SETTLEMENT AGREEMENT

This Settlement Agreement ("**Agreement**") is made and entered into this ___ of _____, 2021, by and between, on the one hand, 3M Company ("**3M**") and, on the other hand, the City of Decatur, Alabama, municipal corporation (the "**City**"), Morgan County, Alabama, a body corporate (the "**County**"), and the Municipal Utilities Board of Decatur, Morgan County, Alabama, referred to herein as Decatur Utilities ("**DU**"). 3M, the City, the County, and DU shall sometimes hereinafter collectively be referred to as the "**Parties**" or individually as a "**Party**."

RECITALS

WHEREAS, 3M operates a manufacturing facility in Decatur, Alabama, that has at times over the course of its operations disposed of wastewater into the DU wastewater treatment system and solid waste at four current and former landfills owned and operated by the City of Decatur: the Decatur-Morgan County Landfill ("**DMCLF**"), the Brookhaven Landfill, the Old Moulton Road Landfill, and the Deer Springs Landfill; and

WHEREAS, DU asserts that following the discovery of the presence of PFAS in the DU wastewater treatment system, DU has undertaken, and continues to undertake, measures to address the presence of PFAS in the DU wastewater treatment system; and

WHEREAS, the City and the County assert that following the discovery by ADEM (defined below) of the presence of PFAS in DMCLF leachate in 2009, the City and the County have undertaken, and continue to undertake, measures to address the presence of PFAS at the DMCLF; and

WHEREAS, recent investigations at the Closed Landfills (defined below) suggest that PFAS materials associated with 3M's historical waste disposal activities may be present at the

Closed Landfills, and that the closure and post-closure care activities previously implemented by the City at the Closed Landfills may not be adequate to prevent the release of PFAS materials into surface water and groundwater at the Closed Landfills; and

WHEREAS, 3M and ADEM executed an Interim Special Order by Consent captioned *In the Matter of: 3M Company, Inc.*, NPDES Permit No. AL0000205, Consent Order No. 20-086-CWP/AP/GW/HW/DW/SW (effective July 24, 2020) (the "**Interim Consent Order**"), and the Parties intend for this Agreement to complement but not supplant the provisions or obligations set forth in the Interim Consent Order; and

WHEREAS, plaintiffs in the actions captioned *Tennessee Riverkeeper, Inc. v. 3M Company, et al.*, No. 5:16-cv-01029-AKK (N.D. Ala.) ("***Riverkeeper***"), and *St. John, et al. v. 3M Company, et al.*, No. 52-CV-2002-00408.00 (Morgan County, Alabama, Cir. Ct.) ("***St. John***"), allege that the defendants named therein are responsible for PFAS contamination in and around Decatur, Morgan County, Lawrence County, Franklin County, Limestone County, Colbert County, and Lauderdale County, Alabama; and

WHEREAS, BFI, DAI, and Toray (each as defined below) are defendants along with 3M, the City, and the County in the *Riverkeeper* and *St. John* actions, and Synagro (defined below) is also a defendant in the *St. John* action; and

WHEREAS, 3M, BFI, DAI, and Toray have agreed to provide certain relief to resolve the *Riverkeeper* action and 3M, BFI, DAI, Synagro, and Toray have agreed to provide certain relief to resolve the *St. John* action, subject to court approval and other provisions set forth in settlement agreements in those actions; and

WHEREAS, the Parties have negotiated this Agreement in coordination with negotiations to resolve *Riverkeeper* and *St. John*, and the Parties intend for this Agreement to complement

any final, approved settlements of *Riverkeeper* and *St. John*, acknowledging that the matters addressed in this Agreement would not have been settled on the terms stated in this Agreement without contemporaneous settlements of *Riverkeeper* and *St. John*; and

WHEREAS, the Parties desire to effectuate investigation and appropriate remediation by the City and the County of the presence of PFAS at the DMCLF in compliance with all applicable laws; and

WHEREAS, the City and the County contend that 3M is responsible in whole or in part for the presence of PFAS at the DMCLF and the potential presence of PFAS at the Closed Landfills; and

WHEREAS, DU contends that 3M is responsible in whole or in part for the presence of PFAS in the DU wastewater treatment system; and

WHEREAS, the Parties have agreed that nothing in this Agreement constitutes an admission or concession of any negligence or wrongdoing by any of the Parties; and

WHEREAS, in consideration of the promises and the mutual covenants hereinafter set forth, the Parties, acting by and through counsel, have entered into this Agreement.

THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged by each Party hereto, IT IS HEREBY AGREED by the Parties as follows:

1. DEFINITIONS.

a. "**3M**" means 3M (as defined above) and its affiliates and any of their past, present or future directors, officers, shareholders, agents, attorneys, representatives, employees, affiliates, subsidiaries, insurers and counsel, predecessors, successors or assigns.

b. "**ADEM**" means the Alabama Department of Environmental Management and any successor Departments or Agencies of the State of Alabama.

c. "**BFI**" means collectively BFI Waste Systems of Alabama, LLC and BFI Waste Systems of North America, LLC.

d. "**Closed Landfills**" means, collectively, the following:

i. Brookhaven Landfill: the approximately 40-acre parcel located between 5th Avenue S.W. and 8th Street S.W., Decatur, Alabama, that was operated as a municipal landfill by the City from approximately 1950 to 1963, as more fully described in Exhibit 1 to this Agreement;

ii. Old Moulton Road Landfill: the approximately 39-acre parcel off of Old Moulton Road southwest of Decatur, Alabama, that was operated as a municipal landfill by the City from approximately 1964 to 1973, as more fully described in Exhibit 2 to this Agreement; and

iii. Deer Springs Landfill: the approximately 85-acre parcel off of Deer Springs Road south of Decatur, Alabama, that was operated as a landfill by the City and County from October, 1973 until December, 1980, as more fully described in Exhibit 3 to this Agreement.

e. "**DAI**" means Daikin America, Inc.

f. "**Decatur-Morgan County Landfill**" or "**DMCLF**" means the City of Decatur-Morgan County Sanitary Landfill, located at Sections 7 and 18, Township 5 South, Range 5 West, in Morgan County, Alabama, comprising of 385.15 acres with a disposal area of approximately 223.43 acres.

g. "**Effective Date**" means the date on which this Agreement is executed by all Parties.

h. "**PFAS**" means, solely for purposes of this Agreement, fluorinated organic substances that contain one or more carbon atoms and on which at least two of the hydrogen atoms have been replaced by fluorine atoms. "PFAS" includes without limitation perfluorooctanoic acid ("**PFOA**"), perfluorooctane sulfonate ("**PFOS**"), perfluoroalkyl acids, perfluoroalkane sulfonyl fluorides, perfluoroalkyl iodides, per- and polyfluoroalkyl ether-based substances, fluoropolymers, side-chain fluorinated polymers, and chemical precursors and degradants of all such substances. "PFAS" for purposes of this Agreement includes all per- and polyfluoroalkyl substances and their chemical precursors and degradants, as well as all products manufactured with or containing such substances, precursors, or degradants.

i. "**PWM**" means Pugh Wright McAnally, Inc.

j. "**Released Claims**" means all claims against the Released Parties that are released in this Agreement.

k. "**Released Parties**" means 3M, BFI, DAI, Synagro, and Toray and their parents, subsidiaries, divisions, affiliated business entities, predecessors, and successors, and all of their agents, employees, officers, directors, partners, current and former shareholders, owners, members, promoters, representatives, trustees, assigns, insurers and subrogees, individually or in their corporate or personal capacity. It is the intention of this Agreement that the definition of Released Parties be as broad, expansive and inclusive as possible.

l. "**Synagro**" means Synagro WWT, Inc. and/or Synagro South, LLC.

m. "**Toray**" means Toray Fluorofibers (America), Inc.

2. PAYMENT FOR PAST MITIGATION WORK.

In recognition of the mitigation work performed at the DMCLF by the City and by DU at its waste water treatment plant and sewer system prior to the Effective Date, 3M shall pay to the City and DU $9,272.861.61 within thirty (30) days after the Effective Date as restitution to the City and DU for a portion of the costs and expenses the City and DU incurred prior to the Effective Date to mitigate the presence of PFAS, including compliance with any relevant laws.

3. CAPPING CELLS 2-11 OF THE DMCLF.

a. The County and the City, in consultation with ADEM, have determined that Cells 2-11 at the DMCLF will be capped with a synthetic liner. The City, through its contractor(s) to be selected through a public bidding process, shall conduct the capping of Cells 2-11 in compliance with all applicable laws and regulations and with the approval of ADEM (the "**Cap Work**"). The cap shall be designed as set forth in Exhibit 4 (the "**PWM Scope**").

b. 3M shall fund the Cap Work based on the award by the City of a binding bid, up to a cost not to exceed $22,254,095.42, which number includes PWM's fee and a 10% contingency. The City shall retain PWM as the Prime Project Manager for the Cap Work as reflected in the PWM Scope. 3M shall pay the City the amount of the binding bid award or $22,254,095.42, whichever amount is less, within thirty (30) days after said bid is accepted and approved by the City Council. 3M's sole obligation with respect to the Cap Work shall be to pay for the Cap Work as provided in this Paragraph. The City, the County, and 3M stipulate and agree that 3M will pay costs greater than $22,254,095.42 only if (i) the City and PWM provide reasonable advance notice to 3M of any such additional costs that are expected to be incurred in the performance of the Cap Work, (ii) the additional costs relate directly to the Cap Work, as specified reflected in the PWM Scope, and (iii) the additional costs are fair and appropriate in

3M's discretion, whose agreement will not be unreasonably withheld. 3M shall have no obligation to personally undertake or to enter into any contract to undertake the Cap Work.

c. The City and any other entity identified by ADEM as a permittee shall be solely responsible for compliance with applicable laws, including environmental laws, in connection with the Cap Work.

d. The City shall have sole control and direction of the Cap Work and shall be solely responsible for managing and supervising the performance of the Cap Work. Although the City and ADEM may choose to consult with 3M for its technical expertise, 3M has no right, authority, or ability whatsoever to direct or control any aspect of the Cap Work.

e. The City shall require its contractor(s) to name 3M as additional insured on all insurance policies relating to the Cap Work.

4. DMCLF LEACHATE TREATMENT.

a. The Parties agree that the state of available scientific research indicates that no feasible, cost-effective methods currently exist for treating landfill leachate for PFOA and PFOS. This Paragraph describes the management practices and future research that the City shall perform in connection with the DMCLF to best address its leachate quality.

b. There is a pilot study underway by BFI to evaluate potential technologies for the removal of PFOS and PFOA from DMCLF leachate. This study is being performed by Brown and Caldwell for BFI and will evaluate nanofiltration, adsorption via granular activated carbon, and reverse osmosis treatment technologies using leachate from Morris Farm Landfill and from the DMCLF, which will undergo biological treatment to condition the leachate prior to treatment.

c. DMCLF SID Discharge Permit Renewal.

i. The DMCLF discharges its leachate to the Decatur Utilities Wastewater Treatment Plant pursuant to a State Indirect Discharge ("**SID**") Permit (No. IU085200552). The SID permit is renewed every five years. When the City next prepares its permit renewal application for the DMCLF, it shall refer to the literature review conducted by Brown and Caldwell of the academic work then available on treatment technologies for removing PFOS and PFOA from landfill leachate. The City will refer to any opinion that BFI has obtained in the preceding five (5) years to satisfy this provision and as support for its own opinion as to whether such treatment is feasible and cost-effective. If, under statutory or regulatory obligations ADEM should require the DMCLF to treat its leachate or dispose of it in some manner other than discharging the same to DU's wastewater treatment plant as a result of the presence of PFAS, then the City shall consult with 3M regarding treatment or alternative disposal methods and 3M shall design and pay for the reasonable cost for treatment or alternative disposal methods that comply with the City's ADEM obligations pursuant to applicable environmental statutes and regulations. In that event, the City may have input into 3M's design, and will cooperate in the design and construction of the system.

ii. The City will provide a copy of its 2025 SID Permit renewal application to 3M on the date the application is submitted to ADEM for review.

5. DMCLF GROUNDWATER AND LEACHATE POND INVESTIGATION.

a. The City and the County wish to further evaluate the distribution and transport of PFAS in groundwater at the DMCLF site and to assess its potential for off-site fate and transport and also wish to investigate the presence above and below ground of PFAS in the former open air pond at the DMCLF used to store leachate.

b. To assist the City and the County, 3M will investigate the presence of PFAS in the former open air pond at the DMCLF consistent with the Alabama Environmental Investigation and Remediation Guidance (AEIRG), Version 4.0, dated February 2017, and subsequently adopted updates. To the extent that any remediation of PFAS is warranted, and required by ADEM under statutory or regulatory obligations, to assist the City and the County, 3M shall pay the reasonable costs of such remediation. Any proposal for remediation shall be subject to ADEM's approval.

c. To assist the City and the County, 3M shall pay the reasonable costs of an investigation of the presence in groundwater of the PFAS identified in Attachment 2 of the Interim Consent Order for which a reference standard and laboratory analytical method has been developed that may be associated with the DMCLF ("**DMCLF GWI**"). The City, the County, and 3M agree that Arcadis is the contractor selected to perform the DMCLF GWI and that the results of the DMCLF GWI shall be provided to the City, the County, and 3M. The scope of the DMCLF GWI shall be consistent with Exhibit 5 hereto.

d. In material parts, the DMCLF GWI shall consist of the following elements:

i. site monitoring well and regional drainage assessment;

ii. pilot boring drilling and testing;

iii. hydraulic conductivity testing; and

iv. bedrock dye tracing.

e. The City and the County shall review the results of the DMCLF GWI and confer with each other and with ADEM to determine, in their reasonable discretion and in compliance with any legal obligations, whether groundwater treatment for PFAS is warranted. To the extent that any such treatment is warranted, and required by ADEM under statutory or regulatory

obligations, to assist the City and the County, consistent with the Alabama Environmental Investigation and Remediation Guidance (AEIRG), Version 4.0, dated February 2017, and subsequently adopted updates, 3M shall be responsible for the reasonable costs and expenses of any DMCLF PFAS groundwater treatment system and the implementation thereof to the it relates to PFAS compounds identified in Exhibit 5 for which ADEM requires treatment based on statutory or regulatory obligations. Any proposal for groundwater treatment and implementation thereof shall be subject to ADEM's approval.

6. 3M RESERVATION OF RIGHTS REGARDING DMCLF.

Notwithstanding anything in this Agreement to the contrary, 3M's agreement to conduct or fund activities with respect to the DMCLF shall not be deemed to be a waiver by 3M of, and 3M expressly retains, all rights and remedies against persons other than the City and the County.

7. REIMBURSEMENT OF DU SLUDGE DISPOSAL COSTS.

3M shall pay DU within thirty (30) days after the Effective Date $7,000,000.00 for the reasonable and necessary costs incurred by DU after the Effective Date to remove and dispose of sludge from the DU wastewater treatment facility at the DMCLF. It is the expectation of the Parties that this amount will finance the removal and disposal of the sludge at the DMCLF for twenty years (i.e., approximately $350,000.00 per year). If, in that 20-year period, removal and disposal of such sludge to DMCLF as a result of the presence of PFAS is prohibited by applicable state or federal law, DU shall have the right to request reimbursement from 3M, on an annual basis, of the difference between $350,000.00 and the reasonable and necessary costs incurred by DU to remove and dispose of the sludge at another approved disposal facility.

8. CLOSED LANDFILLS.

a. The City shall transfer title of the Closed Landfills to 3M pursuant to quitclaim

deeds. Transfer of the Brookhaven Landfill property will not occur until at least sixty (60) days after the City informs 3M in writing that it has ceased using the facility on that property for public recreation purposes.

b. The City shall reasonably cooperate with 3M with respect to any claims, demands, allegations, investigations, or inquiries by 3M or any other person regarding the historic ownership or operation of the Closed Landfills, including the storage, transportation, or disposal of materials at or to the Closed Landfills. Such cooperation shall include providing 3M with information, records, and assistance, including the identification of persons who may have relevant knowledge and making employees and other representatives and advisors available on a mutually convenient basis to provide additional information and explanation of any information provided hereunder.

c. The City will not and will not permit others to destroy, alter, or otherwise dispose of any books, records, documentation, or portions thereof regarding the ownership or operation of the Closed Landfills, including records regarding the storage, transportation, or disposal of materials at and to the Closed Landfills, without first giving reasonable prior notice to 3M and offering to surrender to 3M such books, records, documentation, or portions thereof. The City shall, whenever reasonably requested by 3M upon advance written request, permit 3M to have access to such records as may be required by 3M.

d. The City hereby assigns, transfers, conveys, and grants to 3M any and all claims, demands, and causes of action of any kind whatsoever that the City has or may have against any other person arising out of or otherwise related to the presence of PFAS or hazardous substances at, in, on, under, or from any of the Closed Landfills, and 3M may in its own name and for its own benefit prosecute, collect, settle, compromise and grant releases on said claims, demands,

and causes of action as it in its sole discretion deems advisable.

9. RECREATIONAL FACILITY.

3M shall pay $35,000,000.00 to the City within thirty (30) days after the Effective Date toward the City's development and construction of a new public recreational facility within the City.

10. ADDITIONAL PROJECTS.

3M will make a payment in the amount of $25,000,000.00 to the City, County, and DU within thirty (30) days after the Effective Date. Funds from the payment (net of costs, fees, and expenses), and any interest earned or any other appreciation in value, shall be applied toward projects within the City of Decatur and Morgan County that support and promote community redevelopment and recreation.

11. COMMUNITY ACTION GROUP

3M has established a Community Action Group ("**CAG**"). The CAG is a formal, collective group of community members and 3M representatives that provide community information and assistance in the action/decision making process. The City and County agree to confer periodically with the CAG but the CAG shall have no authority to determine how the City, County, and DU do so, including with respect to the manner in which the City, County, and DU apply funds obtained pursuant to this Agreement.

12. RELEASE BY THE CITY AND THE COUNTY.

Except as further provided in this Paragraph, the City (including DU) and the County, each hereby releases and forever discharges each of the Released Parties from any and all past, present, or future claims, demands, rights, causes of action, losses, damages, attorneys' fees, costs, and expenses, whether asserted or not, accrued or not, known or unknown, that have arisen

or may arise at any time in the future out of or relate in any way to the presence of or exposure to any PFAS in and around Decatur, Morgan County, Lawrence County, Franklin County, Limestone County, Colbert County, or Lauderdale County, Alabama, or in or around the Tennessee River and its tributaries or from or at sites owned or operated by any of the Released Parties, or in the soil, groundwater, surface water, pore water, drinking water, well water, waste water, treated water, leachate, biosolids, solids, sludge, discharge, sediment, air and/or fish or other biota, or any other environmental media, including at, in, on, under or from any of the Closed Landfills, the DMCLF, or the DU wastewater treatment system. Notwithstanding the foregoing, the City and the County each reserves the right to bring future claims against any of the Released Parties only to the extent that (i) such claims arise solely due to a change in applicable state or federal law governing the City's, the County's, or DU's remedial obligations with respect to the presence of PFAS at, in, on, under or from any property owned by any of them, including PFAS in soils, surface water, groundwater, drinking water, leachate, or other discharge, (ii) such claims arise because treated drinking water supplied by DU exceeds 70 parts per trillion for PFOS and/or PFOA, (iii) the City, County, or DU have been sued by a party who opts out of *St. John*, or (iv) as to Toray, future claims related to Toray's discharges of HFPO-DA above non-detect levels.

13. COVENANT NOT TO SUE.

Each of the City, the County, and DU, on behalf of itself and its parents, members, affiliates, subsidiaries, predecessors, partners, employees, officers, directors, principals, agents, attorneys, successors, and assigns, shall forever refrain from commencing, prosecuting, continuing, or causing to be commenced, prosecuted, or continued any suit, action, or other

proceeding against any Released Party based upon or with respect to the Released Claims, except as provided for herein.

14. NO ADMISSION OF WRONGDOING OR LIABILITY.

By entering into and reaching this Agreement, none of the Parties admits or acknowledges any liability to each other or to any other entity or person with respect to the creation, handling, use, or disposal of any PFAS-containing products or wastes. Nothing in this Agreement constitutes an admission by any of the Parties. Nothing contained in this Agreement is intended to be nor shall be interpreted by anyone as in any way suggesting anything to the contrary in any proceedings. Neither this Agreement nor any related documents or facts related to the settlement or settlement negotiations shall be offered or received in evidence against any of the Parties for any purpose in any proceeding other than in such proceedings as may be necessary to consummate or enforce this Agreement or to assert its effect in connection with a defense of res judicata, collateral estoppel, release, or other theory of claim preclusion, issue preclusion, or similar defense.

15. PARTIES' COOPERATION.

The Parties agree to reasonably cooperate with one another for purposes of this Agreement, including but not limited to consulting with one another with respect to any planned investigations and/or remedial measures regarding the presence of PFAS at the DMCLF or the DU wastewater treatment system and drinking water system.

16. REPRESENTATIONS AND WARRANTIES.

a. The Parties represent and warrant that they are voluntarily entering into this Agreement as a result of arms-length negotiations among their counsel and that in executing this Agreement, they are relying solely upon their own judgment, belief and knowledge, and the

advice and recommendations of their own independently-selected counsel, concerning the nature, extent and duration of their rights and claims hereunder and regarding all matters which relate in any way to the subject matter hereof. The Parties acknowledge that they have not been influenced to any extent whatsoever in executing this Agreement by any representations, statements, or omissions pertaining to any of the foregoing, except as specifically set forth in this Agreement. Each Party assumes the risk of mistakes as to facts or law.

b. The Parties represent and warrant that they have carefully read the contents of this Agreement, and that this Agreement is signed freely by each individual executing this Agreement on behalf of the Parties. The Parties further represent and warrant to each other that they have made such investigation of the facts pertaining to the settlement, this Agreement, and all of the matters pertaining thereto, as they deem necessary.

c. The Parties represent and warrant to each other that each Party's execution, delivery and performance of this Agreement does not violate the terms, conditions, or provisions of any charter, bylaws, or other organizational document of the Party.

d. The Parties represent and warrant to each other that each Party's execution, delivery, and performance of this Agreement is not contingent upon the consent, approval, or action of any board, individual, governmental authority, or other entity to be obtained after the Effective Date, and that each Party has obtained all necessary corporate or governmental approvals to permit the undersigned representatives of each Party to bind the Party by executing this Agreement.

17. MISCELLANEOUS.

a. Construction. The Parties acknowledge that this Agreement was jointly drafted, and they agree that if any of its terms are ambiguous, then the rule of construction construing the

ambiguity against the drafting party shall not be employed in the interpretation of this Agreement.

b. Governing Law. The Agreement shall be governed, construed by, and follow the law of the State of Alabama.

c. Reasonable Extensions. The Parties may agree in writing to reasonable extensions of time to carry out any of the provisions of the Agreement.

d. Payments by 3M. All amounts paid and actions taken by 3M pursuant to this Agreement are for restitution, remediation, or to further compliance with the law within the meaning of those terms under 26 U.S.C. Section 162(f). No portion of any amount paid under this Agreement constitutes a fine, penalty, punitive damages, disgorgement of profits, or an amount paid in settlement of any claim for any of the foregoing.

e. Costs. Except as otherwise provided herein, the Parties agree to bear their own expert fees, costs, and expenses in connection with this Agreement and the matters addressed herein.

f. Amendment. This Agreement may be amended only by a writing executed by all Parties hereto.

g. Severability. The provisions of this Agreement are not severable.

h. Waiver. The provisions of this Agreement may be waived only by written agreement signed by the waiving Party. The waiver by any Party of any breach of this Agreement shall not be deemed to be or construed as a waiver of any other breach, whether prior to, subsequent to, or contemporaneous with this Agreement.

i. Successors and Assigns. This Agreement shall be binding upon and inure to the benefit of the Parties and their respective successors, permitted assigns, and legal representatives.

Neither this Agreement nor any of the rights, interests or obligations hereunder, may be assigned, in whole or in part, by operation of law or otherwise by any Party without the prior written consent of the other Parties.

j. Notice. Any notice required of the Parties shall be provided by U.S. Mail and electronic mail to the following:

For the City:

City of Decatur
ATTN: Mayor
P.O. Box 488
Decatur, Alabama 35602-488

With copies to:

City of Decatur
ATTN: City Attorney
P.O. Box 488
Decatur, Alabama 35602-488

Barnes F. Lovelace, Jr.
David. W. Langston
Harris, Caddell & Shanks, P.C.
P.O. Box 2688
Decatur, Alabama 35602-2688
blovelace@harriscaddell.com
dlangston@harriscaddell.com

For the County:

Morgan County
ATTN: Chairman
P.O. Box 668
Decatur, Alabama 35602-668

With copies to:

Barnes F. Lovelace, Jr.
David. W. Langston
Harris, Caddell & Shanks, P.C.
P.O. Box 2688
Decatur, Alabama 35602-2688
blovelace@harriscaddell.com
dlangston@harriscaddell.com

For Decatur Utilities:

Decatur Utilities
ATTN: General Manager
P.O. Box 2232
Decatur, Alabama 35602-2232

With copies to:

Barnes F. Lovelace, Jr.
David. W. Langston
Harris, Caddell & Shanks, P.C.
P.O. Box 2688
Decatur, Alabama 35602-2688
blovelace@harriscaddell.com
dlangston@harriscaddell.com

For 3M:

M. Christian King
Harlan I. Prater, IV
Lightfoot, Franklin & White, LLC
The Clark Building
400 North 20th Street
Birmingham, AL 35203
cking@lightfootlaw.com
hprater@lightfootlaw.com

k. Execution. This Agreement may be executed in counterparts and shall be binding upon the Parties executing this or any counterpart.

[Signature Pages to Follow]

FOR 3M COMPANY:

_____
Signature

_____
Name

_____
Title

Executed _____, 2021

FOR THE CITY OF DECATUR, ALABAMA:

_____
Signature

_____
Name

_____
Title

Executed _____, 2021

FOR MORGAN COUNTY, ALABAMA:

_____
Signature

_____
Name

_____
Title

Executed _____, 2021

FOR THE MUNICIPAL UTILITIES BOARD OF DECATUR, MORGAN COUNTY, ALABAMA:

_____
Signature

_____
Name

_____
Title

Executed _____, 2021

EXHIBIT 1
AQUADOME

The following described property located in Morgan County, Alabama, to wit:

The NE ¼ of the NW ¼ of Section 30, Township 5, Range 4 West, except rights of way for any roads around the margin of said property.

LESS AND EXCEPT:

A tract of land lying in the NE ¼ of the NW ¼, Section 30, Township 5 South, Range 4 West, City of Decatur, Morgan County, Alabama, as follows: Beginning at the SW corner of the NE ¼ of the NW ¼, Section 30, Township 5 South, Range 4 West, and running east a distance of 45.68 feet to a point on the east margin of 5th Avenue, SW, the true point of beginning; thence continuing east along the north margin of a 20 foot alley a distance of 850 feet to a point; thence turning an angle of 90° and running north a distance of 750.74 feet to a point; thence turning an angle of 89°57' clockwise from back tangent and running west a distance of 850 feet to a point on the east margin of 5th Avenue, SW; thence turning an angle of 90°03' measured clockwise from back tangent and running south along said east margin of 5th Avenue, SW, a distance of 750 feet to the true point of beginning, subject to reservation of right to operate, maintain, repair and improve drainage structures now located thereon.

EXHIBIT 2
MUD TAVERN – OLD MOULTON ROAD

The following described property located in Morgan County, Alabama, to wit:

The SE ¼ of the SE ¼ of Section 8, Township 6 South, Range 5 West.

EXHIBIT 3
DEER SPRINGS - FLINT

The following described property located in Morgan County, Alabama, to wit:

PARCEL 1

The W ½ of the SE ¼, Section 20, Township 6 South, Range 4 West less and except the following described property, to-wit:

That part of the NW ¼ of the SE ¼ of Section 20, Township 6 South, Range 4 West, described as beginning 12 feet south of the Northeast corner of said NW ¼ of SE ¼, thence South 630 feet, thence West 79.6 feet, thence North 630 feet, and thence East 79.6 feet to the point of beginning.

ALSO all that part of the S ½ of the NE ¼ of the SE ¼, Section 20, Township 6 South, Range 4 West, lying west of the State Highway No. 31, containing 6 acres, more or less, less and except 3 acres described as follows: A tract of land containing 3 acres lying in the S ½ of NE ¼ of SE ¼, Section 20, Township 6 South, Range 4 West, Morgan County, Alabama, described as follow: Beginning at the NW corner of the NE ¼ of SE ¼, Section 20, Township 6 South, Range 4 West, and running south along the quarter section line 660 feet, more or less, to the true point of beginning; thence running east along the south fence lines of the "Deer Springs Property" for a distance of 241.15 feet to the westerly margin of U. S. Highway No. 31; thence turning an angle of 112 degrees 14 minutes measured counterclockwise from back tangent and running southeasterly along the westerly margin of U. S. Highway No. 31 for a distance of 556.8 feet to a point; thence turning and angle of 67 degrees 46 minutes measured counterclockwise from back tangent, and running west 452.0 feet to the quarter section line; thence running north 515.4 feet to the true point of beginning.

ALSO the West 10 acres of the SE ¼ of the SE ¼, Section 20, Township 6 South, Range 4 West.

ALSO, all that part of the E ½ of the SE ¼ of the SE ¼ lying west of State Highway 31, less and except 1 acre in the southeast corner thereof described as follows: Beginning at the southeast corner of the foregoing described tract where the southerly section line of the SE ¼ of the SE ¼, Section 20, Township 6 South, Range 4 West, intersects the westerly margin of Bee Line Highway, which is the same as Highway 31, thence running north along said Highway 144 feet, thence West 300 feet, thence South 144 feet to the south line of said SE ¼ of SE ¼, and thence East 300 feet to the point of beginning.

and

The following described property located in Morgan County, Alabama, to wit:

PARCEL 2

A tract of land lying in the SE ¼ of Section 20, Township 6 South, Range 4 West, Morgan County, Alabama, and being a circle (having a 150 foot radius) tract of land, the outside limits

lying 150 feet from the center of the proposed tower site; to find the center of said tower site commence at the NW corner of the SE ¼ of said Section 20; thence S88°45'57"E 1287.91 feet; thence S1°14'03"W 1896.59 feet to the center of said proposed tower site and to the radius point of said circle tract of land. Said tract contains 1.62 acres, more or less and is subject to any easements of record or easements existing on site.

EXHIBIT 4

PUGH WRIGHT MCANALLY
CIVIL ENGINEERS

Morgan County Regional Landfill

Scope of Professional Services for Project Management, Civil Engineering Design, and Quality Control Assurance for the Closure and Capping of Municipal Solid Waste Cells 2 through 11

PUGH WRIGHT MCANALLY
CIVIL ENGINEERS
310 8TH AVENUE NE | DECATUR, ALABAMA 35601 | POST OFFICE BOX 2419 | 35602
256.353.3937P 256.350.2285F

June 1, 2021

Ms. Wanda Tyler
Landfill/Recycling Director City of Decatur
Morgan County Regional Landfill
500 Landfill Drive
Trinity, AL 35673

RE: Scope of Professional Services for Project Management, Civil Engineering Design, and Quality Control Assurance for the Closure and Capping of Municipal Solid Waste Cells 2 through 11

Ms. Tyler,

We at Pugh Wright McAnally (PWM) thank you for the opportunity to provide a fee proposal for the scope of services for the closure and capping of cells 2 through 11 for the Morgan County Regional Landfill (MCRL). From our ongoing involvement with MCRL we understand and are very familiar with the proposed closure for the Municipal Solid Waste (MSW) Cells 2 through 11. We are pleased to offer our services as the project manager, prime designer, and for quality control assurance (QCA) to achieve a successful project for Morgan County and the City of Decatur. As part of this proposal PWM has engaged with Thiel Engineering to assist with peer review assistance throughout the design, bidding, and construction of the liner cap for cells 2 through 11.

Project Overview

PWM understands the proposed project includes the closure and capping of approximately 95 acres of MSW Cells 2 through 11. Due to the limited supply of clay that would potentially meet the transmissivity requirements for a traditional MSW cap, it is likely PWM will recommend a

modified soil and Linear Low-Density Polyethylene (LLDPE) landfill liner cap which would include a Geosynthetic Clay Liner (GCL). The modified cap design will meet the requirements that is currently accepted by EPA and ADEM minimum design standards for subtitled landfills. The proposed capping system will include a designed stratum section comprised of engineered fill, geocomposites, LLDPE Liner, and designed drainage plane layers. As part of the design, PWM will provide all of the critical slope stability details and calculations. PWM will coordinate and provide all critical design details which affect stability and reliability of the proposed liner. PWM will provide design for all required storm sewer to properly drain side slopes as to not interfere with the integrity of proposed liner cap. PWM will provide necessary calculations for expected pore pressures from leachate and gas and provide the necessary design to relieve any negative overburden pressures from the proposed liner cap. Due to the critical nature of this project it is of the utmost importance the necessary calculations, analysis, and soil evaluations are performed to assure a quality design.

Proposed Tasks

Design Task

PWM will provide a complete set of Plans and Specs for the closure and capping of Cells 2 through 11. PWM will perform the field surveying to provide all topographic data necessary for design. The construction plan package will include a complete index of sheets, necessary specs, design calculations, material test results, and subsurface exploration results. It is anticipated the sheet index will contain the following:

- Title and Index Sheet
- General Notes and Instructions for Contractor
- Overall Layout
- Existing available asbuilt information
- Multiple Site Plans (Includes blown up detailed sections of the cells)
- Cross Sections of the Cells
- Details of Gas Venting Systems
- Details of Leachate Collection Systems
- Details of Liner Sections
- Details of Storm Water Systems and Storm Water Management
- Best Management Practices Plan to Accommodate Erosion Control
- Erosion Control Details

Permitting Task

PWM will coordinate all necessary permits and approvals anticipated with this project. PWM will coordinate all submittals required by ADEM with the Land Division Permitting. It is expected all fees incorporated with these permits will be paid or reimbursed by the owner. PWM will provide all storm water inspections and reporting as part of this scope.

Bidding and Contractor Selection Task

PWM will prepare the necessary bidding and project documents required for contractor selection and awarding. Due to the critical nature of this project, PWM recommends prequalifying contractors to bid and construct the cap and closure of Cells 2 through 11. PWM will work with the City of Decatur's Purchasing Department in organizing and preparing the necessary documents which are required for a contractor to work for the City of Decatur. PWM will organize and coordinate all necessary prebid meetings, address all RFIs from bidders, and coordinate bid openings and public announcements. PWM will make recommendation to the City of Decatur for the qualified low bidder.

Construction Administration and Quality Control Assurance

PWM proposes to offer quality control assurance and construction administration services for the proposed project. Services will include organizing and coordination of a required preconstruction meeting prior to start of work, attend necessary on site meetings to address

any issues which may arise during construction, verify work performed, and review all pay requests from the contractor.

Due to the nature of the project and special testing required, PWM will provide quality control assurance services for the geosynthetics installed. PWM will provide onsite inspector(s) during construction and installation for all geosynthetics. Laboratory testing will be required and included for the geosynthetics. All standard geotechnical soils testing required within the specification of the construction contract will be inclusive of this scope. All construction staking, asbuilt surveys, grade line surveys, and construction task will be the responsibility of the contractor.

FEE

Historically PWM has worked for Morgan County Regional Landfill on a time and materials hourly basis. Due to the nature and involvement of this project, PWM proposes a lump sum fee as a percentage of the proposed construction cost to cover additional administration and sub consultant services which are part of this scope. For all tasks mentioned above throughout the completion of the project, PWM proposes to offer professional services at a fee rate of **5.8%** of the estimated construction cost of the project. This rate meets the standard of practice fee schedule derived from the Alabama Building Commission section *179-X-4.10 Schedule of Basic Fee Rates Group III Basic Fee Rate.*

It is the opinion of PWM the closure cost for capping cells 2 through 11 will be **$19,158,140.00** yielding a consulting, design, construction services fee of **$1,072,855.84.** PWM is pleased to offer our services as the Prime Project Manager for Closure and Capping of Cells 2 through 11 for an estimated fee of **$1,072,855.84**

It is of the utmost importance to PWM to provide the City of Decatur and Morgan County Regional Landfill a high level of professionalism and project management services. We look forward in continuing our relationship as project engineer for the Morgan County Regional Landfill and being a part of future projects to come. Should you need any additional clarification of information in regards to our proposal please do not hesitate to contact Nathan Tomberlin or Blake McAnally.

Sincerely,

PUGH WRIGHT McANALLY, INC

Nathan L. Tomberlin, PE
Principle Engineer

H. Blake McAnally, President
Principal in Charge

SHORT FORM OF AGREEMENT
BETWEEN OWNER AND ENGINEER
FOR
PROFESSIONAL SERVICES

THIS IS AN AGREEMENT effective as of _____ ("Effective Date") between

City of Decatur, AL ("Owner")

and

Pugh Wright MCanally ("Engineer").

Owner's Project, of which Engineer's services under this Agreement are a part, is generally identified as follows:

Closing and Capping Municipal Solid Waste Cells 2 through 11 ("Project").

Engineer's Services under this Agreement are generally identified as follows:

Scope of Professional Services for Project Management, Civil Engineering Design, and Quality Control Assurance for the Closure and Capping of Municipal Solid Waste Cells 2 through 11

Owner and Engineer further agree as follows:

1.01 *Basic Agreement and Period of Service*

A. Engineer shall provide, or cause to be provided, the services set forth in this Agreement. If authorized by Owner, or if required because of changes in the Project, Engineer shall furnish services in addition to those set forth above. Owner shall pay Engineer for its services as set forth in Paragraphs 7.01 and 7.02.

B. Engineer shall complete its services within a reasonable time, or within the following specific time period: *See Exhibit A*.

C. If the Project includes construction-related professional services, then Engineer's time for completion of services is conditioned on the time for Owner and its contractors to complete construction not exceeding ___ months. If the actual time to complete construction exceeds the number of months indicated, then Engineer's period of service and its total compensation shall be appropriately adjusted.

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

SHORT FORM OF AGREEMENT BETWEEN OWNER AND ENGINEER FOR PROFESSIONAL SERVICES

Prepared by

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by

ACEC
American Council of Engineering Companies

AGC of America
The Associated General Contractors of America
Quality People. Quality Projects.

ASCE American Society of Civil Engineers

National Society of Professional Engineers
Professional Engineers in Private Practice

AMERICAN COUNCIL OF ENGINEERING COMPANIES

_____

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

_____

AMERICAN SOCIETY OF CIVIL ENGINEERS

_____

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
A Practice Division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

This Agreement has been prepared for use with the Standard General Conditions of the Construction Contract (EJCDC C-700, 2007 Edition) of the Engineers Joint Contract Documents Committee. Their provisions are interrelated, and a change in one may necessitate a change in the other.

SPECIAL NOTE ON USE OF THIS FORM

This abbreviated Agreement form is intended for use only for professional services of limited scope and complexity. It does not address the full range of issues of importance on most projects. In most cases, Owner and Engineer will be better served by the Standard Form of Agreement Between Owner and Engineer for Professional Services (EJCDC E-500, 2008 Edition), or one of the several special purpose EJCDC professional services agreement forms.

SHORT FORM OF AGREEMENT
BETWEEN OWNER AND ENGINEER
FOR
PROFESSIONAL SERVICES

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City of Decatur, AL ("Owner")

and

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B. Engineer shall complete its services within a reasonable time, or within the following specific time period: *See Exhibit A*.

C. If the Project includes construction-related professional services, then Engineer's time for completion of services is conditioned on the time for Owner and its contractors to complete construction not exceeding ___ months. If the actual time to complete construction exceeds the number of months indicated, then Engineer's period of service and its total compensation shall be appropriately adjusted.

2.01 *Payment Procedures*

A. *Invoices*: Engineer shall prepare invoices in accordance with its standard invoicing practices and submit the invoices to Owner on a monthly basis. Invoices are due and payable within 30 days of receipt. If Owner fails to make any payment due Engineer for services and expenses within 30 days after receipt of Engineer's invoice, then the amounts due Engineer will be increased at the rate of 1.0% per month (or the maximum rate of interest permitted by law, if less) from said thirtieth day. In addition, Engineer may, after giving seven days written notice to Owner, suspend services under this Agreement until Engineer has been paid in full all amounts due for services, expenses, and other related charges. Owner waives any and all claims against Engineer for any such suspension. Payments will be credited first to interest and then to principal.

3.01 *Termination*

A. The obligation to continue performance under this Agreement may be terminated:

1. For cause,

a. By either party upon 30 days written notice in the event of substantial failure by the other party to perform in accordance with the Agreement's terms through no fault of the terminating party. Failure to pay Engineer for its services is a substantial failure to perform and a basis for termination.

b. By Engineer:

1) upon seven days written notice if Owner demands that Engineer furnish or perform services contrary to Engineer's responsibilities as a licensed professional; or

2) upon seven days written notice if the Engineer's services for the Project are delayed for more than 90 days for reasons beyond Engineer's control.

Engineer shall have no liability to Owner on account of a termination by Engineer under Paragraph 3.01.A.1.b.

c. Notwithstanding the foregoing, this Agreement will not terminate as a result of a substantial failure under Paragraph 3.01.A.1.a if the party receiving such notice begins, within seven days of receipt of such notice, to correct its substantial failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of notice; provided, however, that if and to the extent such substantial failure cannot be reasonably cured within such 30 day period, and if such party has diligently attempted to cure the same and thereafter continues diligently to cure the same, then the cure period provided for herein shall extend up to, but in no case more than, 60 days after the date of receipt of the notice.

2. For convenience, by Owner effective upon Engineer's receipt of written notice from Owner.

B. The terminating party under Paragraph 3.01.A may set the effective date of termination at a time up to 30 days later than otherwise provided to allow Engineer to complete tasks whose value would

otherwise be lost, to prepare notes as to the status of completed and uncompleted tasks, and to assemble Project materials in orderly files.

C. In the event of any termination under Paragraph 3.01, Engineer will be entitled to invoice Owner and to receive full payment for all services performed or furnished in accordance with this Agreement and all reimbursable expenses incurred through the effective date of termination.

4.01 *Successors, Assigns, and Beneficiaries*

A. Owner and Engineer are hereby bound and the successors, executors, administrators, and legal representatives of Owner and Engineer (and to the extent permitted by Paragraph 4.01.B the assigns of Owner and Engineer) are hereby bound to the other party to this Agreement and to the successors, executors, administrators, and legal representatives (and said assigns) of such other party, in respect of all covenants, agreements, and obligations of this Agreement.

B. Neither Owner nor Engineer may assign, sublet, or transfer any rights under or interest (including, but without limitation, moneys that are due or may become due) in this Agreement without the written consent of the other, except to the extent that any assignment, subletting, or transfer is mandated or restricted by law. Unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under this Agreement.

C. Unless expressly provided otherwise, nothing in this Agreement shall be construed to create, impose, or give rise to any duty owed by Owner or Engineer to any contractor, subcontractor, supplier, other individual or entity, or to any surety for or employee of any of them. All duties and responsibilities undertaken pursuant to this Agreement will be for the sole and exclusive benefit of Owner and Engineer and not for the benefit of any other party.

5.01 *General Considerations*

A. The standard of care for all professional engineering and related services performed or furnished by Engineer under this Agreement will be the care and skill ordinarily used by members of the subject profession practicing under similar circumstances at the same time and in the same locality. Engineer makes no warranties, express or implied, under this Agreement or otherwise, in connection with Engineer's services. Subject to the foregoing standard of care, Engineer and its consultants may use or rely upon design elements and information ordinarily or customarily furnished by others, including, but not limited to, specialty contractors, manufacturers, suppliers, and the publishers of technical standards.

B. Engineer shall not at any time supervise, direct, control, or have authority over any contractor's work, nor shall Engineer have authority over or be responsible for the means, methods, techniques, sequences, or procedures of construction selected or used by any contractor, or the safety precautions and programs incident thereto, for security or safety at the Project site, nor for any failure of a contractor to comply with laws and regulations applicable to such contractor's furnishing and performing of its work.

C. This Agreement is to be governed by the law of the state or jurisdiction in which the Project is located.

D. Engineer neither guarantees the performance of any contractor nor assumes responsibility for any contractor's failure to furnish and perform its work in accordance with the contract between Owner and such contractor. Engineer is not responsible for variations between actual construction bids or costs and Engineer's opinions or estimates regarding construction costs.

E. Engineer shall not be responsible for the acts or omissions of any contractor, subcontractor, or supplier, or of any of their agents or employees or of any other persons (except Engineer's own employees) at the Project site or otherwise furnishing or performing any construction work; or for any decision made regarding the construction contract requirements, or any application, interpretation, or clarification of the construction contract other than those made by Engineer.

F. The general conditions for any construction contract documents prepared hereunder are to be the "Standard General Conditions of the Construction Contract" as prepared by the Engineers Joint Contract Documents Committee (EJCDC C-700, 2007 Edition) unless the parties agree otherwise.

G. All documents prepared or furnished by Engineer are instruments of service, and Engineer retains an ownership and property interest (including the copyright and the right of reuse) in such documents, whether or not the Project is completed. Owner shall have a limited license to use the documents on the Project, extensions of the Project, and for related uses of the Owner, subject to receipt by Engineer of full payment for all services relating to preparation of the documents and subject to the following limitations: (1) Owner acknowledges that such documents are not intended or represented to be suitable for use on the Project unless completed by Engineer, or for use or reuse by Owner or others on extensions of the Project, on any other project, or for any other use or purpose, without written verification or adaptation by Engineer; (2) any such use or reuse, or any modification of the documents, without written verification, completion, or adaptation by Engineer, as appropriate for the specific purpose intended, will be at Owner's sole risk and without liability or legal exposure to Engineer or to its officers, directors, members, partners, agents, employees, and consultants; (3) Owner shall indemnify and hold harmless Engineer and its officers, directors, members, partners, agents, employees, and consultants from all claims, damages, losses, and expenses, including attorneys' fees, arising out of or resulting from any use, reuse, or modification of the documents without written verification, completion, or adaptation by Engineer; and (4) such limited license to Owner shall not create any rights in third parties.

H. To the fullest extent permitted by law, Owner and Engineer (1) waive against each other, and the other's employees, officers, directors, agents, insurers, partners, and consultants, any and all claims for or entitlement to special, incidental, indirect, or consequential damages arising out of, resulting from, or in any way related to the Project, and (2) agree that Engineer's total liability to Owner under this Agreement shall be limited to $50,000 or the total amount of compensation received by Engineer, whichever is greater.

I. The parties acknowledge that Engineer's scope of services does not include any services related to a Hazardous Environmental Condition (the presence of asbestos, PCBs, petroleum, hazardous substances or waste as defined by the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq., or radioactive materials). If Engineer or any other party encounters a Hazardous Environmental Condition, Engineer may, at its option and without liability for consequential or any other damages, suspend performance of services on the portion of the Project affected thereby until Owner: (1) retains appropriate specialist consultants or contractors to

identify and, as appropriate, abate, remediate, or remove the Hazardous Environmental Condition; and (2) warrants that the Site is in full compliance with applicable Laws and Regulations.

J. Owner and Engineer agree to negotiate each dispute between them in good faith during the 30 days after notice of dispute. If negotiations are unsuccessful in resolving the dispute, then the dispute shall be mediated. If mediation is unsuccessful, then the parties may exercise their rights at law.

6.01 *Total Agreement*

A. This Agreement (including any expressly incorporated attachments), constitutes the entire agreement between Owner and Engineer and supersedes all prior written or oral understandings. This Agreement may only be amended, supplemented, modified, or canceled by a duly executed written instrument.

7.01 *Basis of Payment—Percentage of Construction Cost*

A. Using the procedures set forth in Paragraph 2.01, Owner shall pay Engineer as follows:

1. An amount equal to 5.8 percent of the cost to construct the work designed or specified by the Engineer ("Construction Cost"). This amount includes compensation for Engineer's Services and services of Engineer's consultants, if any. The percentage of Construction Costs noted herein accounts for labor, overhead, profit, and reimbursable expenses.

2. As a basis for payment to Engineer, Construction Cost will be based on one or more of the following determinations with precedence in the order listed:

a. For work designed or specified by Engineer and incorporated in the completed Project, the actual final cost of the work performed by Contractor.

b. For work designed or specified by Engineer but not constructed, the lowest bona fide bid received from a qualified bidder for such work; or, if the work is not bid, the lowest bona fide negotiated proposal or contractor's estimate for such work.

c. For work designed or specified but not constructed, upon which no bid, proposal, or estimate is received, Engineer's most recent opinion of probable Construction Cost.

B. The portion of the compensation amount billed monthly for Engineer's services will be based upon Engineer's estimate of the percentage of the total services actually completed during the billing period.

7.02 *Additional Services:* For additional services of Engineer's employees engaged directly on the Project, Owner shall pay Engineer an amount equal to the cumulative hours charged to the Project by each class of Engineer's employees times standard hourly rates for each applicable billing class; plus reimbursable expenses and Engineer's consultants' charges, if any. Engineer's standard hourly rates are attached as Exhibit B.

Attachments: Exhibit A - Probable Design and Construction Schedule

Exhibit B - 2021 Hourly Rate Schedule

IN WITNESS WHEREOF, the parties hereto have executed this Agreement, the Effective Date of which is indicated on page 1.

OWNER:	ENGINEER:
By: _____	By: _____
Title: _____	Title: _____
Date Signed: _____	Date Signed: _____
	Engineer License or Firm's Certificate Number: _____
	State of: _____
Address for giving notices:	Address for giving notices:
_____	_____
_____	_____
_____	_____
_____	_____

EXHIBIT A

SUBTITLE D CLOSURE FOR CELLS 2 THROUGH 11 FOR THE DECATUR-MORGAN COUNTY REGIONAL LANDFILL
PROBABLE DESIGN AND CONSTRUCTION SCHEDULE

Prepared By: Pugh Wright McAnally

TASK DESCRIPTION	PLAN START	PLAN END	TYPE
PHI - SCOPING AND PROPOSAL	1/1/2022	3/16/2022	
Meeting with Parties Involved / Establishing Understanding of Scope	1/1/2022	1/10/2022	b
Engage with Sub Consultants/ Receive Sub Scope and Fee	1/10/2022	2/10/2022	r
Prepare Scope and Proposal	2/10/2022	3/10/2022	g
Present Scope for Council Approval	3/16/2022	3/16/2022	y
PHII - DESIGN, TESTING, PERMITTING, AWARDING PROJECT	4/1/2022	6/1/2023	
Surveying and Topographic Data	4/1/2022	6/1/2022	b
Preliminary Engineering and Determination of Capping Limits	6/1/2022	7/1/2022	r
Critical Slope Stability Study	6/1/2022	9/1/2022	g
Capping Design and Plan Production	7/1/2022	2/1/2023	y
Prepare Contract Documents and Specifications	12/1/2022	2/1/2023	p
ADEM Review and Approval	2/1/2023	3/1/2023	o
Advertising, Bidding, and Project Awarding	3/1/2023	5/1/2023	b
PHIII - CONSTRUCTION	6/1/2023	6/1/2025	
Notice to Proceed	6/1/2023	6/1/2023	b
Mobilization	6/1/2023	7/1/2023	p
Clearing and Grubbing	7/1/2023	10/1/2023	r
Initial Earthwork Stage	8/1/2023	2/1/2024	g
Construct Gas Collection System	10/1/2023	3/1/2024	o
Geosynthetics	3/1/2024	9/1/2024	p
Final Earthwork Stage	9/1/2024	2/1/2025	g
ADEM Review and Approval	2/1/2025	3/1/2025	o
Final Closeout, Asbuilt Data, Final Inspections	3/1/2025	6/1/2025	b

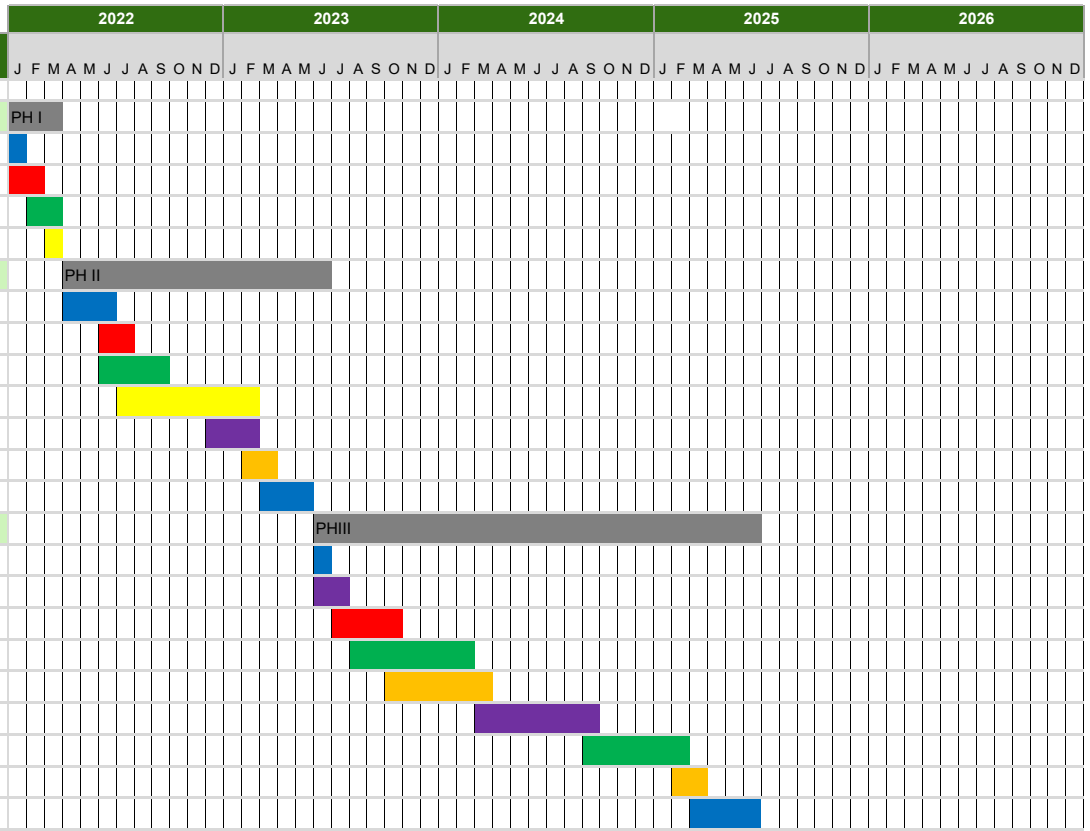

EXHIBIT B

PUGH WRIGHT MCANALLY CIVIL ENGINEERS
310 8TH AVENUE NE | DECATUR, ALABAMA 35601 | POST OFFICE BOX 2419 | 35602
256.353.3937P 256.350.2285F

2021 HOURLY RATE SCHEDULE

Valid 1 January through 31 December 2021

PROJECT MANAGER.....$158.75 per hour
PRINCIPAL ENGINEER.....$140.75 per hour
LICENSED PROFESSIONAL ENGINEER.....$124.50 per hour
GRADUATE ENGINEER.....$107.00 per hour
SENIOR PARTY CHIEF (Licensed Professional Surveyor)….....$ 91.00 per hour
CIVIL DESIGNER II.....$ 93.00 per hour
CIVIL DESIGNER I.....$ 83.00 per hour
CIVIL TECHNICIAN…….…….$ 55.00 per hour
PARTY CHIEF.....$ 74.00 per hour
INSPECTOR.....$ 76.50 per hour
CLERICAL.....$ 42.50 per hour

SURVEY CREWS: (Includes electronic Total Station and Data Collector)
2-man.....$120.00 per hour
3-man.....$156.00 per hour
Each additional man.....$ 44.50 per hour

EQUIPMENT CHARGES:
GPS (SMARTROVER STATIONS)….....$ 52.00 per hour
LEICA MS 50 SCANNER…….$160.00 per hour
VELODYNE SCANNER/M-600 UAS……..$375.00 per hour

REIMBURSABLES 4% of above Hourly Totals (Includes prints, copies, telephone, fax, postage, stakes, hubs, iron pins, flagging.)
OTHER COSTS (Sub-Contracts, Over-night shipping, Permits and Fees, Travel): As Required by Client shall be invoiced at Cost + 10%

The hourly rates are portal-to-portal from our office at 310 8th Avenue, N.E., Decatur, Alabama, and include all payroll taxes, fringe benefits, overhead, and profit. The rates are for nine hours daily, Monday through Friday. Saturday work or daily work required in excess of nine hours shall be 1.3 times the foregoing rate schedule. Sunday or holiday work shall be 1.5 times the foregoing rate schedule.

Pugh Wright McAnally, Inc. will keep accurate records of the number of hours charged for each employee assigned to the work and such records will be available for inspection by your authorized representative. Terms of payment will be net monthly. Balances in excess of 30 days may be subject to a finance charge.

Pugh Wright McAnally, Inc. maintains in full force and effect the following minimum insurance coverage's:

- Insurance to protect against claims under any applicable Workmen's Compensation Law, State or Federal. Employer's Liability insurance with limits of $500,000 per accident.
- Public Liability insurance with limits of $1,000,000 combined single limit for property damage and bodily injury.
- Automobile Liability insurance with limits of $1,000,000 combined single limit for bodily injury and death and/or property damage.
- In addition to the above coverage, we also carry an excess umbrella policy of $2,000,000.
- Professional Liability insurance with limits of $2,000,000 each claim, $2,000,000 aggregate.

Certificates evidencing said insurance and containing a ten-day notice of cancellation clause shall be furnished upon request.

OPINION OF PROBABLE COST:
SUBTITLE D CLOSURE FOR CELLS 2 THROUGH 11 FOR THE DECATUR-MORGAN COUNTY REGIONAL LANDFILL

ABBREVIATIONS

LS-LUMP SUM AC-ACRE EA-EACH
SY-SQUARE YARD CY-CUBIC YARI LF-LINEAR FOOT

INCLUDES: 275 mil DS 8oz. GEOCOMPOSITE DRG. LAYER, GEOSYNTHETIC - 60 MIL TEXTURED LINEAR LOW-DENSITY POLYETHYLENE (LLDPE) MEMBRANE, AND THE SUBSTITUTION OF GEOSYNTHETIC CLAY LINER - (BENTONITE MAT) WITH A 12" COVER SOIL INSTEAD OF A CONVENTIONAL CLAY LINER (GCL) 18" THICKNESS 1x10^-5 PERMEABILITY REQUIREMENT

BASE BID

ITEM	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	AMOUNT
1	1.0	LS	MOBILIZATION / DEMOBILIZATION	$150,000.00	$150,000.00
2	95.0	AC	GRUBBING, STRIPPING, AND STOCKPILING	$5,970.00	$567,150.00
3	90,000.0	CY	6" TOPSOIL/COMPOST BLEND	$8.00	$720,000.00
4	174,000.0	CY	12" COVER SOIL	$4.50	$783,000.00
5	508,200.0	SY	275 mil DS 8 oz. GEOCOMPOSITE DRAINAGE LAYER	$7.55	$3,836,910.00
6	508,200.0	SY	60 mil TEXTURED LINEAR LOW-DENSITY POLYETHYLENE (LLDPE) MEMBRANE	$6.00	$3,049,200.00
7	508,200.0	SY	GEOSYNTHETIC CLAY LINER (GCL) - BENTONITE MAT	$4.90	$2,490,180.00
8	180,000.0	CY	12" COVER SOIL (No Permeability Requirement)	$4.50	$810,000.00
9	508,200.0	SY	GEOCOMPOSITE DRAINAGE LAYER 6 oz. (GAS VENTING)	$4.00	$2,032,800.00
10	12,000.0	LF	6" PERFORATED GAS COLLECTION TOE DRAIN	$19.00	$228,000.00
11	26,000.0	LF	4" PERFORATED ADS SUB DRAIN AT BENCH	$15.00	$390,000.00
12	14,000.0	LF	6" PERFORATED ADS PERIMETER COVER UNDERDRAIN	$18.00	$252,000.00
13	64.0	EA	6" SOLID HDPE GAS VENT RISER AND RISER ASSEMBLY	$3,200.00	$204,800.00
14	20,000.0	LF	6" PERFORATED HDPE LFG COLLECTION PIPE TO GAS VENT RISER	$32.00	$640,000.00
15	10,500.0	LF	18" HDPE STORM PIPE DOWN DRAIN	$35.00	$367,500.00
16	7,000.0	LF	6" HDPE GAS LATERAL TO EXISTING HEADER TIE IN	$25.00	$175,000.00
17	170.0	EA	18" HDPE FABRICATED HEADWALL AND FITTINGS	$1,200.00	$204,000.00
18	22.0	EA	18" PRECAST CONCRETE WINGWALL	$3,800.00	$83,600.00
19	15.0	EA	15" VERTICAL EXISTING GAS WELL PIPE PENETRATION, BOOT, AND ASSEMBLY	$2,900.00	$43,500.00
20	30.0	EA	8" VERTICAL EXISTING GAS WELL PIPE PENETRATION, BOOT, AND ASSEMBLY	$2,500.00	$75,000.00
21	105.0	EA	6" VERTICAL EXISTING GAS WELL PIPE PENETRATION, BOOT, AND ASSEMBLY	$1,200.00	$126,000.00
22	90.0	EA	4" VERTICAL EXISTING GAS WELL PIPE PENETRATION, BOOT, AND ASSEMBLY	$970.00	$87,300.00
23	240.0	EA	2" VERTICAL EXISTING GAS WELL PIPE PENETRATION, BOOT, AND ASSEMBLY	$900.00	$216,000.00
24	65.0	EA	6" GAS VENT RISER PENETRATION BOOT AND CLAMP	$1,200.00	$78,000.00
25	75.0	EA	2" GAS VALVE PENETRATION BOOT AND CLAMP	$1,500.00	$112,500.00
26	15.0	EA	4" EXISTING LFG PIPE HORIZONTAL BOOT AND CLAMP	$2,800.00	$42,000.00

27	60.0	EA	6" EXISTING LFG PIPE HORIZONTAL BOOT AND CLAMP	$1,300.00	$78,000.00
28	60.0	EA	8" EXISTING LFG PIPE HORIZONTAL BOOT AND CLAMP	$1,500.00	$90,000.00
29	30.0	EA	2" HDPE ELECTROFUSION COUPLER REPAIR	$700.00	$21,000.00
30	30.0	EA	4" HDPE ELECTROFUSION COUPLER REPAIR	$670.00	$20,100.00
31	60.0	EA	6" HDPE ELECTROFUSION COUPLER REPAIR	$785.00	$47,100.00
32	60.0	EA	8" HDPE ELECTROFUSION COUPLER REPAIR	$1,100.00	$66,000.00
33	9,300.0	LF	ACCESS ROAD	$50.00	$465,000.00
34	12,000.0	LF	SILT FENCE	$5.00	$60,000.00
35	105.0	AC	SEEDING	$3,300.00	$346,500.00
36	210.0	EA	WATTLES	$200.00	$42,000.00
37	300.0	SY	RIP RAP	$115.00	$34,500.00
38	19,000.0	SY	TURF REINFORCEMENT MATTING	$4.00	$76,000.00
39	95.0	EA	CONCRETE RISER REMOVAL	$500.00	$47,500.00
			CONSTRUCTION TOTAL		**$19,158,140.00**
			TOTAL CONSULTING AND DESIGN FEE (5.6%*)		**$1,072,855.84**
			10% CONTINGENCY		**$2,023,099.58**
			TOTAL PROJECT COST		**$22,254,095.42**

*Percentage Derived from Alabama Building Commission 179-X-4.10 SCHEDULE of BASIC FEE RATES Group III Basic Fee Rate

EXHIBIT 5

ARCADIS Design & Consultancy for natural and built assets

DRAFT

PRELIMINARY INVESTIGATION WORK PLAN

City of Decatur-Morgan County Sanitary Landfill
Decatur, Alabama

October 15, 2021

PRELIMINARY INVESTIGATION WORK PLAN

City of Decatur-Morgan County Sanitary Landfill

Decatur, Alabama

Signature

Signature

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Our Ref.:

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Date:

October 15, 2021

Contents

TABLES

FIGURES

Acronyms and Abbreviations

ADEM	Alabama Department of Environmental Management
AEIRG	Alabama Environmental Investigation and Remediation Guidance
CDFM	Corehole Dynamic Flow Meter
COC	contaminants of concern
CSM	conceptual site model
DPT	direct push technology
ERT	electrical resistivity tomography
ft bgs	feet below ground surface
GPS	global positioning system
HAL	Health Advisory Level
MASW	multichannel analysis of surface waves
OTV	Optical Televiewer
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutane sulfonate
PFHS	perfluorohexane sulfonate
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PIWP	Preliminary Investigation Work Plan
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
SSI	statistically significant increases
USEPA	United States Environmental Protection Agency

INTRODUCTION

Pursuant to Alabama Department of Environmental Management (ADEM) Administrative Code r. Chapters 335-13-1 through 335-13-9, routine groundwater monitoring is performed at the City of Decatur – Morgan County Sanitary Landfill (the site; **Figure 1**) to monitor potential contaminants of concern (COCs) related to ongoing landfill operations. Samples are compared to the Groundwater Protection Standards (GWPS) for Appendix I and II COCs and assessed for the presence of statistically significant increases (SSI) relative to long-term data trends. In addition to routine monitoring activities, samples have been analyzed for per- and polyfluoroalkyl substances (PFAS) as part of a preliminary investigation to assess their presence or absence resulting from historical disposal of PFAS-containing manufacturing waste from the 3M Decatur manufacturing plant. The PFAS analyzed consisted of perfluorooctanoic acid (PFOA), perfluorobutane sulfonate (PFBS), perfluorohexane sulfonate (PFHS), and perfluorooctane sulfonate (PFOS), all of which were detected in groundwater. Activities proposed in this Preliminary Investigation Work Plan (PIWP) are intended to further evaluate the nature and extent of PFAS in groundwater at the site and its potential to migrate off-site.

On site, groundwater occurs in three different hydrostratigraphic units, defined by their similar water-transmitting properties. These units consist of the residuum, the epikarst, and the Tuscumbia-Fort Payne bedrock. The current site monitoring well network is comprised of nested well sets, which include well screen intervals for each of these three hydrostratigraphic units (shallow, intermediate, and bedrock zones, respectively). Within the northern half of the site, generally defined by well sets MW-1, MW-2, MW-3 and MW-4, PFOS and PFOA exceed the United States Environmental Protection Agency's (USEPA's) Health Advisory Level (HAL) of 70 nanograms per liter in all three zones. The presence of PFAS in each unit is consistent with the observed site vertical hydraulic gradients which indicate a prevailing downward trend (TTL, Inc. [TTL] 2018). This condition promotes downward movement of PFAS-containing groundwater from the residuum, through the epikarst, and into deeper bedrock. The presence of PFAS in groundwater and the prevailing northward regional bedrock flow towards the Tennessee River have prompted a need to further understand the presence of PFAS in on-site groundwater and the potential to migrate off site beyond the monitoring network.

An adaptive investigation approach has been developed to collect additional site information, support development of a preliminary conceptual site model (CSM) for PFAS occurrence and groundwater transport, and to guide future remedial decision making. This adaptive process includes a series of investigation steps that can each advance the understanding of site geologic and hydrogeologic conditions and be used to guide, tailor, or augment the subsequent steps. The goals of the proposed investigation activities detailed in this preliminary investigation report include:

1. Understand the nature of the three hydrostratigraphic units present at the site and their bearing on the potential migration and transport of PFAS from the landfill,
2. Identify the potential for off-site transport of PFAS towards potential receptors, and
3. Develop a preliminary CSM for use in supporting remedy and groundwater management decisions for the site.

To support achievement of the above, the following investigation elements have been identified to generate additional information for the site:

1. Surface geophysics

2. Closed Leachate Lagoon investigation activities
3. Pilot boring drilling, downhole geophysics, and packer testing – new monitoring wells
4. Hydraulic conductivity testing and groundwater monitoring
5. Bedrock dye tracing

As described in the following sections, the above activities are planned in sequence to provide guidance for the subsequent steps. These activities will be used to improve the understanding of PFAS distribution on site and the presence, fate, and transport of PFAS in soil, groundwater, and surface water media. Results from the investigation activities proposed under this PIWP will increase the overall understanding of the PFAS that are reasonably expected to be present in soil and groundwater and leverage these data to develop an updated remediation plan in accordance with the February 2017 Alabama Environmental Investigation and Remediation Guidance (AEIRG) that will further mitigate the source(s) and migration of PFAS in groundwater and soil. The following sections are focused on outlining the overall approach for each of the above elements, identifying the key information developed during each step, and outlining how these data will be used to support the overall adaptive investigation decision process.

CURRENT SITE CONDITIONS

Site Geology and Hydrogeology

The following description of site geology is derived from prior investigation reports, specifically the Fall 2020 Report of Groundwater Monitoring and Statistical Evaluation (TTL 2020). The site is in the Highland Rim physiographic province and is underlain by carbonate rocks of the Mississippian system, specifically the Tuscumbia Limestone and the Fort Payne Chert. These rocks comprise the Tuscumbia-Fort Payne Aquifer, a karst aquifer. Karst aquifers are characterized by relatively high bulk hydraulic conductivity afforded by heterogeneous networks of solution channels (commonly referred to as “conduits”) through which most of the groundwater is transmitted. These networks occupy a small volume of the rock, the remainder is relatively competent and of low permeability. The rock is mantled by residuum composed chiefly of silty clay with relatively small amounts of sand-and-gravel-sized chert clasts. Residuum is a product of in-place weathering of the limestone.

The water table occurs in the residuum across much of the site, though in some areas, where the bedrock is shallower, the water table occurs in the bedrock. All three “zones” currently monitored at the site, the residuum (shallow), the residuum-bedrock interface (referred-to as “intermediate” or “epikarst”), and the bedrock collectively form an unconfined aquifer.

Groundwater generally flows toward the north-northwest, based primarily on interpretations made from potentiometric maps (TTL 2020). Estimating groundwater-flow directions using potentiometric maps is not very reliable in karst. Such maps can be used in a broad sense to infer general directions of groundwater movement in the bedrock; however, it must be understood that the actual path that groundwater takes may be significantly different than inferred from the potentiometry. Groundwater elevations in each water-bearing zone fluctuate significantly; however, the available data are insufficient to determine the cause(s) of the variation. Variation can be caused by seasonal conditions (including the engineered raising and lowering of the Tennessee River), evapotranspiration, and diffuse (and potentially concentrated) infiltration of rainfall.

Mid-South Testing, Inc. (1994) estimated the average hydraulic conductivity for each zone based on the results of slug and bail tests as follows: 0.265 feet per day (f/d) for the bedrock; 0.067 f/d for the epikarst; and 0.019 f/d for the residuum. Wide ranges of hydraulic conductivity values are common in karst aquifers. Because the various methods of conductivity measurement (e.g., core tests, slug tests, pumping tests, etc.) measure different portions of the aquifer permeability, they produce widely differing numbers in karst terranes. Apparent values of hydraulic conductivity have been shown to range across six orders of magnitude in a single aquifer when these different types of tests are applied (Ewers 2006). Groundwater flow rates for each hydrostratigraphic unit were reported by TTL based on the site-specific hydraulic conductivity data presented above. While the methodology used by TTL to estimate the velocities is valid for porous media (e.g., sand and gravel), it is not valid for karst aquifers, and the results likely significantly underestimate true flow velocities in the epikarst and bedrock across the site.

Existing Well Network

The existing well network (**Figure 2**) across the facility consists of 32 groundwater monitoring wells within the three hydrostratigraphic units. A well completion table of the existing wells is included as **Table 1**. The three MW-13 wells (bedrock, epikarst, and residuum zones) are considered to be upgradient (background) wells for the landfill network while monitoring wells MW-11 and MW-12 are located adjacent to the closed fly ash landfill. According to a TTL report (November 2020), MW-4IR was installed to replace MW-4I in March 2019.

FIELD ACTIVITIES

The site investigation activities will be completed using an adaptive investigation approach to provide additional data useful in supporting development of a preliminary CSM and guiding future management and/or remedial decisions for the site. Activities proposed under this investigation are included in the following sections.

Surface Geophysics

To expand the CSM related to the residuum, epikarst and bedrock profiles across the site and to refine the proposed well locations, a surface geophysical survey will be performed prior to drilling. The objective of the geophysical survey will be to identify regions in the subsurface that may represent zones of enhanced transmissivity in the bedrock. A combined electrical resistivity tomography (ERT) and seismic-imaging survey consisting of nearly 20,000 line-feet will be completed along the western (transect 1), central (transect 2), eastern (transect 3), northern (transect 4) and north-central (transect 5) portions of the site as shown on **Figure 3**. Based on available site data the site geology consists of the following primary zones:

1. *Residuum:* refers to all saturated unconsolidated material above bedrock and is generally derived from the dissolution of limestone containing clay with silt and sand with varying amounts of chert and limestone.
2. *Epikarst:* consists of the uppermost, highly weathered zone of the bedrock. Thickness varies widely spatially.

3. *Limestone Bedrock:* generally competent but still contains occasional cavities/conduits. Competency generally increases with depth.

Each of the above zones within the overall groundwater system will have varying degrees of contribution to either promoting or inhibiting the flow of groundwater. A variety of geophysical methods are potentially available for use and their application is guided by the collective experience in assessing broader karst terranes. These methods include ground penetrating radar, ERT, seismic, and micro-gravity methods. In general, the combination of two or more geophysical techniques are typically employed depending on site-specific conditions (Benson and Yuhr, 1992; Hoover 2003; Dobecki and Upchurch, 2006) as the most effective in providing useful information for assessment of depth to bedrock, location of fractured rock, and presence of sinkholes and voids.

In addition to ERT, seismic methods including seismic refraction and multichannel analysis of surface waves (MASW) are well suited to estimate the depth to the contact between unconsolidated materials and/or weathered rock and competent bedrock. Seismic refraction is effective due to a large contrast in the body wave (P-wave or S-wave) velocities at the bedrock interface. One significant limitation of seismic refraction is the requirement that seismic velocities increase with depth. A low-velocity feature, such as a cavity, within the otherwise high-velocity bedrock will likely be masked. To offset this, MASW does not require an increase in velocity with depth and effectively reflects the shear strength of the subsurface materials and is particularly well suited to quantifying the loosened and weak materials associated with the ravelling of soils into a void space in limestone.

The combination of seismic refraction and MASW have been utilized effectively in understanding subsurface conditions (Bansah and Anderson 2018; Parker and Hawman 2012), including for the Huntsville area (Yuhr et al. 2005 and 2008), where the bedrock formations investigated are the same as those underlying the site. This combination of methods will be employed to help constrain the ERT results. The combined use of ERT and seismic methods is more effective than either method alone because each method provides a response based on different physical properties associated with subsurface features. The use of multiple methods will help identify and constrain subsurface anomalies and allow a more robust interpretation of the collected data. The following presents the specifically planned approach.

A combined ERT and seismic-imaging survey will be completed along portions of the western, central, eastern, northern and north-central boundaries as shown on **Figure 3.**

The planned data collection is summarized in the following table:

Planned Line Number	Planned ERT (feet)	Planned Seismic (feet)
1	6,850	6,850
2	4,000	4,000
3	2,850	2,850
4	4,500	4,500
5	1,600	1,600
Total	***19,800***	***19,800***

Field implementation of the ERT survey will include the following tasks:

- Careful horizontal and vertical surveying is critical to successful completion of the geophysical survey to properly account for topographic variability. The location of the electrodes in each transect will be mapped with a high precision global positioning system (GPS) surveying unit. The GPS unit will provide State Plane Coordinates for the horizontal location and elevation which will be incorporated into the data processing.
- Use of an Advanced Geosciences, Inc. (AGI) Super Sting R8 meter and passive electrodes to gather the data. Steel electrode stakes will be driven into the ground along the route of each profile, with a multi-connector cable used to connect the stakes to the resistivity instrument. A 4- to 5- meter maximum electrode separation will be used.
- Data collection will consist of a combined array pair of strong gradient with either pole-dipole (preferred) or dipole-dipole. Pole-dipole arrays have nearly a two-fold greater depth of penetration than dipole-dipole arrays for a given layout. However, a remote electrode is required for the pole-dipole array and space limitations may preclude the use of a remote electrode.
- Once the apparent resistivity datasets are collected, they will be downloaded to a computer and subsequently inverse-modeled using an inversion modeling software (AGI EarthImager™ and Res2DInv) to obtain an “actual”, true resistivity model cross-section of the subsurface.

Seismic imaging is a commonly applied approach for obtaining stratigraphic information, determining soil and rock parameters, and defining bedrock topography and fracture zones. For this application, seismic imaging provides an additional line of evidence for evaluating the subsurface characteristics of the bedrock as it only responds to changes in the mechanical strength of the rock and is not influenced by the changes in moisture content, clay mineralogy or conductivity of groundwater, all of which impact ERT readings. The combination of the seismic data with the ERT provides a higher level of confidence since the data sets mutually constrain the other.

The seismic methods proposed for this investigation are 1) P-wave seismic refraction and 2) combined MASW and refraction microtremor (ReMi). These seismic methods are particularly sensitive to the density and compressional and shear strengths of the soil and rock. The objectives of seismic imaging include:

- Determination of stratigraphy with associated shear (S) wave velocities.
- Determination of high, resistant zones or weak, fractured zones in bedrock.

Field implementation of the proposed seismic imaging will include the following tasks:

- As with ERT, careful horizontal and vertical surveying is critical to successful completion of the seismic survey. The positions of the seismic lines will be marked on the ground at the Site for data control purposes and will a differential GPS survey of the geophone locations will be completed to determine their positions and elevations. The survey data will be incorporated into the data processing. Survey activities will be completed concurrent with the ERT locations.
- Depending on the seismic response parameters a geophone separation of up to 6 meters will be used.
- The seismic survey will consist of firmly planting the line of geophones evenly spaced along a straight line, generally 24 in number. A seismic impulse (or “shot”) is generated utilizing sledge hammer or

other impact device which establishes the “time-zero”, which is transmitted directly to the seismograph at the moment of impact after which the seismograph records the geophone responses over a specified time window as the seismic waves travel downward through the subsurface and then back up to the geophones. For the refraction method, five to seven shots are typically recorded for each geophone spread or layout and include far and near offset shots, forward and reverse shots and a center shot. Additional shots will also be taken at additional positions along the geophone cable to obtain surface wave data needed for the MASW method. ReMi data is collected without using a controlled energy source – it uses random background vibrations instead. Arcadis will use interactive seismic data processing programs for the processing and interpretation of both refraction and MASW/ReMi data sets.

Leachate Lagoon Investigation Activities

Two settling lagoons are centrally located on the site (**Figure 4**). These lagoons formerly received leachate from landfill operations for a period of several decades, ending in the early 2000s. According to available information, the leachate lagoons are clay lined and now contain water derived from precipitation. The proposed investigation activities have been selected to assess the potential presence of PFAS in lagoon sediments, lagoon water, and in the surrounding groundwater. These activities are intended to characterize the potential for previous or ongoing discharge of PFAS into shallow residuum groundwater and assess its potential transport into deeper epikarst and bedrock groundwater at the site. Investigation activities performed will include a series of soil, groundwater, surface water, and sediment samples collected from within the lagoons and the surrounding area. Details of the specific scope elements are outlined below. The proposed sampling locations are shown on **Figure 4**.

- Soil Sampling
    - Completion of up to six direct push borings around the perimeter of the lagoons.
    - Each location will be continuously cored using dual tube macro core tooling, or similar. Each core will be logged for lithology and the saturation of the core will be used to identify target groundwater sampling zones within the borings.
- Soil samples will be collected from each boring to characterize the vadose profile. Sampling will be completed for PFAS at the following depth intervals:
    - 0-1 feet below ground surface (bgs)
    - 4-5 feet bgs
    - Every 5 feet vertically between 5 feet and the water table (i.e., 9-10 feet, 14-15 feet, etc.)
- Groundwater Sampling:
    - Two groundwater samples will be collected from each boring location via screen point sampler or temporary polyvinyl chloride (PVC) well. The depth of the groundwater samples will be based on site conditions but are anticipated to be collected from the first zone of saturation encountered and near refusal at the base of the borehole. Based on the site data, it is anticipated that the total depth of the borings will be up to 50 feet bgs with samples collected at approximately 35 and 50

feet bgs. If the saturated thickness of the interval is deeper than anticipated or if the borehole does not yield sufficient water from the shallow interval, only one sample may be collected.

  - Groundwater samples will be collected as grab samples with minimal purging based on the anticipated low permeability anticipated in the residuum.
  - At the completion of sampling activities, all downhole tooling and/or temporary well materials will be removed from the borehole and the location will be abandoned from the base of the borehole to ground surface with Portland Type 1 cement.
  - Following completion, boring locations will be surveyed.

- Lagoon Sediment Sampling:
  - The sediment sampling in the lagoons will be completed at up to three locations with the approximate locations shown on **Figure 4**.
  - At each location the sediment will be profiled to determine the thickness of accumulated sediment present between the base of the lagoon and the top of the underlying clay. The method for collecting a core to profile the sediment will be based on the conditions of the ponds and the depth of surface water present at each sampling location. The primary method is anticipated to be a push core that can be collected where surface water is present. If areas of the lagoon are dry, a stainless-steel auger may also be used to collect the sediment.
  - Once the sediment thickness is known, sample intervals will be selected. Samples will be collected every 1 to 2 feet across the vertical length of the sediment to obtain samples.
- Surface Water Sampling:
  - Three surface water samples will be collected from the lagoons at the locations shown on **Figure 4**.
  - Samples will be collected using a direct fill method at each of the locations.

All lagoon-related samples will be analyzed for PFAS using two different analytical methods. The first includes USEPA Method 537, with samples analyzed by Eurofins TestAmerica. The second method is Method ETS-8-044.3, with samples analyzed by the 3M Environmental Laboratory in St. Paul, Minnesota. This second method includes a comprehensive list of PFAS compounds (**Tables 2A**, **2B** and **2C**) that are or were present at the 3M Decatur Plant during the period of landfill waste disposal. Surface water samples will be analyzed for the following geochemical parameters: dissolved calcium, dissolved magnesium, dissolved potassium, dissolved sodium, chloride, sulfate, and alkalinity.

Pilot Boring Drilling, Borehole Geophysics and Packer Testing

Results of the geophysical and leachate lagoon investigations will support identification and refinement of the proposed drilling locations for the groundwater investigation. The proposed locations for new well clusters are shown on **Figure 5** and are considered representative of the general locations for the monitoring wells. These locations will be modified, as necessary, based on the identification of a potential source at the leachate lagoon, the features and presence of geophysical anomalies identified in the ERT, seismic and MASW geophysical investigation. Priority will be given to geophysical information indicating

the presence of tertiary porosity features, zones of apparent weathering, or other anomalies considered indicative of potential groundwater flow zones.

At each proposed location, a cluster of three wells is anticipated. This three well cluster will include a shallow residuum well, an intermediate epikarst well and a deep well completed in the bedrock. Details on the drilling, testing and well completion procedures are described in the following sections.

Drilling

Drilling for the new boring locations will be performed using sonic methods as follows:

- Prior to drilling each location, the first 5 feet of each boring will be cleared using soft dig methods to identify and avoid any potential subsurface utilities and collect soil samples.
- Once completed, the overburden will be drilled using sonic drilling methodologies. A standard 4- x 6-inch sampling system will be used to collect a continuous soil core. The 4- x 6-inch sampling system consists of a 4-inch diameter core barrel advanced to collect a continuous soil sample, followed by a 6-inch override casing to the same depth. The 4-inch core barrel will be removed to extract the soil sample while the override casing remains in place to keep the borehole open. At the surface, the soil/rock core will be extruded from the 4-inch core barrel and placed in polyethylene bags for photographing and logging. The core barrel will then be re-inserted to the base of the borehole and the process repeated until the terminal depth is reached. This method allows for continuous stratigraphical characterization and collection of depth-discrete soil samples as the boring is advanced.
    - Soil samples will be collected from each location to provide a vertical profile of PFAS distribution across the vadose zone. Sampling will be completed at the following depth intervals:
        - 0-1 feet bgs
        - 4-5 feet bgs
        - Every 5 feet vertically between 5 feet and the water table (i.e., 9-10, 14-15, etc.)
    - The borings will be advanced to a minimum depth of 15 feet into the top of bedrock to provide an adequate seal for installation of a surface casing. Once the total depth of the surface casing is determined, the 6-inch borehole will be over drilled to 10 inches with additional override casing to provide adequate annular space for the installation of a 6-inch diameter, carbon steel casing. The surface casing will be grouted from the base of the boring to ground surface using a neat Portland Type 1 cement and will be allowed to cure for a minimum of 24 hours before additional drilling is completed at that location.
    - The total depth of the boreholes will be evaluated as additional data are collected and analyzed. It is anticipated that the borings will target the vertical extent of the Tuscumbia Limestone and are anticipated to extend to an average total depth of 200 ft bgs.

Borehole Geophysics

Upon reaching the terminal depth at each bedrock location, borehole geophysics will be completed. The geophysical logging suite will consist of the following tools:

- Natural Gamma – All rock and soils emit gamma radiation in varying amounts. Gamma logging records the amount of natural gamma radiation emitted from the rock and provides a useful means of identifying different bedrock formations and correlating stratigraphy between drilling locations.
- Three-Arm Caliper – The caliper tool measures the borehole diameter. Perturbations in the caliper logs can indicate fractures, fracture zones, or areas of friable rock where drilling has enlarged the borehole beyond the nominal bit diameter.
- Optical Televiewer (OTV) – Provides a continuous, detailed 360-degree image of the borehole wall, allowing for identification of fractures and measurement of fracture strike, dip, and frequency. OTV does not typically work well in large diameter boreholes or when the water column is turbid, where the acoustic televiewer can often be used in lieu of the OTV.
- Acoustic Televiewer – Provides a continuous image of the borehole wall from a fixed transducer and variable speed, rotating reflective surface that measures the acoustic properties of the borehole wall. The distance and angles the beam travels allow for identification of fractures and measurement of strike and dip.
- Fluid Temperature – The fluid temperature tool records water temperature. Since water flowing into or out of the well at a water-bearing zone, like a fracture, can create perturbations in the temperature profile in a well, a fluid temperature log can provide an indication of open flowing fractures and other transmissive zones.
- Fluid Conductivity – This tool records the electrical conductivity of groundwater and can identify and discriminate between different water-bearing zones if the total dissolved solids or ionic content of the water in the two zones are different.
- Corehole Dynamic Flow Meter (CDFM) – The CDFM is designed to measure vertical groundwater flow within a borehole over a range of 0.01 to 10 gallons per minute (gpm). It may be performed under static and dynamic conditions (non-pumping or pumping). The CDFM detects vertical groundwater movement using an electromagnet and two electrodes. The tool is typically positioned at fixed depth intervals during operation.

Note that completing flowmeter logs under both ambient and dynamic conditions provides differing types of information where each support identifying transmissive fractures within a borehole. Ambient logging helps to evaluate whether natural conditions allow for vertical flow up or down the borehole. Dynamic flow logging also helps identify which fractures contribute groundwater to the well under stressed conditions.

Borehole geophysical data will be used to select depths for collecting groundwater samples via packer testing in intervals where target fracture or flow features are identified or judged likely to transmit groundwater.

Results from the geophysical testing will be used to assess overall bedrock borehole transmissivity and hydraulic conductivity, distribution of PFAS in groundwater, and support subsequent decisions for well construction. These decisions include whether to complete the boreholes as permanent monitoring locations or to grout up the boreholes if no significant fractures or groundwater flow is identified.

Packer Testing

The result of the borehole geophysics will be evaluated to identify potentially transmissive vertical intervals throughout the borehole and will serve as the basis for selecting target intervals for the packer testing. The selected intervals will be isolated in the borehole using a straddle packer assembly. The straddle packer assembly will consist of two rubber-coated, inflatable packers separated by 10 feet of 2-inch, perforated riser, with an unperforated riser extending to the surface. Once in place, the packers will be inflated to form a seal against the borehole wall and isolate the selected interval from the rest of the open borehole. A submersible pump will be installed inside the riser pipe into the screened interval of the straddle packer. Pressure transducers will also be deployed to monitor the water level response during pumping. These transducers will be installed within the riser and outside the riser to evaluate changes in water level throughout the duration of the test.

Once the packer assembly and data loggers are installed, pumping will be initiated at a flow rate of approximately 0.5 gpm. Flow rate, volume purged, manual water level measurement outside and inside the riser, and packer inflation pressure will be periodically recorded during purging.

The combination of flow rate and drawdown will be used as a key decision parameter during pumping from each packer test interval. Drawdown will be limited to a maximum of 20 feet below static to avoid overstressing the formation. Groundwater samples will be collected if a minimum acceptable yield of 0.5 gpm with 20 feet or less of drawdown (specific capacity of 0.01 gpm/foot) is met. If the test does not meet these minimum criteria, the test will be aborted because samples are not representative of groundwater transport pathways.

If the test interval meets the minimum acceptable yield criteria, it will be purged to a target volume V1+V2, where:

V1 = 1 isolated interval volume (borehole volume between packers)

V2 = 1 isolated interval volume + the volume in the riser.

At the completion of the purging, a groundwater sample will be collected into laboratory provided containers and analyzed for PFAS. Samples will be submitted to the 3M analytical laboratory for analysis of PFOA, PFBS, PFHS, and PFOS as indicator parameters for well screen selection, which will be analyzed on an expedited turnaround time to support interim decision making on final well screen placement. For the purposes of this PIWP, it is assumed that up to seven samples will be collected from each boring.

After samples are collected, or the interval is aborted due to minimum acceptable yield criteria, the packers will be deflated, and the process will be completed at the next pre-determined interval.

Monitoring Well Completion

The wells will be installed as nested groups of three and distributed vertically through the residuum, epikarst and bedrock at the four boring locations. Depending on the borehole geophysics and packer testing, bedrock borings could result in up to two well screens per borehole to provide monitoring in key bedrock intervals.

Any portion of a bedrock borehole below the total depth of the proposed well will be plugged using bentonite. The bentonite will be added to bring the depth of the borehole to within 2 feet of the base of the proposed well screen. Filter sand will be added from the top of the bentonite to approximately 2 feet above the well screen with the remaining annular space filled with neat Portland Type 1 cement.

Monitoring wells will be completed using 2-inch diameter well materials. Well screens will be comprised of 10-ft 304 stainless steel 0.010-inch (10-slot) vee-wire materials. Risers will be Schedule 80 PVC. In some instances where subsurface voids are encountered, a stainless-steel wrapped pre-packed Schedule 80 PVC screen may be used.

The residuum and epikarst well screen intervals will be determined using the stratigraphic profile and drilling observations during the installation of the bedrock boring. The residuum well will target the shallow groundwater with the top of its screen interval proximal to the water table.

The epikarst screen placement will vary based on the conditions encountered but will focus on the transmissive intervals near and within the upper weathered portion of the bedrock.

Each of the residuum and epikarst wells will be installed in a dedicated borehole with a minimum of five feet spacing between borings; and will be drilled using sonic tooling. The target depth of the residuum and epikarst wells will be evaluated on a case-by-case basis during the completion of the bedrock boring and will rely upon lithologic and hydrologic observations. Once the target well interval is determined, the residuum and epikarst wells will be constructed using 2-inch well materials as discussed previously.

The screened intervals in the bedrock wells will be determined using a combination of the borehole geophysics and packer testing results discussed previously. Screen placement will focus on the transmissive intervals that are judged to be significant to the overall groundwater flow system.

All completed monitoring wells will be finished as stick-up wells with 2- x 2-foot concrete pads and protective bollards. After surface completions have been installed, the monitoring wells will be developed using a combination of surging and pumping. Well development at each location will consist of combination of surging using a surge block assembly and purging a minimum of three borehole volumes in addition to the volume used during the drilling of the well screened interval.

Upon completion and development of the monitoring wells, each well will be surveyed for northing, easting and top of casing and ground surface elevations.

Hydraulic Conductivity Testing

In karst aquifers, bedrock monitoring wells may monitor groundwater that is predominantly moving rapidly through the aquifer (through interconnected networks of solution-widened features referred to as “conduits”), groundwater that is moving very slowly (through the primary porosity of the rock and/or sparse, unweathered fractures), or some combination of the two. For understanding contaminant transport, wells that are reasonably well-connected hydraulically to conduit networks are of greatest value. For this reason, it is important to understand, in a general sense, how well each monitoring well is connected to the active flow system in the aquifer. A convenient means of estimating this is by conducting slug tests at each well, as completed at the site in the past. These tests estimate the hydraulic conductivity of the bedrock immediately surrounding the well screen. Wells with relatively high hydraulic

conductivities tend to be better connected to the active flow system, whereas wells with low hydraulic conductivities tend to be poorly connected.

Slug tests entail quickly displacing a volume of water in the well by adding or removing a “slug” and then recording the resulting change in the water level over time. Slug testing will be completed at all new and existing wells. Measurements are made with a pressure transducer and digital data logger. Combined with the down-hole geophysical data collected, these data will collectively provide a baseline understanding of each well’s hydraulic behavior in advance of dye tracing, as discussed below.

Groundwater Monitoring

Following completion of the well installation activities, a comprehensive groundwater sampling event will be completed to evaluate the distribution of PFAS across the site. The comprehensive sampling event will include all existing site wells and the new wells installed as part of the investigation.

Prior to completing groundwater sampling activities, a comprehensive groundwater gauging event will be completed to aid in inferring groundwater flow directions in each hydrostratigraphic unit. Note that the practice of inferring groundwater flow directions in karstic bedrock (including the epikarst) using water-level data can be unreliable based on the presence of tertiary porosity features and variability in the weathering throughout the epikarst zone. True groundwater flow directions may differ from those inferred using water-level data.

Monitoring well groundwater samples will be analyzed for PFAS using USEPA Method 537 and Method ETS-8-044.3 consistent with the lagoon PFAS samples. Additionally, groundwater samples will be analyzed for the following geochemical parameters: dissolved calcium, dissolved magnesium, dissolved potassium, dissolved sodium, chloride, sulfate, and alkalinity. Depending on turbidity observed in the field, samples may be filtered prior to laboratory shipment. These analytes will be useful in evaluating unique groundwater signatures, identifying where infiltration and precipitation contribute to “younger” groundwater, and to evaluate mixing between the primary hydrostratigraphic units.

Bedrock Dye-Trace Study

Delineating impacted groundwater in karst settings is more challenging, and less precise, than at non-karst sites. This is because most groundwater in karst aquifers (typically >90%) moves through a complex, interconnected network of conduits. These pathways cannot be reliably mapped (unless they are caved-sized such that they can be entered and surveyed) and occupy a very small volume of the bedrock; on the order of a few percent or less. Consequently, monitoring wells oftentimes do not intercept these important flow pathways that dominate groundwater movement. Also, one of the primary tools used by hydrogeologists to infer groundwater flow directions – potentiometric maps – have limited utility in karst. While such maps provide some useful information relative to groundwater movement, inferences made from them regarding the directions of groundwater movement at the site scale are often unreliable.

Groundwater contained in the primary and fracture porosity of the rock moves relatively slowly toward, and discharges into, the conduit network. Once in the network, groundwater typically moves quite rapidly, often much faster than in non-karst settings. Conduit networks tend to converge in the downgradient direction and discharge at focused points: springs. As one moves away from a contaminant-release area

(i.e., “source area”) in karst, impacted groundwater becomes largely confined to the conduit network. As such, traditional “plumes” of dissolved contamination tend not to form in karst.

Based on the characteristics described above, dye tracing is a tool commonly employed in karst settings to help characterize groundwater flow. Benefits of this approach include that the results are easily understood by stakeholders and positive tracer detections are irrefutable. Tracer studies entail introducing one-or-more non-toxic tracer dyes into the bedrock and monitoring a network of wells, springs, and surface-water bodies for the dye. Depending on the situation, other locations where groundwater is abstracted (e.g., groundwater depression systems, quarries, etc.) may be included in the monitoring network. The dyes can be detected at very low concentrations – well below the concentration at which the dyes are visible to the naked eye.

The primary objectives of a tracer study at this site would be to:

1. Identify the point(s) from which groundwater beneath the landfill discharges to the land surface (e.g., springs and surface-water bodies) or is pumped from the aquifer (if pumping wells are located within the study area).
2. Estimate groundwater velocities from the introduction point(s) to the locations where dye is positively detected.
3. Identify the monitoring wells that are hydraulically connected to the active flow system in the bedrock underlying the landfill (such wells would be useful locations to monitor the quality of water leaving the landfill).

A separate work plan detailing the scope of the tracer study to be conducted at the site will be prepared once the investigative work described above is completed and the data analyzed. In general, the dye-trace study, would consist of the following components:

Water-Well Inventory/Imagery Survey and Field Reconnaissance

The water-well inventory will consist of reviewing available records regarding the existence of domestic and other wells in the area. Arcadis will also review available aerial imagery and maps (historical and current) for evidence of sinkholes and springs. Reconnaissance of the site and surroundings will be conducted, including an aerial thermograph survey, to help identify potential tracer monitoring points. Such points include springs and seeps, other features contributing water to surface water (e.g., storm sewers, tile drains, etc.), locations where groundwater is abstracted (if any, based on review of data collected), and selected surface-water monitoring locations.

Tracer-Study Work Plan

Data from the well inventory and reconnaissance will be used to develop a field work plan. The work plan will lay out the scope and objectives of the study, including the proposed monitoring network to be used and the study duration. The plan will also cover procedures for deploying and collecting samplers, analytical methods and protocols to be used to analyze them for the tracer, the estimated number of sampling rounds, and the sampling frequency.

Background Fluorescence Study

The tracer study will employ one-or-more of several fluorescent dyes proven suitable for tracing groundwater in karst aquifers. In addition to tracing groundwater, these dyes are commonly used for other purposes, including testing sewer lines for leaks and testing domestic leach fields for regulatory

compliance. Additionally, these dyes are commonly used by industry and are present in many consumer products. For these reasons, it is necessary to determine the "background fluorescence" of waters to be monitored. In addition to establishing background conditions, these data are also used to select the appropriate dye to use during the study. Background studies typically consist of deploying dye samplers at all proposed sampling stations and collecting two rounds of samples one week apart.

Dye Introduction and Monitoring

For a successful tracer study, it is important that the dye is introduced into the active flow system of the aquifer. Various methods of dye introduction exist, though all may not be suitable or practicable at a given site. Methods include introducing dye into sinkholes, test pits excavated to (or near) the bedrock surface, or wells. Wells tend to be the least desirable means by which to introduce tracer dyes, unless they are shown to be reasonable well-connected to the active flow system (for example, through a potable-water injection test).

The introduction method, duration of the study, and the sampling frequency would be determined based on the data collected from the above steps and the time of the year when the study is conducted. When seasonal groundwater velocities are high, the duration of a tracer study is typically less than when velocities are low. Groundwater velocities are typically highest during seasonally wet periods outside the growing season, such as winter and spring, and when the Tennessee River is at its low (winter) stage. For the type of study contemplated for this site, the duration could be expected to range from approximately four to eight months, with sampling frequencies starting at weekly, and gradually transitioning to every other week, and ultimately monthly toward latter portion of the study.

As noted above, results from the tracer study could potentially identify point-of-discharge locations for additional monitoring and or remediation. If it is demonstrated that bedrock groundwater discharges to one or several primary surface water features, sampling of these locations for PFAS and other site related COCs would be expected to understand the relative change in concentration between the site and the point of discharge and to guide future remedial decision making.

Investigation Derived Waste

Soil and rock cuttings generated during drilling activities will be transported from each borehole location to a 25-yard roll-tarp box located in a designated staging area on site.

Groundwater waste generated during drilling and sampling activities, purge water waste generated during well development activities, and wastewater generated during decontamination activities will be transported to a 7,000-gallon vacuum sludge box at the designated staging area.

It is assumed that all waste (soil, rock, groundwater) that will be generated at each proposed drilling location or monitoring well is representative across the site, therefore, prior to completion of the investigation activities, waste profile samples will be collected from each waste stream for preparation of waste disposal at an approved facility.

REPORTING AND SCHEDULE

Data collected from the above investigation activities will be compiled and summarized in an investigation report. This report will include results from the multiple investigation activities performed as part of this

PIWP combined with previous site geologic, hydrogeologic, and water quality data to establish a preliminary CSM. The analytical results from the investigation activities will also be evaluated in general accordance with the Regional Screening Level (RSL) Evaluation outlined in the Alabama Risk-Based Corrective Action (ARBCA) Guidance Manual. The following process and hierarchy, as outlined in the ARBCA Manual, will be used for determining the appropriate screening criteria for groundwater.

- Use of the Maximum Contaminant Levels (MCLs) or RSLs obtained from the USEPA RSL Generic Tables
- If no MCL has been established or the RSL is not listed in the RSL Tables, calculate an RSL based upon ingestion of water and inhalation of vapors during domestic use of water
- If no MCL, no listing in the RSL Tables, or insufficient information is available to calculate an RSL, apply approved Lifetime Health Advisory (HA) or Secondary Drinking Water Standards.

The developed CSM will include a summary of potential exposure pathways for PFAS at the site in support of follow-on decisions related to future remediation or site management needs.

Initiation of the investigation activities is proposed for January 2022 and would continue through April 2023. As detailed above, the proposed dye-trace study is anticipated to span multiple months to allow a sufficient monitoring duration for dye collection response. A generalized schedule of the preliminary investigation activities is provided below for reference purposes only.:

- Approval of PIWP – within 2 months of submittal to ADEM (January 2022)
- Completion of Surface Geophysics – January 2022
- Closed Leachate Lagoon Investigation – February2022
- Pilot Borings, Borehole Geophysics and Packer Testing – February through June 2022
- Monitoring Well Installation and Development – July 2022
- Slug Testing and Comprehensive Groundwater Monitoring – July 2022
- IDW Removal - August 2022
- Dye Tracing –August 2022 – April 2023
- Comprehensive Investigation Report Submittal – August 2023

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TABLES

FIGURES

ATTACHMENT A

Arcadis U.S., Inc.

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Table 1: Well Construction Details
Morgan County Landfill
Decatur, Alabama

ARCADIS

Well ID	Unit Screened	Date Installed	Top of Casing Elevation (ft amsl)	Ground Surface Elevation (ft amsl)	Well Diameter (inches)	Well Depth (ft bgs)	Screened Interval (ft bgs)
MW-1B	Bedrock	7/29/1994	580.04	578.16	2	76.6	76.1 - 71.1
MW-1I	Epikarst	7/7/1994	579.96	577.42	4	89.3	89.0 - 84.0
MW-1S	Resdiuum	7/8/1994	579.69	577.75	4	25.8	25.5 -20.5
MW-2B	Bedrock	7/12/1994	589.29	587.43	2	54	53.5 - 48.5
MW-2I	Epikarst	7/8/1994	588.67	586.54	4	30.4	29.9 - 24.9
MW-3B	Bedrock	7/14/1994	615.27	613.34	2	81.9	81.4 -76.4
MW-3I	Epikarst	7/8/1994	614.47	612.75	4	61.8	61.3 - 56.3
MW-3S	Resdiuum	7/7/1994	614.92	613.07	4	41.5	40.6 - 35.6
MW-4B	Bedrock	7/28/1994	602.32	600.15	2	85.5	85.0 - 80.0
MW-4I	Epikarst	8/3/1994	602.22	599.94	4	60	59.5 - 54.5
MW-4IR	Epikarst	3/2/2019	602.57	599.7	4	50	45 - 50
MW-4S	Resdiuum	8/3/1994	602.7	600.52	4	45.1	43.7 - 38.7
MW-5B	Bedrock	7/11/1994	612.75	610.3	2	84.3	83.8 - 78.8
MW-5I	Epikarst	7/23/1994	612.23	609.59	4	63.6	63.1 - 58.1
MW-5S	Resdiuum	7/24/1994	613.14	610.69	4	28.5	28.1 - 23.1
MW-6B	Bedrock	7/25/1994	610.05	607.72	2	67.7	67.1 - 62.1
MW-6I	Epikarst	8/2/1994	609.89	607.66	4	49.5	49.0 - 44.0
MW-7B	Bedrock	7/1/1994	647.05	644.93	2	83.6	83.1 - 78.1
MW-7I	Epikarst	7/15/1994	647.03	645.13	4	65.8	65.3 - 60.3
MW-7S	Resdiuum	7/20/1994	647.36	645.26	4	33.9	33.4 -28.4
MW-8B	Bedrock	7/21/1994	606.34	604.19	2	79.4	78.9 -73.9
MW-8I	Epikarst	7/7/1994	606.22	604.25	4	49.5	49.0 - 44.0
MW-9B	Bedrock	7/13/1994	615.54	613.33	2	61.5	61.0 -56.0
MW-9I	Epikarst	7/6/1994	614.97	612.98	4	46.9	46.4 - 41.4
MW-9S	Resdiuum	7/5/1994	615.18	613.28	4	29.4	29.0 - 24.0
MW-11B	Bedrock	7/9/1994	619.21	616.86	2	61.1	60.6 -55.6
MW-11I	Epikarst	7/5/1994	619.08	616.83	4	33.9	33.4 - 28.4
MW-11S	Resdiuum	7/2/1994	618.83	616.68	4	26	25.2 - 20.2
MW-12B	Bedrock	7/9/1994	625.78	623.48	2	69.9	69.4 - 64.4
MW-12I	Epikarst	6/27/1994	624.35	622.42	4	46.8	46.0 - 41.0
MW-13B	Bedrock	7/22/1994	645.07	643.64	2	61.9	61.4 - 56.4
MW-13I	Epikarst	6/25/1994	645.88	643.68	4	36.5	35.7 - 30.7
MW-13S	Resdiuum	6/25/1994	646.29	644	4	24.3	23.7 -38.7

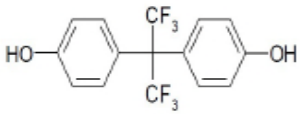
Notes:
ft amsl - feet above mean sea level
ft bgs - feet below ground surface

Table 2A – On-Site PFAS[1]
3M Decatur Plant
Decatur, Alabama

Short Name or Acronym	CASN	Chemical Name or Structure	Air	Water	Soil	Sediment
TFA	76-05-1	Trifluoroacetic acid	X	X[2]		
PFPA	378-76-7	Perfluoropropionic acid	X	X[2]		
PFBA (linear)	375-22-4	Perfluorobutyric acid CF3CF2CF2COOH	X[3]	X[2,3]		
Iso-PFBA (branched)	335-10-4	(CF3)2CFCOOH Propanoic acid, 2,3,3,3-tetrafluoro-2-(trifluoromethyl)-	X[3]	X[1]		
PFBS, C4 Sulfonate	375-73-5	Nonafluorobutane-1-sulfonic acid		X	X	X
PBSF/DMAPA	68555-77-1	N-[3-(Dimethylamino)propyl]-1,1,2,2,3,3,4,4,4-nonafluorobutane-1-sulfonamide		X		
PBSF/DMAPA/AA	212335-64-3 OR 172616-04-5	2-Propenoic acid, reaction products with N-[3-(dimethylamino)propyl]-1,1,2,2,3,3,4,4,4-nonafluoro-1-butanesulfonamide OR N-[3-(Dimethylamino)propyl]-N-(1,1,2,2,3,3,4,4,4-nonafluorobutane-1-sulfonyl)-beta-alanine		X		
PFPeA	2706-90-3	Perfluoropentanoic Acid		X[2]	X[2]	X[2]
PBSK	29420-49-3	Potassium nonafluorobutane-1-sulfonate		X[2]	X[2]	X[2]
FBSA, C4 amide	30334-69-1	1,1,2,2,3,3,4,4,4-Nonafluorobutane-1-sulfonamide	X	X	X	X
	131003-86-6	1,1,2,2,3,3,4,4,4-Nonafluorobutane-1-sulfonamide Ammonium salt (FBSA -NH4)	X[2]	X[2]	X[2]	X[2]
MeFBSA, C4 Methyl Amide	68298-12-4	1,1,2,2,3,3,4,4,4-Nonafluoro-N-methylbutane-1-sulfonamide		X	X	X
MeFBSE, C4 Methyl Alcohol	34454-97-2	1,1,2,2,3,3,4,4,4-Nonafluoro-N-(2-hydroxyethyl)-N-methylbutane-1-sulfonamide	X	X	X	X
FBSE, C4 Primary Alcohol	34454-99-4	1,1,2,2,3,3,4,4,4-Nonafluoro-N-(2-hydroxyethyl)-1-butanesulfonamide	X	X		
	484024-67-1	1,1,2,2,3,3,4,4,4-Nonafluoro-N-(2-hydroxyethyl)-1-butanesulfonamide Ammonium	X[2]	X[2]		

[1] The analytes listed are consistent with those detailed in Attachment 1 of the Interim Special Order by Consent No. 20—086-CWP/AP/GW/HW/DW/SW, dated July 24, 2020, between ADEM and 3M. The analytes listed include PFAS raw materials, byproducts and products that are either currently used or manufactured on site or have been used or manufactured in recent history (approximately after the year 2000). These analytes may potentially be available in onsite media but would not be expected to be available in offsite media. Other notes included on page 3.

Table 2A – On-Site PFAS[1]
3M Decatur Plant
Decatur, Alabama

Short Name or Acronym	CASN	Chemical Name or Structure	Air	Water	Soil	Sediment
		Salt				
FBSEE, C4 diol	34455-00-0	1,1,2,2,3,3,4,4,4-Nonafluoro-N,N-bis(2-hydroxyethyl)butane-1-sulfonamide	X	X		
2333 TFPA	359-49-9,	CF3CFHCOOH 2,3,3,3-Tetrafluoropropionic acid		X[2]		
Propanoic acid, 2,2,3,3-tetrafluoro-	71592-16-0	HCF2CF2COOH Propanoic acid, 2,2,3,3-tetrafluoro		X[2]		
C4 Methyl Amide Phosphonium Curatives	332350-93-3	Phosphonium, triphenyl(phenylmethyl)-, salt with 1,1,2,2,3,3,4,4,4-nonafluoro-N-methyl-1 butanesulfonamide (1:1)		X[1]		
bis-Phenol AF	1478-61-1		X	X		
DBI	129135-87-1	Bis(Nonafluorobutanesulfonyl)imide	X	X		
HFP, Hexafluoropropylene	116-15-4	1,1,2,3,3,3-Hexafluoro-1-propene	X	X		
ADONA	958445-44-8	3H-Perfluoro-3-[(3-methoxy-propoxy)propanoic acid], ammonium salt	X[2]	X[2]		
PMVE	1187-93-5	Perfluormethylvinylether	X	X		
DIOFB	375-50-8	1,4-Diiodocotafluorobutane; Octafluoro-1,4-diiodobutane	X	X		
VDF	75-38-7	1,1-Difluoroethylene	X	X		
TFE	116-14-3	Tetrafluoroethylene	X	X		
HFPO-DA	13252-13-6	Hexafluoropropylene oxide dimer acid		X[2]		
PFBSi	34642-43-8	Nonafluorobutane-1-sulfinic acid		X[2]	X[2]	X[2]
MeFBSAA, C4 Methyl glycine Acid	159381-10-9	Perfluorobutyl-methyl sulfonamido acetic acid		X[2]		
FBSAA, C4 glycine Acid	347872-22-4	Perfluorobutyl sulfonamido acetic acid		X[2]		

Notes on Page 3.

Table 2A – On-Site PFAS[1]
3M Decatur Plant
Decatur, Alabama

Short Name or Acronym	CASN	Chemical Name or Structure	Air	Water	Soil	Sediment
FBSEE diacid	1268835-43-3	[(Nonafluorobutane-1-sulfonyl)-carboxymethylamino]acetic acid		X[2]		
PBSF	375-72-4	Perfluorobutanesulfonyl fluoride	X	X[1]		
PFSA monomer	88190-28-7	1,1,2,2,3,3,4,4-octafluoro-4-[(trifluoroethenyl)oxy]-1-butanesulfonyl fluoride	X	X[1]		

X[1] = Reacts in water to form another species that is measured by the analytical method.
X[2] = Anion is measured by the analytical method
X[3] = Current analytical method does not distinguish linear from branched isomer

Table 2B – On- and Off-Site PFAS[1]
3M Decatur Plant
Decatur, Alabama

Short Name or Acronym	CASN	Chemical Name or Structure	Air	Water	Soil	Sediment
PFBA (linear)	375-22-4	Perfluorobutyric acid CF3CF2CF2COOH	X[3]	X[2,3]		
PFBS, C4 Sulfonate	375-73-5	Nonafluorobutane-1-sulfonic acid		X	X	X
PFPeS	2706-91-4	Perfluoropentanesulfonate		X		
PFHxA	307-24-4	Perfluorohexanoic acid	X[2]	X[2]	X[2]	X[2]
PFHxS	355-46-4	Perfluorohexanesulfonate	X	X	X	X
PFHxSA	41997-13-1, 8169-3-16	1,1,2,2,3,3,4,4,5,5,6,6,6-Tridecafluorohexane-1-sulfonamide; perfluorohexanesulfonamide		X		
PFHpA	375-85-9	Perfluoroheptanoic acid		X[2]	X[2]	X[2]
PFHpS	375-92-8	Perfluoroheptanesulfonate		X		
PFOA	335-67-1	Perfluorooctanoic acid	X[2]	X[2]	X[2]	X[1]
PFOS	1763-23-1	Perfluorooctanesulfonate	X	X	X	X
PFOSA	754-91-6	Perfluorooctanesulfonamide	X	X	X	X
PFNA	375-95-1	Perfluorononanoic acid		X[2]	X[2]	X[2]
PFNS	68259-12-1	Perfluorononanesulfonate		X		
PFDA	335-76-2	Perfluorodecanoic acid		X[2]	X[2]	X[2]
PFDS	335-77-3	Perfluorodecanesulfonate		X		
PFUnA	2058-94-8	Perfluoroundecanoic acid		X[2]	X[2]	X[2]
PFDoA	307-55-1	Perfluorododecanoic acid		X[2]	X[2]	X[2]
PFDoS	79780-39-5	Perfluorododecylsulfonate		X		
PFTrA	72629-94-8	Perfluorotridecanoic acid		X[2]		
PFTreA	376-06-7	Perfluorotetradecanoic acid		X[2]		
PFHxDa	67905-19-5	Perfluorohexadecanoic acid		X[2]		
PFODA	16517-11-6	Perfluorooctadecanoic acid		X[2]		
N-EtFOSAA	2991-50-6	N-ethyl perfluorooctanesulfonamidoacetic acid		X[2]		
N-MeFOSAA	2355-31-9	N-methyl perfluorooctanesulfonamidoacetic acid		X[2]		
EtFOSA	4151-50-2	N-ethyl perfluorooctanesulfonamide	X	X		
MeFOSA	31506-32-8	N-methyl perfluorooctanesulfonamide	X	X		
PECHS	335-24-0	Perfluoro-4-ethylcyclohexanesulfonate		X		
PBSA	68555-77-1	N-[3-(dimethylamino)propyl]-1,1,2,2,3,3,4,4-nonafluoro-butane-1-sulfonamide		X		
PBSA-C1 or C2	172616-04-5	3-((N-(3-(dimethylamino)propyl)-perfluorobutyl)sulfonamido)propanoic acid		X		

[1] The analytes listed in Table 2B are consistent with those included in Attachment 2 of the Interim Special Order by Consent No. 20—086-CWP/AP/GW/HW/DW/SW, dated July 24, 2020, between ADEM and 3M. The analytes include PFAS byproducts and products that were historically manufactured (approximately prior to 2002) at the site but have since been phased out. These analytes may potentially be available in both onsite and offsite media. Other notes included on Page 2.

Table 2B – On- and Off-Site PFAS[1]
3M Decatur Plant
Decatur, Alabama

Short Name or Acronym	CASN	Chemical Name or Structure	Air	Water	Soil	Sediment
PBSA-DC	225460-13-7	3-((3-((N-(2-carboxyethyl)-perfluorobutyl)sulfonamido)propyl)-dimethylammonio)propanoate		X		
PBSA-S1	2089108-94-9	1-Propanaminium, N-(2-hydroxyethyl)-N,N-dimethyl-3-[[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl](3-sulfopropyl)amino]-, inner salt		X		
PHSA	50598-28-2	N-[3-(dimethylamino)propyl]-1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-hexane-1-sulfonamide		X		
PHSA-C1	141607-32-1	3-((N-(3-(dimethylamino)propyl)-perfluorohexyl)sulfonamido)propanoic acid		X		
PHSA-C2	81190-41-2	2-carboxyethyl-dimethyl-[3-(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexylsulfonylamino)propyl]ammonium		X		
PHSA-DC	756771-34-3	3-[3-[2-carboxylatoethyl(dimethyl)ammonio]propyl-(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexylsulfonyl)amino]propanoate		X		
PHSA-S3	38850-60-1	3-[3-(dimethylamino)propyl-(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexylsulfonyl)amino]propane-1-sulfonic acid		X		
PHSA-E1	736877-37-5	1-Propanaminium, N-(2-hydroxyethyl)-N,N-dimethyl-3-[[(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]amino]-, inner salt		X		
PFOSA-NO	178094-69-4 (K salt)	N-oxide of N-[3-(dimethylamin)propyl)-perfluorooctane-1-sulfonamide		X		
PFHxSF	423-50-7	Perfluorohexane sulfonyl fluoride	X	X[1]		
POSF	307-35-7	Perfluorooctane sulfonyl fluoride	X	X[1]		

X[1] = Reacts in water to form another species that is measured by the analytical method.
X[2]= Anion is measured by the analytical method.

Table 2C– On-Site PFAS Requiring Further Standard and Method Development
3M Decatur Plant
Decatur, Alabama

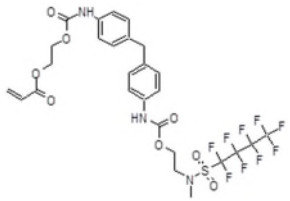
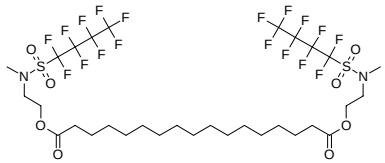
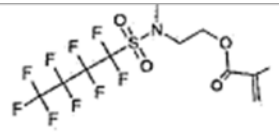
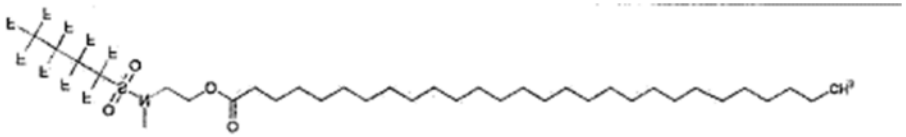
Short Name or Acronym	CASN	Chemical Name or Structure
bis-Phenol AF Curatives		Multiple curatives based on Bis-phenol AF
Oligomers		R2(CF2CH2)x-R1
Tetrafluoropropionic acid esters		CF3CFHCOO-R
C4 Methyl Amide Phosphonium Curatives	332350-90-0	Phosphonium, tributyl(2-methoxypropyl)-, salt with 1,1,2,2,3,3,4,4,4- nonafluoro-N-methyl-1-butanesulfonamide (1:1)
C4 protective treatment monomer	856220-62-7	
C18-Diester		
HFPO-TA	2641-34-1	Hexafluoropropylene oxide trimer acid
HFPO-TetA	27639-98-1	Hexafluoropropylene oxide tetramer acid
PFSA monomer pre-cursor	117516-16-2	2,3,3,3-tetrafluoro-2-[1,1,2,2,3,3,4,4-octafluoro-4-(fluorosulfonyl)butoxyl]propanoyl fluoride
Iso-PFBA (branched)	335-10-4	(CF3)2CFCOOH Propanoic acid, 2,3,3,3-tetrafluoro-2-(trifluoromethyl)
C4 Hydride Sulfonate	70259-85-7 (K salt form)	Potassium 1,1,2,2,3,3,4,4-octafluorobutane-1-sulfonate

Table 2C– On-Site PFAS Requiring Further Standard and Method Development
3M Decatur Plant
Decatur, Alabama

MeFBSEA, C4 acrylate	67584-55-8	2-[Methyl(1,1,2,2,3,3,4,4,4-nonafluorobutane-1-sulfonyl)amino]ethyl prop-2-enoate
MeFBSEMA, C4 methacrylate		
2-Fluoromalonic acid	473-87-0	HOOCCFHCOOH
Fluorochemical ester PM-870		
PHSA-S1	38850-58-7	1-Propanaminium, N-(2-hydroxyethyl)-N,N-dimethyl-3-[(3 sulfopropyl){1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]amino)-, inner salt
C8 Quaternary Ammonium Iodide or Chloride Salt	1652-63-7, 153810-83-4, 34561-26-7, 39340-48-2, 54298-25-8, 94809-83-3	3-(1,1,2,2,3,34,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctylsulfonylamino)propyl-trimethyl-ammonium;methane

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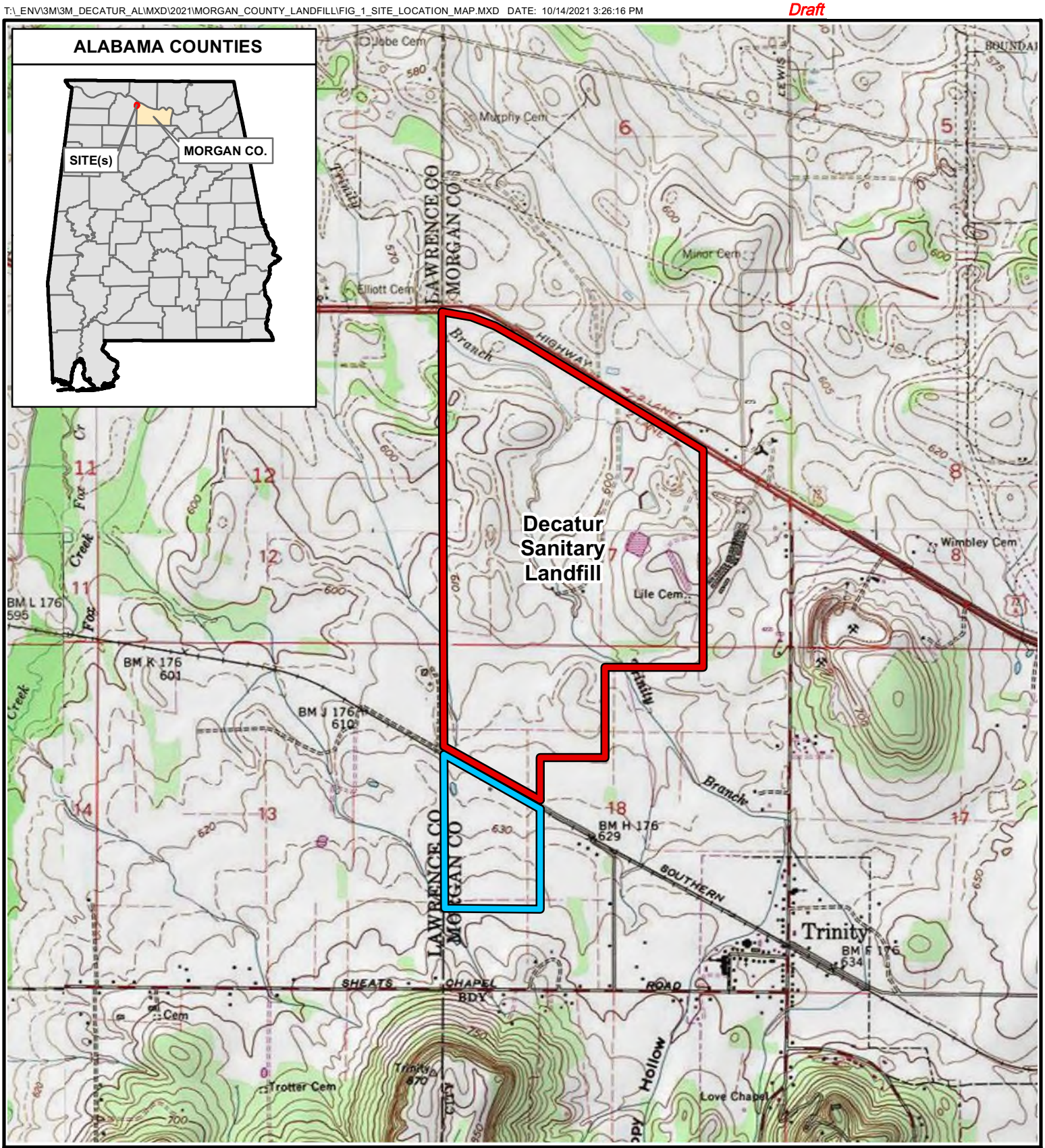

LEGEND:

- Decatur Sanitary Landfill
- Fly Ash Landfill

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SCALE IN FEET

MORGAN COUNTY LANDFILL
DECATUR, MORGAN COUNTY, ALABAMA

SITE LOCATION MAP

ARCADIS

FIGURE 1

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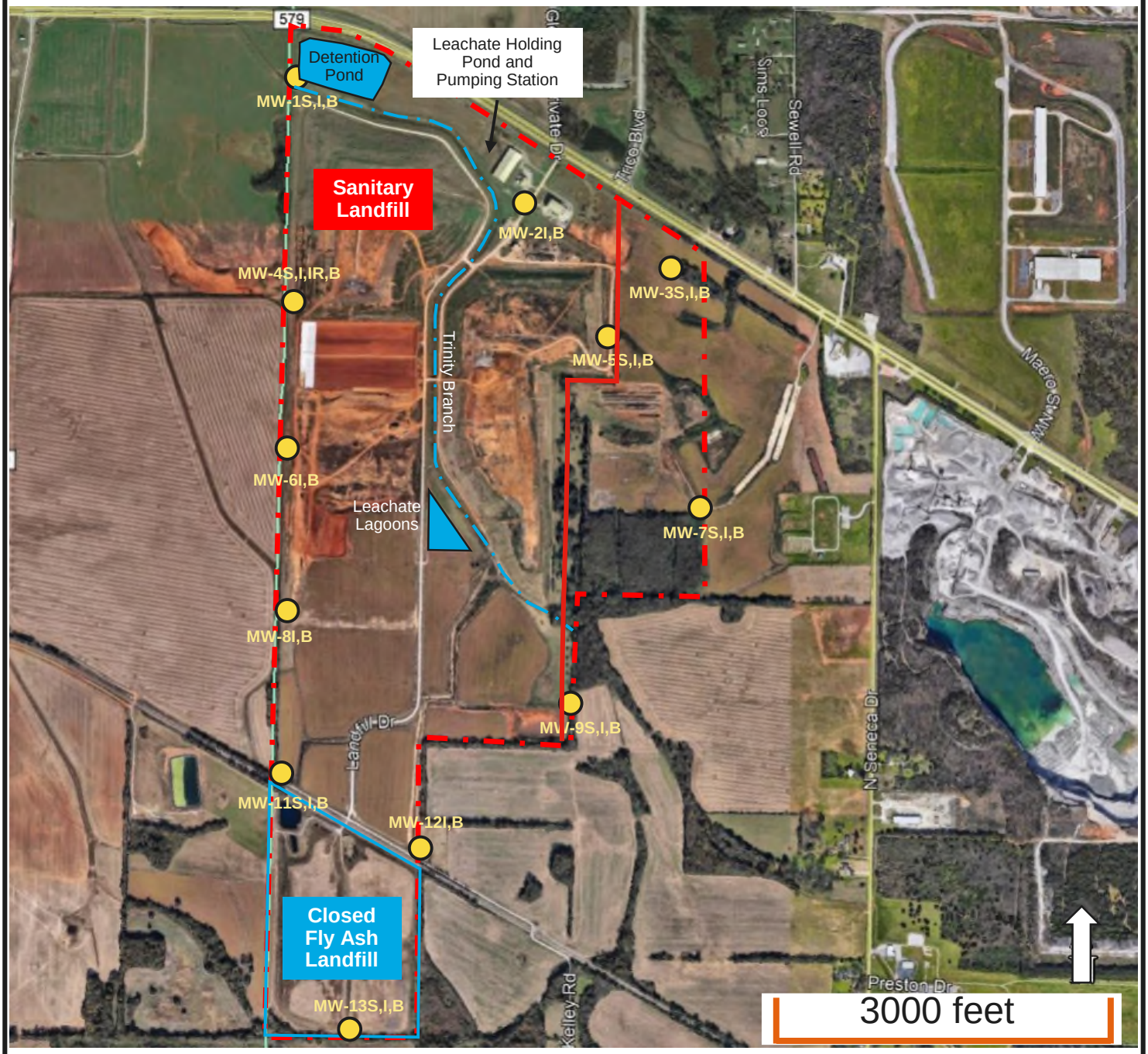

Legend

- Approximate Site Boundary
- Existing Well
- Pond/Lagoon
- Trinity Branch Creek

MORGAN COUNTY LANDFILL
DECATUR, MORGAN COUNTY, ALABAMA

SITE LAYOUT MAP

ARCADIS

FIGURE
2

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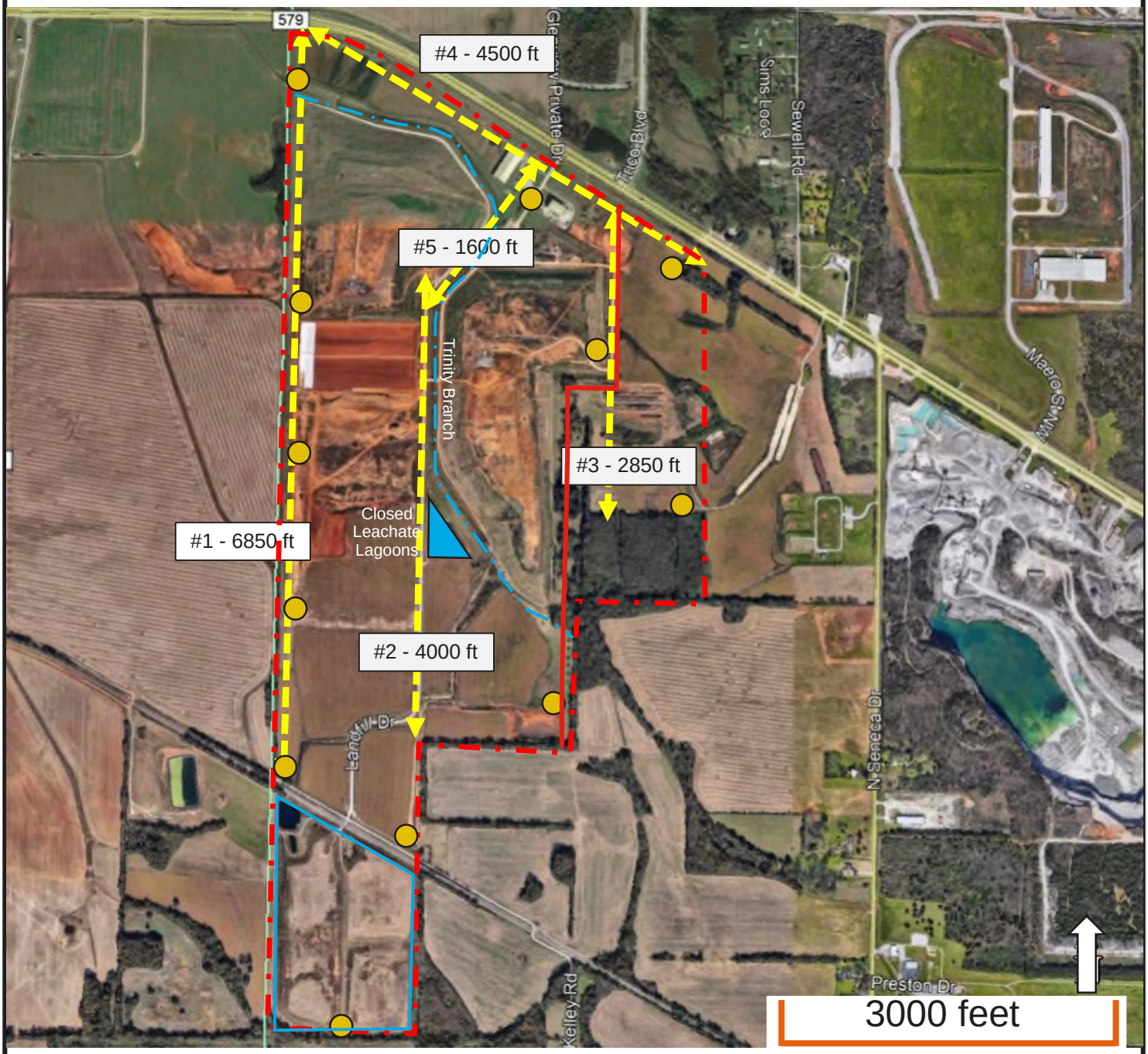

Legend

- Approximate Site Boundary
- Existing Well
- ERT/Seismic Survey Lines
- Pond/Lagoon
- Trinity Branch Creek

MORGAN COUNTY LANDFILL
DECATUR, MORGAN COUNTY, ALABAMA

SURFACE
GEOPHYSICS TRANSECTS

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FIGURE
3

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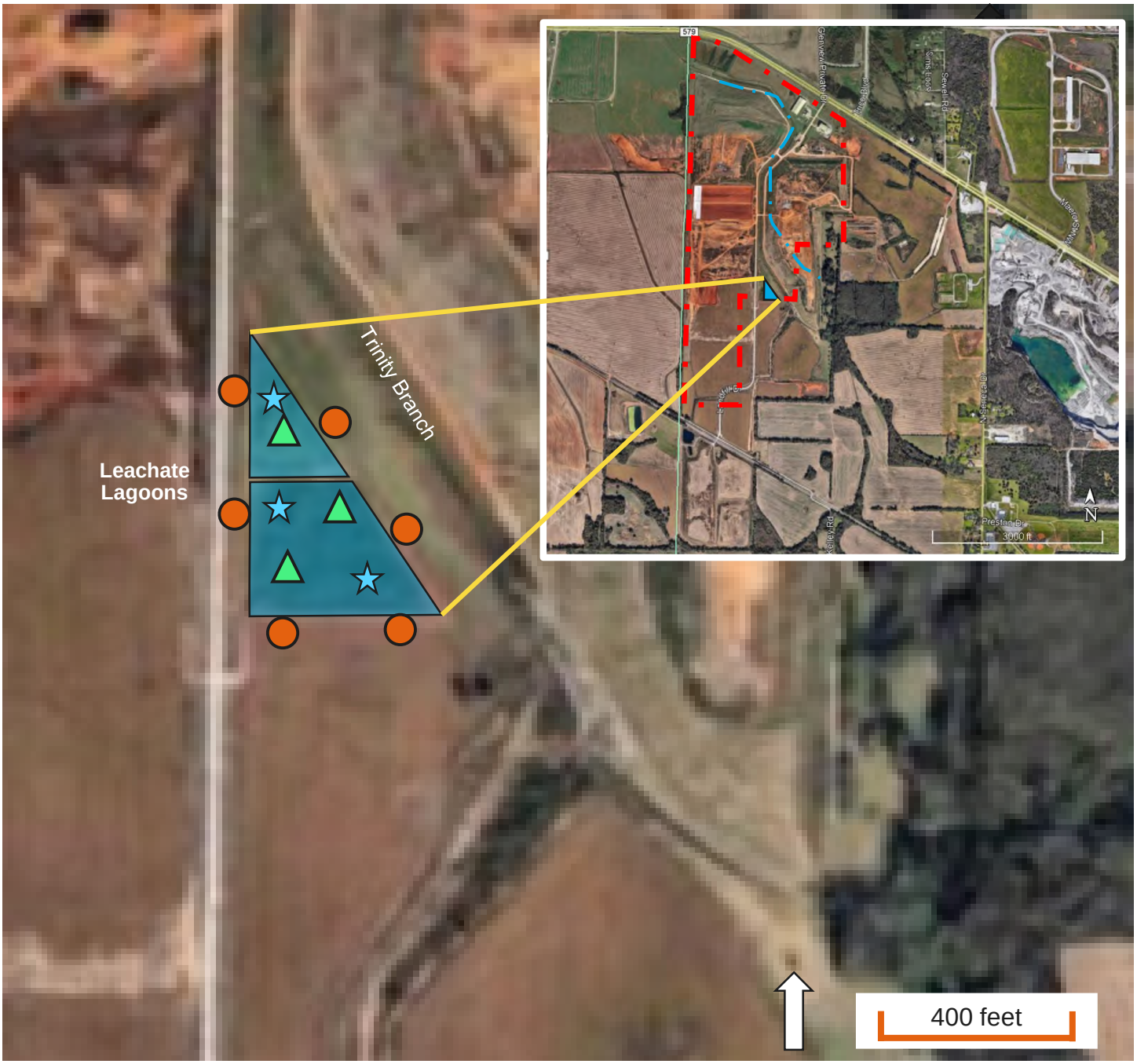

Legend

- Direct Push Borings
- Sediment Sample
- Surface Water Sample

MORGAN COUNTY LANDFILL
DECATUR, MORGAN COUNTY, ALABAMA

CLOSED LEACHATE LAGOON
INVESTIGATION AREA

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FIGURE
4

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Legend

- Approximate Site Boundary
- Existing Well
- Proposed Well Cluster
- Proposed Bedrock Well

MORGAN COUNTY LANDFILL
DECATUR, MORGAN COUNTY, ALABAMA

MONITORING WELL CLUSTERS

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FIGURE
5

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