Lexington-Fayette
Urban County Government

Request for Proposals

The Lexington-Fayette Urban County Government hereby requests proposals for **RFP #44-2023 Haley Pike Landfill Leachate Treatment System Improvements** to be provided in accordance with terms, conditions and specifications established herein.

Sealed proposals will be received through Ion Wave until **2:00 PM**, prevailing local time, on **October 19, 2023.** All forms and information requested in RFP must be included and attached in Response Attachments tab in Ion Wave.

Proposals received after the date and time set for opening proposals will not be accepted. It is the sole responsibility of the Proposer to assure that his/her proposal is submitted in Ion Wave before the date and time set for opening proposals.

Proposals, once submitted, may not be withdrawn for a period of one hundred twenty (120) calendar days.

The Lexington-Fayette Urban County Government reserves the right to reject any or all proposals, and to waive technicalities and informalities when such waiver is determined by the Lexington-Fayette Urban County Government to be in its best interest.

Signature of this proposal by the Proposer constitutes acceptance by the Proposer of terms, conditions and requirements set forth herein.

Minor exceptions may not eliminate the proposal. Any exceptions to the specifications established herein shall be listed in detail on a separate sheet and attached hereto. The Lexington-Fayette Urban County Government shall determine whether any exception is minor.

The Lexington-Fayette Urban County Government encourages the participation of minority- and women-owned businesses in Lexington-Fayette Urban County Government contracts. This proposal is subject to Affirmative Action requirements attached hereto.

There will be an optional informal walk-thru Oct 6, 2023, 2:00 pm. Meet at the scale house located at 4216 Hedger Ln, Lexington, KY. No questions will be entertained during this walk-thru, all questions must be sent through IonWave at https://lexingtonky.ionwave.net.

Please do not contact any LFUCG staff member or any other person involved in the selection process other than the designated contact person(s) regarding the project contemplated under this RFP while this RFP is open and a selection has not been finalized. Any attempt to do so may result in disqualification of the firm's submittal for consideration.

Laws and Regulations

All applicable state laws, municipal ordinances and regulations of all authorities having jurisdiction over the project shall apply to the contract, and shall be deemed to be incorporated herein by reference.

Equal Employment Opportunity

The Entity (regardless of whether construction contractor, non-construction contractor or supplier) agrees to provide equal opportunity in employment for all qualified persons, to prohibit discrimination in employment because of race, color, religion, sex (including pregnancy, sexual orientation or gender identity), national origin, disability, age, genetic information, political affiliation, or veteran status, and to promote equal employment through a positive, continuing program from itself and each of its sub-contracting agents. This program of equal employment opportunity shall apply to every aspect of its employment policies and practices.

Kentucky Equal Employment Opportunity Act

The Kentucky Equal Employment Opportunity Act of 1978 (KRS 45.560-45.640) requires that any "county, city, town, school district, water district, hospital district, or other political subdivision of the state shall include in directly or indirectly publicly funded contracts for supplies, materials, services, or equipment hereinafter entered into the following provisions:

"During the performance of this contract, the contractor agrees as follows:

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, or national origin;

(2) The contractor will state in all solicitations or advertisements for employees placed by or on behalf of the contractors that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, age, or national origin;

(3) The contractor will post notices in conspicuous places, available to employees and applicants for employment, setting forth the provision of the nondiscrimination clauses required by this section; and

(4) The contractor will send a notice to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding advising the labor union or workers' representative of the contractor's commitments under the nondiscrimination clauses."

The Act further provides:

"KRS 45.610. Hiring minorities -- Information required

(1) For the length of the contract, each contractor shall hire minorities from other sources within the drawing area, should the union with which he has collective

bargaining agreements be unwilling to supply sufficient minorities to satisfy the agreed upon goals and timetables.

(2) Each contractor shall, for the length of the contract, furnish such information as required by KRS 45.560 to KRS 45.640 and by such rules, regulations and orders issued pursuant thereto and will permit access to all books and records pertaining to his employment practices and work sites by the contracting agency and the department for purposes of investigation to ascertain compliance with KRS 45.560 to 45.640 and such rules, regulations and orders issued pursuant thereto.

KRS 45.620. Action against contractor -- Hiring of minority contractor or subcontractor

(1) If any contractor is found by the department to have engaged in an unlawful practice under this chapter during the course of performing under a contract or subcontract covered under KRS 45.560 to 45.640, the department shall so certify to the contracting agency and such certification shall be binding upon the contracting agency unless it is reversed in the course of judicial review.

(2) If the contractor is found to have committed an unlawful practice under KRS 45.560 to 45.640, the contracting agency may cancel or terminate the contract, conditioned upon a program for future compliance approved by the contracting agency and the department. The contracting agency may declare such a contractor ineligible to bid on further contracts with that agency until such time as the contractor complies in full with the requirements of KRS 45.560 to 45.640.

(3) The equal employment provisions of KRS 45.560 to 45.640 may be met in part by a contractor by subcontracting to a minority contractor or subcontractor. For the provisions of KRS 45.560 to 45.640, a minority contractor or subcontractor shall mean a business that is owned and controlled by one or more persons disadvantaged by racial or ethnic circumstances.

KRS 45.630 Termination of existing employee not required, when

Any provision of KRS 45.560 to 45.640 notwithstanding, no contractor shall be required to terminate an existing employee upon proof that employee was employed prior to the date of the contract.

KRS 45.640 Minimum skills

Nothing in KRS 45.560 to 45.640 shall require a contractor to hire anyone who fails to demonstrate the minimum skills required to perform a particular job."

It is recommended that all of the provisions above quoted be included as <u>special conditions</u> in each contract. In the case of a contract exceeding $250,000, the contractor is required to furnish evidence that his workforce in Kentucky is representative of the available work-force in the area from which he draws employees, or to supply an Affirmative Action plan which will achieve such representation during the life of the contract.

LFUCG Non-Appropriation Clause

Contractor acknowledges that the LFUCG is a governmental entity, and the contract validity is based upon the availability of public funding under the authority of its statutory mandate.

In the event that public funds are unavailable and not appropriated for the performance of the LFUCG's obligations under this contract, then this contract shall automatically expire without penalty to the LFUCG thirty (30) days after written notice to Contractor of the unavailability and non-appropriation of public funds. It is expressly agreed that the LFUCG shall not activate this non-appropriation provision for its convenience or to circumvent the requirements of this contract, but only as an emergency fiscal measure during a substantial fiscal crisis, which affects generally its governmental operations.

In the event of a change in the LFUCG's statutory authority, mandate and mandated functions, by state and federal legislative or regulatory action, which adversely affects the LFUCG's authority to continue its obligations under this contract, then this contract shall automatically terminate without penalty to the LFUCG upon written notice to Contractor of such limitation or change in the LFUCG's legal authority.

Contention Process

Vendors who respond to this invitation have the right to file a notice of contention associated with the RFP process or to file a notice of appeal of the recommendation made by the Director of Procurement resulting from this invitation.

Notice of contention with the RFP process must be filed within 3 business days of the bid/proposal opening by (1) sending a written notice, including sufficient documentation to support contention, to the Director of the Division of Procurement or (2) submitting a written request for a meeting with the Director of Procurement to explain his/her contention with the RFP process. After consulting with the Commissioner of Finance the Chief Administrative Officer and reviewing the documentation and/or hearing the vendor, the Director of Procurement shall promptly respond in writing findings as to the compliance with RFP processes. If, based on this review, a RFP process irregularity is deemed to have occurred the Director of Procurement will consult with the Commissioner of Finance, the Chief Administrative Officer and the Department of Law as to the appropriate remedy.

Notice of appeal of a RFP recommendation must be filed within 3 business days of the RFP recommendation by (1) sending a written notice, including sufficient documentation to support appeal, to the Director, Division of Procurement or (2) submitting a written request for a meeting with the Director of Procurement to explain his appeal. After reviewing the documentation and/or hearing the vendor and consulting with the Commissioner of Finance and the Chief Administrative Officer, the Director of Procurement shall in writing, affirm or withdraw the recommendation.

AMERICAN RESCUE PLAN ACT

AMENDMENT 1 — CERTIFICATION OF COMPLIANCE FOR EXPENDITURES USING FEDERAL FUNDS, INCLUDING THE AMERICAN RESCUE PLAN ACT

The Lexington-Fayette Urban County Government ("LFUCG") may use Federal funding to pay for the goods and/or services that are the subject matter of this bid. That Federal funding may include funds received by LFUCG under the American Rescue Plan Act of 2021. Expenditures using Federal funds require evidence of the contractor's compliance with Federal law. Therefore, by the signature below of an authorized company representative, you certify that the information below is understood, agreed, and correct. Any misrepresentations may result in the termination of the contract and/or prosecution under applicable Federal and State laws concerning false statements and false claims.

The bidder (hereafter "bidder," or "contractor") agrees and understands that in addition to all conditions stated within the attached bid documents, the following conditions will also apply to any Agreement entered between bidder and LFUCG, if LFUCG uses Federal funds, including but not limited to funding received by LFUCG under the American Rescue Plan Act ("ARPA"), toward payment of goods and/or services referenced in this bid. The bidder also agrees and understands that if there is a conflict between the terms included elsewhere in this Request for Proposal and the terms of this Amendment 1, then the terms of Amendment 1 shall control. The bidder further certifies that it can and will comply with these conditions, if this bid is accepted and an Agreement is executed:

1. Any Agreement executed as a result of acceptance of this bid may be governed in accordance with 2 CFR Part 200 and all other applicable Federal law and regulations and guidance issued by the U.S. Department of the Treasury.

2. Pursuant to 24 CFR ∫ 85.43, any Agreement executed as a result of acceptance of this bid can be terminated if the contractor fails to comply with any term of the award. This Agreement may be terminated for convenience in accordance with 24 CFR ∫ 85.44 upon written notice by LFUCG. Either party may terminate this Agreement with thirty (30) days written notice to the other party, in which case the Agreement shall terminate on the thirtieth day. In the event of termination, the contractor shall be entitled to that portion of total compensation due under this Agreement as the services rendered bears to the services required. However, if LFUCG suspects a breach of the terms of the Agreement and/or that the contractor is violating the terms of any applicable law governing the use of Federal funds, LFUCG may suspend the contractor's ability to receive payment by giving thirty (30) days' advance written notice. Further, either party may terminate this Agreement for cause shown with thirty (30) days written notice, which shall explain the party's cause for the termination. If the parties do not reach a settlement before the end of the 30 days, then the Agreement shall terminate on the thirtieth day. In the event of a breach, LFUCG reserves the right to pursue any and all applicable legal, equitable, and/or administrative remedies against the contractor.

3. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

(1) Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and

applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

(4) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(6) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part, and the contractor may be declared ineligible for further government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(8) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance.

Provided, however, that in the event a contractor becomes involved in or is threatened with litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

4. If fulfillment of the contract requires the contractor to employ mechanic’s or laborers, the contractor further agrees that it can and will comply with the following:

(1) *Overtime requirements: No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such a workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such a workweek.*

(2) *Violation: liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.*

(3) *Withholding for unpaid wages and liquidated damages. LFUCG shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.*

(4) *Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower-tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower-tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section.*

5. The contractor shall comply with all applicable standards, orders, or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq.

6. The contractor shall report each violation to LFUCG and understands and agrees that LFUCG will, in turn, report each violation as required to assure notification to the Treasury Department and the appropriate Environmental Protection Agency Regional Office.

7. The contractor shall include these requirements in numerical paragraphs 5 and 6 in each subcontract exceeding $100,000 financed in whole or in part with Federal funding.

8. The contractor shall comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. § 1251 et seq.

9. The contractor shall report each violation to LFUCG and understands and agrees that LFUCG will, in turn, report each violation as required to assure notification to the Treasury Department and the appropriate Environmental Protection Agency Regional Office.

10. The contractor shall include these requirements in numerical paragraphs 8 and 9 in each subcontract exceeding $100,000 financed in whole or in part with Federal funds.

11. The contractor shall comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. § 1251 et seq.

12. The contractor shall report each violation to LFUCG and understands and agrees that LFUCG will, in turn, report each violation as required to assure notification to the Treasury Department and the appropriate Environmental Protection Agency regional office.

13. The contractor shall include these requirements in numerical paragraphs 11 and 12 in each subcontract exceeding $100,000 financed in whole or in part with American Rescue Plan Act funds.

14. The contractor shall include this language in any subcontract it executes to fulfill the terms of this bid: "the sub-grantee, contractor, subcontractor, successor, transferee, and assignee shall comply with Title VI of the Civil Rights Act of 1964, which prohibits recipients of federal financial assistance from excluding from a program or activity, denying benefits of, or otherwise discriminating against a person on the basis of race, color, or national origin (42 U.S.C. § 2000d et seq.), as implemented by the Department of the Treasury's Title VI regulations, 31 CFR Part 22, which are herein incorporated by reference and made a part of this contract (or agreement). Title VI also includes protection to persons with 'Limited English Proficiency' in any program or activity receiving federal financial assistance, 42 U.S.C. § 2000d et seq., as implemented by the Department of the Treasury's Title VI regulations, 31 CFR Part 22, and herein incorporated by reference and made a part of this contract or agreement."

15. Contractors who apply or bid for an award of $100,000 or more shall file the required certification that it will not and has not used federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency. Each tier certifies to the tier above that it will not and has not used federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-federal funds that takes place in connection with obtaining any federal award. Such disclosures are forwarded from tier to tier, up to the recipient. The required certification is included here:

a. The undersigned certifies, to the best of his or her knowledge and belief, that:
    (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
    (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
    (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.
b. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

16. The contractor acknowledges and certifies that it has not been debarred or suspended and further acknowledges and agrees that it must comply with regulations regarding debarred or suspended entities in accordance with 24 CFR § 570.489(l). Funds may not be provided to excluded or disqualified persons.

17. The contractor agrees and certifies that to the greatest extent practicable, it will prefer the purchase, acquisition, and use of all applicable goods, products or materials produced in the United States, in

conformity with 2 CFR 200.322 and/or section 70914 of Public Law No. 117-58, §§ 70901-52, also known as the Infrastructure Investment and Jobs Act, whichever is applicable.

18. The contractor agrees and certifies that all activities performed pursuant to any Agreement entered as a result of the contractor's bid, and all goods and services procured under that Agreement, shall comply with 2 C.F.R. § 200.216 (Prohibition on certain telecommunications and video surveillance services and equipment) and 2 C.F.R. 200 § 200..323 (Procurement of recovered materials), to the extent either section is applicable.

19. If this bid involves construction work for a project totaling $10 million or more, then the contractor further agrees that all laborers and mechanics, etc., employed in the construction of the public facility project assisted with funds provided under this Agreement, whether employed by contractor, or contractor's contractors, or subcontractors, shall be paid wages complying with the Davis-Bacon Act (40 U.S.C. 3141-3144). Contractor agrees that all of contractor's contractors and subcontractors will pay laborers and mechanics the prevailing wage as determined by the Secretary of Labor and that said laborers and mechanics will be paid not less than once a week. The contractor agrees to comply with the Copeland Anti- Kick Back Act (18 U.S.C. § 874) and its implementing regulations of the U.S. Department of Labor at 29 CFR part 3 and part 5. The contractor further agrees to comply with the applicable provisions of the Contract Work Hours and Safety Standards Act (40 U.S.C. Section 327-333), and the applicable provisions of the Fair Labor Standards Act of 1938, as amended (29 U.S.C. et seq.). Contractor further agrees that it will report all suspected or reported violations of any of the laws identified in this paragraph to LFUCG.

_____ _____

Signature Date

SELECTION CRITERIA:

EVALUATION CRITERIA	POINTS POSSIBLE
Qualifications	25 points possible
Past Performance	25 points possible
Proposal / Project Approach	25 points possible
Degree of Local Employment	20 points possible
Cost	5 points possible
Total points possible	**100 points possible**

Proposals shall contain the appropriate information necessary to evaluate based on these criteria. A committee composed of government employees as well as representatives of relevant user groups will evaluate the proposals.

Questions shall be submitted via IonWave at: https://lexingtonky.ionwave.net

Affirmative Action Plan

All vendors must submit as a part of the proposal package the following items to the Urban County Government:

1. Affirmative Action Plan for his/her firm;
2. Current Work Force Analysis Form;

Failure to submit these items as required may result in disqualification of the submitter from award of the contract.

AFFIDAVIT

Comes the Affiant, _____, and after being first duly sworn, states under penalty of perjury as follows:

1. His/her name is _____ and he/she is the individual submitting the proposal or is the authorized representative of_____, the entity submitting the proposal (hereinafter referred to as "Proposer").

2. Proposer will pay all taxes and fees, which are owed to the Lexington-Fayette Urban County Government at the time the proposal is submitted, prior to award of the contract and will maintain a "current" status in regard to those taxes and fees during the life of the contract.

3. Proposer will obtain a Lexington-Fayette Urban County Government business license, if applicable, prior to award of the contract.

4. Proposer has authorized the Division of Procurement to verify the above-mentioned information with the Division of Revenue and to disclose to the Urban County Council that taxes and/or fees are delinquent or that a business license has not been obtained.

5. Proposer has not knowingly violated any provision of the campaign finance laws of the Commonwealth of Kentucky within the past five (5) years and the award of a contract to the Proposer will not violate any provision of the campaign finance laws of the Commonwealth.

6. Proposer has not knowingly violated any provision of Chapter 25 of the Lexington-Fayette Urban County Government Code of Ordinances, known as "Ethics Act."

Continued on next page

7. Proposer acknowledges that "knowingly" for purposes of this Affidavit means, with respect to conduct or to circumstances described by a statute or ordinance defining an offense, that a person is aware or should have been aware that his conduct is of that nature or that the circumstance exists.

Further, Affiant sayeth naught.

_____

STATE OF _____

COUNTY OF _____

The foregoing instrument was subscribed, sworn to and acknowledged before me

by _____ on this the _____ day

of _____, 20__.

My Commission expires: _____

_____
NOTARY PUBLIC, STATE AT LARGE

EQUAL OPPORTUNITY AGREEMENT

Standard Title VI Assurance

The Lexington Fayette-Urban County Government, (hereinafter referred to as the "Recipient") hereby agrees that as a condition to receiving any Federal financial assistance from the U.S. Department of Transportation, it will comply with Title VI of the Civil Rights Act of 1964, 78Stat.252, 42 U.S.C. 2000d-4 (hereinafter referred to as the "Act"), and all requirements imposed by or pursuant to Title 49, Code of Federal Regulations, U.S. Department of Transportation, Subtitle A, Office of the Secretary, (49 CFR, Part 21) Nondiscrimination in Federally Assisted Program of the Department of Transportation – Effectuation of Title VI of the Civil Rights Act of 1964 (hereinafter referred to as the "Regulations") and other pertinent directives, no person in the United States shall, on the grounds of race, color, national origin, sex, age (over 40), religion, sexual orientation, gender identity, veteran status, or disability be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Recipient receives Federal financial assistance from the U.S. Department of Transportation, including the Federal Highway Administration, and hereby gives assurance that will promptly take any necessary measures to effectuate this agreement. This assurance is required by subsection 21.7(a) (1) of the Regulations.

The Law

- Title VII of the Civil Rights Act of 1964 (amended 1972) states that it is unlawful for an employer to discriminate in employment because of race, color, religion, sex, age (40-70 years) or national origin.

- Executive Order No. 11246 on Nondiscrimination under Federal contract prohibits employment discrimination by contractor and sub-contractor doing business with the Federal Government or recipients of Federal funds. This order was later amended by Executive Order No. 11375 to prohibit discrimination on the basis of sex.

- Section 503 of the Rehabilitation Act of 1973 states:

  The Contractor will not discriminate against any employee or applicant for employment because of physical or mental handicap.

- Section 2012 of the Vietnam Era Veterans Readjustment Act of 1973 requires Affirmative Action on behalf of disabled veterans and veterans of the Vietnam Era by contractors having Federal contracts.

- Section 206(A) of Executive Order 12086, Consolidation of Contract Compliance Functions for Equal Employment Opportunity, states:

  The Secretary of Labor may investigate the employment practices of any Government contractor or sub-contractor to determine whether or not the contractual provisions specified in Section 202 of this order have been violated.

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The Lexington-Fayette Urban County Government practices Equal Opportunity in recruiting, hiring and promoting. It is the Government's intent to affirmatively provide employment opportunities for those individuals who have previously not been allowed to enter into the mainstream of society. Because of its importance to the local Government, this policy carries the full endorsement of the Mayor, Commissioners, Directors and all supervisory personnel. In following this commitment to Equal Employment Opportunity and because the Government is the benefactor of the Federal funds, it is both against the Urban County Government policy and illegal for the Government to let contracts to companies which knowingly or unknowingly practice discrimination in their employment practices. Violation of the above mentioned ordinances may cause a contract to be canceled and the contractors may be declared ineligible for future consideration.

Please sign this statement in the appropriate space acknowledging that you have read and understand the provisions contained herein. Return this document as part of your application packet.

Bidders

I/We agree to comply with the Civil Rights Laws listed above that govern employment rights of minorities, women, Vietnam veterans, handicapped and aged persons.

_____ _____

Signature *Name of Business*

WORKFORCE ANALYSIS FORM

Name of Organization: _____

Categories	**Total**	White (Not Hispanic or Latino)		Hispanic or Latino		Black or African-American (Not Hispanic or Latino		Native Hawaiian and Other Pacific Islander (Not Hispanic or Latino		Asian (Not Hispanic or Latino		American Indian or Alaskan Native (not Hispanic or Latino		Two or more races (Not Hispanic or Latino		**Total**	
		M	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Administrators																	
Professionals																	
Superintendents																	
Supervisors																	
Foremen																	
Technicians																	
Protective																	
Para-																	
Office/Clerical																	
Skilled Craft																	
Service/Maintena																	
Total:																	

Prepared by: _____Date: _____/_____/_____

(Name and Title)

Revised 2015-Dec-15

DIRECTOR, DIVISION OF PROCUREMENT
LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT
200 EAST MAIN STREET
LEXINGTON, KENTUCKY 40507

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITIES AND DBE CONTRACT PARTICIPATION

Notice of requirement for Affirmative Action to ensure Equal Employment Opportunities and Disadvantaged Business Enterprises (DBE) Contract participation. Disadvantaged Business Enterprises (DBE) consists of Minority-Owned Business Enterprises (MBE) and Woman-Owned Business Enterprises (WBE).

The Lexington-Fayette Urban County Government has set a goal that not less than ten percent (10%) of the total value of this Contract be subcontracted to Disadvantaged Business Enterprises, which is made up of MBEs and WBEs. The Lexington Fayette Urban County Government also has set a goal that not less than three percent (3%) of the total value of this Contract be subcontracted to Veteran-owned Small Businesses. The goal for the utilization of Disadvantaged Business Enterprises as well Veteran –owned Small Businesses as subcontractors is a recommended goal. Contractor(s) who fail to meet such goal will be expected to provide written explanations to the Director of the Division of Purchasing of efforts they have made to accomplish the recommended goal, and the extent to which they are successful in accomplishing the recommended goal will be a consideration in the procurement process. Depending on the funding source, other DBE goals may apply.

For assistance in locating Disadvantaged Business Enterprises Subcontractors contact:

Sherita Miller, MPA, Division of Procurement
Lexington-Fayette Urban County Government
200 East Main Street, 3rd Floor, Room 338
Lexington, Kentucky 40507
smiller@lexingtonky.gov

Firm Submitting Proposal: _____

Complete Address: _____
Street City Zip

Contact Name: _____ Title: _____

Telephone Number: _____ Fax Number: _____

Email address: _____

Lexington-Fayette Urban County Government
MWDBE PARTICIPATION GOALS

A. GENERAL

1) The LFUCG request all potential contractors to make a concerted effort to include Minority-Owned (MBE), Woman-Owned (WBE), Disadvantaged (DBE) Business Enterprises and Veteran-Owned Small Businesses (VOSB) as subcontractors or suppliers in their bids.

2) Toward that end, the LFUCG has established 10% of total procurement costs as a Goal for participation of Minority-Owned, Woman-Owned and Disadvantaged Businesses on this contract.

3) **It is therefore a request of each Bidder to include in its bid, the same goal (10%) for MWDBE participation and other requirements as outlined in this section.**

4) The LFUCG has also established a 3% of total procurement costs as a Goal for participation for of Veteran-Owned Businesses.

5) **It is therefore a request of each Bidder to include in its bid, the same goal (3%) for Veteran-Owned participation and other requirements as outlined in this section.**

B. PROCEDURES

1) The successful bidder will be required to report to the LFUCG, the dollar amounts of all payments submitted to Minority-Owned, Woman-Owned or Veteran-Owned subcontractors and suppliers for work done or materials purchased for this contract. (See Subcontractor Monthly Payment Report)

2) Replacement of a Minority-Owned, Woman-Owned or Veteran-Owned subcontractor or supplier listed in the original submittal must be requested in writing and must be accompanied by documentation of Good Faith Efforts to replace the subcontractor / supplier with another MWDBE Firm; this is subject to approval by the LFUCG. (See LFUCG MWDBE Substitution Form)

3) For assistance in identifying qualified, certified businesses to solicit for potential contracting opportunities, bidders may contact:

    a) The Lexington-Fayette Urban County Government, Division of Procurement (859-258-3320)

4) The LFUCG will make every effort to notify interested MWDBE and Veteran-Owned subcontractors and suppliers of each Bid Package, including information on the scope of work, the pre-bid meeting time and location, the bid date, and all other pertinent information regarding the project.

C. DEFINITIONS

1) A Minority-Owned Business Enterprise (MBE) is defined as a business which is certified as being at least 51% owned, managed and controlled by persons of African American, Hispanic, Asian, Pacific Islander, American Indian or Alaskan Native Heritage.

2) A Woman-Owned Business Enterprise (WBE) is defined as a business which is certified as being at least 51% owned, managed and controlled by one or more women.

3) A Disadvantaged Business (DBE) is defined as a business which is certified as being at least 51% owned, managed and controlled by a person(s) that are economically and socially disadvantaged.

4) A Veteran-Owned Small Business (VOSB) is defined as a business which is certified as being at least 51% owned, managed and controlled by a veteran and/or a service disabled veteran.

5) Good Faith Efforts are efforts that, given all relevant circumstances, a bidder or proposer actively and aggressively seeking to meet the goals, can reasonably be expected to make. In evaluating good faith efforts made toward achieving the goals, whether the bidder or proposer has performed the efforts outlined in the Obligations of Bidder for Good Faith Efforts outlined in this document will be considered, along with any other relevant factors.

D. OBLIGATION OF BIDDER FOR GOOD FAITH EFFORTS

1) **The bidder shall make a Good Faith Effort to achieve the Participation Goal for MWDBE and Veteran-Owned subcontractors/suppliers. The failure to meet the goal shall not necessarily be cause for disqualification of the bidder; however, bidders not meeting the goal are required to furnish with their bids written documentation of their Good Faith Efforts to do so.**

2) Award of Contract shall be conditioned upon satisfaction of the requirements set forth herein.

3) The Form of Proposal includes a section entitled "MWDBE Participation Form". The applicable information must be completed and submitted as outlined below.

4) **Failure to submit this information as requested may be cause for rejection of bid or delay in contract award.**

E. DOCUMENTATION REQUIRED FOR GOOD FAITH EFFORTS

1) Bidders reaching the Goal are required to submit only the MWDBE Participation Form." The form must be fully completed including names and telephone number of participating MWDBE firm(s); type of work to be performed; estimated value of the contract and value expressed as a percentage of the total Lump Sum Bid Price. The form must be signed and dated, and is to be submitted with the bid.

2) Bidders not reaching the Goal must submit the "MWDBE Participation Form", the "Quote Summary Form" and a written statement documenting their Good Faith Effort to do so. If bid includes no MWDBE and/or Veteran participation, bidder shall enter "None" on the subcontractor / supplier form). In addition, the bidder must submit written proof of their Good Faith Efforts to meet the Participation Goal:

   a. Advertised opportunities to participate in the contract in at least two (2) publications of general circulation media; trade and professional association publications; small and minority business or trade publications; and publications or trades targeting minority, women and disadvantaged businesses not less than fifteen (15) days prior to the deadline for submission of bids to allow MWDBE firms and Veteran-Owned businesses to participate.

   b. Included documentation of advertising in the above publications with the bidders good faith efforts package

c. Attended LFUCG Procurement Economic Inclusion Outreach event

d. Attended pre-bid meetings that were scheduled by LFUCG to inform MWDBEs and/or Veteran-Owned businesses of subcontracting opportunities

e. Sponsored Economic Inclusion event to provide networking opportunities for prime contractors and MWDBE firms and Veteran-Owned businesses.

f. Requested a list of MWDBE and/or Veteran subcontractors or suppliers from LFUCG and showed evidence of contacting the companies on the list(s).

g. Contacted organizations that work with MWDBE companies for assistance in finding certified MWBDE firms and Veteran-Owned businesses to work on this project. Those contacted and their responses should be a part of the bidder's good faith efforts documentation.

d. Sent written notices, by certified mail, email or facsimile, to qualified, certified MWDBEs and/or Veteran-Owned businesses soliciting their participation in the contract not less than seven (7) days prior to the deadline for submission of bids to allow them to participate effectively.

e. Followed up initial solicitations by contacting MWDBEs and Veteran-Owned Businesses to determine their level of interest.

j. Provided the interested MWBDE firm and/or Veteran-Owned business with adequate and timely information about the plans, specifications, and requirements of the contract.

k. Selected portions of the work to be performed by MWDBE firms and/or Veteran-Owned businesses in order to increase the likelihood of meeting the contract goals. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate MWDBE and Veteran participation, even when the prime contractor may otherwise perform these work items with its own workforce

l. Negotiated in good faith with interested MWDBE firms and Veteran-Owned businesses not rejecting them as unqualified without sound reasons based on a thorough investigation of their capabilities. Any rejection should be so noted in writing with a description as to why an agreement could not be reached.

m. Included documentation of quotations received from interested MWDBE firms and Veteran-Owned businesses which were not used due to uncompetitive pricing or were rejected as unacceptable and/or copies of responses from firms indicating that they would not be submitting a bid.

n. Bidder has to submit sound reasons why the quotations were considered unacceptable. The fact that the bidder has the ability and/or desire to perform the contract work with its own forces will not be considered a sound reason for rejecting a MWDBE and/or Veteran-Owned business's quote. Nothing in this provision shall be construed to require the bidder to accept unreasonable quotes in order to satisfy MWDBE and Veteran goals.

o. Made an effort to offer assistance to or refer interested MWDBE firms and Veteran-Owned businesses to obtain the necessary equipment, supplies, materials, insurance and/or bonding to satisfy the work requirements of the bid proposal

p. Made efforts to expand the search for MWBE firms and Veteran-Owned businesses beyond the usual geographic boundaries.

q. Other--any other evidence that the bidder submits which may show that the bidder has made reasonable good faith efforts to include MWDBE and Veteran participation.

Note: Failure to submit any of the documentation requested in this section may be cause for rejection of bid. Bidders may include any other documentation deemed relevant to this requirement which is subject to review by the MBE Liaison. Documentation of Good Faith Efforts must be submitted with the Bid, if the participation Goal is not met.

MINORITY BUSINESS ENTERPRISE PROGRAM

Sherita Miller, MPA
Minority Business Enterprise Liaison
Division of Procurement
Lexington-Fayette Urban County Government
200 East Main Street
Lexington, KY 40507
smiller@lexingtonky.gov
859-258-3323

OUR MISSION: The mission of the Minority Business Enterprise Program is to facilitate the full participation of minority and women owned businesses in the procurement process and to promote economic inclusion as a business imperative essential to the long term economic viability of Lexington-Fayette Urban County Government.

To that end the city council adopted and implemented Resolution 484-2017 – A Certified Minority, Women and Disadvantaged Business Enterprise ten percent (10%) minimum goal and a three (3%) minimum goal for Certified Veteran-Owned Small Businesses and Certified Service Disabled Veteran – Owned Businesses for government contracts.

The resolution states the following definitions shall be used for the purposes of reaching these goals (a full copy is available in Procurement):

Certified Disadvantaged Business Enterprise (DBE) *– a business in which at least fifty-one percent (51%) is owned, managed and controlled by a person(s) who is socially and economically disadvantaged as define by 49 CFR subpart 26.*

Certified Minority Business Enterprise (MBE) *– a business in which at least fifty-one percent (51%) is owned, managed and controlled by an ethnic minority (i.e. African American, Asian American/Pacific Islander, Hispanic Islander, Native American/Native Alaskan Indian) as defined in federal law or regulation as it may be amended from time-to-time.*

Certified Women Business Enterprise (WBE) *– a business in which at least fifty-one percent (51%) is owned, managed and controlled by a woman.*

Certified Veteran-Owned Small Business (VOSB) *– a business in which at least fifty-one percent (51%) is owned, managed and controlled by a veteran who served on active duty with the U.S. Army, Air Force, Navy, Marines or Coast Guard.*

Certified Service Disabled Veteran Owned Small Business (SDVOSB) *– a business in which at least fifty-one percent (51%) is owned, managed and controlled by a disabled veteran who served on active duty with the U.S. Army, Air Force, Navy, Marines or Coast Guard.*

The term "Certified" shall mean the business is appropriately certified, licensed, verified, or validated by an organization or entity recognized by the Division of Purchasing as having the appropriate credentials to make a determination as to the status of the business.

We have compiled the list below to help you locate certified MBE, WBE and DBE certified businesses. Below is a listing of contacts for LFUCG Certified MWDBEs and Veteran-Owned Small Businesses in (https://lexingtonky.ionwave.net)

Business	Contact	Email Address	Phone
LFUCG	Sherita Miller	smiller@lexingtonky.gov	859-258-3323
Commerce Lexington – Minority Business Development	Tyrone Tyra	ttyra@commercelexington.com	859-226-1625
Tri-State Minority Supplier Diversity Council	Susan Marston	smarston@tsmsdc.com	502-365-9762
Small Business Development Council	Shawn Rogers UK SBDC	shawn.rogers@uky.edu	859-257-7666
Community Ventures Corporation	Phyllis Alcorn	palcorn@cvky.org	859-231-0054
KY Transportation Cabinet (KYTC)	Melvin Bynes	Melvin.bynes2@ky.gov	502-564-3601
KYTC Pre-Qualification	Shella Eagle	Shella.Eagle@ky.gov	502-782-4815
Ohio River Valley Women's Business Council (WBENC)	Sheila Mixon	smixon@orvwbc.org	513-487-6537
Kentucky MWBE Certification Program	Yvette Smith, Kentucky Finance Cabinet	Yvette.Smith@ky.gov	502-564-8099
National Women Business Owner's Council (NWBOC)	Janet Harris-Lange	janet@nwboc.org	800-675-5066
Small Business Administration	Robert Coffey	robertcoffey@sba.gov	502-582-5971
LaVoz de Kentucky	Andres Cruz	lavozdeky@yahoo.com	859-621-2106
The Key News Journal	Patrice Muhammad	production@keynewsjournal.com	859-685-8488

LFUCG MWDBE PARTICIPATION FORM
Bid/RFP/Quote Reference #_____

The MWDBE and/or veteran subcontractors listed have agreed to participate on this Bid/RFP/Quote. If any substitution is made or the total value of the work is changed prior to or after the job is in progress, it is understood that those substitutions must be submitted to Procurement for approval immediately. **Failure to submit a completed form may cause rejection of the bid.**

MWDBE Company, Name, Address, Phone, Email	MBE WBE or DBE	Work to be Performed	Total Dollar Value of the Work	% Value of Total Contract
1.				
2.				
3.				
4.				

The undersigned company representative submits the above list of MWDBE firms to be used in accomplishing the work contained in this Bid/RFP/Quote. Any misrepresentation may result in the termination of the contract and/or be subject to applicable Federal and State laws concerning false statements and false claims.

_____ _____

Company **Company Representative**

_____ _____

Date **Title**

LFUCG MWDBE SUBSTITUTION FORM
Bid/RFP/Quote Reference #_____

The substituted MWDBE and/or veteran subcontractors listed below have agreed to participate on this Bid/RFP/Quote. These substitutions were made prior to or after the job was in progress. These substitutions were made for reasons stated below and are now being submitted to Procurement for approval. By the authorized signature of a representative of our company, we understand that this information will be entered into our file for this project.

SUBSTITUTED MWDBE Company Name, Address, Phone, Email	MWDBE Formally Contracted/ Name, Address, Phone, Email	Work to Be Performed	Reason for the Substitution	Total Dollar Value of the Work	% Value of Total Contract
1.					
2.					
3.					
4.					

The undersigned acknowledges that any misrepresentation may result in termination of the contract and/or be subject to applicable Federal and State laws concerning false statements and false claims.

_____ _____

Company **Company Representative**

_____ _____

Date **Title**

MWDBE QUOTE SUMMARY FORM
Bid/RFP/Quote Reference #_____

The undersigned acknowledges that the minority and/or veteran subcontractors listed on this form did submit a quote to participate on this project. Failure to submit this form may cause rejection of the bid.

Company Name	**Contact Person**
Address/Phone/Email	**Bid Package / Bid Date**

MWDBE Company Addres	**Contact Person**	**Contact Information (work phone, Email, cell)**	**Date Contacted**	**Services to be performed**	**Method of Communication (email, phone meeting, ad, event etc)**	**Total dollars $$ Do Not Leave Blank (Attach Documentation)**	**MBE * AA HA AS NA Female**	**Veteran**

(MBE designation / AA=African American / HA= Hispanic American/AS = Asian American/Pacific Islander/ NA= Native American)

The undersigned acknowledges that all information is accurate. Any misrepresentation may result in termination of the contract and/or be subject to applicable Federal and State laws concerning false statements and claims.

_____ _____
Company **Company Representative**

_____ _____
Date **Title**

LFUCG SUBCONTRACTOR MONTHLY PAYMENT REPORT

The LFUCG has a 10% goal plan adopted by city council to increase the participation of minority and women owned businesses in the procurement process. The LFUCG also has a 3% goal plan adopted by cited council to increase the participation of veteran owned businesses in the procurement process. In order to measure that goal LFUCG will track spending with MWDBE and Veteran contractors on a monthly basis. By the signature below of an authorized company representative, you certify that the information is correct, and that each of the representations set forth below is true. Any misrepresentation may result in termination of the contract and/or prosecution under applicable Federal and State laws concerning false statements and false claims. Please submit this form monthly to the Division of Procurement/ 200 East Main Street / Room 338 / Lexington, KY 40507.

Bid/RFP/Quote #_____
Total Contract Amount Awarded to Prime Contractor for this Project_____

Project Name/ Contract #	**Work Period/ From: To:**
Company Name:	**Address:**
Federal Tax ID:	**Contact Person:**

Subcontractor Vendor ID (name, address, phone, email	Description of Work	Total Subcontract Amount	% of Total Contract Awarded to Prime for this Project	Total Amount Paid for this Period	Purchase Order number for subcontractor work (please attach PO)	Scheduled Project Start Date	Scheduled Project End Date

By the signature below of an authorized company representative, you certify that the information is correct, and that each of the representations set forth below is true. Any misrepresentations may result in the termination of the contract and/or prosecution under applicable Federal and State laws concerning false statements and false claims.

_____ _____
Company **Company Representative**

_____ _____
Date **Title**

LFUCG STATEMENT OF GOOD FAITH EFFORTS
Bid/RFP/Quote #_____

By the signature below of an authorized company representative, we certify that we have utilized the following Good Faith Efforts to obtain the maximum participation by MWDBE and Veteran-Owned business enterprises on the project and can supply the appropriate documentation.

_____ Advertised opportunities to participate in the contract in at least two (2) publications of general circulation media; trade and professional association publications; small and minority business or trade publications; and publications or trades targeting minority, women and disadvantaged businesses not less than fifteen (15) days prior to the deadline for submission of bids to allow MWDBE firms and Veteran-Owned businesses to participate.

_____ Included documentation of advertising in the above publications with the bidders good faith efforts package

_____ Attended LFUCG Procurement Economic Inclusion Outreach event

_____ Attended pre-bid meetings that were scheduled by LFUCG to inform MWDBEs and/or Veteran-Owned Businesses of subcontracting opportunities

_____ Sponsored Economic Inclusion event to provide networking opportunities for prime contractors and MWDBE firms and Veteran-Owned businesses

_____ Requested a list of MWDBE and/or Veteran subcontractors or suppliers from LFUCG and showed evidence of contacting the companies on the list(s).

_____ Contacted organizations that work with MWDBE companies for assistance in finding certified MWBDE firms and Veteran-Owned businesses to work on this project. Those contacted and their responses should be a part of the bidder's good faith efforts documentation.

_____Sent written notices, by certified mail, email or facsimile, to qualified, certified MWDBEs soliciting their participation in the contract not less than seven (7) days prior to the deadline for submission of bids to allow them to participate effectively.

_____ Followed up initial solicitations by contacting MWDBEs and Veteran-Owned businesses to determine their level of interest.

_____ Provided the interested MWBDE firm and/or Veteran-Owned business with adequate and timely information about the plans, specifications, and requirements of the contract.

_____ Selected portions of the work to be performed by MWDBE firms and/or Veteran-Owned businesses in order to increase the likelihood of meeting the contract goals. This includes, where appropriate, breaking out contract work items

into economically feasible units to facilitate MWDBE and Veteran participation, even when the prime contractor may otherwise perform these work items with its own workforce

_____ Negotiated in good faith with interested MWDBE firms and Veteran-Owned businesses not rejecting them as unqualified without sound reasons based on a thorough investigation of their capabilities. Any rejection should be so noted in writing with a description as to why an agreement could not be reached.

_____ Included documentation of quotations received from interested MWDBE firms and Veteran-Owned businesses which were not used due to uncompetitive pricing or were rejected as unacceptable and/or copies of responses from firms indicating that they would not be submitting a bid.

_____ Bidder has to submit sound reasons why the quotations were considered unacceptable. The fact that the bidder has the ability and/or desire to perform the contract work with its own forces will not be considered a sound reason for rejecting a MWDBE and/or Veteran-Owned business's quote. Nothing in this provision shall be construed to require the bidder to accept unreasonable quotes in order to satisfy MWDBE and Veteran goals.

_____ Made an effort to offer assistance to or refer interested MWDBE firms and Veteran-Owned businesses to obtain the necessary equipment, supplies, materials, insurance and/or bonding to satisfy the work requirements of the bid proposal

_____Made efforts to expand the search for MWBE firms and Veteran-Owned businesses beyond the usual geographic boundaries.

_____ Other--any other evidence that the bidder submits which may show that the bidder has made reasonable good faith efforts to include MWDBE **and Veteran participation.**

NOTE: **Failure to submit any of the documentation requested in this section may be cause for rejection of bid. Bidders may include any other documentation deemed relevant to this requirement which is subject to approval by the MBE Liaison. Documentation of Good Faith Efforts must be submitted with the Bid, if the participation Goal is not met.**

The undersigned acknowledges that all information is accurate. Any misrepresentations may result in termination of the contract and/or be subject to applicable Federal and State laws concerning false statements and claims.

_____	_____
Company	**Company Representative**
_____	_____
Date	**Title**

GENERAL PROVISIONS

1. Each Respondent shall comply with all Federal, State & Local regulations concerning this type of service or good.

   The Respondent agrees to comply with all statutes, rules, and regulations governing safe and healthful working conditions, including the Occupational Health and Safety Act of 1970, *29 U.S.C. 650 et. seq.*, as amended, and KRS Chapter 338. The Respondent also agrees to notify the LFUCG in writing immediately upon detection of any unsafe and/or unhealthful working conditions at the job site. The Respondent agrees to indemnify, defend and hold the LFUCG harmless from all penalties, fines or other expenses arising out of the alleged violation of said laws.

2. Failure to submit ALL forms and information required in this RFP may be grounds for disqualification.

3. Addenda: All addenda and IonWave Q&A, if any, shall be considered in making the proposal, and such addenda shall be made a part of this RFP. Before submitting a proposal, it is incumbent upon each proposer to be informed as to whether any addenda have been issued, and the failure to cover in the bid any such addenda may result in disqualification of that proposal.

4. Proposal Reservations: LFUCG reserves the right to reject any or all proposals, to award in whole or part, and to waive minor immaterial defects in proposals. LFUCG may consider any alternative proposal that meets its basic needs.

5. Liability: LFUCG is not responsible for any cost incurred by a Respondent in the preparation of proposals.

6. Changes/Alterations: Respondent may change or withdraw a proposal at any time prior to the opening; however, no oral modifications will be allowed. Only letters, or other formal written requests for modifications or corrections of a previously submitted proposal which is addressed in the same manner as the proposal, and received by LFUCG prior to the scheduled closing time for receipt of proposals, will be accepted. The proposal, when opened, will then be corrected in accordance with such written request(s), provided that the written request is contained in a sealed envelope which is plainly marked “modifications of proposal”.

7. Clarification of Submittal: LFUCG reserves the right to obtain clarification of any point in a bid or to obtain additional information from a Respondent.

8. Bribery Clause: By his/her signature on the bid, Respondent certifies that no employee of his/hers, any affiliate or Subcontractor, has bribed or attempted to bribe an officer or employee of the LFUCG.

9. Additional Information: While not necessary, the Respondent may include any product brochures, software documentation, sample reports, or other documentation that may assist LFUCG in better understanding and evaluating the Respondent's response. Additional documentation shall not serve as a substitute for other documentation which is required by this RFP to be submitted with the proposal,

10. Ambiguity, Conflict or other Errors in RFP: If a Respondent discovers any ambiguity, conflict, discrepancy, omission or other error in the RFP, it shall immediately notify LFUCG of such error in writing and request modification or clarification of the document if allowable by the LFUCG.

11. Agreement to Bid Terms: In submitting this proposal, the Respondent agrees that it has carefully examined the specifications and all provisions relating to the work to be done attached hereto and made part of this proposal. By acceptance of a Contract under this RFP, proposer states that it understands the meaning, intent and requirements of the RFP and agrees to the same. The successful Respondent shall warrant that it is familiar with and understands all provisions herein and shall warrant that it can comply with them. No additional compensation to Respondent shall be authorized for services or expenses reasonably covered under these provisions that the proposer omits from its Proposal.

12. Cancellation: If the services to be performed hereunder by the Respondent are not performed in an acceptable manner to the LFUCG, the LFUCG may cancel this contract for cause by providing written notice to the proposer, giving at least thirty (30) days notice of the proposed cancellation and the reasons for same. During that time period, the proposer may seek to bring the performance of services hereunder to a level that is acceptable to the LFUCG, and the LFUCG may rescind the cancellation if such action is in its best interest.

A. Termination for Cause

(1) LFUCG may terminate a contract because of the contractor's failure to perform its contractual duties

(2) If a contractor is determined to be in default, LFUCG shall notify the contractor of the determination in writing, and may include a specified date by which the contractor shall cure the identified deficiencies. LFUCG may proceed with termination if the contractor fails to cure the deficiencies within the specified time.

(3) A default in performance by a contractor for which a contract may be terminated shall include, but shall not necessarily be limited to:
   (a) Failure to perform the contract according to its terms, conditions and specifications;
   (b) Failure to make delivery within the time specified or according

to a delivery schedule fixed by the contract;

(c) Late payment or nonpayment of bills for labor, materials, supplies, or equipment furnished in connection with a contract for construction services as evidenced by mechanics' liens filed pursuant to the provisions of KRS Chapter 376, or letters of indebtedness received from creditors by the purchasing agency;

(d) Failure to diligently advance the work under a contract for construction services;

(e) The filing of a bankruptcy petition by or against the contractor; or

(f) Actions that endanger the health, safely or welfare of the LFUCG or its citizens.

B. At Will Termination

Notwithstanding the above provisions, the LFUCG may terminate this contract at will in accordance with the law upon providing thirty (30) days written notice of that intent**,** Payment for services or goods received prior to termination shall be made by the LFUCG provided these goods or services were provided in a manner acceptable to the LFUCG. Payment for those goods and services shall not be unreasonably withheld.

13. Assignment of Contract: The contractor shall not assign or subcontract any portion of the Contract without the express written consent of LFUCG. Any purported assignment or subcontract in violation hereof shall be void. It is expressly acknowledged that LFUCG shall never be required or obligated to consent to any request for assignment or subcontract; and further that such refusal to consent can be for any or no reason, fully within the sole discretion of LFUCG.

14. No Waiver: No failure or delay by LFUCG in exercising any right, remedy, power or privilege hereunder, nor any single or partial exercise thereof, nor the exercise of any other right, remedy, power or privilege shall operate as a waiver hereof or thereof. No failure or delay by LFUCG in exercising any right, remedy, power or privilege under or in respect of this Contract shall affect the rights, remedies, powers or privileges of LFUCG hereunder or shall operate as a waiver thereof.

15. Authority to do Business: The Respondent must be a duly organized and authorized to do business under the laws of Kentucky. Respondent must be in good standing and have full legal capacity to provide the services specified under this Contract. The Respondent must have all necessary right and lawful authority to enter into this Contract for the full term hereof and that proper corporate or other action has been duly taken authorizing the Respondent to enter into this Contract. The Respondent will provide LFUCG with a copy of a corporate resolution authorizing this action and a letter from an attorney confirming that the proposer is authorized to do business in the State of Kentucky if requested. All proposals must

be signed by a duly authorized officer, agent or employee of the Respondent.

16. Governing Law: This Contract shall be governed by and construed in accordance with the laws of the Commonwealth of Kentucky. In the event of any proceedings regarding this Contract, the Parties agree that the venue shall be the Fayette County Circuit Court or the U.S. District Court for the Eastern District of Kentucky, Lexington Division. All parties expressly consent to personal jurisdiction and venue in such Court for the limited and sole purpose of proceedings relating to this Contract or any rights or obligations arising thereunder. Service of process may be accomplished by following the procedures prescribed by law.

17. Ability to Meet Obligations: Respondent affirmatively states that there are no actions, suits or proceedings of any kind pending against Respondent or, to the knowledge of the Respondent, threatened against the Respondent before or by any court, governmental body or agency or other tribunal or authority which would, if adversely determined, have a materially adverse effect on the authority or ability of Respondent to perform its obligations under this Contract, or which question the legality, validity or enforceability hereof or thereof.

18. Contractor understands and agrees that its employees, agents, or subcontractors are not employees of LFUCG for any purpose whatsoever. Contractor is an independent contractor at all times during the performance of the services specified.

19. If any term or provision of this Contract shall be found to be illegal or unenforceable, the remainder of the contract shall remain in full force and such term or provision shall be deemed stricken.

20. Contractor [or Vendor or Vendor's Employees] will not appropriate or make use of the Lexington-Fayette Urban County Government (LFUCG) name or any of its trade or service marks or property (including but not limited to any logo or seal), in any promotion, endorsement, advertisement, testimonial or similar use without the prior written consent of the government. If such consent is granted LFUCG reserves the unilateral right, in its sole discretion, to immediately terminate and revoke such use for any reason whatsoever. Contractor agrees that it shall cease and desist from any unauthorized use immediately upon being notified by LFUCG.

_____ _____

Signature Date

RISK MANAGEMENT PROVISIONS
INSURANCE AND INDEMNIFICATION

INDEMNIFICATION AND HOLD HARMLESS PROVISION

(1) It is understood and agreed by the parties that Contractor hereby assumes the entire responsibility and liability for any and all damages to persons or property caused by or resulting from or arising out of any act or omission on the part of Contractor or its employees, agents, servants, owners, principals, licensees, assigns or subcontractors of any tier (hereinafter "CONTRACTOR") under or in connection with this agreement and/or the provision of goods or services and the performance or failure to perform any work required thereby.

(2) CONTRACTOR shall indemnify, save, hold harmless and defend the Lexington-Fayette Urban County Government and its elected and appointed officials, employees, agents, volunteers, and successors in interest (hereinafter "LFUCG") from and against all liability, damages, and losses, including but not limited to, demands, claims, obligations, causes of action, judgments, penalties, fines, liens, costs, expenses, interest, defense costs and reasonable attorney's fees that are in any way incidental to or connected with, or that arise or are alleged to have arisen, directly or indirectly, from or by CONTRACTOR's performance or breach of the agreement and/or the provision of goods or services provided that: (a) it is attributable to personal injury, bodily injury, sickness, or death, or to injury to or destruction of property (including the loss of use resulting therefrom), or to or from the negligent acts, errors or omissions or willful misconduct of the CONTRACTOR; and (b) not caused solely by the active negligence or willful misconduct of LFUCG.

(3) In the event LFUCG is alleged to be liable based upon the above, CONTRACTOR shall defend such allegations and shall bear all costs, fees and expenses of such defense, including but not limited to, all reasonable attorneys' fees and expenses, court costs, and expert witness fees and expenses, using attorneys approved in writing by LFUCG, which approval shall not be unreasonably withheld.

(4) These provisions shall in no way be limited by any financial responsibility or insurance requirements, and shall survive the termination of this agreement.

(5) LFUCG is a political subdivision of the Commonwealth of Kentucky. CONTRACTOR acknowledges and agrees that LFUCG is unable to provide indemnity or otherwise save, hold harmless, or defend the CONTRACTOR in any manner.

(6) Notwithstanding, the foregoing with respect to any professional services performed by CONTRACTOR hereunder (and to the fullest extent permitted by law), CONTRACTOR shall indemnify, save, hold harmless and defend LFUCG from and against any and all liability, damages and losses, including but not limited to, demands, claims, obligations, causes of action, judgments, penalties, fines, liens, costs, expenses, interest, defense costs and reasonable attorney's fees, for any damage due to death or injury to any person or injury to any property (including the loss of use resulting therefrom) to the extent arising out of, pertaining to or relating to the negligence, recklessness or willful misconduct of CONTRACTOR in the performance of this agreement.

FINANCIAL RESPONSIBILITY

BIDDER/CONTRACTOR understands and agrees that it shall demonstrate the ability to assure compliance with the above Indemnity provisions and these other risk management provisions prior to final acceptance of its bid and the commencement of any work or provision of goods.

INSURANCE REQUIREMENTS

YOUR ATTENTION IS DIRECTED TO THE INSURANCE REQUIREMENTS BELOW, AND YOU MAY NEED TO CONFER WITH YOUR INSURANCE AGENTS, BROKERS, OR CARRIERS TO DETERMINE IN ADVANCE OF SUBMISSION OF A RESPONSE THE AVAILABILITY OF THE INSURANCE COVERAGES AND ENDORSEMENTS REQUIRED HEREIN. IF YOU FAIL TO COMPLY WITH THE INSURANCE REQUIREMENTS BELOW, YOU MAY BE DISQUALIFIED FROM AWARD OF THE CONTRACT.

Required Insurance Coverage

BIDDER/CONTRACTOR shall procure and maintain for the duration of this contract the following or equivalent insurance policies at no less than the limits shown below and cause its subcontractors to maintain similar insurance with limits acceptable to LFUCG in order to protect LFUCG against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by CONTRACTOR. The cost of such insurance shall be included in any bid:

Coverage	**Limits**
General Liability (Insurance Services Office Form CG 00 01)	$1 million per occurrence, $2 million aggregate or $2 million combined single limit
Auto Liability	$1 million per occurrence
Worker's Compensation	Statutory
Employer's Liability	$100,000
Professional (E&O Liability)	$1 million per claim
Excess/Umbrella Liability	$2 million per occurrence

The policies above shall contain the following conditions:

a. All Certificates of Insurance forms used by the insurance carrier shall be properly filed and approved by the Department of Insurance for the Commonwealth of Kentucky (DOI). LFUCG shall be named as an additional insured in the General Liability Policy and Commercial Automobile Liability Policy using the Kentucky DOI approved forms.

b. The General Liability Policy shall be primary to any insurance or self-insurance retained by LFUCG.

c. LFUCG shall be provided at least 30 days advance written notice via certified mail, return receipt requested, in the event any of the required policies are canceled or non-renewed.

d. Said coverage shall be written by insurers acceptable to LFUCG and shall be in a form acceptable to LFUCG. Insurance placed with insurers with a rating classification of no less than Excellent (A or A-) and a financial size category of no less than VIII, as defined by the most current Best's Key Rating Guide shall be deemed automatically acceptable.

Renewals

After insurance has been approved by LFUCG, evidence of renewal of an expiring policy must be submitted to LFUCG, and may be submitted on a manually signed renewal endorsement form. If the policy or carrier has changed, however, new evidence of coverage must be submitted in accordance with these Insurance Requirements.

Deductibles and Self-Insured Programs

IF YOU INTEND TO SUBMIT A SELF-INSURANCE PLAN IT MUST BE FORWARDED TO LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT, DIVISION OF RISK MANAGEMENT, 200 EAST MAIN STREET, LEXINGTON, KENTUCKY 40507 NO LATER THAN A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO THE RESPONSE DATE. Self-insurance programs, deductibles, and self-insured retentions in insurance policies are subject to separate approval by Lexington-Fayette Urban County Government's Division of Risk Management, upon review of evidence of BIDDER/CONTRACTOR's financial capacity to respond to claims. Any such programs or retentions must provide LFUCG with at least the same protection from liability and defense of suits as would be afforded by first-dollar insurance coverage

Safety and Loss Control

CONTRACTOR shall comply with all applicable federal, state, and local safety standards related to the performance of its works or services under this Agreement and take necessary action to protect the life, health and safety and property of all of its personnel on the job site, the public, and LFUCG.

Verification of Coverage

BIDDER/CONTRACTOR agrees to furnish LFUCG with all applicable Certificates of Insurance signed by a person authorized by the insurer to bind coverage on its behalf prior to final award, and if requested, shall provide LFUCG copies of all insurance policies, including all endorsements.

Right to Review, Audit and Inspect

CONTRACTOR understands and agrees that LFUCG may review, audit and inspect any and all of its records and operations to insure compliance with these Insurance Requirements.

DEFAULT

BIDDER/CONTRACTOR understands and agrees that the failure to comply with any of these insurance, safety, or loss control provisions shall constitute default and that LFUCG may elect at its option any single remedy or penalty or any combination of remedies and penalties, as available, including but not limited to purchasing insurance and charging BIDDER/CONTRACTOR for any such insurance premiums purchased, or suspending or terminating the work.

00548704

Leachate Treatment System Improvement Project
Haley Pike Landfill
RFP 44-2023

Lexington-Fayette Urban County Government (LFUCG) is accepting proposals from interested professional engineering firms for engineering services at the Haley Pike Landfill located at 4216 Hedger Lane in Lexington, Fayette County, Kentucky. The selected firm shall perform professional services as hereinafter stated which include project management, coordination with permitting agencies, preparation of engineered drawings for construction, preparation of technical specifications for bidding purposes, bid assistance, construction administration and oversight related to implementation of the construction, and one year of post-construction leachate treatment system operational assistance. This Scope of Engineering Services provides a minimum set of guidelines, tasks, and activities for the design, bidding, and construction administration services for the project.

1. Scope of Work

1.1. General Project Description

Leachate at the closed Haley Pike Landfill is currently being managed and treated through the use of a passive Wetland Treatment System (WTS). Discharge from the WTS is permitted by Kentucky Pollutant Discharge Elimination System (KPDES) Permit No. KY0092100. Notices of Violation (NOVs) have been issued due to permit exceedances associated with the WTS, and currently, LFUCG is under an Agreed Order (AO) with the Kentucky Energy and Environment Cabinet, Division of Enforcement. As part of the AO, LFUCG has engaged with an engineering company who completed an engineering study (*Leachate Management Alternatives Analysis and Engineering Study* report dated September 1, 2023) to identify potential upgrades or alternatives to the current system to more reliably meet current permit limits.

After evaluating the recommendations, LFUCG has made a final determination to implement a combination of three (3) of the alternatives outlined in engineering study report. The options selected for design include: **Maintenance and Rehabilitation of the Current System, Wetland Substrate Rehabilitation, and Equalization (EQ) Basin Aeration (Options #1, #2 and #4 as presented in the Leachate Management Alternatives Analysis and Engineering Study report dated September 1, 2023)**; therefore, LFUCG is interested in hiring an engineering company to perform the following tasks:

- Provide customary civil, geotechnical, survey, and other technical services as necessary for design, bidding, and construction administration for the improvements as specific in the scope;
- Prepare bid specifications and engineering drawings to provide clear direction to the bidders for the work to be accomplished;
- Prepare an Engineer's Opinion of Probable Construction Cost;
- Assist with any permitting or Kentucky Division of Waste Management (KDWM) / other regulatory agency involvement;
- Assist with preparation of a Request for Bid (RFB), respond to bidders' questions during the bid process, and provide technical assistance during the bid evaluation process;

- Provide construction project management, oversight, and owner's engineer services during implementation of the construction phase of the project;
- Prepare final as-built drawings and a construction project close out report, including an Operations and Maintenance Plan for the upgraded system; and
- Provide one year of system operation, troubleshooting, and oversight post-construction.

1.2. Scope of Services

Phase 1 – Design Services

1. Review pertinent existing documentation and perform reconnaissance of the area as necessary for design and construction planning.
2. If determined to be necessary by the respondent, conduct any additional investigations or inspections to support the project. Details regarding proposed activities should be outlined in the scope of work portion of the bid response.
3. Prepare Detailed Design Plans, Construction Drawings (of standard scale and sheet size), and Specifications necessary for construction of the improvement project.
4. LFUCG is open to value-added engineering recommendations for design modifications for the system to improve effectiveness of its designed purpose, increase the life expectancy of the feature, and/or modifications to make the system easier to clean and maintain.
5. Prepare contract documents for construction bidding. Documents shall include the construction drawings and a construction bid specification package. Drawings shall be provided in CAD format and also as final PDF drawings.
6. Prepare Engineer's Opinion of Probable Construction Cost.

Phase 2 – Bid Services

1. Assist in bid process to include:
    a. Coordinate the preparation and distribution of Contract Documents to the Division of Procurement.
    b. Provide LFUCG with two (2) complete sets of the Contract Documents (including two full size plans and two sets of bound specifications) plus PDF electronic versions of each.
    c. Attend pre-bid meeting and prepare and distribute meeting minutes.
    d. Respond to questions from bidders and assist in preparing addenda.
    e. Attend bid opening.
    f. Review bids, prepare the bid tabulation, and recommend award.

Phase 3 – Construction Administration

1. Provide Final Construction Sets to be presented at the Pre-Construction Meeting to the selected contractor (three full size plans, three half size plans and three bound specifications).
2. Conduct a pre-construction conference and prepare and distribute meeting minutes.
3. Review all shop drawings and documents submitted by the Contractor that are required by the Contract Documents for construction.
4. Respond to Contractor's requests for information.
5. Prepare change orders and submit to LFUCG for approval.
6. Conduct construction progress meetings and prepare and distribute meeting minutes.
7. During the onsite construction period, perform daily site visits by an onsite inspector (resident project representative, RPR) to gauge progress and to resolve technical issues. Issue inspection reports for each visit. Visits by Project Engineer as necessary.
8. Conduct all required testing.

9. Review Contractor's pay requests.
10. Develop a punch list once the project reaches Substantial Completion.
11. Assist the LFUCG Project Manager with the final inspection of the project.
12. Prepare As-Built Drawings and Final Construction Documents.
13. Provide LFUCG with organized PDF electronic files containing all items relative to the project, including drawings and final closeout project documents.
14. Prepare an Operations and Maintenance Plan (O&M) for use by LFUCG.

Phase 4 – System Operation Assistance

1. Provide one full year of system operation assistance including:
    a. Implement the O&M Plan.
    b. Troubleshooting of any post-construction issues.
    c. Balancing seasonal system operations through the SCADA system.
    d. Monitoring plant growth progress in the Wetland Treatment System.
    e. Assistance with identifying suppliers, coordinating, ordering, and installing of any replacement parts (cost of the parts assumed to be separate from this contract).
    f. Coordinating with SCADA system consultant to identify any operational issues post-construction.
    g. Reviewing monthly monitoring results to ensure compliance with KDPES Permit limits (assumes actual sample collection associated with permit monitoring will be conducted under a separate contract, potentially by others).
    h. Assisting with identifying root cause of exceedances, if exceedances occur.
    i. If deemed necessary by the engineering company, performing any system monitoring and/or water sampling to track effectiveness of treatment (outside of the routine permit monitoring).
    j. After one year of O&M Assistance, revise and update the O&M Plan as necessary.

1.3. Meetings

The Consultant shall schedule, coordinate, and preside over meetings; develop the agenda; and keep and distribute meeting minutes. Meetings shall be, at a minimum, the following:

Design and Bid Services - Phases 1 and 2

1. Kick-off meeting to address project scope and task list
2. Planning Meetings to discuss design details (assume up to three meetings)
3. One meeting with LFUCG to review the construction plans draft at 75% complete
4. One pre-bid meeting
5. One meeting with LFUCG to review bid responses

Construction Administration - Phase 3

1. Pre-construction meeting with selected Contractor
2. Contractor meetings, as needed, including one meeting at Substantial Completion
3. One project close-out meeting with LFUCG and Contractor

System Operation Assistance – Phase 4

1. Six month review of system operation
2. Year-end review of system operation

1.4. Deliverables

The following minimum deliverables should be anticipated for this project:

- Meeting Minutes and Agendas for any formal meetings.
- Monthly Summary Updates during the project. These summaries can be stand-alone summary memos (e.g., PDF documents) that can be emailed or a summary email.
- 90% complete construction drawings and specifications.
- Final Construction Drawings and Specifications (as detailed in Section 1.2, Scope of Services).
- As-Built Drawings and Final Construction Documents.
- Operations and Maintenance (O&M) Plan.
- Updated O&M Plan after the one year of system operation to reflect any changes or updates.

1.5 Project Schedule

The duration of all activities defined and listed above as Phase 1 shall begin as soon as the Consultant has received a written notice to proceed and shall not exceed the times listed below. Extension of the duration will be at the sole discretion of LFUCG, and requests for extensions by the Consultant shall be in writing and considered only for additional major activities not included in this document. The following schedule is provided as a basis for task deadlines and will remain in effect until a replacement schedule is approved in writing by LFUCG. The intent is to have the design substantially completed by the end of the first quarter of 2023. The goal is to have construction occur in a weather favorable window in the period from October 2024 through November 2025.

Phase 1 - Design Services	**Target Completion Date**
Initial meeting to review project details and to address scope and task development	January 12, 2024
90% complete draft construction plans	May 31, 2024
Construction Documents finalized, engineer's opinion of probable construction cost complete	June 30, 2024
Phase 2 - Bid Services	**Target Completion Date**
Bid Review Response and Provide Recommendations, estimate for Phase 2 services	10 days after receiving bids
Construction Notice to Proceed	September 30, 2024
Phase 3 - Construction Administration	**Duration**
Construction administration activities (from Notice to Proceed – estimated construction complete date November 30, 2025)	457 Days
Project close out (closeout report due December 31, 2025)	30 days
Phase 4 - System Operation Assistance	Duration
System Operation Assistance (from construction complete)	365 Days

2. Proposal Evaluation Criteria

Proposals will be evaluated by LFUCG based on the following criteria.

EVALUATION CRITERIA	POINTS POSSIBLE
Qualifications	25 points possible
Past Performance	25 points possible
Proposal / Project Approach	25 points possible
Degree of Local Employment	20 points possible
Cost	5 points possible
Total points possible	**100 points possible**

Qualifications (25 points): Respondents are required to provide a statement detailing their experience (years of experience, nature of work, etc.) in performing similar projects (**limit of up to three project examples**). Resumes (**not to exceed one page per person**) and license information should be provided for the personnel who will be performing the engineering services as the licensed engineer on the project and the project manager.

Past Performance (25 points, two page limit): The past record and performance on contracts with the Urban County Government or other governmental agencies with respect to such factors as control of cost, quality of work, and ability to meet schedules.

Proposal / Project Approach (25 points, four page limit): Each respondent shall provide a narrative detailing how they will meet the objectives and requirements of this RFP. Each response will be evaluated based on their explanation in their written proposal. Any value-added engineering information that should be considered should be provided in this narrative in addition to a description of any additional investigations or inspection activities being proposed by the respondent to complete the design. If subcontractors will be used for surveying, evaluation, or partial design services, those subcontractors should be identified in the narrative

Degree of Local Employment (up to 20 points): Points will be awarded for companies with an office in Lexington, Kentucky, or in Central Kentucky.

Cost (up to 5 points): Provide a cost estimate for each phase detailing any assumptions.

3. Method of Invoice and Payment

The Consultant may submit monthly invoices for basic services or work rendered, based upon the Consultant's estimate of the portion of the total services actually completed during the billing cycle. Each invoice shall show the amount to be paid, the subtotal of all prior invoices, and the LFUCG Purchase Order Number against which the invoice is to be charged.

The Division of Environmental Services Project Manager will either approve or deny each invoice within fourteen (14) calendar days of receipt.

4. Stop Work Notice

The Consultant shall at all times monitor time allotted and amounts invoiced for tasks and activities as compared to their original estimates and expectations. The Consultant shall notify the Division of Environmental Services and the Division of Waste Management immediately upon discovery of facts that may necessitate a change in the contract amount or may extend the contract time. If the amount of the change is expected to exceed ten percent (10%) of the original contract amount, the Consultant shall immediately stop all work related to this Scope of Services. Work shall not recommence without written notification from LFUCG. The Consultant shall submit all requests for changes to the Division of Environmental Services in writing and shall be present when the issue is discussed before the Urban County Council. Failure by LFUCG to endorse the requested change does not relieve the Consultant of the contractual requirements and activities defined by this entire Scope of Services.

LFUCG reserves the right to terminate the contract when a mutually satisfactory agreement cannot be reached in a timely manner. All engineering project data must be submitted to LFUCG upon request. If it is determined that the Consultant failed to notify LFUCG on a timely basis regarding insufficient fee or inadequate schedule, LFUCG reserves the right to terminate the contract at any time thereafter.

Lexington-Fayette Urban County Government

Phase 2 Report

Leachate Management Alternatives Analysis and Engineering Study

September 1, 2023

TETRA TECH

Phase 2 Report

Leachate Management Alternatives Analysis and Engineering Study

September 1, 2023

FINAL

PRESENTED TO

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9/1/2023

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9/1/2023

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TETRA TECH

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LIST OF FIGURES

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
BOD	Biological Oxygen Demand
CPI	Consumer Price Index
DO	Dissolved Oxygen
EQ	Equalization
FRP	Fiber Reinforced Plastic
GPD	Gallons per Day
GPY	Gallons per Year
MGY	Million Gallons per Year
NEMA	National Electrical Manufacturers Association
HDPE	High Density Polyethylene
HP	Horsepower
KPDES	Kentucky Pollutant Discharge Elimination System
LFUCG	Lexington-Fayette Urban County Government
LMAAES	Leachate Management Alternatives Analysis and Engineering Study
MG	Million Gallons
PFAS	Per-and Polyfluoroalkyl Substances
SCADA	Supervisory Control and Data Acquisition
TSS	Total Suspended Solids
UV	Ultraviolet
VFD	Variable Frequency Drive
WTS	Wetlands Treatment System
WWTP	Wastewater Treatment Plant

1.0 INTRODUCTION

This Leachate Management Alternatives Analysis and Engineering Study (LMAAES) has been prepared to identify cost-effective leachate treatment options for the closed Haley-Pike Landfill (Site) owned and maintained by the Lexington-Fayette Urban County Government (LFUCG). Leachate from the Site is conveyed to a 4.4-million-gallon equalization pond and treated in a Wetlands Treatment System (WTS) consisting of two in-parallel operating treatment cells prior to discharge via Outfall 005 to an unnamed tributary of the North Elkhorn Creek under Kentucky Pollutant Discharge Elimination System (KPDES) Permit No. KY0092100 (expiration date November 30, 2024). The treatment system was constructed in 2006 with a design capacity of 13,700 gallons per day or approximately five (5) million gallons per year (MGY). As a result of the expansion of the leachate collection system, raw leachate influent to the treatment system increased and was reported to range between 22.7 MGY and 42.4 MGY in the period of 2016 through 2022. These raw leachate influent flows do not include precipitation into the treatment system.

Seasonal variability in raw leachate quality and treatment efficacy result in sporadic exceedances of discharge parameters including ammonia, iron, and total suspended solids (TSS). Based on the dilute characteristics of the leachate, Tetra Tech has identified and discussed four (4) approaches to enhancing treatment capabilities of the existing system in the Phase I Report, submitted April 20, 2023. A fifth approach, construction of a force main for discharging to the Town Branch wastewater treatment facility, was prescribed by LFUCG, and evaluated. The budgetary construction cost estimate for Force Main Alignment Option # 5 was updated to reflect current costs.

The work subject of this report includes conceptual engineering plans and construction cost estimates for the four (4) options identified by Tetra Tech in the Phase 1 Report. To facilitate comparison of all five options, Tetra Tech has escalated the construction cost estimate included in the Preliminary Engineering Report, prepared by Palmer Engineering, on February 25, 2021, for the preferred force main alignment (Option #5) by the Consumer Price Index (CPI) for construction. The LMAAES systematically analyzes the following four (4) alternatives for enhancing treatment efficacy at the Site:

- Option #1 – Maintenance and Rehabilitation of Current System and Recommendations
- Option #2 – Wetland Substrate Rehabilitation
- Option #3 – Post-Treatment Filtration
- Option #4 – EQ Basin Aeration.

Section 1 of this document provides relevant site background information, outlines the project goals, and provides a table of assumptions to form the basis of the LMAAES. Each of the alternative options listed above is described and evaluated in Sections 2 through 6. A best value approach is recommended in Section 7.

1.1 SITE DESCRIPTION AND HISTORY

1.1.1 Site Location and Features

The approximate 420-acre landfill complex, maintained by LFUCG, is located along Hedger Lane in Lexington, Fayette County, Kentucky. The Site consists of two closed landfill cells (phases): Unit 1 Phase 1 (45-acres) and Unit 1 Phase 2 (97-acres). **Figure 1** is an existing conditions site plan.

In 2006, closure construction at the landfill included the installation of a leachate collection system around the Unit 1, Phase 2 landfill, construction of a pump station and Equalization (EQ) Basin, and construction of a wetland treatment system (WTS). Closure construction in 2008 included the installation of additional leachate system components around the perimeter of the Unit 1, Phase 1 landfill and connection to the Unit 1, Phase 2 leachate

collection system. The final construction phase was completed in 2013, including the final cap of the remaining landfill area.

Currently, leachate from the closed and capped portions (Unit 1, Phase 1 and Unit 1, Phase 2) of the LFUCG maintained Landfill is treated in a Wetlands Treatment System (WTS) prior to discharge. An influent pump station conveys the leachate from the collection system via a 6-inch HDPE SDR 11 pipe to a double-lined 4.4 million-gallon (MG) capacity EQ Basin with depths ranging from 6 to 10 feet. The EQ Basin discharges into two 0.75-acre subsurface constructed wetlands, that operate in parallel and are planted with native cattails. The constructed wetlands are double-lined, filled with gravel and range in depth from 2.5 to 3.5 feet. The storage volume in the EQ Basin is controlled by a SCADA[1]-controlled valve and flow meter located between the EQ Basin and two wetland cells. The SCADA system monitors, controls, and records discharges from the wetland treatment system. Treated leachate, i.e., effluent, is discharged to an unnamed tributary of the North Elkhorn Creek from Outfall 005 under Kentucky Pollutant Discharge Elimination System (KPDES) Permit No. KY0092100. The KPDES Permit was issued on October 28, 2019, and the expiration date is November 30, 2024.

A groundwater augmentation system (using groundwater from Well A10) was implemented to maintain WTS water levels during low flow and to control effluent chloride concentrations. This system ceased operation in 2015 due to pump failure.

The design capacity of the WTS was 5 MGY. However, actual system intake was subsequently determined to be as much as 42.4 MGY (MACTEC, 2010). Annual raw leachate influent to the treatment system between 2016 through 2022 was determined to be 34.5 MGY on average. Leachate flows are seasonally variable and affected by specific weather events.

The LFUCG collects monthly leachate quality data for WTS inflow (post EQ Basin) and at Outfall 005. Limited historical analytical data for raw (i.e., untreated) leachate was available for review; the reports describe a dilute leachate with relatively low concentrations of parameters of concern compared to typical leachate: Total Suspended Solids (TSS), ammonia, and iron. Raw leachate was sampled four (4) times as part of Phase 1 to obtain additional leachate quality data for analysis. Sampling results are included in **Table 1**. KPDES Permit Limits, if applicable, are included for comparison. Laboratory reports are included in **Appendix A**.

TSS analytical results show seasonal but steady trends over the past six years for the raw leachate and WTS effluent (Outfall 005); however, TSS concentrations in raw leachate have increased in the past six months. Iron concentrations generally decrease between the raw leachate to the WTS effluent and exhibit seasonal variability. The data indicates iron reduction in the EQ Basin is primarily caused by sedimentation. Iron reduction in the EQ Basin is further documented as a concentration decrease between WTS influent (post EQ Basin) and WTS effluent. Iron concentrations in raw leachate, WTS influent (post EQ Basin), and WTS effluent have remained steady over the past six years but an increase in iron WTS influent (post EQ Basin) concentrations has been observed in the past 8 months.

Ammonia concentrations tend to decrease in the warmer months at the WTS influent (post EQ Basin) and WTS effluent and increase in the fall and winter months in the raw leachate. The fluctuations in ammonia in the WTS effluent are directly correlated to elevated temperatures during the growing seasons favoring nitrification, i.e., the microbially mediated oxidation of ammonia to nitrate. Ammonia concentrations in raw leachate have slightly decreased over time; however, effluent concentrations appear steady.

Although the current system can remove iron and ammonia, it has limited ability to consistently meet the KPDES Permit requirements for these two constituents. Recommendations were developed to rehabilitate and modify the treatment system to enhance iron oxidation and nitrification. Wetlands rehabilitation will also contribute to

[1] Supervisory Control and Data Acquisition

enhanced ammonia removal and nutrient uptake by vegetation. This evaluation does not account for PFAS or additional parameters that may be added to the KPDES Permit.

1.2 GENERAL OBJECTIVES OF LEACHATE MANAGEMENT SYSTEM UPGRADES

This LMAAES provides budgetary construction cost estimates and scoring of alternatives to identify the preferred approach for upgrading and rehabilitating the leachate treatment system to effectively treat the contaminants found in raw leachate. The estimated costs provided herein are budgetary costs, not proposed prices and include a 25% contingency.

2.0 OPTION #1: MAINTENANCE AND REHABILITATION OF CURRENT SYSTEM AND RECOMMENDATIONS

Maintenance and rehabilitation of the leachate management system is required to aid in the reduction of contaminants that exceed the KPDES Permit requirements. Under this option, the existing system should be evaluated to determine the interior condition of the piping for the potential build-up of iron and other deposits. Accumulated sediment could result in preferential flow conditions and thus degrade treatment efficacy. In addition, the pump in Well A10 should be repaired to restore the groundwater augmentation system.

Leachate collection pipes and riser pipes should be cleaned to remove biological material, sedimentation, and iron scaling. Prior to cleaning, LFUCG may elect to have a video inspection of the pipe system to assess its overall condition. Pipe video inspection and cleaning will facilitate flow, remove obstructions, can reduce preferential flow paths, and identify the existence of damage to the system.

Sediment accumulated in the EQ Basin should also be removed to restore storage capacity and reduce the potential for anaerobic processes. Decomposition of organic matter under anaerobic conditions can introduce ammonia and thus increase oxygen demand for nitrification. Care should be taken during sediment removal to not damage the existing liner system.

Tetra Tech sampled groundwater from Well A10 on May 5, 2023, and analyzed the sample for the following parameters:

- BOD, TSS, TDS, Chloride, NO3+NO2, TKN, NH3-N, Phosphorus, COD, Sulfide, Metals, Hardness, a-Terpineol, Benzoic Acid, p-Cresol, and Phenol (analyzed by laboratory)
- pH, Temperature, and Conductivity (analyzed in field)

Since the well pump was no longer operational, Well A10 was sampled using a 2-inch diameter disposable hand bailer. Three (3) volumes of the well were purged before sampling. Samples were collected in bottles with appropriate preservatives provided by the laboratory (Fouser Environmental Services, Versailles KY). Parameters that required sample preservation were collected first, followed by non-preserved samples. Samples were stored on ice in coolers to ensure sample temperatures remained below 4°C during transport to the laboratory under chain of custody. Laboratory results, which include field-collected parameters, are included in **Appendix A.** All KPDES Permit parameters analyzed were below their respective KPDES Permit Limits, including iron, ammonia and TSS. The analytical results are included in **Table 1**.

The use of the groundwater augmentation system may be beneficial to introduce additional water into the system during dry periods. The option for adding groundwater should be considered to control water levels in the EQ Basin and wetlands cells. If the groundwater augmentation system is implemented, water quality in Well A10 should be monitored quarterly to verify that parameter concentrations have not changed over time. Quarterly samples should be collected at the same time as regulatory-required samples and the existing piping from Well A10 should be modified to include a sampling port. Approximately three (3) well volumes should be purged using the well pump prior to sampling collection to ensure accurate comparison.

2.1 TECHNICAL FEASIBILITY

The maintenance and rehabilitation of the current system is a low-cost option when compared to more enhanced and involved treatment options. However, this option should not be considered a long-term, stand-alone solution for consistently meeting the KPDES Permit requirements.

2.2 REGULATORY CONSIDERATIONS

The rehabilitation efforts alone may not be sufficient to enhance the treatment efficacy to meet the KPDES standards. Rehabilitation of the current system in combination with other treatment options may be necessary to achieve compliance.

2.3 CONSTRUCTABILITY

The EQ Basin should be dredged to remove accumulated sediment to restore storage capacity and enhance solid separation through sedimentation. Removed sediment should be disposed of at a duly permitted waste facility. Exposed EQ basin liner should be inspected for damage and repaired, as necessary.

Alternatively, the existing 60-mil HDPE textured liner can be overlined with a 40-mil HDPE white textured liner, which is less likely to degrade over time. The existing liner has been exposed to the elements, causing photo-oxidative degradation and geomembrane fragility, allowing holes/perforations to form in portions of the EQ Basin.

2.3.1 Leachate Management During Construction

Throughout construction work, parts of the system will remain operational and provide some level of treatment. Work is proposed to proceed in the following phases:

1. EQ Basin
2. Southern WTS cell (i.e., Cell 1)
3. Northern WTS cell (i.e., Cell 2)

Subject to the work phase, elements of the WTS under construction will temporarily be bypassed. Remaining WTS elements will remain in use. As work on an WTS element is completed, such element will be returned to service. The temporary treatment augmentation system will consist of two (2) portable pumps (Pump #1, Pump #2) and a Bag Filtration System (100-micron and 50-micron filter bags), as well as tubing and a dumpster for filter bag disposal. The system will provide treatment and liquid conveyance.

Phase 1: EQ Basin Maintenance

During this phase, the treatment augmentation system will bypass the EQ Basin; both WTS cells will remain operational. The Leachate Pump Station will be taken offline.

- Pump No. 1 will draw leachate from the existing leachate Pump Station (adjacent to collection vault MH#14) and discharge to the Flow Meter Vault upstream of the WTS.
- The Bag Filtration System will be installed near the Flow Meter Vault between the EQ Basin and the WTS.
- Pump No. 2 will be installed near the Bag Filtration System and will be used to dewater the EQ Basin.
- Discharge from both pumps will be manifolded and passed through the Bag Filtration System prior to discharge to the Flow Meter Vault.
- Pump No. 1 can be removed from service upon completion of the EQ Basin maintenance work but may remain on-site as a backup for Pump No. 2.
- The leachate Pump Station will be returned to service.

Phase 2: Southern WTS Cell Maintenance

During this phase, WTS Cell 1 will be removed from service for maintenance work. The EQ Basin will receive leachate from the Pump Station.

- Pump No. 2 will be used to remove leachate from the EQ Basin and discharge to WTS Cell 2 via the Bag Filtration System.
- Pump No. 2 will remain in service throughout Phase 2 work.
- Upon completion of the work, WTS Cell 1 will be put into service.

Phase 3: Northern WTS Cell Maintenance

Similar to Phase 2, but WTS Cell 2 will be removed from service for maintenance work. Discharge from Pump No. 2 will be directed to WTS Cell 1 via the Bag Filtration System.

2.4 CONSTRUCTION COST

Construction costs include replacing the pump for Well A10, removing and disposing sediment accumulated in the EQ Basin, and evaluating and cleaning the existing leachate collection system piping. Leachate management during construction is also included in the total construction cost. Optional additional construction items include either geomembrane overlining and installation of a rain cover or removal and replacement of the existing liner in the EQ Basin.

A breakdown of the costs is provided in **Table 2.** Mobilization and demobilization costs were estimated to be 7% of the construction cost estimate. Professional services (e.g., engineering design, permitting, and construction quality administration) are also included and were estimated to be 15% of the construction cost estimate.

2.5 ANNUAL OPERATING COST

The facility will have routine annual operating costs related to the following:

- System monitoring (monitoring flow rates, monitoring water levels, adjusting basin levels for seasonal variation, equipment checks, removal of debris from basin, weekly inspection checklist, equipment maintenance checklists)
- SCADA system maintenance
- Regulatory-required KPDES and DWM sampling and analysis
- Plant maintenance (wetland plant cultivation and invasive species removal).

The total routine annual operating costs are shown in **Table 2**.

2.6 PERIODIC OPERATING COST

Periodic operating costs include:

- Pump replacement at Well A10
- Pipe inspection, evaluation, and cleaning
- Wetland cells substrate and plant replacement
- EQ Basin cleanout
- Replacement of system parts.

These periodic costs occur on various schedules; the total cost for a 10-year period is shown in **Table 2**.

2.7 LIFE OF SYSTEM AND REPLACEMENT CONSIDERATIONS

The life span of the existing leachate system will be dependent on the O&M activities performed as well as the volume and quality of leachate introduced into the wetlands treatment system. Inspections of the leachate conveyance piping and measurement of sediment accumulation in the EQ Basin may result in adjustment of assumed maintenance or replacement intervals.

3.0 OPTION #2: WETLAND SUBSTRATE REHABILITATION

Constructed wetlands can provide a sustainable treatment for dilute landfill leachate using a cost-effective and limited maintenance option. Contaminant removal in the wetlands is provided by physical, chemical, and biological processes. The physical processes include sedimentation or settlement of the suspended particles from the raw leachate. The longer the retention time in the WTS, the higher the removal rate of solids. Under this option, the hydraulic load, media, and vegetation were evaluated to treat the raw leachate entering the WTS. Removal of fines in the substrate will increase water flow and air movement through the substrate which will increase nitrification and iron oxidation processes. Replacing or removing organic materials from the substrate (gravel) increases its porosity and enhances oxygen transfer. Emergent plants in wetland systems can also have high Biological Oxygen Demand (BOD) removal efficiencies. As most plants cannot directly utilize ammonia, it is recommended to augment the current cattail population with plants, such as Bulrushes, that can metabolize ammonia, discussed below. Bulrushes and cattails transmit oxygen from the leaf to the root systems which serve as hosts for a variety of growth organisms. The microbial activity performed by these organisms enhances the BOD removal via organic decomposition. Additional plants will also increase evapotranspiration, the loss of water through the leaves.

This option includes wetland media gradation and nutrient evaluation to restore performance. Access to the influent piping, flow level monitoring equipment, and decant system for inspection and repair will be provided during the removal of substrate. It is assumed that little to no maintenance has been performed on the wetlands treatment cells substrate and piping system. Over time, the wetlands substrate has likely become clogged with sediments deposited from raw leachate within the wetlands cells reducing the overall effectiveness of leachate treatment. The wetlands substrate should be removed and replaced with clean media (limestone) to allow for an increased flow paths and filtering through the substrate. The perforated piping system, including geotextile wrapping, should be inspected and replaced, as necessary. Care should be taken to not damage the liner system beneath the stone in the wetlands during removal activities. Tetra Tech believes the rehabilitated wetlands can handle the actual flows while meeting permit requirements based on the treatment system performance.

Research was conducted to assess the planting of different species from the original wetlands design to determine if they could provide additional ammonia removal. Tetra Tech reviewed several technical papers and determined that Softstem Bulrush (*Scirpus validus*) provides increased ammonia removal. Other species such as cattails, reeds, and even floating species such as duckweed could provide sufficient ammonia removal, but the bulrush species should provide the highest removal rates. We understand that LFUCG does not wish to plant duckweed as this plant causes operational issues at the Site including clogging outlet structures of the EQ Basin.

3.1 TECHNICAL FEASIBILITY

The wetland cells were previously planted with a combination of species including phragmites (reeds), scirpus (bulrush), Agrostis alba (redtop), and typha sp. (cattails). The first three species listed did not survive and were later replaced with cattails throughout. The cattails were transplanted from an adjacent wetland area and have been growing in the wetland's cells successfully. It is recommended to plant additional native wetland species such as bulrush and reeds which can metabolize ammonia directly. Softstem bulrush and reeds work to transfer oxygen from the shoots to the roots. The oxidized root system (rhizospheres) performs sequential nitrification-denitrification where ammonia is oxidized to nitrite and nitrate which are denitrified to nitrogen gas. The combined nitrification/denitrification rate is dependent on temperature and dissolved oxygen in the system and therefore seasonal variability was considered during the design of this option. Wetlands management and plantings combined with Option #3 will enhance the ammonia removal processing through the system.

The plants will be planted per the original design specifications at 1,000 plants per acre.

The selected bulrush species are native to Kentucky and should withstand the localized climate constraints. Plants may be harvested in the winter to remove the growth and reduce decomposition in the Spring.

3.2 REGULATORY CONSIDERATIONS

Like Option #1, the wetlands rehabilitation efforts alone may not be sufficient to enhance the treatment efficacy to meet the KPDES standards. Rehabilitation of the wetlands treatment system in combination with other treatment options may be necessary to achieve compliance.

3.3 CONSTRUCTABILITY

The overall footprint of the cell will not change from the original design. Wetlands enhancement construction items listed under this option can be performed with little to no interruption of Site operations. Work should be coordinated so that each wetland cell can be sequentially rehabilitated to maintain leachate treatment capabilities.

The new species to be planted, including softstem bulrush, will be installed according to the recommendations provided by the nursery for planting and per the design specifications. Before planting, the existing cell must be prepared. This preparation will include removing and replacing the wetland substrate (limestone) rock and underlying geotextile fabric. This cleaning will enhance the biodegradation of contaminants, filtration and interception of larger particles, and physical support for wetlands plants. Cell rehabilitation should be scheduled immediately prior to the plants' growth season when plants are dormant and are less likely to be damaged by stress.

Ideally, most wetland plantings should occur in the early Spring after the plant dormancy has ended. Upon planting, elevated water levels should be maintained to ensure roots are exposed to water for nutrients and water uptake.

3.4 CONSTRUCTION COST

Construction costs are outlined in **Table 3**. The key construction cost items are removing and replacing the vegetation and substrate, replacing the geotextile, and inspecting sumps and manholes within the wetlands cells. On-site leachate management, using the process described in Option #1, would likely be required due to the reduction in treatment capacity of the WTS during construction. Mobilization and demobilization costs were estimated to be 7% of the construction cost estimate. Professional services are also included and were estimated to be 15% of the construction cost estimate.

3.5 ANNUAL OPERATING COST

The facility will incur the same routine annual operating costs as with Option #1. The total routine annual operating costs are shown in **Table 3**.

3.6 PERIODIC OPERATING COST

Periodic operating costs will include the same items as the periodic costs with Option #1. The total cost for a 10-year period is shown in **Table 3**.

3.7 LIFE OF SYSTEM AND REPLACEMENT CONSIDERATIONS

The life of the planted wetland cell will be based on the long-term management considerations outlined above. Each year maintenance will be required to ensure that proper care is taken of the bulrush and any required maintenance of the substrate media is completed. As noted above, replacement and replanting will occur each year based on the freeze-thaw cycle.

4.0 OPTION #3: POST-TREATMENT FILTRATION

Several alternative leachate filtration treatment options were considered as part of this evaluation. Most available leachate treatment technologies require a large footprint, training and staffing of wastewater treatment operators, purchase and dosing of treatment chemicals, as well as the transportation and disposal costs for wastes generated by those systems. Leachate treatment technologies such as activated carbon vessels, reverse osmosis, and electrocoagulation were not evaluated due to high costs associated with design, installation, and requirements for full-time staff to operate and maintain these systems.

The filtration system recommended and evaluated is the Parkson Dynasand Continuous Backwash Sand Filter (Dynasand Filter), Model No. DSF-7DBTF, which will effectively reduce the leachate contaminant concentrations of TSS, BOD and iron to levels below current KPDES permit prior to discharge. The Dynasand Filter is an upflowing, granular media filter tank with a continuous backwash cycle. Tank is composed of Fiber Reinforced Plastic (FRP). The filter media bed (sand) is continually cleaned by an internal washing system that does not require the need for a conventional backwash pump and additional storage tanks/vessels. The Dynasand Filter system is manufactured and delivered as a stand-alone package, and the overall footprint is small when compared to other types of treatment systems.

The benefits of this filtration system are:

1) Low energy consumption when compared to other water treatment technologies.
2) Simple to construct and maintain, reducing operator person-hours.
3) No chemical additives are required.
4) No need for additional equipment such as blowers, collection tanks, etc.
5) Continuously cleaned sand bed which limits the media changeouts.

The best choice of location for the filtration system is the embankment area between the EQ Basin and the two wetlands cells.

4.1 TECHNICAL FEASIBILITY

The post-treatment filter system was designed to reduce the site contaminant concentrations to meet the current KPDES Permit limits.

This system can also be enhanced with additional treatment units in the future should additional contaminants (emerging contaminants such as PFAS compounds) be added to the KPDES Permit for the Site.

4.1.1 Design Basis

Tetra Tech worked with the Parkson Corporation (manufacturer of the Dynasand Filter) to determine the configuration and size of filtration equipment required to meet the KPDES Permit limits based on historic analytical and flow data obtained from the Site. Using data from 2016 to 2022, an average leachate flow of 35 MGY and the average raw leachate concentrations shown below (cf. Phase 1 Report, Tetra Tech, 2023) were utilized for the design basis:

- TSS: 18.03 mg/L
- Iron: 39.36 mg/L
- Ammonia: 12.03 mg/L

The Dynasand Filter system operates on the following principles:

1) Influent (post EQ Basin) is fed into the top of the unit.
2) The influent flows downward through an annular section between the influent feed pipe and the airlift housing.
3) The influent feed is sent to the bottom of the sand bed through a series of feed radials.
4) Influent flows upward through the downward moving sand bed.
5) Organic and inorganic impurities are captured in the sand.
6) The polished leachate continues to move upward and exits the top of the filter through the effluent pipe.

4.1.2 Equipment Sizing

The Dynasand Filter has been sized to accommodate average leachate flow of 0.1 MGD. The filter system itself measures 3 feet in diameter and 13.2 feet in height. The filter package comes with all internal filter parts, filter media (sand), NEMA 4X Air Control Panel, head loss gauge, low level float switch, access ladder, and low-pressure air supply package.

A 5-hp rotary screw air compressor providing adequate supply for the air lift pump is included along with the filter package.

The Dynasand Filter system will require a foundation, enclosure, electrical service, a small air compressor, lighting, temperature controls, influent piping from the EQ Basin, and discharge pump and piping to the wetland cells. A 15 ft x 15 ft concrete slab with foundation and steel reinforcement was assumed to support the filter package and building enclosure for this cost estimate.

4.2 REGULATORY CONSIDERATIONS

Based on the information available, Tetra Tech believes that the proposed system will be capable of meeting permit requirements. The manufacturer recommends bench-scale testing to validate equipment sizing and performance. Testing is recommended as part of the detailed engineering design. Additional permitting may be required as the treatment process will change from a passive to an active system.

4.3 CONSTRUCTABILITY

A survey will be required at the site to help determine an exact location for the post-treatment filtration system. Once a location is selected, electrical service will be rerouted on-site to power the system. The treatment system will be sited on a suitable concrete foundation and will be enclosed in a climate-controlled building. The filtration system will be fed by a piping system and pump removing raw leachate from the EQ Basin, circulating the leachate through the filtration system, and discharging treated leachate into the wetlands cells. Rejects (backwash waters) could be discharged into the EQ Basin for additional settling and re-treatment through the filtration system, avoiding the need to manage reject separately. Backwashing occurs automatically.

Due to the relatively small quantities of backwash water and to avoid providing a solids management system, Tetra Tech recommends directing the backwash water into the EQ Basin where the accumulated solids can be periodically removed with solids settling out from the raw leachate. Providing a separate solids management system, consisting of storage tank, chemical dosing, and dewatering equipment (e.g., belt filter press or rotary fan press) would not be economical. Solid storage would require a 10,000-gallon to 12,000-gallon tank protected from the elements, which would increase the structure and require ancillary site improvements.

4.4 CONSTRUCTION COST

Construction costs will include survey, electrical upgrades, foundation and building enclosure for the treatment system, pumps, piping from EQ Basin to the treatment system and from the filtration system to the wetlands, backwash piping for reject batches, and supply and installation of the treatment system. On-site leachate management, using the process described in Option #1, would also be required to lower water levels in the EQ Basin system for piping installation. Initial costs would also include commissioning of the treatment system. The purchase and installation of solar panels to power the filtration system is included as an optional additional construction item and could be implemented if desired by LFUCG.

Mobilization and demobilization, as well as professional services, including training time for the site operators, is included in the total construction cost. Parkson provides the option to assist with system start-up, commissioning, and operator training.

The estimated construction costs for the recommended work under this option are detailed in **Table 4.**

4.5 ANNUAL OPERATING COST

The filtration system will require regular part-time monitoring and preventative maintenance by trained operators, estimated at one day per week. Annual chemical and electricity costs associated with the filtration system were estimated based on anticipated use.

In addition to annual costs related to the filtration system, the facility will incur the same routine annual operating costs as with Options #1 and #2. The total estimated annual operating costs are shown in **Table 4**.

4.6 PERIODIC OPERATING COST

Media changeouts are infrequent as the Dynasand units are continuously backwashing the media within the vessel. Changeouts are initially recommended every 5 years, depending upon performance, and observed raw leachate conditions. Other periodic costs associated with the filtration system may include pump replacement, compressor replacement, and media replacement.

The other components of the WTS will also need to continue to be maintained, as discussed previously under prior options, for continued operations of the system. The total cost for a 10-year period is shown in **Table 4**.

4.7 LIFE OF SYSTEM AND REPLACEMENT CONSIDERATIONS

It is recommended and included in the cost estimate for this option, that the Dynasand filtration vessel be constructed within an enclosed building. The building enclosure is an additional cost; however, it will protect the filtration vessel from the elements, reducing maintenance needs and costs. In addition, enclosing the filtration vessel will protect the equipment and components from inclement weather, reducing heat trace and insulation which may be necessary for freeze protection during the winter months. The building will need to be maintained. If the filtration vessel and other system components are in an enclosed building, the life of these systems can be extended well beyond a system that is subject to the direct effects of temperature and weather, subject to proper maintenance of equipment. Dynasand systems installed in protected environments have remained in service for 20 years, provided periodic maintenance is performed. After the 20-year service life, the system can be evaluated for possible refurbishment or replacement if treatment is still required.

5.0 OPTION #4: EQ BASIN AERATION

Aeration in the EQ Basin is proposed to introduce oxygen to facilitate biologically mediated degradation of organic matter, enhance nitrification, and promote iron oxidation. Maintaining a healthy aerobic microbial population requires maintaining a dissolved oxygen (DO) concentration of greater than 2 mg/L. While oxygen is naturally introduced by diffusion and turbulent flow at the water surface, oxygen demand by aerobic processes can deplete the DO concentration and become a limiting factor at deeper water depths. Mechanical aeration can enhance oxygen transfer and distribution throughout the water column to provide better oxygenation and a larger aerobically active portion of the EQ Basin.

Microbial populations are generally not free-floating but exhibit a preference for attached growth, creating low-density flocs with the potential to become anchored by a particle or structure. Micro-organisms attached to flocs are not limited to microbes but may include nematodes, fungi, algae, and protozoa. Aeration also introduces mixing energy to maintain flocs in suspension. The aggregate density of flocs, including the organic matter of attached micro-organisms, is only slightly higher than that of water. Flocs are not spherical, thus having less favorable settling characteristics.

Sedimentation is an effective method for reducing carry-over of suspended solids from the EQ Basin into the WTS. Efficacy of sedimentation is primarily dependent on particle size and density (‘Stokes Law’), water depth, and flow regime. To promote sedimentation, the vertical settling velocity of the suspended solid particulates should be greater than the horizontal flow velocity. This is to reduce the fraction of solids that can be captured by intake structures at the EQ Basin outfall. Flow conditions conducive to sedimentation also encourage floatables to rise to the water surface, where they can be captured by intake structures.

Tetra Tech is proposing a mechanical aeration system in combination with the creation of a quiescent zone to enhance pretreatment and solid separation and iron precipitation in the EQ Basin. The quiescent zone would be created using curtain-style baffles to create a plug-flow area, separate from the aerated portion of the basin. The TXB- Custom Baffle Curtain, manufactured by Texas Boom Company, will be comprised of floating baffles that extend above the water surface and be anchored by stainless steel cables to the banks of the EQ Basin. The proposed stage baffle system is depicted in **Figure 2**. The arrangement creates two symmetrical flow paths to the centrally located EQ Basin outfall and would require one (1) approximately 400-ft cable and one (1) approximately 300-ft cable. The cables would be secured in concrete blocks set outside the pond liner limits. A 30-mil Cooley Coolguard SKX30 impermeable skirt will be used to create baffles. The SKX30 geomembrane material would be welded around a polyethene piping with a tension cable running through the piping. Pipe spacers and clamps will be provided to prevent lateral movement of the baffles. Baffle curtain profiles would be provided to stiffen the membrane and weight would be attached at the bottom to prevent the baffles from floating (due to the lower density of the geomembrane). The baffles would not be attached to the basin bottom or sideslope.

5.1 TECHNICAL FEASIBILITY

Aeration in the EQ Basin will provide a higher and faster removal rate of BOD and TSS, increase microbial growth and reproduction, and control algae growth. Aeration circulates air in the water to remove dissolved gases, oxidize dissolved metals, and improve ammonia removal processes. Surface aeration systems work best in shallow water applications such as the EQ Basin.

The curtain baffle system would reduce the volume of solids being discharged from the EQ Basin into the WTS and potential clogging of the substrate and piping system.

5.1.1 Design Basis

Two methods of aeration can be considered:

1. Jet aeration/manifolds
2. Surface aerators

The jet aeration system includes the installation of a piping system (including manifolds) on the bottom of the EQ Basin. The jet aeration system will introduce air bubbles through nozzles installed in the piping. An air compressor will introduce air into the EQ Basin piping system. Jet aeration systems provide excellent oxygen transfer but require a more robust system to distribute air through the system and can be difficult to maintain since most components are submerged.

Surface aerators consist of a submersed motor suspended from a floatation device with angled propellers to create oxygen transfer on the water surface. Paddlewheels or aspirator types of surface aerator systems are better suited for the movement away from the aeration devices. Floating surface aerators have a high pumping rate and can effectively mix liquids providing required DO levels for leachate treatment. These aerators operate with an electrical motor without the need for an air compressor or piping system and can be installed with limited interruption to normal landfill operations.

Both types of aeration systems can be timer-operated to reduce electrical consumption costs. Some surface aeration systems can be installed with solar panels and battery back-up systems. Aeration devices can be operated manually (operator adjustments to flow) or automatically controlled (sensors in basins adjust flow). The DO analyzer should be installed in the well-mixed portion of the EQ Basin near the aeration devices to ensure the designed oxygen transfer is taking place.

For the purposes of this analysis, a surface aeration system has been evaluated for use on-site.

5.1.2 Equipment Sizing

A basic calculation was prepared to allow for a minimum of ½ horsepower for every million gallons of EQ Basin capacity. This aeration system design also considers seasonal design flows and loading, the requirements for BOD removal, and total nitrogen reduction for ammonia removal. Due to the high output of air through the aeration system, baffle walls may need to be installed in the EQ Basin to allow for proper sedimentation of suspended solids.

The EQ Basin area measures about 2.20 acres (embankment area measures an additional 0.26 acres). The surface aeration system selected provides complete mixing of the influent portion of the EQ Basin. Five (5) 10-horsepower aerators equipped with a pontoon float system and swing arm kit have been appropriately sized for the EQ Basin aeration. These units will be installed in an orientation that encourages a circular pattern and discourages short circuiting while preventing dead zones. Due to the water level fluctuations in the EQ Basin, the addition of 10-foot swing arms and 316 stainless steel aerators are recommended to ensure longevity and prevent damage to the existing liner system. A Dissolved Oxygen (DO) monitoring system may be considered to measure DO in the aeration basin to better determine an aeration schedule. A DO analyzer can incorporate the ability to adjust aeration output to meet oxygen demands in real-time conditions if a control system is desired.

The curtain baffle system has been designed to allow for flow patterns that increase sedimentation prior to discharge into the two wetlands treatment cells.

5.2 REGULATORY CONSIDERATIONS

The installation of surface aerators and a curtain baffle system will enhance treatment processes in the EQ Basin but may not reduce contaminants to concentrations below the KPDES Permit limits. The wetland cells will operate

more efficiently with reduced sediment loading in the leachate entering the WTS. These technologies in combination with other treatment options should be considered.

5.3 CONSTRUCTABILITY

The installation of a surface aeration system along with the curtain-baffle can be completed with little to no disruption of normal Site operations. Sediments will predominantly settle in the quiescent zone from where they can be removed using a vac truck. The surface aerators and curtain-baffle can be installed while operations are on-going with minor disruptions to the treatment system process and site operations.

The aeration equipment will require assembly, field mounting, electrical connections, start-up, and commissioning. Electrical equipment such as disconnects, motor starters, and run timers should also be considered for enhanced operations of equipment. Soft starts and variable frequency drives (VFDs) are recommended for the aeration units to prevent damage to the motors and other sensitive components.

Mooring cables, clips, and concrete blocks will need to be installed to prevent the aeration units and curtain baffles from moving into undesirable areas within the EQ Basin.

5.4 CONSTRUCTION COST

Aeration systems operate with minimal costs and provide a simple operation with long-term reliability. The estimated construction costs for the EQ Basin aeration system and curtain baffle system upgrades as discussed above is provided in **Table 5**. The construction costs also include on-site leachate management during construction of the curtain baffle system, mobilization and demobilization, and professional services. The purchase and installation of solar panels has been included as an optional additional item that could be implemented if desired by LFUCG.

5.5 ANNUAL OPERATING COST

Non-routine operating costs will include removing sediments/sludge accumulated along the curtain baffles and electrical costs associated with running the surface aerators. Surface aeration systems have limited maintenance requirements with passive operation. During regular inspections of the system, aerators should be inspected to ensure proper operation. Instrumentation including DO monitors, VFDs, etc., if utilized, will also need to be checked regularly. Sensors must be calibrated regularly in accordance with manufacturer specifications.

In addition to annual operating costs associated with the aeration system, the facility will incur the same routine annual operating costs as discussed with the other options. The total estimated annual operating costs are shown in **Table 5**.

5.6 PERIODIC OPERATING COST

Sediment that accumulates along the baffle system should be noted during regular inspections and removed periodically to reduce sediment loading in the wetlands treatment cells. The Cooley Coolguard geomembrane material is Ultraviolet (UV) light resistant and exhibits an excellent outdoor service life of more than 20 years.

Various parts and components of the surface aerator system may need to be replaced periodically, and it was assumed that the aerators themselves would need to be replaced every 10 years.

As discussed previously, the other components of the WTS will also need to continue to be maintained for continued operations of the system. The total cost for a 10-year period is shown in **Table 5**.

5.7 LIFE OF SYSTEM AND REPLACEMENT CONSIDERATIONS

Periodic limited maintenance of aeration equipment will be required to keep the system fully functional. At least one additional replacement aerator should be kept on-site if a working aerator stops functioning to prevent downtime and to ensure continued treatment. Submerged equipment may show signs of aging over time and should be replaced before they affect the performance of the system.

6.0 OPTION #5: DISCHARGE VIA FORCE MAIN TO TOWN BRANCH WWTP

Palmer Engineering (Palmer) previously evaluated off-site leachate disposal using a force main to convey collected leachate to the Town Branch Wastewater Treatment Plant (WWTP) as described in the *Proposed Haley Pike Landfill Pump Station and Force Main Preliminary Engineering Report* dated February 25, 2021. The design evaluated the installation of a new leachate pump station connecting to the existing sanitary sewer system. A pump with a flow rate of 350 GPM and an 8-inch force main was recommended to convey peak flows of approximately 500,000 gallons per day to the Town Branch WWTP. Two pumps were considered for this option: one main pump with a duplicate back-up pump.

Several piping routes were evaluated but the shortest route ("Purple") was selected with an alignment running between the Site and the pump station near Polo Club Boulevard along Hedger Lane, west on Rockwell Road, crosses I-64 and continues southwest on Haley Road, turns west along Winchester Road, and connects to the existing sanitary sewer system near Polo Club Boulevard. Coordination with the Federal Highway Administration (FHWA) will be required, as well as obtaining one easement (from a private property owner). Four (4) stream crossings will need to be permitted along the proposed force main route.

Tetra Tech did not evaluate any changes to the proposed force main design prepared by Palmer. The Palmer force main design was used to prepare a revised cost estimate.

6.1 TECHNICAL FEASIBILITY

This option is the most expensive and labor-intensive leachate treatment alternative option. The construction activities associated with this option will take longer to implement than the other treatment options and are contingent upon approvals from state and federal regulatory agencies. This option is also subject to meeting the Town Branch WWTP requirements for acceptance for treatment.

6.2 REGULATORY CONSIDERATIONS

If this option is selected, a reduction in the analyzed parameters or elimination of Outfall 005 from the KPDES permit may be requested from the Kentucky Division of Water. However, this may be subject to discharge effluent limitations from the Town Branch WWTP. Periodic Sampling of the raw leachate may be required by the Town Branch WWTP to confirm leachate quality prior to discharge off-site. Future PFAS requirements may also be imposed. PFAS pre-treatment may be required; this could also incur high costs associated with potentially low standards enforced.

As stated above, this option requires the approval of several regulatory permits prior to the construction of the force main. The required permits should be submitted well before the anticipated construction work to allow ample review and comments.

6.3 CONSTRUCTABILITY

The construction for this option would require a new pump station on-site and approximately 41,000 feet of force main installation. Force main installation work will include permitting, road cutting, directional boring, stream crossings, connection/modification to the existing sanitary sewer, and other coordination for construction. The project will require engineering services for design, bidding, construction administration, and inspection. Pump testing, force main pressure testing, electrical, instrumentation and control system testing will also be required.

6.4 CONSTRUCTION COST

Discharge of leachate generated on-site to the Town Branch WWTP is the costliest option but would eliminate Outfall 005 from the KPDES Discharge Permit and costs related to permit compliance. Costs for the pump station and force main installation were estimated at $5.2 MM by Palmer and were re-evaluated as part of this engineering analysis.

Initial construction costs will include the costs for purchasing pumps, piping and mechanical and electrical equipment, engineering, testing and inspection. Installation and commissioning costs will also include construction of foundations, pump station housing, connections of piping, electrical wiring, and controls and instrumentation.

Due to the range of utilities that could be relocated to improve operations, the total estimated probable construction cost is highly variable. A back-up generator or alternate power source should be considered so there is no interruption to normal leachate conveyance.

The total budgetary estimate of probable costs for this option is based on the Palmer estimate which was escalated to current dollars utilizing the CPI. The estimated construction costs, including professional services, are included in **Table 6**.

6.5 ANNUAL OPERATING COST

Pump station and force main operations are typically automated and do not require continuous on-site operator presence. Annual operating costs include maintenance and repair costs, energy costs to operate the pumps, and general housekeeping. The force main pipes will need to be jetted and cleaned regularly. Force main cleaning was assumed to be completed every year for estimating purposes; but the frequency will be dependent upon actual buildup.

With discharge to the Town Branch WWTP rather than on-site, KPDES Permit sampling would not be required at Outfall 005. However, the facility will still have standard annual operating costs related to the regulatory-required DWM sampling and analysis at the other KPDES outfalls. In addition, electricity and regular maintenance will be required. Planned routine inspections and preventative maintenance can limit unplanned downtime and costly emergency repairs. Iron deposits and sedimentation may occur in the force main and pump system and will need to be inspected and cleaned, as necessary, to maintain flow capacity. O&M manuals for the various components should be reviewed and maintenance schedules should be followed to ensure normal system operation.

The total estimated annual operating costs are shown in **Table 6**.

6.6 PERIODIC OPERATING COST

Continued pumping of leachate is critical for the LFUCG under this option, and the pump may need to be periodically replaced. The estimated periodic cost of replacing the pump is included in **Table 6**.

6.7 LIFE OF SYSTEM AND REPLACEMENT CONSIDERATIONS

The longer the pump station and force main operate, the smaller the impact of the initial costs will have on the total lifecycle cost. Pump stations can have a useful life of between 30 to 50 years, with proper maintenance and selection of appropriate equipment.

It should be noted that PFAS or other emerging compounds may be added to the KPDES Permit in the future and may require pre-treatment before discharge to Town Branch WWTP at an additional cost.

7.0 SCORING MATRIX FOR ALTERNATIVES

Tetra Tech has prepared the following scoring matrix to evaluate and select the appropriate approach for leachate management at the Haley Pike Landfill. Each treatment option was evaluated based on the following criteria:

- Technical Feasibility
- Regulatory Considerations
- Constructability
- Construction Cost
- Annual Operating Cost
- Long-Term Maintenance Considerations
- Life of System and Replacement Considerations

Scoring was performed by five (5) Tetra Tech project team members who collaborated on preparation of the work. The project team also scored the criteria themselves to obtain scoring weights reported in percent. Scoring was performed on a five-rank scale:

Rank	Description
1	Excellent
2	Above average
3	Average
4	Below Average
5	Poor

Each project team member scored individually and independently. Scores were averaged and weighted. Scores are reported to one significant digit to indicate trending between the five-score rank. In a last step, the weighted scores were ranked from one to five. The resulting scoring evaluation is summarized in **Table 7**.

Options #1, # 2, and #4 are clustered with scores ranging from 2.1 (Option #4) to 2.3 (Option #2), whereas Option #5 was ranked lowest. Option #3 was ranked below the cluster. It is Tetra Tech's opinion that combining the clustered options will achieve a greater balance of cost, benefit, and regulatory compliance. Option #3 is not recommended for implementation without performing the work included in Option #1 since excess solids in the treatment system would create fouling of the post-filtration system, requiring more frequent backwashing. Ideally, Option #1 would be implemented in conjunction with any other chosen option(s) since treatment system maintenance will increase the overall efficiency of the system.

Options #3 and #5 require significant infrastructure installations with an expected service life of 20 years. As leachate quality tends to improve post-closure, Tetra Tech anticipates that the post-filtration equipment (Option

#3) would not need to be replaced. In comparison, the force main and pump stations are likely to remain operational with routine maintenance and replacements of mechanical equipment.

Tetra Tech recommends that LFUCG proceed with the clustered options which combine maintenance (Options #1 and #2) with upgrades to enhance biological treatment and solid separation (Option #4).

8.0 CONCLUSION AND RECOMMENDATIONS

Landfill leachate with ammonia, iron and TSS concentrations higher than the KPDES Permit must be removed by the leachate treatment system before discharge to Outfall 005. Integrated treatment methods and co-treatment with groundwater from Well A10 will help reduce concentrations of contaminants. Maintenance and cleaning of existing leachate system components is required to maintain and increase the longevity of a functional treatment system. Biological methods such as nitrification/denitrification are required to remove ammonia from landfill leachate. Physical treatments such as aeration, sedimentation, and filtration can effectively remove heavy metals and suspended solids from the raw leachate.

The objective of the LMAAES evaluation of the current wetlands treatment system is to determine the most cost effective and appropriate leachate treatment option to meet the KPDES Permit requirements. A summary of the costs associated with each option is presented in **Table 8**. Costs were obtained from standard cost estimating guides, and specific information and pricing provided by material and equipment manufacturers and suppliers.

It is recommended that Options #1 and #2 be completed in tandem to rehabilitate the existing system in order to increase the flow capacity through the system and to revitalize the wetlands vegetation. The system has been operating since 2006 and regular maintenance of the piping system and WTS have not been performed. Options #1 and #2 are recommended to be completed to inspect and rehabilitate the existing system, which will also aid in determining a proper regular maintenance schedule for the system moving forward. While it is recommended that Options #1 and #2 be completed, it is not anticipated that completing these options alone would be sufficient to meet KPDES Permit requirements.

To meet KPDES Permit requirements, it is recommended that Options #1 and #2 be completed in conjunction with either Option #3 or #4. Both combinations (Options #1, #2, and #3, and Options #1, #2, and #4) have the capability to meet current KPDES Permit Limits. We recommend that Option #4 be implemented over Option #3. Option #4 has a lower construction cost and can be implemented during on-going operations with minimal disruptions to on-site treatment. Once the system is installed and the initial startup period is completed to determine the optimal aeration cycle timing, operation of the system will be passive with minimal maintenance requirements. Option #3 would require more, though limited, hands-on operation for the filtration system; adding chemicals and checking the system as needed. Option #3 also has a higher construction cost and requires some additional footprint on-site to install equipment and an enclosed building, whereas Option #4 does not require additional footprint. Both options would require relocation of electrical feeds, regular inspections, and routine maintenance to ensure proper operation. The added benefit of Option #3 is that post-filtration TSS would be consistent upon discharge to the WTS. Option #3 could also be added in the future if parameters are added to the KPDES Permit that cannot be removed by aeration or biological methods. The costs for the implementation of a combination of the options are presented in **Table 9.**

Option #5 is not recommended. Though it allows LFUCG to discharge leachate off-site without needing to meet the KPDES Permit requirements at Outfall 005, Option #5 is the costliest option and more expensive than all four other options combined. Additionally, the raw leachate would need to be periodically analyzed to confirm that no discharge limits to the Town Branch WWTP are violated.

The concentration levels of the raw leachate from the closed landfill is relatively weak, with contaminant concentrations at or slightly above the KPDES Permit requirements. Typically, leachate concentrations will continue to decrease over time as the closed landfill matures. Rehabilitating and improving the existing on-site WTS presents a more cost-effective option for handling leachate.

9.0 LIMITATIONS

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

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

TABLES

Table 1: Sampling Results – Raw Leachate and May 2023 Well A10 Groundwater Results

	Sample Date	pH (SU)	Temperature (°C)	Conductivity (µMHO/cm)	BOD, 5 Day (mg/L)	TSS (mg/L)	TDS (mg/L)	Hardness (mg/L)	Sulfide (mg/L)	Nitrate+ Nitrite (mg/L)	TKN (mg/L)	Ammonia, NH3-N (mg/L)	Phosphorus, Total (mg/L)	COD (mg/L)
Raw Leachate	1/10/2023	6.08	14	961	30	17	480	375	0.05	1	15	8.33	0.13	34
	1/26/2023	6	12.4	881	4	19	428	408	0.05	1	6.1	4.68	0.13	10
	2/10/2023	5.96	12.4	10	60	25	464	424	0.05	0.1	3.9	8.13	0.13	15
	2/22/2023	6.09	15.6	828	9	28	552	434	0.05	0.3	9.3	9.49	0.24	26
Well A-10	5/5/2023	6.96	13.8	612	4	14	300	330	0.05	0.1	1	0.24	0.13	10
	Minimum	**5.96**	**12.4**	**10**	**4**	**14**	**300**	**330**	**0.05**	**0.1**	**1**	**0.24**	**0.13**	**10**
	Maximum	**6.96**	**15.6**	**961**	**60**	**28**	**552**	**434**	**0.05**	**1**	**15**	**9.49**	**0.24**	**34**
	Average	**6.218**	**14**	**658**	**21**	**20**	**444**	**394**	**0.05**	**0.5**	**7**	**6.17**	**0.15**	**19**
	Permit Limit (avg/max)	**Report**	**6.0 - 9.0**	**-**	**37/ 140**	**27/ 88**	**-**	**Report**	**-**	**-**	**-**	**4.22/ 10**	**-**	**-**

Note – values highlighted in yellow are reported as “less than” the value shown.

Table 1 (cont.): Sampling Results – Raw Leachate and May 2023 Well A10 Groundwater Results

	Sample Date	Phenol (mg/L)	Benzoic acid (mg/L)	a-Terpineol (mg/L)	p-cresol (mg/L)	Arsenic, Total (mg/L)	Barium, Total (mg/L)	Cadmium, Total (mg/L)	Calcium, Total (mg/L)	Chromium, Total (mg/L)	Iron, Total (mg/L)	Lead, Total (mg/L)
Raw Leachate	1/10/2023	0.1	0.1	0.1	0.166	0.01	0.08	0.0025	111	0.01	12	0.01
	1/26/2023	0.01	0.01	0.01	0.01	0.01	0.08	0.0025	119	0.01	13	0.01
	2/10/2023	0.01	0.02	0.01	0.01	0.1	0.08	0.0025	140	0.01	11.1	0.01
	2/22/2023	0.01	0.02	0.01	0.01	0.01	0.09	0.0025	122	0.01	20	0.01
Well A-10	5/5/2023	0.01	0.05	0.01	0.01	0.1	0.01	0.0025	73	0.1	1.25	0.01
	Minimum	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.0025**	**73**	**0.01**	**1.25**	**0.01**
	Maximum	**0.1**	**0.1**	**0.1**	**0.166**	**0.1**	**0.09**	**0.0025**	**140**	**0.1**	**20**	**0.01**
	Average	**0.03**	**0.04**	**0.03**	**0.04**	**0.04**	**0.07**	**0.0025**	**113**	**0.03**	**11**	**0.01**
	Permit Limit (avg/max)	**0.015/ 0.026**	**0.071/ 0.12**	**0.016/ 0.033**	**0.014/ 0.025**	**-**	**-**	**-**	**-**	**-**	**2.36/ 4.00**	**-**

Note – values highlighted in yellow are reported as “less than” the value shown.

Table 1 (cont.): Sampling Results – Raw Leachate and May 2023 Well A10 Groundwater Results

	Sample Date	Magnesium, Total (mg/L)	Manganese, Total (mg/L)	Mercury, Hg (mg/L)	Potassium, K (mg/L)	Selenium, Total (mg/L)	Silver, Total (mg/L)	Sodium, Na (mg/L)	Zinc, Total (mg/L)
Raw Leachate	1/10/2023	16.3	2.2	0.0002	11.2	0	0	32.2	0.01
	1/26/2023	15	3	0.0002	7.3	0.1	0.0025	22	0.01
	2/10/2023	21	3.2	0.0002	11	0.1	0.0025	32	0.01
	2/22/2023	17	2.9	0.0002	10	0.1	0.0025	31.1	0.01
Well A-10	5/5/2023	8.4	0.2	0.0002	2	0.1	0.0025	7	0.02
	Minimum	**8.4**	**0.2**	**0.0002**	**2**	**0**	**0**	**7**	**0.01**
	Maximum	**21**	**3.2**	**0.0002**	**11.2**	**0.1**	**0.0025**	**32.2**	**0.02**
	Average	**15.54**	**2.3**	**0.0002**	**8.3**	**0.08**	**0.002**	**24.86**	**0.012**
	Permit Limit (avg/max)	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**0.11/0.20**

Note – values highlighted in yellow are reported as “less than” the value shown.

Table 2 - Item List
Haley Pike Landfill
Treatment Alternatives Cost Estimate
Option 1 - Maintenance and Rehabilitation of Current System and Recommendations[1]

Item	Description of Work	Engineer's Estimated Quantity	Unit	Unit Cost	Total Cost
Construction Costs					
1	Mobilization/Demobilization (7% of Construction Cost Estimate)	1	LS	$ 148,672.30	$ 148,672.30
2	General Conditions (7% of Construction Cost Estimate)	1	LS	$ 148,672.30	$ 148,672.30
3	Inspect, Evaluate, and Clean Existing System Piping[2]	1	LS	$ 10,000.00	$ 10,000.00
4	Removal of Accumulated Sediment in the EQ Basin (10% of EQ Basin Capacity)[2]	710	CY	$ 55.00	$ 39,050.00
5	Replacement Pump for Well A10[3]	1	EA	$ 5,000.00	$ 5,000.00
6	Leachate Management During Construction[4]	3	MO	$ 100,000.00	$ 300,000.00
	CONSTRUCTION COSTS SUB TOTAL:				**$651,394.60**
	Contingency (25%)				$162,848.65
	CONSTRUCTION COSTS TOTAL:				**$814,243.25**
	ROUNDED CONSTRUCTION COSTS TOTAL:				**$814,300.00**
Optional Additional Construction					
7	Overliner Over Existing Liner for the EQ Basin (40-mil)[5]	107,160.00	SF	$ 0.63	$ 67,868.00
8	Removal of Existing Liner and Placement of New Liner in the EQ Basin (60-mil)[5]	107,160.00	SF	$ 1.90	$ 203,604.00
9	Install Rain Cover for UV Protection (exposed overliner only)	53,580.00	SF	$ 0.32	$ 17,145.60
	OPTIONAL ADDITIONAL ITEMS SUB TOTAL:				**$203,604.00**
	Note: Either installing the new 60 mill liner (Item 8) or overlaying the existing liner and installing a rain cover (Items 7 & 9) would be selected. For budgetary estimates, installation of a new 60 mil liner is shown in cost estimate.				
	Contingency (25%)				$50,901.00
	OPTIONAL ADDITIONAL ITEMS TOTAL:				**$254,505.00**
	ROUNDED OPTIONAL ADDITIONAL ITEMS TOTAL:				**$254,600.00**

ROUNDED TOTAL OF CONSTRUCTION AND OPTIONAL ADDITIONAL ITEMS:	**$1,068,900.00**

Professional Services[6]					
1	Engineering Design, Permitting, and Certification	15%		$ 1,068,900.00	$ 160,335.00
2	Construction Quality Administration	15%		$ 1,068,900.00	$ 160,335.00
	PROFESSIONAL SERVICES TOTAL:				**$320,670.00**

	Option 1: Budgetary Cost Estimate for Construction				**$1,389,570.00**
Annual Operations and Maintenance Costs					
1	Annual System Monitoring and Operational Adjustments (Third Party)[7]	1.00	LS	$ 124,800.00	$ 124,800.00
2	SCADA System Maintenance (Third Party)	1.00	LS	$ 15,000.00	$ 15,000.00
3	Monthly Regulatory Sampling and Lab Analysis (Third Party)[8]	1.00	LS	$ 50,000.00	$ 50,000.00
4	Annual Plant Maintenance (Third Party)[9]	1.00	LS	$ 12,000.00	$ 12,000.00
	ANNUAL OPERATIONS AND MAINTENANCE SUB TOTAL:				**$201,800.00**
	Contingency (25%)				$50,450.00
	OPERATIONS AND MAINTENANCE COSTS TOTAL (Annual):				**$252,250.00**
	ROUNDED OPERATIONS AND MAINTENANCE COSTS TOTAL (Annual):				**$252,300.00**
Periodic Operations and Maintenance Costs (Recurring Cost at 10-year Intervals)					
1	Pump Replacement at Well A10 (once every 10 years)[10]	1	EA	$ 7,500.00	$ 7,500.00
2	Pipe Inspection, Evaluation, and Cleaning (once every 3 years, 3 times in 10 years)[2]	3	LS	$ 10,000.00	$ 30,000.00
3	Wetland Cells Substrate and Plant Replacement (once every 10 years) (value taken from Option #2)[11]	1	LS	$ 1,191,840.00	$ 1,191,840.00
4	EQ Basin Cleanout (every 10 years)[2]	1	LS	$ 515,500.00	$ 515,500.00
5	System Parts Replacement (every 10 Years)	1	LS	$ 25,000.00	$ 25,000.00
	PERIODIC OPERATIONS AND MAINTENANCE COSTS SUB TOTAL (Per every 10 years):				**$1,769,840.00**
	Contingency (25%)				$442,460.00
	PERIODIC OPERATIONS AND MAINTENANCE COSTS TOTAL (Per every 10 years):				**$2,212,300.00**
	ROUNDED PERIODIC OPERATIONS AND MAINTENANCE COSTS TOTAL (Per every 10 years):				**$2,212,300.00**

Notes:

1. Effluent may not meet current KPDES permit limits.
2. Includes sediment disposal costs.
3. Cost of replacing pump in Well A10 includes materials, installation, and testing.
4. Leachate management during construction assumes a 3-month construction period and includes two portable pumps, temporary piping, and filter bags to bypass EQ Basin and route flow directly through WTS.
5. Overliner/new liner area = basin (2.20 ac) + embankment (0.26 ac).
6. Professional services are estimated based upon 15% of the construction work, inclusive of optional additional items.
7. Assumes Third Party on-site 2 days per week.
8. Includes quarterly sampling of Well A10.
9. Includes wetland plant cultivation and invasive species removal.
10. Assumes 20 gpm for pump replacement at Well A10.
11. Wetland cells are approximately 0.75 ac.

Table 3 - Item List
Haley Pike Landfill
Treatment Alternatives Cost Estimate
Option 2 - Wetlands Substrate Rehabilitation

Item	Description of Work	Engineer's Estimated Quantity	Unit	Unit Cost	Total Cost
Construction Costs					
1	Vegetation Removal - Wetlands Cell 1	0.75	AC	$ 5,000.00	$ 3,750.00
2	Substrate Removal - Wetlands Cell 1	1	LS	$ 45,900.00	$ 45,900.00
3	Replace Geotextile - Wetlands Cell 1	2,800.00	SY	$ 2.88	$ 8,064.00
4	Substrate Replacement - Wetlands Cell 1[1]	3,300.00	CY	$ 40.00	$ 132,000.00
5	Replanting Vegetation - Wetlands Cell 1[2]	1	LS	$ 22,000.00	$ 22,000.00
6	Vegetation Removal - Wetlands Cell 2	0.75	AC	$ 5,000.00	$ 3,750.00
7	Substrate Removal - Wetlands Cell 2	1	LS	$ 45,900.00	$ 45,900.00
8	Replace Geotextile - Wetlands Cell 2	2,800.00	SY	$ 2.88	$ 8,064.00
9	Substrate Replacement - Wetlands Cell 2[1]	3,300.00	CY	$ 40.00	$ 132,000.00
10	Replanting Vegetation - Wetlands Cell 2[2]	1	LS	$ 22,000.00	$ 22,000.00
11	Inspect/Repair Wetland Cell Sumps and Manholes	1	LS	$ 10,000.00	$ 10,000.00
12	Leachate Management During Construction[3]	3	MO	$ 100,000.00	$ 300,000.00
	CONSTRUCTION COSTS SUB TOTAL:				**$733,428.00**
	Contingency (25%)				$183,357.00
	CONSTRUCTION COSTS TOTAL:				**$916,785.00**
	ROUNDED CONSTRUCTION COSTS TOTAL:				**$916,800.00**

Professional Services[4]					
1	Engineering Design, Permitting, and Certification	15%		$ 916,800.00	$ 137,520.00
2	Construction Quality Administration	15%		$ 916,800.00	$ 137,520.00
	PROFESSIONAL SERVICES TOTAL:				**$275,040.00**

Option 2: Budgetary Cost Estimate for Construction	**$1,191,840.00**

Annual Operations and Maintenance Costs					
1	Annual System Monitoring and Operational Adjustments (Third Party)[5]	1.00	LS	$ 124,800.00	$ 124,800.00
2	SCADA System Maintenance (Third Party)	1.00	LS	$ 15,000.00	$ 15,000.00
3	Monthly Regulatory Sampling and Lab Analysis (Third Party)[6]	1.00	LS	$ 50,000.00	$ 50,000.00
4	Annual Plant Maintenance (Third Party)[7]	1.00	LS	$ 12,000.00	$ 12,000.00
	ANNUAL OPERATIONS AND MAINTENANCE SUB TOTAL:				**$201,800.00**
	Contingency (25%)				$50,450.00
	OPERATIONS AND MAINTENANCE COSTS TOTAL (Annual):				**$252,250.00**
	ROUNDED OPERATIONS AND MAINTENANCE COSTS TOTAL (Annual):				**$252,300.00**

Periodic Operations and Maintenance Costs (Recurring Cost at 10-year Intervals)					
1	Pump Replacement at Well A10 (once every 10 years)[8]	1	EA	$ 7,500.00	$ 7,500.00
2	Pipe Inspection, Evaluation, and Cleaning (once every 3 years, 3 times in 10 years)[9]	3	LS	$ 10,000.00	$ 30,000.00
3	Wetland Cells Substrate and Plant Replacement (once every 10 years) (value taken from Const. Cost)[10]	1	LS	$1,191,840.00	$ 1,191,840.00
4	EQ Basin Cleanout (every 10 years)[9]	1	LS	$ 515,500.00	$ 515,500.00
5	System Parts Replacement (every 10 Years)	1	LS	$ 25,000.00	$ 25,000.00
	PERIODIC OPERATIONS AND MAINTENANCE COSTS SUB TOTAL (Per every 10 years):				**$1,769,840.00**
	Contingency (25%)				$442,460.00
	PERIODIC OPERATIONS AND MAINTENANCE COSTS TOTAL (Per every 10 years):				**$2,212,300.00**
	ROUNDED PERIODIC OPERATIONS AND MAINTENANCE COSTS TOTAL (Per every 10 years):				**$2,212,300.00**

Notes:

1. Assume limestone (or similar) for wetlands substrate.
2. Wetland plants to include bulrush and cattails.
3. Leachate management during construction assumes a 3-month construction period and includes two portable pumps, temporary piping, and filter bags to bypass EQ Basin and route flow directly through WTS.
4. Professional services are estimated based on 15% of the construction work.
5. Assumes Third Party on-site 2 days per week.
6. Includes quarterly sampling of Well A10.
7. Includes wetland plant cultivation and invasive species removal.
8. Assumes 20 gpm for pump replacement at Well A10.
9. Includes sediment disposal costs.
10. Wetland cells are approximately 0.75 ac.

Table 4 - Item List
Haley Pike Landfill
Treatment Alternatives Cost Estimate
Option 3 - Post-Treatment Filtration

Item	Description of Work	Engineer's Estimated Quantity	Unit	Unit Cost	Total Cost
Construction Costs					
1	Mobilization/Demobilization	1	LS	$ 177,000.00	$ 177,000.00
2	General Conditions	1	LS	$ 177,000.00	$ 177,000.00
3	Survey	1	LS	$ 29,700.00	$ 29,700.00
4	Electrical Upgrades/Tie-in	1	LS	$ 30,000.00	$ 30,000.00
5	Foundation for Treatment System	1200	SF	$ 14.90	$ 17,880.00
6	Building/Enclosure for Treatment System	1	LS	$ 80,000.00	$ 80,000.00
7	Pump to Feed Treatment System[1]	1	EA	$ 12,800.00	$ 12,800.00
8	Backwash Piping to Influent Location in EQ Basin[2]	400	FT	$ 130.00	$ 52,000.00
9	Post-Treatment Piping from Treatment System to Wetlands[3]	75	FT	$ 130.00	$ 9,750.00
10	Dynasand Filtration System - Supply and Installation[4]	1	LS	$ 178,000.00	$ 178,000.00
11	Filtration Treatment System Startup/Commissioning (assume 1 week of manufacture operation)	1	LS	$ 26,700.00	$ 26,700.00
12	Leachate Management During Construction[5]	3	MO	$100,000.00	$ 300,000.00
	CONSTRUCTION COSTS SUB TOTAL:				**$1,090,830.00**
	Contingency (25%)				$272,707.50
	CONSTRUCTION COSTS TOTAL:				**$1,363,537.50**
	ROUNDED CONSTRUCTION COSTS TOTAL:				**$1,363,600.00**

Optional Additional Construction					
13	Purchase and Install Solar Panels[6]	1	LS	$ 120,000.00	$ 120,000.00
	OPTIONAL ADDITIONAL ITEMS SUB TOTAL:				**$120,000.00**
	Contingency (25%)				$30,000.00
	OPTIONAL ADDITIONAL ITEMS TOTAL:				**$150,000.00**
	ROUNDED OPTIONAL ADDITIONAL ITEMS TOTAL:				**$150,000.00**
	ROUNDED TOTAL OF CONSTRUCTION AND OPTIONAL ADDITIONAL ITEMS:				**$1,513,600.00**

Professional Services					
1	Engineering Design, Permitting, and Certification[7]	15%		$ 1,513,600.00	$ 227,040.00
2	Construction Quality Administration[7]	15%		$ 1,513,600.00	$ 227,040.00
3	Operator Training (training of Third Party Operator)	5	Day	$ 1,000.00	$ 5,000.00
	PROFESSIONAL SERVICES TOTAL:				**$459,080.00**

Option 3: Budgetary Cost Estimate for Construction	**$1,822,680.00**

Annual Operations and Maintenance Costs					
1	Annual System Monitoring and Operational Adjustments (Third Party)[8]	1.00	LS	$ 124,800.00	$ 124,800.00
2	SCADA System Maintenance (Third Party)	1.00	LS	$ 15,000.00	$ 15,000.00
3	Monthly Regulatory Sampling and Lab Analysis (Third Party)[9]	1.00	LS	$ 50,000.00	$ 50,000.00
4	Annual Plant Maintenance (Third Party)[10]	1.00	LS	$ 12,000.00	$ 12,000.00
5	Annual Preventive Maintenance of Dynsand Equipment (Third Party)	1.00	LS	$ 21,000.00	$ 21,000.00
6	Annual Process Equipment Monitoring and Operational Adjustments (Third Party)[8]	1.00	LS	$ 124,800.00	$ 124,800.00
7	Chemicals for Filtration System Cleaning	1.00	LS	$ 2,600.00	$ 2,600.00
8	Electricity	1.00	LS	$ 6,000.00	$ 6,000.00
	ANNUAL OPERATIONS AND MAINTENANCE SUB TOTAL:				**$356,200.00**
	Contingency (25%)				$89,050.00
	OPERATIONS AND MAINTENANCE COSTS TOTAL (Annual):				**$445,250.00**
	ROUNDED OPERATIONS AND MAINTENANCE COSTS TOTAL (Annual):				**$445,300.00**

Periodic Operations and Maintenance Costs (Recurring Cost at 10-year Intervals)					
1	Pump Replacement	1	EA	$ 12,800.00	$ 12,800.00
2	Air Compressor Replacement	1	EA	$ 2,000.00	$ 2,000.00
3	Dynasand Cleaning - Media Replacement (once ever 5 years; two times in ten years)	2	LS	$ 17,800.00	$ 35,600.00
4	Pump Replacement at Well A10 (once every 10 years)[11]	1	EA	$ 7,500.00	$ 7,500.00
5	Pipe Inspection, Evaluation, and Cleaning (once every 3 years, 3 times in 10 years)[12]	3	LS	$ 10,000.00	$ 30,000.00
6	Wetland Cells Substrate and Plant Replacement (once every 10 years) (value taken from Option #2)[13]	1	LS	$ 1,191,840.00	$ 1,191,840.00
7	EQ Basin Cleanout (every 10 years)[12]	1	LS	$ 515,500.00	$ 515,500.00
8	System Parts Replacement (every 10 Years)	1	LS	$ 25,000.00	$ 25,000.00
	PERIODIC OPERATIONS AND MAINTENANCE COSTS SUB TOTAL (Per 10 years):				**$1,820,240.00**
	Contingency (25%)				$455,060.00
	PERIODIC OPERATIONS AND MAINTENANCE COSTS TOTAL (Per 10 years):				**$2,275,300.00**
	ROUNDED PERIODIC OPERATIONS AND MAINTENANCE COSTS TOTAL (Per 10 years):				**$2,275,300.00**

Notes:

1. Feed pump required to pump treated leachate from Wetland cells to filtration system. Feed piping layout to be determined upon detailed design, if Option is selected.
2. Backwash piping for filtration system will be required. Reject assumed to be discharged back into treatment system. Layout to be determined upon detailed design, if Option is selected.
3. Discharge piping from filtration system to Outfall 005 will be required. Layout to be determined upon detailed design, if Option is selected.
4. Assume Parkson Dynasand® filtration system. Initial sizing completed for estimate, to be confirmed upon detailed design, if Option is selected.
5. Leachate management during construction assumes a 3-month construction period and includes two portable pumps, temporary piping, and filter bags to bypass EQ Basin and route flow directly throug WTS.
6. Optional solar panels are included to power the aeration system.
7. Design and construction admin services are estimated on 15% of the construction work, inclusive of optional additional items.
8. Assumes Third Party on-site 2 days per week.
9. Includes quarterly sampling of Well A10.
10. Includes wetland plant cultivation and invasive species removal.
11. Assumes 20 gpm for pump replacement at Well A10.
12. Includes sediment disposal costs.
13. Wetland cells are approximately 0.75 ac.

Table 5 - Item List
Haley Pike Landfill
Treatment Alternatives Cost Estimate
Option 4 - Extended Aeration in EQ Basin

Item	Description of Work	Engineer's Estimated Quantity	Unit	Unit Cost	Total Cost
Construction Costs					
1	Mobilization/Demobilization	1	LS	$ 23,996.00	$ 23,996.00
2	General Conditions	1	LS	$ 23,996.00	$ 23,996.00
3	Survey	1	LS	$ 29,603.18	$ 29,603.18
3	Electrical Upgrades/Tie-in	1	LS	$ 30,000.00	$ 30,000.00
4	Surface Aerators[1]	1	LS	$ 108,000.00	$ 108,000.00
5	Instrumentation (Optional)	1	LS	$ 5,000.00	$ 5,000.00
6	Baffle System (Curtain Style)	1	LS	$ 75,000.00	$ 75,000.00
7	Aeration System Calibration/Startup[2]	1	LS	$ 10,800.00	$ 10,800.00
8	Dissolved Oxygen Metering System in EQ Basin	1	LS	$ 6,000.00	$ 6,000.00
9	Leachate Management During Construction[3]	3	MO	$ 100,000.00	$ 300,000.00
	CONSTRUCTION COSTS SUB TOTAL:				**$612,395.18**
	Contingency (25%)				$153,098.79
	CONSTRUCTION COSTS TOTAL:				**$765,493.97**
	ROUNDED CONSTRUCTION COSTS TOTAL:				**$765,500.00**

Optional Additional Construction					
10	Purchase and Install Solar Panels[4]	1	LS	$ 120,000.00	$ 120,000.00
	OPTIONAL ADDITIONAL ITEMS SUB TOTAL:				**$120,000.00**
	Contingency (25%)				$30,000.00
	OPTIONAL ADDITIONAL ITEMS TOTAL:				**$150,000.00**
	ROUNDED OPTIONAL ADDITIONAL ITEMS TOTAL:				**$150,000.00**
	ROUNDED TOTAL OF CONSTRUCTION AND OPTIONAL ADDITIONAL ITEMS:				**$915,500.00**

Professional Services[5]					
1	Engineering Design, Permitting, and Certification	15%		$ 915,500.00	$ 137,325.00
2	Construction Quality Administration	15%		$ 915,500.00	$ 137,325.00
	PROFESSIONAL SERVICES TOTAL:				**$274,650.00**

Option 4: Budgetary Cost Estimate for Construction	**$1,190,150.00**

Annual Operations and Maintenance Costs					
1	Annual System Maintenance (Third Party)[6]	1.00	LS	$ 124,800.00	$ 124,800.00
2	SCADA System Maintenance (Third Party)	1.00	LS	$ 15,000.00	$ 15,000.00
3	Monthly Regulatory Sampling and Lab Analysis (Third Party)[7]	1.00	LS	$ 50,000.00	$ 50,000.00
4	Annual Plant Maintenance (Third Party)[8]	1.00	LS	$ 12,000.00	$ 12,000.00
5	Electricity	1.00	LS	$ 6,000.00	$ 6,000.00
6	Aerator Preventive Maintenance (seals, grease, etc.)	1.00	LS	$ 5,000.00	$ 5,000.00
	ANNUAL OPERATIONS AND MAINTENANCE SUB TOTAL:				**$212,800.00**
	Contingency (25%)				$53,200.00
	OPERATIONS AND MAINTENANCE COSTS TOTAL (Annual):				**$266,000.00**
	ROUNDED OPERATIONS AND MAINTENANCE TOTAL (Annual):				**$266,000.00**

Periodic Operations and Maintenance Costs (Recurring Cost at 10-year Intervals)					
1	Surface Aerator Replacement (assume reuse of existing electrical conduit, junction boxes, etc.)	1	LS	$ 108,000.00	$ 108,000.00
2	Pump Replacement at Well A10 (once every 10 years)[9]	1	EA	$ 7,500.00	$ 7,500.00
3	Pipe Evaluation and Cleaning (once every 3 years, 3 times in 10 years)[10]	3	LS	$ 10,000.00	$ 30,000.00
4	Wetland Cells Substrate and Plant Replacement (once every 10 years) (value taken from Option #2)[11]	1	LS	$ 1,191,840.00	$ 1,191,840.00
5	EQ Basin Cleanout (every 10 years)[10]	1	LS	$ 515,500.00	$ 515,500.00
6	System Parts Replacement (every 10 Years)	1	LS	$ 25,000.00	$ 25,000.00
	PERIODIC OPERATIONS AND MAINTENANCE COSTS SUB TOTAL (Per every 10 years):				**$1,877,840.00**
	Contingency (25%)				$469,460.00
	PERIODIC OPERATIONS AND MAINTENANCE COSTS TOTAL (Per every 10 years):				**$2,347,300.00**
	ROUNDED PERIODIC OPERATIONS AND MAINTENANCE COSTS TOTAL (Per every 10 years):				**$2,347,300.00**

Notes:

1. Five (5) aerators assumed for cost estimate based on initial aeration calculations. Aeration system designed for approximately 1-1.5 ac.
2. Aeration system calibration is included to determine optimal aeration cycle timing for the site.
3. Leachate management during construction assumes a 3-month construction period and includes two portable pumps, temporary piping, and filter bags to bypass EQ Basin and route flow directly through WTS.
4. Optional solar panels are included to power the aeration system.
5. Professional services are estimated based upon 15% of the construction work, inclusive of optional additional items.
6. Assumes Third Party on-site 2 days per week.
7. Includes quarterly sampling at Well A10.
8. Includes wetland plant cultivation and invasive species removal.
9. Assumes 20 gpm for pump replacement at Well A10.
10. Includes sediment disposal costs.
11. Wetland cells are approximately 0.75 ac.

Table 6 - Item List
Haley Pike Landfill
Treatment Alternatives Cost Estimate
Option 5 - Discharge via Forcemain to Town Branch WWTP[1]

Construction Costs					
	PALMER ENGINEERING ESTIMATED CONSTRUCTION COST:[2]				**$5,233,433.40**
	Inflation Factor (2021 to 2023)				1.133
	CONSTRUCTION COSTS SUB TOTAL:				**$5,929,738.38**
	ROUNDED CONSTRUCTION COSTS SUB TOTAL:				**$5,929,800.00**
	Contingency (25%)				$1,482,450.00
	CONSTRUCTION COSTS TOTAL:				**$7,412,250.00**
	ROUNDED CONSTRUCTION COSTS TOTAL:				**$7,412,300.00**

Professional Services[3]					
1	Engineering Design, Permitting, and Certification	15%		$ 7,412,300.00	$ 1,111,845.00
2	Construction Quality Administration	15%		$ 7,412,300.00	$ 1,111,845.00
	PROFESSIONAL SERVICES TOTAL:				**$2,223,690.00**

Option 5: Budgetary Cost Estimate for Construction	**$9,635,990.00**

Annual Operations and Maintenance Costs					
1	Pump Preventative Maintenance	1.00	LS	$ 6,000.00	$ 6,000.00
2	Electricity	1.00	LS	$ 6,000.00	$ 6,000.00
3	Misc. Electrical Components Replacement	1.00	LS	$ 10,000.00	$ 10,000.00
4	Monthly Regulatory Sampling and Lab Analysis (Third Party)[4]	1.00	LS	$ 45,000.00	$ 45,000.00
	OPERATIONS AND MAINTENANCE SUB TOTAL (Annual):				**$67,000.00**
	Contingency (25%)				$16,750.00
	OPERATIONS AND MAINTENANCE COSTS TOTAL (Annual):				**$83,750.00**
	ROUNDED OPERATIONS AND MAINTENANCE COSTS TOTAL (Annual):				**$83,800.00**

Periodic Operations and Maintenance Costs (Recurring Cost at 10-year Intervals)					
1	Pump Replacement[5]	2	EA	$ 29,500.00	$ 59,000.00
	PERIODIC OPERATIONS AND MAINTENANCE COSTS SUB TOTAL (Per every 10 years):				**$59,000.00**
	Contingency (25%)				$14,750.00
	PERIODIC OPERATIONS AND MAINTENANCE COSTS TOTAL (Per every 10 years):				**$73,750.00**
	ROUNDED PERIODIC OPERATIONS AND MAINTENANCE COSTS TOTAL (Per every 10 years):				**$73,800.00**

Notes:

1. Discharge limits required by TB WWTP to be determined.
2. Construction cost based on Palmer Engineering Report (February 25, 2021) for purple forcemain alignment and inflated using CPI from 2021$ to 2023$.
3. Pump size based on Palmer Engineering Report (February 25, 2021).
3. Professional services are estimated based upon 15% of the construction cost.
4. Assumption that Regulatory Permit sampling will still be required with the exception of Outfall #005. Quarterly sampling at Well A10 not needed.
5. Pump size based on Palmer Engineering Report (February 25, 2021).

Table 7: Scoring Matrix of Leachate Treatment Options

Criteria	Criteria Weight	Score of Options				
		Option #1	Option #2	Option #3	Option #4	Option #5
		Maintenance & Rehabilitation of Current System & Recommendations	Wetland Substrate Rehabilitation	Post-Treatment Filtration	EQ Basin Aeration	Discharge via Force Main to TB WWTP
Technical Feasibility	18%	2.2	2.6	2.0	2.2	4.2
Regulatory Considerations	12%	5.0	3.2	1.8	3.0	4.0
Constructability	14%	2.2	2.0	3.0	2.2	4.6
Construction Cost	18%	2.0	2.8	4.0	1.2	5.0
Annual Operating Cost	15%	1.4	1.2	2.4	1.8	4.4
Long-Term Maintenance Considerations	15%	1.2	1.8	2.4	2.4	2.4
Life of System and Replacement Considerations	8%	2.0	2.4	2.0	2.0	1.0
Total Weighted Score		2.2	2.3	2.6	2.1	3.9
Rank		**2**	**3**	**4**	**1**	**5**

Table 8: Summary of treatment options, estimated costs, and rank based on scoring matrix

Leachate Treatment Option	Estimated Construction Cost (Includes Optional Additional Items)	Estimated Annual Operation and Maintenance Cost	Estimated Periodic Operations and Maintenance Cost	Rank
1. Maintenance and Rehabilitation of Current System and Recommendations	$1,389,570	$252,300	$2,212,300	2
2. Wetland Substrate Rehabilitation	$1,191,840	$252,300	$2,212,300	3
3. Post-Treatment Filtration	$1,822,680	$445,300	$2,275,300	4
4. EQ Basin Aeration	$1,190,150	$266,000	$2,347,300	1
5. Discharge via Force Main to Town Branch WWTP	$9,635,990	$83,800	$73,800	5

Table 9: Estimated construction costs for combined leachate treatment options

Leachate Treatment Options	Estimated Combined Construction Cost (Including Optional Items)
Options #1 and #2	$2,281,410
Options #1, #2 and #3	$3,804,090
Options #1, #2 and #4	$3,171,560

FIGURES

N

0 40' 80'

SCALE: 1" = 80'

980
970
960
950
EXISTING

967.0
953.4
956.8
966.1
969.1
959.0
957.7
952.8
965.3
978.1
981.0
976.2
965.2
958.6
953.1
963.4
971.1
969.2
980.3

6" HDPE SDR 11
CASING PIPE
VALVE VAULT
METER VAULT
AIR RELEASE
PUMP STATIONS (2 EA)
FLOW SPLITTER STRUCTURE
GENERATOR
CONTROL PANEL
COLLECTION VAULT
WETLAND CELL NO. 2
WETLAND EFFLUENT STRUCTURE
6" HDPE SDR 11
FLOW METER VALVE VAULT
EQUALIZATION BASIN
W.S.E. 971.7
AIR RELEASE
WETLAND CELL NO. 1

TETRA TECH
www.tetratech.com

LEXINGTON FAYETTE URBAN COUNTY GOVERNMENT
HALEY PIKE LANDFILL
EXISTING SITE PLAN

PROJ:	200-11681-23002
DATE:	MARCH 2023
DESN:	RNR

Supplemental
FIGURE 1

Bar Measures 1 inch

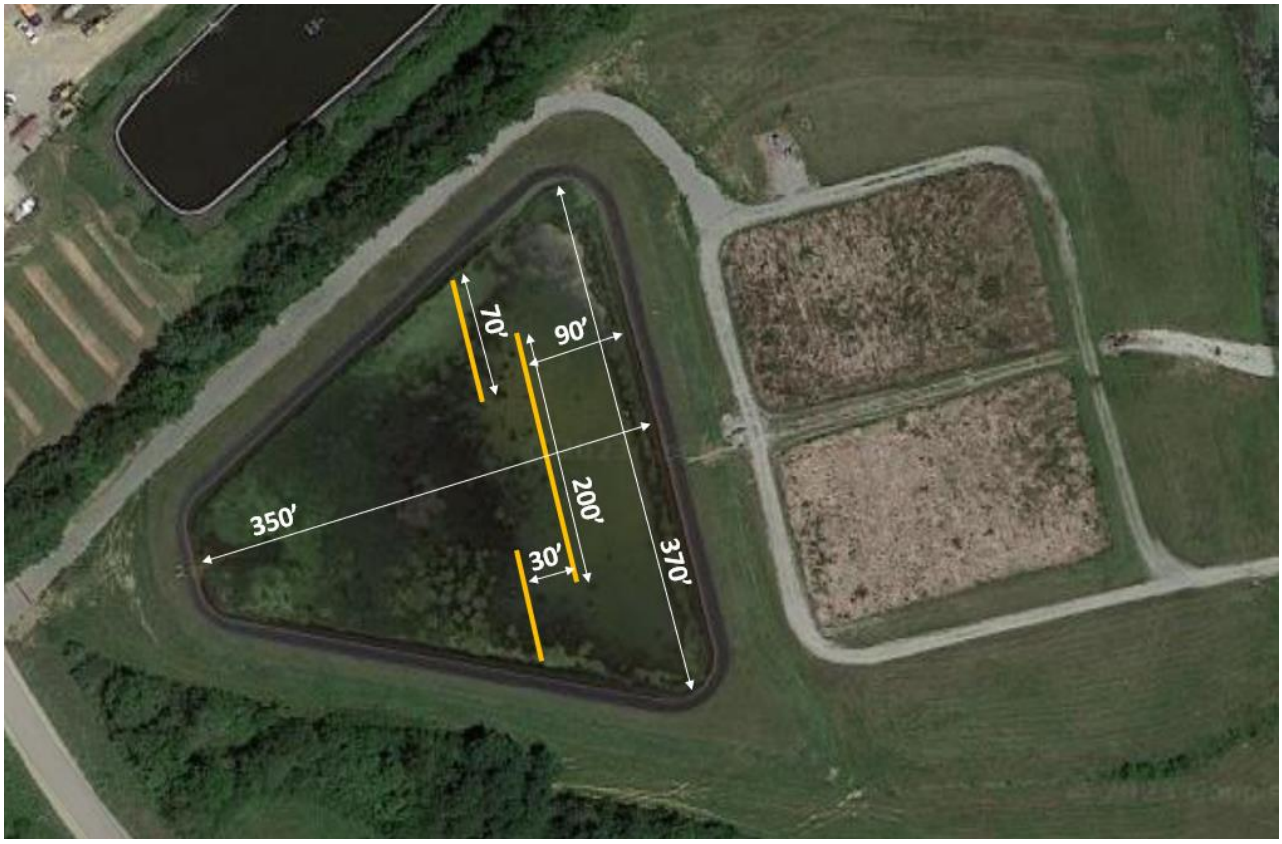

Figure 2: Proposed Baffle Arrangement for the EQ Pond

APPENDIX A: LABORATORY REPORTS

FOUSER ENVIRONMENTAL SERVICES, LTD
LABORATORY/CONSULTING
859.873.6211 lab@fouser.com

ACCREDITED
ISO/IEC 17025:2017
CERT #5293.01

Certificate of Analysis

#1004169012523114154

Tetra Tech, Inc.
424 Lewis Hargett Circle, Suite 110
Lexington, KY 40503
Lucy Pacholik

Project HP Leachate Analysis
Entered By Lynn Ellis
Date Reported 1/25/2023
Date Received 1/10/2023
Date Approved 1/25/2023

Test	Method	Result	Units	MRL	Date	Initials	Qualifiers
1004169-01	**HP Leachate**		**1/10/23 10:45**				
pH	SM 4500 H+B	6.08	SU		1/10/2023	CL	
Temperature	SM 2550 B	14.0	ºC		1/10/2023	CL	
Conductivity	SM 2510 B	961	µMHO/CM	10	1/10/2023	CL	
BOD, 5 Day	SM 5210 B	30	mg/L	30	1/16/2023	CB	K1
Total Suspended Solids	SM 2540 D	17	mg/L	2	1/12/2023	CB	
Total Dissolved Solids	SM 2540 C	480	mg/L	40	1/12/2023	CB	
Hardness	EPA 130.1	375	mg/L	25	1/13/2023	CC	
Sulfide	SM 4500-S2 D	<0.05	mg/L	0.05	1/11/2023	CT	
TKN	Hach 10242	15	mg/L	1	1/24/2023	CB	
Nitrate+Nitrite	Hach 10206	<1.0	mg/L	1	1/24/2023	CB	
Ammonia, NH3-N	SM 4500-NH3 D	8.33	mg/L	0.1	1/16/2023	CB	
Phosphorus, Total	SM 4500-P E	<0.13	mg/L	0.125	1/13/2023	CT	
COD	EPA 410.4	34	mg/L	30	1/19/2023	CT	
Phenol	SW-8270C	<0.1	mg/L	0.1	1/13/2023	AE	
Benzoic acid	SW-8270C	<0.1	mg/L	0.1	1/13/2023	AE	
a-Terpineol	SW-8270C	<0.1	mg/L	0.1	1/13/2023	AE	
m,p-cresol	SW-8270C	0.166	mg/L	0.1	1/13/2023	AE	
Arsenic, Total	EPA 200.7	<0.01	mg/L	0.01	1/12/2023	KM	
Barium, Total	EPA 200.7	0.08	mg/L	0.01	1/12/2023	KM	
Cadmium, Total	EPA 200.7	<0.0025	mg/L	0.0025	1/12/2023	KM	
Calcium, Total	EPA 200.7	111.0	mg/L	0.5	1/13/2023	KM	
Chromium, Total	EPA 200.7	<0.01	mg/L	0.01	1/12/2023	KM	
Iron, Total	EPA 200.7	12.00	mg/L	.1	1/13/2023	KM	
Lead, Total	EPA 200.7	<0.01	mg/L	0.01	1/13/2023	KM	
Magnesium, Total	EPA 200.7	16.30	mg/L	0.5	1/13/2023	KM	
Manganese, Total	EPA 200.7	2.2	mg/L	0.1	1/13/2023	KM	
Mercury, Hg	EPA 245.1	<0.0002	mg/L	0.0002	1/19/2023	KM	
Potassium, K	EPA 200.7	11.20	mg/L	2	1/18/2023	KM	

Lab No: EC:

FOUSER ENVIRONMENTAL SERVICES, LTD
LABORATORY/CONSULTING
859.873.6211 lab@fouser.com

ISO/IEC 17025:2017
CERT #5293.01

Certificate of Analysis

#1004169012523114154

Tetra Tech, Inc.
424 Lewis Hargett Circle, Suite 110
Lexington, KY 40503
Lucy Pacholik

Project	HP Leachate Analysis
Entered By	Lynn Ellis
Date Reported	1/25/2023
Date Received	1/10/2023
Date Approved	1/25/2023

Test	Method	Result	Units	MRL	Date	Initials	Qualifiers
1004169-01	**HP Leachate**		**1/10/23 10:45**				
Selenium, Total	EPA 200.7	<0	mg/L	0.01	1/12/2023	KM	
Silver, Total	EPA 200.7	<0.00	mg/L	0.0025	1/12/2023	KM	
Sodium, Na	EPA 200.7	32.2	mg/L	5	1/18/2023	KM	
Zinc, Total	EPA 200.7	0.01	mg/L	0.01	1/12/2023	KM	

AE = Analysis performed by Alloway Environmental, KY Cert #90018
Results for EPA Method 8270 were reported at higher detection levels due to sample matrix.
CL = Analysis performed by client.

Approved By Ray Fouser

Ray Fouser, P.E.

Qualifiers

K1 = The sample dilutions set-up for the BOD analysis did not meet the oxygen depletion criteria of at least 2 mg/L. Any reported result is an estimated value.

Lab No: EC:

FOUSER ENVIRONMENTAL SERV

1004169-01

les, Kentucky 40383 • Phone (859) 873-6211 lab@fouser.com

SHADED AREA FOR LAB USE ONLY

CHAIN OF CUSTODY RECORD

Hdwy Pike Leachate

Client/Company Ordering Test:	Location/Address:	Other Sample Related Remarks:
Tetra Tech		Field – pH – 6.08 S.Cond – 961 Temp – 14.6
Sampler (Signature):	KPDES# / PO#	Sample Description

FES Lab #	Collection Date	Collection Time	Sample Outfall ID / Location (Composite Run Date/Time (ex. 1/1-2/22 08:00-08:00))	Grab/ Comp	Matrix	Pres.	Cont.	Vol./Wgt.	Analyses Required
	1/10/23	10:45	HP Leachate	G	lt	X	pb	1 L.	BOD, TSS, TDS, pH, NO_3+NO_2
						SA	pb	8 oz.	COD, NH_3N, TKN, Phos.
						SH+ZA	pb	8 oz.	S=
						PA	pb	8 oz.	*metals, hardness
						X	ag.	1 L.	a-Terpineol, Benzoic Acid, pCresol, Phenol

Relinquished By:	Received By:	Date	Time (24 hr)
	Lab, Lynn Ellis	1/10/23	12:45
Relinquished By:	Received By:	Date	Time (24 hr)
Relinquished By:	Received By:	Date	Time (24 hr)
Relinquished By:	Received By:	Date	Time (24 hr)

Shipping Conditions: ☐ Iced ☐ Ambient
Container Temperature: 8 °C
IR used: (**CF:** 0
Holding times acceptable? ☐ Yes ☐ No
pH's checked? ☐ **Preservative added?** no
Data entered by: LL
Method of Delivery:
☐ FES ☐ Client ☐ UPS/Fed Ex ☐ Other

MATRIX CODES:
dw - drinking water; ww – wastewater; oil – oil; sl – sludge; gw – groundwater; s – solid; o - other; su – surface water; lt – leachate; sw - storm water

PRESERVATION CODES:
NA – Nitric Acid (HNO_3); SA – Sulfuric Acid (H_2SO_4); AC – Ammonium Chloride; ST – Sodium Thiosulfate ($Na_2S_2O_3$); HA – Hydrochloric Acid (HCl); SH – Sodium Hydroxide (NaOH); X – None; ZA – Zinc Acetate ($Zn(O_2CCH_3)_2$); AA - Ascorbic Acid ($C_6H_8O_6$); PA – Phosphoric Acid (H_3PO_4); CS – Copper Sulfate ($CuSO_4$)

CONTAINER CODES: : gb – glass bottle; pb – plastic bottle; pba – plastic bag; ag – amber glass bottle; ap – amber plastic bottle

* Ca, Mg, K, Na, Mn, Fe, Zn, As, Ba, Cd, Cr, Pb, Se, Ag, Hg

FOUSER ENVIRONMENTAL SERVICES, LTD
LABORATORY/CONSULTING
859.873.6211 lab@fouser.com

ACCREDITED
ISO/IEC 17025:2017
CERT #5293.01

Certificate of Analysis

#1004576021523132816

Tetra Tech, Inc.
424 Lewis Hargett Circle, Suite 110
Lexington, KY 40503
Lucy Pacholik

Project	HP Leachate Analysis
Entered By	Lynn Ellis
Date Reported	2/15/2023
Date Received	1/26/2023
Date Approved	2/15/2023

Test	Method	Result	Units	MRL	Date	Initials	Qualifiers
1004576-01	**HP Leachate**		**1/26/23 11:00**				
pH	SM 4500 H+B	6.00	SU		1/26/2023	CL	
Temperature	SM 2550 B	12.4	ºC		1/26/2023	CL	
Conductivity	SM 2510 B	881	µMHO/CM	10	1/26/2023	CL	
BOD, 5 Day	SM 5210 B	4	mg/L	12	2/1/2023	CB	
Total Suspended Solids	SM 2540 D	19	mg/L	2	2/1/2023	KM	
Total Dissolved Solids	SM 2540 C	428	mg/L	40	1/27/2023	CB	
Hardness	EPA 130.1	408	mg/L	25	1/27/2023	CC	
Chloride	EPA 300.0	28	mg/L	10	1/27/2023	MG	
Sulfide	SM 4500-S2 D	<0.05	mg/L	0.05	2/2/2023	CT	
TKN	Hach 10242	6.1	mg/L	1	2/6/2023	CB	
Nitrate+Nitrite	Hach 10206	<1.0	mg/L	1	2/6/2023	CB	
Ammonia, NH3-N	SM 4500-NH3 D	4.68	mg/L	0.1	2/9/2023	CB	
Phosphorus, Total	SM 4500-P E	<0.13	mg/L	0.125	2/2/2023	CT	
COD	EPA 410.4	<10	mg/L	10	2/2/2023	CT	
Phenol	SW-8270C	<0.01	mg/L	0.01	1/31/2023	AE	
Benzoic acid	SW-8270C	<0.01	mg/L	0.01	1/31/2023	AE	
a-Terpineol	SW-8270C	<0.01	mg/L	0.01	1/31/2023	AE	
m,p-cresol	SW-8270C	<0.01	mg/L	0.01	1/31/2023	AE	
Arsenic, As	EPA 200.7	<0.01	mg/L	0.01	1/30/2023	KM	
Barium, Ba	EPA 200.7	0.08	mg/L	0.01	1/30/2023	KM	
Cadmium, Cd	EPA 200.7	<0.0025	mg/L	0.0025	1/30/2023	KM	
Calcium, Ca	EPA 200.7	119.0	mg/L	1	2/9/2023	KM	
Chromium, Cr	EPA 200.7	<0.01	mg/L	0.01	1/30/2023	KM	
Iron, Fe	EPA 200.7	13.00	mg/L	0.1	2/9/2023	KM	
Lead, Pb	EPA 200.7	<0.01	mg/L	0.01	1/30/2023	KM	
Magnesium, Mg	EPA 200.7	15.00	mg/L	0.5	2/9/2023	KM	
Manganese, Mn	EPA 200.7	3.00	mg/L	0.1	2/9/2023	KM	
Mercury, Hg	EPA 245.1	<0.0002	mg/L	0.0002	1/31/2023	KM	

Lab No: EC:

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859.873.6211 lab@fouser.com
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Certificate of Analysis

#1004576021523132816

Tetra Tech, Inc.
424 Lewis Hargett Circle, Suite 110
Lexington, KY 40503
Lucy Pacholik

Project	HP Leachate Analysis
Entered By	Lynn Ellis
Date Reported	2/15/2023
Date Received	1/26/2023
Date Approved	2/15/2023

Test	Method	Result	Units	MRL	Date	Initials	Qualifiers
1004576-01	**HP Leachate**		**1/26/23 11:00**				
Potassium, K	EPA 200.7	7.30	mg/L	2	2/10/2023	KM	
Selenium, Se	EPA 200.7	<0.10	mg/L	0.1	2/9/2023	KM	
Silver, Ag	EPA 200.7	<0.0025	mg/L	0.0025	2/3/2023	KM	
Sodium, Na	EPA 200.7	22.0	mg/L	5	2/10/2023	KM	
Zinc, Zn	EPA 200.7	<0.01	mg/L	0.01	1/30/2023	KM	

CL = Analysis performed by client.

Approved By Ray Fouser

Ray Fouser, P.E.

Lab No: EC:

FOUSER ENVIRONMENTAL S 1004576-01 Versailles, Kentucky 40383 • Phone (859) 873-6211 lab@fouser.com

SHADED AREA FOR LAB USE ONLY

CHAIN OF CUSTODY RECORD

Client/Company Ordering Test:	Location/Address:	Other Sample Related Remarks:
Tetra Tech		pH - 6.00 Cond - 881 Temp 12.4
Sampler (Signature):	KPDES# / PO#	Sample Description

FES Lab #	Collection Date	Collection Time	Sample Outfall ID / Location (Composite Run Date/Time (ex. 1/1-2/22 08:00-08:00))	Grab/ Comp	Matrix	Pres.	Cont.	Vol./Wgt.	Analyses Required
	1/26/23	11:00	HP Leachate	G	LT	X	pb	1 L.	BOD, TSS, TDS, Cl-
						SA	pb	8 oz.	NO3-N + NO2-N, COD, NH3-N, TKN, Phos
						SH+ZA	pb	8 oz.	S=
						NA	pb	8 oz	* metals, hardness
						X	ag	1 L.	α-Terpineol, Benzoic acid, p-cresol, Phenol

Relinquished By:	Received By:	Date	Time (24 hr)
[signature]	Lab Lynn Ellis	1/26/23	12:35
Relinquished By:	Received By:	Date	Time (24 hr)
Relinquished By:	Received By:	Date	Time (24 hr)
Relinquished By:	Received By:	Date	Time (24 hr)

Shipping Conditions: ☑ Iced ☐ Ambient
Container Temperature: 4°C
IR used: 1 **CF:** 0
Holding times acceptable? ☑ Yes ☐ No
pH's checked? ☑ **Preservative added?** No
Data entered by: AA
Method of Delivery:
☐ FES ☑ Client ☐ UPS/Fed Ex ☐ Other

MATRIX CODES:
dw - drinking water; ww – wastewater; gw – groundwater; su – surface water
sw - storm water; oil – oil; s – solid; lt – leachate
sl – sludge; o - other

PRESERVATION CODES:
NA – Nitric Acid (HNO_3); ST – Sodium Thiosulfate ($Na_2S_2O_3$); ZA – Zinc Acetate ($Zn(O_2CCH_3)_2$)
SA – Sulfuric Acid (H_2SO_4); HA – Hydrochloric Acid (HCl); AA - Ascorbic Acid ($C_6H_8O_6$)
AC – Ammonium Chloride; SH – Sodium Hydroxide (NaOH); PA – Phosphoric Acid (H_3PO_4)
X – None; CS – Copper Sulfate ($CuSO_4$)

CONTAINER CODES: : gb – glass bottle; pb – plastic bottle; pba – plastic bag; ag – amber glass bottle; ap – amber plastic bottle

* Ca, Mg, K, Na, Mn, Fe, Zn, As, Ba, Cd, Cr, Pb, Se, Ag, Hg

FOUSER ENVIRONMENTAL SERVICES, LTD
LABORATORY/CONSULTING
859.873.6211 lab@fouser.com

ISO/IEC 17025:2017
CERT #5293.01

Certificate of Analysis

#1004919022823101018

Tetra Tech, Inc.
424 Lewis Hargett Circle, Suite 110
Lexington, KY 40503
Lucy Pacholik

Project	HP Leachate Analysis
Entered By	Lynn Ellis
Date Reported	2/28/2023
Date Received	2/10/2023
Date Approved	2/28/2023

Test	Method	Result	Units	MRL	Date	Initials	Qualifiers
1004919-01	**HP Leachate**		**2/10/23 09:15**				
pH	SM 4500 H+B	5.96	SU		2/10/2023	CL	
Temperature	SM 2550 B	12.4	ºC		2/10/2023	CL	
Conductivity	SM 2510 B	<10	µMHO/CM	10	2/10/2023	CL	
BOD, 5 Day	SM 5210 B	<60	mg/L	60	2/15/2023	CB	
Total Suspended Solids	SM 2540 D	25	mg/L	2	2/15/2023	CB	
Total Dissolved Solids	SM 2540 C	464	mg/L	40	2/15/2023	CB	
Hardness	EPA 130.1	424	mg/L	25	2/20/2023	CC	
Chloride	EPA 300.0	48	mg/L	10	2/13/2023	MG	
Sulfide	SM 4500-S2 D	<0.05	mg/L	0.05	2/17/2023	CT	
TKN	EPA 351.2	3.9	mg/L	1	2/14/2023	CT	
Nitrate+Nitrite	EPA 353.2	<0.1	mg/L	0.1	2/21/2023	CT	
Ammonia, NH3-N	SM 4500-NH3 D	8.13	mg/L	0.1	2/14/2023	CB	
Phosphorus, Total	SM 4500-P E	<0.13	mg/L	0.125	2/17/2023	CT	
COD	EPA 410.4	15	mg/L	10	2/20/2023	CT	
Phenol	SW-8270C	<0.01	mg/L	0.01	2/16/2023	AE	
Benzoic acid	SW-8270C	<0.02	mg/L	0.02	2/16/2023	AE	
a-Terpineol	SW-8270C	<0.01	mg/L	0.01	2/16/2023	AE	
m,p-cresol	SW-8270C	<0.01	mg/L	0.01	2/16/2023	AE	
Arsenic, As	EPA 200.7	<0.10	mg/L	0.1	2/21/2023	KM	
Barium, Ba	EPA 200.7	0.08	mg/L	0.01	2/16/2023	KM	
Cadmium, Cd	EPA 200.7	<0.0025	mg/L	0.0025	2/16/2023	KM	
Calcium, Ca	EPA 200.7	140.0	mg/L	1	2/21/2023	KM	
Chromium, Cr	EPA 200.7	<0.01	mg/L	0.01	2/16/2023	KM	
Iron, Fe	EPA 200.7	11.10	mg/L	0.2	2/21/2023	KM	
Lead, Pb	EPA 200.7	<0.01	mg/L	0.01	2/20/2023	KM	
Magnesium, Mg	EPA 200.7	21.00	mg/L	0.5	2/21/2023	KM	
Manganese, Mn	EPA 200.7	3.20	mg/L	0.1	2/21/2023	KM	
Mercury, Hg	EPA 245.1	<0.0002	mg/L	0.0002	2/20/2023	KM	

Lab No: EC:

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CERT #5293.01

Certificate of Analysis

#1004919022823101018

Tetra Tech, Inc.
424 Lewis Hargett Circle, Suite 110
Lexington, KY 40503
Lucy Pacholik

Project	HP Leachate Analysis
Entered By	Lynn Ellis
Date Reported	2/28/2023
Date Received	2/10/2023
Date Approved	2/28/2023

Test	Method	Result	Units	MRL	Date	Initials	Qualifiers
1004919-01	**HP Leachate**		**2/10/23 09:15**				
Potassium, K	EPA 200.7	11	mg/L	2	2/21/2023	KM	
Selenium, Se	EPA 200.7	<0.10	mg/L	0.1	2/21/2023	KM	
Silver, Ag	EPA 200.7	<0.0025	mg/L	0.0025	2/16/2023	KM	
Sodium, Na	EPA 200.7	32.0	mg/L	5	2/21/2023	KM	
Zinc, Zn	EPA 200.7	<0.01	mg/L	0.01	2/16/2023	KM	

CL = Analysis performed by client.

Approved By Ray Fouser

Ray Fouser, P.E.

Lab No: EC:

FOUSER ENVIRONMENTAL 1004919-01 • Versailles, Kentucky 40383 • Phone (859) 873-6211 lab@fouser.com

CHAIN OF CUSTODY RECORD

SHADED AREA FOR LAB USE ONLY

Client/Company Ordering Test:	Location/Address:	Other Sample Related Remarks:
Tetra Tech		PH – 5.96 cond 6.99 Temp 12.4
Sampler (Signature):	PO#	Sample Description

FES Lab #	Collection Date	Collection Time	Sample ID / Location	Grab/ Comp	Matrix	Pres.	Cont.	Vol./Wgt.	Analyses Required
	2/7/10/23	9:15	Leachate	grab	lt	X	pb	1L.	BOD, TSS, TDS, Cl–
				grab	lt	SA	pb	8 oz.	NO3+NO2, TKN, NH3-N, Phos, COD
				grab	lt	SH+ZA	pb	8 oz.	S=
				grab	lt	NA	pb	8 oz.	metals*, hardness
				grab	lt	X	ag	1 L.	2-terpineol, Benzoic acid, p-cresol, Phenol

Relinquished By:	Received By:	Date	Time (24 hr)
	lab CSF	2/10/23	1027.
Relinquished By:	Received By:	Date	Time (24 hr)
Relinquished By:	Received By:	Date	Time (24 hr)
Relinquished By:	Received By:	Date	Time (24 hr)

Shipping Conditions: ☑ Iced ☐ Ambient
Container Temperature: 8.6 °C
IR used: 1 **CF** 0
Holding times acceptable? ☐ Yes ☐ No
Data entered by: _____
Method of Delivery:
☐ FES ☑ Client ☐ UPS/Fed Ex ☐ Other

MATRIX CODES:
dw - drinking water; ww – wastewater; gw – groundwater; su – surface water; sw - storm water; oil – oil; s – solid; lt – leachate; sl – sludge; o - other

PRESERVATION CODES:
NA – Nitric Acid (HNO_3); ST – Sodium Thiosulfate ($Na_2S_2O_3$); ZA – Zinc Acetate ($Zn(O_2CCH_3)_2$)
SA – Sulfuric Acid (H_2SO_4); HA – Hydrochloric Acid (HCl); AA - Ascorbic Acid ($C_6H_8O_6$)
AC – Ammonium Chloride; SH – Sodium Hydroxide (NaOH); PA – Phosphoric Acid (H_3PO_4)
X – None; CS – Copper Sulfate ($CuSO_4$)

CONTAINER CODES: : gb – glass bottle; pb – plastic bottle; pba – plastic bag; ag – amber glass bottle; ap – amber plastic bottle

* As, Ba, Cd, Ca, Cr, Fe, Pb, Mg, Mn, Hg, K, Se, Ag, Na, Zn

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859.873.6211 lab@fouser.com

ACCREDITED
ISO/IEC 17025:2017
CERT #5293.01

Certificate of Analysis

#1005170030723132408

Tetra Tech, Inc.
424 Lewis Hargett Circle, Suite 110
Lexington, KY 40503
Lucy Pacholik

Project	HP Leachate Analysis
Entered By	Lynn Ellis
Date Reported	3/7/2023
Date Received	2/22/2023
Date Approved	3/7/2023

Test	Method	Result	Units	MRL	Date	Initials	Qualifiers
1005170-01	**HP Leachate**		**2/22/23 10:30**				
pH	SM 4500 H+B	6.09	SU		2/22/2023	CL	
Temperature	SM 2550 B	15.6	ºC		2/22/2023	CL	
Conductivity	SM 2510 B	828	µMHO/CM	10	2/22/2023	CL	
BOD, 5 Day	SM 5210 B	9	mg/L	3	2/28/2023	CB	
Total Suspended Solids	SM 2540 D	28	mg/L	2	2/22/2023	CB	
Total Dissolved Solids	SM 2540 C	552	mg/L	40	2/14/2023	CB	
Hardness	EPA 130.1	434	mg/L	25	3/3/2023	CT	
Chloride	EPA 300.0	40	mg/L	10	2/22/2023	RF	
Sulfide	SM 4500-S2 D	<0.05	mg/L	0.05	2/27/2023	CT	
TKN	EPA 351.2	9.3	mg/L	1	3/1/2023	CT	
Nitrate+Nitrite	EPA 353.2	0.3	mg/L	0.1	2/24/2023	CC	
Ammonia, NH3-N	SM 4500-NH3 D	9.49	mg/L	0.1	3/2/2023	CT	
Phosphorus, Total	SM 4500-P E	0.24	mg/L	0.125	2/23/2023	CT	
COD	EPA 410.4	26	mg/L	10	3/6/2023	CT	
Phenol	SW-8270C	<0.01	mg/L	0.01	3/1/2023	AE	
Benzoic acid	SW-8270C	<0.02	mg/L	0.02	3/1/2023	AE	
a-Terpineol	SW-8270C	<0.01	mg/L	0.01	3/1/2023	AE	
m,p-cresol	SW-8270C	<0.01	mg/L	0.01	3/1/2023	AE	
Arsenic, As	EPA 200.7	0.01	mg/L	0.01	2/24/2023	KM	
Barium, Ba	EPA 200.7	0.09	mg/L	0.01	2/24/2023	KM	
Cadmium, Cd	EPA 200.7	<0.0025	mg/L	0.0025	2/24/2023	KM	
Calcium, Ca	EPA 200.7	122.0	mg/L	1	2/24/2023	KM	
Chromium, Cr	EPA 200.7	<0.01	mg/L	0.01	2/24/2023	KM	
Iron, Fe	EPA 200.7	20.0	mg/L	0.2	2/24/2023	KM	
Lead, Pb	EPA 200.7	<0.01	mg/L	0.01	2/24/2023	KM	
Magnesium, Mg	EPA 200.7	17.0	mg/L	0.5	2/24/2023	KM	
Manganese, Mn	EPA 200.7	2.90	mg/L	0.1	2/24/2023	KM	
Mercury, Hg	EPA 245.1	<0.0002	mg/L	0.0002	3/3/2023	KM	

Lab No: EC:

FOUSER ENVIRONMENTAL SERVICES, LTD
LABORATORY/CONSULTING
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ISO/IEC 17025:2017
CERT #5293.01

Certificate of Analysis

#1005170030723132408

Tetra Tech, Inc.
424 Lewis Hargett Circle, Suite 110
Lexington, KY 40503
Lucy Pacholik

Project	HP Leachate Analysis
Entered By	Lynn Ellis
Date Reported	3/7/2023
Date Received	2/22/2023
Date Approved	3/7/2023

Test	Method	Result	Units	MRL	Date	Initials	Qualifiers
1005170-01	**HP Leachate**		**2/22/23 10:30**				
Potassium, K	EPA 200.7	10	mg/L	2	2/27/2023	KM	
Selenium, Se	EPA 200.7	<0.01	mg/L	0.01	2/24/2023	KM	
Silver, Ag	EPA 200.7	<0.0025	mg/L	0.0025	2/24/2023	KM	
Sodium, Na	EPA 200.7	31.1	mg/L	5	2/27/2023	KM	
Zinc, Zn	EPA 200.7	<0.01	mg/L	0.01	2/24/2023	KM	

AE = Analysis performed by Alloway Environmental, KY Cert #90018
CL = Analysis performed by client.

Approved By Ray Fouser

Ray Fouser, P.E.

Lab No: EC:

FOUSER ENVIRONMENTA

1005170-01

ue • Versailles, Kentucky 40383 • Phone (859) 873-6211 lab@fouser.com

SHADED AREA FOR LAB USE ONLY

CHAIN OF CUSTODY RECORD

Client/Company Ordering Test: **Tetra Tech**

Location/Address:

Other Sample Related Remarks: **Field Analyses** pH 6.09 Temp. 15.6 Conductivity 828

Sampler (Signature): Shawn Ellis

PO#

FES Lab #	Collection Date	Collection Time	Sample ID / Location	Grab/ Comp	Matrix	Pres.	Cont.	Vol./ Wgt.	Analyses Required
	2/22/23	10:30	HP Leachate	grab	lt	X	pb	1 L	BOD, TSS, TDS, Chloride
	2/22/23	10:30	HP Leachate	grab	lt	SA	pb	8 oz	NO3+NO2,TKN,NH3-N,Phos.,COD
	2/22/23	10:30	HP Leachate	grab	lt	SH+ZA	pb	8 oz	Sulfide
	2/22/23	10:30	HP Leachate	grab	lt	NA	pb	8 oz	*Metals, Hardness
	2/22/23	10:30	HP Leachate	grab	lt	X	ag	1 L	a-Terpineol, Benzoic Acid, p-Cresol, Phenol

Relinquished By: Shawn Ellis	Received By: Lab, Lynn Ellis	Date 2/22/23	Time (24 hr) 11:55
Relinquished By:	Received By:	Date	Time (24 hr)
Relinquished By:	Received By:	Date	Time (24 hr)
Relinquished By:	Received By:	Date	Time (24 hr)

Shipping Conditions: ☐ Iced ☐ Ambient
Container Temperature: 13.4 °C
IR used: 1 **CF** 0
Holding times acceptable? ☐ Yes ☐ No
Data entered by: _____
Method of Delivery:
☐ FES ☑ Client ☐ UPS/Fed Ex ☐ Other

MATRIX CODES: ww – wastewater; gw – groundwater; su – surface water; dw - drinking water; oil – oil; s – solid; lt – leachate; sw - storm water; sl – sludge; o - other

PRESERVATION CODES: ST – Sodium Thiosulfate ($Na_2S_2O_3$); ZA – Zinc Acetate ($Zn(O_2CCH_3)_2$); NA – Nitric Acid (HNO_3); HA – Hydrochloric Acid (HCl); AA - Ascorbic Acid ($C_6H_8O_6$); SA – Sulfuric Acid (H_2SO_4); SH – Sodium Hydroxide (NaOH); PA – Phosphoric Acid (H_3PO_4); AC – Ammonium Chloride; X – None; CS – Copper Sulfate ($CuSO_4$)

CONTAINER CODES: : gb – glass bottle; pb – plastic bottle; pba – plastic bag; ag – amber glass bottle; ap – amber plastic bottle

*As,Ba,Cd,Ca,Cr,Fe,Pb,Mg,Mn,Hg,K,Se,Ag,Na,Zn

FOUSER ENVIRONMENTAL SERVICES, LTD
LABORATORY/CONSULTING
859.873.6211 lab@fouser.com

Certificate of Analysis

#1006919053023164850

Tetra Tech, Inc.
424 Lewis Hargett Circle, Suite 110
Lexington, KY 40503
Lucy Pacholik

Project HP Leachate Analysis
Entered By Lynn Ellis
Date Reported 5/30/2023
Date Received 5/5/2023
Date Approved 5/30/2023

Test	Method	Result	Units	MRL	Date	Initials	Qualifiers
1006919-01	**HP Well A-10**		**5/5/23 09:30**				
pH	SM 4500 H+B	6.96	SU		5/5/2023	CL	
Temperature	SM 2550 B	13.8	ºC		5/5/2023	CL	
Conductivity	SM 2510 B	612	µMHO/CM	10	5/5/2023	CL	
BOD, 5 Day	SM 5210 B	4	mg/L	6	5/10/2023	CB	
Total Suspended Solids	SM 2540 D	14	mg/L	2	5/10/2023	CB	
Total Dissolved Solids	SM 2540 C	300	mg/L	40	5/11/2023	CT	
Hardness	EPA 130.1	330	mg/L	25	5/5/2023	CC	
Chloride	EPA 300.0	5.6	mg/L	10	5/12/2023	RF	J
Sulfide	SM 4500-S2 D	<0.05	mg/L	0.05	5/8/2023	CT	
TKN	EPA 351.2	<1.0	mg/L	1	5/19/2023	CC	
Nitrate+Nitrite	EPA 353.2	<0.1	mg/L	0.1	5/9/2023	HL	
Ammonia, NH3-N	SM 4500-NH3 D	0.24	mg/L	0.1	5/8/2023	CB	
Phosphorus, Total	SM 4500-P E	0.13	mg/L	0.125	5/12/2023	HL	
COD	EPA 410.4	<10	mg/L	10	5/11/2023	CT	
Phenol	SW-8270C	<0.01	mg/L	0.01	5/16/2023	AE	
Benzoic acid	SW-8270C	<0.05	mg/L	0.05	5/16/2023	AE	
a-Terpineol	SW-8270C	<0.01	mg/L	0.01	5/16/2023	AE	
m,p-cresol	SW-8270C	<0.01	mg/L	0.01	5/16/2023	AE	
Arsenic, As	EPA 200.7	<0.10	mg/L	0.1	5/18/2023	KM	
Barium, Ba	EPA 200.7	<0.10	mg/L	0.1	5/18/2023	KM	
Cadmium, Cd	EPA 200.7	<0.0025	mg/L	0.0025	5/17/2023	KM	
Calcium, Ca	EPA 200.7	73.0	mg/L	1	5/18/2023	KM	
Chromium, Cr	EPA 200.7	<0.10	mg/L	0.1	5/18/2023	KM	
Iron, Fe	EPA 200.7	1.25	mg/L	0.01	5/17/2023	KM	
Lead, Pb	EPA 200.7	<0.01	mg/L	0.01	5/17/2023	KM	
Magnesium, Mg	EPA 200.7	8.4	mg/L	0.5	5/18/2023	KM	
Manganese, Mn	EPA 200.7	0.20	mg/L	0.1	5/18/2023	KM	
Mercury, Hg	EPA 245.1	<0.0002	mg/L	0.0002	5/25/2023	KM	

Lab No: EC:

FOUSER ENVIRONMENTAL SERVICES, LTD
LABORATORY/CONSULTING
859.873.6211 lab@fouser.com

Certificate of Analysis

#1006919053023164850

Tetra Tech, Inc.
424 Lewis Hargett Circle, Suite 110
Lexington, KY 40503
Lucy Pacholik

Project	HP Leachate Analysis
Entered By	Lynn Ellis
Date Reported	5/30/2023
Date Received	5/5/2023
Date Approved	5/30/2023

Test	Method	Result	Units	MRL	Date	Initials	Qualifiers
1006919-01	**HP Well A-10**		**5/5/23 09:30**				
Potassium, K	EPA 200.7	<2	mg/L	2	5/24/2023	KM	
Selenium, Se	EPA 200.7	<0.10	mg/L	0.1	5/18/2023	KM	
Silver, Ag	EPA 200.7	<0.0025	mg/L	0.0025	5/17/2023	KM	
Sodium, Na	EPA 200.7	7.0	mg/L	5	5/24/2023	KM	
Zinc, Zn	EPA 200.7	0.02	mg/L	0.01	5/17/2023	KM	

AE = Analysis performed by Alloway Environmental, KY Cert #90018
CL = Analysis performed by client.

Approved By Ray Fouser

Ray Fouser, P.E.

Qualifiers

J = The reported result is less than the MRL but greater than or equal to the MDL and the concentration is an approximate value.

Lab No: EC:

FOUSER ENVIRONMENTAL 1006919-01 , Versailles, Kentucky 40383 • Phone (859) 873-6211 lab@fouser.com

SHADED AREA FOR LAB USE ONLY

CHAIN OF CUSTODY RECORD

Client/Company Ordering Test: **Tetra Tech**

Location/Address:

Other Sample Related Remarks: **Field Analyses** pH 6.96 Temp. 13.8 Conductivity 612

Sampler (Signature): Shawn Ellis

PO#

Sample Description

FES Lab #	Collection Date	Collection Time	Sample ID / Location	Grab/ Comp	Matrix	Pres.	Cont.	Vol./ Wgt.	Analyses Required
	5/5/23	9:30	HP Well A-10	grab	gw	X	pb	1 L	BOD, TSS, TDS, Chloride
			HP Well A-10	grab	gw	SA	pb	8 oz	NO3+NO2,TKN,NH3-N,Phos.,COD
			HP Well A-10	grab	gw	SH+ZA	pb	8 oz	Sulfide
			HP Well A-10	grab	gw	NA	pb	8 oz	*Metals, Hardness
	5/5/23	9:31	HP Well A-10	grab	gw	X	ag	1 L	a-Terpineol, Benzoic Acid, p-Cresol, Phenol

Relinquished By: Shawn Ellis	Received By: Lab, Lynn Ellis	Date 5/5/23	Time (24 hr) 11:45
Relinquished By:	Received By:	Date	Time (24 hr)
Relinquished By:	Received By:	Date	Time (24 hr)
Relinquished By:	Received By:	Date	Time (24 hr)

Shipping Conditions: ☑ Iced ☐ Ambient
Container Temperature: 11 °C °C
IR used: 1 **CF** 0
Holding times acceptable? ☑ Yes ☐ No
Data entered by: YR
Method of Delivery:
☐ FES ☑ Client ☐ UPS/Fed Ex ☐ Other

MATRIX CODES: dw - drinking water; ww – wastewater; oil – oil; sl – sludge; sw - storm water; gw – groundwater; s – solid; o - other; su – surface water; lt – leachate

PRESERVATION CODES: NA – Nitric Acid (HNO_3); SA – Sulfuric Acid (H_2SO_4); AC – Ammonium Chloride; ST – Sodium Thiosulfate ($Na_2S_2O_3$); HA – Hydrochloric Acid (HCl); SH – Sodium Hydroxide (NaOH); X – None; ZA – Zinc Acetate ($Zn(O_2CCH_3)_2$); AA - Ascorbic Acid ($C_6H_8O_6$); PA – Phosphoric Acid (H_3PO_4); CS – Copper Sulfate ($CuSO_4$)

CONTAINER CODES: : gb – glass bottle; pb – plastic bottle; pba – plastic bag; ag – amber glass bottle; ap – amber plastic bottle

*As,Ba,Cd,Ca,Cr,Fe,Pb,Mg,Mn,Hg,K,Se,Ag,Na,Zn