Peachtree City Water & Sewerage Authority
Regular Meeting
Agenda
Tuesday, November 8, 2022
8:30 a.m.

I. Pledge of Allegiance

II. Public Comment

III. Minutes

September 16, 2022 - Regular Meeting Minutes

IV. Reports

A. Authority Members
B. General Manager

V. Medical Insurance

VI. Budget Year End Update

VII. Mauldin & Jenkins Engagement Letter for the Audit

VIII. Biosolids Management System Alternatives Evaluation Report

IX. Executive Session – Real Estate, Personnel, Potential Litigation

X. Adjourn

** Location of meeting is Peachtree City Water & Sewerage Authority at 1127 Hwy. 74, South **

NOTE: This agenda is subject to change up to twenty-four hours prior to the scheduled meeting.

A quorum of City Council will be in attendance.

Peachtree City Water and Sewerage Authority

September 16, 2022

The Peachtree City Water and Sewerage Authority held its monthly meeting on Friday, September 16, 2022, in the break room of the John W. Gronner Administrative Center. The following individuals were present: Chairman Kim Learnard, Vice-Chairman Mike King, Board Member Phil Prebor, Board Member Frank Destadio, Ms. Melissa Griffis (attorney with Horne & Griffis), Mr. Dan Davis (ISE), Ms. Leslie Baer (ISE), Ms. Millie Shah (WASA), Mr. Larry McNeil (WASA), Mr. Chris Miller (Cpak Technology Solutions), Mr. Bo Davis (ISE), and Mr. John Dufresne.

Ms. Learnard called the meeting to order at 8:30 am. The meeting began with the Pledge of Allegiance.

Ms. Learnard opened the meeting up for public comment. There were no public comments.

Ms. Griffis stated Ms. Gretchen Caola was no longer serving on the Board and a new Treasurer/Secretary was needed. Mr. Prebor made a motion to nominate Mr. Destadio as Treasurer/Secretary, seconded by Mr. King. Motion carried.

Ms. Learnard asked for a motion to approve the August 16, 2022 regular meeting minutes. Mr. Prebor stated he was not at the August 16, 2022 meeting but did review the meeting minutes. Mr. King made a motion to approve the August 16, 2022 regular meeting minutes, seconded by Mr. Destadio. Motion carried.

There were no reports from the Authority members. Mr. Dan Davis provided a General Manager report and discussed a letter received from the EPD regarding the Line Creek plant. Mr. Dan Davis stated he will review the letter and report back to the Board. Mr. Dan Davis stated a draft of the biosolids management report will be presented at the November board meeting and it will contain multiple options for consideration.

Mr. Dan Davis discussed the Organizational Chart stating that the chart was presented at the Board meeting last month which includes a new logistics position (Maintenance Coordinator). Mr. Destadio made a motion to approve the Organizational Chart, seconded by Mr. King. Motion carried.

Mr. Dan Davis discussed the Job Description stating it supports the new position in the Organizational Chart and was presented at the Board meeting last month. Mr. King made a motion to approve the Job Description, seconded by Mr. Prebor. Motion carried.

Ms. Shah discussed the FY23 Annual Budget stating the bottom line is the same as presented at the last Board meeting and includes additional FY22 COLA and FY23 COLA. Mr. Bo Davis stated there are minor qualitative changes to the budget from what was presented last month, including renaming two column headings to improve clarity. Mr. Destadio discussed prepayment of fees from a particular subdivision and its effect on the FY22 revenues being over budget. Mr. Prebor made a motion to approve the FY23 Annual Budget, seconded by Mr. King. Motion carried.

Ms. Shah discussed the Annual Services Contract stating three bids were received and a standard procurement process was followed. Ms. Shah stated the contract term is for one year with a one-year renewal. The staff recommends the contract be awarded to Crawford Grading and Pipeline, Inc. Mr.

Prebor asked why there was a large disparity in the bid amounts. Ms. Shah stated the bids were dependent on internal costs. Mr. Dan Davis stated both Crawford Grading and Pipeline, Inc. and RDJE, Inc. have held the contract in the past. Mr. Prebor made a motion to approve the Annual Services Contract with Crawford Grading and Pipeline, Inc. in the amount of $171,995, seconded by Mr. Destadio. Motion carried.

Ms. Shah discussed the Emergency Services Contract stating one bid was received and a standard procurement process was followed. Ms. Shah stated the contract term is for one year with a one-year renewal. The staff recommends the contract be awarded to Crawford Grading and Pipeline, Inc. Mr. Destadio made a motion to approve the Emergency Services Contract with Crawford Grading and Pipeline, Inc. in the amount of $23,280, seconded by Mr. King. Motion carried.

Mr. Dan Davis discussed the Agreement with the Fayette County Water System, stating the Authority received a notice of an increase in the rate for billing services for a three-year term. Mr. Dan Davis recommended the Authority respond to the Water System notice requesting revisions to the agreement. The revisions suggested include changing the term to two years, and the removal of redundant language. Mr. Prebor asked why the term should be changed. Ms. Griffis stated the renewal notice was early and a two-year term will maintain the original schedule which is preferable to the Authority staff (to not extend the term outside the current agreement). Ms. Griffis noted the current agreement allows the Water System to increase the rate amount at any time within the term. Ms. Shah stated the proposed increase is $55,000 per year, totaling $266,000 for the budget year. Mr. King made a motion to approve the revised Agreement with the Fayette County Water System, seconded by Mr. Prebor. Motion carried.

Ms. Learnard asked for a motion to adjourn into Executive Session for the purpose of Real Estate, Personnel, and Potential Litigation. The motion was made by Mr. King and seconded by Mr. Prebor. Motion carried. The meeting was adjourned into Executive Session at 8:58 am.

The meeting was reconvened at 9:42 am.

Ms. Learnard opened the regular meeting session again. Mr. Prebor made a motion to change the Board meeting dates: canceling the October 18, 2022 meeting; canceling the December 20, 2022 meeting; and rescheduling the November 15, 2022 meeting to November 8, 2022 (to accommodate medical renewals), seconded by Mr. Destadio. Motion carried.

Ms. Learnard asked for a motion to adjourn. The motion was made by Mr. King and seconded by Mr. Prebor. Motion carried. The meeting was adjourned at 9:43 am.

_____
Chairman – Kim Learnard

_____
Vice Chairman – Mike King

MARSH & McLENNAN AGENCY

Peachtree City Water & Sewerage Authority

December 1, 2022 Renewal Overview

Todd Browning
Sr. VP of Employee Health & Benefits

November 8, 2022

Medical Plan Renewal

	Current NPOS 19 Copay OPT 1	Renewal NPOS 19 Copay OPT 1
In-network		
Deductible - Individual	$1,000	$1,000
Deductible - Family	$2,000	$2,000
Out-of-pocket maximum - Individual	$4,000	$4,000
Out-of-pocket maximum - Family	$8,000	$8,000
Coinsurance	0%	0%
Preventative Office Visits & Testing	$0	0%
Office Visit(PCP) Copay	$20	$20
Office Visit(specialist) Copay	$50	$50
Urgent Care Copay	$100	$100
Emergency Room	$500	$500
Outpatient Lab Testing	$0	$0
Outpatient X-Ray	$0	$0
Outpatient Complex Imaging	$500	$500
Inpatient Hospital Stay - Facility	0% after Deductible	0% after Deductible
Outpatient Surgery - Facility	0% after Deductible	0% after Deductible
In-Network Pharmacy Coverage		
Pharmacy Deductible (separate from medical deductible)	None	None
Tier 1	$10	$10
Tier 2	$35	$35
Tier 3	$55	$55
Tier 4	25%	25%
Specialty	25%/35%	25%/35%
Financial Summary		
Monthly Premium **Annual Premium**	**$59,456.64** **$713,479.68**	**$99,271.22** **$1,191,254.64**
Annual Premium Over **Annual Percentage Over Current**		**$477,774.96** **67.0%**

PROPOSED MEDICAL PLAN: Humana Simplicity + Prosperity GAP with Flexible Spending Account

	Current	Proposed	
	Humana NPOS 19 Copay OPT 1	Humana + GAP *Note: All Employees electing the Humana medical coverage will automatically be enrolled in the GAP plan.*	
In-network			
Deductible - Individual	$1,000	$0	$500
Deductible - Family	$2,000	$0	$1,500
Out-of-pocket maximum - Individual	$4,000	$6,500	$500
Out-of-pocket maximum - Family	$8,000	$13,000	$1,500
Coinsurance	0%	0%	0%
Preventative Office Visits & Testing	$0	$0	$0
Office Visit(PCP) Copay	$20	$45	$0 after $500 Deductible is met
Office Visit(specialist) Copay	$50	$90	
Urgent Care Copay	$50	$100	
Emergency Room	$100	$500	
Ambulance Transportation	$500	$500	
Outpatient Lab Testing	$0	$0	
Outpatient X-Ray	$0	$0	
Outpatient Complex Imaging	$500	$500	
Inpatient Hospital Stay - Facility	0% after Deductible	$2,000/day up to 3 days	
Outpatient Surgery - Facility	0% after Deductible	$1,750	
In-Network Pharmacy Coverage			
Pharmacy Deductible	None	None	
Tier 1	10	$10	Medical Plan Copays Apply
Tier 2	$35	$45	
Tier 3	$55	$90	
Tier 4	25%	25%	
Tier 5	25%/35%	25%	

Financial Summary	**Current**	**Renewal**	
Monthly Premium	**$59,456.64**	**$99,271.22**	**$62,336.26**
Annual Premium	**$713,479.68**	**$1,191,254.64**	**$748,035.12**
PTC WASA FSA Contribution Annually			**$11,500.00**
Total Contribution Annually			**$759,535.12**
			% Change over Current
			6.46%

Dental Renewal

	Current Ameritas PPO	Proposed Principal PPO
In-network		
Annual Benefit Maximum	$1,500	$1,500
Annual Individual Deductible	$25	$25
Orthodontic Lifetime Benefit Max		
● Adult Coverage	None	None
● Pediatric Coverage	$1,500	$1,500
Out of Network Reimbursement	90th U&C	90th U&C
In-Network Dental Services		
Diagnostic & Preventative Services ● Periodic oral exam ● Teeth Cleaning (prophylaxis) ● Bite-wing X-rays ● Intraoral X-rays	0%	0%
Basic Services ● Fillings	20%	20%
Endodontics ● Root Canal	20%	20%
Periodontics ● Scaling and Root Planing	20%	20%
Oral Surgery ● Surgical Extractions	20%	20%
Major Services ● Crowns	50%	50%
Prosthodontics ● Dentures ● Bridges ● Dental Implants (covered)	50%	50%
Orthodontic Services	50%	50%
Financial Summary		
Monthly Premium	**$1,632.64**	**$1,681.68**
Annual Premium	**$19,591.68**	**$20,180.16**
Annual Premium Over Current		**$588.48**
Annual Percentage Over Current		**3.0%**

Vision Renewal

	Current Eyemed	Proposed Eyemed via Humana
In-network		
Exam Copay	$10	$10
Material Copay	$25	$15
Exam Frequency	12	12
Lens Frequency	12	12
Frame Frequency	24	12
Materials		
Eyeglass Lenses Allowances Single Vision Lined Bifocal Lined Trifocal Lenticular	$25 Copay	$15 Copay
Frame Allowances	$100 Allowance	$130 Allowance + 20% off of balance
Contact Lens Allowances (in lieu of frame & lenses)		
Contact Lens Fitting & Follow-up Exam	10% off retail	Up to $40 Copay
Elective Contact Lens	$115	$130
Therapeutic / Medically Necessary Lenses	Covered	Covered
Financial Summary		
Monthly Premium **Annual Premium**	**$418.08** **$5,016.96**	**$332.29** **$3,987.48**
Annual Premium Over Current **Annual Percentage Over Current**		**- $1,029.48** **-20.5%**

Additional Ancillary Benefits

	Principal			
	Current Rate	*Current Monthly Premium*	*Renewal Rate*	*Renewal Monthly Premium*
Group Term Life	$0.352	$1,176.04	$0.352	$1,176.04
Accidental Death & Dismemberment	$0.038	$126.96	$0.038	$126.96
Dependent Life	$1.91	$49.93	$1.91	$43.93
Short Term Disability	$0.38	$657.29	$0.38	$657.29
Long Term Disability	1.05%	$1,381.86	1.05%	$1,381.86
Monthly Premium		**$3,392.08**		**$3,392.08**
Annual Premium		**$40,704.96**		**$40,704.96**
Annual Premium Over Current				**$0.00**
Annual Percentage Over Current				**0.00%**

MARSH & McLENNAN
AGENCY

Quarterly Financial Report
September 30, 2022

PCWASA Cash Account Balances
September 30, 2022

1111	Revenue Operating Account	$	5,554,255
1112	Sinking Fund Account	$	1,725,053
1113	Renewal & Extension Account	$	9,053
1114	Capital Fund Account	$	7,582
1320	Georgia Fund One	$	3,752,195
		$	11,048,139

Peachtree City Water and Sewerage Authority
Financial Report
For the Fiscal Year Ending on September 30, 2022
Preliminary Financials - Unaudited

	FY 2022 APPROVED BUDGET	FY 2022 ACTUAL/ ENCUMBRANCES	% Used YTD
Revenues - Rate	$9,380,470	$9,476,997	101.03%
Revenues - Fee	$866,750	$1,353,066	156.11%
Fund Balance	$1,100,000	$0	
Operating Fund Revenues	$11,347,220	$10,830,063	
Salaries, Wages, & Benefits	$3,052,352	$2,937,226	96.23%
Materials, Supplies, & Services	$3,595,642	$3,380,381	94.01%
Operation Expenditures	$6,647,994	$6,317,607	95.03%
Operating Surplus (Deficit)	$4,699,226	$4,512,456	
Oper Trfr-Sinking Fund	$2,749,787	$2,749,787	100.00%
Oper Trfr-Ren & Ext	$350,000	$330,230	94.35%
Oper Trfr-Capital	$1,418,865	$689,020	48.56%
Sub-Total	$4,518,652	$3,769,037	83.41%
Total All Expenditures	$11,166,646	$10,086,644	
Net Surplus (Deficit)	$180,574	$743,419	
Other Income (Expenditures)	$0	$0	
Total Surplus (Deficit)	$180,574	$743,419	

Percentage into Budget Year: 100%

MAULDIN & JENKINS
CPAs & ADVISORS

October 27, 2022

Members of the Board of Directors
Peachtree City Water and Sewerage Authority
1127 Highway 74 South
Peachtree City, Georgia 30269

We are pleased to confirm our understanding of the services we are to provide the Peachtree City Water and Sewerage Authority (the "Authority"), a component unit of the City of Peachtree City, Georgia, for the year ended September 30, 2022.

Audit Scope and Objectives

We will audit the financial statements of the Authority and the disclosures, which collectively comprise the basic financial statements of the Peachtree City Water and Sewerage Authority, as of and for the year then ended. Accounting standards generally accepted in the United States of America ("GAAP") provide for certain required supplementary information ("RSI"), such as management's discussion and analysis ("MD&A"), to supplement the Authority's basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. As part of our engagement, we will apply certain limited procedures to the Authority's RSI in accordance with auditing standards generally accepted in the United States of America ("GAAS"). These limited procedures will consist of inquiries of management regarding the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We will not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance. The following RSI is required by GAAP and will be subjected to certain limited procedures, but will not be audited:

1. Management's Discussion and Analysis ("MD&A").

The objectives of our audit are to obtain reasonable assurance as to whether the financial statements as a whole are free from material misstatement, whether due to fraud or error; issue an auditor's report that includes our opinions about whether your financial statements are fairly presented, in all material respects, in conformity with GAAP; and report on the fairness of the supplementary information referred to in the second paragraph when considered in relation to the financial statements as a whole. Reasonable assurance is a high level of assurance but is not absolute assurance and, therefore, is not a guarantee that an audit conducted in accordance with GAAS and *Government Auditing Standards* will always detect a material misstatement when it exists. Misstatements,

including omissions, can arise from fraud or error and are considered material if there is a substantial likelihood that, individually or in the aggregate, they would influence the judgment of a reasonable user made based on the financial statements.

The objectives also include reporting on internal control over financial reporting and compliance with provisions of laws, regulations, contracts, and award agreements, noncompliance with which could have a material effect on the financial statements in accordance with *Government Auditing Standards*.

Auditor's Responsibilities for the Audit of the Financial Statements

We will conduct our audit in accordance with GAAS and the standards for financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States, and will include tests of the accounting records of the Peachtree City Water and Sewerage Authority and other procedures we consider necessary to enable us to express such opinions. As part of an audit in accordance with GAAS and *Government Auditing Standards*, we will exercise professional judgment and maintain professional skepticism throughout the audit.

We will evaluate the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management. We will also evaluate the overall presentation of the financial statements, including the disclosures, and determine whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation. We will plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether from: 1) errors, 2) fraudulent financial reporting, 3) misappropriation of assets, or 4) violations of laws or governmental regulations that are attributable to the government or to acts by management or employees acting on behalf of the government. Because the determination of waste and abuse is subjective, *Government Auditing Standards* do not expect auditors to perform specific procedures to detect waste or abuse in financial audits, nor do they expect auditors to provide reasonable assurance of detecting waste or abuse.

Because of the inherent limitations of an audit, combined with the inherent limitations of internal control, and because we will not perform a detailed examination of all transactions, there is an unavoidable risk that some material misstatements may not be detected by us, even though the audit is properly planned and performed in accordance with GAAS and *Government Auditing Standards*. In addition, an audit is not designed to detect immaterial misstatements or violations of laws or governmental regulations that do not have a direct and material effect on the financial statements. However, we will inform the appropriate level of management of any material errors, any fraudulent financial reporting or misappropriation of assets that comes to our attention. We will also inform the appropriate level of management of any violations of laws or governmental regulations that come to our attention, unless clearly inconsequential. Our responsibility as auditors is limited to the period covered by our audit and does not extend to any later periods for which we are not engaged as auditors.

We will also conclude, based on the audit evidence obtained, whether there are conditions or events, considered in the aggregate, that raise substantial doubt about the government's ability to continue as a going concern for a reasonable period of time.

Our procedures will include tests of documentary evidence supporting the transactions recorded in the accounts, tests of the physical existence of inventories, and direct confirmation of receivables and certain other assets and liabilities by correspondence with selected customers, creditors, and financial institutions. We will request written representations from your attorneys as part of the engagement, and they may bill you for responding to this inquiry.

We have identified the following significant risk(s) of material misstatement as part of our audit planning:

1. Management's override of internal controls.

Audit Procedures—Internal Control
We will obtain an understanding of the government and its environment, including internal control relevant to the audit, sufficient to identify and assess the risks of material misstatement of the financial statements, whether due to error or fraud, and to design and perform audit procedures responsive to those risks and obtain evidence that is sufficient and appropriate to provide a basis for our opinions. Tests of controls may be performed to test the effectiveness of certain controls that we consider relevant to preventing and detecting errors and fraud that are material to the financial statements and to preventing and detecting misstatements resulting from illegal acts and other noncompliance matters that have a direct and material effect on the financial statements. Our tests, if performed, will be less in scope than would be necessary to render an opinion on internal control and, accordingly, no opinion will be expressed in our report on internal control issued pursuant to *Government Auditing Standards*. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentation, or the override of internal control. An audit is not designed to provide assurance on internal control or to identify significant deficiencies or material weaknesses. Accordingly, we will express no such opinion. However, during the audit, we will communicate to management and those charged with governance internal control related matters that are required to be communicated under AICPA professional standards and *Government Auditing Standards*.

Audit Procedures—Compliance
As part of obtaining reasonable assurance about whether the financial statements are free of material misstatement, we will perform tests of Peachtree City Water and Sewerage Authority's compliance with provisions of applicable laws, regulations, contracts, agreements, and grants. However, the objective of our audit will not be to provide an opinion on overall compliance, and we will not express such an opinion in our report on compliance issued pursuant to *Government Auditing Standards*.

Other Services
We will also assist in preparing the financial statements and related notes of the Authority in conformity with accounting principles generally accepted in the United States of America based on information provided by you. These nonaudit services do not constitute an audit under *Government Auditing Standards* and such services will not be conducted in accordance with *Government Auditing Standards*. We will perform these services in accordance with applicable professional standards. The other services are limited to the financial statement services previously defined. We, in our sole professional judgement, reserve the right to refuse to perform any procedure or take any action that could be construed as assuming management responsibilities.

You agree to assume all management responsibilities relating to the financial statements and related notes and any other nonaudit services we provide. You will be required to acknowledge in the management representation letter our assistance with preparation of the financial statements and related notes and that you have reviewed and approved the financial statements and related notes prior to their issuance and have accepted responsibility for them. Further, you agree to oversee the nonaudit services by designating an individual, preferably from senior management, with suitable skill, knowledge, or experience; evaluate the adequacy and results of those services; and accept responsibility for them.

Responsibilities of Management for the Financial Statements

Our audit will be conducted on the basis that you acknowledge and understand your responsibility for designing, implementing, establishing, and maintaining effective internal controls relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error, and for evaluating and monitoring ongoing activities, to help ensure that appropriate goals and objectives are met; following laws and regulations; and ensuring that management and financial information is reliable and properly reported. Management is also responsible for implementing systems designed to achieve compliance with applicable laws, regulations, contracts, and grant agreements. You are also responsible for the selection and application of accounting principles, for the preparation and fair presentation of the financial statements and all accompanying information in conformity with accounting principles generally accepted in the United States of America, and for compliance with applicable laws and regulations and the provisions of contracts and grant agreements.

Management is responsible for making drafts of financial statements, all financial records, and related information available to us and for the accuracy and completeness of that information (including information from outside of the general and subsidiary ledgers). You are also responsible for providing us with: 1) access to all information of which you are aware that is relevant to the preparation and fair presentation of the financial statements, such as records, documentation, identification of all related parties and all related-party relationships and transactions, and other matters; 2) additional information that we may request for the purpose of the audit; and 3) unrestricted access to persons within the government from whom we determine it necessary to obtain audit evidence. At the conclusion of our audit, we will require certain written representations from you about your responsibilities for the financial statements; compliance with laws, regulations, contracts, and grant agreements, and other responsibilities required by GAAS and *Government Auditing Standards*.

Your responsibilities include adjusting the financial statements to correct material misstatements and confirming to us in the management representation letter that the effects of any uncorrected misstatements aggregated by us during the current engagement and pertaining to the latest period presented are immaterial, both individually and in the aggregate, to the financial statements of each opinion unit taken as a whole.

You are responsible for the design and implementation of programs and controls to prevent and detect fraud, and for informing us about all known or suspected fraud affecting the government involving: 1) management, 2) employees who have significant roles in internal control, and 3) others where the fraud could have a material effect on the financial statements. Your responsibilities include informing us of your knowledge of any allegations of fraud or suspected fraud affecting the government received in communications from employees, former employees, grantors, regulators, or others. In addition, you are responsible for identifying and ensuring that the government complies with applicable laws, regulations, contracts, agreements, and grants and for taking timely and appropriate steps to remedy fraud and noncompliance with provisions of laws, regulations, contracts, or grant agreements that we report.

With regard to an exempt offering document with which Mauldin & Jenkins is not involved, you agree to clearly indicate in the exempt offering document that Mauldin & Jenkins is not involved with the contents of such offering document. In the event that Mauldin & Jenkins is requested to be involved with an exempt offering document, you agree that the aforementioned auditor's report or reference to Mauldin & Jenkins will not be included without our prior permission or consent. Furthermore, any agreement to perform work in connection with an exempt offering document, including an agreement to provide permission or consent, will be a separate engagement.

Management is responsible for establishing and maintaining a process for tracking the status of audit findings and recommendations. Management is also responsible for identifying and providing report copies of previous financial audits, attestation engagements, performance audits or other studies related to the objectives discussed in the Audit Scope and Objectives section of this letter. This responsibility includes relaying to us corrective actions taken to address significant findings and recommendations resulting from those audits, attestation engagements, performance audits, or other studies. You are also responsible for providing management's views on our current findings, conclusions, and recommendations, as well as your planned corrective actions, for the report, and for the timing and format for providing that information.

With regard to the electronic dissemination of audited financial statements, including financial statements published electronically on your website, you understand that electronic sites are a means to distribute information and, therefore, we are not required to read the information contained in these sites or to consider the consistency of other information in the electronic site with the original document.

You acknowledge the Peachtree City Water and Sewerage Authority will not utilize Mauldin & Jenkins, LLC to store documents, data, or records on behalf of the Authority in accordance with the "Hosting Services" (see ET section 1.295.143) interpretation of the AICPA Code of Professional Conduct. The Authority is solely responsible for maintaining its own data and records.

In that regard, SuraLink is used solely as a method of transferring data to Mauldin & Jenkins, LLC and is not intended for the storage of the Authority's information. All information you will provide through SuraLink is a copy and you will maintain original documents and data as part of your records.

Engagement Administration, Fees, and Other

We understand that your employees will prepare all cash or other confirmations we request and will locate any documents selected by us for testing.

We will provide copies of our reports to the Peachtree City Water and Sewerage Authority; however, management is responsible for distribution of the reports and the financial statements. Unless restricted by law or regulation, or containing privileged and confidential information, copies of our reports are to be made available for public inspection.

The audit documentation for this engagement is the property of Mauldin & Jenkins and constitutes confidential information. However, subject to applicable laws and regulations, audit documentation and appropriate individuals will be made available upon request and in a timely manner to a federal agency providing direct or indirect funding, or the U.S. Government Accountability Office for purposes of a quality review of the audit, to

resolve audit findings, or to carry out oversight responsibilities. We will notify you of any such request. If requested, access to such audit documentation will be provided under the supervision of Mauldin & Jenkins personnel. Furthermore, upon request, we may provide copies of selected audit documentation to the aforementioned parties. These parties may intend, or decide, to distribute the copies or information contained therein to others, including other governmental agencies.

The audit documentation for this engagement will be retained for a minimum of five years after the report release date or for any additional period requested by a regulatory body. If we are aware that a federal awarding agency, pass-through entity, or auditee is contesting an audit finding, we will contact the party(ies) contesting the audit finding for guidance prior to destroying the audit documentation.

We expect to begin our audit on approximately January 9, 2023 and to issue our reports no later than March 31, 2023. David Irwin is the engagement partner and is responsible for supervising the engagement and signing the reports or authorizing another individual to sign them. Our fee for these services will be $14,500 for the year ended September 30, 2022. Our hourly rates vary according to the degree of responsibility involved and the experience level of the personnel assigned to your audit. Our invoices for these fees will be rendered as work progresses and are payable upon presentation. The above fees are based on anticipated cooperation from your personnel (including complete and timely receipt by us of the information on the respective client participation listings) and the assumption that unexpected circumstances (including scope changes) will not be encountered during the audit. If significant additional time is necessary, we will discuss it with management and arrive at a new fee estimate before we incur the additional costs.

As a result of our prior or future services to you, we might be requested or required to provide information or documents to you or a third party in a legal, administrative, arbitration, or similar proceeding in which we are not a party. If this occurs, our efforts in complying with such requests will be deemed billable to you as a separate engagement. We shall be entitled to compensation for our time and reasonable reimbursement for our expenses (including legal fees) in complying with the request. For all requests we will observe the confidentiality requirements of our profession and will notify you promptly of the request.

Reporting

We will issue written reports upon completion of our audit of the Peachtree City Water and Sewerage Authority's financial statements. Our report will be addressed to the Board of Directors of the Peachtree City Water and Sewerage Authority. We cannot provide assurance that unmodified opinions will be expressed. Circumstances may arise in which our report may differ from its expected form and content based on the results of our audit. Depending on the nature of these circumstances, it may be necessary for us to modify our opinions or add emphasis-of-matter or other-matter paragraphs to our auditor's report, or if necessary, withdraw from this engagement. If our opinions are other than unmodified, we will discuss the reasons with you in advance. If, for any reason, we are unable to complete the audit or are unable to form or have not formed opinions, we may decline to express opinions or to issue reports or may withdraw from this engagement.

We will also provide a report (that does not include an opinion) on internal control related to the financial statements and compliance with the provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a material effect on the financial statements as required by *Government Auditing Standards*. The report on internal control and on compliance and other matters will state: 1) that the purpose of the report is solely to describe the scope of testing of internal control and compliance, and the results of that testing, and not to provide an opinion on the effectiveness of the entity's internal control on compliance, and 2) that the report is an integral part of an audit performed in accordance with *Government Auditing Standards*

in considering the entity's internal control and compliance. The report will also state that the report is not suitable for any other purpose. If during our audit, we become aware that the Peachtree City Water and Sewerage Authority is subject to an audit requirement, that is not encompassed in the terms of this engagement, we will communicate to management and those charged with governance, that an audit in accordance with U.S. generally accepted auditing standards and the standards for financial audits contained in *Government Auditing Standards,* may not satisfy the relevant legal, regulatory, or contractual requirements.

We appreciate the opportunity to be of service to the Peachtree City Water and Sewerage Authority and believe this letter accurately summarizes the significant terms of our engagement. If you have any questions, please let us know. If you agree with the terms of our engagement as described in this letter, please sign below, and return it to us.

Sincerely,

MAULDIN & JENKINS, LLC

David Irwin

RESPONSE:

This letter correctly sets forth the understanding of the Peachtree City Water and Sewerage Authority.

By: _____

Title: _____

PEACHTREE CITY WATER AND SEWERAGE AUTHORITY

Biosolids Management System Alternatives Evaluation

October 31, 2022

prepared for

PEACHTREE CITY
Water and Sewerage Authority

1127 Hwy 74 South
Peachtree City, GA 30269

prepared by

Integrated Science & Engineering, Inc.
1039 Sullivan Road, Suite 200
Newnan, GA 30265
(p) 678.552.2106
COA#: PEF000625 EXP: 06/30/2024

Contents

Table of Figures

List of Tables

Appendices

1. BACKGROUND

Peachtree City Water and Sewerage Authority (Authority) engaged Integrated Science and Engineering (ISE) to assist in the analysis and selection of an improved biosolids handling system. Recent increases in disposal fees and growing restrictions on biosolids acceptance at landfills throughout the state have highlighted the need for a more resilient biosolids management program at the Authority's two wastewater treatment plants, Line Creek and Rockaway. The current biosolids handling operation includes limited aerobic digestion and dewatering at Line Creek and limited sludge holding tanks and dewatering at Rockaway. Neither facility produces a Class A or Class B designated sludge, meaning that the sludge cannot be used beneficially without further modification. The dewatered sludge from both plants is hauled to the Pine Ridge landfill in Griffin, GA for disposal. While the Authority has received more favorable fees as compared to other utilities in the Metro-Atlanta area, the disposal rate is expected to continue to rise, possibly doubling without warning. There is also the possibility for landfills to reject sludge altogether without warning.

ISE has evaluated eight alternates for treating and disposing of biosolids. These alternates consist of the use of four main technologies for treating sludge; aerobic digestion, thermal drying, dehumidification, and solar drying. The systems also include two options for disposal; surface disposal in a landfill and land application of sludge. The sections below describe each scenario in detail and provide a cost analysis of operation and capital costs involved with each option.

2. REGULATORY REQUIREMENTS

The United States Environmental Protection Agency (EPA) established regulations for the treatment and disposal of sewage sludge in the Code of Federal Regulations Title 40, Part 503. The regulations allow for three methods of sludge disposal:

- Land application (Subpart B) – applied to land to replenish nutrients in soil and fertilize crops
- Surface disposal (Subpart C) – disposed of in surface sites, including landfills
- Incineration (Subpart E) – burned at high temperatures in an incinerator

The regulations restrict the disposal of sewage sludge, unless certain treatment criteria are met for pathogen reduction and vector attraction reduction. These criteria are summarized below.

2.1. Pathogen Reduction

Part 503 establishes two categories of sewage sludge in regards to pathogen reduction; Class A and Class B. Class A sludge meets more stringent treatment requirements, with pathogens reduced to below detectable levels, and as such, has less restrictions on final use of the sludge. Class B sludge has pathogens reduced to levels unlikely to pose risks to public health and the environment with restrictions on where and how sludge may be used or disposed. The general methods for achieving Class A or B pathogen reduction requirements are presented in the following table.

Table 2-1: Class A and B Pathogen Treatment Alternates[1]

Class A	*Alternate 1*: Thermally Treated Sewage Sludge	Use one of four time-temperature regimes
	Alternate 2: Sewage Sludge Treated in a High pH-High Temperature Process	Specifies pH, temperature, and air-drying requirements
	Alternate 3: Sewage Sludge Treated in Other Processes	Demonstrate that the process can reduce enteric viruses and viable helminth ova. Maintain operating conditions used in the demonstration.
	Alternate 4: Sewage Sludge Treated in Unknown Processes	Test for pathogens - Salmonella, enteric viruses, and viable helminth ova - at the time the sewage sludge is used or disposed.
	Alternate 5: Use of Process to Further Reduce Pathogens (PFRP)	Sewage sludge is treated in one of the processes to further reduce pathogens
	Alternate 6: Use of a Process Equivalent to PFRP	Sewage sludge is treated in a process equivalent to one of the PFRP's, as determined by the permitting authority
Class B	*Alternate 1*: Monitoring of Indicator Organisms	Test for fecal coliform density as an indicator for all pathogens at the time of sewage sludge use or disposal
	Alternative 2: Use of Process to Significantly Reduce Pathogens	Sewage sludge is treated in one of the processes to significantly reduce pathogens
	Alternate 3: Use of Process Equivalent to PSRP	Sewage sludge is treated in a process equivalent to one of the PSRP's, as determined by the permitting authority.

Class A

For Class A sludge, a majority of the treatment methods meet alternates 1 and 5. Approved options for PFRP's are presented in **Table 2-2** below.

Table 2-2: Processes to Further Reduce Pathogens (PFRP's) - Class A[1]

Composting	Using either the within-vessel composting method or the static aerated pile composting method, the temperature of the sewage sludge is maintained at 55°C (131°F) or higher for three days. Using the windrow composting method, the temperature of the sewage sludge is maintained at 55°C (131°F) or higher for 15 days or longer. During the period when the compost is maintained at 55°C (131°F) or higher, there shall be a minimum of five turnings of the windrow.
Heat Drying	Sewage sludge is dried by direct or indirect contact with hot gases to reduce the moisture content of the sewage sludge to 10% or lower. Either the temperature of the sewage sludge particles exceeds 80°C (176°F) or the wet bulk temperature of the gas in contact with the sewage sludge as the sewage sludge leaves the dryer exceeds 80°C (176°F).
Heat Treatment	Liquid sewage sludge is heated to a temperature of 180°C (356°F) or higher for 30 minutes.
Thermophillic Aerobic Digestion	Liquid sewage sludge is agitated with air or oxygen to maintain aerobic conditions and the mean cell residence time (i.e., the solids retention time) of the sewage sludge is 10 days at 55°C (131°F) to 60°C (140°F).
Beta Ray Irradiation	Sewage sludge is irradiated with beta rays from an electron accelerator at dosages of at least 1.0 megarad at room temperature (ca. 20°C [68°F]).
Gamma Ray Irradiation	Sewage sludge is irradiated with gamma rays from certain isotopes, such as Cobalt 60 and Cesium 137, at dosages of at least 1.0 megarad at room temperature (ca. 20°C [68°F]).
Pasteurization	The temperature of the sewage sludge is maintained at 70°C (158°F) or higher for 30 minutes or longer.

Sewage sludge meeting Class A criteria for pathogen reduction may be land applied or distributed to the public for unrestricted use as a soil amendment or fertilizer as long as vector attraction reduction criteria are also met at the time of sludge preparation. Vector attraction reduction is discussed in Section 2.2 below.

Class B

Class B pathogen reduction is typically achieved using a process to significantly reduce pathogens (PSRP). Approved options for PSRP's are outlined in **Table 2-3**.

Table 2-3: Processes to Significantly Reduce Pathogens (PSRP's) – Class B[1]

Aerobic Digestion	Sewage sludge is agitated with air or oxygen to maintain aerobic conditions for a specific mean cell residence time (i.e., solids retention time) at a specific temperature. Values for the mean cell residence time and temperature shall be between 40 days at 20°C (68°F) and 60 days at 15°C (59°F).
Air Drying	Sewage sludge is dried on sand beds or on paved or unpaved basins. The sewage sludge dries for a minimum of three months. During two of the three months, the ambient average daily temperature is above 0°C (32°F).
Anaerobic Digestion	Sewage sludge is treated in the absence of air for a specific mean cell residence time (i.e., solids retention time) at a specific temperature. Values for the mean cell residence time and temperature shall be between 15 days at 35°C to 55°C (131°F) and 60 days at 20°C (68°F).
Composting	Using either the within-vessel, static aerated pile, or windrow composting methods, the temperature of the sewage sludge is raised to 40°C (104°F) or higher and remains at 40°C (104°F) or higher for five days. For four hours during the five-day period, the temperature in the compost pile exceeds 55°C (131°F).
Lime Stabilization	Sufficient lime is added to the sewage sludge to raise the pH of the sewage sludge to 12 after two hours of contact.

Sewage sludge meeting Class B criteria for pathogen reduction may be land applied as long as vector attraction reduction is achieved and the following site restrictions and management practices are met:

Site Restrictions:

1) Restrictions for the harvesting of crops and turf:[1]
   a) Food crops with harvested parts that touch the sewage sludge/soil mixture and are totally above ground shall not be harvested for 14 months after application of sewage sludge.
   b) Food crops with harvested parts below the land surface where sewage sludge remains on the land surface for four months or longer prior to incorporation into the soil shall not be harvested for 20 months after sewage sludge application.
   c) Food crops with harvested parts below the land surface where sewage sludge remains on the land surface for less than four months prior to incorporation shall not be harvested for 38 months after sewage sludge application.
   d) Food crops, feed crops, and fiber crops, whose edible parts do not touch the surface of the soil, shall not be harvested for 30 days after sewage sludge application.
   e) Turf grown on land where sewage sludge is applied shall not be harvested for 1 year after application of the sewage sludge when the harvested turf is placed on either land with a high potential for public exposure or a lawn, unless otherwise specified by the permitting authority.
2) Restriction for the grazing of animals:
   a) Animals shall not graze on land for 30 days after application of sewage sludge to the land.
3) Restrictions for public contact:
   a) Access to land with a high potential for public exposure, such as a park or ballfield, is restricted for one year after sewage sludge application. Examples of restricted access include posting with no trespassing signs, or fencing.
   b) Access to land with a low potential for public exposure (e.g., private farmland) is

restricted for 30 days after sewage sludge application. An example of restricted access is remoteness.

2.2. Vector Attraction Reduction

In order for sewage sludge to be applied to land for beneficial reuse, either in bulk or distributed to the public in bags or other containers, the sludge must meet the pathogen reduction requirements of either Class A or Class B along with one of the vector attraction reduction requirements in the following table. This ensures that vectors, such as rodents, flies, and birds, are not attracted to the sewage sludge, increasing the potential for the spread of diseases.

Table 2-4: Summary of Vector Attraction Reduction Requirements for Land Application of Sewage Sludge

	Requirement	Most Appropriate for:
Option 1	At least 38% reduction in volatile solids during sewage sludge treatment	Sewage sludge processed by: Anaerobic biological treatment, aerobic biological treatment, or chemical oxidation
Option 2	Less than 17% additional volatile solids loss during bench-scale anaerobic batch digestion of the sewage sludge for 40 additional days at 30°C to 37°C (86°F to 99°F)	Only for anaerobically digested sewage sludge
Option 3	Less than 15% additional volatile solids reduction during bench-scale aerobic batch digestion for 30 additional days at 20°C (68°F)	Only for aerobically digested sewage sludge with 2% or less solids—e.g., sewage sludge treated in extended aeration plants
Option 4	SOUR at 20°C (68°F) is ≤1.5 mg oxygen/hr/g total sewage sludge solids	Sewage sludge from aerobic processes (should not be used for composted sludges). Also, for sewage sludge that has been deprived of oxygen for longer than 1–2 hours.
Option 5	Aerobic treatment of the sewage sludge for at least 14 days at over 40°C (104°F) with an average temperature of over 45°C (113°F)	Composted sewage sludge (Options 3 and four are likely to be easier to meet for sewage sludge from other aerobic processes)
Option 6	Addition of sufficient alkali to raise the pH to at least 12 at 25°C (77°F) and maintain a pH ≥12 for two hours and a pH ≥11.5 for 22 more hours	Alkali-treated sewage sludge (alkalies include lime, fly ash, kiln dust, and wood ash)
Option 7	Percent solids ≥75% prior to mixing with other materials	Sewage sludges treated by an aerobic or anaerobic process (i.e., sewage sludges that do not contain unstabilized solids generated in primary wastewater treatment)
Option 8	Percent solids ≥90% prior to mixing with other materials	Sewage sludges that contain unstabilized solids generated in primary wastewater treatment (e.g., any heat-dried sewage sludges)

Table 2-1 Continued

Option 9	Sewage sludge is injected into soil so that no significant amount of sewage sludge is present on the land surface one hour after injection, except Class A sewage sludge which must be injected within eight hours after the pathogen reduction process.	Liquid sewage sludge applied to the land. Domestic septage applied to agricultural land, a forest, or a reclamation site
Option 10	Sewage sludge is incorporated into the soil within six hours after application to land. Class A sewage sludge must be applied to the land surface within eight hours after the pathogen reduction process and must be incorporated within six hours after application.	Sewage sludge applied to the land. Domestic septage applied to agricultural land, forest, or a reclamation site.
Option 11	Sewage sludge placed on an active sewage sludge unit shall be covered with soil or other material at the end of each operating day.	Landfills only, with sludges not meeting Class A or Class B pathogen requirements

Options 1 through 8 reduce the attractiveness of the sludge to vectors. Options 9 and 10 prevent vectors from coming into contact with the sludge. Option 11 only applies to landfills where sewage sludge classified as solid waste (meeting neither Class A nor Class B criteria) is disposed.

2.3. Disposal Options

As noted above, EPA allows sewage sludge to be disposed of in three ways: land application, surface disposal, and incineration.

Land Application

In order to land apply sewage sludge, a Class A or Class B designation is required in regards to pathogens, as well as one of the first 10 options for vector attraction reduction. In order for sewage sludge to be applied to or distributed on the land with no restrictions, Class A pathogen requirements and one of the first 8 options for vector attraction reduction must be met. Sludge can still be land applied when meeting options 9 or 10 for vector attraction reduction; however, the site restrictions listed in Section 2.1 apply.

The quantity of sludge that may be applied to a piece of land is dependent on pollutant loading limits established in Part 503, and also the agronomic rate of the specific crop for nutrient loading. Specific management practices and monitoring is required by Part 503 in order to track and manage the levels of heavy metals and other pollutants applied to a land application site. The particular management practices and monitoring required depends on the quality classification of the sewage sludge. All quality classifications require the following:

- Regulated metals must not exceed the ceiling concentration limits established in Part 503
- Comply with monitoring and recordkeeping requirements in Part 503

Regulations specific to each classification are outlined in the table below.

Table 2-5:Sludge Quality Classifications

Exceptional Quality (EQ)	• Not exceed pollutant concentration limits for metals in Part 503 • Meet one of six Class A pathogen reduction alternates • Meet one of the first 8 options for vector attraction reduction
Pollutant Concentration (PC)	• Not exceed pollutant concentration limits for metals in Part 503 • Meet one of three Class B pathogen reduction alternates and Class B site restrictions • Meet one of the first 10 options for vector attraction reduction • Comply with management requirements in Part 503
Cumulative Pollutant Loading Rate (CPLR)	• Not exceed cumulative pollutant loading rate limits for metals in Part 503 • Meet either Class A or Class B pathogen reduction requirements • Meet one of the first 10 vector attraction reduction requirements • Comply with management requirements in Part 503
Annual Pollutant Loading Rate (APLR)	• Not exceed annual pollutant loading rate limits in Part 503 • Meet one of six Class A pathogen reduction alternates • Meet one of the first 8 vector attraction reduction requirements • Meet labeling requirements in Part 503

General requirements pertaining to the different classifications of sewage sludge applied to the land are summarized in **Table 2-6**.

Table 2-6: Summary of Part 503 Requirements for Different Types of Sewage Sludge[1]

Type of Sewage Sludge[a]	Ceiling Concentration Limit	Other Pollutant Limits	Pathogen Class	Vector Attraction Reduction	Siting Restrictions	General Requirements, Management Practices	Track Added Pollutants
"Exceptional Quality" (Bag or Bulk)	Yes	Pollutant Concentration Limits	A	1 of Options 1-8b	No	No[b]	No
Pollutant Concentration (Bulk Only)	Yes	Pollutant Concentration Limits	B	1 of Options 1-10	Yes	Yes	No
CPLR (Bulk Only)	Yes	Cumulative Pollutant Loading Rates (CPLRs)	A or B	1 of Options 1-10	No if Pathogen Class A Yes if Pathogen Class B	Yes	Yes
APLR (Bag Only)	Yes	Annual Pollutant Loading Rates (APLRs)	A	1 of Options 1-8	No	Yes[c]	No

Additional details of restrictions applying to the land application of sewage sludge can be found in Chapter three of EPA's Process Design Manual for Land Application of Sewage Sludge.

Surface Disposal

Surface disposal includes disposal of sewage sludge in surface sites, such as landfills. Class A or Class B sludge is required for surface disposal unless option 11 for vector attraction reduction is used. This is the typical practice at landfills where fill is placed over waste materials on a daily basis. In the case of landfills, all monitoring is performed by the landfill operator as a part of its waste permit, leaving the Authority with no responsibility beyond disposal.

Incineration

Incineration is the process of burning biosolids in a combustion chamber, oxidizing organic materials and leaving only inert material (ash) to be disposed. Disposal of this ash may be made without restriction; however, strict requirements apply to the sewage sludge that enters the incinerator. Extensive continuous monitoring and air permitting is also required for the off-gas released to the atmosphere. Incineration requires high energy input as well as special equipment and processes not familiar with operations staff. For this reason, incineration was not considered as a feasible disposal option and is therefore not discussed in more detail in this report.

[1] (United States Environmental Protection Agency, 1995)

[a] All sewage sludge must also meet Part 503 frequency of monitoring requirements and recordkeeping and reporting requirements.

[b] If sewage sludge instead follows vector attraction reduction options 9 or 10 (incorporation or injection), the sewage sludge must also meet
Part 503 general requirements and management practices, and would not be considered "exceptional quality" sewage sludge.

[c] Only two general requirements and a management practice requirement for labeling must be met.

3. SLUDGE PRODUCTION RATES

Sludge is a byproduct of the wastewater treatment process, consisting of the solids removed from the activated sludge treatment process. The sludge is made up of organic material from the microbes used to drive nutrient removal in the treatment process, along with fine inorganic materials that are removed by settling or filtration. This liquid sludge usually contains between 1 and 2 percent solids as it is wasted from the treatment process for dewatering. Following a short holding period, the liquid sludge is mixed with polymer to enhance the separation of solids and water before being processed through a belt press to remove excess water, resulting in a semi-solid sludge waste product containing between 15% and 20% solids.

Sludge is currently processed at both Rockaway and Line Creek, and the volume produced is generally a factor of wastewater flow rates through the treatment plants. In order to determine potential future sludge production rates to account for long-term operating costs, current sludge rates were correlated with wastewater flowrates and extrapolated to a 30-year planning period.

Two approaches were used to estimate the future sludge rates. The first approach utilized the current wastewater flowrates and the actual plant capacity, assuming that the plant capacity will be reached by the end of the 30-year period. The second approach utilized population projections for Peachtree City to project the potential wastewater flowrates at the end of the 30-year period. The wastewater and sludge flow rates for the two approaches are shown in **Table 3-1**.

Table 3-1: Sludge Projections

	Line Creek	Rockaway	Total
Current Plant Flow (MGD)	1.3	1.7	3.0
Plant Capacity (MGD)	2	5	6
Current Sludge Produced (Dry Tons/Week)	15	7	22
% Solids in Dewatered Sludge	17%	13%	15.7%
Projected Sludge Produced at Plant Capacity (Dry Tons/Week)	23.1	16.5	**39.5**
Projected 30-Year Plant Wastewater Flow (MGD)			4.2
Projected 30-Year Sludge (Dry Tons/Week)			**30.8**

As shown, the projected sludge rate from the first approach (assuming full plant capacity) is 39.5 dry tons per week, while the projected sludge rate from the second approach (based on population projections) is only 30.8 dry tons per week. The more conservative of the two projections was used for this analysis, thus the biosolids management alternatives were analyzed using a projected 30-year sludge rate of **39.5 dry tons per week**. This quick analysis also suggests that the total treatment capacity of the Authority's treatment plants should be sufficient to serve the City over the 30-year planning horizon.

While sludge production rates are a major design factor in a biosolids management system, the chemical makeup of the sludge also plays an important role in biosolids management. As

discussed in Section 2.3, the sludge application rate in a land application system is controlled by the chemical makeup of the sewage sludge. The results of recent sludge sampling are presented below. These characteristics were used to size the land application system as discussed in Section 4.1.

Table 3-2: Sludge Metals Content

Pollutant	Line Creek (mg/kg-dry)	Rockaway (mg/kg-dry)
Arsenic	BRL[a]	BRL
Cadmium	BRL	BRL
Chromium	56.9	4.07
Copper	552	71.1
Lead	29.7	BRL
Mercury	0.581	BRL
Nickel	24.7	BRL
Selenium	BRL	BRL
Zinc	1190	105
Nitrogen (lb/ton-dry)	38.5[b]	38.5[a]

[a] Below Reporting Limit (BRL)
[b] Value calculated based on assumed values.

4. BIOSOLIDS MANAGEMENT ALTERNATIVES

There are many solutions for biosolids management, ranging from different technology groups to intergovernmental agreements for treatment and disposal. For the purpose of this study, we focused primarily on practices typical of the southeast region of the United States. These include treatment to Class A standards using drying technologies, treatment to Class B standards using aerobic digestion, and third-party sludge disposal services.

The eight scenarios are outlined in the table below. Each treatment alternate also includes multiple disposal options. The treatment alternate combined with the disposal option makes up the complete biosolids management system.

Table 4-1: Summary of Alternates

Alternate	Disposal Options
A – Aerobic Digestor - Class B	Land Application / Landfill
B – Thermal Dryer with Digestion	Land Application / Landfill
C – Thermal Dryer without Digestion	Land Application / Landfill
D – Sludge Dehumidifier	Land Application / Landfill
E – Solar Dryer – Class B	Land Application / Landfill
F – Solar Dryer – Class A	Land Application / Landfill
G - ERTH Products	Third Party Reuse
H – Green Rock	Third Party Disposal
I – Baseline Existing Program	Landfill

Note that each alternate represents a general technology group with multiple manufacturer options for each technology. The purpose of this study was to determine the most appropriate technology option, not necessarily to determine the best manufacturer. As such, the list of manufacturers used to develop the cost analysis is not exhaustive and is assumed to be representative of the technology group.

Several technologies were initially screened out of the investigation, including lime stabilization, solidification/stabilization, anaerobic digestion, and composting. Lime stabilization processes to attain Class A and Class B sludge were ruled out because of the fact that lime is added to the sludge, increasing the volume of solids that has to be hauled and disposed. Even if a Class A biosolids was achieved, the quantity of sludge needing to be hauled for final disposal would be more than if the current operating procedures were continued. This provides no benefit when paired with the disposal options that are feasible in the region and when compared with other treatment alternates like aerobic digestion, which produces less biosolids for a fraction of the operating cost. A Class A sludge produced from lime stabilization would still be relatively wet, at 20%-25% total solids, and not exceptionally marketable to the general public in the area. This means that disposal options would be limited to landfilling or land application, neither of which benefit from a low solids content Class A biosolid.

Solidification and stabilization processes mix a binder, such as lime, sawdust, fly-ash, or portland cement, with the waste sludge to prevent the leaching of metals and other pollutants

while also physically stabilizing the sludge for placement as fill in landfills and other surface disposal sites. This practice is typically used in larger centralized locations, such as regional landfills, due to the higher costs associated with installing and operating a system. The higher cost and utilization of the final product can be justified with high volumes of sludge and is not economically feasible for decentralized applications. A pursuit of a solidification/stabilization system would require cooperation with other local utilities and local landfill operators, or use of a third-party service. Solidification is included as a part of the third-party solution discussed in alternate H below. As an alternate to traditional solidification methods, new solidification reagents are in development that may be more practical for small scale installation, while also reducing the bulk volume of stabilized solids for disposal. This may become a potential addition to the alternates discussed below to make landfill disposal more viable; however, applicability and associated costs are not fully known at this time.

Anaerobic digestion is a process for stabilizing sludge to Class B while allowing for the capture of biogases which can be reused for heating or power generation. This digestion process allows higher solids contents to be achieved in the dewatered sludge and requires less time to achieve pathogen reduction; however, anaerobic digestors are more expensive to install and more labor intensive to operate as compared to conventional aerobic digestion commonly seen at smaller wastewater treatment plants, such as those operated by the Authority. Anaerobic digesters also perform best when receiving primary sludge from primary clarifiers in combination with secondary sludge. Primary clarifiers are not used at Line Creek or Rockaway, making anaerobic digestion a less desirable option.

Composting can be used to produce Class A biosolids, which can be distributed to the general public or land applied in bulk. Similar to the solidification process, composting is best suited for larger centralized applications where the volume of sludge being processed can justify the space and equipment needed for operation. A large aspect of a composting facility is being able to market the final product to the general public in order to balance the inflow and outflow of sludge in an efficient manner. Composting requires other materials to be mixed with the sludge to serve as a carbon source. This carbon source can be woodchips, sawdust, and agricultural waste. Similar to the lime stabilization process, this carbon source increases the total volume of final product to be disposed of and requires a consistent supply from a third-party vendor, which adds to the operational complexities and expenses. Another local utility has implemented a composting process for biosolids handling, and found that marketing the composted product is difficult and unpredictable, leading to a surplus of finished product.

The alternates listed above were excluded from the analysis for the reasons stated. Each feasible option, consisting of a disposal component and a treatment component, is discussed in more detail below.

4.1. Disposal Options

Landfilling

Surface disposal via a landfill is the current method used by the Authority and has been the standard for many years. Recent slope failures at multiple regional landfills have been traced back to sewage sludge as the primary cause. This results in many landfills have beginning to impose restrictions on what quality of sludge is allowed for disposal. Tipping fees have also

steeply increased, significantly raising the operating expenses for local utilities. The future of landfill disposal is unpredictable and even slight variations can have significant impacts on the Authority's operations.

The current benefit of landfill disposal is that any quality of sewage sludge is accepted, regardless of pathogen and vector attraction reduction. This is likely to change in the coming years.

Landfill disposal was included in this analysis as a baseline for comparison with other methods. The operating expense associated with landfilling is highly dependent on the volume of sludge hauled and dumped at the landfill. Recent annual tipping fee increases have been in excess of 10%. For the purpose of this analysis, an annual fee increases of 10% was assumed over the 30-year planning period. The only capital expense associated with landfilling is replacement of the current dump trucks with a larger semi-truck and dumping trailer to improve the efficiency of the hauling operation.

Land Application

Disposal via land application can be performed in bulk onto large tracts of land or distributed to the general public in bags or other containers as a soil amendment or fertilizer. Due to the complexities with marketing and distributing biosolids in small quantities to the public, and the higher level of treatment required to allow this, only bulk land application was considered in this analysis. Bulk land application can include application to agricultural sites, forests, sports fields, right of ways, and reclamation sites. Sites open to public access require sludge to be treated to Class A Exceptional Quality standards and can often carry a negative public image, with potential odor issues. For this reason, bulk application to agricultural land was the primary focus of this analysis.

The land area required for bulk land application can be dependent on the total loading of metals or nitrogen. The loading of metals is controlled by CFR 40, Part 503. Nitrogen and other nutrient loadings are controlled by the agronomic rate of the particular crop being grown on the land. Crops that uptake more nutrients allow higher sludge application rates, and ultimately require less land area. In most cases, nitrogen loading controls the application rate of biosolids. Loading rates for the Authority's sludge were calculated based on the loading of metals and nitrogen. The loading rate based on the agronomic rate for nitrogen was the most limiting at 7.8 dry tons/acre per year, and therefore was used to calculate the land area required for bulk land application.

Coastal Bermuda is widely grown in the southeast United States for hay and has one of the highest nitrogen uptake rates of any crop. The proposed land application system was sized based on a crop of Coastal Bermuda being harvested for hay several times per year. The required land application area was calculated to be 264 acres for an annual sludge application rate of 2056 dry tons per year. Depending on the classification of biosolids land applied, buffers may be required between property lines, state waters, wells, and buildings. To account for buffers and access roads throughout a property, 300 acres was used as the minimum required land application area. In order to improve the longevity of the land application system, a network of five 300-acre land application sites would be recommended. These sites could be located on one large piece of land or spread across multiple parcels. Development of the land application system would require

conversion of forested land to pasture land. This provides an opportunity to regain a portion of the capital invested to prepare the land through the harvest and sale of timber. Equipment required to operate the land application system includes a spreader truck and a reloader conveyor to load the spreader truck from the dump truck. Depending on the treatment method used, a tractor and harrows may be required to incorporate the biosolids into the soil in order to meet the vector attraction requirements for Class B sludge. A cost estimate for developing a land application system was prepared and is included in **Appendix A**. The total cost for a land application system is estimated to range from **$6.6 to 6.8 million**, inclusive of the potential return from the sale of timber and the land purchase.

The operational cost of land application for sludge disposal is largely dependent on the quantity of sludge to be disposed, which varies with each treatment method. The operating cost for land application is included in the operating cost of each treatment alternate discussed below. Another large operating cost factor is the travel distance to the land application site. To account for the range of possible operating costs for each alternate, cost curves were prepared using a range of haul distances. The cost curves are presented in **Figure 4-1**. It is assumed that operation of the hauling and biosolids spreading will be performed by the Authority, while hay harvest and any other field maintenance will be performed by a local farmer leasing the rights to harvest the hay.

4.2. Treatment Alternatives

All alternates discussed below present different methods to treat and ultimately dispose of sludge generated from the Authority's two wastewater treatment plants. In order to make the treatment process more efficient, we recommend that sludge from both plants be combined at Rockaway prior to treatment. This reduces the amount of equipment that is needed and reduces operational and maintenance requirements. All alternates, excluding alternates G, H, and I, include pumping sludge from Line Creek to Rockaway for a centralized sludge treatment and processing operation. This includes moving the belt press and associated equipment currently used at Line Creek to Rockaway to provide ample dewatering capacity to process all sludge. Details of how sludge is to be processed once being combined at Rockaway is provided below.

<u>Alternate A – Aerobic Digestor – Class B</u>
One of the most typical ways of treating sludge in the southeast United States is with aerobic digestion. This involves holding liquid sludge in a large tank while oxygen is introduced to feed the micro-organisms present in the sludge and encourage the consumption of volatile organic material. The sludge must be held for a period between 40 and 60 days at a specific temperature to meet pathogen reduction requirements and produce a Class B sludge. During this digestion period, volatile solids are reduced and the sludge is thickened through multiple decanting cycles. This results in less sludge to be dewatered and typically produces a slightly higher solids content in the sludge cake. A solids content of 18% to 20% can typically be achieved in aerobically digested sludge. The class B biosolids produced can be land applied with site restrictions or disposed of in a landfill.

In this alternate, sludge from both treatment plants will be combined in one of two aerobic digesters. Two digesters will be required to stage the aeration, decanting, and dewatering stages of the digestion process. Each digester will be approximately 78 feet in diameter with a side water depth of 16 feet, and will utilize coarse bubble diffusers and blowers to provide the oxygen

needed to drive the digestion process. Operation and maintenance of this system is simple and inexpensive, with minor maintenance required for the blowers and occasional cleaning of the coarse bubble diffusers. An added benefit of the digesters is the excess sludge storage capacity that can be used to hold sludge for extended periods should there ever be a need to shut down the belt press for several weeks. Digestion also conditions the sludge, making further treatment processes more efficient. This treatment alternate is added to many of the following alternates, either as a requirement, or as a way to improve efficiency or make a dryer, less odorous final product. The total capital cost to install an aerobic digestor, including a pipeline to combine sludge from both treatment plants is approximately **$2.68 million**.

Alternate B - Thermal Dryer with Digestion

An indirect heat type, paddle wheel thermal dryer provides a simple and safe way to obtain Class A sludge with extremely high solids contents greater than 90%. High temperature oil fills a set of hollow augers, and the dewatered sludge cake is pushed through an insulated chamber by the heated augers, drying the sludge and killing pathogens in the process. This design prevents large volumes of air from contacting the sludge, cutting down on odor, and keeping flammable gases from contacting an ignition source. Thermal dryers operate most efficiently when running for a continuous period of time. This means that batch processing with a 24-hour runtime over multiple days is ideal. This operation regime requires a sludge cake hopper to hold dewatered sludge from the belt press until it can be processed through the dryer. This operating scheme would also ideally have 24-hour plant supervision. The equipment includes an oil heater, insulated chamber with sludge augers, and small air scrubbing system with a completely automated control system.

High energy input is required to reach and maintain operating temperature in the dryer. Multiple sources can be used to power the heater including electricity, propane, natural gas, and biogas. For the purpose of analyzing the operating cost, natural gas was assumed as the energy source. The high heat used in the drying process produces one the highest and most consistent solids content of any alternate. This reduces the volume of biosolids to be hauled and disposed by a factor of five. Although the solids are extremely dry and low volume following the drying process, the polymer from the dewatering process remains in the solids and can rehydrate when exposed to rain or other water sources during storage or at the landfill. This may continue to lead to regulatory issues for landfills due to the instability of the solids, and may cause ongoing difficulties with landfill disposal.

The end product is considered Class A Exceptional Quality that could be land applied with no restrictions. While the biosolids produced from the thermal dryer could be distributed to the general public or local farmers, because of the complexities in marketing and the varying demand for the final product, conventional land application on Authority owned property was assumed for development of an operating cost. A single dryer unit operating 24 hours per day, five days per week is required to handle the long-term demands of 39.5 dry tons per week. An aerobic digestor installed to condition sludge prior to drying will cut down on the required dryer runtime and will help to reduce potential odors. The total capital cost to install a thermal dryer, including aerobic digestors and sludge pipeline between the two treatment plants, is approximately **$9.73 million**.

Alternate C – Thermal Dryer without Digestion

Similar to Alternate B, this alternate would utilize a thermal dryer to produce a high solids content (+/- 90%) Class A biosolid. However; instead of being held and treated through aerobic digestion first, Alternate C involves sending undigested sludge through the dryer. A small sludge storage tank of approximately 75,000 gallons will be used to combine sludge from both treatment plants and hold it until dewatering can be performed with the existing belt presses. The resulting sludge cake is expected to be consistent with the current sludge solids content, at 16% solids, leading to more sludge cake being processed through the thermal dryer and longer dryer runtimes. This slightly increases the operating cost for the dryer, but removes the operation cost of the digestor. It is likely that the resulting final product will have a slightly lower solids content than alternate B and more odor, although odors will still be negligible compared to other treatment methods. The total capital cost to install a thermal dryer, including a sludge holding tank and pipeline between the two treatment plants is approximately **$8.54 million**.

Alternate D – Sludge Dehumidifier

A sludge dehumidifier utilizes a heat pump to circulate hot air through a drying chamber to produce a Class A, exceptional quality biosolid with at least 90% solids content. The drying chamber recirculates the hot air, conserving energy and reducing odors from exhaust air vented from the system. A condenser unit removes humidity from the air to prepare it for return cycles through the drying chamber. Sludge cake is passed through the drying chamber on a belt, with controls for varying belt speeds to achieve varying levels of dryness. The dehumidifier operates most efficiently when operating continuously; therefore, 24-hour operation is recommended. A hopper would be used to store the sludge cake between drying cycles and to feed the dryer at a steady rate. This method of drying uses much lower temperatures than a thermal dryer but requires high air circulation to produce a dry final product. This technology is relatively new to the municipal wastewater treatment market and has a low installation base within the United States. As such maintenance requirements are not well known and actual performance is not well documented.

Digestion is required prior to dehumidification to boost sludge cake to at least 18% solids content and enhance equipment performance. Two dehumidification units will be required to meet the demands, operating five days per week, 24 hours per day. Automated operation reduces the requirement for operator intervention; however, operator supervision is still recommended while the units are operating. The total capital cost to install a sludge dehumidifier, including aerobic digestors and pipeline between the two treatment plants is approximately **$13.59 million**.

Alternate E – Solar Dryer – Class B

A solar dryer makes use of the sun's energy to produce a dry biosolid, ranging from 50% up to 90% solids content. Class A sludge can be produced when solids content exceeds 90%, while anything less than that is considered Class B. A solar dryer consists of a greenhouse constructed over a concrete slab. An automated sludge turning device passes through the greenhouse on a track, mixing and slowly transporting the drying sludge from one end of the greenhouse to the other. Sludge is fed into one end of the greenhouse either by front end loader, or by a conveyor system, and the final product is removed from the other end by front end loader. Once the sludge is in the greenhouse, very little operator attention is required, as the system is automated and has very few moving parts. System controls allow the sludge depth and retention time in the

greenhouse to be adjusted with seasonal temperature changes. A series of fans and vents in the greenhouse provide circulation to expedite the drying process, although solar drying takes much longer than thermal drying and is highly dependent on weather and climate patterns. As such, the final product tends to vary in makeup and consistency throughout the year, reaching Class A during the summer months and dropping to Class B during the winter. This restricts land application options to Authority owned sites but reduces the volume to haul and dispose by up to five times. Solar drying requires the largest footprint of all treatment alternates, but has the lowest operating cost. There is also potential for strong odors to develop in the solar dryer and escape to the surrounding area. To help control this odor, digestion is required to stabilize the solids and reduce volatile organic compounds in the sludge prior to drying.

A total of four units will be required to accommodate 30-year demands; however, construction and use of the individual units may be phased as sludge production increases with time. Initially, only two units would be required to handle current sludge rates. Three units would likely be required within the first five years, and the fourth unit would not be needed until sludge production reaches about 127 wet tons per week (+/- 18 years from present). Maintenance requirements for the solar dryer are relatively low, although maintenance is amplified by the number of operating units. Greenhouse panels also require replacement every 8-10 years to maintain high admittance of solar radiation into the greenhouses. Equipment replacement and maintenance costs are included in cost estimates in **Appendix A** and presented in **Table 4-2**. The total capital cost to install the solar dryers, including aerobic digestors and pipeline between the two treatment plants is approximately **$14.43 million**.

Alternate F – Solar Dryer – Class A

Similar to alternate E above, this alternate would utilize solar dryers to produce a thoroughly dried biosolid. In order to enhance the performance and consistently produce a Class A biosolid, regardless of the season and weather conditions, a radiant floor heating system can be installed in the slab to provide a secondary heat source to the sun. This system would typically only be used during the cooler season, operating for about 6 months out of the year. Digestion is still recommended prior to the solar dryer and is included in the capital cost estimate for system installation, which totals approximately **$15.54 million**.

Alternate G – ERTH Products

ERTH Products is a local corporation that specializes in compost manufacturing and marketing of the soil products produced. They operate a facility in Plains, GA that composts municipal sewage sludge with peanut hulls in order to produce a Class A product that can be land applied without restrictions. Almost as important as the composting operation itself, ERTH Products has an established market for composted product sales. The Authority would contract with ERTH Products to pick up sludge from each treatment plant and be responsible for the hauling, composting, and final distribution of the biosolids. ERTH Products has proposed a 10-year contract with annual fee adjustments agreed upon by both parties. The initial fee is **$105 per wet ton**, which accounts for necessary handling equipment purchases by ERTH Products. Once the sludge leaves the Authority's facilities, responsibility is transferred to ERTH Products, including all sludge hauling, monitoring, permitting, handling, and distribution. ERTH Products would pick up sludge cake as-is from both Line Creek and Rockaway, so no alteration would be required to the existing sludge processing system at either plant. ERTH Products will provide the

truck and trailer to load sludge into for transport to their composting facility. The contract will have the option to exit at the end of each year and will have the option to negotiate a new contract at the end of the initial 10-year period. For the purposes of developing a 30-year operating cost, an annual increase equivalent to the inflation rate was assumed.

Alternate H – Green Rock

Green Rock is an environmental services company that specializes in strategic, sustainable waste solutions. They provide environmental security and liability protection through custom waste solutions, project management, and oversight. Green Rock has established relationships within the waste management industry to provide efficient solutions to common waste problems. Green Rock has proposed a contract for hauling and disposal of dewatered sludge from Line Creek and Rockaway. The initial phase of the contract involves hauling and landfill disposal of sludge at a rate of **$88 per wet ton**, plus additional fees of **$535 per load** and roll-off rental at **$8 per day**. Future phases of the project involve construction of a central solidification facility, which Green Rock would use to stabilize sludge prior to disposal. This process would be beneficial if landfills continue to impose more stringent requirements on sludge, making the option of landfill disposal obsolete. Fees associated with this future phase of the contract include a solidification and disposal fee of **$150 per wet ton**, plus additional fees of **$1,385 per load** and roll-off rental at **$8 per day**. In each phase, once the sludge leaves the Authority's facilities, responsibility and liability is transferred to Green Rock. Green Rock would pick up sludge cake as-is from both Line Creek and Rockaway on roll-off containers, so no alteration would be required to the existing sludge processing system at either plant. Green Rock will provide the roll-off container and container liner at the rates shown above. Since it is not known when the future phase of solidification may be needed or implemented, for the purpose of developing a 30-year operating cost, the solidification process was assumed to be implemented after the first 10 years.

Alternate I - Baseline – Existing System

In order to provide a baseline for comparison with proposed treatment alternatives, the existing system was analyzed to estimate a 30-year operating cost. This alternate assumes dewatering and disposal operations continue as currently arranged, with dewatered sludge being disposed in a landfill. For the baseline scenario, no new equipment or infrastructure is needed, instead the existing tankage and three belt presses at Line Creek and Rockaway will remain in use. The dewatered sludge produced is not classified as either Class A or B, and cannot be used for beneficial reuse. Landfilling is the only disposal option. A landfill tipping fee increase of 10% per year was applied to reflect recent rate changes. The resulting annual increase in sludge production, along with increases in operating expenses was used to develop a 30-year operating cost.

4.3. Summary of Alternates

The operating cost associated with each alternate were calculated for each disposal option. Operational costs over the 30-year period reflect increases in labor and fuel costs due to inflation and increase in cost due to increased sludge production. Repair and maintenance costs are also included in the operating expenses. The annual costs were adjusted to present worth using the average inflation rate from the past 30 years. Equipment replacement costs were included in the total 30-year costs, assuming an average lifespan for mechanical equipment of 15-20 years. Costs for repairs, operation, or replacement of belt press equipment was excluded from the

analysis since this equipment is already in place and will be used for all alternates. The total 30-year costs are shown below for each alternate and each disposal option.

Table 4-2: Total 30-Year System Costs in Present Worth

Alternate	Total 30-Year System Cost w/ Landfill Disposal	Total 30-Year System Cost w/ Land Application
A - Aerobic Digestor - Class B	$ 59,600,000	$ 15,700,000
B - Thermal Dryer w/ Digestion	$ 30,200,000	$ 26,200,000
C - Thermal Dryer w/o Digestion	$ 29,800,000	$ 23,500,000
D - Sludge Dehumidifier	$ 35,800,000	$ 31,800,000
E - Solar Dryer - Class B	$ 31,800,000	$ 27,400,000
F - Solar Dryer - Class A	$ 34,800,000	$ 30,700,000
G - ERTH Products	$ 29,500,000	
H – Green Rock	$71,900,000	
I - Baseline Existing Program	$ 75,400,000	

A more detailed breakout of costs is provided in **Appendix A**. As shown in Table 4-2, except for ERTH Products, land application provides the least expensive disposal option. Since land application is dependent on the haul distance from the treatment plants to the land application site, and the location for a land application site is currently unknown, the total cost for land application disposal was calculated for a multitude of haul distances. The total costs for each alternate at varying haul distances are presented in Figure 4-1.

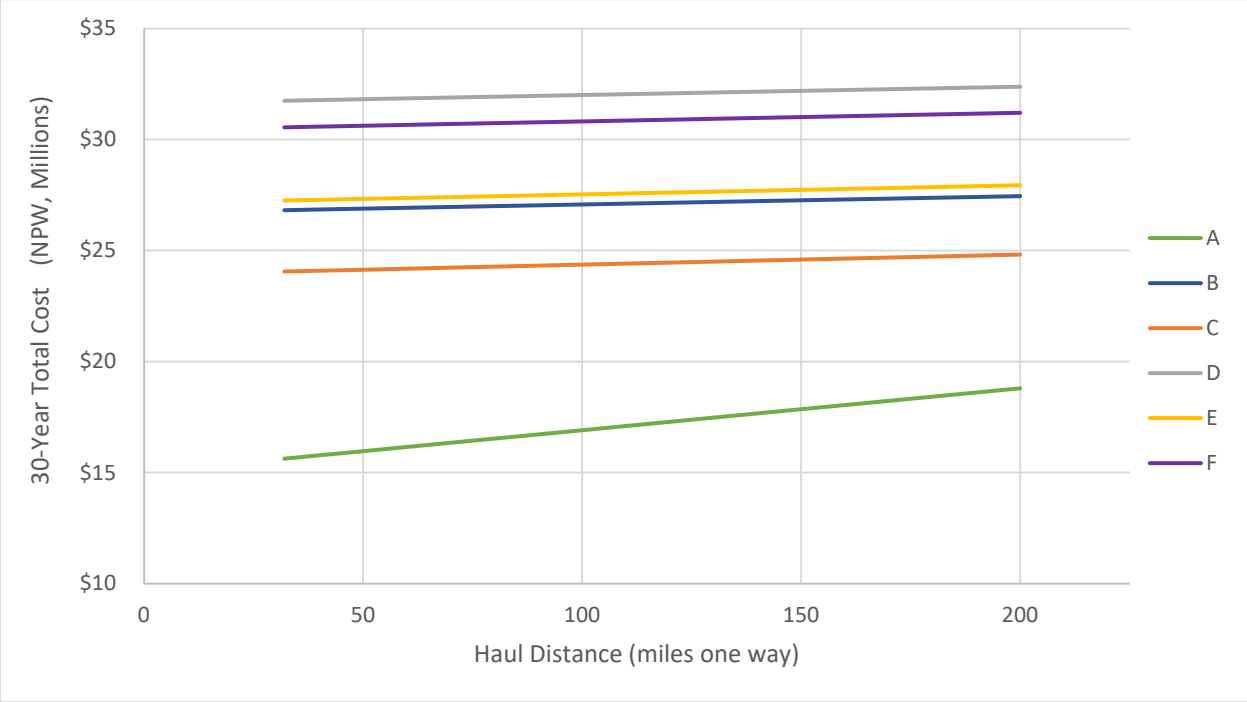

Figure 4-1: Total Cost vs. Haul Distance for Land Application

As shown, Alternate A, aerobic digestion, is by far the least expensive option even with a haul distance of 200 miles one way. This distance includes nearly all of Georgia and Alabama, opening the opportunity for a variety of land application options. A summary of the benefits and drawbacks of each alternate are presented in the alternates matrix in Table 4-3.

In conclusion, all of the options presented above are viable alternatives, each having pros and cons that merit further consideration by the Authority. The increasing regulatory constraint on landfills necessitates a level of urgency on selecting an alternative to the current "base line" method of biosolids disposal. We recommend that the Authority appoint a committee of staff and a Board Member or two to further evaluate the alternatives in the context of long-term budgeting and operational considerations in order to determine which alternative is the best for the Authority in the long term.

Table 4-3: Alternates Matrix

Alternate	Quality	Approximate Quantity at Capacity (Avg. Wet Tons/Week @ % Solids)	Implementation Time Period	Infrastructure Requirements	Disposal Options	Initial Capital Outlay	Total 30-Year Cost	Pros	Cons
A Aerobic Digestor	Class B	178 @ 20%	1-3 Years	(2) Aerobic Digestors	Landfill	$ 2,677,295	$ 59,640,248	• Simple and familiar operation • Low capital and operating cost • Low repair and maintenance costs	• Low solids content biosolid, meaning 5 to 6 times the volume of material to haul and dispose versus other alternates • Limited land application options with a Class B biosolid • Disposal costs will vary greatly with fluctuations in the price of diesel. • Potential for regulatory pressure with landfill disposal
					Land Application	$ 9,494,795	$ 15,727,090		
B Thermal Dryer w/ Digestion	Class A	36 @ 90%	3-5 Years	(2) Aerobic Digestors Thermal Dryer Sludge Hopper and Conveyor	Landfill	$ 9,726,242	$ 30,154,217	• High solids content Class A biosolid • 5 to 6 times less material to haul versus baseline • No restrictions on land application or distribution	• High operating cost • 24-hour operation with operator supervision recommended • High repair and maintenance costs • Potential for regulatory pressure with landfill disposal
					Land Application	$ 16,343,742	$ 26,235,399		
C Thermal Dryer w/o Digestion	Class A	44 @ 90%	3-5 Years	Sludge Holding Tank Thermal Dryer Sludge Hopper and Conveyor	Landfill	$ 8,542,205	$ 29,807,503	• High solids content Class A biosolid • 5 to 6 times less material to haul versus baseline • No restrictions on land application or distribution	• High operating cost • 24-hour operation with operator supervision recommended • High repair and maintenance costs • Longer runtimes as compared to alternate B • Potential odor issues • Potential for regulatory pressure with landfill disposal
					Land Application	$ 15,159,705	$ 23,474,564		
D Sludge Dehumidifier	Class A	36 @ 90%	3-5 Years	(2) Aerobic Digestors (2) Sludge Dehumidifiers Sludge Hopper and Conveyor	Landfill	$ 13,587,233	$ 35,767,795	• High solids content Class A biosolid • 5 to 6 times less material to haul versus baseline • No restrictions on land application or distribution	• High costs • Less familiar process with unknown maintenance/repair procedures • Potential for regulatory pressure with landfill disposal
					Land Application	$ 20,204,733	$ 31,848,977		
E Solar Dryer - Class B	Class B	40 @ 80%	3-6 Years	(2) Aerobic Digestors (4) Greenhouses with Solar Dryer Equipment Slduge Conveyor	Landfill	$ 14,433,008	$ 31,804,167	• Lowest operating costs • 4 to 5 times less material to haul versus baseline • Very little operator input required	• Potential for odor issues • Does not produce a consistent product, meaning that Class B site restrictions would be required for year-round disposal • Large footprint required • Potential for regulatory pressure with landfill disposal
					Land Application	$ 21,250,508	$ 27,355,124		
F Solar Dryer - Class A	Class A	36 @ 90%	4-6 Years	(2) Aerobic Digestors (4) Greenhouses with Solar Dryer Equipment and Heated Floors Slduge Conveyor	Landfill	$ 15,536,795	$ 34,818,968	• High solids content Class A biosolid • 5 to 6 times less material to haul versus baseline • No restrictions on land application or distribution	• No cost benefit over thermal dryer. • High total costs • Potential for odor issues • Potential for regulatory pressure with landfill disposal
					Land Application	$ 22,154,295	$ 30,652,467		
G ERTH Products	Solid Waste	250 @ 16%	Within 6 Months	None	Pick-up at plant	N/A	$ 29,543,064	• Low burden on Authority • Requires no change in operation • Can be implemented at any time without delay	• Higher long-term cost with potential for fluctuation • Lack of resiliency
H Green Rock	Solid Waste	250 @ 16%	Within 6 Months	None	Pick-up at plant	N/A	$ 71,934,126	• Low burden on Authority • Requires no change in operation • Can be implemented at any time without delay	• Higher long-term cost with potential for fluctuation • Lack of resiliency
I Baseline Existing Program	Solid Waste	250 @ 16%	Current		Landfill	N/A	$ 75,378,205		• Highest cost alternate • Regulatory pressure • Potential for variability in cost and acceptance of sludge at landfill

Appendix A – Cost Estimates

October 31, 2022
Project No. 1040.2102

Alternate	Disposal Method	Total 30-Year Present Value Costs			
		Initial Capital Outlay	30-Year System Operating Cost	30-Year Equipment Replacement	Total 30-Year Cost
A - Aerobic Digestor - Class B	Landfill	$ 2,677,295	$ 56,874,953	$ 88,000	$ 59,640,248
	Land Application	$ 9,494,795	$ 5,994,295	$ 238,000	$ 15,727,090
B - Thermal Dryer w/ Digestion	Landfill	$ 9,726,242	$ 16,879,975	$ 3,548,000	$ 30,154,217
	Land Application	$ 16,343,742	$ 6,193,657	$ 3,698,000	$ 26,235,399
C - Thermal Dryer w/o Digestion	Landfill	$ 8,542,205	$ 17,805,298	$ 3,460,000	$ 29,807,503
	Land Application	$ 15,159,705	$ 4,704,859	$ 3,610,000	$ 23,474,564
D - Sludge Dehumidifier	Landfill	$ 13,587,233	$ 15,809,015	$ 6,371,547	$ 35,767,795
	Land Application	$ 20,204,733	$ 5,122,697	$ 6,521,547	$ 31,848,977
E - Solar Dryer - Class B	Landfill	$ 14,433,008	$ 15,283,159	$ 2,088,000	$ 31,804,167
	Land Application	$ 21,250,508	$ 3,866,616	$ 2,238,000	$ 27,355,124
F - Solar Dryer - Class A	Landfill	$ 15,536,795	$ 17,194,173	$ 2,088,000	$ 34,818,968
	Land Application	$ 22,154,295	$ 6,260,172	$ 2,238,000	$ 30,652,467
G - ERTH Products	Site Pick-up		$ 29,543,064		$ 29,543,064
H - Green Rock	Site Pick-up		$ 71,934,126		$ 71,934,126
I - Baseline Existing Program	Landfill		$ 75,378,205	$ 200,000	$ 75,378,205

Land Application System Capital Cost - Class A	$ 107,500.00
Land Application System Capital Cost - Class B	$ 307,500.00
Land Cost	$ 6,510,000.00
Land Application Equipment Replacement Cost	$ 150,000.00

1. Equipment replacement costs assume a mechnical equipment lifespan of 15-20 years.
2. Operating costs include energy costs, labor costs, fuel costs for hauling, and annual repair/maintenance of processing and hauling equipment, and disposal costs.
3. Land application operating costs include fuel, labor, and equipment repair/maintenance.
4. Land application of Class B includes equipment to incorporate biosolids into the soil with each application, assuming vector attraction reduction options 1-8 are not met.
5. Annual operating expesnses are adjusted to present worth using the average inflation rate from the most recent 30 years (2.32%).
6. The following assumptions were made for calculation of operating costs:

Current Tipping Fees	$	63.17	
Tipping Fee Annual Increase		10%	
Fuel Cost	$	3.00	gallon (Assuming bulk purchase)
Hauling Distance		32	
Load Capacity		27.8	cy (Assumes purchase of tractor trailer and dump trailer)
Current Personnel Rate	$	15	/hr
Natural Gas Cost	$	5.85	per 1000 cf
Electricity Cost	$	0.08	$/kW-hr (Projected to remain constant through 2050 by US Energy Information Administration)
Equipment Repair/Maintenance		40%	of operation cost, including labor and fuel
Tire Replacement Cost	$	10,000.00	Replace tires every 6 years or 80,000 miles, whichever comes first

Land Application System

Assumptions:

1. Land will need to be cleared and converted to field for hay harvest. Land already cleared is likely being used for agriculture and will not be sold.
2. Parcels of at least 300 acres will be needed, allowing application to one parcel each year for 5 years rotation, or one parcel of 1400 acres. For the purpose of this analysis, assume 5 parcels of 300 acres, or 1500 acres total.
3. Other party will be responsible for hay harvest. PTC will be responsible for biosolids placement on land.
4. Dump trailers will be used to transfer biosolids from WWTP to land application site. Solids will be dumped and loaded into spreader trucks for land application.
5. Gravel roads will be installed on property for solids disposal and transport.
6. The crop to be grown on the land application site is coastal bermuda. Pine forests could also serve for land application, however there may be more difficulty in applying and spreading the sludge. (See chapter 8 of EPA's Process Design Manual for Land Application for more information)
7. The hay harvester will be responsible for any field maintenance such as applying herbicides or additional fertilizers to enhance the hay crop.

Item	Quantity	Unit	Rate	Total Cost
Reloader Conveyor System	1	EA	$ 30,000.00	$ 30,000.00
Concrete Pad for Loading (5 sites)	185	CY	500	$ 92,500.00
Covered Storage Area on Slab	2500	SF	40	$ 100,000.00
Spreader Truck	1	EA	$ 120,000.00	$ 120,000.00
Tractor and Harrows (Only for Class B)	1	EA	$ 200,000.00	$ 200,000.00
Land Clearing	1500	ACRES	$ 750.00	$ 1,125,000.00
Timber Value	1500	ACRES	$ (1,200.00)	$ (1,800,000.00)
Planting Coastal Bermuda	1500	ACRES	$ 100.00	$ 150,000.00
Gravel Roads	7	MILE	$ 30,000.00	$ 210,000.00
Inspection Wells	20	EA	$ 4,000.00	$ 80,000.00
Subtotal for Land Prep				**$ 307,500.00**
Land	$ 1,500.00	ACRES	$ 4,340.00	$ 6,510,000.00
Grand Total for Land Aplication System				**$ 6,817,500.00**

Land Values by County

Meriwether	$ 4,400.00
Pike	$ 4,270.00
Spalding	$ 4,490.00
Upson	$ 4,200.00
Average	$ 4,340.00

INTEGRATED Science & Engineering

1039 Sullivan Road, Suite 200
Newnan, GA 30265
(P) 678.552.2106
(F) 678.552.2107
www.intse.com

Project Name: Biosolids Handling Analysis
Client: Peachtree City Water And Sewerage Authority

Date: 5/5/2022
Job Number: 1040.2102
Calculations By: Davis Ozier
Calculation Description: Construction Cost Estimate
Aerobic Digestor

ENGINEERING COST ESTIMATE

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE (FIGURES)	AMOUNT (FIGURES)
	SLUDGE TRANSFER FORCE MAIN AND PUMP STATION AT LBT				
1	3" HDPE	11,050	LF	$ 50.00	$ 552,500.00
2	AIR RELEASE VALVES	4	EA	$ 1,500.00	$ 6,000.00
3	RR CROSSING	1	LS	$ 10,000.00	$ 10,000.00
4	UTILITY COORDINATION	1	LS	$ 15,000.00	$ 15,000.00
5	CLEARING AND GRUBBING	2	AC	$ 7,500.00	$ 13,125.00
6	PUMP STATION AND PUMP CONTROLS	1	LS	$ 70,000.00	$ 70,000.00
7	PLANT MODIFICATIONS - PIPE AND VALVES	1	LS	$ 15,000.00	$ 15,000.00
	ROCKAWAY PLANT ITEMS				
8	DIGESTOR - CONCRETE TANK	2	EA	$ 412,450.93	$ 824,901.86
9	COARSE BUBBLE DIFFUSERS	2,075	EA	$ 13.50	$ 28,012.50
10	BLOWERS	3	EA	$ 20,000.00	$ 60,000.00
11	PIPING AND INSTALL	1	LS	$ 160,000.00	$ 160,000.00
12	INSTALL OF LBT BELT PRESS AT ROCKAWAY	1	LS	$ 150,000.00	$ 150,000.00
	EROSION CONTROL ITEMS				
13	SILT FENCE	11,050	LF	$ 3.50	$ 38,675.00
14	DISTRUBED AREA STABILIZATION (Ds1, Ds2, Ds3)	8,185	SY	$ 1.25	$ 10,231.48
15	CONSTRUCTION EXIT	3	EA	$ 1,500.00	$ 4,500.00
	CONSTRUCTION COSTS, CONSULTANT COSTS, AND COST SUMMARY				
16	MOBILIZATION, INSURANCE, AND BONDS	1	LS	$117,476.75	$117,476.75
17	TOTAL CONSTRUCTION SUBTOTAL				$2,075,422.59
18	CONSTRUCTION COST CONTINGENCY (+/- 15%)				$311,313.39
19	**CONSTRUCTION COST SUBTOTAL**				**$2,386,735.98**
20	LEGAL FEES AND SURVEY (+/- 2%)				$41,508.45
21	ENGINEERING (+/- 7%)				$145,279.58
22	CONSTRUCTION ADMINISTRATION (+/- 5%)				$103,771.13
23	**CONSULTANT COST SUBTOTAL**				**$290,559.16**
	ESTIMATED CAPITAL COST				**$2,677,295.14**

INTEGRATED Science & Engineering

1039 Sullivan Road, Suite 200
Newnan, GA 30265
(P) 678.552.2106
(F) 678.552.2107
www.intse.com

Project Name: Biosolids Handling Analysis
Client: Peachtree City Water And Sewerage Authority

Date: 5/5/2022
Job Number: 1040.2102
Calculations By: Davis Ozier
Calculation Description: Construction Cost Estimate
Thermal Dryer - w/ Digestion

ENGINEERING COST ESTIMATE

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE (FIGURES)	AMOUNT (FIGURES)
	SLUDGE TRANSFER FORCE MAIN AND PUMP STATION AT LBT				
1	3" HDPE	11,050	LF	$ 50.00	$ 552,500.00
2	AIR RELEASE VALVES	4	EA	$ 1,500.00	$ 6,000.00
3	RR CROSSING	1	LS	$ 10,000.00	$ 10,000.00
4	UTILITY COORDINATION	1	LS	$ 15,000.00	$ 15,000.00
5	CLEARING AND GRUBBING	2	AC	$ 7,500.00	$ 13,125.00
6	PUMP STATION AND PUMP CONTROLS	1	LS	$ 70,000.00	$ 70,000.00
7	PLANT MODIFICATIONS - PIPE AND VALVES	1	LS	$ 15,000.00	$ 15,000.00
	ROCKAWAY PLANT ITEMS				
8	DIGESTOR - CONCRETE TANK	2	EA	$ 412,450.93	$ 824,901.86
9	COARSE BUBBLE DIFFUSERS	2,075	EA	$ 13.50	$ 28,012.50
10	BLOWERS	3	EA	$ 20,000.00	$ 60,000.00
11	PIPING AND INSTALL	1	LS	$ 160,000.00	$ 160,000.00
12	INSTALL OF LBT BELT PRESS AT ROCKAWAY	1	LS	$ 150,000.00	$ 150,000.00
13	BCR BIOSCRU (INCLUDES HOPPER)	1	LS	$ 3,460,000.00	$ 3,460,000.00
14	DRYER INSTALL	1	LS	$ 1,500,000.00	$ 1,500,000.00
16	CONCRETE SLAB FOR DRYER	5,000	SF	$ 10.00	$ 50,000.00
17	METAL BUILDING FOR DRYER	5,000	SF	$ 20.00	$ 100,000.00
18	SLUDGE CONVEYOR SYSTEM	30	LF	$ 1,500.00	$ 45,000.00
	EROSION CONTROL ITEMS				
19	SILT FENCE	11,050	LF	$ 3.50	$ 38,675.00
20	DISTRUBED AREA STABILIZATION (Ds1, Ds2, Ds3)	8,185	SY	$ 1.25	$ 10,231.48
21	CONSTRUCTION EXIT	3	EA	$ 1,500.00	$ 4,500.00
	CONSTRUCTION COSTS, CONSULTANT COSTS, AND COST SUMMARY				
22	MOBILIZATION, INSURANCE, AND BONDS	1	LS	$426,776.75	$426,776.75
23	TOTAL CONSTRUCTION SUBTOTAL				$7,539,722.59
24	CONSTRUCTION COST CONTINGENCY (+/- 15%)				$1,130,958.39
25	**CONSTRUCTION COST SUBTOTAL**				**$8,670,680.98**
26	LEGAL FEES AND SURVEY (+/- 2%)				$150,794.45
27	ENGINEERING (+/- 7%)				$527,780.58
28	CONSTRUCTION ADMINISTRATION (+/- 5%)				$376,986.13
29	**CONSULTANT COST SUBTOTAL**				**$1,055,561.16**
	ESTIMATED CAPITAL COST				**$9,726,242.14**

INTEGRATED Science & Engineering

1039 Sullivan Road, Suite 200
Newnan, GA 30265
(P) 678.552.2106
(F) 678.552.2107
www.intse.com

Project Name: Biosolids Handling Analysis
Client: Peachtree City Water And Sewerage Authority

Date: 5/5/2022
Job Number: 1040.2102
Calculations By: Davis Ozier
Calculation Description: Construction Cost Estimate
Thermal Dryer - No Digestion

ENGINEERING COST ESTIMATE

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE (FIGURES)	AMOUNT (FIGURES)
	SLUDGE TRANSFER FORCE MAIN AND PUMP STATION AT LBT				
1	3" HDPE	11,050	LF	$ 50.00	$ 552,500.00
2	AIR RELEASE VALVES	4	EA	$ 1,500.00	$ 6,000.00
3	RR CROSSING	1	LS	$ 10,000.00	$ 10,000.00
4	UTILITY COORDINATION	1	LS	$ 15,000.00	$ 15,000.00
5	CLEARING AND GRUBBING	2	AC	$ 7,500.00	$ 13,125.00
6	PUMP STATION AND PUMP CONTROLS	1	LS	$ 70,000.00	$ 70,000.00
7	PLANT MODIFICATIONS - PIPE AND VALVES	1	LS	$ 15,000.00	$ 15,000.00
	ROCKAWAY PLANT ITEMS				
8	SLUDGE HOLDING TANK	1	EA	$ 105,525.08	$ 105,525.08
9	COARSE BUBBLE DIFFUSERS	110	EA	$ 13.50	$ 1,485.00
10	PIPING AND INSTALL	1	LS	$ 100,000.00	$ 100,000.00
11	INSTALL OF LBT BELT PRESS AT ROCKAWAY	1	LS	$ 150,000.00	$ 150,000.00
12	BCR BIOSCRU (INCLUDES HOPPER)	1	LS	$ 3,460,000.00	$ 3,460,000.00
13	DRYER INSTALL	1	LS	$ 1,500,000.00	$ 1,500,000.00
15	CONCRETE SLAB FOR DRYER	5,000	SF	$ 10.00	$ 50,000.00
16	METAL BUILDING FOR DRYER	5,000	SF	$ 20.00	$ 100,000.00
17	SLUDGE CONVEYOR SYSTEM	30	LF	$ 1,500.00	$ 45,000.00
	EROSION CONTROL ITEMS				
18	SILT FENCE	11,050	LF	$ 3.50	$ 38,675.00
19	DISTRUBED AREA STABILIZATION (Ds1, Ds2, Ds3)	8,185	SY	$ 1.25	$ 10,231.48
20	CONSTRUCTION EXIT	3	EA	$ 1,500.00	$ 4,500.00
	CONSTRUCTION COSTS, CONSULTANT COSTS, AND COST SUMMARY				
21	MOBILIZATION, INSURANCE, AND BONDS	1	LS	$374,822.49	$374,822.49
22	TOTAL CONSTRUCTION SUBTOTAL				$6,621,864.06
23	CONSTRUCTION COST CONTINGENCY (+/- 15%)				$993,279.61
24	**CONSTRUCTION COST SUBTOTAL**				**$7,615,143.67**
25	LEGAL FEES AND SURVEY (+/- 2%)				$132,437.28
26	ENGINEERING (+/- 7%)				$463,530.48
27	CONSTRUCTION ADMINISTRATION (+/- 5%)				$331,093.20
28	**CONSULTANT COST SUBTOTAL**				**$927,060.97**
	ESTIMATED CAPITAL COST				**$8,542,204.64**

INTEGRATED Science & Engineering

1039 Sullivan Road, Suite 200
Newnan, GA 30265
(P) 678.552.2106
(F) 678.552.2107
www.intse.com

Project Name: Biosolids Handling Analysis
Client: Peachtree City Water And Sewerage Authority

Date: 5/5/2022
Job Number: 1040.2102
Calculations By: Davis Ozier
Calculation Description: Construction Cost Estimate
Sludge Dehumidifier

ENGINEERING COST ESTIMATE

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE (FIGURES)	AMOUNT (FIGURES)
	SLUDGE TRANSFER FORCE MAIN AND PUMP STATION AT LBT				
1	3" HDPE	11,050	LF	$ 50.00	$ 552,500.00
2	AIR RELEASE VALVES	4	EA	$ 1,500.00	$ 6,000.00
3	RR CROSSING	1	LS	$ 10,000.00	$ 10,000.00
4	UTILITY COORDINATION	1	LS	$ 15,000.00	$ 15,000.00
5	CLEARING AND GRUBBING	2	AC	$ 7,500.00	$ 13,125.00
6	PUMP STATION AND PUMP CONTROLS	1	LS	$ 70,000.00	$ 70,000.00
7	PLANT MODIFICATIONS - PIPE AND VALVES	1	LS	$ 15,000.00	$ 15,000.00
	ROCKAWAY PLANT ITEMS				
8	DIGESTOR - CONCRETE TANK	2	EA	$ 412,450.93	$ 824,901.86
9	COARSE BUBBLE DIFFUSERS	2,075	EA	$ 13.50	$ 28,012.50
10	BLOWERS	3	EA	$ 20,000.00	$ 60,000.00
11	PIPING AND INSTALL	1	LS	$ 160,000.00	$ 160,000.00
12	INSTALL OF LBT BELT PRESS AT ROCKAWAY	1	LS	$ 150,000.00	$ 150,000.00
13	SHINCCI SLUDGE DEHUMIDIFIER (INCLUDES HOPPER)	1	LS	$ 6,283,600.00	$ 6,283,600.00
14	DRYER INSTALL	1	LS	$ 1,500,000.00	$ 1,500,000.00
15	CONCRETE SLAB FOR DRYER	5,000	SF	$ 10.00	$ 50,000.00
16	METAL BUILDING FOR DRYER	5,000	SF	$ 20.00	$ 100,000.00
17	SLUDGE CONVEYOR SYSTEM	30	LF	$ 1,500.00	$ 45,000.00
	EROSION CONTROL ITEMS				
18	SILT FENCE	11,050	LF	$ 3.50	$ 38,675.00
19	DISTRUBED AREA STABILIZATION (Ds1, Ds2, Ds3)	8,185	SY	$ 1.25	$ 10,231.48
20	CONSTRUCTION EXIT	3	EA	$ 1,500.00	$ 4,500.00
	CONSTRUCTION COSTS, CONSULTANT COSTS, AND COST SUMMARY				
21	MOBILIZATION, INSURANCE, AND BONDS	1	LS	$596,192.75	$596,192.75
22	TOTAL CONSTRUCTION SUBTOTAL				$10,532,738.59
23	CONSTRUCTION COST CONTINGENCY (+/- 15%)				$1,579,910.79
24	**CONSTRUCTION COST SUBTOTAL**				**$12,112,649.38**
25	LEGAL FEES AND SURVEY (+/- 2%)				$210,654.77
26	ENGINEERING (+/- 7%)				$737,291.70
27	CONSTRUCTION ADMINISTRATION (+/- 5%)				$526,636.93
28	**CONSULTANT COST SUBTOTAL**				**$1,474,583.40**
	ESTIMATED CAPITAL COST				**$13,587,232.78**

INTEGRATED Science & Engineering

1039 Sullivan Road, Suite 200
Newnan, GA 30265
(P) 678.552.2106
(F) 678.552.2107
www.intse.com

Project Name: Biosolids Handling Analysis
Client: Peachtree City Water And Sewerage Authority

Date: 5/5/2022
Job Number: 1040.2102
Calculations By: Davis Ozier
Calculation Description: Construction Cost Estimate
Solar Dryer

ENGINEERING COST ESTIMATE

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE (FIGURES)	AMOUNT (FIGURES)
	SLUDGE TRANSFER FORCE MAIN AND PUMP STATION AT LBT				
1	3" HDPE	11,050	LF	$ 50.00	$ 552,500.00
2	AIR RELEASE VALVES	4	EA	$ 1,500.00	$ 6,000.00
3	RR CROSSING	1	LS	$ 10,000.00	$ 10,000.00
4	UTILITY COORDINATION	1	LS	$ 15,000.00	$ 15,000.00
5	CLEARING AND GRUBBING	2	AC	$ 7,500.00	$ 13,125.00
6	PUMP STATION AND PUMP CONTROLS	1	LS	$ 70,000.00	$ 70,000.00
7	PLANT MODIFICATIONS - PIPE AND VALVES	1	LS	$ 15,000.00	$ 15,000.00
	ROCKAWAY PLANT ITEMS				
8	DIGESTOR - CONCRETE TANK	2	EA	$ 412,450.93	$ 824,901.86
9	COARSE BUBBLE DIFFUSERS	2,075	EA	$ 13.50	$ 28,012.50
10	BLOWERS	3	EA	$ 20,000.00	$ 60,000.00
11	PIPING AND INSTALL	1	LS	$ 160,000.00	$ 160,000.00
12	INSTALL OF LBT BELT PRESS AT ROCKAWAY	1	LS	$ 150,000.00	$ 150,000.00
13	SOLAR DRYER (GREEN HOUSE AND EQUIPMENT)	1	LS	$ 5,000,000.00	$ 5,000,000.00
14	SOLAR DRYER INSTALL	1	LS	$ 2,500,000.00	$ 2,500,000.00
15	SLAB FOR GREEN HOUSE	64,841	SF	$ 8.00	$ 518,728.00
16	CONCRETE ACCESS DRIVE	11,300	SF	$ 18.00	$ 203,400.00
17	SLUDGE CONVEYOR SYSTEM	250	LF	$ 1,500.00	$ 375,000.00
18 - ADDER	HEATED FLOOR SYSTEM	54,508	LF	$ 15.00	$ 817,620.00
	EROSION CONTROL ITEMS				
19	SILT FENCE	11,050	LF	$ 3.50	$ 38,675.00
20	DISTRUBED AREA STABILIZATION (Ds1, Ds2, Ds3)	8,185	SY	$ 1.25	$ 10,231.48
21	CONSTRUCTION EXIT	3	EA	$ 1,500.00	$ 4,500.00
	CONSTRUCTION COSTS, CONSULTANT COSTS, AND COST SUMMARY				
22	MOBILIZATION, INSURANCE, AND BONDS	1	LS	$633,304.43	$633,304.43
23	TOTAL CONSTRUCTION SUBTOTAL				$11,188,378.27
24	CONSTRUCTION COST CONTINGENCY (+/- 15%)				$1,678,256.74
25	**CONSTRUCTION COST SUBTOTAL**				**$12,866,635.01**
26	LEGAL FEES AND SURVEY (+/- 2%)				$223,767.57
27	ENGINEERING (+/- 7%)				$783,186.48
28	CONSTRUCTION ADMINISTRATION (+/- 5%)				$559,418.91
29	**CONSULTANT COST SUBTOTAL**				**$1,566,372.96**
	ESTIMATED CAPITAL COST				**$14,433,007.97**
	ESTIMATED CAPITAL COST WITH FLOOR HEATING SYSTEM ADDER				**$15,536,794.97**