CITY OF FRANKLIN, TENNESSEE
PROFESSIONAL SERVICES AGREEMENT
COF Contract No.2020-0012

THIS PROFESSIONAL SERVICES AGREEMENT ("Agreement") is by and between the City of Franklin, Tennessee, hereinafter referenced as City, and **HAZEN** hereinafter referenced as Consultant, who mutually agree as follows:

DECLARATIONS. City desires to retain Consultant to provide engineering, related technical, and other services in connection with City's project hereinafter referenced as Project. The Project is described as follows:

FRANKLIN SE WASTEWATER CAPACITY SCOPE

1. SCOPE OF SERVICES. Consultant shall provide engineering related technical services for the Project in accordance with the Scope of Services (Services) as found in Attachment A which shall be considered as an integral part hereof.

2. Consultant shall submit as a part of Attachment A an individual Fee Schedule and a Completion Schedule for the Project based on the detailed Scope of Services.

3. In event of a conflict between this Agreement and the attached document(s), this Agreement shall supersede conflicting terms and conditions.

4. Consultant shall be paid on a monthly basis for work performed based on the Fee Schedule as contained in Attachment A in the Amount of Two Million Eight Hundred Twenty-Two Thousand Three Hundred dollars and Zero cents. ($2,822,300.00).

The Board of Mayor and Aldermen approved this agreement on the _____ day of _____ 2020.

TERMS AND CONDITIONS FOR PROFESSIONAL SERVICES

ARTICLE 1. SERVICES. Consultant will:

1.1 Act for City in a professional manner, using that degree of care and skill ordinarily exercised by and consistent with standards of competent consultants using the standards in the industry:

1.2 Consider all reports to be confidential and distribute copies of the same only to those persons specifically designated by the City.

1.3 Perform all services under the general direction of a senior professional employee, licensed and/or registered in the State of Tennessee, when appropriate.

1.4 Designate, in writing, the sole Project representative to coordinate with City the Services to be provided, including all contact information.

1.5 Unless provided for in the Project Scope of Services (Attachment A), Consultant shall perform all Services with his own forces (employees). Should sub-consultants be proposed to be used in the Project, a listing of said sub-consultants with Services to be performed shall be provided. After approval of this Agreement, no substitute for sub-consultants shall be allowed unless approved by City.

1.6 Retain pertinent records relating to the services performed for a period of seven (7) years following the completion of the work; during this period the records shall be available for review by City at all reasonable times.

ARTICLE 2. CITY'S RESPONSIBILITIES. City, or its authorized representative, will:

2.1 Provide Consultant with all information regarding the Project, which is available to, or reasonably obtainable by, the City.

2.2 Furnish right-of-entry onto the Project site for Consultant's necessary field studies and surveys. Consultant will endeavor to restore the site to its original condition and shall remain solely liable for all damages, costs and expenses, including reasonable attorneys' fees, for failure to make such restoration.

2.3 Designate, in writing, the sole Project representative to coordinate with and direct the Consultant, including all contact information.

2.4 Guarantee to Consultant that it has the legal capacity to enter into this contract and that sufficient monies are available to fund Consultant's compensation.

ARTICLE 3. GENERAL CONDITIONS.

3.1 Consultant, by the performance of services covered hereunder, does not in any way assume, abridge or abrogate any of those duties, responsibilities or authorities customarily vested in other professionals or agencies participating in the Project.

3.2 Consultant shall be responsible for the acts or omissions of any party involved in concurrent or subsequent phases of the Project acting upon written instruction issued by the Consultant.

3.3 Neither City nor Consultant may assign or transfer its duties or interest in this Agreement without written consent of the other party.

3.4 ALLOCATION OF RISK AND LIABILITY; GENERAL. Considering the potential liabilities that may exist during the performance of the services of this Agreement, the relative benefits and risks of the Project, and the Consultant's fee for the services rendered, and in consideration of the promises contained in this Agreement, the City and the Consultant agree to allocate and limit such liabilities in accordance with this Article.

3.5 INDEMNIFICATION. Consultant agrees to indemnify and hold City harmless from and against legal liability for all claims, judgments, losses, damages, and expenses to the extent such claims, judgments, losses, damages, or expenses are caused by Consultant's negligent act, error or omission in the performance of the services of this Agreement. In the event judgments, losses, damages, or expenses are caused by the joint or concurrent negligence of Consultant and City, they shall be borne by each party in proportion to its own negligence.

3.5.1 SURVIVAL. The terms and conditions of this paragraph shall survive completion of this services agreement.

3.6 LIMITATIONS OF RESPONSIBILITY. Consultant shall not be responsible for (a) construction means, methods, techniques, sequences, procedures, or safety precautions and programs in connection with the Project unless specifically undertaken in Attachment A, Scope of Services ; (b) the failure of any contractor, subcontractor, Consultant, or other Project participant, not under contract to Consultant, to fulfill contractual responsibilities to City or to comply with federal, state, or local laws, regulations, and codes; or (c) procuring permits, certificates, and licenses required for any construction unless such procurement responsibilities are specifically assigned to Consultant in Attachment A, Scope of Services.

ARTICLE 4. TERMINATION BY THE CITY. The City may terminate this Agreement in accordance with the following terms and conditions:

4.1 Termination for Convenience. The City may, when in the interests of the City, terminate performance under this Agreement with the Consultant, in whole or in part, for the convenience of the City. The City shall give written notice of such termination to the Consultant specifying when termination becomes effective. The Consultant shall incur no further obligations in connection with the work so terminated, other than warranties and guarantees for completed work and installed equipment, and the Consultant shall stop work when such termination becomes

effective. The Consultant shall also terminate outstanding orders and subcontracts for the affected work. The Consultant shall settle the liabilities and claims arising out of the termination of subcontracts and orders. The City may direct the Consultant to assign the Consultant's right, title and interest under termination orders or subcontracts to the City or its designee. The Consultant shall transfer title and deliver to the City such completed or partially completed work and materials, equipment, parts, fixtures, information and Contract rights as the Consultant has in its possession or control. When terminated for convenience, the Consultant shall be compensated as follows:

(1) The Consultant shall submit a termination claim to the City specifying the amounts due because of the termination for convenience together with costs, pricing or other data required by the City. If the Consultant fails to file a termination claim within one (1) year from the effective date of termination, the City shall pay the Consultant the amount the City deems the Consultant is due.

(2) The City and the Consultant may agree to the compensation, if any, due to the Consultant hereunder.

(3) Absent agreement to the amount due to the Consultant, the City shall pay the Consultant the following amounts:

(a) Contract costs for labor, materials, equipment and other services accepted under this Agreement;

(b) Reasonable costs incurred in preparing to perform and in performing the terminated portion of the work, and in terminating the Consultant's performance, plus a fair and reasonable allowance for direct job site overhead and earned profit thereon (such profit shall not include anticipated profit or consequential damages); provided however, that if it reasonably appears that the Consultant would have not profited or would have sustained a loss if the entire Agreement would have been completed, no profit shall be allowed or included and the amount of compensation shall be reduced to reflect the anticipated rate of loss, if any;

The total sum to be paid the Consultant under this Section shall not exceed the total Agreement Price, as properly adjusted, reduced by the amount of payments otherwise made, and shall in no event include duplication of payment.

4.2 Termination for Cause. If the Consultant does not perform the work, or any part thereof, in a timely manner, supply adequate labor, supervisory personnel or proper equipment or materials, or if it fails to timely discharge its obligations for labor, equipment and materials, or proceeds to disobey applicable law, or otherwise commits a violation of a material provision of this Agreement, then the City, in addition to any other rights it may have against the Consultant or others, may terminate the performance of the Consultant, in whole or in part at the City's sole option, and assume possession of the Project Plans and materials and may complete the work.

In such case, the Consultant shall not be paid further until the work is complete. After Completion has been achieved, if any portion of the Contract Price, as it may be modified hereunder, remains after the cost to the City of completing the work, including all costs and expenses of every nature incurred, has been deducted by the City, such remainder shall belong to the Consultant. Otherwise, the Consultant shall pay and make whole the City for such cost. This obligation for payment shall survive the termination of the Agreement.

In the event the employment of the Consultant is terminated by the City for cause pursuant to this Section and it is subsequently determined by a Court of competent jurisdiction that such termination was without cause, such termination shall thereupon be deemed a Termination for Convenience under this Section and the provisions of Section 4.1 shall apply.

4.3 Termination for Non-Appropriation. The City may also terminate this Agreement, in whole or in part, for non-appropriation of sufficient funds to complete or partially complete the Project, regardless of the source of such funds, and such termination shall be on the terms of Section 4.1.

4.4 The City's rights under this Section shall be in addition to those contained elsewhere herein or provided by law.

ARTICLE 5. SCOPE OF SERVICES. Consultant shall provide the Services as described in Attachment A, Scope of Services.

5.1 By mutual agreement, this Agreement and scope can be amended by the parties. The scope and fee for any additional tasks or services under such amendment shall be mutually negotiated and agreed to in writing prior to beginning such additional tasks or services.

5.2 ENVIRONMENTAL RESPONSIBILITY.
Where drilling/sampling services are involved, the samples obtained from the Project site are the property of the City. Should any of these samples be recognized by the Consultant to be contaminated, the City shall remove them from the Consultant's custody and transport them to a disposal site, all in accordance with applicable government statutes, ordinances, and regulations. For all other samples, the Consultant shall retain them for a sixty (60)-day period following the submission of the drilling/sampling report unless the City directs otherwise; thereafter, the Consultant shall discard the samples in accordance with all federal, state and local laws.

ARTICLE 6. SCHEDULE.

6.1 TIME OF THE ESSENCE. The parties agree that time is of the essence with respect to the parties' performance of all provisions of the Agreement.

6.2 Before executing this Agreement, the Consultant shall have prepared and submitted for approval to the City a Completion Schedule for the Project with milestones for the various stages (tasks) of the Services as outlined in the Scope of Services. The Consultant shall submit and obtain the City's approval for any proposed changes to the logic, durations, sequences, or timing of tasks as approved in the Completion Schedule.

6.3 FORCE MAJEURE. Neither party will be liable to the other for any delay or failure to perform any of the services or obligations set forth in this Agreement due to causes beyond its reasonable control, and performance times will be considered extended for a period of time equivalent to the time lost because of such delay plus a reasonable period of time to allow the parties to recommence performance of their respective obligations hereunder. Should a circumstance of force majeure last more than ninety (90) days, either party may by written notice to the other terminate this Agreement. The term "force majeure" as used herein shall mean the following: acts of God; strikes, lockouts or other industrial disturbances; acts of public enemies; orders or restraints of any kind of the government of the United States or of the State or any of their departments, agencies or officials, or any civil or military authority; insurrections, riots, landslides, earthquakes, fires, storms, tornadoes, droughts, floods, explosions, breakage or accident to machinery, transmission pipes or canals; or any other cause or event not reasonably within the control of either party.

6.4 Should City request changes in the scope, extent, or character of the Project, the fee and the time of performance of Consultant's Services as indicated in Attachment A shall be adjusted equitably.

ARTICLE 7. USE OF DOCUMENTS, DATA.

7.1 All Documents, including, but not limited to, reports, drawings, specifications, and computer software prepared by Consultant pursuant to this Agreement are instruments of service in respect to the Project. The City shall retain an ownership and property interest therein whether or not the Project is completed.

7.1.1 USE OF DATA SYSTEMS: The City maintains all rights to data systems and data (including derivative or hidden data such as metadata) created and used by Consultant through information supplied to the Consultant by the City.

7.1.2 DISCLOSURE OF DOCUMENTS/DATA. City may be required to disclose documents or data under state or federal law. City shall notify Consultant if a request for data or documents has been made and shall give Consultant a reasonable opportunity under the circumstances to respond to the request by redacting proprietary or other confidential information. Consultant waives any right to confidentiality of any document, e-mail or file it fails to clearly mark on each page as confidential or proprietary. In exchange, Consultant agrees to indemnify, defend, and hold harmless City for any claims by third parties relating thereto or arising out of (i) the City's failure to disclose such documents or information required to be disclosed by law, or (ii) the City's release of documents as a result of City's reliance upon Consultant representation that materials supplied by Consultant (in full or redacted form) do not contain trade secrets or proprietary information, provided that the City impleads Consultant and Consultant assumes control over that claim.

7.2 By execution of this Agreement, Consultant and his sub-consultant(s) grant the City a royalty-free, perpetual, irrevocable, and assignable license to use any and all intellectual property interest Consultant or his sub-consultant(s) possess to any drawings, details, specifications, documents, and other information created before each of their first involvement with the Project and subsequently incorporated into the Project's documents. City-furnished data that may be relied upon by Consultant is limited to the printed copies that are delivered to the Consultant pursuant to Article 2 of this Agreement. Any copyrighted electronic files furnished by City shall be used by Consultant only for the Project as described herein. City's posting or publication of such documents created by Consultant for City shall constitute fair use and shall not constitute an infringement of Consultant's copyright, if any.

7.3 Documents that may be relied upon by City are limited to the printed copies (also known as hard copies) that are signed or sealed by the Consultant. Files in electronic media format of text, data, graphics, or of other types that are furnished by Consultant to City are only for

convenience of City, unless the delivery of the Project in electronic media format has been dictated in Attachment A, Scope of Services. Any conclusion or information obtained or derived from electronic files provided for convenience will be at the user's sole risk.

7.4 Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within sixty (60) days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the party delivering the electronic files. Unless stated otherwise herein, Consultant shall not be responsible to maintain documents stored in electronic media format after acceptance by City.

7.5 When transferring documents in electronic media format, Consultant makes no representations as to long term compatibility, usability, or readability, of documents resulting from the use of software application packages, operating systems, or computer hardware differing from that as required of, and used by, Consultant at the beginning of this Project.

7.6 City may make and retain copies of Documents for information and reference in connection with use on the Project by the City, or his authorized representative. Such Documents are not intended or represented to be suitable for reuse by City or others on extensions of the Project or on any other project. Any such reuse or modifications without written verification or adaptation by Consultant, as appropriate for the specific purpose intended, will be at City's sole risk and without liability or legal exposure to the Consultant or to Consultant's sub-consultants.

7.7 If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

7.8 Any verification or adaptation of the Documents for extensions of the Project or for any other project will entitle Consultant to further compensation at rates to be agreed upon by City and Consultant.

ARTICLE 8. INSURANCE.

8.1 During the performance of the Services under this Agreement, Consultant shall maintain the following minimum insurance:

a) General Liability Insurance with a combined single limit of $1,000,000 per occurrence and $2,000,000 annual aggregate.

b) Automobile Liability Insurance with a combined single limit of $1,000,000 for each person and $1,000,000 for each accident.

c) Workers' Compensation Insurance Coverage A in accordance with statutory requirements and Coverage B, Employer's Liability Insurance, with a limit of $500,000 for each occurrence.

d) Professional Liability Insurance with a limit of $1,000,000 annual aggregate.

8.2 Consultant shall add the City an additional insured on all policies unless otherwise prohibited.

8.3 Consultant shall, upon execution of this Agreement, furnish City certificates of insurance, which shall include a provision that such insurance shall not be canceled without at least thirty (30) days' written notice to City.

8.4 No insurance, of whatever kind or type is to be considered as in any way limiting other parties' responsibility for damages resulting from their activities in the execution of the Project. City agrees to include, or cause to be included, in the Project's construction contract, such requirements for insurance coverage and performance bonds by the Project's construction contractor as City deems adequate to indemnify City, Consultant, and other concerned parties against claims for damages and to insure compliance of work performance and materials with Project requirements.

ARTICLE 9. PAYMENT.

9.1 City will pay Consultant for services and expenses in accordance with the Fee Schedule proposal submitted for the Project as part of the Scope of Services. Consultant's invoices will be presented at the completion of the work or monthly and will be payable upon receipt. Payment is due upon presentation of invoice and is past due thirty (30) days from invoice date. City shall give prompt written notice of any disputed amount and shall pay the remaining amount.

9.2 Consultant shall be paid in full for all services under this Agreement, including City authorized overruns of the Project budget or unforeseen need for Consultant's services exceeding the original Scope of Services.

9.3 TRAVEL; EXPENSES

City shall reimburse reasonable expenses, including travel and meals, when specified in the Scope of Services, but only in accordance with the City's Travel and Expense Policy and Procedures Manual. The maximum amount will be applied as of the date of travel and as listed in the per diem reimbursement rates on the "CONUS" website developed by the United States General Services Administration, located at www.gsa.gov [click on 'per diem rates' under the 'etools' category].

ARTICLE 10. MISCELLANEOUS PROVISIONS

10.1 EQUAL EMPLOYMENT OPPORTUNITY. In connection with this Agreement and the Project, City and Consultant shall not discriminate against any employee or applicant for employment because of race, color, sex, national origin, disability or marital status. City and Consultant will take affirmative action to ensure that the contractor used for the

Project does not discriminate against any employee and employees are treated during employment without regard to their race, age, religion, color, gender, national origin, disability or marital status. Such action shall include, but not be limited to, the following: 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.

10.1.1 Consultant shall insert the foregoing provision in all contracts relating to this Project.

10.2 TITLE VI – CIVIL RIGHTS ACT OF 1964. City and Consultant shall comply with all the requirements imposed by Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d), 49 C.F.R., Part 21, and related statutes and regulations.

10.2.1 Consultant shall insert the foregoing provision in all contracts relating to this Project.

10.3 NO THIRD PARTY RIGHTS CREATED. City and Consultant each binds itself and its successors, executors, administrators, permitted assigns, legal representatives and, in the case of a partnership, its partners, to the other party to this Agreement and to their successors, executors, administrators, permitted assigns, legal representatives and partners of such other party in respect to all provisions of this Agreement. The Services provided for in this Agreement are for the sole use and benefit of City and Consultant. Nothing in this Agreement shall be construed to give any rights or benefits to anyone other than City and Consultant.

10.4 WARRANTIES/LIMITATION OF LIABILITY/WAIVER. City reserves all rights afforded to local governments under law for all general and implied warranties. City does not waive any rights it may have to all remedies provided by law and therefore any attempt by Consultant to limit its liability shall be void and unenforceable.

ARTICLE 11. EXTENT OF AGREEMENT:

11.1 APPLICABLE LAW/CHOICE OF FORUM AND VENUE. This Agreement is made under and will be construed in accordance with the laws of the State of Tennessee without giving effect to that state's choice of law rules. The parties' choice of forum and venue shall be exclusively in the courts of Williamson County, Tennessee. Any provision of this Agreement held to violate a law or regulation shall be deemed void, and all remaining provisions shall continue in force.

11.2 ENTIRE AGREEMENT. This Agreement, including these terms and conditions, represent the entire Agreement between City and Consultant for this Project and supersedes all prior negotiations, representations or agreements, written or oral. This Agreement may be amended only by written instrument signed by City and Consultant.

ARTICLE 12. DISPUTE RESOLUTION, BREACH.

12.1 If a dispute should arise relating to the performance of or payment for the Services under this Agreement, the aggrieved party shall notify the other party of the dispute within a reasonable time after such dispute arises. During the pendency of any dispute, the parties shall continue diligently to fulfill their respective obligations hereunder. No arbitration or mediation shall be required as a condition precedent to filing any legal claim arising out of or relating to this Agreement. No arbitration or mediation shall be binding.

12.2 BREACH. Upon deliberate breach of the Agreement by either party, the non-breaching party shall be entitled to terminate the Agreement with notice, with all of the remedies it would have in the event of termination, and may also have such other remedies as it may be entitled to in law or in equity.

ARTICLE 13. SURVIVAL.

The provisions contained in this Professional Services Agreement shall survive the completion of or any termination of the Agreement, contract or other document to which it may accompany or incorporate by reference or which subsequently may be modified, unless expressly excepted from this Article upon consent of both parties.

BY: _____
Consultant's Signature
TITLE: _____
Date: _____

BY: _____
Dr. Ken Moore
Mayor
Date: _____

Approved as to Form:

_____
Maricruz R. Fincher, Staff Attorney

Hazen

Evaluation of Franklin's Southeastern Wastewater Capacity
January 20, 2020

Background

The City of Franklin owns and operates a 12 mgd Clean Water Facility (CWF) that is currently being upgraded to 16 mgd. The discharge of reclaimed water from this facility enters the Harpeth River at mile 85.2. The NPDES permit for this facility was issued June 1, 2017.

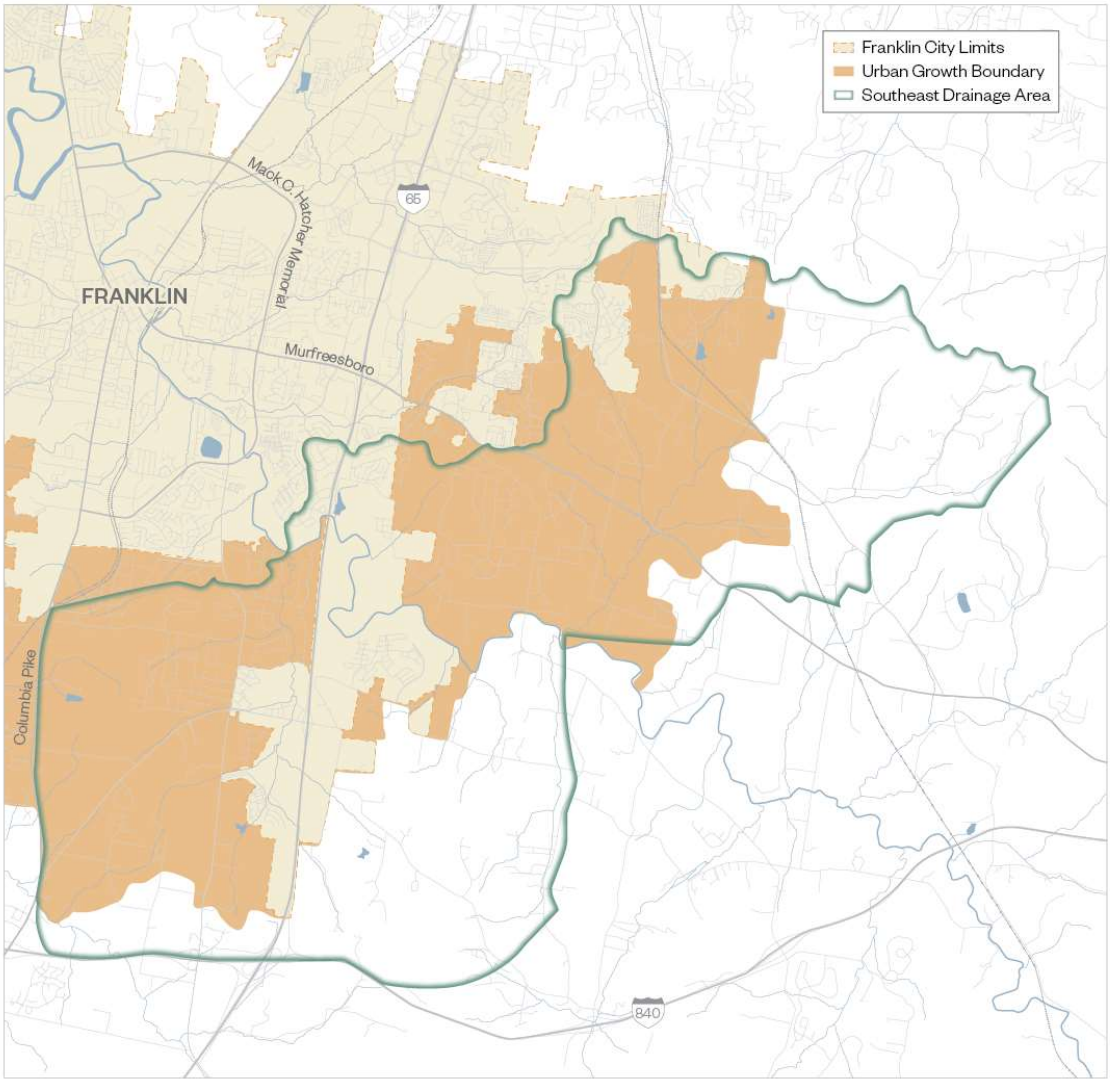
In addition to the CWF, the City owns and operates a 2.1 mgd water treatment plant (WTP) that receives raw water from a 114 million gallon open earthen reservoir that draws water from the Harpeth River at mile 89.2. The City also purchases finished water from Harpeth Valley Utilities District (HVUD).

In 2006, the City proposed to increase the withdrawal and upgrade the existing WTP facilities and requested an Aquatic Resource Alteration Permit (ARAP) for the increased withdrawal. The Tennessee Department of Environment and Conservation (TDEC) subsequently issued an ARAP authorizing an increase in the pumping capacity to 7,800 gpm (11.2 mgd) as long as a minimum of 10 cfs remains in the river after the withdrawal and the withdrawal was no more than 20% of the instantaneous flow. In the 2015 reissuance, the City and TDEC agreed to a requirement that withdrawal would only occur when the dissolved oxygen in the river was at least 5 mg/L.

The State of Tennessee has assessed the Harpeth River in the vicinity of Franklin as being impaired for total phosphorus, dissolved oxygen and sedimentation/siltation. In 2004, EPA developed a Total Maximum Daily Load (TMDL) for organic enrichment/low dissolved oxygen. EPA is currently developing watershed and water quality models that TDEC can use to develop an updated TMDL for the Harpeth River.

The City of Franklin's 2018 population estimate was just under 81,000 and is estimated to grow to between 98,000 to 150,000 by 2040. With this growth comes a sigifnicant increase in demand for water and wastewater services. Water demand projections for 2040 range from 10 mgd to 16 mgd. Wastewater demand estimates for 2040 range from 15 mgd to 23 mgd for areas served by the existing facility and Southeast drainage areas combined.

Much of the population growth is anticipated to occur east of I-65 with drainage patterns toward the south – especially in the Fivemile Creek and Goose Creek drainage basins. Much of the area, shown in the following figure, is located outside the existing service area.



It is critical to carefully consider alternatives to address the anticipated population growth and increase in wastewater flows in this growing area of Franklin. There are many alternatives to consider, including:

- Direct discharge to the Harpeth River
- Harpeth River baseflow augmentation through drip irrigation or rapid infiltration within the riparian area
- Aquifer recharge through drilled injection well(s)
- Irrigation
- Industrial/commercial
- Non-residential toilet flushing
- Discharge to Franklin's raw water supply reservoir or nearby quarry

Project Goals and Objectives

Key project objectives include the following:

- Effectively engage and educate local stakeholders on potential infrastructure improvement needs and long-term benefits.
- Evaluate alternatives to address growth projections in the area, including possible treatment alternatives that produce water that is safe for surface water discharge, managed aquifer recharge (rapid infiltration, drip irrigation or drilled well injection), non-potable reuse, potable reuse, or a combination thereof.
- Work with with Tennessee Department of Environment and Conservation – Division of Water Resources (TDEC-DWR) to develop a strategy that is consistent with state and federal requirements and is sound from a scientific and regulatory standpoint.
- Identifyall permits and authorizations necessary for implementation of selected improvements.
- Identify and validate technological approaches to meet updated TMDL water quality objectives for the Harpeth River.

To accomplish these objectives, the following major tasks are included in this project:

Task 1 – Project Initiation, Data Gathering and Evaluation

Task 2 – Pilot Test - Design and Operation

Task 3 – Alternatives Analysis

Task 4 – Support Services

Task 4.1 Regulatory Coordination

Task 4.2 Communications, Public Education and Involvement

Task 4.3 Project Management

Project Approach

Hazen's approach to the permitting and preliminary design of a potential South CWF is collaborative, methodical and by nature of the project, innovative. Our comprehensive approach will ensure the delivery of a reliable, adaptable, sustainable, and permittable solution to address Franklin's water resources needs, allowing the City to provide world-class service for its customers.

Scope of Work

Task 1 – Project Initiation, Data Gathering and Evaluation

Kick-Off Meeting

The Project Team will review the scope of work, budget, schedule, lines of communication, data needs, and major milestones associated with the project. A site visit to the facility location will facilitate discussions regarding potential layout, treatment processes and outfall locations.

Task 1.1 Basin Characterization

Desktop Study and Field Verification

Hazen will acquire data relevant to the project, including demographics, land use, property values, growth potential, water quality, reclaimed water infrastructure, drinking water wells and geography of the Harpeth River Watershed in the vicinity of Franklin, TN. From this information, Hazen will identify potential locations for non-point source practices to offset nutrient discharges, baseflow augmentation sites, and beneficial (non-potable) reuse customers or City owned parcels.

Hazen will customize GIS-based water master planning tools and dashboards to include potential reclaimed water users and infrastructure for the south drainage area along with potential locations for non-point source practices to offset nutrient discharges, baseflow augmentation sites and locations for potable and non-potable reuse water storage.

Hazen will conduct a workshop to review the basin characterization data, address any data gaps and demonstrate the selected GIS-based planning tool.

The findings of the Basin Characterization Study will be summarized in a draft technical memorandum (TM) submitted for City review. Hazen will conduct a TM review meeting prior to finalization of the TM.

Hydrogeological Investigation

A hydrogeologic investigation is necessary to characterize the groundwater that underlies the Harpeth River watershed in the vicinity of Franklin. Our subconsultant, Southeast Hydrogeology, will conduct an initial desk-top study to develop a conceptual hydrogeologic model and to prioritize sites for additional field investigations. The detailed scope of work is included in Appendix A. Thomas Ballard is the firm's principal hydrogeologist and has over 30 years of experience in subsurface investigations. Prior to initiation of the Study, Hazen will coordinate a meeting with the City and Southeast Hydrology to confirm study goals, objectives, and methods. Once confirmed, Hazen will also coordinate a meeting with TDEC to ensure that the study will be responsive to regulatory concerns.

The desktop study will include a review of published information on the area geology, hydrogeological characteristics, soils data, any previous dye-trace or karst study information and location of any municipal

water wells in the area and domestic wells through review of driller's logs. The desk-top study will also include use of a groundwater vulnerability model such as DRASTIC, PI or EPIK to estimate the potential for a local karst network to affect infiltration, recharge, and fate and transport of reclaimed water introduced to the aquifer via infiltration or well injection. The vulnerability model will use data from published information, the digital elevation model data, and ground cover data.

Following the desk-top study, Hazen will coordinate a meeting between the City and Southeast Hydrogeology to determine appropriate next steps.

To assess characteristics of the sites to be considered for drip irrigation and rapid infiltration, a soils evaluation will be conducted. This evaluation will be conducted according to the requirements of Chapter 17 of TDEC's Design Criteria for Sewage Works and will include test pits, soil profiles, and mapping. A nitrate loading model will also be developed to asses applicable nitrate loading rate. The allowable hydraulic loading rate, dependent upon soil characteristics, is compared to the allowable nitrogen loading rate which is based on the ground water standard of 10 mg/l nitrate-nitrite. The more stringent of the two is applied as the design loading rate.

To assess the efficacy of direct injection via groundwater wells into the karst features, two test wells will be advanced. The wells will be completed as Class V injection wells per TDEC requirements. Once completed short-term packer tests will be completed to estimate the injection capacity. Limited geophysics will also be conducted, if needed.

Many of the requirements for permitting can be met with the desk-top study (including the karst vulnerability assessment), the soil evaluation, and injection well assessment. Additional field work may be required to supplement these analyses including a Detailed Soil Survey (DSR) but is not included in this scope of work.

The findings of the hydrogeological investigation along with preliminary recommendations for injection well design, including pilot hole design and location will be compiled in a draft hydrogeologic investigation report. Hazen will coordinate a report review meeting with the City and Southeast Hydrogeology prior to finalization of the report.

Task 1.2 Evaluate Water Reclamation Technology/Reclaimed Water End Uses

Water reclamation is the process of treating wastewater such that the final product is suitable for beneficial reuse, thus minimizing effluent discharges to receiving waters. In the Harpeth River Watershed, consumptive reuse such as manufacturing, evapotranspiration, and closed-loop cooling systems can provide much-needed nutrient reduction.

Water Reclamation Technology

The level of treatment required for water reuse is determined by the intended use of the water and must always be fully protective of human health and the environment. In reuse applications with high potential for human contact, microbial contaminants are the primary concern and driver for treatment selection. Other constituents, such as nutrients and trace organic contaminants, may also be drivers for treatment

selection depending on discharge requirements or the reuse application. Single or multiple technologies may be added to conventional wastewater unit processes to achieve the desired barriers and finished water quality for selected reuse applications. Advanced treatment techniques , including enhanced biological nutrient removal, membrane bioreactors, ozone oxidation, biologically active carbon filtration (BAF), granular activated carbon (GAC) adsorption, advanced oxidation and ultraviolet (UV) disinfection will be evaluated.

Hazen will conduct a workshop to review the potential treatment technologies that can be used to meet the anticipated effluent criteria for the various end uses. The processes considered will include those previously installed at the WTP and will include coordination with the reservoir management plan currently in development.

Reclaimed Water End Uses

A summary of potential end-use options to be considered is presented below.

Non-Potable Reuse

Water reuse is a long-standing and established practice across the US, both from a regulatory and operational standpoint. Drivers for water reuse span water scarcity, increasingly stringent environmental discharge regulations, economic incentives, and an overall desire to match water use with water quality. Using reclaimed water for non-potable purposes produces the co-benefits of reducing constituent loadings to surface waters and conserving potable water. Hazen will identify opportunities for both traditional and innovative end uses including potential large capacity reclaimed water users, irrigation, surficial aquifer recharge, non-residential toilet flushing, wetland systems and rapid infiltration basins.

Potable Reuse

Hazen will research potable reuse systems across the country to identify practices that are applicable to Franklin, including treatment process selection, operational paradigms, and outreach.

Raw Water Supply Augmentation – In direct potable reuse, the reclaimed water is added to the raw water supply as it is treated. In Franklin's case, water from a potential South CWF could be pumped into the City's 114-MG water supply reservoir. The reclaimed water could also be pumped and temporarily stored nearby before being blended with raw water from the reservoir.

In addition to directly augmenting Franklin's water supply, several end uses could result in potable reuse. Baseflow augmentation through infiltration upstream of the water treatment plant would be considered indirect potable reuse with the soil matrix providing the environmental buffer. Similarly, direct aquifer injection would most likely be considered IPR with the aquifer providing the environmental buffer. Due to the proximity of the discharge to the water intake, direct discharge to the Harpeth River would also likely be considered potable reuse.

Baseflow Augmentation/Aquifer Recharge – Baseflow augmentation typically involves discharge of water directly into streams to provide for downstream uses. However, it can also refer to the temporary storage

of subsurface water in floodplains or shallow aquifers for later release to increase the magnitude and permanence of low flow. Baseflow augmentation through infiltration or irrigation has the advantage of additional pollutant removal through soil processes. Using the information obtained in the hydrogeologic study, Hazen will evaluate the feasibility of using reclaimed water from a potential South CWF for baseflow augmentation through practices such as rapid infiltration basins or drip irrigation.

Hazen has worked with a number of utilities that employ aquifer recharge, storage and recovery for disposal and/or reuse of highly treated effluent. Typically, reclaimed water is injected into subsurface formations for storage and in many cases, recovery for beneficial purposes. Direct injection has the benefit of a small footprint and depending upon the groundwater flow patterns could potentially impact baseflow in the Harpeth River. Hazen will use the information gathered in the hydrogeologic study to determine the potential for aquifer storage within the Harpeth River watershed.

Effluent Trading/Discharge to Harpeth River

Hazen will evaluate the feasibility of eliminating the point source load, and implementation of management practices such as riparian restoration and stream restoration to provide NPS offsets. In addition, Hazen will explore the possibility of a seasonal discharge to minimize nutrient loads to the river.

Regulatory Review

Hazen will compile and review non-potable and potable reuse regulations and guidance from across the United States. The review will include state-specific designations of allowable non-potable reuse applications and the associated required type of reclaimed water (e.g., Level 1 vs. Level 2; Class A vs. Class B). For each type of reclaimed water, the specific treatment requirements and concentrations limits will be noted. Ongoing development of non-potable reuse regulations in select states will also be reviewed, as some states are currently in the process of establishing or modifying regulatory language.

This review will also include potable reuse regulations from the states in which they exist. Additionally, recent literature regarding proposed regulatory frameworks for potable reuse will be reviewed to provide insight into the potential future regulatory landscape.

Tennessee does not currently have reuse regulations and is willing to work with systems in piloting reuse applications. We will work with TDEC to develop a regulatory approach for Franklin should this be the selected management method.

Hazen will conduct a workshop to review potable reuse and non-potable reuse regulatory policies as well as requirements for public access reuse, baseflow augmentation, ground water discharge, surface water discharge.

Upon completion of Task 1.2, Hazen will prepare a draft technical memorandum that describes feasible treatment schemes, a proposed regulatory approach, and summarizes possible end uses for reclaimed water from a potential new treatment facility. Hazen will conduct a TM review meeting prior to finalization of the TM.

Task 1 Deliverables:

- TM 1.1 Basin Characterization
- Hydrogeologic Study Report
- TM 1.2 Water Reclamation Technology and End Uses

Task 2 – Pilot Test Design and Operation

Pilot testing different technologies and processes will allow the City of Franklin to select and optimize a treatment train that best meets the needs of a new facility for the near- and long-term planning horizons. To facilitate representative pilot testing of multiple processes, technologies, and mechanical equipment, a pilot test site must be selected with access to the City's wastewater collection system.

The design, construction, and operation of a pilot plant enables the testing of treatment train(s) with isolated and independent flow, biology, and control from that of the existing treatment processes, while still benefitting from evaluation of the City's own raw wastewater. The boundaries of the pilot plant will begin at the wastewater collection system point of connection and extend to the final treatment process necessary for the selected effluent endpoints.

The specific treatment processes to be piloted will be determined during Task 2.1, during which treatment processes will be screened with respect to anticipated effluent criteria for surface water discharge and beneficial reuse and other factors. The piloted treatment train(s) will include an upstream biological treatment (i.e., typical secondary wastewater treatment) and downstream advanced treatment.

Task 2.1 Develop Piloting Plan

Hazen will prepare a Piloting Plan based on an initial pilot development meeting with the City that will evaluate and provide recommendations for the pilot plant location and layout, develop an influent characterization plan, and recommend effluent criteria based on end uses. The task will also include evaluating and recommending the pilot treatment plant processes and provide a detailed plan for operation of the pilot. Hazen will conduct an initial workshop to review a proposed outline for the piloting plan, site recommendations and schedule.

The City of Franklin anticipates multiple potential endpoints for effluent produced by a new facility, including surface water discharge, groundwater discharge, non-potable beneficial reuse, and raw water supply augmentation, due to drivers related to nutrient management. To implement any one of these effluent endpoints, technical and managerial barriers must be in place to ensure continuous protection of human and environmental health. The pilot system will demonstrate the performance of the selected treatment train to the City, regulators, and the public, as well as provide insights regarding operational requirements, reliability, and optimization strategies for the full-scale facility. The pilot system must demonstrate the ability to consistently produce water that meets expected criteria for each effluent endpoint, including treatment requirements and concentration limits based on existing US regulations and emerging contaminants.

Pilot Site Selection

Influent to the existing CWF is not representative of flows and loads anticipated from growth areas throughout the County. Therefore, other locations providing potential access to a more representative wastewater source will be evaluated. Potential options include the new city owned parcel east of I-65 the nearby Redwing Pump Station property and the Franklin Water Treatment Plant site. Several factors will be investigated in the selection of a suitable piloting location, including:

1. Availability and accessibility of a suitable space to install the pilot and related equipment and buildings
2. The level of site work that would be required to prepare the site for the installation of the pilot
3. Availability of water, sewer, and power (including back-up power) for the operation of the pilot
4. Public perception and ease of access for informational tours
5. Proximity and ease of access for City staff
6. Potential conflicts with other construction
7. Site security
8. Stormwater impacts and site restoration, if applicable

Hazen will provide recommendations of one or more site options that are considered viable based on the above criteria. The City will select a site that will be used as the basis for the pilot planning and design.

Development of Water Quality Targets

The specific effluent endpoints will be subject to a unique set of water quality targets for the protection of the environment and human health. The determination of these water quality targets is essential, as they drive treatment technology selection, monitoring paradigms, and operational requirements. Although drivers for water reuse are widespread, there are currently no established regulations for water reuse in Tennessee, nor at the federal level. Therefore, we will collaborate with TDEC to establish these water quality requirements using existing regulations and guidelines from other relevant locations. We will also consider the specific non-potable re-use applications being evaluated by the City.

The water quality required for direct discharge to the Harpeth River must be consistent with the current TMDL and the discharge of constituent loads (e.g., nutrients, CBOD) must be offset with reductions in the watershed. Therefore, the required water quality will also be dependent upon the offsets available. For planning purposes, Hazen anticipates that the same level water quality will be required for groundwater discharge and baseflow augmentation.

Influent Wastewater Characterization

Hazen will develop a sampling protocol to characterize the influent wastewater to a new CWF (and pilot). The sampling protocol also incorporate requested analyses from unit process manufacturers being considered for pilot testing. The Redwing Pump Station is equipped with a flow meter and the wastewater is anticipated to be representative of what will be received by a potential new facility. A composite

sampler will be installed at the pump station to collect flow-paced wastewater samples for analysis. Two 7-day sampling events will be scheduled, with one event taking place during the winter months and the other taking place during the summer months. The first sampling event should occur prior to the design of the pilot facility while the second can occur concurrently with pilot construction or operation.

Hazen will provide the City with an influent characterization plan. The plan will include information necessary for treatment technology vendors to evaluate pilot unit sizing. Anticipated testing will include parameters such as chemical oxygen demand (COD), five-day carbonaceous biochemical oxygen demand (CBOD5), total suspended solids (TSS), volatile suspended solids (VSS), total Kjeldahl nitrogen (TKN), ammonia nitrogen (NH3-N), nitrate + nitrite (NOx), total phosphorus (TP), ortho-phosphate, total dissolved solids (TDS), alkalinity, full ion profiles, volatile fatty acid, and pH.

Sample preparation will be required to determine the fractionation of certain influent parameters between solid, colloidal, and soluble species. One priority pollutant scan will be conducted during each sampling event. It is assumed that the sample preparation will be done by the City lab staff prior to release to the commercial lab for measurement.

Once the water quality characterization is compiled, we will benchmark this data with influent data from the existing CWF and other reuse facilities across the country. This will provide stakeholders with relative comparisons of wastewater strength to existing facilities.

Pilot Process Selection

It is anticipated that the pilot plant at a minimum will include preliminary treatment and biological treatment upstream of advanced treatment technologies. The inclusion of secondary treatment in the pilot system with the appropriate level of nutrient removal will better represent the secondary effluent of the new full-scale facility and thus better reflect secondary effluent interactions with downstream advanced treatment processes. As a result, the boundary of the pilot plant is anticipated to begin at the wastewater collection system point of connection and extend to the final treatment process necessary for the specific effluent endpoints.

Specific goals of the pilot include:

- Evaluate the nutrient removal potential and associated operational requirements (e.g., chemical additions, DO control).
- Determine the non-biodegradable and non-reactive nutrient fractions that are not readily removed by the piloted treatment processes.
- Evaluate performance of pathogen barriers with respect to California's 12-log virus, 10 log-Cryptosporidium, and 10-log Giardia reduction criteria (12/10/10 criteria).
- Monitor compliance with National Primary and Secondary Drinking Water Standards, as well as Health Advisory Levels (HALs), throughout the treatment train.
- Evaluate the stability of the finished product water and potential effects on the blending with surface or reservoir water for use in the Franklin WTP.

- Monitor the removal of trace organic contaminants using California's 9 surrogate group approach. This approach may be modified to suit the specific set of emerging contaminants present in Harpeth River water.

The pilot plant is assumed to include membrane bioreactors (MBRs) as the secondary treatment process. This assumption is based on the potential for stringent nutrient limits and the compact footprint that is expected to be required of the full-scale facility. MBRs can be configured in a 4 or 5 stage Bardenpho configuration to achieve a high level of nutrient removal. MBR pilots are known to scale very well to full scale operation and are a very reliable method to produce the quality of secondary effluent required for the downstream advanced treatment processes. Up to three MBR manufacturers will be screened to determine the following:

1. Availability of a pilot or ability to construct within the schedule constraints
2. Configuration (truck mount, skid or constructed on site)
3. Site requirements of the pilot (space, protection from the elements)
4. Rental, delivery, and set-up/start-up costs
5. Maintenance, cleaning, and chemical costs

MBR manufacturers will be eliminated if they cannot provide a pilot within the site and schedule constraints.

Potential treatment technologies following the MBR to produce IPR or DPR quality water may include ozone contact, biological activated carbon (BAC), biological activated filters (BAF), ion exchange (IX), ultraviolet disinfection (UV), UV with advanced oxidative processes (AOP) and post-treatment stabilization.

Equipment manufacturers as well as companies that build and lease pilot equipment will be contacted and screened in a manner similar to the MBR manufacturers. Piloting equipment companies and manufacturers will be eliminated if they cannot provide a pilot within the site and schedule constraints.

Other ancillary processes may include mixing flow control tanks, waste stream management facilities, chemical feed systems, residuals handling systems, yard piping and related pumping, structures (tanks, containers, trailers, etc.), electrical equipment and backup power systems, and instrumentation and controls. The pilot plan will detail the requirements for these items with enough detail to develop an AACE Class V estimate of probable construction cost for the pilot facility.

Selection of the equipment for the pilot will consider the treatment levels achieved by individual processes, the interactions between processes, full scale experience, and the manufacturers ability to provide piloting equipment. Hazen will compare two potential treatment trains for the pilot. Process flow diagrams will be provided for each option. The advantages and disadvantages of each treatment train option will be discussed. Limitations of treatment, historical experience of other utilities, potential permitting issues, and public acceptance will be discussed.

Hazen will investigate options for equipment and materials selection and procurement, including use of and limitations on sole sourcing, competitive proposals from suppliers, administrative and schedule

impacts of equipment and materials procurement, operations and maintenance factors, and purchase from multiple suppliers.

Hazen will provide recommendations for the pilot treatment train to the City in a workshop. The City will confirm the pilot treatment train selection that will be the basis for the pilot planning and design. The meeting discussion will be documented in meeting minutes.

Pilot Preliminary Design and Operating Plan

Hazen will develop a conceptual level pilot site plan(s) based on the selected site and pilot treatment train. Hazen will develop P&IDs, conceptual level piping schematics and single line electrical diagrams. Hazen will develop sizing and performance criteria for each major treatment process for the pilot system. Hazen will document the monitoring requirements and investigate the remote monitoring capabilities of the major treatment processes. The requirements for operation and maintenance of each major treatment process will be described. The requirements for start-up and testing of the major treatment processes will also be described.

Hazen will provide an AACE Class V estimate of probable cost for the construction and start-up of the pilot. This will include:

- Site plan related costs
- Purchased equipment and delivery and set-up of rental equipment
- Construction, and start-up costs
- Estimate of the operating costs of the pilot including:
    - Remote monitoring costs
    - Man-hours to operate the pilot
    - Sampling and laboratory costs
    - Power and other utilities costs
    - Operating and cleaning chemical costs
    - Other incidental equipment needs and costs

Hazen will develop a pilot operation plan and detailed schedule. WMD staff will be consulted to determine availability to provide in-house sample analysis. If necessary, a pilot sampling plan will be provided to local laboratories in order to estimate the sampling costs for the pilot. The laboratories will also be asked to provide the necessary instructions for obtaining and preserving the samples.

The results of the pilot site selection, pilot process section and pilot preliminary design and operating plan subtasks will be incorporated in a draft report for City review. A workshop will be held to discuss the draft report and receive City comments. Hazen will prepare meeting minutes from the workshop and prepare responses to the City's comments. Hazen will also receive comments from TDEC on the preliminary design and operating plan (described below). All the comments received will be used to finalize the final report for submittal to the City.

A copy of the Pilot Preliminary Design and Operating Plan will be provided to TDEC for comment. Hazen will coordinate with TDEC and respond to questions and comments on the Piloting Preliminary

Design and Operating Plan. Hazen will conduct a workshop with TDEC to discuss the Plan. Hazen will receive comments from TDEC at the workshop and provide meeting minutes. Hazen will update the Plan based on TDEC's feedback, as necessary.

Task 2.2 Pilot System Design and Bidding

Pilot System Design

Hazen will provide functional design of the Pilot Plant in the form of drawings, flow diagrams and specifications and will evaluate pilot system hydraulics and design piping, flow control, and related pumping accordingly. Design drawings and specifications will be developed for use in bidding and constructing the pilot system. The Pilot Plant design documents are envisioned to include:

- Overall Site Location Plan
- Civil site drawing(s)
- Pilot System Site Plan
- Process Flow Schematic(s)
- Pilot System Piping Schematics
- Pilot System Electrical Schematic
- Pilot System Instrumentation Summary
- List of material and equipment required with designation of responsible supplier.
- Specifications – limited text, model numbers, catalog cut sheets when appropriate, etc. to define equipment and materials for procurement.

Hazen will coordinate the pilot requirements with the manufacturers of key treatment components of the proposed facility. Each manufacturer may have space, energy or connection requirements that will need to be accommodated for proper implementation into a fully functional pilot treatment system. Hazen will investigate the options for the City to pre-purchase or pre-negotiate the price of the major treatment processes. The agreements with equipment manufacturers or the specifications will include installation and start-up assistance, periodic site visits to verify and/or to make changes to operation of their systems during optimization, phone assistance to answer questions and provide direction when not on-site, preparation of process and sizing calculations, review of operational data for their systems and other technical support.

Detailed design will include preparation of Bidding Documents for the construction of the pilot facilities. Drawings will be prepared in Revit, and submittals and bidding documents will be generated for 22 x 24 format. Specifications will be prepared in 50 division format. Progress submittals of drawings and specifications will be provided to the City at 50% and 95% levels of design. For both progress submittals, electronic and hard copies of submittals will be provided. A workshop will be held to discuss the progress submittals and to discuss City comments for each submittal. Hazen will provide responses to City comments and meeting minutes from the workshop. The comments from the City on the 95% design documents will be incorporated into the Bid Ready documents.

The estimate of probable cost for the Pilot Plan will be updated at the 50%, 95% and Bid Ready submittals. If requested by the City, operating and maintenance costs cost estimates will be updated for major design submittals as needed.

It is assumed that the City will obtain any necessary building department permits for equipment and structures required for the project. Hazen will provide plans, specifications, and other information required for permit review. It is assumed that the City will pay for all fees associated with necessary permits. In some instances, the contractor may be required to pick up / apply for permits. In those cases, the requirements will be clearly outlined in the Contract Documents.

Pilot System Bidding Assistance

Hazen will perform the following activities to assist the City during the bidding of the project:

- Pre-Bid Meeting: Hazen will attend the pre-bid meeting to be conducted by the City.
- Addenda: Hazen will assist the City Project Manager with the preparation of addenda to the bid announcement.
- Bid Review: Hazen will review the contractors' bid submittals, assist the City in evaluating the bids, and provide a recommendation concerning bid award on the technical merits of the bids.
- Conformed Documents: Hazen will prepare conformed drawings and specifications, based on addenda, for the City's use in providing construction documents to the contractor.

Task 2.3 Pilot Construction, Start-up, and Testing

Pilot Plant Construction

Hazen will perform the following activities to assist the City during the construction of the project:

- Pre-Construction Meeting: Hazen will attend the pre-construction meeting to be conducted by the City.
- Shop Drawing Submittals: Hazen will review and respond to up to twenty (20) shop drawing submittals/resubmittals, including material samples, laboratory, samples, shop reports, and test reports, provided by the contractor. Hazen's review of the shop drawing submittals will consist of a review for general conformance with the design concept and compliance with the information presented in the construction contract documents. However, such review will not extend to the contractor's means, methods, sequences, techniques, or procedures of construction or to the contractor's safety precautions and programs.
- Requests for Information (RFIs): Hazen will review and respond, in writing, to up to twenty (20) RFIs from the contractor to provide clarifications and interpretations of the construction contract documents.
- Requests for Proposed Change (RPCs): Hazen will assist City staff in preparing documentation necessary to solicit responses from the Contractor for proposed changes to contract cost and/or time for up to ten (10) RPCs. In addition, Hazen will assist in evaluating the Contractor's responses and negotiating the proposed changes in order to incorporate them into change orders to the construction contract.

- Site Visits: Hazen design engineers will perform site visits as needed during the anticipated 6-month construction period to attend construction progress meetings, assist the City to address the contractor's questions and concerns. Hazen will also provide construction monitoring (assume 16 hours per week) to observe the work to determine if it is proceeding in general accordance with the construction contract documents.
- Substantial Completion Inspection: Hazen will perform one (1) site visit to assist City determine if the work has been substantially completed in general accordance with the construction contract documents and provide a list of deficiencies to City for use in preparing substantial completion documents.
- Final Completion Inspection: Hazen will perform one (1) final site visit to assist City determine if the work has been completed in accordance with the construction contract documents and provide brief written comments to City if necessary. Final completion is assumed to be when the pilot is ready for operation and testing can be commenced.
- Operation and Maintenance Manuals: Hazen will review manufacturer's operation and maintenance manuals, information, warranties, certifications, spare parts, and other documentation necessary to start, operate, and maintain the piloting equipment.

The Contractor will be responsible for receiving and installing pilot treatment systems and equipment at the pilot test site in coordination with manufacturers, Hazen, and the City. The Contractor will coordinate the delivery of the pilot test systems and equipment to the site with manufacturers and inspect the deliveries for damage and completeness of shipment.

Details related to raw wastewater access and power at the pilot test site will be determined by Hazen during Task 2 (Pilot System Design and Bidding) and noted in the Design Documents. The Contractor will be responsible for ensuring that all pilot treatment systems and equipment are in agreement with available power supplies, and that sufficient equipment is in place for the conveyance of raw wastewater to the systems. Necessary site work, including grading, compaction, conduit, and piping runs will be the responsibility of the Contractor.

The Contractor will contact, negotiate, and arrange for the delivery of the necessary chemicals and other incidental supplies for the startup of the pilot plant. Chemicals may include but are not limited to supplemental carbon, sodium hypochlorite, ferric chloride, micronutrient solution, sulfuric acid, citric acid, sodium bisulfite, sodium hydroxide, carbon dioxide, lime, polymer, and hydrogen peroxide. The pilot treatment systems will be designed such that all cleaning chemicals are neutralized prior to discharge to the head of the pilot plant and/or the City's collection system. The City will be responsible for replenishing chemicals and other incidental supplies throughout the duration of pilot operation. Hazen will coordinate with the City on the timing of chemical delivery and ordering of incidental supplies. Hazen will forward Material Safety Data Sheets (MSDSs) to the City for all chemicals used at the pilot plant, as well as provide copies to be kept at the pilot test site, prior to the delivery of chemicals to the pilot test site.

Pilot Plant Startup

The Contractor, manufacturers, Hazen, and the City will perform a final evaluation of the installed pilot plant to define proper performance of the specific components prior to startup. Once the Contractor,

manufacturers, Hazen, and the City approve of the pilot plant's installation, the Contractor will initiate system startup and field acceptance testing to establish baseline performance data and procedures prior to the operational phase of the pilot system. Startup and commissioning of the pilot plant will not span more than 10 days. Upon completion of startup and testing of the pilot, waste activated sludge (WAS) or mixed liquor will be added to the MBR pilot system to enable biological startup. The system will operate and support the mixed liquor for a minimum of 45 days prior to commencing normal steady-state pilot operation. WAS of mixed liquor will be delivered by tanker truck to the pilot plant site from the existing clean water treatment facility, as coordinated by the Contractor with the City and Hazen.

During startup and commissioning, the Contractor will verify and calibrate the pilot plant and provide written certification through email to Hazen and the City of proper installation, functional testing, and readiness for biological seeding. The Contractor will provide written confirmation that all analytical and monitoring instruments within the pilot plant have been properly calibrated and are ready for service.

Upon completion of startup and operation of the pilot with imported mixed liquor, raw wastewater will be added to the pilot system to enable startup of the upstream biological treatment process in the pilot system. The system will be operated receiving raw wastewater for a minimum of 10 days for the system to stabilize prior to sending MBR effluent to downstream process. MBR effluent must meet the specified design criteria before effluent will be sent to downstream pilot processes. The manufacturer will be responsible for working with contractor to ensure the design treatment criteria are met.

Weekly conference calls will be held between the City, the Contractor, Hazen, and manufacturers during pilot test construction and startup to report on pilot status, resolve any operational issues, and formalize the remaining action items necessary to bring the pilot plant into functional operation. In coordination with the manufacturers, the Contractor will provide the City and Hazen with an operational manual for the entirety of the pilot plant prior to completion of the startup and commissioning phase. It is assumed that Hazen will provide 10 days of on-site observation and City staff training during the start-up and performance testing of the new equipment as it is placed into operation.

Task 2.4 Pilot Plant Operation

Hazen staff will be responsible for pilot operation, support, and coordination. Overall, this includes:

- Coordination: Hazen staff will provide coordination between the City of Franklin, the Contractor, and equipment manufacturers as needed. As coordinated by Hazen, equipment manufacturers will be required to provide labor onsite to maintain the internal functions of their equipment (e.g., sensors, software, control logic). Manufacturers will not be allowed onsite or to modify equipment operations without prior notification. Hazen will monitor the activities of the equipment manufacturers' representatives throughout pilot testing. Hazen will also provide coordination for chemical deliveries to the pilot plant site, lab personnel, and other activities in support of pilot testing.
- Field operation: City will identify appropriate staff to lead day-to-day operation of the pilot facility. Hazen will provide as-needed assistance based on an average of 20 hours per week for the first three months and 10 hours a week for the final 6 months of operation.

- Operational data collection and water quality analysis: Water quality parameters and associated frequencies of measurement will be determined in the Piloting Plan based on the treatment processes selected for piloting and the regulatory limits associated with the various potential effluent endpoints. Certain key water quality parameters will be conducted on a frequent basis, either onsite by Hazen staff and/or via remote sensing, in order to identify and respond to any arising issues as necessary.
    - Pilot sampling and laboratory analyses are assumed to be conducted three (3) times per week for the duration of the pilot to provide operational process data for the selected treatment processes. Samples are assumed to be collected and analyzed onsite by Hazen and City staff for parameters including by not limited to dissolved oxygen, pH, temperature, and select water quality parameters using HACH kits (e.g., chemical oxygen demand, ammonia, nitrite, nitrate, total nitrogen, and ortho-phosphate). Aliquots of each sample that require analysis at the City's laboratory or shipment to a third-party laboratory for additional analyses will be prepared as needed, including manifests.
    - At least two (2) priority pollutant scans must be conducted during the pilot operation.
- Data compilation and analysis: Hazen staff will compile and analyze the operational data collected throughout the duration of the pilot study, including that collected via onsite sensors, onsite analysis, and/or offsite analysis.
- SCADA and remote viewing: A VPN portal will be established to allow remote monitoring during setup and operation of the pilot facility. It is assumed City will use an existing on-call contractor to procure integration services.

The City will be responsible for maintaining the City's wastewater collection system, thus providing the necessary raw wastewater flow rates from their collection system to the pilot system. The City will also be responsible for the cost of all laboratory analysis, replenishing chemicals and other incidental supplies throughout the duration of pilot operation.

A duration of eighteen (18) months is assumed for the the pilot study, which includes approximately 9 months for construction, startup and commissioning, biological seeding, and nine (9) months of continued steady state operation with seasonal variation.

Monthly Pilot Progress Updates

Prior to the initiation of Pilot Plant Startup, Hazen staff will coordinate with the City to schedule monthly pilot progress update meetings to take place throughout startup and operation of the pilot plant. The meetings will be held at City offices and attended by up to three (3) Hazen staff unless otherwise noted, City staff, and others as appropriate (e.g., the Contractor, equipment manufacturers). The meetings will be conducted in a discussion forum format to facilitate discussion and resolution of issues.

The purpose of these monthly meetings is to review data and discuss pilot plant operations with City staff. Discussions, decisions, and conclusions made during the monthly pilot progress update meetings will be documented in meeting minutes. For each individual pilot progress update, Hazen will prepare the agenda, presentation materials, and draft and final meeting minutes.

Upon completion of the pilot study, Hazen will prepare a draft technical memorandum that documents the findings of the study. The TM will include a description of the piloted treatment processes, operational data, data analysis, lessons learned, and conclusions. Implications related to anticipated effluent criteria for the various potential effluent endpoints, operations, costs, and other areas will be presented. Ultimately, recommendations for full-scale design will be provided based on the findings of the pilot study. Hazen will conduct a TM review meeting prior to finalization of the TM.

Task 2 Deliverables:

- Piloting Plan
- Pilot Plant Design Package (50%, 100%) and conformed documents
- Meeting minutes
- TM 2.1: Pilot Testing Technical Memorandum

Task 3 – Alternatives Analysis

Task 3.1 Alternatives Identification

Hazen will use the information gathered in the previous tasks and conduct a workshop to identify a suite of viable alternatives, including a potential new facility with advanced treatment options to support multiple end use options. These options will likely include direct and indirect potable reuse, non-potable reuse, baseflow augmentation/aquifer recharge and direct discharge to the Harpeth River.

Up to three treatment alternatives and three end use alternatives will be short listed for evaluation. Each alternative identified must be permittable, technologically feasible, and financially responsible.

Hazen will provide a presentation of the alternative selection process and short-listed alternatives at the completion of the task.

Task 3.2 Alternatives Evaluation

Hazen will work with City staff to identify and select cost and non-cost metrics to be used for triple bottom-line analysis of each alternative using HazenConverge. As a first step, Hazen will prepare a broad list of environmental, social, and economic metrics. This list will serve as a reference in the development of Franklin-specific criteria.

Hazen will utilize the Envision Rating System to document the sustainability of the considered alternatives. Envision will assist in identifying ways in which sustainable approaches can be used to plan, design, construct and operate potential infrastructure projects. It provides opportunities for improved technical performance in parallel with social, environmental, and economic improvements.

A project team workshop will be conducted to initially brainstorm the best criteria that apply to Franklin and this project, specifically. Hazen will then categorize and assign weightings to the criteria based on their importance to Franklin.

Hazen will evaluate and rank the alternatives according to the metrics developed. A final Alternatives Evaluation TM will present alternative selection, analysis, comparison and ranking.

Hazen will provide a final presentation of the alternatives identified, evaluated, ranked, and the final alternative recommendation.

Task 3 Deliverables:

- TM 3: Alternatives Analysis

Task 4 – Support Services

Task 4.1 Regulatory Coordination

Permitting/Regulatory Approaches

This project will consider innovative treatment and nutrient management methods that are considered leading edge technologies in the country and yet to be implemented in Tennessee. As a result, specific regulatory and/or permitting infrastructure does not exist for certain potential project elements such as potable reuse of wastewater and base flow augmentation. However, the Tennessee Water Quality Control Act and the Tennessee Safe Drinking Water Act provide adequate legal authority for the state to regulate the activities being proposed. Hazen will compile other states' regulatory practices as well as EPA guidance on permitting potable/non-potable reuse, effluent trading, and underground injection via drip irrigation.

Our team's unique understanding of Tennessee's regulatory drivers along with our national experience with reclaimed water is essential to successfully navigating these specific capacity strategies. We will work closely with TDEC-DWR to develop permitting approaches consistent with state and federal laws that protect human health and the environment. Anticipated approach development areas include the following:

- Non-potable beneficial reuse: Hazen fully understands TDEC-DWR's need for assurance that there is adequate, permanent capacity for reclaiming wastewater for purposes such as non-residential toilet flushing, commercial/large capacity laundry facilities, and public and private irrigation.

- Baseflow augmentation/aquifer recharge: Hazen has experience with a number of aquifer recharge projects, working closely with state and federal Underground Injection Control (UIC) Programs to authorize the subsurface disposal of highly treated wastewater for nutrient control and reclaimed water recovery.

- Potable reuse: Hazen's potable reuse experts have been involved in the design of the vast majority of the permitted IPR projects in the U.S. and abroad. Hazen is also the lead investigator of a Water Reuse Research Foundation study for the implementation of DPR of recycled water. TDEC-DWR has already expressed interest in drawing upon this experience as the agency develops Tennessee's regulatory approach to potable reuse.

- Effluent trading: TDEC-DWR has yet to issue an NPDES permit that includes pollutant trading as a permit requirement. In most cases, the agency was unable to receive adequate assurance of the pollutant offset. Hazen's work with successful trading programs in Virginia and North Carolina, will prove invaluable in identifying trading opportunities.

Initial TDEC Meeting

Hazen will coordinate and lead a meeting with TDEC personnel regarding the project concept and methodology. The purpose of the meeting will be to present the overall project goals, concepts, anticipated technologies, methodology for decision making and project schedule. This meeting will allow the Project Team and TDEC to discuss questions and/or concerns prior to project implementation and will set the tone for communications with TDEC throughout the project.

Additional TDEC Meetings

Throughout the project, Hazen will coordinate up to four meetings with TDEC at key points in project implementation to ensure continued effective communication and to provide TDEC with specific technical information regarding treatment processes, pilot testing and reuse/reclamation plans.

Antidegradation

Any potential discharge to the Harpeth River requires an antidegradation evaluation which is comprised of the analysis of the reclaimed water end use alternatives in terms of cost and environmental impact, and a determination of the potential socioeconomic impact of the increased wastewater treatment capacity afforded by the potential Southeast CWF.

While the full antidegradation evaluation will be conducted during the permitting phase of the project, Hazen will work closely with the City and TDEC to develop an agreed-upon course of action specific to the South CWF.

TMDL Development

Currently, the Harpeth River in the vicinity of the service area is subject to the Organic Enrichment/Low Dissolved Oxygen Total Maximum Daily Load (TMDL) for Waters in the Harpeth River Watershed (EPA, 2004). This TMDL established point source waste load allocations (WLAs) and non-point source (NPS) load allocations (LA) for CBOD, total nitrogen, and total phosphorus to address dissolved oxygen impairment. However, the TMDL was never fully implemented (i.e., no NPS load reductions) and is scheduled to be updated within the next two to three years.

EPA Region IV is developing a Load Simulation Program C++ (LSPC) watershed model and a Water Quality Analysis Simulation Program (WASP) water quality model to support the updated TMDL. Water quality data collected by stakeholders including the City of Franklin, through October 2018 is currently being used by EPA to calibrate the WASP model. Once calibrated, the model will be used by TDEC to establish revised WLAs and LAs for each of the pollutants that contribute to impairment of the Harpeth River. TMDLs may include provisions for discharges from new facilities. In a 2017 meeting with the City of Franklin and Hazen, TDEC-DWR indicated a willingness to consider inclusion of a specific WLA for a potential new CWF. Hazen and the City will continue to work with TDEC-DWR throughout the TMDL process to ensure a fair and appropriate WLA for the new facility. This will include participation in the TMDL stakeholder meetings as well as those between the City and TDEC-DWR.

Task 4.2 Communications, Public Education, and Involvement

The Hazen team understands firsthand the challenges associated with wastewater management within the Harpeth River watershed. All options associated with a potential South CWF will be subject to a certain amount of public interest and will require a deliberate strategy for success.

Hazen intends to partner with a local firm to assist with public relations within the community. The Hazen team will also work closely with the City's Communications Department to support communication and education initiatives regarding project goals and tasks. Hazen's communication resources coupled with Sheridan's knowledge of the local community and public sentiment will provide Franklin with a comprehensive and effective approach for public outreach for Franklin's projects.

The overarching goals of the communications component of the project will be to:

- Establish transparency and trust between the City, the Hazen team, and stakeholders
- Clearly articulate the overwhelming community need for the project
- Educate stakeholders on the goals, costs, merits, and benefits of the proposed solution
- Reinforce recognition of Franklin's thoughtful and responsible approach to accommodating growth with a project that will protect and improve environmental resources

At the onset of project planning, the communications team will meet with the City's Communications department to refine the tasks, delineate responsibilities, and develop a communications plan. The plan will include strategies and message platforms to convey appropriate knowledge and information to stakeholders. Specific approaches that may be incorporated into the plan include: a project website to inform the public and promote transparency; use of social media to share project information; tracking social media conversations to determine public sentiment and to quickly address media inquiries and public feedback.

Task 4.3 Project Management

The Hazen team will manage the entire project and ensure that City goals are met for overall budget, schedule, and functionality. To aid in a successful project and in order to keep the City fully involved in the evaluation and decision making process, in addition to specific workshops, monthly progress

conference calls and/or meetings will be held to review project status and to receive comments on any work performed.

We will issue monthly status reports with each invoice to keep the City informed of progress and any deviations from scope, schedule, or budget that have occurred.

Project Work Plan

A detailed project-specific Project Work Plan will be developed. The project work plan will provide a detailed scope and schedule of work, budget, sub-consultant list, key staff, and task leaders. The scope of work will be shared with the City and used and updated as appropriate by the Hazen team during implementation of the project.

QA/QC

Our Team is committed to quality management as an integral part of the project work plan. We recognize that success will be judged on the quality of the research, planning, and piloting for a potential new facility.

To this end, quality measures on our projects include both quality assurance and control, as well as project scheduling, management and budgetary control measures that combine to form an integrated quality management plan.

The Quality Management Plan is part of the overall Project Work Plan. The function of project quality control is carried out through performance reviews, checks, inspections, and tests. These activities are predetermined to ensure that our work meets the specific goals of Franklin, as well as the industry standard of care, published codes, standards, and regulatory agency requirements.

The QA/QC group will work closely with the project team to ensure that a quality product will be produced at each deliverable.

Project Schedule

Our team has prepared a project schedule which confirms that the scope of work can be completed within 32 months from the notice to proceed.

Out of Scope Work and Next Steps

Additional services may be warranted or desired by the City in support of this project. Any such services, along with future phases of work associated with this analysis, including preliminary and final design of identified improvements, will be developed as separate task orders and/or at the conclusion of this alternatives-evaluation phase.

Appendix A

Southeast Hydrogeology Scope of Work

Southeast Hydrogeology, PLLC
1715K S. Rutherford Blvd, #400
Murfreesboro, TN 37130
(931) 394-3233

January 9, 2020

Ms. Saya Qualls, PE
Hazen and Sawyer
545 Mainstream Drive, Suite 320
Nashville, TN 37228

Subject: Scope of Work and Fee Estimate for Hydrogeological Investigation 2017-012
City of Franklin, Williamson County, Tennessee

Ms. Qualls:

Based on our phone conversations and emails, Southeast Hydrogeology, PLLC (SEH) has prepared a preliminary scope of work for a hydrogeological investigation related to a treated waste water disposal project in Franklin, Williamson County, Tennessee.

Background

The project proposes to dispose of up to 8 million gallons per day of highly treated waste water and dispose of it through a combination of potable and non-potable re-use, sub-surface drip infiltration in a riparian corridor adjacent to the Harpeth River, possible rapid infiltration basins in the riparian corridor and possible injection wells. The purpose of the infiltration and injection wells are to provide recharge to provide base flow augmentation for the Harpeth River, while using the filtering process of the soils to remove any remaining potential pollutants in the treated waste water. Our understanding is that any injection wells would be considered to be Class V injection wells and would be subject to all the regulatory guidelines thereof. We also understand that the primary constituent of concern in the treated waste water is nitrate with concentrations of nitrogen at 3 mg/L or less.

Preliminary Scope of Work – Hydrogeological Investigation

SEH proposes the following scope of work, broken into five tasks. The task description includes a brief description of the task along with assumptions. Preliminary costs for the individual task are included as an attachment.

Task 1: Desktop Study and Site Visits

The desktop survey would include a review of available data including existing soils data, geologic mapping, cave mapping, existing dye tracer test data, topographic maps, satellite and aerial photography, and LIDAR (if available); a karst assessment; site visits and follow ups. To determine the potential for a local karst network which could affect recharge and infiltration, as well as potential injection well locations or design, a preliminary karst study will be conducted using the either the DRASTIC, PI or EPIK model, as appropriate for the conditions. The karst study will mainly utilize data acquired as part of the desk-top study, as well as digital elevation model data and ground cover data. The desktop study will be used to prioritize sites for purposes of soils assessment and injection test holes.

Assumptions for data to be developed during the Desktop Study

- Review of available geologic and soils data Assumes unsaturated hydraulic conductivity data is available
- Review of aerial and satellite photography
- Review of LIDAR data, if available
- Review of available well log/well construction information
- Site visits to all seven properties
- Karst assessment and analysis
- Prioritize sites for drip irrigation, infiltration and test wells
- Develop background information requirements for Class V injection wells

Schedule

The Desktop Study will be completed approximately 2 to 2 ½ months following the Notice to Proceed.

Cost Estimate

Based on the assumptions above, preliminary cost for the Desktop Study report is estimated to be **$19,076.00**.

Task 2: Soils Assessment

For purposes of the soils survey for the drip irrigation and infiltration gallery assessment, we are assuming that we would need approximately 200 acres to dispose of approximately 2 mgpd of the treated waste water, based on other similar types of projects in Middle Tennessee. While the riparian land along the Harpeth River can possibly do better than that, TDEC has a maximum application rate of 0.25 gpd/ft^2 which limits how much treated waste water can be applied per acre with drip irrigation. A soils assessment in Williamson County requires three phases:

1.) A preliminary phase to evaluate the prospective sites from the list you sent me including a review of existing soils information, site visit and production of a map to show expected % yield per acre. This will be used to prioritize the parcels for more detailed assessment.

2.) Assuming we have narrowed things down to about 300 acres or so, we would perform the TDEC mandated WPC assessment which would produce an intensity map on a surveyed 100-

foot grid with 2 exploration pits per acre. The object would be to identify 200 favorable acres for the drip irrigation and infiltration. It may be possible, due to the scale of the project, to negotiate a reduced density with TDEC in order to complete a study sufficient to support a preliminary engineering design. For purposes of this preliminary proposal, however, we assume that the regular TDEC requirements would apply.

3.) Williamson County typically requires a Detailed Soil Survey (DSR) which must be conducted on a surveyed 50-foot grid. The DSR more than doubles the price but it may be possible that the City of Franklin can get an exemption from this requirement. For purposes of this preliminary proposal, it is assumed that the DSR will not be conducted at this point.

Assumptions

- Assumes full TDEC grid and test pits for the WPC study
- Assumes 200 acres for the WPC study
- Assumes soils data and profile information is available
- Assumes no DSR is required at this time

Schedule

The Soils Assessment will be completed approximately 2 to 2 ½ months following the completion of the desktop study.

Cost Estimate

Based on the assumptions above for assessing 200 acres of land per TDEC requirements, preliminary cost for the Soils Assessment is estimated to be **$191,526.00**.

Task 3: Nitrate Loading Modeling

SEH will model nitrate loading to groundwater from the drip irrigation disposal and infiltration gallery to assess nitrate loading based on total flows of 2-3 mgpd of highly treated waste water. Initial assumptions expect that approximately 200 acres may be required for disposal of 2-3 mgpd with a nitrogen concentration of 3 mg/L or less. Nitrate loading rates will be calculated using the Hantzsche and Finnemore (1992) methodology or an alternative method if determined to be more acceptable to TDEC.

Assumptions – all the following data is available prior to the Nitrate Loading Modeling

- Percolation test data;
- Soil profile data;
- Hydrogeological parameters including unsaturated hydraulic conductivity and other recharge properties;
- Available areas for infiltration;
- Waste water nitrate concentration, and;
- Baseline water quality data.

Schedule

The Nitrate Loading Modeling will be completed approximately 1 to 1 ½ months following the completion of the soil assessment.

Cost Estimate
Based on the assumptions above, preliminary cost for the Nitrate Loading Modeling is estimated to be **$19,560.00**.

Task 4: Injection Well Assessment

For the injection well assessment, we have included some costs for limited geophysics, if needed. Due to problems with sink holes in some residential areas in Franklin, it is possible that some karst evaluation work may already be done, so we would want to track that down if it is available and not duplicate any existing studies. A preliminary review of karst features in the Franklin area indicate that the Carters Limestone may be a good target for injection wells to dispose of some of the wastewater, although the Bigby-Cannon Limestone may also have potential. The Hermitage Formation which separates the Bigby-Cannon Limestone from the Carters Limestone is generally considered a confining layer and will not be evaluated for injection well purposes. For purposes of the preliminary proposal, we estimate two test wells to 300 feet with packer tests in each one. Each test well will also be e-logged and video logged to assess its potential as an injection well. There are four parcels listed as potential for injection wells, so we will prioritize the parcels and conduct test well drilling and testing based on our priority rankings. As with all drilling, there is the possibility that we may not get the results we hope for and additional test wells may be required.

TDEC requires the following documentation to be submitted as part of the approval process for Class V injection wells:

- General information concerning the name and location of the facility, the activities conducted that require a permit, the nature of the business, the contact person and other required environmental permits.
- Information regarding the injection well, injection zone, the injected fluid, operation status and parameters.
- Information concerning the area lying within and below a one-mile radius of the injection well pump site or facility; this includes surface geographic features, subsurface geology and demographic and cultural features.
- Attachments such as topographic and geologic quadrangle maps, schematic diagrams showing construction details and materials of the well, chemical analysis data of the injection fluid, process descriptions, procedures for operation and maintenance, geologic/geographic information collected during construction, facility blueprints, and erosion and sediment control construction diagrams may be required.

Many of these requirements for the injection well permitting can be met with the desktop study and karst vulnerability study addressed in Task 1 above, as well as available project specifications from Hazen and Sawyer. Development of the information on the subsurface geologic features may require the dye-tracer study discussed above. SEH will prepare a checklist for the Class V injection well permitting requirements to assure that all necessary data

is developed. SEH will provide preliminary recommendations for injection well design, based on information developed as part of the hydrogeological investigation.

Assumptions

- Assumes geophysical survey at two most favorable locations
- Assumes dye tracer test as needed at most favorable locations
- Test wells at two highest priority sites
- Assumes two 6-inch diameter test wells to 300 feet each
- E-log and video log each test well upon completion
- Assumes one packer test in each well
- Favorable test well will be temporarily sealed and stabilized until it can be developed into a final test well.
- Assumes water is available for the packer tests.

Schedule

The Injection Well Assessment will be completed approximately 3 to 4 months following the completion of the desktop study, depending on driller availability. The geophysical survey and the dye tracer test would precede the drilling of the test wells. Test well drilling is expected to take up to 5 days for each test well with an e-log and video log conducted in each boring at the conclusion of the drilling. Packer testing would require approximately 4 days per test well.

Cost Estimate

Based on the assumptions above, preliminary cost for the Injection Well Assessment is estimated to be **$146,485.50**.

Task 5: Hydrogeological Report

SEH will would provide a final hydrogeological assessment and recommendations report which will summarize the results of the soil assessment, nitrate loading modeling and injection well assessment, along with providing conclusions and recommendations. All data developed during the assessment will be included as appendices to the hydrogeological report.

Assumptions

- Includes discussion of desktop survey
- Includes discussion and analysis of soils assessment
- Includes discussion and analysis of nitrate loading modeling methodology and results
- Includes discussion of injection well assessment and related tasks
- Includes conclusions and recommendations for preliminary drip infiltration and injection well design
- All data included in appendices to the report.

Schedule

The Hydrogeological Report will be completed approximately 1 to 1 ½ months following the completion of the Nitrate Loading Modeling and the Injection Well Assessment.

SOUTHEAST HYDROGEOLOGY

Cost Estimate

Based on the assumptions above, preliminary cost for the Hydrogeological Report is estimated to be **$18,830.00**.

Limitations

1. The interpretations and/or conclusions contained in this work scope and proposal represent our professional opinions. These opinions are based on currently available information and were developed in accordance with currently accepted geologic, hydrogeologic, and engineering practices at this time and for these specific sites in Williamson County, Tennessee in 2020. Other than this, no warranty is implied or intended.
2. The proposed work will be limited to scope of work listed above. The scope of the proposed study has been developed and is considered appropriate for a treated waste water disposal study based on Williamson County and Tennessee Department of Environmental and Conservation requirements.
3. If it becomes necessary to conduct meticulous investigations into additional properties beyond those seven designated sites, SEH will immediately inform Hazen & Sawyer that these investigations are necessary to complete the study. SEH will also estimate the level of effort needed to conduct these additional studies.
4. If additional data collection, monitoring or other hydrologic information, i.e. groundwater modeling is required, including the drilling of additional test wells, additional soil assessment, and additional geophysical surveys, will be also be considered outside the scope of this proposal.
5. The hydrogeological study will be prepared for and is intended for the exclusive use of Hazen & Sawyer. Any reliance on this report by third parties shall be at such parties' sole risk. The work described herein will be performed under the direct supervision of a Professional Geologist, registered with the State of Tennessee. The findings will be relevant to the dates of our site visits and the defined scope of work and should not be relied upon to represent conditions at later dates.

Very truly yours,
SOUTHEAST HYDROGEOLOGY, PLLC

Thomas E. Ballard
Principal Hydrogeologist
P.G. #5738 (TN), C.H.G. #961 (CA)

Attachments: Preliminary Cost Estimate
SEH Rate Schedule

Southeast Hydrogeology Cost Estimate

Date: 1/9/20

Site: **Franklin Hydrogeological Study**

Project #: 2017-012

TASK SUMMARY SHEET

Task Summary

Task No.	Task Description	Cost
TASK 1:	Desktop Study	$19,076.00
TASK 2	Soils Assessment	$191,526.00
TASK 3:	Nitrate Loading Analysis	$19,560.00
TASK 2:	Karst Evaluation for Injection Wells	$146,485.50
TASK 5:	Hydrogeological Report	$18,830.00
	TOTAL	**$376,401.50**

Notes and assumptions:

Southeast Hydrogeology Cost Estimate

Date: 1/9/20

Site: **Franklin Hydrogeological Study**

Project #: **2017-012**

TASK 1: **Desktop Study**

- Review of available geologic and soils data
- Review of aerial and satellite photography
- Review of LIDAR data, if available
- Review of available well log/well construction information
- Site visits
- Karst assessment and analysis
- Digitize data
- Prioritize sites for drip irrigation, infiltration and test wells
- Develop background information requirements for Class V injection wells

Subcontractor Services

Category	Units	# Units	Cost / Unit	Cost
Subcontractor	Est	0	$0.00	$0.00
Markup			12%	$0.00
		Total Subcontractor Services		**$0.00**

Professional Services

Category	Units	# Units	Cost / Unit	Cost
Principal Professional	hr	4	$150.00	$600.00
Senior Professional	hr	60	$135.00	$8,100.00
Project Professional	hr	40	$125.00	$5,000.00
Staff Professional	hr	0	$115.00	$0.00
Sr Field Technician	hr	0	$95.00	$0.00
GIS Specialist	hr	40	$85.00	$3,400.00
CAD Technician	hr	20	$65.00	$1,300.00
Clerical	hr	0	$55.00	$0.00
		Total Professional Services		**$18,400.00**

Expenses

Category	Units	# Units	Cost / Unit	Cost
Mileage	miles	320	$0.55	$176.00
Lodging/meals	day	0	$150.00	$0.00
Data Acquisition	LS	1	$500.00	$500.00
Misc. Supplies	item	0	$0.00	$0.00
		Total Expenses		**$676.00**

Outside Expenses

Category	Units	# Units	Cost / Unit	Cost
Permit	ea.	0	$0.00	$0.00
Markup			12%	$0.00
		Total Outside Expenses		**$0.00**

TOTAL TASK 1: **$19,076.00**

Notes and assumptions:

Southeast Hydrogeology Cost Estimate

Date: 1/9/20

Site: **Franklin Hydrogeological Study**

Project #: **2017-012**

TASK 2 **Soils Assessment**

- Preliminary evaluation - review soil survey and prioritize sites
- WPC assessment - evaluate on 100' grid; soil pits per TDEC requirements
- Assumes 200 acres for detailed soils assessment

Subcontractor Services

Category	Units	# Units	Cost / Unit	Cost
Soil Scientist - Prelim Evaluation	Est	1	$13,125.00	$13,125.00
Soil Scientist - WPC Testing	Acre	200	$735.00	$147,000.00
Surveyor	Est	1	$7,875.00	$7,875.00
Markup			12%	$20,160.00
	Total Subcontractor Services			**$188,160.00**

Professional Services

Category	Units	# Units	Cost / Unit	Cost
Principal Professional	hr	4	$150.00	$600.00
Senior Professional	hr	20	$135.00	$2,700.00
Project Professional	hr	0	$125.00	$0.00
Staff Professional	hr	0	$115.00	$0.00
Sr Field Technician	hr	0	$95.00	$0.00
GIS Specialist	hr	0	$85.00	$0.00
CAD Technician	hr	0	$65.00	$0.00
Clerical	hr	0	$55.00	$0.00
	Total Professional Services			**$3,300.00**

Expenses

Category	Units	# Units	Cost / Unit	Cost
Mileage	miles	120	$0.55	$66.00
Lodging/meals	day	0	$150.00	$0.00
Misc. Supplies	item	0	$250.00	$0.00
Sampling Supplies	item	0	$0.00	$0.00
	Total Expenses			**$66.00**

Outside Expenses

Category	Units	# Units	Cost / Unit	Cost
Permit	ea.	0	$0.00	$0.00
Markup			12%	$0.00
	Total Outside Expenses			**$0.00**

TOTAL TASK 2 **$191,526.00**

Notes and assumptions:

Southeast Hydrogeology Cost Estimate

Date: 1/9/20

Site: **Franklin Hydrogeological Study**

Project #: 2017-012

TASK 3: Nitrate Loading Analysis

- Assumes soil assessment is completed and data is available.
- Assumes unsaturated hydraulic conductivity data is available.
- Assumes soils data and profile information is available.
- Assumes no surface water analysis.
- Assumes nitrate loading is the required analysis.
- Assumes assessment of 200 acres of disposal area.

Subcontractor Services

Category	Units	# Units	Cost / Unit	Cost
Subcontractor	Quote	0	$0.00	$0.00
Markup			12%	$0.00
	Total Subcontractor Services			**$0.00**

Professional Services

Category	Units	# Units	Cost / Unit	Cost
Principal Professional	hr	12	$150.00	$1,800.00
Senior Professional	hr	90	$135.00	$12,150.00
Project Professional	hr	20	$125.00	$2,500.00
Staff Professional	hr	0	$115.00	$0.00
Sr Field Technician	hr	0	$95.00	$0.00
GIS Technician	hr	20	$85.00	$1,700.00
CAD Technician	hr	20	$65.00	$1,300.00
Clerical	hr	2	$55.00	$110.00
	Total Professional Services			**$19,560.00**

Expenses

Category	Units	# Units	Cost / Unit	Cost
Mileage	miles	0	$0.55	$0.00
Lodging/meals	day	0	$150.00	$0.00
Misc. Supplies	item	0	$0.00	$0.00
Copy, Bind, Mail	item	0	$75.00	$0.00
	Total Expenses			**$0.00**

Outside Expenses

Category	Units	# Units	Cost / Unit	Cost
Permit	ea.	0	$0.00	$0.00
Markup			12%	$0.00
	Total Outside Expenses			**$0.00**

TOTAL TASK 3: **$19,560.00**

Notes and assumptions:

Southeast Hydrogeology Cost Estimate

Date: 1/9/20

Site: **Franklin Hydrogeological Study**

Project #: **2017-012**

TASK 2: **Karst Evaluation for Injection Wells**

- Evaluate Bigby-Cannon Limestones and Carters Limestone
- Includes geophysical survey at 2 locations
- Drill 2 6-inch diameter 300-ft test wells
- E-log and video log each boring
- Stabilize test wells holes
- Packer testing of injection wells
- Assumes availability of water for packer tests

Subcontractor Services

Category	Units	# Units	Cost / Unit	Cost
Drilling Contractor - mob/demob	Est	1	$7,500.00	$7,500.00
Drilling Contractor - test hole	Est	2	$15,000.00	$30,000.00
Drilling Contractor - packer test	Est	2	$20,000.00	$40,000.00
E-log, video log	Est	2	$4,200.00	$8,400.00
Geophysical Contractor	Est	2	$8,500.00	$17,000.00
Markup			12%	$11,448.00
	Total Subcontractor Services			**$106,848.00**

Professional Services

Category	Units	# Units	Cost / Unit	Cost
Principal Professional	hr	12	$150.00	$1,800.00
Senior Professional	hr	65	$135.00	$8,775.00
Project Professional	hr	110	$125.00	$13,750.00
Staff Professional	hr	0	$115.00	$0.00
Sr Field Technician	hr	0	$95.00	$0.00
GIS Technician	hr	20	$85.00	$1,700.00
CAD Technician	hr	20	$65.00	$1,300.00
Clerical	hr	0	$55.00	$0.00
	Total Professional Services			**$27,325.00**

Expenses

Category	Units	# Units	Cost / Unit	Cost
Mileage	miles	350	$0.55	$192.50
Lodging/meals	day	9	$150.00	$1,350.00
Field Equipment	day	5	$150.00	$750.00
Misc. Supplies	LS	1	$500.00	$500.00
Copy, Bind, Mail	item	0	$0.00	$0.00
	Total Expenses			**$2,792.50**

Outside Expenses

Category	Units	# Units	Cost / Unit	Cost
Laboratory Costs - water samples	ea.	30	$250.00	$7,500.00
Drilling permits	ea.	2	$500.00	$1,000.00
Markup			12%	$1,020.00
	Total Outside Expenses			**$9,520.00**

TOTAL TASK 2: **$146,485.50**

Notes and assumptions:

Southeast Hydrogeology Cost Estimate

Date: 1/9/20

Site: **Franklin Hydrogeological Study**

Project #: **2017-012**

TASK 5: **Hydrogeological Report**

- Discussion of soils assessment.
- Discussion of nitrate loading modeling with conclusions
- Discussion of injection well viability and recommendations
- All data developed during the study phase will be included as appendices

Subcontractor Services

Category	Units	# Units	Cost / Unit	Cost
Subcontractor	Quote	0	$0.00	$0.00
Markup			12%	$0.00
	Total Subcontractor Services			**$0.00**

Professional Services

Category	Units	# Units	Cost / Unit	Cost
Principal Professional	hr	8	$150.00	$1,200.00
Senior Professional	hr	40	$135.00	$5,400.00
Project Professional	hr	60	$125.00	$7,500.00
Staff Professional	hr	0	$115.00	$0.00
Sr Field Technician	hr	0	$95.00	$0.00
GIS Technician	hr	40	$85.00	$3,400.00
CAD Technician	hr	16	$65.00	$1,040.00
Clerical	hr	4	$55.00	$220.00
	Total Professional Services			**$18,760.00**

Expenses

Category	Units	# Units	Cost / Unit	Cost
Mileage	miles	0	$0.55	$0.00
Lodging/meals	day	0	$150.00	$0.00
Misc. Supplies	item	0	$25.00	$0.00
Copy, Bind, Mail	item	1	$70.00	$70.00
	Total Expenses			**$70.00**

Outside Expenses

Category	Units	# Units	Cost / Unit	Cost
Permit	ea.	0	$136.00	$0.00
Markup			12%	$0.00
	Total Outside Expenses			**$0.00**

TOTAL TASK 5: **$18,830.00**

Notes and assumptions:

SOUTHEAST HYDROGEOLOGY PLLC

SOUTHEAST HYDROGEOLOGY, PLLC
2020 SCHEDULE OF FEES

PERSONNEL

Principal Geologist	$150.00/hr
Project Manager	135.00/hr
Senior Geologist	135.00/hr
Project Geologist	125.00/hr
Staff Geologist	115.00/hr
Senior Technician	95.00/hr
Technician	85.00/hr
GIS Technician	85.00/hr
CAD Technician	65.00/hr
Clerical	55.00/hr

EQUIPMENT

Vehicle Use (pickup or automobile) 0.55/mi
Markup 15%
Air Sampling Pump $50.00/day
Brass Tubes $6.00/ea.
Data Logger/Transducer $200.00/day
Disposable Bailer $15.00/ea.
Dissolved Oxygen Meter $40.00/day
Drum $55.00/ea.
Generator $125.00/day
GPS (sub-meter) $250.00/day
Grunfos Pump $200.00/day
Hand Auger $25.00/day
Hollow Stem Power Auger $450.00/day
Impact Soil Sampler $25.00/day
Interface Probe $40.00/day
Locking Well Cap $22.00/ea.
pH/Temp/Cond Meter $40.00/day
Photoionization Detector $100.00/day
Sampling Supplies $25.00/day
Soil Vapor Probe $500.00/day
Sample Pump $45.00/day
Survey Equipment $150.00/day
Tedlar Bags $25.00/ea.
Teflon Bailer $20.00/day
Turbidity Meter $50.00/day
Tyvek Suit $25.00/ea.
Water Level Indicator $35.00/day
Slug Test Assembly $250.00/day
Disposable Tubing (per foot) $1.15/ft
Teflon Tubing (per foot) $2.50/ft
Combo Meter (DO/ORP/pH) $100.00/day
Air Compressor $75.00/day
Anemometer $40.00/day
Manometer $40.00/day
Roto-Hammer Drill $75.00/day
IR Thermometer $25.00/day
Bladder Pump $150.00/day

MISCELLANEOUS

Per Diem Allowance-Field Living Expense: Federal Government Guidelines (by County)
Outside Services / Rentals / Permits / Job Materials: Cost + 15%
Other Rates, Unit Prices and Service Minimums: Available Upon Request
Expert Testimony and Courtroom, Deposition or Hearing Attendance/Preparation: See Special Schedule

Evaluation of Franklin's Southeastern Wastewater Capacity
City of Franklin, Tennessee
Estimated Fee

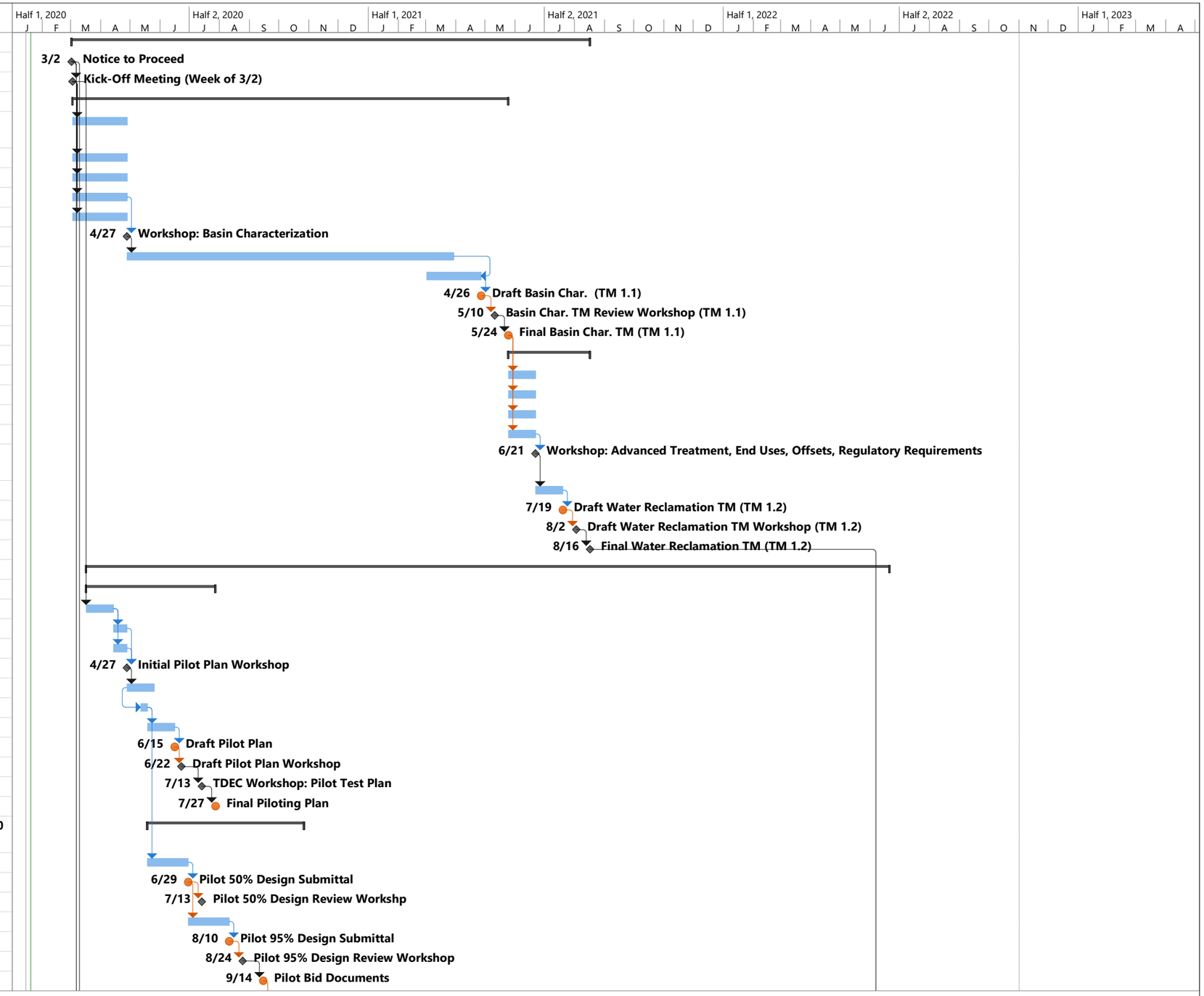
	TA/QC	Process Ld VP	Proj. Dir. VP	PM SA	Reg/TA AVP	Comm. SA	Comm. A	Process A	Process SPE	GIS/Modl SR HYD	Reg./Sus. SA	Proc/Reg AE	Reg/Env SPSCI	Reg/Env PSCI	Electrical A	Electrical SPE	Stmwtr SPE	Structural SA	Structural AE	HVAC/plb A	I/C A	Admin Admin	CAD Prin. Des	CAD SP Des	Field Insp. CM	**Total Hours**	**Fee Labor**
TASK 1 – Project Initiation/Data Gathering and Evaluation																											
Kick-off Meeting	4	4	4	6	14			8																		40	$9,849
Subtask 1.1: Basin Characterization																											
Review reuse master plan to identify potential reuse projects and existing reuse infrastructure										40		60														100	$15,168
Gather social and economic data for Franklin and areas within the UGB -such as demographics, tax base, property values, income quantiles, growth potential											4	80														84	$11,018
Compile and review Harpeth River water quality data; review existing TMDL												48														48	$6,067
Identify potential ag non-point source BMPs and/or stormwater retrofit BMPs that can offset nutrients discharged from the WRF										60		60														120	$18,961
Workshop: Basin Characterization			8	8	12					16		40														84	$15,168
Develop GIS Planning Tool										120		40														160	$27,809
Hydrogeologic Investigation Coordination				16	24																					40	$9,944
Draft TM 1.1 Basin Characterization				8	16					40		48	16													128	$22,036
TM 1.1 Review Meeting			8	8	8					8																32	$7,542
Final TM 1.1 Basin Characterization			4	8	8					24		16														60	$11,545
QA/QC	8		4	8	8						16															44	$10,702
Subtask 1.2: Evaluate Water Reclamation Methods and End Uses																											
Identify advanced treatment technologies	4	8			16			24				24		8												84	$16,390
Identify potential end uses				8	40							40		24												112	$20,562
Identify potential discharge offsets				8	24						24	48					24									128	$23,553
Regulatory Review for Reuse					8			8						24												40	$6,910
Workshop: Advanced Treatment, end uses, offsets, regulatory requirements	16	8	4	8	24			16																		76	$18,792
Draft TM 1.2 Water Reclamation Technologies and End Uses				8	40			8			16	56		24			16									168	$30,463
TM 1.2 Review Meeting				4	16							16														36	$7,142
Final TM 1.2 Water Reclamation Technologies and End Uses				4	12			8				16		8			8									56	$10,091
QA/QC	4	8	4																							16	$4,213
TASK 1 TOTAL =	**36**	**28**	**36**	**102**	**270**	**0**	**0**	**72**	**0**	**308**	**60**	**592**	**16**	**88**	**0**	**0**	**48**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1656**	**$303,926**
TASK 2 - Pilot Test - Design and Operation																											
Subtask 2.1: Develop Piloting Plan																											
Initial Meeting w/Franklin: Piloting Plan Workshop	16	12	8		12			24				12		12								4	4			104	$21,657
TDEC Workshop: Pilot Test Plan	8	8	8		12			24				12										4				76	$16,327
Identify water quality targets and influent characterization	8	8	2					32				24		16								4				94	$16,854
Pilot Process Selection	12	16	4		16			120				40		80								4				292	$53,279
Draft Pilot Operation Plan	12	16	8		16			120				40		80								4	24			320	$57,872
Final Piloting Plan	8	8	2		8			40				24		24								4	4			122	$22,247
QA/QC	36		6											4								4				50	$11,987
Subtask 2.2: Pilot System Design and Bidding																											
50% Design	24	32	8	40				120			24	120			40			16	80	8	120	12	80	40		764	$139,992
95% Design	24	32	8	40				72			24	60			24			12	48	8	120	12	40	20		544	$104,620
Bid Documents	12	2	2	16				32				16			8			8	24	8	16	12	20	10		186	$33,897
Bidding Assistance	8	4	4	32				24				16			4			4		8	8	8	10	4		134	$26,460
QA/QC	52	16	8											8				16		8	32					140	$32,907
Subtask 2.3: Pilot Construction, Start-Up and Testing																											
Pilot Test Construction	10	16	8	40	8			84	288			40			40			8	32	4	40	16			416	1050	$184,275
Startup and Testing		8		24				80	80			40			8						24					264	$48,665
Conference Calls During Construction and Startup	12	12		30				30																		84	$19,277
QA/QC	30	12	4																							46	$12,114
Subtask 2.4: Pilot Plant Operation																											
Pilot Plant Operation (9 months)		40	8		16			160	520						40						160	40				984	$179,704
Operational Data Collection and Water Quality Analysis	40	40			64			160				100		16								40				460	$89,536
Monthly Progress Meetings	24	40			72			112				80														328	$68,932
Operation QA/QC	16		8		8											16										48	$11,039
Draft TM 2.1	12	16	4		32			92				80									8	8	24			276	$51,846
TM 2.1 Review Meeting	8	8	8		16			32				16														88	$19,129
Final TM 2.1	12	8	4		16			32				24														96	$20,140
TDEC Workshop: Pilot Test Results	16	8	8		40			40				16														128	$29,199
TM QA/QC	28		4											8							8					48	$11,124
TASK 2 TOTAL =	**428**	**362**	**124**	**222**	**336**	**0**	**0**	**1430**	**888**	**0**	**48**	**760**	**0**	**248**	**164**	**16**	**0**	**64**	**184**	**44**	**536**	**176**	**206**	**74**	**416**	**6726**	**$1,283,079**

	TA/QC	Process Ld VP	Proj. Dir. VP	PM SA	Reg/TA AVP	Comm. SA	Comm. A	Process A	Process SPE	GIS/Modl SR HYD	Reg./Sus. SA	Proc/Reg AE	Reg/Env SPSCI	Reg/Env PSCI	Electrical A	Electrical SPE	Stmwtr SPE	Structural SA	Structural AE	HVAC/plb A	I/C A	Admin Admin	CAD Prin. Des	CAD SP Des	Field Insp. CM	**Total Hours**	**Fee Labor**
TASK 3 - Alternatives Analysis																											
Subtask 3.1: Alternatives Identification																											
Identify alternatives and short list to 3x3			8	16	16			24				32													96	$18,918
Workshop 1: Identify viable atlternatives w/City		8	8	8	16			16				24													80	$16,559
Presentation of Alternatives		8	4	4	4							24													44	$8,153
Subtask 3.2: Alternatives Evaluation																											
Develop Criteria Evaluation Model			4	8	24			4				24	16	24											104	$18,560
Workshop 2: Identify and select metrics for Criteria Eval. Mod w/City (inc. Envision)		16	12	12	40			16			24	24													144	$32,380
Evaluate alternatives		8	8	8	16			8	16		4	80													148	$25,512
Draft TM 3 Alternatives Evaluation					12							80		32											124	$17,486
TM 3 Review Meeting w/City			12	12	12							16													52	$11,060
Final TM 3 Alternatives Evaluation		4	4	8	16							24		16											72	$13,272
QA/QC	16	8	8								12														44	$11,145
Presentation of Final Alternatives Evaluation and Ranking	8	8	4	4	4							24													52	$10,260
TASK 3 TOTAL =	**24**	**60**	**72**	**80**	**160**	**0**	**0**	**68**	**16**	**0**	**40**	**352**	**16**	**72**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**960**	**$183,306**
TASK 4 - Support Services																											
Subtask 4.1: Regulatory Coordination																											
Initial TDEC Meeting			8	8	24				16			32													88	$16,896
Work with TDEC to develop permitting approach(es) for IPR/DPR, baseflow augmentation, direct discharge, effluent trading and reclaimed water use; and antidegradation					60				56			60		48											224	$38,848
Work with TDEC on TMDL development and allocations					60							40		24											124	$24,017
Meeting re:water reclamation methods and end uses			8	8	8			16	16																56	$11,924
Meeting re: pilot testing			8	8	8			24	24																72	$14,873
Meeting: Alternatives Analysis, Social/Economic Benefit Determination and Preliminary Engineering			8	8	40							40													96	$19,508
QA/QC	8																								8	$2,107
SUBTASK 4.1 TOTAL =	**8**	**0**	**32**	**32**	**200**	**0**	**0**	**40**	**112**	**0**	**0**	**172**	**0**	**72**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**668**	**$128,173**
Subtask 4.2: Communications, Public Education and Involvement																											
Communication / PR Plan			48		48	160	80																		336	$71,207
Attend Internal / External meetings			40		40	48	48																		176	$38,764
SUBTASK 4.2 TOTAL =	**0**	**0**	**88**	**0**	**88**	**208**	**128**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**512**	**$109,971**
Subtask 4.3: Project Management																											
Overall Project Management: Monthly progress meetings/Conf. Calls and Status Reports/Sub-coordination	40	40	256	384	192																	120			1032	$238,018
Project Work Plan		16	20	24	40			16				24													140	$31,769
SUBTASK 4.3 TOTAL =	**40**	**56**	**276**	**408**	**232**	**0**	**0**	**16**	**0**	**0**	**0**	**24**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**120**	**0**	**0**	**1172**	**$269,787**
Total Labor Hours Per Category	**536**	**506**	**628**	**844**	**1286**	**208**	**128**	**1626**	**1016**	**308**	**148**	**1900**	**32**	**480**	**164**	**16**	**48**	**64**	**184**	**44**	**536**	**296**	**206**	**74**	**416**	**11,694**	

Hazen

Fee Breakdown Per Task:	
TASK 1 – Project Initiation/Data Gathering and Evaluation	$303,926
TASK 2 - Pilot Test - Design and Operation	$1,283,079
TASK 3 - Alternatives Analysis	$183,306
Subtask 4.1: Regulatory Coordination	$128,173
Subtask 4.2: Communications, Public Education and Involvement	$109,971
Subtask 4.3: Project Management	$269,787
Tasks 1 - 9 Total	**$2,278,242**
Sub-consultants	
Southeast Hydrogeology	$376,402
Public Relations Allowance	$100,000
Sub-Total	**$476,402**
Subconsultant markup (10%)	$47,640
Misc Hazen Expenses (Travel, Lodging, Meals, Etc..)	$20,000
Total Fee	**$2,822,300**

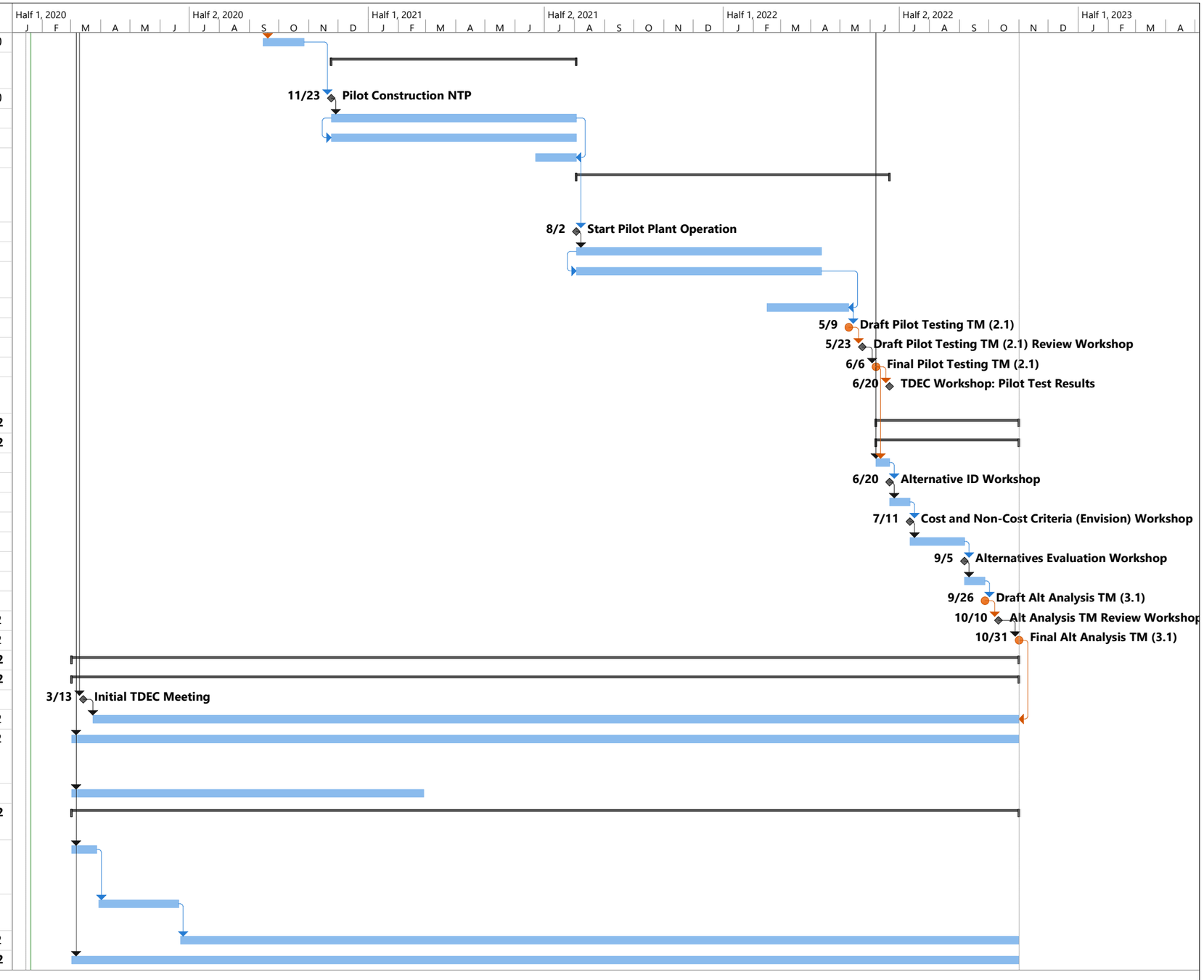
ID	Task Mode	Task Name	Duration	Start	Finish
1		**Task 1 - Project Initiation/Data Gathering**	**381 days**	**Mon 3/2/20**	**Mon 8/16/21**
2		Notice to Proceed	0 days	Mon 3/2/20	Mon 3/2/20
3		Kick-Off Meeting (Week of 3/2)	0 days	Mon 3/2/20	Mon 3/2/20
4		**1.1 Basin Characterization**	**320 days**	**Tue 3/3/20**	**Mon 5/24/21**
5		Review reuse master plan / ID existing infrastructure and end use	40 days	Tue 3/3/20	Mon 4/27/20
6		Gather social and economic data	40 days	Tue 3/3/20	Mon 4/27/20
7		Review TMDL / Compile Harpeth Rive	40 days	Tue 3/3/20	Mon 4/27/20
8		ID Potential WRF Offset Ag / SW BMF	40 days	Tue 3/3/20	Mon 4/27/20
9		Develop GIS Planning Tool	40 days	Tue 3/3/20	Mon 4/27/20
10		Workshop: Basin Characterization	0 days	Mon 4/27/20	Mon 4/27/20
11		Hydrogeologic Investigation	240 days	Tue 4/28/20	Mon 3/29/21
12		Develop Draft Basin Char. TM (TM 1.	40 days	Tue 3/2/21	Mon 4/26/21
13		Draft Basin Char. (TM 1.1)	0 days	Mon 4/26/21	Mon 4/26/21
14		Basin Char. TM Review Workshop (TM	0 days	Mon 5/10/21	Mon 5/10/21
15		Final Basin Char. TM (TM 1.1)	0 days	Mon 5/24/21	Mon 5/24/21
16		**1.2 Water Reclamation Methods and E**	**60 days**	**Tue 5/25/21**	**Mon 8/16/21**
17		ID Advanced Treatment Techs	20 days	Tue 5/25/21	Mon 6/21/21
18		ID Potential End Uses	20 days	Tue 5/25/21	Mon 6/21/21
19		ID Potential Discharge Offsets	20 days	Tue 5/25/21	Mon 6/21/21
20		Regulatory Review for Reuse	20 days	Tue 5/25/21	Mon 6/21/21
21		Workshop: Advanced Treatment, End Uses, Offsets, Regulatory	0 days	Mon 6/21/21	Mon 6/21/21
22		Develop Draft Water Reclamation TM	20 days	Tue 6/22/21	Mon 7/19/21
23		Draft Water Reclamation TM (TM 1.2	0 days	Mon 7/19/21	Mon 7/19/21
24		Draft Water Reclamation TM Worksh	0 days	Mon 8/2/21	Mon 8/2/21
25		Final Water Reclamation TM (TM 1.2	0 days	Mon 8/16/21	Mon 8/16/21
26		**Task 2 - Pilot Testing Design and Operatio**	**590 days**	**Tue 3/17/20**	**Mon 6/20/22**
27		**2.1 Develop Piloting Plan**	**95 days**	**Tue 3/17/20**	**Mon 7/27/20**
28		Review Existing Information	20 days	Tue 3/17/20	Mon 4/13/20
29		Develop WQ Targets / Char. Plan	10 days	Tue 4/14/20	Mon 4/27/20
30		Identify Pilot Plant Site	10 days	Tue 4/14/20	Mon 4/27/20
31		Initial Pilot Plan Workshop	0 days	Mon 4/27/20	Mon 4/27/20
32		Initial Wastewater Characterization	20 days	Tue 4/28/20	Mon 5/25/20
33		Pilot Process Selection	5 days	Tue 5/12/20	Mon 5/18/20
34		Develop Draft Piloting Plan	20 days	Tue 5/19/20	Mon 6/15/20
35		Draft Pilot Plan	0 days	Mon 6/15/20	Mon 6/15/20
36		Draft Pilot Plan Workshop	0 days	Mon 6/22/20	Mon 6/22/20
37		TDEC Workshop: Pilot Test Plan	0 days	Mon 7/13/20	Mon 7/13/20
38		Final Piloting Plan	0 days	Mon 7/27/20	Mon 7/27/20
39		**2.2 Pilot System Design and Bidding**	**115 days**	**Tue 5/19/20**	**Mon 10/26/20**
40		Develop 50 % Design	30 days	Tue 5/19/20	Mon 6/29/20
41		Pilot 50% Design Submittal	0 days	Mon 6/29/20	Mon 6/29/20
42		Pilot 50% Design Review Workshp	0 days	Mon 7/13/20	Mon 7/13/20
43		Develop 95 % Design	30 days	Tue 6/30/20	Mon 8/10/20
44		Pilot 95% Design Submittal	0 days	Mon 8/10/20	Mon 8/10/20
45		Pilot 95% Design Review Workshop	0 days	Mon 8/24/20	Mon 8/24/20
46		Pilot Bid Documents	0 days	Mon 9/14/20	Mon 9/14/20



Project: 2020_New South Permi
Date: Mon 1/20/20

Task | Split | Milestone | Summary | Project Summary | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Deadline | Progress | Manual Progress

ID	Task Mode	Task Name	Duration	Start	Finish
47		Bidding Assistance	30 days	Tue 9/15/20	Mon 10/26/20
48		**2.3 Pilot Plant Construction, Start-Up and Testing**	**180 days**	**Mon 11/23/20**	**Mon 8/2/21**
49		Pilot Construction NTP	0 days	Mon 11/23/2	Mon 11/23/20
50		Pilot Construction	180 days	Tue 11/24/2(	Mon 8/2/21
51		Weekly Conference Calls	180 days	Tue 11/24/2(	Mon 8/2/21
52		Startup, Seeding and Commissioning	30 days	Tue 6/22/21	Mon 8/2/21
53		**2.4 Pilot Testing: Pilot Plant Operation, Data Collection and Analysis**	**230 days**	**Mon 8/2/21**	**Mon 6/20/22**
54		Start Pilot Plant Operation	0 days	Mon 8/2/21	Mon 8/2/21
55		Pilot Plant Operation	180 days	Tue 8/3/21	Mon 4/11/22
56		Operational Data Collection and Water Quality Analysis	180 days	Tue 8/3/21	Mon 4/11/22
57		Develop Draft Pilot Testing TM (2.1)	60 days	Tue 2/15/22	Mon 5/9/22
58		Draft Pilot Testing TM (2.1)	0 days	Mon 5/9/22	Mon 5/9/22
59		Draft Pilot Testing TM (2.1) Review W	0 days	Mon 5/23/22	Mon 5/23/22
60		Final Pilot Testing TM (2.1)	0 days	Mon 6/6/22	Mon 6/6/22
61		TDEC Workshop: Pilot Test Results	0 days	Mon 6/20/22	Mon 6/20/22
62		**Task 3 - Alternatives Analysis**	**105 days**	**Tue 6/7/22**	**Mon 10/31/22**
63		**3.1 ID / Evaluate Alternatives**	**105 days**	**Tue 6/7/22**	**Mon 10/31/22**
64		ID/Compile Alternatives	10 days	Tue 6/7/22	Mon 6/20/22
65		Alternative ID Workshop	0 days	Mon 6/20/22	Mon 6/20/22
66		Develop Draft HazenConverge Mode	15 days	Tue 6/21/22	Mon 7/11/22
67		Cost and Non-Cost Criteria (Envision)	0 days	Mon 7/11/22	Mon 7/11/22
68		Evaluate Alternatives (Cost and Non-(	40 days	Tue 7/12/22	Mon 9/5/22
69		Alternatives Evaluation Workshop	0 days	Mon 9/5/22	Mon 9/5/22
70		Develop Draft Alt Analysis TM (3.1)	15 days	Tue 9/6/22	Mon 9/26/22
71		Draft Alt Analysis TM (3.1)	0 days	Mon 9/26/22	Mon 9/26/22
72		Alt Analysis TM Review Workshop	0 days	Mon 10/10/2	Mon 10/10/22
73		Final Alt Analysis TM (3.1)	0 days	Mon 10/31/2	Mon 10/31/22
74		**Task 4 - Support Services**	**696 days**	**Mon 3/2/20**	**Mon 10/31/22**
75		**4.1 Regulatory Coordination**	**696 days**	**Mon 3/2/20**	**Mon 10/31/22**
76		Initial TDEC Meeting	0 days	Fri 3/13/20	Fri 3/13/20
77		Quarterly TDEC Coordination Meetin	680 days	Tue 3/24/20	Mon 10/31/22
78		Coordinate With TDEC on IPR/DPR, Direct Discharge, Effluent Trading and Reclaimed Water Use	696 days	Mon 3/2/20	Mon 10/31/22
79		TDEC TMDL development and alloca	260 days	Mon 3/2/20	Fri 2/26/21
80		**4.2 Communications, Public Education and Involvement**	**696 days**	**Mon 3/2/20**	**Mon 10/31/22**
81		Develop and implement communications strategy for overall project	20 days	Mon 3/2/20	Fri 3/27/20
82		Develop and implement IPR/DPR public education strategy	60 days	Mon 3/30/20	Fri 6/19/20
83		Internal/External Meetings	616 days	Mon 6/22/20	Mon 10/31/22
84		**4.3 Project Management**	**696 days**	**Mon 3/2/20**	**Mon 10/31/22**



Project: 2020_New South Permi
Date: Mon 1/20/20

Task	Summary	Inactive Milestone	Duration-only	Start-only	External Milestone	Manual Progress
Split	Project Summary	Inactive Summary	Manual Summary Rollup	Finish-only	Deadline	
Milestone	Inactive Task	Manual Task	Manual Summary	External Tasks	Progress	