156.60	
78	225	F225	<b>Latitude:</b> 18.3715991 <b>Longitude: -</b> 66.2644438  <b>Northing:</b> 259583.006 <b>Easting:</b> 217850.490  <b>Elevation:</b> 157.27	

	<b>POINT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>PICTURE</b>
79	226	F226	<b>Latitude:</b> 18.3715921 <b>Longitude: -</b> 66.2645397  <b>Northing:</b> 259579.595 <b>Easting:</b> 217842.550  <b>Elevation:</b> 158.03	
80	227	F227	<b>Latitude:</b> 18.3715742 <b>Longitude: -</b> 66.2645541  <b>Northing:</b> 259579.381 <b>Easting:</b> 217839.598  <b>Elevation:</b> 158.11	
81	228	F228	<b>Latitude:</b> 18.3715803 <b>Longitude: -</b> 66.2648682  <b>Northing:</b> 259580.676 <b>Easting:</b> 217803.682  <b>Elevation:</b> 161.11	

	<b>POINT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>PICTURE</b>
82	300	F300	<b>Latitude:</b> 18.3731458 <b>Longitude: -</b> 66.2653232  <b>Northing:</b> 259770.334 <b>Easting:</b> 217752.529  <b>Elevation:</b> 112.53	NA
83	301	F301	<b>Latitude:</b> 18.3731458 <b>Longitude: -</b> 66.2653232  <b>Northing:</b> 259768.958 <b>Easting:</b> 217751.147  <b>Elevation:</b> 112.45	NA
84	302	F302	<b>Latitude:</b> 18.3731458 <b>Longitude: -</b> 66.2653232  <b>Northing:</b> 259772.363 <b>Easting:</b> 217748.562  <b>Elevation:</b> 112.82	NA
85	303	F303	<b>Latitude:</b> 18.3731458 <b>Longitude: -</b> 66.2653232  <b>Northing:</b> 259664.813 <b>Easting:</b> 217643.127	NA



			<b>Elevation:</b> 144.70	
86	304	F304	<b>Latitude:</b> 18.3731458 <b>Longitude: -</b> 66.2653232  <b>Northing:</b> 259430.337 <b>Easting:</b> 217839.223  <b>Elevation:</b> 142.19	NA

## VI. DEVIATION DUE TO CURRENT FIELD CONDITIONS

Leachate production deals with the creation of contaminated liquid at the base of a landfill. It involves the elements of a water balance in which precipitation either runs off from the landfill or infiltrates. The amount of leachate generated depends on **water availability, landfill surface condition, refuse state, and condition of surrounding layers of soil**. Also **landfill age, ambient air temperature, precipitation and refuse permeability, depth, temperature, and waste composition** are factors that affect leachate quantity and composition.

## VII. CONCLUSIONS

The leachate collected at the slope toes of the landfill jeopardize safety measurements of the landfill sites. The difference between seepage in landfills and seepage in the soil is that there is a dominant flow in addition to the main Darcy seepage mode. Due to the complex composition

and filling mode of a waste landfill, there is a preferential leakage channel in the seepage<sup>1</sup>. The leachate percolates along the larger pores to form a dominant flow. With the increase of the compaction degree of the waste, the macropores gradually decrease, and Darcy seepage is the main seepage form of the landfill<sup>2</sup>. Based on that, leachate seepage is generally observed at the slope toes of the facility, as results shows from the inventory seepage locations. A total of 86 individual seepage locations were identified.

It was not possible to access the southwest part of the landfill, as there was no pathway available to access the area. Several attempts were done to contact Ms. Gerica Santiago to access the area thru her property, but she did not allow a direct communication and even EPA's Project Manager (Mr. Carl Plossl) could not provide a final answer regarding accessing the area via adjacent neighbors.

## VIII. GEOREFERENCE DRAWING

---

<sup>1</sup> The Hidden Damage of Landfills

Published: April 15, 2021 • By Kayla Vasarhelyi

<sup>2</sup> Serges Mendo Meye, Guowei Li, Zhenzhong Shen, Lei Gan, Liqun Xu, "Research on Seepage Field and Slope Stability Considering Heterogeneous Characteristics of Waste Piles: A Less Costly Way to Reduce High Leachate Levels and Avoid Accidents", *Advances in Civil Engineering*, vol. 2022, Article ID 9069991, 20 pages, 2022.

<https://doi.org/10.1155/2022/9069991>

TA	LAND FILL	LIXIVIADOS	LOCATIONS		
Point	Northing	Easting	Elevation	Description	
001	259607.543	217995.823	141.11	F101	
002	259615.336	217995.925	142.19	F103	
003	259619.382	217985.014	141.77	F105	
004	259619.382	217985.014	141.77	F105	
005	259619.382	217985.014	141.77	F105	
006	259619.382	217985.014	141.77	F105	
007	259619.382	217985.014	141.77	F105	
008	259619.382	217985.014	141.77	F105	
009	259619.382	217985.014	141.77	F105	
010	259619.382	217985.014	141.77	F105	
011	259619.382	217985.014	141.77	F105	
012	259619.382	217985.014	141.77	F105	
013	259619.382	217985.014	141.77	F105	
014	259619.382	217985.014	141.77	F105	
015	259619.382	217985.014	141.77	F105	
016	259619.382	217985.014	141.77	F105	
017	259619.382	217985.014	141.77	F105	
018	259619.382	217985.014	141.77	F105	
019	259619.382	217985.014	141.77	F105	
020	259619.382	217985.014	141.77	F105	
021	259619.382	217985.014	141.77	F105	
022	259619.382	217985.014	141.77	F105	
023	259619.382	217985.014	141.77	F105	
024	259619.382	217985.014	141.77	F105	
025	259619.382	217985.014	141.77	F105	
026	259619.382	217985.014	141.77	F105	
027	259619.382	217985.014	141.77	F105	
028	259619.382	217985.014	141.77	F105	
029	259619.382	217985.014	141.77	F105	
030	259619.382	217985.014	141.77	F105	
031	259619.382	217985.014	141.77	F105	
032	259619.382	217985.014	141.77	F105	
033	259619.382	217985.014	141.77	F105	
034	259619.382	217985.014	141.77	F105	
035	259619.382	217985.014	141.77	F105	
036	259619.382	217985.014	141.77	F105	
037	259619.382	217985.014	141.77	F105	
038	259619.382	217985.014	141.77	F105	
039	259619.382	217985.014	141.77	F105	
040	259619.382	217985.014	141.77	F105	
041	259619.382	217985.014	141.77	F105	
042	259619.382	217985.014	141.77	F105	
043	259619.382	217985.014	141.77	F105	
044	259619.382	217985.014	141.77	F105	
045	259619.382	217985.014	141.77	F105	
046	259619.382	217985.014	141.77	F105	
047	259619.382	217985.014	141.77	F105	
048	259619.382	217985.014	141.77	F105	
049	259619.382	217985.014	141.77	F105	
050	259619.382	217985.014	141.77	F105	
051	259619.382	217985.014	141.77	F105	
052	259619.382	217985.014	141.77	F105	
053	259619.382	217985.014	141.77	F105	
054	259619.382	217985.014	141.77	F105	
055	259619.382	217985.014	141.77	F105	
056	259619.382	217985.014	141.77	F105	
057	259619.382	217985.014	141.77	F105	
058	259619.382	217985.014	141.77	F105	
059	259619.382	217985.014	141.77	F105	
060	259619.382	217985.014	141.77	F105	
061	259619.382	217985.014	141.77	F105	
062	259619.382	217985.014	141.77	F105	
063	259619.382	217985.014	141.77	F105	
064	259619.382	217985.014	141.77	F105	
065	259619.382	217985.014	141.77	F105	
066	259619.382	217985.014	141.77	F105	
067	259619.382	217985.014	141.77	F105	
068	259619.382	217985.014	141.77	F105	
069	259619.382	217985.014	141.77	F105	
070	259619.382	217985.014	141.77	F105	
071	259619.382	217985.014	141.77	F105	
072	259619.382	217985.014	141.77	F105	
073	259619.382	217985.014	141.77	F105	
074	259619.382	217985.014	141.77	F105	
075	259619.382	217985.014	141.77	F105	
076	259619.382	217985.014	141.77	F105	
077	259619.382	217985.014	141.77	F105	
078	259619.382	217985.014	141.77	F105	
079	259619.382	217985.014	141.77	F105	
080	259619.382	217985.014	141.77	F105	
081	259619.382	217985.014	141.77	F105	
082	259619.382	217985.014	141.77	F105	
083	259619.382	217985.014	141.77	F105	
084	259619.382	217985.014	141.77	F105	
085	259619.382	217985.014	141.77	F105	
086	259619.382	217985.014	141.77	F105	
087	259619.382	217985.014	141.77	F105	
088	259619.382	217985.014	141.77	F105	
089	259619.382	217985.014	141.77	F105	
090	259619.382	217985.014	141.77	F105	
091	259619.382	217985.014	141.77	F105	
092	259619.382	217985.014	141.77	F105	
093	259619.382	217985.014	141.77	F105	
094	259619.382	217985.014	141.77	F105	
095	259619.382	217985.014	141.77	F105	
096	259619.382	217985.014	141.77	F105	
097	259619.382	217985.014	141.77	F105	
098	259619.382	217985.014	141.77	F105	
099	259619.382	217985.014	141.77	F105	
100	259619.382	217985.014	141.77	F105	

**LEYENDA:**

- ESTACION DE CONTROL HORIZONTAL
- PUNTO COLINDANCIA
- LINEA DE COLINDANCIA
- TORRE ELECTRICA EXISTENTE
- CONTORNO INTERVALOS DE UN (1.00) METRO
- CONTORNO INTERVALOS DE CINCO (5.00) METROS
- CAMINO EN TIERRA
- ESTRUCTURAS EN HORMIGON EXISTENTE (RESIDENCIAS)
- SUMIDERO LIXIVIADOS IDENTIFICADOS POR PERSONAL TERRATEX

**NOTAS GENERALES:**

- TODAS LAS DISTANCIAS EXCEPTO LAS INDICADAS SE HAN EXPRESADO EN EL SISTEMA METRICO.
- LA LOCALIZACION DE LOS PUNTOS SE HA HECHO CON UN MEDIDOR DE DISTANCIA ELECTRONICO TOTAL STATION "TOPCON" GTS 230 & COLECTOR DE DATOS NOMAD TRIMBLE.
- LA MENSURA SE REALIZO POR LOS PUNTOS DE COLINDANCIA EXISTENTES SUJETOS A CONFORMIDAD DE COLINDANTES Y POSIBLE RECTIFICACION.
- CONTORNOS A INTERVALOS DE UN (1.00) METRO.
- ESTA MENSURA Y TOPOGRAFIA SE LLEVA A CABO A PETICION DE TERRATEX ENGINEERING GROUP, PSC.
- EL SISTEMA HORIZONTAL ESTA REFERENCIADO A NAD-83 DE PUERTO RICO.
- SE UTILIZO EQUIPO DE POSICIONAMIENTO GPS GLOBAL ESTACION VIRTUAL (VRS). DATUM: NAD-83 (2011) EP GEOID:G18RFR.
- ESTE TRABAJO CUENTA CON EL APOYO DE FOTOGRAFIA A TRAVES DEL USO DE "DRONE".
- PARA LA PREPARACION DE ESTE PLANO SE UTILIZO DATA DEL PLANO CONFECCIONADO POR EL AGIMENSUR JOSE M. COUVERTIER Y CERTIFICADO POR EL ING. EMILIO GUTIERREZ DEL ARROYO, LIC. #16.789. DEL MISMO SE UTILIZA DATOS TABLA DE MENSURA.

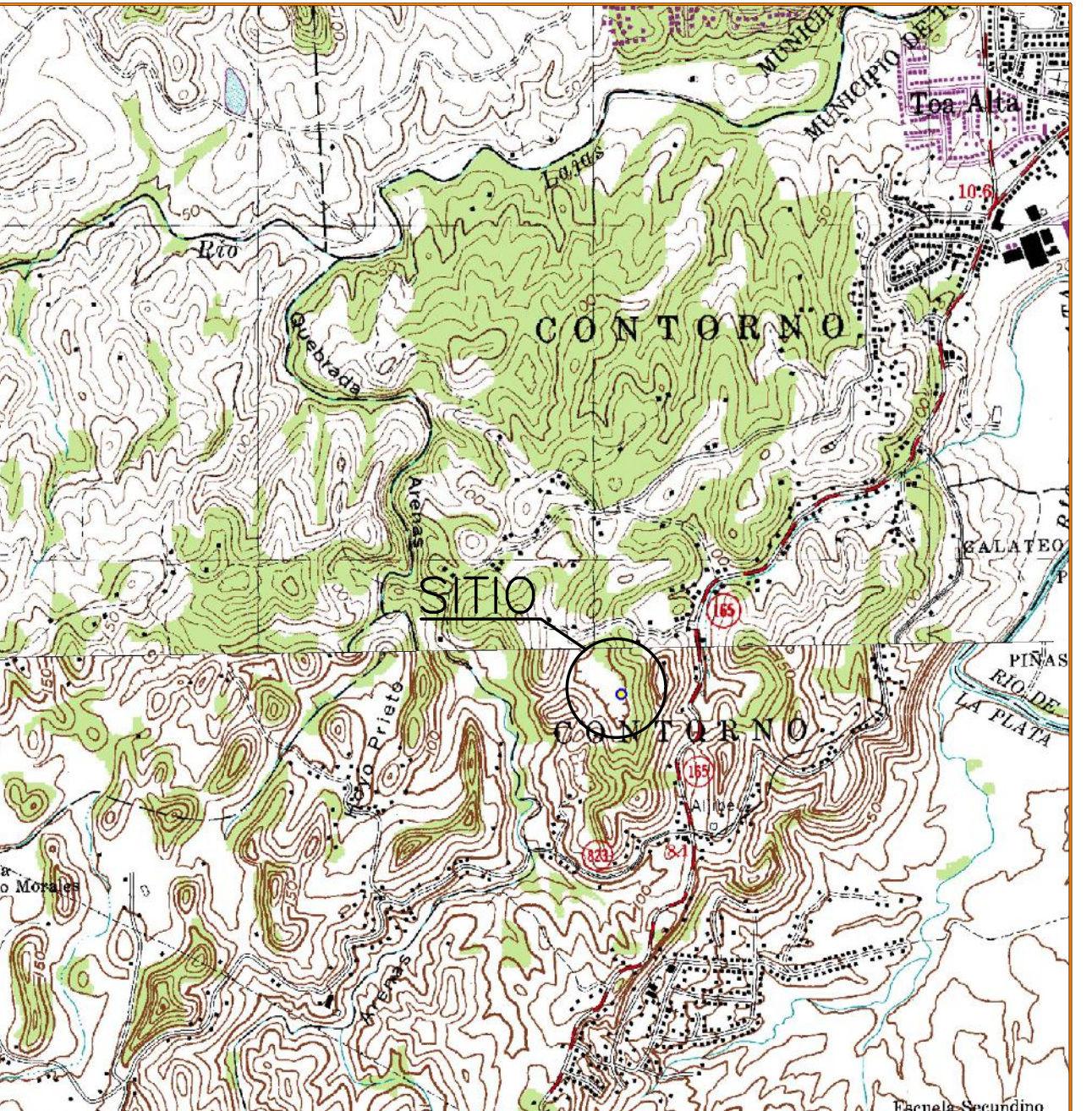
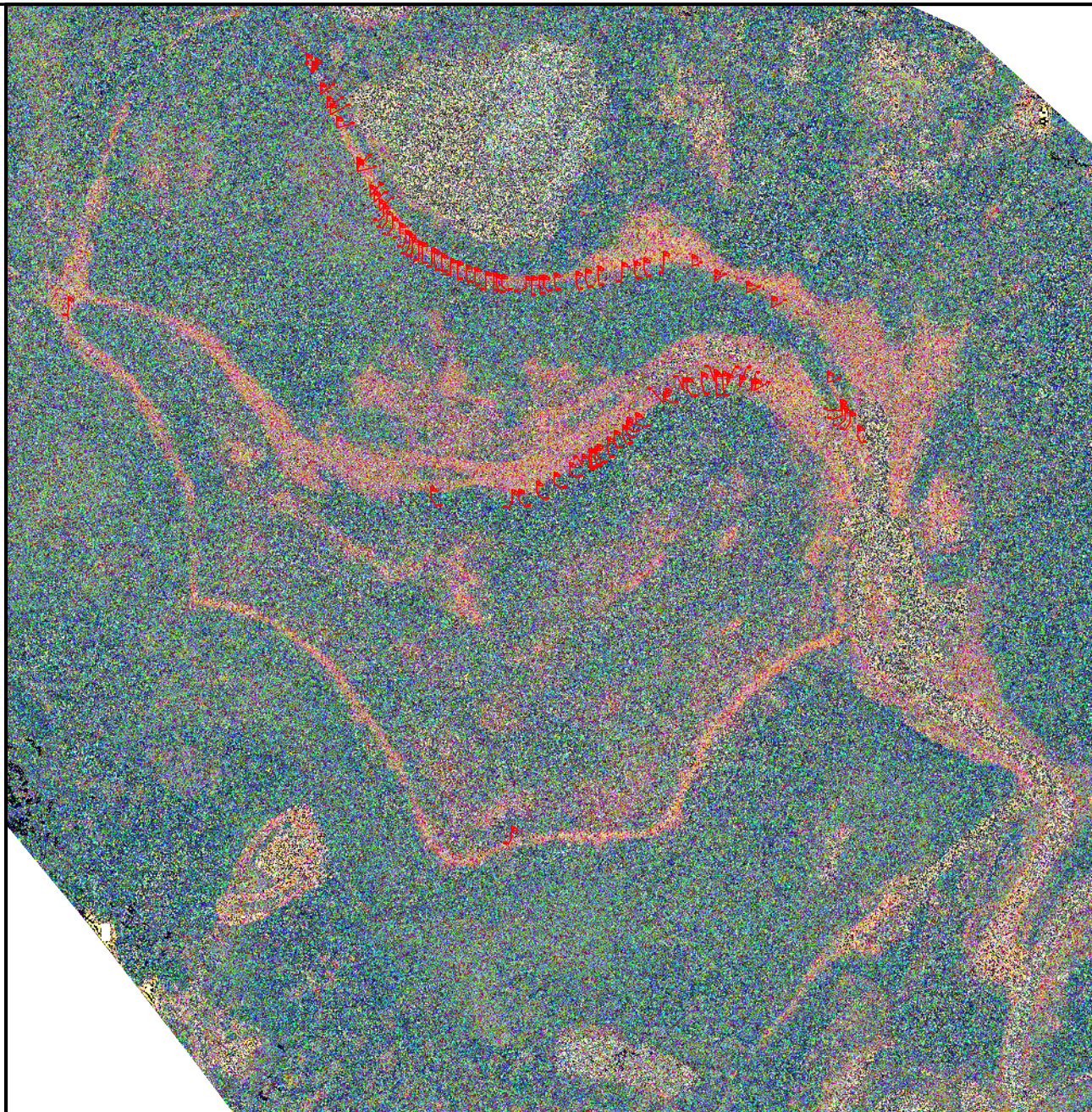
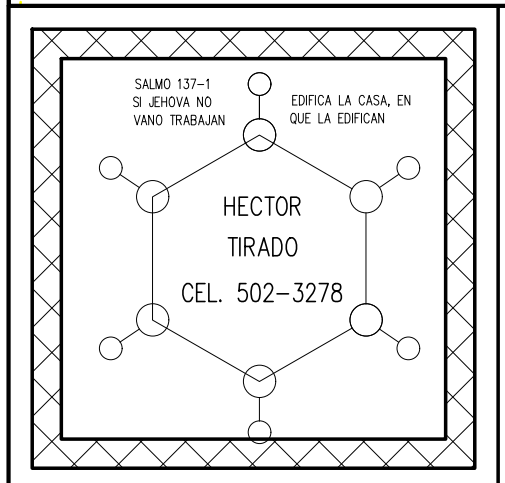
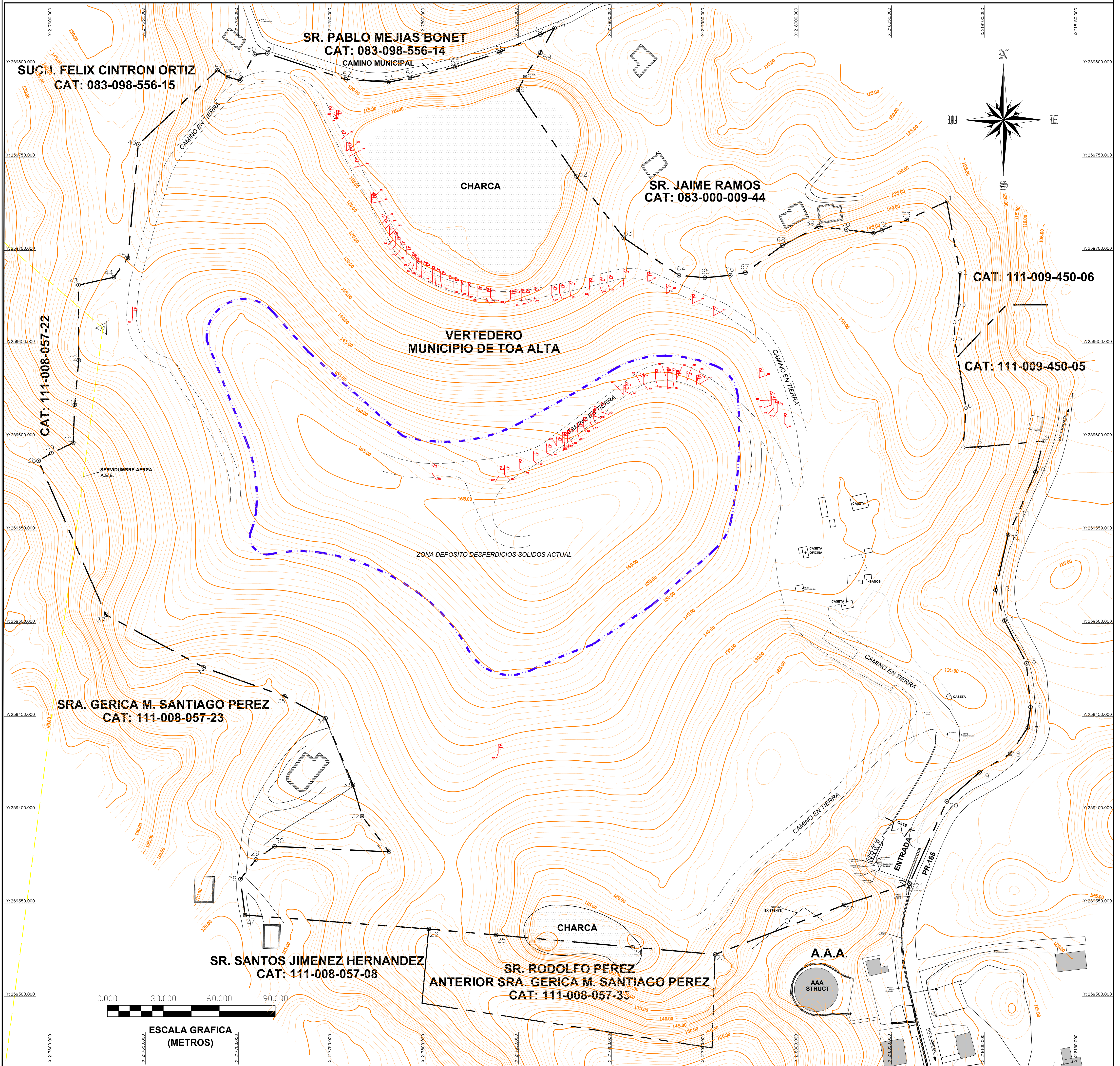


FOTO AÉREA (DRONE) N.T.S. MAPA DE LOCALIZACION 1:20,000

CONDICIONES EXISTENTES PARA DICIEMBRE 17, 2022 COORD. LAMBERT NAD-83 X= 217,876.00 Y= 259,575.00



**PLANO TOPOGRÁFICO "ASBUILT" CONDICIONES EXISTENTES**  
**IDENTIFICACIÓN SUMIDEROS LIXIVIADOS EXISTENTES**  
 FINCA PROPIEDAD DEL MUNICIPIO DE TOA ALTA  
 VEREDERO RESIDUOS SÓLIDOS  
 SITA: EN CARRETERA PR-165, KM. 9.0, Bo. MAMEY  
 TOA ALTA, PUERTO RICO

CERTIFICO CORRECTO:	FECHA: DICIEMBRE 19, 2022
	DIBUJADO POR: D. PASTRANA (3949)
	ESCALA: 1: 1,000
HECTOR TIRADO RODRIGUEZ, P.E., R.P.A. INGENIERO CIVIL No. 12215	