COBB COUNTY WATER SYSTEM

South Cobb Water Reclamation Facility Expansion and Upgrade

FACILITY PLAN

Program No. T3025 | Final Report | October 2026



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ACRONYMS AND ABBREVIATIONS

Acronym	Definition
AADF	Annual Average Daily Flow
ADF	Average Daily Flow
AFP6	Air Force Plant 6 (Lockheed Martin Facility)
ARC	Atlanta Regional Commission
Ardurra	Ardurra Group, Inc.
BFP	Belt Filter Press
BHP	Brake Horsepower
BNR	Biological Nutrient Removal
BOD	Biochemical Oxygen Demand
$CBOD_5$	Carbonaceous Five-Day Biochemical Oxygen Demand
CCD	Cobb County Department
CCWS	Cobb County Water System
CFD	Computational Fluid Dynamics
CIP	Capital Improvement Program
CNOP	Comprehensive Nutrient Optimization Plan
CPR	Condition and Performance Report
DAFT	Dissolved Air Flotation Thickener
DDR	Design Development Report
DO	Dissolved Oxygen
EID	Environmental Information Document
EPD	Georgia Environmental Protection Division
FM	Fairbanks Morse
FOG	Fats, Oils, and Grease
FRED	Federal Reserve Economic Data
GAWP	Georgia Association of Water Professionals
GBT	Gravity Belt Thickener
GIS	Geographic Information System
HLR	Hydraulic Loading Rate
HVAC	Heating, Ventilation and Air Conditioning
I&C	Instrumentation and Controls
I&I	Inflow and Infiltration
ILS	Influent Lift Station
IR	Internal Recycle
LS	Lift Station
MBR	Membrane Bioreactor
MGD	Million Gallons per Day
ML	Mixed Liquor
MLSS	Mixed Liquor Suspended Solids
MLVSS	Mixed Liquor Volatile Suspended Solids
MMADF	Maximum Monthly Average Daily Flow
MMF	Maximum Month Flow

MNGWPD	Metropolitan North Georgia Water Planning District
MOPO	Maintenance of Plant Operations
MS4	Municipal Separate Storm Sewer System
NRCY	Nitrate Recycle
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
ORP	Oxidation Reduction Potential
PDB	Progressive Design-Build
PDF	Peak Daily Flow
PE	Professional Engineer
PER	Preliminary Engineering Report
PLC	Programmable Logic Controller
PWWF	Peak Wet Weather Flow
RAS	Return Activated Sludge
RDT	Rotary Drum Thickener
RFP	Request for Proposal
SCADA	Supervisory Control and Data Acquisition
SCWRF	South Cobb Water Reclamation Facility
SIC	Standard Industrial Classification
SLR	Solids Loading Rate
SOR	Surface Overflow Rate
SST	Stainless Steel
SW	Stormwater
TKN	Total Kjeldahl Nitrogen
TM	Technical Memorandum
TN	Total Nitrogen
TP	Total Phosphorus
TRC	Total Residual Chlorine
TSS	Total Suspended Solids
UV	Ultraviolet Disinfection
VFD	Variable Frequency Drive
VSS	Volatile Suspended Solids
WAS	Waste Activated Sludge
WET	Whole Effluent Toxicity
WLA	Wasteload Allocation
WPCP	Water Pollution Control Plant
WPP	Watershed Protection Plan
WRF	Water Reclamation Facility

Key Flow Definitions

Term	Definition
AADF	Annual Average Daily Flow
ADF	Average Daily Flow
MMF	Maximum Month Flow
PDF	Peak Daily Flow
PWWF	Peak Wet Weather Flow
Design Capacity	Permitted treatment capacity of the facility

Key Regulatory Definitions

Term	Definition
NPDES Permit	National Pollutant Discharge Elimination System Permit
WLA	Wasteload Allocation issued by Georgia EPD
CNOP	Comprehensive Nutrient Optimization Plan
EID	Environmental Information Document
DDR	Design Development Report
WPP	Watershed Protection Plan
Antidegradation Analysis	Regulatory evaluation supporting increased discharge authorization

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EXECUTIVE SUMMARY

ES.1 Introduction

The Cobb County Water System (CCWS) retained Ardurra Group, Inc. to prepare a long-range Facilities Plan for the South Cobb Water Reclamation Facility (SCWRF) located in Austell, Georgia. The primary purpose of the planning effort was to evaluate the existing SCWRF, identify rehabilitation and reliability needs, assess future treatment requirements, and develop a comprehensive strategy for expanding the facility from its current permitted capacity of 40 million gallons per day (MGD) Maximum Month Flow (MMF) to 50 MGD MMF.

The SC WRF is one of four major wastewater treatment facilities operated by CCWS and serves the southwestern portion of Cobb County, including portions of Austell, Mableton, Powder Springs, Marietta, Smyrna, Douglas County, and Paulding County. Treated effluent is discharged to the Chattahoochee River under National Pollutant Discharge Elimination System (NPDES) Permit No. GA0026158.

Originally conceived as a conventional capacity expansion study, the Facility Plan evolved into a broader evaluation of infrastructure rehabilitation, nutrient removal capability, operational reliability, regulatory compliance, implementation strategy, and long-term capital planning following issuance of a new Georgia Environmental Protection Division (EPD) Wasteload Allocation (WLA) in November 2025.

ES.2 Planning Drivers

Three primary drivers established the need for this Facility Plan:

Capacity Expansion

Population and flow projections indicate wastewater flows within the South Cobb service area will continue to increase throughout the planning period. Historical wastewater flows increased from approximately 23.8 MGD in 2017 to approximately 28.6 MGD in 2024. Based on historical trends, the SCWRF is projected to reach its

current permitted 40 MGD MMF capacity around 2031. Inclusion of projected intergovernmental contributions from Douglas County, Paulding County, and Lockheed Martin/AFP6 may accelerate this need to approximately 2029.

Infrastructure Rehabilitation

Facility assessments identified numerous treatment processes, equipment systems, electrical systems, and support facilitiesare approaching or exceeding their expected useful life. Rehabilitation needs were identified throughout the headworks, grit removal facilities, primary clarifiers, secondary clarifiers, solids handling facilities, reuse water system, instrumentation system, and electrical infrastructure. The chemical system of the plant was found to be in adequate condition.

Regulatory Compliance

The November 2025 Georgia EPD WLA established substantially more stringent planning-level effluent objectives for future operation at 50 MGD MMF. These requirements significantly expanded the planning effort beyond a conventional hydraulic capacity study and required evaluation of advanced nutrient removal technologies capable of achieving future regulatory objectives.

ES.3 Major Technical Findings

Existing Facility Performance

The SCWRF has consistently met current permit requirements and has historically demonstrated reliable treatment performance. However, evaluations completed as part of this planning effort identified multiple operational and reliability concerns requiring attention.

Urgent Facility Issues

Technical Memorandum (TM)No. 3 identified four urgent facility concerns:

1. Stormwater management concerns associated with elevated fecal indicator monitoring results.
2. Excessive rag loading throughout the treatment process.
3. Maintenance-intensive solids handling systems.
4. Reuse water system reliability concerns.

These concerns were found to be interconnected and represent significant contributors to current maintenance demands and long-term reliability challenges.

Equipment and Infrastructure Assessment

TM No. 4 concluded several major treatment systems have reached or exceeded their anticipated useful life and require rehabilitation or replacement. Key concerns include:

- Ineffective aerated grit removal facilities.
- Aging primary clarifier equipment.
- Secondary clarification limitations.
- Maintenance-intensive RAS (Return Activated Sludge) and WAS (Waste Activated Sludge) pumping systems.
- Solids thickening inefficiencies.
- Reuse water system deterioration.
- Obsolete instrumentation and control equipment.

ES.4 Regulatory Planning Basis

SCWRF currently operates under NPDES Permit No. GA0026158 with effluent limitations that include:

- $CBOD_5$ = 13.0 mg/L
- TSS = 10.0 mg/L
- Ammonia-N = 1.8 mg/L
- Total Phosphorus = 0.52 mg/L
- Maximum Month Flow = 40 MGD

Georgia EPD subsequently issued WLA No. WLA000309 to support future expansion to 50 MGD MMF and established the following planning-level objectives:

- $CBOD_5$ = 2.9 mg/L
- TSS = 5.0 mg/L
- Ammonia-N = 0.5 mg/L
- Total Phosphorus = 0.30 mg/L
- Flow = 50 MGD MMF

The WLA further identified the potential for future Total Nitrogen limitations associated with protection of downstream West Point Lake. For planning purposes, this Facility Plan evaluated alternatives against future targets of approximately:

- Total Nitrogen (TN) = 4.0 mg/L
- Total Phosphorus (TP) = 0.13 mg/L

ES.5 Alternatives Evaluation

Multiple treatment alternatives were developed and evaluated through hydraulic analysis, BioWin process modeling, constructability assessments, implementation sequencing reviews, site utilization evaluations, planning-level cost estimating, and lifecycle cost comparisons.

The Facilities Plan evaluated multiple nutrient removal approaches, including advanced biological nutrient removal processes, tertiary membrane treatment systems, and deep bed denitrifying filtration systems. These evaluations were completed for planning purposes and should not be interpreted as owner selection of a final treatment technology. While deep bed denitrifying filtration was evaluated during preparation of the Facilities Plan, CCWS does not currently identify this technology as preferred but should expect the evaluation of alternative approaches to be capable of achieving equivalent or superior treatment performance, reliability, maintainability, and lifecycle value.

Alternatives included:

- MLE 2-Stage Bardenpho BNR
- 3-StageBardenpho BNR
- 4-Stage Bardenpho BNR
- 5-Stage Bardenpho BNR
- Deep Bed Denitrifying Filter Alternatives
- Membrane-Based Alternatives

Following screening and refinement, an Alternative Advancement Framework was established.

Primary Alternatives

Alternative A11.3

- 4-Stage Bardenpho Process with Deep Bed Denitrifying Filters

Key characteristics include:

- Conventional treatment configuration.
- New BNR basins.
- Primary replacement and additional secondary clarification.
- Deep bed denitrifying filtration.
- Strong long-term nutrient compliance capability.

Estimated total CAPEX project cost of approximately $373 million.

Alternative A14.2

- 5-Stage Bardenpho Process with Tertiary Membranes

Key characteristics include:

- Membrane-based solids separation.
- Efficient site utilization.
- Reduced facility footprint.
- Strong constructability profile.
- Excellent future nutrient compliance flexibility.

Estimated total CAPEX project cost of approximately $307 million.

Both alternatives demonstrated the ability to satisfy current WLA requirements and future nutrient planning objectives.

Planning-Level Cost Estimate Disclaimer

The capital cost estimates presented throughout this Facilities Plan are intended solely for planning, screening, and comparative evaluation purposes. These estimates were developed to allow CCWS to evaluate relative differences between treatment alternatives and implementation strategies and should not be interpreted as construction bids, Guaranteed Maximum Prices (GMPs), or final project budgets.

Consistent with the planning-level nature of this evaluation, the reported Total Project Costs do not include a separate contingency allowance. Excluding contingency allows for direct comparison of the base costs associated with the alternatives evaluated during the Facilities Planning process.

Prior to budgeting, capital programming, procurement, or project implementation, Ardurra recommends application of an overall project contingency appropriate for the level of project definition available at the time of estimate preparation. For planning purposes, a contingency allowance of **approximately 30 percent** should be considered to account for market uncertainty, inflation, labor and material cost escalation, procurement conditions, project delivery considerations, regulatory requirements, design development, and other factors that may influence future project costs.

Accordingly, the planning-level Total Project Costs presented within this Facilities Plan should be viewed as comparative baseline estimates, and future project budgeting should incorporate an appropriate contingency allowance and escalation analysis based on the

selected project delivery approach and level of design completion.

ES.6 Implementation Framework

The Facility Planning effort concluded future development should occur as a phased program rather than as a single comprehensive construction project. Trigger-based implementation provides the ability to align capital investments with actual growth, operational needs, and regulatory requirements.

Key planning triggers include:

- 29.2 MGD Average Daily Flow (ADF)
- 36.5 MGD Maximum Month Flow (MMF)

Recommended implementation phases include:

- Headworks and grit removal improvements.
- Clarification reliability improvements.
- Expansion to 50 MGD MMF.
- Future nutrient compliance improvements.
- Long-term facility optimization.

ES.7 Recommendations

Based on the findings of this Facility Plan, CCWS should:

1. Continue planning and permitting efforts supporting expansion of SCWRF to 50 MGD MMF.
2. Complete currently active reliability projects, including:
    - Influent Lift Station (ILS) Recovery and Roller Gates Restoration (T5004)
    - ILS HVAC Systems Replacement (T3026)
    - Headworks Improvements (T3017)
    - Secondary Clarifier Rehabilitations (T3028)
    - Effluent Filter Rehabilitation (T3023)
    - Biosolids Thickening Improvements (T3027)
3. Initiate required permitting activities, including:
    - Antidegradation Analysis
    - Environmental Information Document (EID)
    - Design Development Report (DDR)
    - Watershed Protection Plan (WPP) review and updates
4. Utilize this Facility Plan as the basis for future Progressive Design-Build (PDB) procurement activities.
5. Continue refinement of the treatment approaches represented by Alternatives A11.3 and A14.2 during preliminary engineering and procurement.
6. Continue monitoring flow trends, intergovernmental contributions, regulatory developments, and future nutrient management initiatives.

ES.8 Conclusion

The South Cobb Water Reclamation Facility has served as a critical component of the

(CCWS) for more than sixty years. This Facility Plan demonstrates expansion to 50 MGD MMF is both necessary and achievable. Multiple technically viable treatment pathways exist; however, future success will depend upon balancing capacity expansion, infrastructure rehabilitation, regulatory compliance, operational reliability, and implementation flexibility. Through proactive permitting, phased capital investment, and continued advancement of the preferred treatment alternatives, CCWS is well-positioned to maintain reliable wastewater treatment service and meet anticipated stringent regulatory compliance through at least the year 2050.



SECTION 1

INTRODUCTION AND BACKGROUND

1.1 Project Purpose

The CCWS retained Ardurra Group, Inc. to evaluate the existing SCWRF and develop a long-range Facility Plan supporting expansion of the facility from its current permitted 40 MGD MMF capacity to 50 MGD MMF while maintaining regulatory compliance, operational reliability, and future treatment flexibility.

The Facility Plan is intended to provide CCWS with a technically defensible and financially responsible roadmap for facility rehabilitation, treatment process improvements, capacity expansion, nutrient removal planning, and phased capital improvements through at least the year 2050.

The final deliverable is intended to serve as a planning framework supporting future permitting efforts, project prioritization, capital budgeting, procurement strategy development, preliminary engineering, and subsequent design activities.

1.2 Facility Background

The SCWRF is one of four major wastewater treatment facilities owned and operated by CCWS. The facility is located at 490 Lee Industrial Boulevard in Austell, Georgia and serves the southwestern quadrant of Cobb County, including portions of the Cities of Austell, Mableton, Powder Springs, Marietta, and Smyrna, as well as portions of Douglas and Paulding Counties. Treated effluent is discharged to the Chattahoochee River under NPDES Permit No. GA0026158. The SCWRF service area and its relationship to other CCWS wastewater service basins are shown in Figure 1.2-1 which was pulled from previous CCWS studies and is denoted as Figure 2.1 in the following Figure 1.2-1.

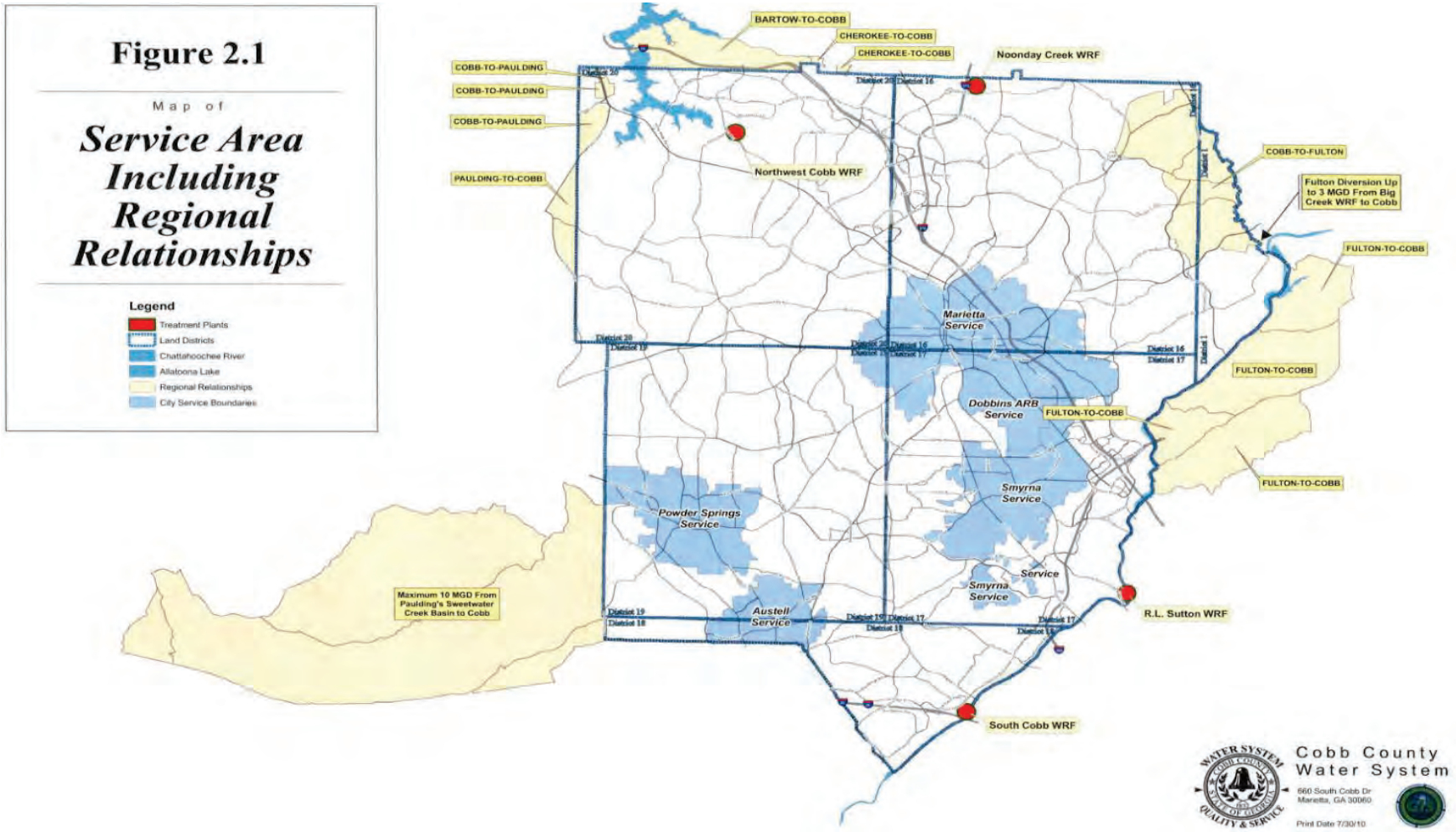


Figure 1.2-1

CCWS Wastewater Service Areas and SCWRF Service Boundary

As shown in Figure 1.2-1, the SCWRF serves one of the largest wastewater basins within the CCWS system and receives flows from both in-county and intergovernmental service areas, making it a critical regional treatment facility for the southwestern portion of Cobb County.

The SCWRF currently operates with a permitted 40 MGD MMF capacity and was originally constructed in 1963. The facility has undergone numerous expansions and rehabilitation projects, including major upgrades completed in 1976, 1994, 1998, 2004, 2012, and 2015, and today functions as one of the largest wastewater treatment facilities within Cobb County. Recent capital investments include rehabilitation of the ILS roller gates and HVAC systems replacement, headworks improvements, secondary clarifiers, effluent filtration facilities, , replacement of the dissolved air flotation thickening system with rotary drum thickening facilities, and other reliability and process improvement projects.

At the time this Facility Plan was initiated, SCWRF operated as a conventional activated sludge facility consisting of influent screening, aerated grit removal, primary clarification, conventional activated sludge treatment, secondary clarification, tertiary filtration, chlorination/dechlorination, effluent discharge to the Chattahoochee River, and biosolids thickening and dewatering facilities.

The facility was designed to treat:

- Average Daily Flow (ADF): 33 MGD
- Maximum Month Flow (MMF): 40 MGD
- Peak Wet Weather Flow (PWWF): 86 MGD

1.3 Project Drivers

1.3.1 Capacity Expansion Driver

The original driver for this project was the projected need to expand SCWRF from 40 MGD MMF to 50 MGD MMF in response to anticipated growth within the South Cobb service area. Historical flow evaluations performed as part of TM No. 2 demonstrated future wastewater flows are expected to continue increasing over the planning period and additional treatment capacity will be required before existing permitted limits are exceeded.

TM No. 2 identified a planning triggers of approximately:

- 29.2 MGD ADF
- 36.5 MGD MMF

as the point at which planning, permitting, design, and procurement activities should promptly begin to provide sufficient time for implementation of facility improvements.

1.3.2 Infrastructure Rehabilitation Driver

A second major driver was the condition and age of key SCWRF infrastructure. A significant portion of the facility's process equipment and treatment infrastructure have reached the end of their useful life and require systematic rehabilitation or replacement as part of this long-term expansion program. Previous assessments, workshops, and condition evaluations identified numerous process, equipment, electrical, instrumentation, structural, and operational improvements requiring consideration within the planning horizon. This exhaustive effort has

been captured in the Condition and Performance Reports (CPRs).

1.3.3 Regulatory Driver

A third and ultimately defining primary driver emerged during development of the Facility Plan when Georgia EPD issued a WLA for the proposed 50-MGD expansion. The WLA established significantly more stringent planning-level limits than those currently imposed under the existing NPDES permit and indicated future Total Nitrogen (TN) limitations may be required to address downstream impacts on West Point Lake, ,located in west-central Georgia along the Chattahoochee River.

Capacity Driver	Infrastructure Driver	Regulatory Driver
Population Growth	Aging Facilities	Existing NPDES Permit
Intergovernmental Flows	Equipment Condition	November 2025 WLA
Industrial Growth	Process Reliability	Future TN/TP Limits
50 MGD Expansion Need	Rehabilitation Needs	Nutrient Compliance Planning

Table 1.3-1
Primary Drivers Influencing the SCWRF Facility Plan

The combination of projected flow growth, aging infrastructure, and increasingly stringent regulatory requirements created the basis for this Facility Plan effort. While the original planning effort focused primarily on expansion of treatment capacity from 40 MGD MMF to 50 MGD MMF, issuance of the November 2025 WLA expanded the planning effort to include evaluation of treatment technologies capable of meeting both current and future nutrient removal objectives. Table 1.3-1 summarizes the primary drivers that collectively established the need for the SCWRF Facility Plan.

1.4 Planning Horizon

The original Request for Proposal (RFP) asked for the development of a Facility Plan extending through the year 2040. During the planning process, CCWS requested additional emphasis on long-term flexibility, regulatory adaptability, and implementation sequencing. Consequently, the planning horizon utilized throughout this Facility Plan extends beyond the immediate 2040 timeframe and considers the implications of future growth, nutrient regulations, and facility development through approximately 2050.

The planning horizon includes:

- Near-Term Planning (2026-2035)
- Mid-Term Expansion and Compliance (2035-2045)
- Long-Term Facility Development (2045-2050+)

1.5 Population and Flow Planning Basis

As documented in TM No. 2, multiple forecasting approaches were evaluated to establish a planning basis for future treatment capacity needs at the SCWRF. Historical wastewater flow data, population growth trends, Metropolitan North Georgia Water Planning District (MNGWPD) planning information, intergovernmental flow commitments, and U.S. Census data were evaluated as part of the forecasting effort. Both linear and exponential forecasting methodologies were analyzed to establish a reasonable range of future wastewater flow projections for the SCWRF service area.

The SCWRF currently operates with a permitted MMF capacity of 40 MGD. Historical flow evaluations showed average daily flow (ADF) increased from approximately 23.8 MGD in 2017 to 28.6 MGD in 2024, reflecting continued growth throughout the South Cobb service area. Evaluation of historical operating data further demonstrated flow growth has progressed at a faster rate than population growth due to a combination of service area development, intergovernmental flow contributions, system dynamics, and other factors influencing wastewater demand.

TM No. 2 concluded that the historical linear flow projection methodology provides the most reliable planning basis for future facility improvements. Using this approach, the SCWRF is projected to reach its current permitted 40 MGD MMF capacity at approximately the year 2031. When future projected contributions from Douglas County, Paulding County, and Lockheed/AFP6 are considered, the projected capacity limitation could occur as early as 2029 based on anticipated intergovernmental contributions.

Although the precise timing of future flow increases may vary as growth patterns evolve, the forecasting effort identified several planning trigger points that should be monitored by CCWS. These trigger values are intended to serve as early warning indicators allowing sufficient time for permitting, design, procurement, and construction before existing treatment capacity limitations are encountered. The trigger values do not represent facility failure thresholds, but rather planning milestones intended to preserve implementation flexibility and protect long-term regulatory compliance.

Planning Metric	Flow
Current Average Daily Flow (2024)	28.6 MGD
Average Daily Flow Planning Trigger	29.2 MGD
Current Maximum Month Flow (2024)	35.0 MGD
Maximum Month Flow Planning Trigger	36.5 MGD
Existing Permitted Capacity	40.0 MGD MMF
Planned Expansion Capacity	50.0 MGD MMF

Table 1.5-1
SCWRF Planning Trigger Flow Summary

Note: *Planning Trigger values identify the point at which facility planning, permitting, design, and*

implementation activities should be actively progressing. These values are intended to provide approximately five years of implementation flexibility before existing permitted capacity is reached.

Table 1.5-1 demonstrates that the SCWRF has already approached the planning trigger range identified within TM No. 2. Consequently, the population and flow projection effort recommended expansion planning should begin immediately and major facility improvements supporting expansion to 50 MGD MMF should not be delayed beyond the current planning cycle.

In addition to flow projections, TM No. 2 identified several key factors that should continue to be monitored by CCWS throughout implementation of the Facility Plan. These include annual influent flow trends, South Cobb Tunnel Lift Station loading patterns, actual intergovernmental contributions from Douglas and Paulding Counties, industrial loading changes associated with Lockheed/AFP6, future zoning and land use amendments, and ongoing inflow and infiltration (I&I) reduction efforts. Continued monitoring of these factors will help refine future projections and support more accurate timing of subsequent capital improvements.

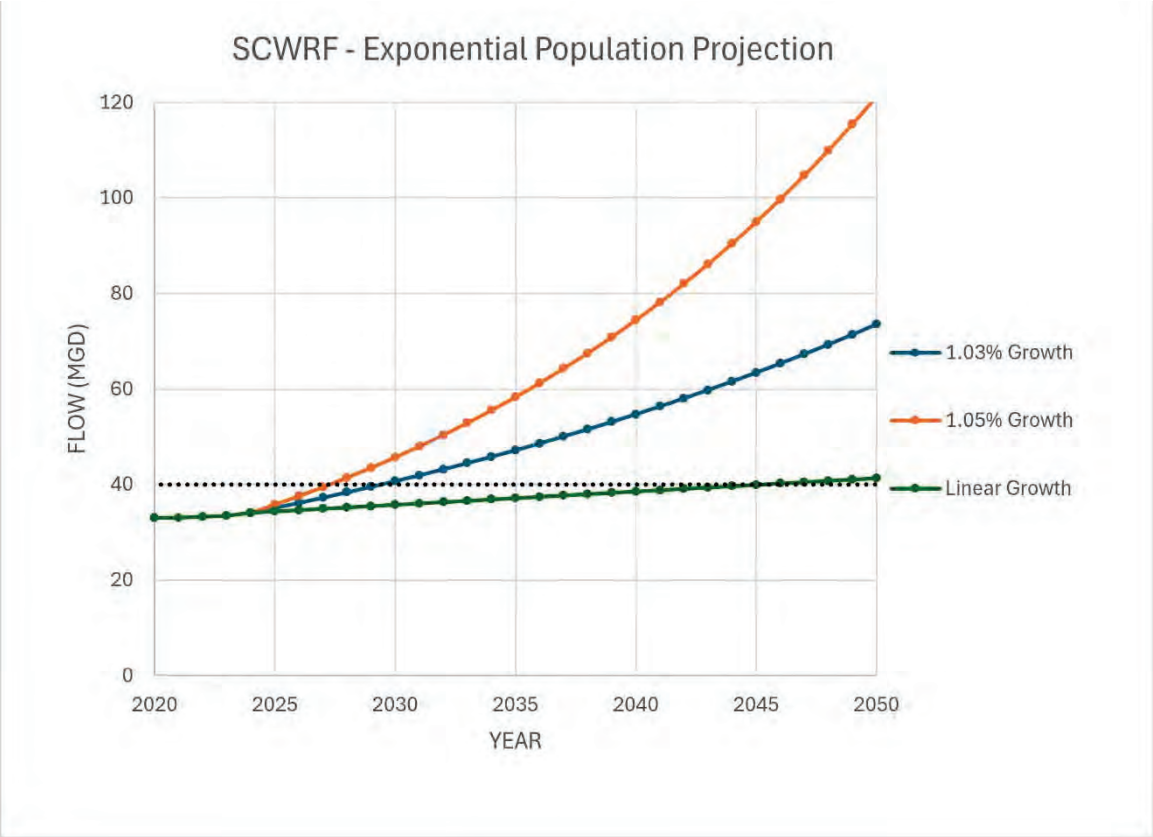


Figure 1.5-1
SCWRF Long-Term Flow Projection Summary

Figure 1.5-1 illustrates the relationship between historical flow trends, planning trigger criteria established in TM No. 2, current permitted capacity of the facility, and the planned 50 MGD expansion target. The upward trend in the projection summary reinforces the conclusion that immediate expansion planning is justified to maintain adequate schedule flexibility and avoid future treatment capacity constraints.

Accordingly, the population and flow projection effort established the foundation for the

remainder of this Facility Plan and confirmed the need for both facility rehabilitation and expansion planning. These findings subsequently became one of the primary drivers influencing alternative development, technology evaluation, implementation sequencing, and the selection of Alternatives A11.3 and A14.2 for detailed refinement during the final phase of the Facility Plan effort.

1.6 Regulatory Background

The SCWRF currently operates under NPDES Permit No. GA0026158 issued by the Georgia EPD. The permit authorizes discharge of up to 40 MGD MMF to the Chattahoochee River and establishes effluent limitations, monitoring requirements, sludge management requirements, Watershed Protection Plan requirements, Whole Effluent Toxicity testing requirements, and CNOP obligations.

The current permit includes monthly average effluent limitations of:

- $CBOD_5$ = 13.0 mg/L
- TSS = 10.0 mg/L
- Ammonia-N = 1.8 mg/L
- Total Phosphorus = 0.52 mg/L

along with nutrient monitoring requirements for Total Nitrogen and associated nitrogen species, implementation of a CNOP, and permit reopener language that allows future nutrient limits to be incorporated as EPD continues implementation of nutrient management strategies throughout Georgia.

As discussed previously, expansion of SCWRF from 40 MGD MMF to 50 MGD MMF was identified as a planning necessity through the Population and Flow Projections effort. To support future planning activities, CCWS submitted a WLA request to the Georgia NPDES seeking planning-level guidance for a future 50-MGD discharge.

The resulting WLA was issued on November 10, 2025, and became the predominant milestone affecting development of this Facility Plan. Rather than simply authorizing additional flow capacity, the WLA established substantially more stringent planning-level treatment objectives than those contained in the existing NPDES permit and introduced additional long-term nutrient removal considerations that required re-evaluation of all previously screened treatment alternatives.

The WLA established planning-level targets for future expansion to 50 MGD MMF that included:

- $CBOD_5$ = 2.9 mg/L
- TSS = 5.0 mg/L
- Ammonia-N = 0.5 mg/L
- Total Phosphorus = 0.30 mg/L

Additionally, EPD specifically noted that future Total Nitrogen limitations may ultimately be required to address nutrient impacts associated with downstream West Point Lake. The WLA further identified the need for completion of an Antidegradation Analysis, Environmental Information Document (EID), and Design Development Report (DDR) prior to future permit issuance for the expanded facility.

As a result of these regulatory developments, alternative evaluation efforts originally focused on

capacity expansion and rehabilitation were expanded to include advanced nutrient removal capabilities, future Total Nitrogen compliance flexibility, tertiary treatment technologies, filtration strategies, denitrification approaches, and future treatment process optimization requirements.

Parameter	Existing Permit	WLA Planning Target	Future Planning Basis
$CBOD_5$	13.0 mg/L	2.9 mg/L	2.9 mg/L
TSS	10.0 mg/L	5.0 mg/L	5.0 mg/L
Ammonia-N	1.8 mg/L	0.5 mg/L	0.5 mg/L
Total Phosphorus	0.52 mg/L	0.30 mg/L	0.13 mg/L
Total Nitrogen	Monitor Only	Monitor Only	4.0 mg/L

Table 1.6-1
Existing Permit Requirements, WLA Requirements, and Future Planning Targets
Future Planning Basis values reflect planning assumptions used during evaluation of alternatives and long-term regulatory compliance flexibility and do not represent currently enforceable permit limits.

The progression shown in Table 1.6-1 demonstrates the regulatory challenge facing the SCWRF expansion effort. While the existing facility has consistently performed well under current permit requirements, the WLA introduced significantly lower planning-level effluent targets and highlighted the potential for future Total Nitrogen limitations. As a result, future treatment technologies had to be evaluated not only on their ability to achieve the required increase in hydraulic capacity, but also on their capability to maintain compliance under increasingly stringent nutrient removal requirements. These considerations became a central decision factor during the alternatives evaluation process and directly influenced advancement of Alternatives A11.3 and A14.2 into the final refinement phase of the Facility Plan.

In addition, NPDES permits are generally renewed on five-year cycles. The current permit is scheduled to expire in 2027, and future permit reissuances occurring throughout the planning horizon may incorporate additional nutrient management requirements as Georgia Environmental Protection Division (EPD) initiatives continue to evolve. For planning purposes, CCWS anticipates that future permit reissuances, including the permit cycle anticipated around 2032, could potentially include more stringent nutrient removal requirements than those currently contained within the existing permit. Consequently, future treatment alternatives were evaluated not only for current WLA compliance, but also for their ability to adapt to evolving regulatory requirements over the life of the facility.

1.7 Facility Planning Process

Development of the Facility Plan was completed through multiple technical memoranda, condition assessment reports, hydraulic evaluations, BioWin® wastewater process modeling efforts, alternative screening workshops, and collaborative review sessions involving CCWS, Jacobs, owner advisor, and Ardurra.

Initial planning efforts evaluated numerous biological treatment and nutrient removal alternatives including conventional activated sludge expansion, multiple Biological Nutrient Removal (BNR) configurations, tertiary membrane treatment systems, deep-bed denitrifying filtration systems, and combinations thereof. These alternatives were analyzed using hydraulic modeling, process

simulation, capital cost estimating, present value evaluations, constructability assessments, site utilization studies, sequencing evaluations, and implementation planning analyses.

Following completion of the alternatives evaluation process and subsequent review by CCWS and Jacobs, a formal Alternative Advancement Framework was established. This process identified Alternatives A11.3 and A14.2 as the primary candidates for continued refinement during the final phase of Facility Plan development.

1.8 Purpose of the Final Facility Plan and Deliverables

The purpose of the Final Facility Plan is to:

- Document the evaluation of existing SCWRF facilities.
- Establish planning criteria based upon current permit requirements and future WLA planning objectives.
- Evaluate future regulatory compliance requirements and treatment needs.
- Compare alternatives capable of supporting expansion to 50 MGD MMF.
- Define recommended treatment process improvements and facility rehabilitation projects.
- Establish phased implementation strategies tied to projected flow triggers and regulatory needs.
- Support future permitting, environmental review, and project delivery efforts.
- Provide a long-term planning framework through at least 2050.

The Facility Plan is intended to function as a living planning document and should be periodically updated as regulatory requirements, treatment technologies, growth projections, and operational conditions continue to evolve. Future updates should incorporate actual operating experience, revised population and flow projections, facility performance data, regulatory developments, and lessons learned from implementation of future capital projects.

1.8.1 Facility Planning Process

Development of the Facility Plan was completed through a progressive series of technical evaluations, workshops, condition assessments, hydraulic evaluations, process modeling efforts, alternatives analyses, and collaborative review sessions involving CCWS, Jacobs, and Ardurra. The planning process evolved significantly following issuance of the November 2025 WLA, which expanded the scope of the evaluation from a conventional capacity expansion study into a long-range regulatory compliance and treatment technology planning effort.

Major project deliverables included:

- TM No. 1 – Sampling Plan Recommendations
- TM No. 2 – Population and Flow Projections
- TM No. 3 – Initial Findings and Urgent Issues
- TM No. 4 – Evaluation of Facilities and Equipment
- Condition Performance Reports (CPRs)
- Workshop #1
- Workshop #2
- Alternative Screening Evaluation
- Revised TM No. 5 – Process Model and Hydraulics
- Revised TM No. 6 – Development of Preliminary Scenarios
- Alternative Refinement Phase

- Final Facility Plan Development

1.8.2 Alternative Advancement Framework

Following completion of Workshop #2 and subsequent review of alternative evaluation results by CCWS, Jacobs, and Ardurra, an Alternative Advancement Framework was established to guide the Technical Refinement Phase of the Facility Plan. The purpose of the framework was to focus detailed evaluation efforts on the alternatives that offered the most favorable combination of treatment performance, future regulatory compliance flexibility, site utilization, constructability, implementation sequencing, and lifecycle cost considerations.

Alternatives were categorized as Primary Alternatives, Secondary Alternatives, and Alternatives Not Advanced Further.

Category	Alternatives
Primary Alternatives	A11.3, A14.2
Secondary Alternatives	A12, A13, A14.1, A15
Not Advanced Further	A9, A10.1, A10.2, A11.1, A11.2

Table 1.8-1
Alternative Advancement Framework

The Alternative Advancement Framework did not constitute final selection of a preferred alternative. Rather, it identified the alternatives considered most appropriate for continued development and refinement during completion of the Facility Plan. Among those alternatives, A11.3 represents a conventional treatment approach centered on a consolidated 4-Stage Bardenpho process with deep bed denitrifying filtration, while A14.2 represents a compact footprint alternative utilizing a 5-Stage Bardenpho process with tertiary membrane treatment.

Detailed evaluation of these alternatives is presented in Sections 5 and 6 of this Facility Plan.



SECTION 2

EXISTING FACILITIES EVALUATION

2.1 Existing Facility Overview

The SCWRF is one of four major wastewater treatment facilities owned and operated by the CCWS. Located at 490 Lee Industrial Boulevard in Austell, Georgia, the facility serves the southwestern portion of Cobb County, including portions of the Cities of Austell, Mableton, Powder Springs, Marietta, and Smyrna, as well as limited service areas within Douglas and Paulding Counties. Treated effluent from the facility is discharged to the Chattahoochee River under NPDES Permit No. GA0026158.

The SCWRF currently operates as a conventional activated sludge facility with primary clarification, secondary clarification, tertiary filtration, chemical phosphorus removal, disinfection, and biosolids handling processes. The facility has a permitted MMF capacity of 40 MGD and is designed to treat an ADF of approximately 33 MGD and a Peak Wet Weather Flow (PWWF) of approximately 86 MGD.

Since its original construction in 1963, the SCWRF has undergone multiple expansions, modifications, rehabilitation projects, and process upgrades. Major improvements completed over the life of the facility have included expansion of liquid treatment capacity, implementation of biological nutrient removal processes, installation of tertiary filtration, biosolids handling modifications, construction of the South Cobb Tunnel and Influent Lift Station, and various other reliability improvement projects. More recent capital investments have included rehabilitation of the effluent filtration facility, improvements to the plant headworks, and other process reliability upgrades. Additional facility improvements underway include replacement of the dissolved air flotation thickening process with rotary drum thickening facilities and rehabilitation of the five existing secondary clarifiers.

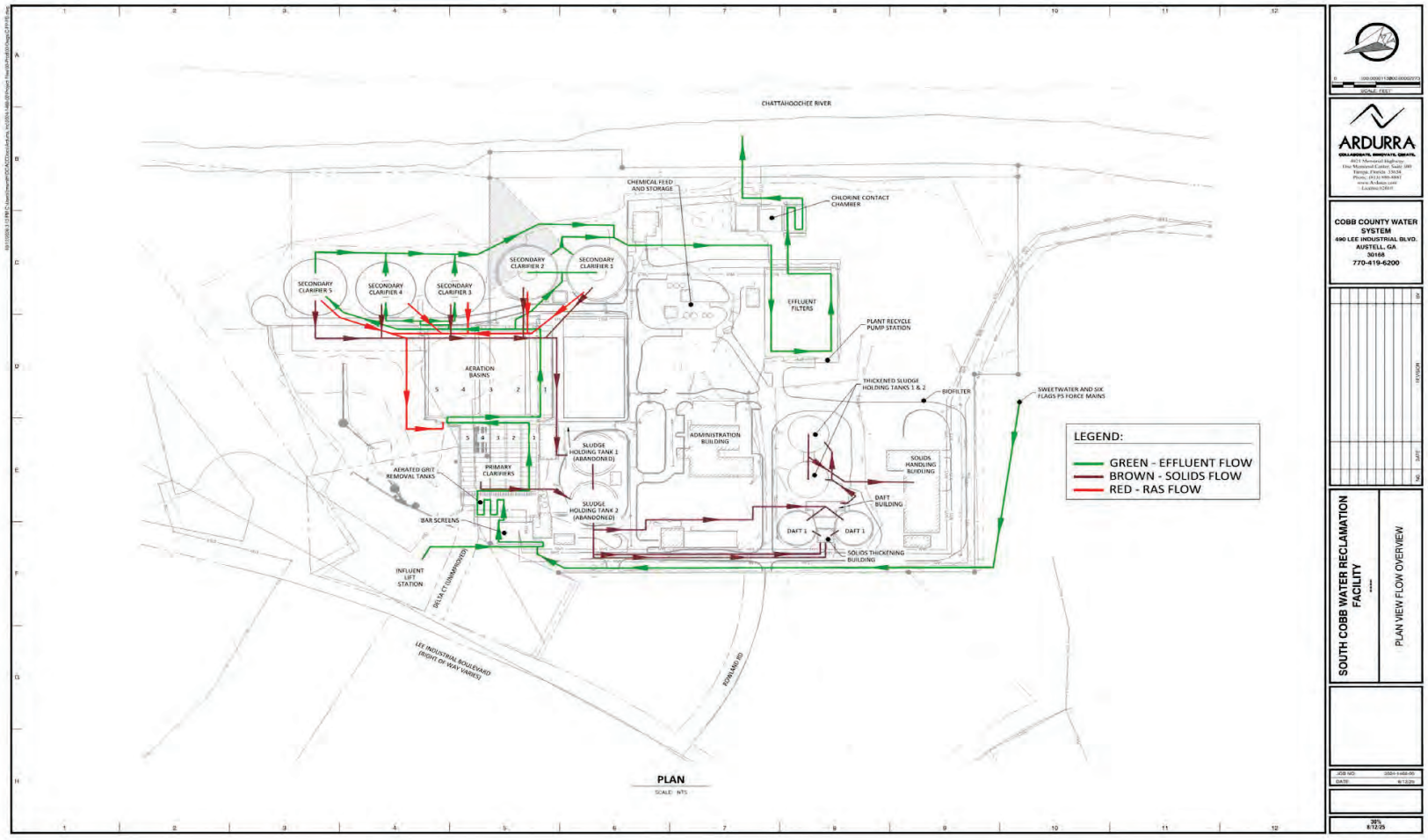


Figure 2.1-1
Existing South Cobb Water Reclamation Facility Process Flow Schematic

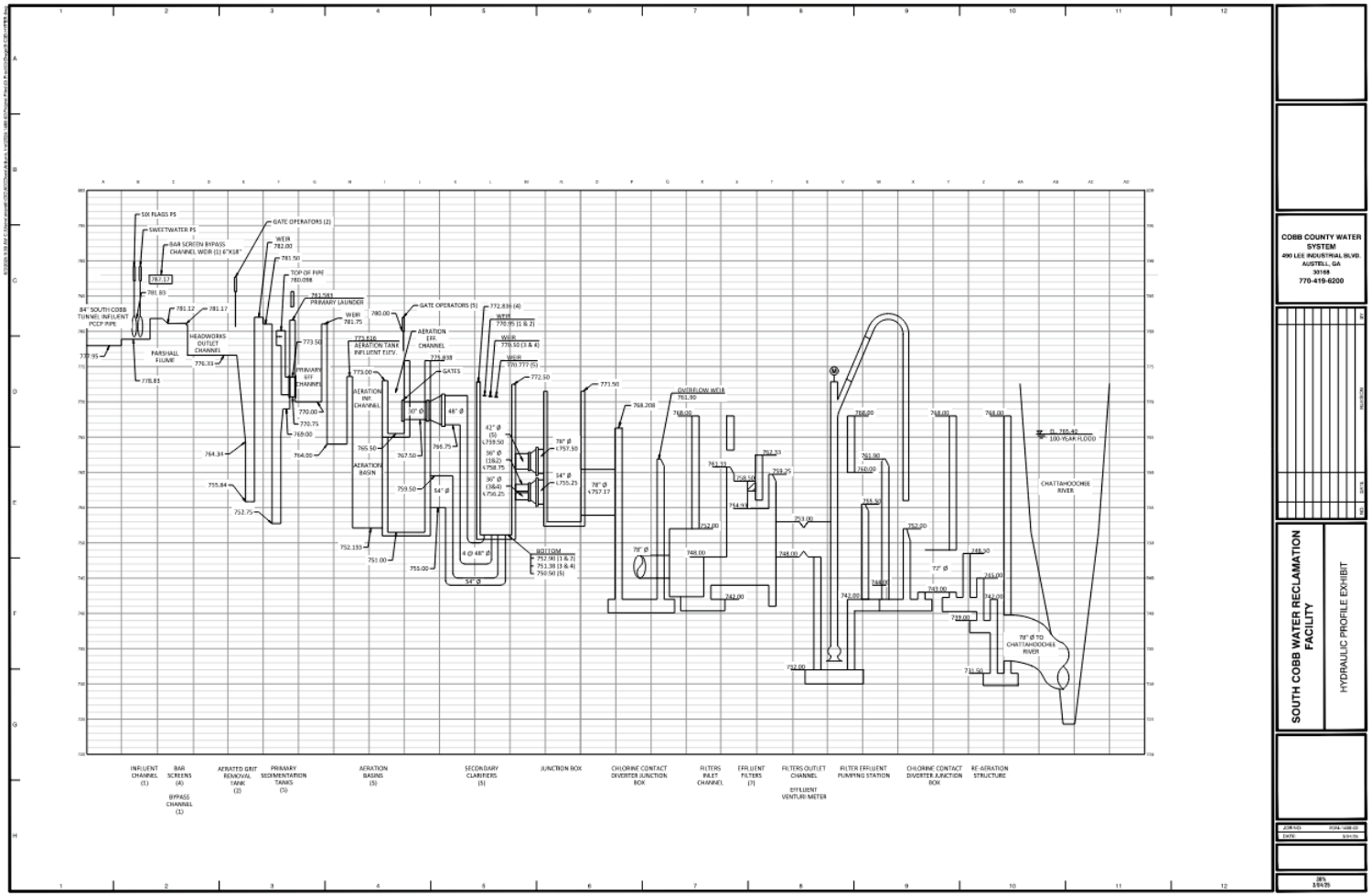


Figure 2.1-2
Existing South Cobb Water Reclamation Facility Hydraulic Profile

The existing facility layout and treatment configuration reflect more than sixty years of incremental growth and development. As a result, treatment processes, hydraulic conveyance systems, support facilities, and equipment installed during different construction eras must now function together to meet increasingly stringent regulatory requirements while supporting future expansion of the facility to 50 MGD MMF. Evaluation of these existing facilities and their ability to support future treatment objectives is a key component of this Facility Plan.

Figure 2.1-1 above presents the existing SCWRF process flow schematically illustrating the movement of liquid and solids through the treatment process through the existing South Cobb Water Reclamation Facility. The SCWRF currently operates as a conventional activated sludge treatment facility consisting of influent screening, grit removal, primary clarification, biological treatment, secondary clarification, tertiary filtration, disinfection, biosolids thickening, and dewatering processes. The process flow diagram reflects the treatment configuration evaluated during development of this Facility Plan.

Figure 2.1-2 presents the existing hydraulic profile utilized during development of this Facility Plan and illustrates key hydraulic control elevations throughout the treatment process.

Detailed evaluations of existing facility performance, condition assessments, equipment reliability, hydraulic limitations, and rehabilitation needs were previously documented within TM No. 3 – Initial Findings and Urgent Issues Report and TM No. 4 – Evaluation of Facilities and Equipment. The following sections summarize the key findings from those evaluations that are most relevant to future expansion planning, regulatory compliance, and development of the recommended capital improvement program.

2.2 Existing Facility Performance Summary

2.2.1 Historical Facility Performance

The South Cobb Water Reclamation Facility has historically provided reliable wastewater treatment and has consistently met the requirements of NPDES Permit No. GA0026158 under existing operating conditions. Operational data reviewed during development of this Facility Plan indicate that the facility has maintained compliance with established permit limitations for carbonaceous biochemical oxygen demand ($CBOD_5$), total suspended solids (TSS), ammonia-nitrogen, total phosphorus, and other regulated parameters while treating flows approaching the facility's current design capacity.

The facility currently operates as a conventional activated sludge treatment plant with chemical phosphorus removal, tertiary filtration, disinfection, and biosolids management processes. Historical operating data demonstrate that the SCWRF has benefited from proactive operations and maintenance practices and continued capital investment, allowing the facility to maintain regulatory compliance despite the age of many treatment processes and support systems.

While overall treatment performance remains satisfactory, the evaluations completed as part of this Facility Plan identified multiple process areas where aging infrastructure,

operational limitations, and maintenance-intensive equipment are placing increasing demands on operations staff and limiting the facility's ability to accommodate future regulatory requirements and projected flow increases.

2.2.2 Flow and Loading Trends

The Population and Flow Projections evaluation documented continued increases in wastewater flows within the South Cobb service area. ADF increased from approximately 23.8 MGD in 2017 to approximately 28.6 MGD in 2024. Population and flow forecasting completed as part of TM No. 2 concluded that the SCWRF is projected to approach its current permitted 40 MGD MMF capacity around 2031 based on historical trends, with projected intergovernmental contributions potentially accelerating this timeline to approximately 2029.

TM No. 2 further established planning trigger criteria of approximately:

- 29.2 MGD ADF
- 36.5 MGD MMF

to initiate implementation of facility improvements needed to support future expansion and permit compliance objectives.

These findings confirmed that expansion planning should proceed immediately to maintain adequate schedule flexibility for planning, permitting, procurement, design, and construction activities.

2.2.3 Existing Process Limitations

Although current permit compliance has generally been maintained, previous evaluations completed by CCWS and its consultants identified several process limitations that affect long-term facility reliability and future expansion capability.

These limitations include:

- Ineffective grit removal performance.
- Aging primary clarification equipment.
- Secondary clarification capacity constraints.
- Maintenance-intensive solids pumping systems.
- Biosolids thickening inefficiencies.
- Reuse water system reliability concerns.
- Aging instrumentation, controls, and electrical infrastructure.

In addition, TM No. 3 identified four urgent facility issues requiring attention:

1. Stormwater-related concerns associated with elevated fecal sampling results.
2. Excessive rag loading throughout treatment processes.
3. High maintenance requirements for solids management pumping systems.
4. Reliability concerns associated with the plant reuse water system.

These issues were found to be interconnected and have influenced both the rehabilitation recommendations and expansion alternatives developed throughout this Facility Plan.

Category	Summary Finding
Permit Compliance	Facility historically meets current permit requirements
Current Permitted Capacity	40 MGD MMF
Current Operating Flow (2024)	Approximately 28.6 MGD ADF
Primary Expansion Driver	Future flow growth and need for 50 MGD capacity
Major Operational Challenge	Aging infrastructure and increasing maintenance demands
Major Regulatory Challenge	Compliance with WLA requirements and future nutrient limits
Urgent Facility Concerns	Stormwater, rag loading, solids management pumps, reuse water reliability
Primary Planning Objective	Expansion to 50 MGD MMF while maintaining future regulatory compliance

Table 2.2-1
Existing Facility Performance Summary

The operational evaluations, condition assessments, and process reviews completed under TM No. 3 and TM No. 4 established that the SCWRF is capable of continuing to meet current permit requirements; however, significant rehabilitation needs, process limitations, and future regulatory requirements must be addressed to support long-term operation and expansion to 50 MGD MMF. The following section summarizes the key findings from those evaluations that directly influence future capital improvement planning and alternative development.

2.3 Existing Facility Assessment Summary

2.3.1 Overview

Detailed facility assessments were previously completed and documented in TM No. 3 – SCWRF Initial Findings and Urgent Issues Report and TM No. 4 – SCWRF Evaluation of Facilities and Equipment. These evaluations included site inspections, staff interviews, historical document reviews, equipment assessments, operational observations, and preliminary condition evaluations of major treatment processes and support systems throughout the facility.

The purpose of these evaluations was to identify facility conditions that could impact long-term reliability, operational efficiency, maintenance requirements, treatment performance, future expansion capabilities, and regulatory compliance. The findings from TM No. 3 and TM No. 4 formed a critical basis for development of the rehabilitation

recommendations, capital improvement planning efforts, process evaluations, and alternatives screening completed during the Facility Planning process.

2.3.2 Summary of TM No. 3 Findings

TM No. 3 identified four facility issues that were considered urgent due to their ongoing impact on operations, maintenance, system reliability, and future plant performance. These issues were also determined to be highly interconnected, requiring consideration as part of a comprehensive facility improvement strategy.

The four urgent concerns identified were:

1. Stormwater Management Concerns associated with elevated fecal indicator concentrations observed within stormwater runoff potentially originating from offsite sources connected to the SCWRF drainage system.
2. Excessive Rag Loading throughout the treatment process resulting from limitations of the existing screening systems and operational impacts associated with flows received from the South Cobb Tunnel Influent Lift Station. Rag accumulation was documented in multiple downstream treatment processes and support systems.
3. Maintenance Intensive Solids Handling Systems, including significant labor requirements associated with maintaining return activated sludge (RAS), waste activated sludge (WAS), and centrifuge feed pumping systems. These concerns were linked to ineffective grit removal, limited solids capture within the dissolved air flotation thickening process, and excessive solids recycling throughout the plant.
4. Reuse Water System Reliability Issues associated with deterioration of existing reuse water piping systems, increasing pipe failures, pressure surge concerns, and difficulties associated with system isolation and repairs.

TM No. 3 concluded that these issues should be considered foundational planning drivers within future rehabilitation, reliability, and expansion projects.

2.3.4 Summary of TM No. 4 Findings

TM No. 4 expanded the evaluation to include condition and performance assessments of major treatment processes, support facilities, equipment systems, and associated infrastructure throughout the SCWRF. The evaluation utilized condition scoring, performance scoring, and consequence-of-failure criteria to identify the processes requiring priority consideration during future facility planning efforts.

The assessment concluded that several major treatment systems are approaching or have exceeded their anticipated useful life and should be considered for rehabilitation, replacement, expansion, or reconfiguration as part of the long-term Capital Improvement Program.

These systems include:

- Preliminary treatment and grit removal facilities.
- Primary clarification equipment and sludge collection systems.
- Secondary clarification facilities and associated RAS/WAS pumping systems.
- Solids thickening and biosolids handling processes.
- Reuse water distribution infrastructure.

- Selected electrical, instrumentation, and support systems.

The evaluations further concluded that several treatment processes currently function adequately under existing operating conditions but would present challenges when evaluated against future expansion requirements, long-term reliability goals, or anticipated nutrient removal objectives.

Assessment Area	Primary Finding
Headworks	Existing screening improvements underway; rag loading remains a significant operational concern
Grit Removal	Existing aerated grit removal process no longer provides reliable grit capture and requires replacement
Primary Clarification	Existing sludge collection systems, pumps, and support equipment have exceeded expected useful life
Aeration System	Existing biological processes remain operational but provide limited flexibility for future nutrient removal objectives
Secondary Clarification	Existing clarifier facilities and RAS/WAS systems represent both reliability and future capacity concerns
Tertiary Treatment	Filter rehabilitation project completed and in warranty phase ; future treatment requirements remain dependent on selected expansion alternative
Solids Handling	Existing DAFT process being replaced with rotary drum thickeners (RDTs); long-term solids handling improvements remain necessary
Reuse Water System	System reliability concerns require future rehabilitation or replacement
Electrical / I&C	Selected systems approaching obsolescence and requiring long-term modernization
Plantwide Reliability	Aging infrastructure creates increasing maintenance demands and operational risk

Table 2.3-1
Summary of Existing Facility Assessment Findings

The combination of projected flow growth, aging infrastructure, and increasingly stringent regulatory requirements served as the three primary drivers which created the basis for this Facility Plan effort. While the original planning effort focused primarily on expansion of treatment capacity from 40 MGD MMF to 50 MGD MMF, issuance of the November 2025 WLA expanded the planning effort to include evaluation of treatment technologies capable of meeting both current and future nutrient removal objectives.

2.3.5 Relationship to Future Planning

Although the SCWRF continues to meet current permit requirements, the findings documented in TM No. 3 and TM No. 4 demonstrate that future expansion planning must address both facility rehabilitation needs and future treatment objectives simultaneously. Expansion to 50 MGD MMF cannot be achieved solely through the addition of treatment capacity. Rather, long-term success will require a coordinated program that addresses aging infrastructure, hydraulic limitations, solids handling reliability, nutrient removal requirements, operational flexibility, and future regulatory compliance objectives.

These assessment findings became key inputs into the alternatives evaluation process and directly influenced the advancement of Alternatives A11.3 and A14.2 into the Technical Refinement Phase documented within the Alternative Selection Confirmation Memorandum.

2.4 Existing Capacity and Reliability Constraints

2.4.1 Overview

The SCWRF has consistently demonstrated the ability to meet the requirements of its current NPDES permit; however, evaluations completed during development of this Facility Plan identified several hydraulic, process, solids handling, and reliability constraints that limit the facility's ability to accommodate future growth and increasingly stringent regulatory requirements. These constraints do not signify immediate failure of existing treatment processes. Rather, they represent limitations that must be addressed as part of any long-term rehabilitation and expansion program supporting the planned increase from 40 MGD MMF to 50 MGD MMF.

The constraints summarized in this section are based upon historical evaluations, staff interviews, facility assessments, hydraulic reviews, process modeling, and alternatives evaluations completed as part of the Facility Planning process. These limitations became significant drivers in development and eventual refinement of the alternatives advanced for further evaluation.

2.4.2 Hydraulic Constraints

The SCWRF was developed through multiple expansions over more than sixty years. As a result, many treatment processes, channels, and hydraulic control points were designed under significantly different regulatory and treatment objectives than those currently being considered. Several hydraulic considerations identified during the planning effort require consideration during future expansion planning. In addition to facility-wide treatment capacity limitations, the Visual Hydraulics hydraulic evaluation assessed the ability of existing influent channels, process channels, flow-split structures, gates, flumes, launders, hydraulic transitions, and conveyance piping to accommodate future flow conditions. These hydraulic control points influence water surface elevations, process performance, operational flexibility, and the ability to maintain reliable treatment throughout the facility under both average and peak flow conditions. The alternatives developed during this Facilities Plan were specifically configured to address both hydraulic limitations and treatment process requirements identified through the hydraulic evaluation and process modeling efforts.

A significant hydraulic consideration is the ability of the facility to reliably treat projected future flows while maintaining treatment performance during peak wet weather events. The facility currently receives influent flows from the South Cobb Tunnel Influent Lift Station, the Six Flags Pump Station, and the Sweetwater Pump Station. Variability in flow loading from these facilities influences hydraulic conditions throughout the treatment train, causes substantial recycling of solids back to the head of the plant and contributes to elevated maintenance requirements for pumps and associated equipment. These concerns played a significant role in CCWS's decision to initiate replacement of the DAFT process with rotary drum thickening facilities.

Additional concerns were noted regarding the age, maintainability, and reliability of sludge collection systems, centrifuge feed pumping systems, thickened sludge handling facilities, and associated support equipment. Future expansion planning therefore required consideration of both treatment process performance and long-term biosolids management reliability.

See Figure 2.1-2 Existing SCWRF Hydraulic Profile above.

2.4.3 Treatment Process Constraints

Although the existing treatment processes continue to perform satisfactorily under current permit conditions, several process limitations were identified that reduce flexibility for future expansion and nutrient removal objectives.

The existing grit removal process has experienced long-term operational concerns and does not consistently provide the level of grit removal originally intended. Historical evaluations, staff interviews, and facility inspections identified this process as a candidate for replacement or significant modification as part of future facility improvements.

Primary clarification facilities have experienced performance and reliability challenges associated with aging sludge collection systems, pumps, and level control equipment. Previous evaluations further identified concerns regarding solids distribution, sludge blanket management, and process efficiency.

The biological treatment system has historically provided satisfactory nitrification performance; however, evaluations identified limited flexibility for accommodating future nutrient removal objectives without significant process modifications. Future TN and TP planning targets identified through the WLA process require treatment performance substantially beyond the capabilities originally envisioned for the existing process configuration.

Secondary clarification was repeatedly identified as one of the most significant process bottlenecks within the existing facility. Previous evaluations concluded that clarification capacity, solids loading, and associated RAS/WAS pumping systems represent critical factors influencing future treatment capacity and expansion alternatives. These findings directly influenced development of multiple alternatives evaluated during the Facility Planning effort.

2.4.4 Solids Handling Constraints

Biosolids processing facilities at the SCWRF have experienced increasing operational and maintenance demands due to aging equipment, solids recycling impacts, and inefficiencies associated with existing thickening processes. TM No. 3 identified solids management systems as one of the four urgent facility concerns requiring consideration during planning for future improvements.

Historically, operation of the dissolved air flotation thickener (DAFT) process resulted in substantial recycling of solids back to the head of the plant and contributed to elevated maintenance requirements for pumps and associated equipment. These concerns played a significant role in CCWS's decision to initiate replacement of the DAFT process with rotary drum thickening facilities.

Additional concerns were noted regarding the age, maintainability, and reliability of sludge collection systems, centrifuge feed pumping systems, thickened sludge handling facilities, and associated support equipment. Future expansion planning therefore required consideration of both treatment process performance and long-term biosolids management reliability.

2.4.5 Reliability Constraints

A recurring theme identified throughout the facility assessments was the increasing maintenance effort required to sustain reliable operation of aging infrastructure. Many systems evaluated during TM No. 3 and TM No. 4 have either reached or exceeded their expected useful life and require increasing levels of maintenance intervention to remain in service.

Particular concerns identified by operations and maintenance personnel included:

- Excessive rag loading throughout treatment processes.
- High maintenance requirements associated with RAS, WAS, and solids handling pumps.
- Reuse water system failures and piping deterioration.
- Aging primary and secondary clarification equipment.
- Obsolete instrumentation and programmable logic controller hardware.
- Reliability concerns associated with selected electrical infrastructure.

These reliability constraints do not currently prevent the SCWRF from complying with permit requirements; however, they reduce operational flexibility, increase maintenance costs, and create additional risks that become increasingly significant as the facility approaches its current design and permitted capacity limits.

2.4.6 Relationship to Alternatives Development

The hydraulic, treatment, solids handling, and reliability constraints summarized above became foundational considerations during alternatives evaluation and refinement. Expansion alternatives were required to address not only future hydraulic capacity needs, but also the facility limitations identified during TM No. 3 and TM No. 4. Consequently, alternatives advanced for refinement were evaluated on their ability to:

- Accommodate 50 MGD MMF.
- Improve operational reliability.
- Reduce maintenance demands.
- Address future nutrient removal objectives.
- Maintain regulatory compliance.
- Provide long-term implementation flexibility.

These constraints ultimately influenced advancement of Alternatives A11.3 and A14.2 into the Technical Refinement Phase documented within the Alternative Selection Confirmation Memorandum and provided the framework for the recommendations presented in the remainder of this Facility Plan.

2.5 Existing Facility Improvement Needs

2.5.1 Overview

The evaluations documented in TM No. 3, TM No. 4, historical facility assessments, staff interviews, process evaluations, and hydraulic reviews collectively identified a series of rehabilitation, reliability, capacity, and regulatory improvement needs at the South Cobb Water Reclamation Facility. Although the facility continues to operate successfully within the limitations of the existing permit, the existing treatment train was not originally designed to support the treatment objectives established by the November 2025 WLA nor the future nutrient removal considerations identified by the Georgia EPD.

As a result, future capital planning must address both aging infrastructure and the treatment improvements necessary to support expansion to 50 MGD MMF while maintaining long-term regulatory compliance, reliability, resiliency, and operational flexibility.

2.5.2 Rehabilitation Needs

Facility assessments identified numerous process components that have either exceeded their expected useful life or are experiencing increasing maintenance demands. While many of these systems remain operational, long-term reliability and maintainability concerns indicate that rehabilitation or replacement should be incorporated into future capital improvement planning efforts.

Major rehabilitation needs identified during the planning effort include:

- Replacement of the existing aerated grit removal process.
- Rehabilitation or replacement of primary clarification equipment and sludge collection systems.
- Rehabilitation of existing secondary clarification facilities.
- Rehabilitation or replacement of aging RAS and WAS pumping systems.
- Rehabilitation of deteriorated reuse water distribution infrastructure.
- Modernization of selected electrical, instrumentation, and process control systems.
- Ongoing replacement of obsolete or unsupported equipment throughout the facility.

Many of these improvements are independent of future expansion requirements and would ultimately be necessary even if facility flows remained at existing levels. However, incorporation of these projects into the overall expansion program creates opportunities to improve constructability, reduce future costs, minimize operational disruptions, and better coordinate long-term facility investments.

2.5.3 Reliability Improvements

Operational interviews and process assessments identified several areas where future improvements should focus on enhancing facility reliability and reducing maintenance intensity. These concerns were repeatedly identified by operations and maintenance personnel and became important considerations during evaluation of future treatment alternatives.

Reliability improvement priorities include:

- Reduction of rag loading throughout treatment processes.
- Reduction of maintenance requirements associated with solids management systems.
- Improved grit removal performance.
- Improved reuse water system reliability.
- Increased treatment process redundancy.
- Improved operational flexibility during peak flow events.
- Elimination of single-point process failures where practical.
- Improved access for maintenance, repair, and equipment replacement activities.

Addressing these operational reliability concerns was an important objective during development and refinement of the alternatives evaluated as part of this Facility Plan.

2.5.4 Capacity Expansion Needs

The Population and Flow Projections analysis concluded that the SCWRF will ultimately require expansion from its current permitted 40 MGD MMF capacity to 50 MGD MMF. Future expansion must provide sufficient hydraulic, process, solids handling, and support facility capacity to reliably accommodate projected flows while maintaining permit compliance.

Major capacity-related needs identified through the planning effort include:

- Expansion of influent screening capacity.
- Replacement and expansion of grit removal facilities.
- Additional primary treatment capacity.
- Additional biological treatment capacity.
- Additional secondary clarification capacity, where required by selected alternatives.
- Expanded tertiary treatment capability.
- Expanded disinfection capacity.
- Increased solids handling and processing capability.
- Supporting hydraulic and conveyance improvements throughout the facility.

These improvements form the basis for the alternatives developed and evaluated during

the Technical Refinement Phase of the Facility Plan.

2.5.5 Regulatory Improvement Needs

The November 2025 WLA introduced substantially more stringent treatment objectives than those currently contained within NPDES Permit No. GA0026158. Future facility improvements must therefore address both capacity expansion and increasingly stringent nutrient removal requirements.

The WLA established the following planning-level treatment targets for future 50-MGD operation:

- $CBOD_5$ = 2.9 mg/L
- TSS = 5.0 mg/L
- Ammonia-N = 0.5 mg/L
- TP = 0.30 mg/L

EPD further indicated that future TN limitations may ultimately be established to address downstream West Point Lake nutrient concerns. Consequently, future treatment improvements must provide sufficient flexibility to address increasingly stringent nutrient removal objectives throughout the planning horizon.

These regulatory requirements became one of the three primary drivers in the alternatives evaluation process and influenced advancement of Alternatives A11.3 and A14.2 into the Technical Refinement Phase.

Improvement Category	Need Identified
Headworks	Complete screening expansion and improve rag management
Grit Removal	Replace existing aerated grit removal system
Primary Clarification	Rehabilitate existing facilities and provide additional capacity
Biological Treatment	Increase treatment capacity and nutrient removal capability
Secondary Clarification	Improve reliability and provide additional capacity where required
Tertiary Treatment	Expand treatment capability to support future permit requirements
Disinfection	Expand disinfection capacity to support 50 MGD operation
Solids Handling	Improve thickening and solids management reliability
Reuse Water System	Rehabilitate or replace deteriorated distribution piping
Electrical / I&C	Modernize obsolete equipment and control systems
Regulatory Compliance	Provide capability to meet WLA limits and future TN objectives

Table 2.5-1
Existing Facility Improvement Needs Summary
Sources: TM No. 3, TM No. 4, WLA Response, and Alternative Refinement Evaluations.

2.5.6 Relationship to Alternatives Development

The improvement needs summarized above established the foundation for the alternatives evaluation effort completed as part of this Facility Plan. Future alternatives were required to address not only projected flow increases, but also long-standing reliability concerns, aging infrastructure, process limitations, hydraulic constraints, solids handling requirements, and increasingly stringent regulatory objectives.

As a result, future facility planning evolved beyond a traditional capacity expansion project and became a comprehensive evaluation of infrastructure rehabilitation, nutrient compliance planning, operational reliability improvements, and long-term capital investment strategies. These needs ultimately drove the development, screening, and refinement of the alternatives discussed in the subsequent sections of this Facility Plan and led to advancement of Alternatives A11.3 and A14.2 for final evaluation.

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SECTION 3

REGULATORY PLANNING BASIS

3.1 Existing NPDES Permit Requirements

The SCWRF currently operates under NPDES Permit No. GA0026158 issued by the Georgia EPD. The permit authorizes discharge of treated effluent to the Chattahoochee River and establishes operating, monitoring, reporting, sludge management, watershed protection, and water quality compliance requirements applicable to facility operations.

The current NPDES permit provides authorization for discharge of up to 40 MGD MMF with a corresponding weekly average discharge limit of 50 MGD. The permit was issued on June 23, 2022, became effective July 1, 2022, and is scheduled to expire on June 30, 2027, unless reissued or modified by the Georgia EPD. The permit expires every five years. CCWS anticipates stringent nutrient removal requirements being incorporated into the reissuance of the 2032 permit.

The SCWRF is classified as a major municipal wastewater treatment facility and is required to comply with numeric effluent limitations for conventional pollutants, nutrients, disinfection parameters, bacteria, dissolved oxygen, and other permit conditions associated with discharge to the Chattahoochee River. Current permit limitations are summarized in Table 3.1-1.

Parameter	Monthly Average Limit	Weekly Average Limit
Flow	40.0 MGD	50.0 MGD
$CBOD_5$	13.0 mg/L	19.5 mg/L
TSS	10.0 mg/L	15.0 mg/L

Ammonia-N	1.8 mg/L	2.7 mg/L
Total Phosphorus	0.52 mg/L	0.79 mg/L
Fecal Coliform	200 /100 mL	400 /100 mL

Table 3.1-1
Existing NPDES Permit Effluent Limitations
Source: NPDES Permit No. GA0026158.

In addition to numeric discharge limitations, the permit establishes operational requirements including:

- Dissolved Oxygen minimum effluent concentration of 7.0 mg/L.
- Total Residual Chlorine maximum concentration of 0.02 mg/L.
- pH operating range of 6.0 to 9.0 standard units.
- Annual Whole Effluent Toxicity (WET) monitoring.
- Nutrient monitoring requirements including Total Nitrogen component analysis.
- Sludge management and reporting requirements.
- Watershed Protection Plan implementation requirements.
- CNOP implementation requirements.

As part of Georgia EPD's statewide nutrient management strategy, the permit requires continued monitoring of nitrogen species including nitrate-nitrite, Total Kjeldahl Nitrogen (TKN), organic nitrogen, and Total Nitrogen. The permit also requires implementation and maintenance of a CNOP to support ongoing nutrient reduction efforts and allows future nutrient limitations to be incorporated through permit modification as statewide nutrient permitting initiatives continue to evolve.

A significant component of the current regulatory framework is the permit reopener provision associated with nutrient management. The permit specifically states that Georgia EPD may reopen the permit in the future to incorporate numeric or narrative nutrient limitations as additional watershed-based regulatory requirements are developed. Consequently, while the SCWRF currently operates under the permit limitations summarized above, future regulatory requirements are anticipated to become increasingly stringent, particularly with respect to nutrient removal performance. These future considerations are discussed further in the following sections.

3.2 WLA Requirements

The Population and Flow Projections evaluation documented the need to expand the SCWRF from its current permitted 40 MGD MMF capacity to a future 50 MGD MMF capacity. In support of this long-term expansion effort, CCWS submitted a WLA request to the Georgia EPD seeking planning-level guidance for a future 50 MGD discharge to the Chattahoochee River.

On November 10, 2025, Georgia EPD issued WLA No. WLA000309 for the proposed SCWRF expansion. The WLA established planning-level effluent limitations for a future 50 MGD discharge and became a primary regulatory driver for the Final Facility Plan. The WLA represents a substantial increase in treatment expectations when compared to the existing

NPDES permit and significantly altered the planning assumptions initially used during development of the September 2025 draft Facility Plan.

The WLA established the planning-level discharge objectives summarized in Table 3.2-1.

Parameter	WLA Target
Flow	50.0 MGD MMF
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	2.9 mg/L
Total Suspended Solids (TSS)	5.0 mg/L
Ammonia-Nitrogen (NH_3-N)	0.5 mg/L
Total Phosphorus (TP)	0.30 mg/L
Dissolved Oxygen (Minimum)	7.0 mg/L
Escherichia coli	126 /100 mL
pH	6.0 – 9.0 S.U.
Total Residual Chlorine	0.02 mg/L

Table 3.2-1
Georgia EPD WLA Planning-Level Effluent Targets for 50 MGD MMF Expansion
Source: Georgia EPD WLA No. WLA000309.

Parameter	Existing Permit	WLA Target
$CBOD_5$	13.0 mg/L	2.9 mg/L
TSS	10.0 mg/L	5.0 mg/L
NH_3-N	1.8 mg/L	0.5 mg/L
TP	0.52 mg/L	0.30 mg/L
Design Capacity	40 MGD MMF	50 MGD MMF

Table 3.2-2
Existing Permit vs WLA Planning Targets
Source: NPDES Permit No. GA0026158 and WLA No. WLA000309.

The information presented in Figure 3.2-1 clearly illustrates that the WLA requirements are substantially more stringent than the current permit limitations. While expansion from 40 MGD MMF to 50 MGD MMF was originally identified as the primary project driver, issuance of the WLA expanded the planning effort to include detailed evaluation of nutrient removal capability, treatment process selection, long-term compliance flexibility, and future regulatory adaptability. As a result, the Facility Plan evolved from a capacity expansion

study into a treatment technology evaluation intended to support both short-term and long-term compliance objectives.

In addition to the numeric planning-level targets listed above, the WLA included several important regulatory observations and future planning considerations. EPD indicated that future permit issuance for the expanded facility would require submission and approval of:

- An Antidegradation Analysis.
- An Environmental Information Document (EID).
- A Design Development Report (DDR).
- Any necessary revisions to the existing Watershed Protection Plan (WPP).

Although the WLA established planning-level limits for $CBOD_5$, TSS, ammonia, and phosphorus, the document further stated that future Total Nitrogen limitations may ultimately be imposed to address nutrient impacts associated with downstream West Point Lake. This statement became particularly important during evaluation of alternatives because it established a need to consider not only the ability of a treatment process to meet current WLA objectives, but also its ability to adapt to future nutrient reduction requirements that may emerge during the life of the facility.

The implications of the WLA ultimately became one of the primary factors influencing the Facility Planning effort. As documented throughout the alternatives evaluation process and reflected in the Alternative Advancement Framework, treatment alternatives were evaluated not only for their ability to provide 50 MGD MMF capacity, but also for their ability to:

- Consistently achieve the WLA treatment objectives.
- Support future Total Nitrogen reduction requirements.
- Provide flexibility for future nutrient regulations.
- Maintain long-term operational reliability.
- Accommodate phased implementation strategies.
- Improve overall treatment resiliency and regulatory adaptability.

Consequently, the WLA served as the principal regulatory basis for development of the updated process modeling, alternatives refinement effort, and final evaluation of Alternatives A11.3 and A14.2. The future regulatory implications associated with Total Nitrogen and more stringent nutrient removal requirements are discussed further in the following section.

3.3 Potential Future Nutrient Requirements

The November 2025 WLA established planning-level effluent objectives for expansion of the SCWRF from 40 MGD MMF to 50 MGD MMF. While the WLA established numeric planning targets for carbonaceous biochemical oxygen demand ($CBOD_5$), total suspended solids (TSS), ammonia-nitrogen (NH_3-N), and total phosphorus (TP), EPD outside of the WLA also identified the potential for future nutrient limitations to be incorporated into a future permit to address downstream water quality concerns. Specifically, the WLA noted that a Total Nitrogen (TN) limit may be imposed in the future to support nutrient management objectives associated with West Point Lake and other downstream receiving waters.

The potential for future nutrient limitations is not unexpected. The current NPDES Permit No. GA0026158 already requires nutrient monitoring, implementation of a CNOP, and includes permit reopener language specifically intended to accommodate future nutrient management requirements as Georgia EPD continues implementation of statewide nutrient permitting initiatives.

As a result, CCWS directed that the Facility Planning effort evaluate treatment alternatives not only on their ability to meet the WLA requirements, but also on their ability to accommodate more stringent future nutrient removal objectives if required during the life of the facility. This direction was formally incorporated into the Authorization Allowance Directive, which identified future planning-level targets of approximately:

- Total Phosphorus (TP) = 0.13 mg/L
- Total Nitrogen (TN) = 4.0 mg/L

for long-term planning and alternatives evaluation purposes. These values do not represent currently enforceable permit limits but were used as planning assumptions to evaluate future facility resiliency, treatment flexibility, and regulatory adaptability.

Parameter	Existing Permit	WLA Planning Target	Future Planning Target
Total Phosphorus (TP)	0.52 mg/L	0.30 mg/L	0.13 mg/L
Total Nitrogen (TN)	Monitoring Only	Monitoring Only	4.0 mg/L

Table 3.3-1
Nutrient Planning Basis for Alternatives Evaluation
Future Planning Targets were utilized for alternatives evaluation and long-term facility planning purposes only and do not represent current permit requirements.

The progression shown in Table 3.3-1 demonstrates that future regulatory compliance planning extends beyond simply achieving the WLA objectives. Alternatives capable of satisfying current WLA requirements may not necessarily provide sufficient flexibility to accommodate future Total Nitrogen or enhanced phosphorus removal requirements. Consequently, future treatment technologies were evaluated using both near-term and long-term performance scenarios to better understand the ability of each alternative to adapt to evolving regulatory conditions.

The potential impacts of future nutrient limitations became one of the key drivers influencing the process modeling and alternatives evaluation effort. As documented in the updated BioWin evaluations and Workshop #2 alternatives review, treatment alternatives were assessed based on their ability to achieve future nutrient removal targets through combinations of biological nutrient removal (BNR), tertiary membrane treatment, deep-bed denitrifying filtration, chemical phosphorus removal, supplemental carbon addition,

and other process enhancements.

Workshop #2 evaluations further demonstrated that the principal alternatives advanced for refinement, Alternatives A11.3 and A14.2, were capable of achieving the modeled future nutrient objectives without implementation of supplemental carbon addition under the modeled conditions. However, future implementation of supplemental carbon systems remains a potential compliance strategy should future nutrient requirements become more stringent than those assumed during this planning effort.

Recognition of these potential future nutrient requirements was a major factor influencing the Alternative Advancement Framework and the subsequent Technical Refinement Phase documented in the Facility Plan development process. Rather than selecting an alternative solely on current permit or WLA requirements, CCWS chose to retain and refine alternatives capable of supporting both immediate expansion objectives and future nutrient management flexibility. This planning approach helps minimize future regulatory risk while providing a more resilient long-term treatment strategy for the SCWRF.

The potential permitting and environmental review requirements associated with future regulatory compliance are discussed in the following sections.

3.4 Antidegradation Analysis Requirements

As part of the November 10, 2025, WLA issued for expansion of the WRF from 40 MGD MMF to 50 MGD MMF, the Georgia EPD identified several regulatory requirements that must be satisfied prior to issuance of a future NPDES permit authorizing the expanded discharge. One of those requirements is completion of an Antidegradation Analysis.

The purpose of an Antidegradation Analysis is to demonstrate that the proposed increase in discharge is justified and that reasonable alternatives have been evaluated prior to allowing additional loading to the receiving water. The analysis is intended to support protection of existing water quality while balancing environmental, social, and economic considerations associated with the proposed project. The Antidegradation Analysis must be reviewed and accepted by Georgia EPD prior to issuance of a future permit supporting the expanded discharge.

The SCWRF expansion is unique sincethe underlying need for expansion has already been documented through both local planning efforts and regional forecasting evaluations completed by CCWS, the Metropolitan North Georgia Water Planning District, and this Facility Planning effort. Population and Flow Projections completed under TM No. 2 demonstrated that the facility will ultimately require expansion to accommodate projected wastewater demands within the South Cobb service area and associated intergovernmental contributors.

From a planning perspective, this Facility Plan provides much of the foundational technical information necessary to support development of a future Antidegradation Analysis. Specifically, the Facility Plan:

- Documents the need for future treatment capacity expansion.
- Evaluates multiple treatment alternatives.
- Considers environmental and regulatory constraints.

- Develops phased implementation strategies.
- Evaluates capital and lifecycle costs.
- Assesses constructability and site utilization impacts.
- Identifies preferred treatment approaches for future development.

While preparation of the Antidegradation Analysis is beyond the scope of this Facility Plan, the evaluation of alternatives completed during development of the Plan will provide important supporting information during future permitting efforts. In particular, the alternatives evaluation process documented that a range of treatment strategies were reviewed and compared prior to advancement of Alternatives A11.3 and A14.2 into the Technical Refinement Phase.

The ability of the selected alternative to reliably meet WLA discharge criteria while minimizing environmental impacts and supporting long-term regulatory compliance will be an important component of future Antidegradation demonstrations submitted to EPD. Consequently, consideration of antidegradation principles became one of the factors influencing the overall Facility Planning process and evaluation of future treatment strategies.

As expansion planning advances into preliminary engineering, permitting, and detailed design, CCWS will need to prepare and submit a formal Antidegradation Analysis consistent with Georgia EPD requirements and in coordination with the EID and DDR discussed in the following sections.

3.5 Environmental Information Document Requirements

As part of the November 10, 2025, WLA issued for expansion of the SCWRF to 50 MGD MMF, Georgia EPD identified preparation of an EID as a required component of the future permitting process. EPD specifically stated that an EID must be submitted to evaluate the direct and indirect environmental impacts associated with the proposed facility expansion and that EPD concurrence with the EID will be required before a draft NPDES permit for the expanded discharge can be issued.

The purpose of the EID is to provide a comprehensive assessment of the environmental consequences associated with implementation of the proposed expansion alternative. The document is intended to support EPD's environmental review of the proposed project and assist in determining whether the selected improvements are consistent with applicable environmental regulations, permitting requirements, and resource protection objectives.

Although preparation of the EID is beyond the scope of this Facility Plan, several elements of the planning process provide important foundational information that will support future EID development.
These include:

- Evaluation of existing facility conditions.
- Assessment of future treatment needs.
- Comparison of treatment alternatives.
- Site utilization evaluations.
- Constructability assessments.
- Construction sequencing evaluations.

- Preliminary capital improvement planning.
- Identification of preferred and secondary treatment alternatives.

The alternative evaluation process completed as part of this Facility Plan specifically considered factors that commonly influence future environmental review activities, including:

- Extent of site disturbance.
- Utilization of adjacent properties.
- Potential utility corridor impacts.
- Long-term facility footprint requirements.
- Construction staging requirements.
- Future expansion flexibility.
- Process technology selection.
- Operational and maintenance considerations.

Several alternatives evaluated during the Facility Planning process exhibited substantially different environmental and site-development characteristics. Alternatives A11.3 and A15 generally require greater site development, larger construction footprints, and increased utilization of adjacent CCWS property, while Alternatives A14.1 and A14.2 were developed specifically to maximize use of existing infrastructure and minimize site expansion requirements. These differences will likely be important considerations during future environmental evaluations.

In support of future permitting efforts, the EID will likely address topics including:

- Existing environmental conditions.
- Wetlands and waters of the United States.
- Floodplain considerations.
- Stormwater management impacts.
- Erosion and sedimentation control.
- Cultural and historical resources.
- Ecological resources and habitats.
- Community impacts.
- Construction-related impacts.
- Potential cumulative environmental impacts.
- Measures incorporated to avoid, minimize, or mitigate environmental effects.

The Facility Plan does not select or approve environmental permitting pathways and should not be considered a substitute for the EID process. Rather, the Facility Plan establishes the planning framework and technical basis that will support preparation of the future EID and associated environmental review documentation. The preferred alternative ultimately selected by CCWS should be carried forward into the EID process where project-specific environmental analyses can be completed at an appropriate level of detail.

As facility implementation progresses into preliminary engineering and design, preparation of the EID should be coordinated with development of the Antidegradation Analysis, DDR, WPP updates, and other permitting activities required by Georgia EPD to support issuance of a future permit for expansion of the SCWRF to 50 MGD MMF.

3.6 Watershed Protection Plan Requirements

The SCWRF currently operates under NPDES Permit No. GA0026158, which recognizes and incorporates the CCWS WPP as an enforceable component of the facility's overall regulatory framework. The WPP serves as a long-term planning and management tool intended to protect receiving stream water quality through monitoring, assessment, corrective actions, and implementation of best management practices (BMPs) throughout the watershed served by the facility.

The current permit requires that the WPPapply to all basins and subbasins served by the SCWRF and that ongoing monitoring be performed to evaluate watershed conditions, verify effectiveness of implemented management strategies, and support compliance with applicable water quality standards. The permit also requires annual certification that the WPP is being implemented as approved and that supporting monitoring and performance information be maintained and reported to Georgia EPD.

As part of the WLA issued for the proposed expansion to 50 MGD MMF, Georgia EPD specifically stated that CCWS must evaluate whether the existing WPP adequately covers the service area associated with the expanded facility. EPD further noted that if the existing WPP does not encompass all service areas affected by the proposed expansion, the WPP must be revised to incorporate the new service area and any associated watershed management requirements prior to permit issuance.

Because the SCWRF receives flow from multiple jurisdictions and continues to experience long-term growth within its service area, maintenance of an accurate and current WPP will remain an important component of future permitting efforts. Areas of particular interest include:

- Existing South Cobb service area boundaries.
- Intergovernmental service agreements.
- Future wastewater service area growth.
- Watershed monitoring requirements.
- Stormwater management programs.
- Inflow and infiltration (I&I) reduction initiatives.
- Future development and land-use changes.
- Best Management Practices (BMPs) intended to protect receiving stream water quality.

The Population and Flow Projections evaluation documented that future wastewater loading to the SCWRF will continue to be influenced by growth within Cobb County as well as contributions from Douglas County, Paulding County, and other service partners. As these service areas evolve, periodic review of the WPP will be necessary to ensure consistency between actual service conditions and watershed planning assumptions.

From a Facility Planning perspective, the alternatives evaluated in this report do not fundamentally alter the receiving water or point of discharge. However, expansion of treatment capacity and changes in service area loading assumptions may require updates to watershed planning documentation, monitoring programs, and long-term watershed management strategies. Consequently, future implementation of the preferred alternative should include a review of the existing WPP to identify any revisions necessary to support permitting the expanded facility.

It is anticipated that future updates to the WPP would be coordinated with preparation of the Antidegradation Analysis, EID, DDR, and permit application documentation required to support expansion of the SCWRF to 50 MGD MMF. Coordination of these efforts will help ensure consistency between facility planning assumptions, watershed management objectives, and regulatory permitting requirements.

Finally, maintenance of an effective WPP is consistent with one of the central objectives of this Facility Plan: to provide a long-term strategy for expanding wastewater treatment capacity while continuing to protect the water quality of the Chattahoochee River along with West Point Lake downstream and supporting future watershed management goals throughout the South Cobb service area.

Any future revisions to the WPP should be coordinated with updates to projected service area boundaries, intergovernmental flow agreements, and future facility expansion assumptions developed through subsequent phases of project implementation.



SECTION 4

PROCESS MODELING AND ALTERNATIVES EVALUATION BASIS

4.1 Planning Assumptions

Development of future treatment alternatives for the SCWRF was based upon a common set of planning, regulatory, hydraulic, and process design assumptions established during completion of TM No. 2, No. 5, and No. 6. These assumptions were developed to provide a consistent basis for process modeling, hydraulic evaluations, alternatives screening, and comparative analysis of future treatment technologies.

The Facility Planning effort utilizes a planning horizon extending through approximately the year 2050 and evaluates expansion of the SCWRF from its current permitted capacity of 40 MGD MMF to a future capacity of 50 MGD MMF. Population and flow projections completed under TM No. 2 demonstrated that continued growth within the South Cobb service area, together with contributions from intergovernmental service partners, will ultimately require expansion of the facility to maintain adequate treatment capacity and regulatory compliance.

The flow planning basis established for alternatives evaluation included a future ADF of 40 MGD, a future MMF of 50 MGD, a future Peak Daily Flow (PDF) of 90 MGD, and a future Peak Hour Flow (PHF) of 94 MGD. These values were utilized consistently throughout the process modeling and hydraulic evaluation efforts.

Planning and implementation trigger criteria established under TM No. 2 were also incorporated into the Facility Planning process. These trigger values include an ADF of approximately 29.2 MGD and a MMF of approximately 36.5 MGD, representing the point at which planning, permitting, design, procurement, and construction activities should be actively progressing to preserve implementation flexibility prior to reaching existing facility limitations.

A significant planning assumption introduced during development of the Facility Plan was issuance of Wasteload Allocation No. WLA000309 by the Georgia EPD on November 10, 2025. The WLA established planning-level treatment objectives for future operation at 50 MGD MMF and became the primary regulatory basis for alternatives development and evaluation. These planning-level objectives include $CBOD_5$ of 2.9 mg/L, TSS of 5.0 mg/L, ammonia-nitrogen of 0.5 mg/L, and total phosphorus of 0.30 mg/L.

In addition to the WLA requirements, future planning-level nutrient objectives were incorporated into the evaluation process to assess long-term treatment flexibility and regulatory adaptability. These planning targets consisted of Total Nitrogen (TN) equal to 4.0 mg/L and Total Phosphorus (TP) equal to 0.13 mg/L. These values do not represent current permit requirements but were utilized as planning assumptions for evaluation of future nutrient management requirements and long-term facility resiliency.

The planning assumptions established in this section formed the basis for the hydraulic evaluations, process modeling efforts, development of preliminary treatment scenarios, alternatives screening evaluations, and selection of alternatives advanced for continued refinement within this Facility Plan.

Planning Element	Basis
Existing Capacity	40 MGD MMF
Expansion Capacity	50 MGD MMF
Future ADF	40 MGD
Future MMF	50 MGD
Future PDF	90 MGD
Future PHF	94 MGD
Planning Trigger ADF	29.2 MGD
Planning Trigger MMF	36.5 MGD
WLA $CBOD_5$	2.9 mg/L
WLA TSS	5.0 mg/L
WLA Ammonia-N	0.5 mg/L
WLA TP	0.30 mg/L
Future Planning TN	4.0 mg/L
Future Planning TP	0.13 mg/L

Table 4.1-1
Planning Basis Summary

The planning assumptions summarized in Figure 4.1-1 established the common basis utilized throughout the process modeling, hydraulic evaluations, and alternatives development efforts completed for the SCWRF Facility Plan. Consistent application of these assumptions allowed direct comparison of future treatment alternatives and ensured that all expansion scenarios were evaluated relative to the same hydraulic, regulatory, and nutrient removal objectives. The following section summarizes the hydraulic evaluation findings that influenced development, screening, and refinement of the treatment alternatives considered during the Facility Planning process.

4.2 Hydraulic Evaluation Summary

A hydraulic evaluation of the SCWRF was completed as part of TM No. 5 to establish the existing hydraulic profile, identify potential bottlenecks, and evaluate the compatibility of the existing treatment train with future expansion to 50 MGD MMF. The hydraulic evaluation utilized record drawings, field survey information, existing structural elevations, and development of a hydraulic model representing the major treatment processes throughout the facility.

The hydraulic model included evaluation of the headworks, aerated grit removal facilities, primary clarifiers, aeration basins, secondary clarifiers, tertiary filtration facilities, chlorine contact basin, and effluent discharge facilities. Hydraulic conditions were evaluated at the existing permitted flow capacity of 40 MGD and referenced to a Chattahoochee River 100-year flood elevation of 765.4 feet.

The hydraulic evaluation indicated that the existing facility is generally capable of accommodating current permitted operating conditions; however, several hydraulic constraints become increasingly significant as flow approaches future expansion requirements. Secondary clarification facilities, tertiary treatment facilities, and selected hydraulic control points were identified as the principal hydraulic elements influencing future treatment configurations and expansion alternatives.

In addition to hydraulic considerations, the process modeling effort completed under TM No. 5 demonstrated that the existing treatment configuration is constrained by solids loading within the secondary clarification system. Even with primary clarification facilities assumed to be fully operational, modeled secondary clarifier solids loading rates approached or exceeded recommended planning criteria under maximum month conditions. These findings reinforced the need for additional solids separation capacity as part of any future expansion strategy.

The hydraulic evaluation also confirmed that expansion of the facility to 50 MGD MMF cannot be accomplished through hydraulic improvements alone. Future treatment alternatives must address both hydraulic capacity and biological treatment requirements necessary to satisfy current and future regulatory objectives. As a result, hydraulic evaluations were conducted in conjunction with process modeling and became a key factor influencing development of the preliminary treatment scenarios documented in TM No. 6.

Key hydraulic findings influencing alternatives development included:

- Existing treatment processes are generally capable of supporting current permitted operating conditions.
- Secondary clarification facilities represent a significant hydraulic and solids handling constraint as future flow increases occur.
- Existing tertiary treatment facilities require evaluation relative to future treatment objectives and expansion requirements.
- Future treatment configurations must consider both hydraulic capacity limitations and nutrient removal requirements.
- Hydraulic evaluations supported development of multiple expansion scenarios incorporating additional biological treatment volume, clarification capacity, tertiary treatment systems, and membrane treatment technologies.

The hydraulic evaluation findings, combined with the process modeling results discussed in the following section, established the technical basis for development, screening, and refinement of the alternatives evaluated during the Facility Planning process.

While the hydraulic evaluation identified physical and operational constraints influencing future facility development, process modeling was required to determine the treatment performance capabilities of potential expansion alternatives. TM No. 5 therefore utilized BioWin process modeling to evaluate existing treatment performance, establish calibration conditions, and assess the ability of future treatment configurations to achieve both WLA requirements and future planning-level nutrient objectives. The results of those evaluations are summarized in the following section.

4.3 Process Modeling Summary

Biological process modeling was completed using the EnviroSim BioWin wastewater process simulation platform to evaluate existing SCWRF performance, establish calibration conditions, and assess future treatment alternatives capable of supporting expansion from 40 MGD MMF to 50 MGD MMF. Process modeling was performed in conjunction with the hydraulic evaluations summarized previously and utilized the Regulatory Planning Basis established in TM No. 5.

The modeling effort incorporated historical operating data, facility-specific influent characteristics, future flow projections, and planning-level treatment objectives established by Georgia EPD Wasteload Allocation No. WLA000309. Existing conditions were calibrated using historical plant performance data to establish a representative baseline for evaluating future treatment scenarios.

The calibrated existing conditions model demonstrated that the SCWRF is capable of achieving current permit requirements for $CBOD_5$, TSS, ammonia, and phosphorus under modeled maximum month operating conditions. However, the existing process configuration does not provide sufficient nutrient removal capability to achieve the future planning-level Total Nitrogen target utilized during alternatives evaluation. Modeling of the existing process configuration produced an effluent Total Nitrogen concentration of approximately 19 mg/L, substantially exceeding the future planning objective of 4.0 mg/L.

Process modeling also confirmed that secondary clarification performance becomes increasingly important as flow approaches future expansion conditions. The calibrated model indicated that the existing treatment process is constrained by solids loading within

the secondary clarification system and that future expansion alternatives must address both biological treatment capacity and solids separation capability.

Following calibration of the existing process model, multiple treatment configurations were developed and evaluated including conventional activated sludge expansion, staged biological nutrient removal (BNR) processes, deep-bed filtration alternatives, and membrane-based treatment alternatives. Evaluation of these alternatives focused on the ability to achieve:

- Expansion to 50 MGD MMF.
- WLA treatment objectives.
- Future planning-level nutrient removal objectives.
- Long-term operational flexibility.
- Future regulatory adaptability.

The modeling effort demonstrated that lower-stage biological nutrient removal alternatives were generally less effective in achieving future nutrient removal objectives, while advanced BNR configurations incorporating four-stage and five-stage treatment processes consistently provided improved nitrogen and phosphorus removal performance. Likewise, membrane-based alternatives demonstrated enhanced solids separation performance while maintaining strong nutrient removal capability.

Particular emphasis was placed on evaluating alternatives relative to both the WLA treatment objectives and future planning-level nutrient targets. Modeling results demonstrated that Alternatives A11.3, A12, A13, A14.1, A14.2, and A15 were all capable of achieving the required WLA effluent objectives. Alternatives A11.3 and A14.2 further demonstrated the ability to achieve the future planning-level nutrient objectives utilized during alternatives evaluation and subsequently emerged as the preferred alternatives for continued refinement.

Alternative	$CBOD_5$ (mg/L)	TSS (mg/L)	Ammonia-N (mg/L)	TN (mg/L)	TP (mg/L)
Existing System	2.6	4.0	0.70	19.0	0.30
A11.3 – 4-Stage BNR	1.7	2.8	0.32	2.9	0.27
A12 – 5-Stage BNR	1.8	2.8	0.37	3.0	0.10
A13 – 4-Stage MBR	1.3	1.2	0.28	2.9	0.12
A14.2 – 5-Stage MBR	1.5	1.2	0.35	3.0	0.04

Table 4.3-1
Summary of Modeled Effluent Performance
Values shown represent planning-level modeling results utilized for alternatives comparison and screening purposes.

The process modeling effort confirmed that multiple treatment approaches are technically capable of achieving expansion to 50 MGD MMF and complying with WLA requirements. Differences among alternatives were therefore driven less by treatment performance and more by considerations such as constructability, implementation flexibility, site utilization,

solids separation strategy, lifecycle cost, and future regulatory adaptability. Consequently, process modeling served as the foundation for alternatives development and screening but was only one component of the broader evaluation framework applied during the Facility Planning process.

The process modeling evaluations established that several alternatives were capable of satisfying both current and future treatment objectives. To identify the most practical long-term solutions, these modeling results were subsequently integrated with hydraulic evaluations, cost assessments, constructability reviews, implementation planning considerations, and site utilization analyses. The methodology utilized to compare and screen alternatives is summarized in the following section.

4.4 Alternatives Evaluation Methodology

Development of alternatives for the CCWS SCWRF was completed through an iterative process incorporating hydraulic analysis, biological process modeling, facility assessments, constructability reviews, implementation planning evaluations, and stakeholder review. The objective of the evaluation process was to identify treatment alternatives capable of supporting expansion of the facility from 40 MGD MMF to 50 MGD MMF while achieving planning-level treatment objectives and maintaining long-term operational flexibility.

The alternatives evaluation process built upon the facility assessments documented in TM No. 3 and No. 4 as well as the hydraulic and process modeling evaluations documented in TM No. 5. Preliminary treatment scenarios developed under TM No. 6 were subsequently screened and compared using a consistent set of technical, operational, implementation, and financial criteria.

4.4.1 Hydraulic Evaluation Considerations

Hydraulic evaluations were utilized to determine the ability of each alternative to accommodate future flow conditions while maintaining reliable operation throughout the treatment process. Particular emphasis was placed on identifying hydraulic bottlenecks, assessing compatibility with future 50 MGD MMF operation, evaluating impacts on major process units, and determining the extent of future hydraulic improvements required for implementation. Alternatives that minimized hydraulic constraints and provided long-term flexibility were viewed favorably during the screening process.

4.4.2 Process Modeling Considerations

Biological process modeling using BioWin was utilized to evaluate treatment performance under future operating conditions. Alternatives were assessed based on their ability to achieve:

- Expansion to 50 MGD MMF.
- WLA treatment objectives.
- Future planning-level nutrient objectives.
- Reliable ammonia removal.
- Nitrogen removal capability.
- Phosphorus removal capability.
- Long-term treatment flexibility.

Process modeling served as the primary technical tool for evaluating treatment performance and identifying alternatives capable of responding to increasingly stringent nutrient management requirements.

4.4.3 Cost Evaluation Considerations

Planning-level capital cost estimates were developed for each alternative to provide a comparative understanding of implementation cost. Cost evaluations considered major treatment facilities, process equipment, supporting infrastructure, site development requirements, and associated implementation costs. In addition to capital costs, present value and lifecycle considerations were utilized to assess long-term operational impacts associated with each treatment strategy.

4.4.4 Constructability Considerations

Constructability evaluations examined the practicality of implementing improvements while maintaining continuous operation of the existing facility. Factors considered included:

- Ability to construct facilities independently of active treatment processes.
- Tiered implementation strategy and sequencing of work.
- Complexity of major process conversions.
- Facility staging opportunities.
- Site access requirements.
- Risk associated with maintaining permit compliance during construction.
- Operational transition requirements.

Alternatives exhibiting lower implementation risk and greater separation between construction activities and active treatment operations generally received more favorable constructability rankings.

4.4.5 Site Utilization Considerations

Site utilization evaluations assessed the physical footprint of each alternative as well as the degree of reliance on adjacent property, contractor support areas, utility corridors, future expansion opportunities, and operational access. These evaluations helped identify alternatives capable of maximizing use of existing infrastructure while minimizing future site development requirements.

4.4.6 Sequencing and Implementation Considerations

Construction sequencing and implementation evaluations examined how improvements could be phased while maintaining treatment performance and regulatory compliance. Alternatives were evaluated with respect to:

- Operational continuity.
- Sequencing complexity.
- Process startup requirements.
- Potential implementation risks.
- Future expansion flexibility.
- Compatibility with phased capital investment strategies.

These evaluations ultimately supported development of the tiered implementation strategies documented later in the Facility Plan.

4.4.7 Alternative Screening Framework

No single evaluation criterion controlled advancement of alternatives. Instead, alternatives were compared using a balanced framework that considered:

- Treatment performance.
- Regulatory compliance capability.
- Hydraulic compatibility.
- Future nutrient removal flexibility.
- Site utilization.
- Constructability.
- Implementation flexibility.
- Capital cost.
- Lifecycle cost.

Results of the evaluation process were presented and discussed during project workshops with CCWS and Jacobs, ultimately leading to establishment of an Alternative Advancement Framework identifying alternatives for continued refinement and evaluation.

Application of the evaluation methodology described above demonstrated that multiple treatment alternatives were technically capable of supporting future expansion of the SCWRF to 50 MGD MMF. However, significant differences were identified with respect to treatment performance, nutrient removal capability, constructability, site utilization, implementation flexibility, lifecycle considerations, and future regulatory adaptability. Based on the collective findings of the hydraulic evaluations, process modeling efforts, and alternatives screening process, a structured Alternative Advancement Framework was established to identify those alternatives most suitable for continued refinement. The outcomes of that process are summarized in the following section.

4.5 Alternatives Advanced for Refinement

Following completion of the hydraulic evaluations, process modeling efforts, preliminary layout development, planning-level cost estimating, and stakeholder review process, a structured screening effort was completed to identify the alternatives most suitable for continued refinement. Alternatives were evaluated based on treatment performance, compliance with the planning-level treatment objectives established by Georgia EPD Wasteload Allocation No. WLA000309, future nutrient removal capability, constructability, site utilization, implementation flexibility, and overall long-term adaptability.

The alternatives evaluation process demonstrated that multiple treatment configurations were technically capable of supporting expansion of the SCWRF from 40 MGD MMF to 50 MGD MMF. Significant differences emerged, however, when alternatives were compared with respect to nutrient removal performance, implementation complexity, facility footprint, lifecycle considerations, and future regulatory flexibility.

Based on the collective findings of the modeling, hydraulic, and alternatives evaluation efforts, two alternatives were identified as the preferred candidates for continued refinement:

- **Alternative A11.3** – 4-Stage BNR Process with Deep Bed Denitrifying Filtration.
- **Alternative A14.2** – 5-Stage BNR Process with Membrane Treatment.

Alternative A11.3 was advanced as a result ofcombining strong nutrient removal performance with a conventional treatment configuration, favorable constructability characteristics, implementation flexibility, and long-term treatment adaptability. Alternative A14.2 was advanced since it demonstrated excellent nutrient removal capability while providing efficient site utilization, reduced dependence on adjacent property, and enhanced solids separation through membrane treatment technology.

Several additional alternatives remained technically viable and were retained as secondary alternatives for comparison purposes, including Alternatives A12, A13, A14.1, and A15. These alternatives demonstrated acceptable treatment performance but were ultimately considered less favorable than the primary alternatives due to factors such as implementation complexity, site utilization considerations, constructability challenges, or overall facility development requirements.

Alternatives A9, A10.1, A10.2, A11.1, and A11.2 were not advanced further for continued refinement. While these alternatives demonstrated varying levels of technical feasibility, comparative evaluations indicated that superior treatment performance, nutrient removal capability, implementation flexibility, and overall project value could be achieved through the alternatives retained for further consideration.

The advancement of Alternatives A11.3 and A14.2 established the basis for the detailed alternatives evaluation presented in Section 5. The following section summarizes the alternatives development process, documents the Alternative Advancement Framework, and presents the detailed evaluation of the alternatives selected for continued refinement.

The process modeling, hydraulic evaluations, alternatives screening efforts, and advancement framework described throughout this section established the technical basis for continued refinement of the most favorable treatment alternatives. These evaluations confirmed that multiple treatment approaches are capable of supporting expansion of the SCWRF to 50 MGD MMF; however, significant differences exist with respect to treatment performance, nutrient removal flexibility, constructability, site utilization, implementation strategy, and lifecycle considerations. Consequently, Alternatives A11.3 and A14.2 were identified as the Primary Alternatives for continued refinement and comparison. The following section documents the alternatives development process, summarizes the Alternative Advancement Framework, and presents the detailed evaluation of the alternatives advanced for further consideration within the Facility Plan.

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SECTION 5

ALTERNATIVES EVALUATION AND REFINEMENT

5.1 Alternative Development Overview

Development of alternatives for the WRF evolved through multiple phases of evaluation, beginning with assessment of existing facility limitations, projected flow demands, treatment performance requirements, anticipated regulatory drivers, and long-term capital planning objectives. Initial planning efforts focused on identifying practical strategies to expand the facility from its current 40 MGD MMF capacity to a future 50 MGD MMF capacity while maintaining operational reliability, treatment performance, and regulatory compliance. As the planning effort progressed, alternatives were refined to address increasingly stringent nutrient removal requirements, future operational flexibility, constructability considerations, and long-term implementation objectives.

The alternatives development process was intentionally iterative. Early evaluations considered a broad range of treatment approaches that varied in the degree of reuse of existing infrastructure, biological treatment configuration, clarification strategy, filtration requirements, nutrient removal capability, and overall site development requirements.

Alternative concepts included combinations of:

- Existing and new primary clarification facilities.
- Conventional activated sludge processes.
- Multiple biological nutrient removal (BNR) configurations.
- Additional secondary clarification facilities.
- Deep-bed denitrifying filtration systems.
- Tertiary membrane treatment systems.
- Solids handling improvements.
- Headworks and grit removal improvements.

Following issuance of the November 2025 WLA, the planning effort expanded beyond a

traditional capacity expansion study. Alternatives were subsequently evaluated against not only the need to increase treatment capacity to 50 MGD MMF, but also their ability to achieve the WLA treatment objectives and accommodate future nutrient removal planning targets. This evolution significantly influenced process modeling, alternatives refinement, and the overall Facility Plan development effort.

To support a consistent and defensible evaluation process, all alternatives were compared using a common set of technical, regulatory, operational, implementation, and financial criteria. The objective was not simply to identify the lowest-cost alternative, but rather to determine which alternatives provided the most balanced approach toward achieving the long-term goals of CCWS. Particular emphasis was placed on the ability of each alternative to support expansion of the SCWRF to 50 MGD MMF while maintaining compliance with existing permit requirements, achieving the planning-level treatment objectives established by the WLA, and providing flexibility to accommodate potential future nutrient reduction requirements.

Technical evaluations included hydraulic analysis, process modeling, nutrient removal capability, treatment reliability, and compliance with current and future regulatory objectives. Operational evaluations considered process complexity, maintenance requirements, equipment reliability, redundancy, and overall operational flexibility. Constructability, construction sequencing, site utilization, and phased implementation considerations were also incorporated to evaluate the practicality of implementing improvements while maintaining uninterrupted treatment operations and permit compliance. Financial evaluations included both planning-level capital cost estimates and long-term lifecycle cost considerations.

Evaluation Category	Primary Considerations
Regulatory Compliance	Ability to meet current NPDES permit requirements, WLA objectives, and future nutrient removal planning targets.
Treatment Performance	Capability to achieve required effluent quality, nutrient removal objectives, and reliable performance under varying flow conditions.
Hydraulic Capacity	Ability to support expansion to 50 MGD MMF and accommodate projected peak flow conditions.
Operational Reliability	Process resiliency, redundancy, maintainability, and long-term operational flexibility.
Constructability	Ability to implement improvements while maintaining facility operations and permit compliance during construction.
Construction Sequencing	Complexity of implementation, process cutovers, startup requirements, and operational continuity.
Site Utilization	Existing property requirements, adjacent parcel impacts, staging needs, and future expansion flexibility.

Tiered Implementation	Ability to phase improvements based on flow triggers, regulatory needs, and capital funding priorities.
Capital Cost	Planning-level construction, engineering, and total project costs.
Lifecycle Cost	Long-term operating, maintenance, chemical, power, and replacement costs.

Table 5.1-1
Alternative Evaluation Criteria Summary
Sources: Workshop #2 evaluation criteria, technical screening analyses, alternatives refinement assessments, and Alternative Selection Confirmation Memorandum.

Following completion of process modeling, hydraulic evaluations, cost estimating, constructability reviews, site utilization assessments, sequencing evaluations, and Workshop #2 discussions, the alternatives were categorized into Primary Alternatives, Secondary Alternatives, and Alternatives Not Advanced Further. This Alternative Advancement Framework was developed collaboratively by CCWS, Jacobs, and Ardurra to focus refinement efforts on the alternatives considered most capable of satisfying the long-term objectives of the Facility Plan.

Category	Alternative	Basis for Classification
Primary	**A11.3 – 4-Stage Bardenpho with Deep Bed Denitrifying Filters**	Advanced for detailed refinement as the preferred conventional treatment alternative. Alternative A11.3 combines a 4-Stage Bardenpho process, conventional solids separation, and future nutrient removal flexibility while providing favorable constructability, implementation flexibility, and long-term operational familiarity.
Primary	**A14.2 – 5-Stage Bardenpho with Tertiary Membranes (Alternative Layout)**	Advanced for detailed refinement as the preferred membrane-based treatment alternative. Alternative A14.2 combines a 5-Stage Bardenpho process with tertiary membrane treatment to provide efficient site utilization, strong nutrient removal capability, and implementation flexibility within the existing facility footprint.
Secondary	**A12 – 5-Stage Bardenpho**	Retained for comparison and validation. Demonstrated technical viability but was considered less favorable than the Primary Alternatives due to enhanced biological phosphorus removal requirements and overall implementation considerations.
Secondary	**A13 – 4-Stage Bardenpho with MBR**	Retained for comparison and validation. Demonstrated strong treatment performance but was considered less favorable than A14.2 due to cost and implementation considerations associated with the membrane process configuration.

Secondary	**A14.1 – 5-Stage Bardenpho with Tertiary Membranes**	Retained for comparison and validation. Similar treatment approach as A14.2, but a less favorable site layout and constructability profile resulted in A14.2 being advanced instead.
Secondary	**A15 – 5-Stage Bardenpho with Deep Bed Denitrifying Filters**	Retained for comparison and validation. Offered significant long-term flexibility but required the largest footprint, greatest capital investment, and most extensive site development.
Not Advanced Further	**A9 – 2-Stage BNR**	Not advanced due to treatment performance limitations and reliance on supplemental chemical and carbon addition to achieve planning targets.
Not Advanced Further	**A10.1 – 3-Stage BNR**	Not advanced due to treatment performance limitations and less favorable nutrient removal capability compared to higher-tier alternatives.
Not Advanced Further	**A10.2 – 3-Stage BNR (Alternate Layout)**	Not advanced due to treatment performance limitations and lower overall ranking relative to more advanced BNR alternatives.
Not Advanced Further	**A11.1 – 4-Stage Bardenpho**	Not advanced because other 4-Stage Bardenpho configurations provided more favorable site layout, constructability, and implementation characteristics.
Not Advanced Further	**A11.2 – 4-Stage Bardenpho**	Not advanced because alternative configurations provided superior overall balance of constructability, site utilization, and future implementation flexibility.

Table 5.1-2
Alternative Advancement Framework Summary
Source: Alternative Selection Confirmation Memorandum dated August 2026.

The Alternative Advancement Framework did not represent final selection of a preferred alternative. Instead, it established the basis for continued refinement of the most promising two treatment strategies while preserving documentation of technically viable secondary alternatives and those alternatives ultimately eliminated from further consideration. The framework allowed detailed technical refinement efforts to focus on the alternatives offering the most balanced combination of treatment performance, future regulatory flexibility, constructability, implementation sequencing, site utilization efficiency, and lifecycle economics.

The following sections summarize the alternatives screening process, document the basis for advancement or elimination of alternatives, provide detailed evaluations of the Primary Alternatives, summarize the Secondary Alternatives, and present the comparative findings that support the final recommendations contained within this Facility Plan.

5.2 Initial Alternatives Screening Summary

5.2.1 Alternatives Screening Approach

Following completion of the Population and Flow Projections, Initial Findings and Urgent Issues evaluations, Existing Facilities Assessment, and preliminary regulatory review activities, a broad range of treatment expansion concepts was developed to evaluate pathways for increasing the WRF from its existing 40 MGD MMF capacity to a future 50 MGD MMF capacity. The intent of the screening effort was to identify technically viable treatment strategies capable of satisfying projected hydraulic demands while addressing existing facility limitations and anticipated regulatory requirements.

The alternatives development process initially focused on variations of conventional activated sludge treatment and biological nutrient removal (BNR) processes utilizing differing combinations of:

- Existing and new primary clarification facilities.
- Existing and expanded aeration basin infrastructure.
- Conventional clarification-based solids separation.
- Tertiary membrane treatment systems.
- Deep-bed denitrifying filtration systems.
- Various biological nutrient removal process configurations.
- Rehabilitation and replacement of aging infrastructure.

As the planning effort progressed, individual alternatives were refined through process modeling, hydraulic evaluations, capacity assessments, constructability reviews, and planning-level cost estimating. The result was a progressive screening process intended to narrow the number of alternatives requiring detailed evaluation while retaining those alternatives capable of supporting long-term facility objectives.

5.2.2 Evolution of Alternatives

Rather than developing a single preferred treatment approach at the outset of the Facility Plan, the alternatives evaluation process intentionally explored a wide range of treatment philosophies. Early alternatives generally fell into three broad categories:

5.2.2.1 Conventional Activated Sludge Expansion Alternatives

These alternatives focused on maximizing use of existing treatment infrastructure while providing incremental capacity increases through additional clarification, biological treatment volume, and support facility improvements. Conventional alternatives generally relied upon additional secondary clarification capacity and deep-bed filtration systems to achieve future treatment objectives.

5.2.2.2 Biological Nutrient Removal (BNR) Alternatives

The second group of alternatives evaluated progressively more advanced nutrient removal configurations, including 2-stage, 3-stage, 4-stage, and 5-stage biological nutrient removal processes. These alternatives were evaluated to determine the degree of biological treatment necessary to achieve WLA requirements and provide long-term flexibility for future nutrient regulations.

5.2.2.3 Membrane-Based Alternatives

The third group of alternatives incorporated membrane treatment technology as a substitute for additional secondary clarification and deep-bed filtration processes. Membrane alternatives were developed to evaluate whether a more compact treatment footprint could simultaneously provide enhanced solids separation, improved nutrient removal performance, and increased future regulatory flexibility.

5.2.3 Impact of the WLA on Alternative Development

The original alternatives screening effort was performed under planning assumptions that differed significantly from those ultimately established by the November 2025 WLA. Issuance of the WLA fundamentally altered the planning basis for the project by introducing significantly more stringent treatment objectives, particularly for ammonia and phosphorus removal.

As a result, alternatives that may have been considered viable under existing permit conditions required re-evaluation against the updated WLA targets of:

- $CBOD_5$ = 2.9 mg/L
- TSS = 5.0 mg/L
- Ammonia-N = 0.5 mg/L
- Total Phosphorus = 0.30 mg/L

while also considering future planning targets of:

- Total Nitrogen (TN) = 4.0 mg/L
- Total Phosphorus (TP) = 0.13 mg/L

for long-term planning purposes.

Consequently, multiple alternatives were revised, refined, reconfigured, or eliminated as process modeling and nutrient removal evaluations advanced.

5.2.4 Screening Methodology

Following issuance of the WLA, alternatives were evaluated using a consistent framework incorporating:

- Hydraulic capacity evaluations.
- BioWin process modeling.
- Nutrient removal capability assessments.
- Constructability reviews.
- Construction sequencing evaluations.
- Site utilization impact assessments.
- Tiered implementation evaluations.
- Planning-level capital cost estimates.
- Lifecycle cost projections.

Particular emphasis was placed on evaluating the ability of each alternative to:

1. Reliably support expansion to 50 MGD MMF.
2. Meet the WLA treatment objectives.
3. Accommodate future nutrient removal requirements.
4. Minimize implementation risks.
5. Provide long-term flexibility for future regulatory changes.

Alternative Category	General Description
Conventional Activated Sludge Expansion	Expansion of biological treatment and clarification capacity utilizing conventional treatment technologies.
2-Stage and 3-Stage BNR Alternatives	Biological nutrient removal approaches emphasizing incremental modification of existing treatment infrastructure.
4-Stage and 5-Stage Bardenpho Alternatives	Advanced biological nutrient removal processes intended to support future nutrient removal objectives.
Deep-Bed Denitrifying Filtration Alternatives	Conventional solids separation combined with tertiary nutrient polishing processes.
Membrane-Based Alternatives	Advanced solids separation utilizing tertiary membrane treatment systems in lieu of expanded secondary clarification.

Table 5.2-1
Screening-Level Alternative Categories
Sources: Alternatives Screening Evaluations, BioWin Modeling Summaries, and Workshop #2 Discussions.

5.2.5 Screening Results

The alternatives screening effort demonstrated that multiple treatment approaches were technically capable of supporting expansion to 50 MGD MMF. However, significant differences emerged when alternatives were compared with respect to nutrient removal performance, constructability, implementation flexibility, site utilization, capital cost, and long-term lifecycle cost.

The screening process further demonstrated that no single evaluation criterion dictated alternative advancement. Rather, advancement decisions reflected a balanced consideration of treatment performance, regulatory compliance capability,

constructability, implementation flexibility, lifecycle cost, and long-term operational objectives. These evaluations ultimately formed the basis for the Alternative Advancement Framework presented in the following section.

The screening effort therefore served as the transition between conceptual alternatives development and detailed refinement of the alternatives considered most compatible with the long-term goals of the SCWRF Facility Plan.

5.3 Alternative Advancement Framework

5.3.1 Overview

Following completion of the alternatives screening effort, CCWS, Jacobs, and Ardurra conducted a structured review of the candidate treatment alternatives to determine which concepts warranted continued refinement and which alternatives should be retained primarily for comparison and validation purposes. This review incorporated the results of process modeling, hydraulic evaluations, planning-level cost estimating, constructability assessments, construction sequencing evaluations, site utilization reviews, nutrient removal evaluations, and discussions completed during Workshop #2.

At the conclusion of the evaluation process, an Alternative Advancement Framework was established to guide the Technical Refinement Phase of the Facility Plan. The intent of the framework was to focus detailed planning efforts on those alternatives most capable of balancing treatment performance, future nutrient removal capability, implementation flexibility, maintainability, constructability, site requirements, and long-term capital investment objectives.

The Alternative Advancement Framework categorized alternatives into three groups:

- Primary Alternatives
- Secondary Alternatives
- Alternatives Not Advanced Further

The framework did not constitute final selection of the preferred alternative. Rather, it identified the alternatives that would receive additional evaluation and refinement prior to development of the Final Facility Plan recommendations.

As documented in Table 5.1-2, the alternatives were categorized into Primary Alternatives, Secondary Alternatives, and Alternatives Not Advanced Further. The following sections summarize the rationale for advancement and subsequent refinement of Primary Alternatives while documenting the role of Secondary Alternatives and the basis for eliminating alternatives from further consideration.

5.3.2 Primary Alternatives

Alternatives A11.3 and A14.2 were advanced as the Primary Alternatives because they represented two distinctly different yet technically viable approaches for achieving the long-term objectives of the SCWRF Facility Plan. Together, these alternatives provided CCWS with a balanced comparison between a conventional treatment approach utilizing deep bed denitrifying filtration and an advanced treatment approach utilizing tertiary membrane treatment.

The Primary Alternatives were intentionally selected to represent two different treatment philosophies rather than variations of a single process configuration. Alternative A11.3 represents the leading conventional treatment approach utilizing biological nutrient removal with conventional solids separation, while Alternative A14.2 represents the leading membrane-based treatment approach utilizing biological nutrient removal in combination with tertiary membrane treatment. The difference in biological process configuration reflects optimization of each alternative as a complete treatment system and should not be interpreted as preference for one specific number of biological stages over another.

Alternative A11.3 was advanced because it provided a consolidated biological treatment platform utilizing conventional treatment technologies while maintaining flexibility for future nutrient compliance flexibility through implementation of additional nutrient removal facilities and treatment process enhancements to be further evaluated during subsequent phases of project development. Evaluations indicated that A11.3 offered favorable constructability characteristics, implementation flexibility, and long-term operational familiarity while remaining capable of supporting future regulatory objectives.

Alternative A14.2 was advanced because it demonstrated strong treatment performance, efficient site utilization, favorable constructability characteristics, and the ability to provide advanced solids separation through membrane treatment. Workshop #2 evaluations consistently identified A14.2 as the most favorable alternative in the areas of constructability, site utilization, and implementation flexibility.

Together, A11.3 and A14.2 represented the alternatives most capable of balancing regulatory compliance, treatment effectiveness, constructability, implementation flexibility, and long-term planning objectives. These alternatives therefore became the focus of the Technical Refinement Phase and are evaluated in detail in the following sections of this Facility Plan.

5.3.3 Secondary Alternatives

Alternatives A12, A13, A14.1, and A15 were retained as Secondary Alternatives because each demonstrated technical viability and remained capable of supporting the overall objectives of the project. However, each possessed one or more characteristics that caused it to be considered less favorable than the Primary Alternatives following the screening and refinement process.

Alternative A12 remained under consideration because it provided a conventional 5-Stage Bardenpho process capable of achieving future nutrient removal goals. However, evaluations indicated that the enhanced biological phosphorus removal requirements and associated operational considerations provided less overall benefit than the alternatives advanced for refinement.

Alternative A13 demonstrated strong treatment performance through implementation of a membrane-based process configuration. Although technically feasible and capable of meeting projected treatment requirements, the alternative was ultimately considered less favorable than Alternative A14.2 due to cost, implementation, and long-term operational considerations.

Alternative A14.1 remained a viable membrane-based alternative throughout the evaluation

process. The treatment philosophy was essentially identical to A14.2; however, the revised site layout developed under A14.2 provided improved constructability, staging opportunities, implementation flexibility, and overall site utilization. As a result, A14.2 became the preferred membrane-based alternative for continued refinement.

Alternative A15 offered perhaps the greatest long-term treatment flexibility among the alternatives considered and provided a robust conventional treatment platform utilizing a full 5-Stage Bardenpho process and deep bed denitrifying filtration. However, the alternative required the largest site footprint, the greatest dependence on adjacent property, and the highest overall capital investment, causing it to be retained as a Secondary Alternative rather than advanced as a Primary Alternative.

While these alternatives were not advanced into the Primary category, they remained valuable comparison alternatives and were utilized throughout the evaluation process to validate findings and assess the relative strengths and weaknesses of the alternatives selected for refinement.

5.3.4 Alternatives Not Advanced Further

Alternatives A9, A10.1, A10.2, A11.1, and A11.2 were documented during the screening process but were not advanced into the Technical Refinement Phase. Although these alternatives addressed portions of the project objectives, comparative evaluations demonstrated that other alternatives provided superior overall treatment performance, nutrient removal capability, constructability characteristics, implementation flexibility, or long-term value.

The alternatives not advanced further generally represented earlier-stage biological nutrient removal concepts that either required greater chemical dependence, provided reduced future nutrient removal flexibility, or demonstrated less favorable constructability and site development characteristics than the alternatives ultimately retained for refinement.

The decision not to advance these alternatives does not imply that they were technically infeasible. Rather, it reflects the comparative screening process used to focus refinement efforts on the alternatives most aligned with the long-term goals of the Facility Plan. These alternatives remain documented to provide context regarding the evolution of the planning effort and progression from the initial screening process to the final alternatives' refinement phase.

5.3.5 Relationship to the Technical Refinement Phase

The Alternative Advancement Framework established the roadmap for the final phase of Facility Plan development. Following confirmation of the framework by CCWS, refinement efforts focused solely on Alternatives A11.3 and A14.2 and included:

- Additional BioWin process modeling.
- Updated capital and lifecycle cost estimating.
- Constructability assessments.
- Construction sequencing evaluations.
- Site utilization analyses.
- Tiered implementation strategy development.

- Long-term nutrient compliance evaluations.

These refinement activities provided the basis for the comparative evaluations and recommendations presented in the remainder of this Facility Plan and ultimately support identification of a preferred long-term strategy for expansion and upgrade of the SCWRF.

5.4 Primary Alternatives Evaluation

5.4.1 Overview

As documented in the Alternative Advancement Framework, Alternatives A11.3 and A14.2 were advanced into the Technical Refinement Phase and designated as the Primary Alternatives for continued evaluation. These alternatives emerged from the screening process as the two most favorable approaches for balancing treatment performance, future nutrient removal capability, implementation flexibility, constructability, site utilization, and long-term planning objectives. Each alternative represents a distinctly different treatment philosophy while remaining capable of supporting expansion of the SCWRF to 50 MGD MMF.

Alternative A11.3 represents a conventional treatment approach centered on a consolidated 4-Stage Bardenpho process with deep bed denitrifying filtration. Alternative A14.2 represents an advanced treatment approach utilizing a 5-Stage Bardenpho process combined with tertiary membrane treatment. Together, these alternatives provide CCWS with a comparison between a conventional biological treatment strategy and a membrane-based treatment strategy capable of addressing both current and future nutrient removal objectives.

5.4.2 Alternative A11.3 – 4-Stage Bardenpho with Deep Bed Denitrifying Filters

Alternative Description

Alternative A11.3 expands the SCWRF to 50 MGD MMF through construction of a new consolidated 4-Stage Bardenpho biological nutrient removal facility supplemented by deep bed denitrifying filtration and additional clarification capacity. The alternative retains a conventional clarification-based treatment approach and relies upon proven biological nutrient removal processes coupled with tertiary denitrifying filtration to achieve future treatment objectives.

Major improvements associated with Alternative A11.3 include:

- Five new 110-foot primary clarifiers.
- Ten new 2.67 MG 4-Stage Bardenpho basins.
- Three new 150-foot secondary clarifiers.
- Rehabilitation of five existing secondary clarifiers.
- New primary sludge pumping facilities.
- New RAS/WAS pumping facilities.
- New BNR blower building.
- New 115-MGD deep bed denitrifying filter facility.
- New UV disinfection facilities.
- Headworks screening and grit removal improvements.

Key Advantages

The primary strengths of Alternative A11.3 include:

- Utilization of conventional and well-understood treatment technologies.
- Consolidated biological nutrient removal process.
- Strong implementation flexibility.
- Ability to construct most major facilities independently of existing treatment operations.
- Reduced operational transition risk compared with membrane treatment alternatives.
- Strong long-term nutrient compliance flexibility through implementation of biological nutrient removal processes and future nutrient removal enhancements to be determined during subsequent phases of project development.

The conceptual arrangement of the proposed facilities is presented in Figure 5.4-1.

Figure 5.4-1. Alternative A11.3 Conceptual Site Layout. Alternative A11.3 expands the SCWRF utilizing a consolidated 4-Stage Bardenpho biological nutrient removal process, additional primary and secondary clarification facilities, and a new denitrifying filtration facility. Major treatment improvements are generally constructed independent of existing active treatment processes, resulting in a conventional treatment configuration emphasizing implementation flexibility and future nutrient removal capability. Alternative A11.3 provides flexibility to accommodate future nutrient removal requirements using treatment technologies to be further evaluated during future project development.

Alternative A11.3 – Expand Existing Process to 50 mgd (4-Stage Bardenpho BNR Process) with Deep Bed Denitrifying Sand Filters

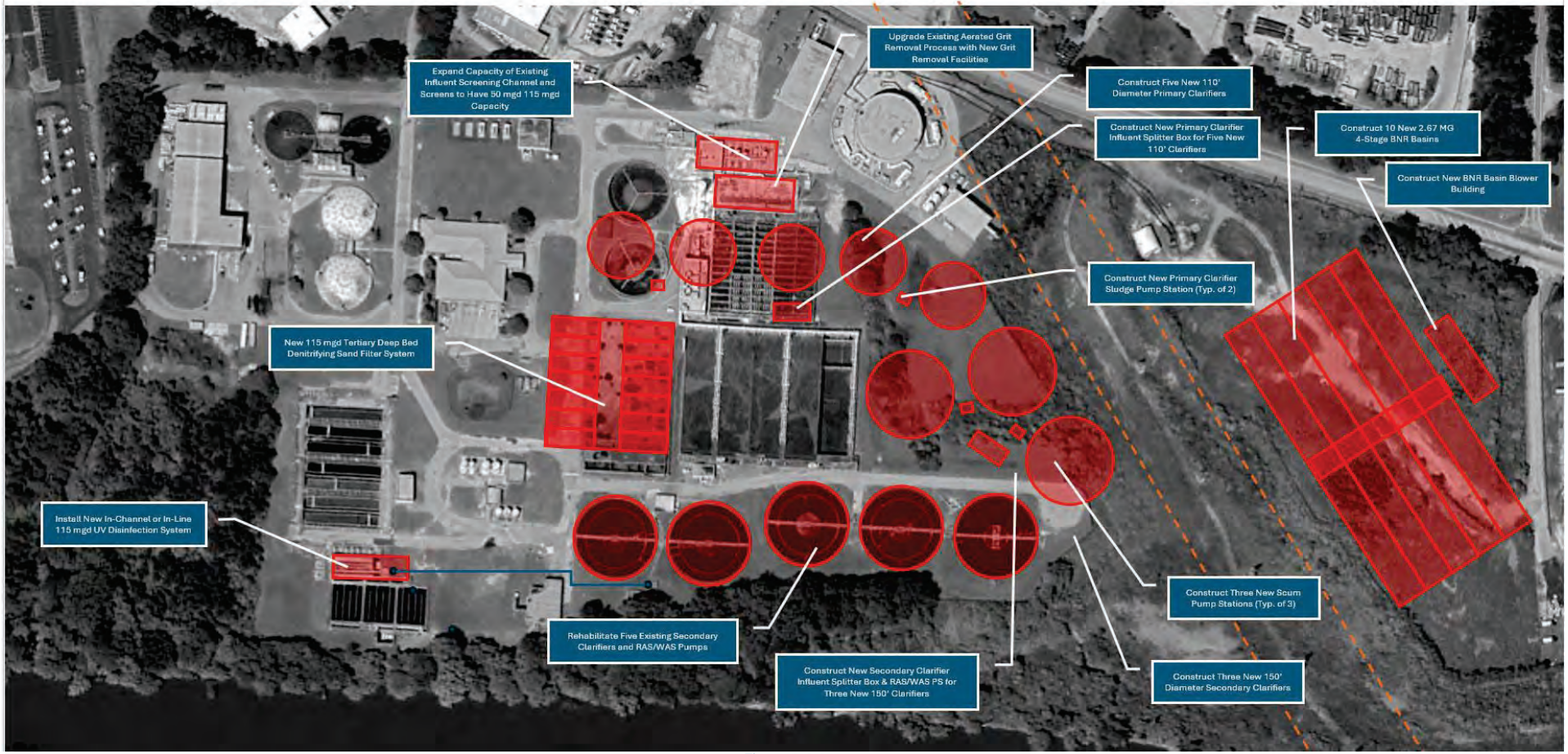


Figure 5.4-1
Alternative A11.3 – 4-Stage Bardenpho Denitrifying Filters Conceptual Site Layout

Key Challenges
Key challenges associated with Alternative A11.3 include:

- Large overall facility footprint.
- Dependence on adjacent parcel utilization.
- Significant new treatment infrastructure.
- Construction of tertiary denitrifying filters.
- Additional secondary clarification facilities.
- Higher capital cost than membrane-based alternatives.

Planning-Level Cost
The planning-level estimate developed during the refinement process identified:

- Total Construction Cost: approximately **$351.9 million**
- Total Project Cost: approximately **$373.1 million** including engineering services.

Technical Refinement Findings
BioWin modeling and alternatives evaluation indicated that Alternative A11.3 is capable of achieving the planning-level Total Nitrogen and Total Phosphorus objectives utilized for alternatives evaluation while maintaining a conventional treatment process configuration. The alternative therefore provides a technically viable approach for satisfying both the WLA requirements and future nutrient planning considerations.

5.4.3 Alternative A14.2 – 5-Stage Bardenpho with Tertiary Membranes

Alternative Description
Alternative A14.2 expands the SCWRF to 50 MGD MMF through implementation of a 5-Stage Bardenpho biological nutrient removal process combined with tertiary membrane treatment. Unlike Alternative A11.3, A14.2 eliminates the need for additional secondary clarification and deep bed filtration by utilizing membrane treatment as the primary solids separation technology.

Major improvements associated with Alternative A14.2 include:

- Five new primary clarifiers.
- Three new BNR basins.
- Conversion of existing aeration basins into a 5-Stage Bardenpho process.
- New primary sludge pumping facilities.
- New BNR blower building.
- New 50-MGD tertiary membrane treatment facility.
- New 160-MGD Mixed Liquor Suspended Solids (MLSS) fine screening facility.
- New UV disinfection facilities.
- Blower system upgrades and associated process improvements.

The conceptual arrangement of the proposed facilities is presented in Figure 5.4-2.

Figure 5.4-2. Alternative A14.2 Conceptual Site Layout. Alternative A14.2 expands the SCWRF utilizing a 5-Stage Bardenpho biological nutrient removal process combined with tertiary membrane treatment. The alternative maximizes the use of existing site infrastructure and minimizes dependence on adjacent property while providing advanced solids separation and nutrient removal capability through implementation of membrane technology.

Alternative A14.2 – Expand Existing Process to 50 mgd (5-Stage Bardenpho BNR Process) with Tertiary Membranes

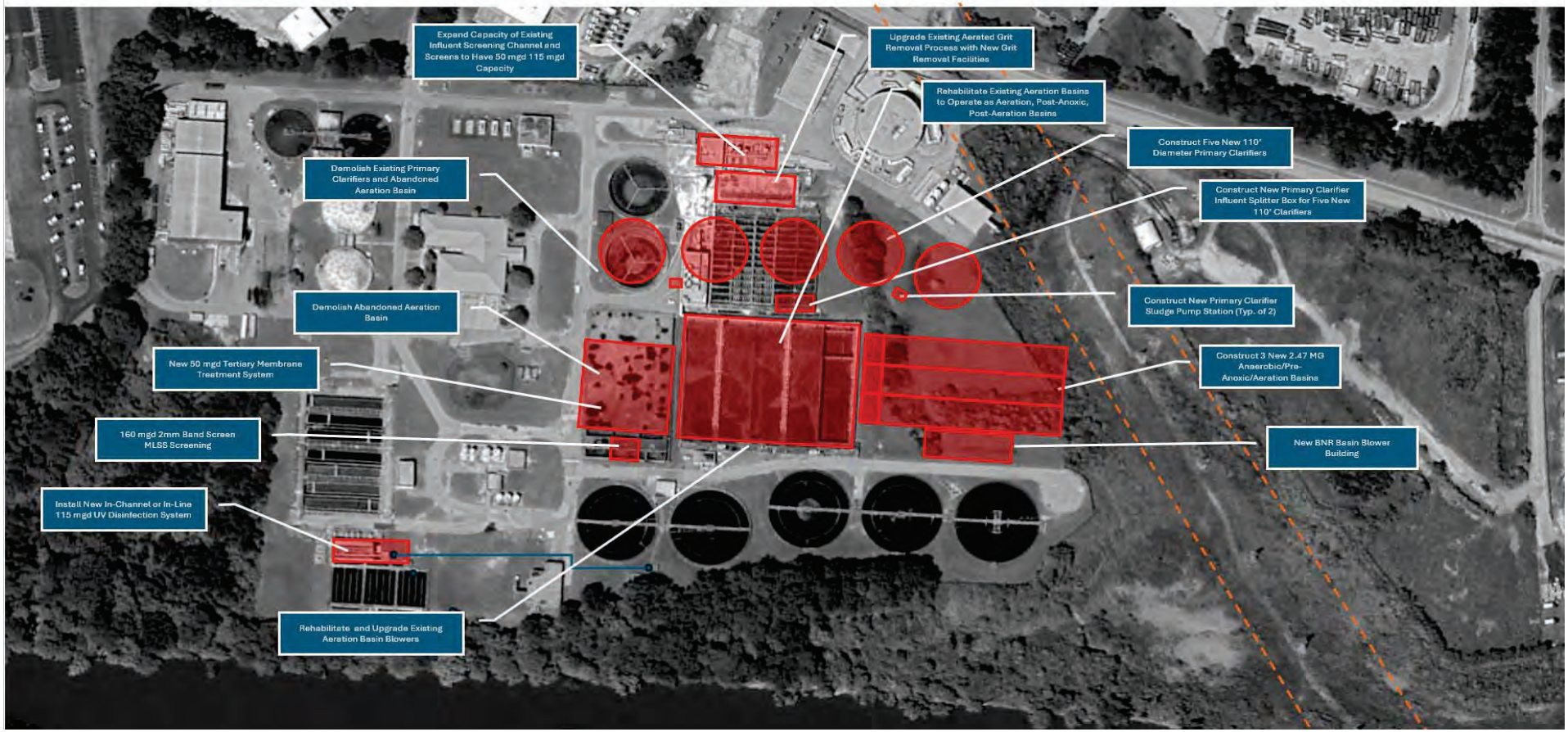


Figure 5.4-2
Alternative A14.2 – 5-Stage Bardenpho with Tertiary Membranes Conceptual Site Layout

Key Advantages

The primary strengths of Alternative A14.2 include:

- Most efficient site utilization among the alternatives evaluated.
- Minimal dependence on adjacent property.
- Strong constructability profile.
- Reduced footprint.
- Elimination of secondary clarifier expansion.
- Elimination of deep bed filtration facilities.
- Strong future nutrient compliance flexibility through membrane treatment.

Key Challenges

Key challenges associated with Alternative A14.2 include:

- Implementation of membrane treatment technology.
- Operational transition associated with membrane facilities.
- Dependence on MLSS fine screening facilities.
- Concentrated construction activities within the existing plant footprint.
- Reduced future expansion flexibility compared with larger conventional alternatives.

Planning-Level Cost

The planning-level estimate developed during the refinement process identified:

- Total Construction Cost: approximately **$289.4 million**
- Total Project Cost: approximately **$306.8 million** including engineering services.

Technical Refinement Findings

Process modeling and alternatives evaluations demonstrated that Alternative A14.2 is capable of satisfying both the WLA requirements and the future nutrient planning targets utilized during the alternatives refinement effort. Additionally, Workshop #2 evaluations consistently identified A14.2 as the most favorable alternative with respect to site utilization, implementation flexibility, sequencing, and constructability.

5.4.4 Summary Comparison of Primary Alternatives

The two Primary Alternatives represent distinctly different approaches to future facility expansion. Alternative A11.3 utilizes conventional treatment processes with deep bed denitrifying filtration and provides strong long-term flexibility while requiring a larger site footprint and higher capital cost. Alternative A14.2 utilizes membrane treatment to reduce site requirements, improves constructability, and minimizes the need for future site expansion while introducing membrane technology and associated operational considerations.

Both alternatives demonstrated the ability to satisfy the technical, regulatory, and operational objectives established for the Facility Plan and were therefore advanced into the Technical Refinement Phase for detailed comparison. The following sections summarize the Secondary Alternatives and document the basis for not advancing other alternatives into the final refinement process.

To facilitate direct comparison, Table 5.4-1 summarizes the primary characteristics of Alternatives A11.3 and A14.2 that were considered during the Technical Refinement Phase. The comparison highlights the differing treatment philosophies, implementation considerations, site requirements, and planning-level costs associated with each

alternative while illustrating why both alternatives were advanced for detailed evaluation.

Evaluation Category	A11.3	A14.2
Treatment Approach	4-Stage Bardenpho + Future Nutrient Removal Facilities	5-Stage Bardenpho + Membranes
Total Project Cost	~$373M	~$307M
Site Utilization	Greater Property Requirement	Most Efficient Site Utilization
Constructability Ranking	#2	#1
Sequencing Risk	Low to Moderate	Low to Moderate
Long-Term Flexibility	High	High
Future Nutrient Flexibility	High	High

Table 5.4-1
Primary Alternative Comparison Matrix
Sources: Workshop #2, Cost Estimates, Alternative Refinement Evaluations.

APPENDICES

Appendix B – Alternatives Evaluation Supporting Documentation

Appendix B.1 Alternatives Screening Cost Summary

Appendix B.2 Alternatives Screening Process Volume Summary

Appendix B.3 BioWin Modeling and PV Costs Summary



SECTION 6

IMPLEMENTATION AND CAPITAL PLANNING FRAMEWORK

6.1 Evaluation Findings

The alternatives evaluation and refinement process completed as part of this Facility Plan confirmed that expansion of the SCWRF to 50 MGD MMF is technically achievable through multiple treatment approaches. However, the evaluations further demonstrated that future facility planning must address not only increased hydraulic capacity, but also aging infrastructure, operational reliability concerns, future nutrient removal objectives, implementation flexibility, and long-term regulatory uncertainty.

The evaluation process progressed through multiple phases of screening, modeling, refinement, and stakeholder review. Initial alternatives development considered a broad range of conventional activated sludge, biological nutrient removal (BNR), filtration, and membrane-based treatment approaches. Following issuance of the November 2025 WLA, the planning basis expanded significantly to include future nutrient removal requirements and long-term regulatory flexibility. As a result, alternatives were evaluated not only for their ability to provide 50 MGD MMF capacity, but also for their ability to consistently achieve the WLA treatment objectives and accommodate future Total Nitrogen and Total Phosphorus planning targets.

The alternatives evaluation process identified several findings that were consistently observed across the planning effort:

- Expansion of the SCWRF to 50 MGD MMF will require a combination of facility rehabilitation, process upgrades, and new treatment capacity.
- Existing facility limitations, particularly within grit removal, primary clarification, secondary clarification, solids handling, and reuse water systems, should be addressed in conjunction with future expansion projects.
- Future treatment planning should consider both current WLA objectives and

potential future nutrient removal requirements associated with Total Nitrogen and enhanced phosphorus removal.
- Constructability, implementation sequencing, operational continuity, and site utilization are equally important evaluation criteria alongside process performance and capital cost.
- Multiple treatment technologies are capable of achieving the required effluent quality; however, each alternative presents different implementation risks, site requirements, lifecycle costs, and long-term operational considerations.

The Alternative Advancement Framework documented during the Technical Refinement Phase identified Alternatives A11.3 and A14.2 as the Primary Alternatives for continued evaluation. Alternative A11.3 represents a conventional treatment approach utilizing a consolidated 4-Stage Bardenpho process with denitrifying filtration, while Alternative A14.2 represents an advanced treatment approach utilizing a 5-Stage Bardenpho process with tertiary membrane treatment. Both alternatives demonstrated the ability to satisfy the planning objectives established for this Facility Plan and remained technically viable through completion of the refinement process.

The evaluation process also confirmed that Secondary Alternatives A12, A13, A14.1, and A15 remain technically feasible approaches for future facility development. While these alternatives were not advanced into the Primary Alternative category, they provide valuable reference points and demonstrate that multiple pathways exist for achieving future treatment objectives should future project priorities, regulatory requirements, funding considerations, or implementation constraints change.

A fundamental conclusion of the Facility Planning effort is that future development of the SCWRF should be approached as a phased program rather than a single construction project. The ability to strategically sequence improvements, align investments with projected flow triggers, coordinate permitting activities, and maintain operational continuity throughout implementation provides significant benefits to CCWS regardless of the ultimate project delivery method selected. This conclusion became one of the primary drivers for development of the Tiered Implementation Strategies evaluated during the Technical Refinement Phase.

Ultimately, the planning effort demonstrated that the SCWRF can continue to serve as a critical regional treatment facility through at least the year 2050 provided that future expansion, rehabilitation, and regulatory compliance activities are pursued in a coordinated and proactive manner. The following sections present a recommended planning framework intended to support future permitting activities, Progressive Design-Build procurement, phased implementation planning, and long-term capital investment decisions.

6.2 Recommended Planning Strategy

The purpose of this Facility Plan is not to advance the SCWRF to final design, nor to prescribe a single facility configuration that must be implemented without modification. Rather, the purpose of the planning effort is to establish a technically defensible framework that allows CCWS to advance future permitting, procurement, preliminary engineering, and implementation activities while maintaining flexibility to adapt to changing regulatory requirements, operational priorities, and project delivery methods.

Throughout development of this Facility Plan, the planning basis evolved from a conventional expansion study focused on increasing treatment capacity from 40 MGD MMF to 50 MGD MMF into a broader evaluation of long-term nutrient compliance, infrastructure rehabilitation, operational reliability, and implementation strategy. Issuance of the November 2025 WLA ultimately established the principal regulatory framework for future planning and became the primary driver influencing future treatment process requirements and alternatives evaluation efforts.

As documented in the Alternative Advancement Framework, Alternatives A11.3 and A14.2 emerged as the most favorable alternatives for further refinement and evaluation. Both alternatives demonstrated the ability to satisfy the planning objectives established for this Facility Plan and both provide technically viable pathways for achieving expansion to 50 MGD MMF while accommodating future nutrient removal requirements.

Accordingly, the recommended planning strategy is not to immediately commit to a single treatment configuration within this Facility Plan. Instead, CCWS should utilize this document to establish the technical, regulatory, and operational framework necessary to support the next phase of project development. The Facility Plan therefore recommends that future project delivery efforts continue to advance the treatment philosophies represented by Alternatives A11.3 and A14.2 while allowing the final treatment configuration to be optimized during subsequent preliminary engineering, permitting, and Progressive Design-Build procurement activities. The Facilities Plan does not prescribe a specific future nutrient removal technology. Selection of nutrient removal technologies should be further evaluated and confirmed during future permitting, preliminary engineering, and Progressive Design-Build procurement activities.

This planning strategy provides several advantages:

- Preserves flexibility as future regulatory requirements continue to evolve.
- Allows continued consideration of future Total Nitrogen and enhanced phosphorus removal requirements.
- Provides flexibility to adapt treatment processes based on future permitting discussions with Georgia EPD.
- Allows optimization of constructability, sequencing, and site utilization during future project development.
- Supports a phased implementation approach aligned with facility rehabilitation needs and future capacity requirements.
- Provides the future Progressive Design-Build team sufficient flexibility to incorporate innovation while remaining consistent with the planning conclusions documented herein.

The recommended planning strategy further recognizes that a substantial portion of the improvements required at the SCWRF are independent of the ultimate treatment alternative selected. Completion of headworks improvements, implementation of rotary drum thickening facilities, rehabilitation of aging infrastructure, clarification improvements, electrical and instrumentation modernization, and reliability improvements remain prudent investments regardless of the final treatment process configuration selected during future project delivery phases.

From a regulatory standpoint, CCWS should proceed under the assumption that future permitting activities will require:

- Expansion from 40 MGD MMF to 50 MGD MMF.
- Compliance with the WLA planning-level treatment objectives.
- Continued evaluation of future Total Nitrogen requirements.
- Preparation of an Antidegradation Analysis.
- Preparation of an Environmental Information Document (EID).
- Coordination of Watershed Protection Plan updates.
- Future permit modification and supporting regulatory documentation.

Consequently, the primary recommendation of this Facility Plan is that CCWS advance future project development using a phased, flexible, and permitting-focused approach that incorporates the findings of this planning effort while preserving the ability to adapt to future regulatory, operational, and procurement considerations. The alternatives evaluation process has demonstrated that multiple technically viable treatment pathways exist; however, successful implementation will depend upon maintaining flexibility throughout subsequent phases of planning, permitting, procurement, and design.

The recommended planning strategy therefore establishes a long-term framework rather than a fixed design solution and is intended to support future implementation of a 50 MGD SCWRF capable of meeting both current and future treatment objectives while maintaining operational reliability and regulatory compliance through at least the year 2050.

6.3 Implementation Strategy Framework

6.3.1 Overview

A consistent conclusion of the Facility Planning effort was that future development of the SCWRF should be implemented through a phased program rather than a single comprehensive construction project. This approach provides flexibility for CCWS to align capital investments with actual flow growth, regulatory developments, operational priorities, and future funding opportunities while maintaining compliance with existing permit requirements. The phased implementation concepts evaluated during refinement of Alternatives A11.3, A14.2, and A15 demonstrate that multiple implementation pathways are available for achieving the long-term objectives established by this Facility Plan. References to nutrient removal facilities within alternative implementation strategies are intended for planning purposes only and should not be interpreted as selection or endorsement of a specific treatment technology.

The implementation strategies developed during the Technical Refinement Phase were intended to:

- Maintain treatment capacity and permit compliance during construction.
- Minimize operational disruptions.
- Preserve flexibility regarding future nutrient requirements.
- Allow capital expenditures to occur in manageable increments.
- Support future Progressive Design-Build delivery methods.
- Maintain adaptability as future regulatory requirements evolve.

Detailed implementation evaluations are provided in the Appendices of this Section 6.

6.3.2 Constructability Considerations

Constructability evaluations completed for the Primary and Secondary Alternatives demonstrated that each alternative can be implemented while maintaining operation of the existing facility. However, significant differences exist regarding staging requirements, operational complexity, temporary bypass requirements, site congestion, construction sequencing challenges, and overall implementation risk.

Detailed constructability narratives developed for Alternatives A11.3 and A14.2 are included in Appendix D and should be utilized as reference information during future procurement and preliminary engineering activities.

6.3.3 Construction Sequencing Considerations

Construction sequencing evaluations demonstrated that future implementation should be carefully coordinated to maintain uninterrupted wastewater treatment operations and regulatory compliance. Sequencing concepts varied significantly among the alternatives evaluated and were strongly influenced by site utilization requirements, process conversions, hydraulic constraints, and treatment plant operational considerations.

Detailed sequencing concepts developed during the Technical Refinement Phase are included in Appendix D and provide planning-level guidance regarding major implementation milestones and operational transitions.

6.3.4 Site Utilization Considerations

Site utilization evaluations identified significant differences in the physical footprint and property requirements associated with the alternatives evaluated.
In general:

- Alternative A14.2 provided the most efficient utilization of the existing site and eliminated reliance on adjacent property.
- Alternative A11.3 required additional site development but provided favorable constructability and future flexibility.
- Alternative A15 required the greatest site area and the largest long-term development footprint.

Detailed implementation evaluations are provided in the Appendices of this Section 6 and should be considered during future procurement, permitting, and preliminary engineering activities.

6.3.5 Capital Planning Philosophy

The Facility Planning process demonstrated that future investments should focus on both rehabilitation of existing infrastructure and expansion of treatment capacity.

Several improvements were identified as beneficial regardless of the ultimate treatment alternative selected, including:

- Completion of ongoing headworks improvements.
- Completed effluent filter rehabilitation.
- Completion of biosolids thickening improvements.

- Grit removal improvements.
- Clarifier rehabilitation.
- Reuse water system improvements.
- Electrical and instrumentation modernization.

These projects represent foundational investments that improve reliability and support future expansion regardless of the treatment process ultimately implemented.

6.3.6 Trigger-Based Implementation Guidance

Population and Flow Projections developed under TM No. 2 established recommended planning trigger criteria of approximately:

- 29.2 MGD ADF
- 36.5 MGD MMF

These values represent the point at which planning, permitting, procurement, design, and implementation activities should be actively progressing to ensure sufficient treatment capacity remains available before permit limitations are encountered.

Future implementation planning should continue to monitor:

- Average daily flow trends.
- Maximum month flow trends.
- Intergovernmental contributions.
- South Cobb Tunnel operating conditions.
- Regulatory developments.
- Future nutrient management requirements.

6.3.7 Relationship to Progressive Design-Build Procurement

This Facility Plan is intended to serve as a planning framework supporting future project delivery activities. The intent of this report is not to prescribe the final means, methods, or treatment configuration that must be implemented. Rather, the report establishes the technical findings, regulatory assumptions, alternatives evaluations, implementation concepts, and planning objectives that should guide subsequent phases of project development.

Future Progressive Design-Build procurement activities should utilize:

- The Regulatory Planning Basis established in Section 3.
- The Process Modeling and Alternatives Evaluation Basis established in Section 4.
- The alternatives refinement findings documented in Section 5.
- The implementation planning framework established herein.

Together these elements provide a comprehensive planning foundation while preserving sufficient flexibility for future optimization, innovation, constructability improvements, and regulatory adaptation during project delivery.

6.4 Recommended Next Steps

The Facility Planning effort has established a comprehensive planning framework for expansion of the SCWRF from its current permitted 40 MGD MMF capacity to 50 MGD MMF while simultaneously addressing aging infrastructure, operational reliability, future nutrient removal requirements, and long-term regulatory compliance needs. Consistent with the

findings of Sections 2 through 6, the next phase of project development should focus on advancing the planning concepts documented herein into permitting, procurement, and preliminary engineering activities while preserving sufficient flexibility to accommodate future regulatory and operational considerations.

6.4.1 Complete Ongoing Capital Improvements

Several major projects are currently underway or in advanced stages of development and should remain a priority for CCWS. These projects address critical reliability and performance concerns identified during the facility assessments and form an important foundation for future expansion activities. These projects include:

- ILS Recovery and Roller Gates Restoration (T5004)
- ILS HVAC Systems Replacement (T3026)
- SCWRF Headworks Improvements (T3017)
- Secondary Clarifier Rehabilitations (T3028)
- SCWRF Effluent Filter Rehabilitation (T3023)
- SCWRF Biosolids Thickening Improvements (T3027)

Completion of these projects will improve facility reliability, reduce maintenance demands, and strengthen the operational baseline upon which future expansion improvements will be developed.

6.4.2 Initiate Future Permitting Activities

The November 2025 WLA established the regulatory pathway necessary to support future expansion of the SCWRF to 50 MGD MMF. Future project development should therefore include advancement of the permitting activities identified by Georgia EPD, including:

- Antidegradation Analysis preparation.
- Environmental Information Document (EID) development.
- Design Development Report (DDR) preparation.
- Watershed Protection Plan (WPP) review and updates, as required.

Coordination with EPD regarding future permit modification requirements.
Advancement of these permitting activities should occur early in the project delivery process to reduce schedule risk and support future procurement efforts.

6.4.3 Advance Progressive Design-Build Procurement

The alternatives evaluation process confirmed that multiple technically viable treatment pathways exist for achieving the long-term objectives established by this Facility Plan. Accordingly, future procurement efforts should focus on utilizing this Facility Plan as the basis for Progressive Design-Build (PDB) procurement activities, allowing the selected Design-Builder to further refine treatment configurations, implementation sequencing, constructability considerations, and lifecycle optimization opportunities.

Specific attention should be given to:

- Treatment performance requirements.
- Regulatory compliance objectives.
- Future nutrient removal flexibility.
- Constructability considerations.
- Site utilization constraints.

- Operational continuity requirements.
- Long-term lifecycle cost considerations.

This approach allows CCWS to capitalize on innovation and optimization opportunities while remaining consistent with the planning conclusions documented throughout this Facility Plan.

6.4.4 Utilize Primary Alternatives as the Basis for Future Development

The Alternative Advancement Framework established Alternatives A11.3 and A14.2 as the Primary Alternatives for continued refinement. Both alternatives demonstrated the ability to satisfy the planning objectives established for the SCWRF expansion and should therefore form the basis for future project development activities.

Future preliminary engineering and procurement efforts should continue to evaluate:

- Conventional treatment approaches represented by Alternative A11.3.
- Membrane-based treatment approaches represented by Alternative A14.2.

The final treatment configuration should ultimately be selected based upon permitting outcomes, procurement results, constructability considerations, lifecycle cost evaluations, and CCWS operational objectives.

6.4.5 Continue Monitoring Flow Triggers and Regulatory Developments

Population and flow projections indicate that facility planning activities should remain closely aligned with the trigger criteria established in TM No. 2. As implementation progresses, CCWS should continue monitoring:

- Average Daily Flow (ADF).
- Maximum Month Flow (MMF).
- Intergovernmental flow contributions.
- South Cobb Tunnel operating conditions.
- Future land use and development trends.
- Future nutrient management initiatives.
- EPD regulatory developments.

Continued monitoring of these factors will allow future planning assumptions and implementation schedules to be periodically refined as new information becomes available.

6.4.6 Periodically Update the Facility Plan

The SCWRF Facility Plan should be viewed as a living planning document rather than a fixed design report. Future updates should be considered as additional information becomes available regarding:

- Regulatory requirements.
- Population and flow trends.
- Facility performance.
- Nutrient management policies.
- Project implementation status.
- Procurement outcomes.

Periodic updates will help ensure that long-term planning objectives remain aligned with actual system needs and future regulatory requirements.

6.4.7 Summary

Based on the evaluations completed during this Facility Planning effort, CCWS is well-positioned to move forward with expansion planning for the SCWRF. The recommended path forward is to complete currently active capital projects, advance permitting efforts, utilize the findings of this Facility Plan to support Progressive Design-Build procurement, and continue refinement of the treatment approaches represented by Alternatives A11.3 and A14.2. This approach provides a balanced strategy that supports future capacity expansion, maintains operational reliability, preserves regulatory flexibility, and positions CCWS to respond effectively to future nutrient compliance requirements through at least the year 2050.

6.5 Capital Planning Framework

6.5.1 Overview

The SCWRF expansion program represents a long-term capital investment strategy intended to address projected flow growth, aging infrastructure, operational reliability concerns, and future regulatory compliance requirements. As documented throughout this Facility Plan, future capital expenditures should not be viewed as a single expansion project, but rather as a coordinated series of rehabilitation, replacement, capacity expansion, and regulatory compliance initiatives implemented over multiple planning horizons. Future nutrient compliance projects may include additional biological, physical, chemical, membrane-based, filtration-based, or other nutrient removal technologies as determined during future project development.

The purpose of the Capital Planning Framework is to establish a strategic structure for future investment decisions while preserving flexibility for future permitting activities, project delivery approaches, and evolving regulatory requirements. Accordingly, the capital planning concepts presented herein are intended to support budgeting, prioritization, procurement planning, and long-range capital improvement programming rather than establish project-specific funding commitments.

6.5.2 Capital Investment Categories

Capital investments discussed in this section are planning-level projections intended to support long-range capital planning and future procurement activities. Actual project scope, sequencing, and costs should be refined during subsequent phases of preliminary engineering, permitting, and Progressive Design-Build project development.
The evaluations completed during development of this Facility Plan indicate that future capital investments generally fall into four major categories:

Facility Rehabilitation

Facility rehabilitation projects address aging infrastructure, equipment nearing or exceeding useful life, and systems that have been identified as reliability concerns through previous facility assessments. These projects generally provide benefits regardless of the treatment alternative ultimately implemented and are expected to remain necessary even if future flow growth occurs at a slower pace than currently projected.
Representative rehabilitation projects include:

- Grit removal improvements.

- Primary clarification rehabilitation.
- Secondary clarification rehabilitation.
- Reuse water system improvements.
- Electrical upgrades.
- Instrumentation and control system modernization.
- Structural rehabilitation and reliability improvements.

Capacity Expansion

Capacity expansion projects are required to support future growth within the South Cobb service area and provide treatment capacity for expansion from 40 MGD MMF to 50 MGD MMF. These projects represent the primary driver underlying development of the Facility Plan and will likely constitute the largest capital investment category within the planning horizon.

Representative expansion projects include:

- Additional biological treatment facilities.
- Additional solids separation facilities.
- Membrane treatment facilities or secondary clarification facilities.
- Influent and effluent hydraulic improvements.
- Disinfection improvements.
- Associated utility and site infrastructure improvements.

Regulatory Compliance Improvements

Regulatory compliance projects are intended to support achievement of the WLA objectives and provide flexibility for future nutrient management requirements. Although the timing and configuration of these improvements will ultimately depend upon future permitting decisions, the Facility Planning effort demonstrated that future nutrient compliance must remain a central consideration in long-term capital planning.

Representative regulatory projects may include:

- Nutrient removal enhancements.
- Additional phosphorus reduction facilities.
- Future Total Nitrogen compliance improvements.
- Process optimization upgrades.
- Supplemental chemical facilities.
- Future treatment process refinements.

Reliability and Resiliency Improvements

Reliability improvements focus on reducing operational risk, minimizing maintenance demands, improving redundancy, and ensuring long-term operational continuity. These projects often provide significant lifecycle value despite representing a relatively small percentage of total capital expenditures.

Representative improvements include:

- Pumping system upgrades.
- Redundancy enhancements.
- Control system modernization.
- Emergency power improvements.
- Reliability-based equipment replacement.
- Operational flexibility improvements.

Capital Planning Framework Summary

Capital Category	Primary Objective	Typical Project Examples
Rehabilitation	Preserve existing infrastructure and reduce maintenance demands	Clarifiers, grit removal, reuse water system, electrical and I&C upgrades
Capacity Expansion	Increase treatment capacity to 50 MGD MMF	Biological treatment, solids separation, disinfection, hydraulic improvements
Regulatory Compliance	Support WLA requirements and future nutrient regulations	Nutrient removal, phosphorus reduction, future TN compliance projects
Reliability and Resiliency	Improve operational continuity and reduce risk	Redundancy, pumping improvements, controls modernization, emergency systems

Table 6.5-1
Capital Planning Framework Summary

6.5.3 Planning-Level Cost Considerations

Planning-level cost estimates prepared during the Facility Planning process demonstrate that future investments associated with rehabilitation, expansion, and regulatory compliance will represent a significant long-term commitment by CCWS. However, the evaluations further demonstrated that implementation of improvements through phased investment strategies can help distribute expenditure over time while maintaining alignment with actual facility needs and regulatory requirements.
The alternatives evaluation process also demonstrated that substantial differences exist between alternatives with respect to:

- Initial capital cost.
- Site development requirements.
- Constructability complexity.
- Operational costs.
- Lifecycle replacement requirements.
- Long-term regulatory flexibility.

For this reason, future capital decisions should not be based solely on construction cost. Instead, total lifecycle value, implementation risk, constructability, regulatory flexibility, operational complexity, and long-term reliability should all be considered during future procurement and project development activities.

6.5.4 Relationship to Future Capital Improvement Programs

The Capital Planning Framework established by this Facility Plan should serve as the foundation for future Capital Improvement Program (CIP) development efforts. Future CIP updates should periodically reassess:

- Actual flow growth.
- Facility operating performance.

- Regulatory developments.
- Capital project status.
- Funding availability.
- Future nutrient management initiatives.
- Procurement outcomes and implementation lessons learned.

Periodic review and refinement of the CIP will help ensure that investments remain aligned with actual facility needs and long-term planning objectives while maintaining flexibility to respond to changing conditions.

6.5.5 Capital Planning Philosophy

The central capital planning philosophy established through this Facility Plan is that future investments should be driven by need, timing, and regulatory requirements rather than implementation of a single comprehensive construction program. The combination of trigger-based planning, phased implementation, and progressive project delivery methods provides CCWS with the flexibility necessary to address future growth and regulatory change while maintaining prudent stewardship of public resources.

Accordingly, this Facility Plan recommends that future capital investments be structured around phased implementation strategies that combine rehabilitation, reliability improvements, regulatory compliance initiatives, and capacity expansion projects into a coordinated long-term program supporting operation of the SCWRF through at least the year 2050.

The implementation and capital planning concepts presented in this section are intended to provide a roadmap for future decision-making and procurement activities. These recommendations should not be interpreted as design requirements, but rather as planning guidance developed from the facility assessments, regulatory evaluations, process modeling efforts, alternatives analyses, and stakeholder reviews completed during development of this Facility Plan.

APPENDICES

Appendix 6 – Implementation and Capital Planning Framework

Appendix C – Tiered Implementation Strategies

Appendix C.1 Alternative A11.3 Tiered Implementation Strategy
Appendix C.2 Alternative A14.1 Tiered Implementation Strategy
Appendix C.3 Alternative A14.2 Tiered Implementation Strategy
Appendix C.4 Alternative A15 Tiered Implementation Strategy

Appendix D – Constructability Narratives

Appendix D.1 Alternative A11.3 Constructability Narrative
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Appendix E – Construction Sequencing Evaluations

Appendix E.1 Alternative A11.3 Construct Sequencing Concept
Appendix E.2 Alternative A14.1 Construct Sequencing Concept
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Appendix F – Site Utilization Evaluations

Appendix F.1 Alternative A11.3 Site Utilization Impact Statement
Appendix F.2 Alternative A14.1 Site Utilization Impact Statement
Appendix F.3 Alternative A14.2 Site Utilization Impact Statement
Appendix F.4 Alternative A15 Site Utilization Impact Statement

Appendix G – Planning Level Cost Information

Appendix G.1 Alternative A11.3 Planning Level Cost Estimate
Appendix G.2 A14.2 Planning Level Cost Estimate
Appendix G.3 Alternative A15 Planning Level Cost Estimate

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SECTION 7

CONCLUSIONS AND RECOMMENDATIONS

7.1 Key Findings

Development of this Facility Plan confirmed that expansion of the SCWRF from its current permitted 40 MGD MMF capacity to 50 MGD MMF is necessary to support projected wastewater demands within the South Cobb service area and associated intergovernmental service agreements. Population and flow projections indicate that expansion planning should continue proactively to maintain adequate treatment capacity and implementation flexibility throughout the planning horizon.

The evaluations completed as part of this planning effort further confirmed that future facility development must address both capacity expansion and aging infrastructure. Existing limitations associated with grit removal, primary clarification, secondary clarification, solids handling systems, reuse water infrastructure, and selected electrical and instrumentation systems remain important drivers for future capital improvements independent of the treatment alternative ultimately selected.

A significant finding of the Facility Planning effort was the impact of the November 2025 WLA on future facility development. The WLA established planning-level treatment objectives that are substantially more stringent than those contained within the current NPDES permit and introduced future Total Nitrogen planning considerations that expanded the scope of the evaluation beyond a conventional capacity expansion study.

The alternatives evaluation process demonstrated that multiple treatment strategies are technically capable of supporting expansion to 50 MGD MMF while satisfying the treatment objectives established for this Facility Plan. However, significant differences exist among alternatives with respect to constructability, implementation flexibility, site utilization, capital cost, lifecycle cost, and long-term regulatory adaptability.

Following alternatives screening, refinement, and stakeholder review, Alternatives A11.3

and A14.2 were advanced as the Primary Alternatives for continued evaluation. These alternatives emerged as the most favorable treatment strategies when considering the complete range of technical, regulatory, operational, implementation, and financial factors evaluated during the planning process.

Collectively, the evaluations completed during the Facility Planning effort demonstrated that future success at the SCWRF will depend on balancing capacity expansion, infrastructure rehabilitation, regulatory compliance, and implementation flexibility rather than focusing on any single project objective.

7.2 Recommendations

The recommendations below are based on the findings throughout this Facility Plan and are based on the current ongoing projects:

- ILS Recovery and Roller Gates Restoration (T5004)
- ILS HVAC Systems Replacement (T3026)
- SCWRF Headworks Improvements (T3017)
- Secondary Clarifier Rehabilitations (T3028)
- SCWRF Effluent Filter Rehabilitation (T3023)
- SCWRF Biosolids Thickening Improvements (T3027)

The recommendations are as follows:

- **Recommendation 1**
  Continue advancement of facility expansion planning based on expansion of the SCWRF to 50 MGD MMF. Future project development should continue to utilize the regulatory assumptions established by the WLA and the future nutrient planning assumptions documented within this Facility Plan.
- **Recommendation 2**
  Complete and place into service all currently active reliability and rehabilitation projects, including headworks improvements, effluent filter rehabilitation, and biosolids thickening improvements. These projects establish a strong operational baseline for future expansion activities.
- **Recommendation 3**
  Initiate future permitting activities identified by Georgia EPD, including the Antidegradation Analysis, Environmental Information Document (EID), DDR, and Watershed Protection Plan evaluations required to support future permit modification activities. Future nutrient removal technology selection should be validated through future permitting, preliminary engineering, and Progressive Design-Build project development activities.
- **Recommendation 4**
  Utilize this Facility Plan as the primary planning document supporting future Progressive Design-Build procurement activities. Future project development should continue refinement of the treatment approaches represented by Alternatives A11.3 and A14.2, which emerged as the Primary Alternatives through the Alternative Advancement Framework established during the Technical Refinement Phase, while preserving flexibility to optimize the final treatment configuration during subsequent phases of project development.
- **Recommendation 5**
  Maintain continued monitoring of flow triggers, regulatory developments,

operational performance, and watershed management requirements. Future implementation activities should remain aligned with the planning trigger criteria established under TM No. 2 and should be periodically updated as new information becomes available.

7.3 Future Planning Considerations

This Facility Plan should be considered a living planning document. Future updates should be performed periodically to reflect changes in flow conditions, regulatory requirements, operational experience, nutrient management initiatives, and future capital improvement activities. As additional information becomes available through permitting, procurement, preliminary engineering, and facility operation, the planning assumptions and implementation strategies documented herein should be reassessed to ensure continued alignment with CCWS objectives.

Future planning efforts should continue to emphasize:

- Regulatory compliance and nutrient management flexibility.
- Operational reliability and maintainability.
- Strategic phased implementation.
- Long-term lifecycle value.
- Capital investment efficiency.
- Protection of the Chattahoochee River watershed.

These planning considerations should remain central regardless of the project delivery method ultimately utilized and should continue to guide future decision-making through permitting, procurement, design, construction, and operation of the expanded facility.

7.4 Closing Statement

The SCWRF has served as a critical component of the Cobb County Water System for more than six decades and will continue to play an essential role in supporting future wastewater treatment needs throughout the region. The evaluations completed during this Facility Planning effort demonstrate that multiple technically viable pathways exist for achieving future treatment objectives while maintaining operational reliability and regulatory compliance. Through continued implementation of the planning framework, phased capital improvements, and future permitting and procurement activities outlined herein, CCWS is well-positioned to successfully expand the SCWRF to 50 MGD MMF and sustain reliable service to its customers through at least the year 2050.

Through implementation of the planning framework, regulatory strategy, phased capital investments, and procurement guidance established herein, CCWS is well-positioned to successfully expand the SCWRF to 50 MGD MMF while maintaining operational reliability, regulatory compliance, and long-term flexibility in support of future wastewater treatment needs throughout the region.

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APPENDICES

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SECTION 5

APPENDIX B

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COST SUMMARY TABLE							
Alternative No.	Alternative Description	Sub-Total Construction Cost	Total Construction Cost *	Engineering Cost	Total CAPEX	30-year PV Cost	TOTAL COST (Cap EX + 30 Yr PV)
A9	50 mgd 2 stg Clar Onsite	$232,577,219.74	$284,492,663.69	$17,069,559.82	$301,562,223.51	$51,395,268.52	$352,957,492.04
A10.1	50 mgd 3 Stg Clar Onsite	$260,347,219.74	$317,816,663.69	$19,068,999.82	$336,885,663.51	$46,658,403.59	$383,544,067.10
A10.2	50 mgd 3 Stg Clar Onsite & Offsite	$288,917,427.70	$352,100,913.24	$21,126,054.79	$373,226,968.04	$46,658,403.59	$419,885,371.63
A11.1	50 mgd 4 Stg Clar Onsite & Offsite	$258,209,719.74	$315,251,663.69	$18,915,099.82	$334,166,763.51	$48,111,005.43	$382,277,768.94
A11.2	51 mgd 4 Stg Clar Onsite & Offsite	$259,049,719.74	$316,259,663.69	$18,975,579.82	$335,235,243.51	$48,111,005.43	$383,346,248.94
A11.3	50 mgd 4 Stg Clar Offsite	$288,787,500.00	$351,945,000.00	$21,116,700.00	$373,061,700.00	$48,111,005.43	$421,172,705.43
A12	50 mgd 5 Stg Clar Onsite & Offsite	$268,559,719.74	$327,671,663.69	$19,660,299.82	$347,331,963.51	$44,985,679.60	$392,317,643.11
A13	50 mgd 3 Stg MBR Onsite	$222,640,000.00	$272,568,000.00	$16,354,080.00	$288,922,080.00	$55,339,439.59	$344,261,519.59
A14	50 mgd 5 Stg MBR Onsite	$236,665,001.00	$289,398,001.20	$17,363,880.07	$306,761,881.27	$54,854,540.63	$361,616,421.90
A15	50 mgd 5 Stg Clar Offsite	$307,477,500.00	$374,373,000.00	$22,462,380.00	$396,835,380.00	$44,985,679.60	$441,821,059.60
	Maximum	$307,477,500.00	$374,373,000.00	$22,462,380.00	$396,835,380.00	$55,339,439.59	$441,821,059.60
	Minimum	$222,640,000.00	$272,568,000.00	$16,354,080.00	$288,922,080.00	$44,985,679.60	$344,261,519.59
	Difference	$84,837,500.00	$101,805,000.00	$6,108,300.00	$107,913,300.00	$10,353,759.99	$97,559,540.01
	Average	$262,323,102.74	$320,187,723.29	$19,211,263.40	$339,398,986.69	$48,921,043.14	$388,320,029.83

NOTE: *Cost estimates are presented without contingency for comparative planning purposes. Refer to the Executive Summary for recommended application of contingency and future budgeting considerations.*

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Process	Required Volumes (MG)						SWD (ft)	Required Surface Area (SF)						BNR Trains			
	Anaerobic	Pre-Anoxic	Aeration	Post-Anoxic	Re-Aeration	Total		Anaerobic	Pre-Anoxic	Aeration	Post-Anoxic	Re-Aeration	Total	Number	Length	Width	
5-Stage	2,083,333	6,250,000	14,583,333	4,687,500	1,041,667	**28,645,833**	24	11,752	35,256	82,263	26,442	5,876	**161,589**				
4-Stage	-	6,250,000	14,583,333	4,687,500	1,041,667	**26,562,500**	24	-	35,256	82,263	26,442	5,876	**149,837**				
3-Stage	2,083,333	3,125,000	22,000,000	-	-	**27,208,333**	24	11,752	17,628	124,100	-	-	**153,480**				
2-Stage	-	3,125,000	20,500,000	-	-	**23,625,000**	24	-	17,628	115,639	-	-	**133,267**				
4-Stage w/ Membranes		3,125,000	6,250,000	2,083,333	900,000	**12,358,333**	24	-	17,628	35,256	11,752	5,077	**69,712**				
5-Stage w/ Membranes	1,041,667	3,125,000	6,250,000	2,083,333	900,000	**13,400,000**	24	5,876	17,628	35,256	11,752	5,077	**75,588**				

Alternative A9 2-Stage BNR Process																	
Existing Aeration Basins	-	-	10,035,927	-	-	10,035,927	24	-	-	56,612	-	-	423,457	5	55	208	10,035,927
New South BNR Basins	-	3,125,000	10,464,073	-	-	13,589,073	24	-	17,628	59,027	-	-	583,440	6	52	250	13,827,528
New North BNR Basins	-	-	-	-	-	-	24	-	-	-	-	-	-				-
Total	-	3,125,000	20,500,000	-	-	23,625,000	24	-	17,628	115,639	-	-	1,006,897				23,863,455
Alternative A10.1 3-Stage BNR Process																	
Existing Aeration Basins	-	-	10,035,927	-	-	10,035,927	24	-	-	56,612	-	-	423,457	5	55	208	10,035,927
New South BNR Basins	-	1,300,000	11,964,073	-	-	13,264,073	24	-	7,333	67,488	-	-	561,000	6	50	250	13,295,700
New North BNR Basins	2,083,333	1,825,000	-	-	-	3,908,333	24	11,752	10,295	-	-	-	164,560	2	50	220	3,900,072
Total	2,083,333	3,125,000	22,000,000	-	-	27,208,333	24	11,752	17,628	124,100	-	-	1,149,017				27,231,699
Alternative A10.2 3-Stage BNR Process																	
Existing Aeration Basins	-	-	10,035,927	-	-	10,035,927	24	-	-	56,612	-	-	423,457	5	55	208	10,035,927
New South BNR Basins	-	-	-	-	-	-	24	-	-	-	-	-	-				-
New North BNR Basins	2,083,333	3,125,000	11,964,073	-	-	17,172,407	24	11,752	17,628	67,488	-	-	733,040	8	50	245	17,373,048
Total	2,083,333	3,125,000	22,000,000	-	-	27,208,333	24	11,752	17,628	124,100	-	-	1,156,497				27,408,975
Alternative A11.1 4-Stage BNR Process - Existing, New North, and New South Basins																	-
Existing Aeration Basins	-		4,306,760	4,687,500	1,041,667	10,035,927	24	-	-	24,294	26,442	5,876	423,457	5	55	208	10,035,927
New South BNR Basins	-	3,019,127	10,276,573	-	-	13,295,700	24	-	17,031	57,969	-	-	561,000	6	50	250	13,295,700
New North BNR Basins	-	3,230,873	-	-	-	3,230,873	24	-	18,225	-	-	-	138,380	2	50	185	3,279,606
Total	-	6,250,000	14,583,333	4,687,500	1,041,667	26,562,500	24	-	35,256	82,263	26,442	5,876	1,122,837				26,611,233
Alternative A11.2 4-Stage BNR Process - Existing and New North Basins																	-
Existing Aeration Basins	-	-	4,306,760	4,687,500	1,041,667	10,035,927	24	-	-	24,294	26,442	5,876	423,457	5	55	208	10,035,927
New South BNR Basins	-	-	-	-	-	-	24	-	-	-	-	-	-	-	-	-	-
New North BNR Basins	-	6,250,000	10,276,573	-	-	16,526,573	24	-	35,256	57,969	-	-	703,120	8	50	235	16,663,944
Total	-	6,250,000	14,583,333	4,687,500	1,041,667	26,562,500	24	-	35,256	82,263	26,442	5,876	1,126,577				26,699,871
Alternative A11.3 4-Stage BNR Process - New North Basins Only																	
Existing Aeration Basins	-	-	-	-	-	-	24	-	-	-	-	-	-	-	-	-	-
New South BNR Basins	-	-	-	-	-	-	24	-	-	-	-	-	-	-	-	-	-
New North BNR Basins	-	6,250,000	14,583,333	4,687,500	1,041,667	26,562,500	24	-	35,256	82,263	26,442	5,876	1,122,000	12	50	250	26,591,400
Total	-	6,250,000	14,583,333	4,687,500	1,041,667	26,562,500	24	-	35,256	82,263	26,442	5,876	1,122,000				26,591,400
Alternative A12 5-Stage BNR Process																	
Existing Aeration Basins	-	-	4,306,760	4,687,500	1,041,667	10,035,927	24	-	-	24,294	26,442	5,876	423,457	5	55	208	10,035,927
New South BNR Basins	-	-	-	-	-	-	24	-	-	57,969	-	-	-	-	-	-	-
New North BNR Basins	2,083,333	6,250,000	10,276,573	-	-	18,609,907	24	11,752	35,256	#REF!	-	-	785,400	10	50	210	18,613,980
Total	2,083,333	6,250,000	14,583,333	4,687,500	1,041,667	28,645,833	24	11,752	35,256	#REF!	26,442	5,876	1,208,857				28,649,907
Alternative A13 4-Stage BNR Process with Tertiary Membranes																	
Existing Aeration Basins	-	-	7,052,594	2,083,333	900,000	10,035,927	24	-	-	39,783	11,752	5,077	423,457	5	55	208	10,035,927
New South BNR Basins	-	3,125,000	-	-	-	3,125,000	24	-	17,628	-	-	-	138,380	2	50	185	3,279,606
New North BNR Basins	-	-	-	-	-	-	24	-	-	-	-	-	-	-	-	-	-
Total	-	3,125,000	7,052,594	2,083,333	900,000	13,160,927	24	-	17,628	39,783	11,752	5,077	561,837				13,315,533
Alternative A14 5-Stage BNR Process with Tertiary Membranes																	
Existing Aeration Basins	-	-	7,052,594	2,083,333	900,000	10,035,927	24	-	-	39,783	11,752	5,077	423,457	5	55	208	10,035,927
New South BNR Basins	1,041,667	3,125,000	-	-	-	4,166,667	24	5,876	17,628	-	-	-	179,296	2	51	235	4,249,306
New North BNR Basins	-	-	-	-	-	-	24	-	-	-	-	-	-	-	-	-	-
Total	1,041,667	3,125,000	7,052,594	2,083,333	900,000	14,202,594	24	5,876	17,628	39,783	11,752	5,077	602,752				14,285,232
Alternative A15 5-Stage BNR Process																	
Existing Aeration Basins	-	-	-	-	-	-	24	-	-	-	-	-	-	-	-	-	-
New South BNR Basins	-	-	-	-	-	-	24	-	-	-	-	-	-	-	-	-	-
New North BNR Basins	2,083,333	6,250,000	14,583,333	4,687,500	1,041,667	28,645,833	24	11,752	35,256	82,263	26,442	5,876	1,230,460	14	50	235	29,161,902
Total	2,083,333	6,250,000	14,583,333	4,687,500	1,041,667	28,645,833	24	11,752	35,256	82,263	26,442	5,876	1,230,460				29,161,902

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		Existing System with Improvements		A9	A10	A11	A12	A13	A14
Notes	Permit WLA	Existing System with Primary Clarifier Improvements, Filters On-line, & RDT	Existing System Expanded	MLE 2-Stage BardenphoProcess with Secondary Clarifiers	3-Stage Bardenpho process	4-Stage Bardenpho process	5-Stage Bardenpho process	4-Stage Bardenpho process MBR conversion	5-Stage Bardenpho process MBR conversion
Primary Clarifiers		5 online @ 50% TSS removal - PS to 2%	3 New Rectangular	5 New 110' Diameter	5 New 110' Diameter	5 New 110' Diameter	5 New 110' Diameter	5 New 110' Diameter	5 New 110' Diameter
Aeration Basins		5 online @ DO 1.5 mg/l	Expanded Aeration (20 MG Total)	2-stage BNR (23.625 MG)	3-stage BNR (27.21 MG)	4-stage BNR (26.56 MG)	5-stage BNR (28.65 MG)	5-stage MBR (12.4 MG)	5-stage MBR (13.4 MG)
Secondary Clarifiers		5 online	5 Existing & 3 New 150' Diameter	5 Existing & 3 New 150' Diameter	5 Existing & 3 New 150' Diameter	5 Existing & 3 New 150' Diameter	5 Existing & 3 New 150' Diameter	None	None
MBR		None	None	None	None	None	None	125 Cassettes	125 Cassettes
Thickening		RDT - WAS to 5%	RDT - WAS Only	RDT - WAS Only	RDT - WAS Only	RDT - WAS Only	RDT - WAS Only	RDT - WAS Only	RDT - WAS Only
Influent									
Total Flow (MGD)	**50.00**	**35.00**	**50.00**	**50.00**	**50.00**	**50.00**	**50.00**	**50.00**	**50.00**
CBOD5 (mg/l)		225	300	300	300	300	300	300	300
COD (mg/l)		675	900	900	900	900	900	900	900
TSS (mg/l)		280	300	300	300	300	300	300	300
VSS (mg/l)		238	255	255	255	255	255	255	255
TKN (mg/l)		55	60	60	60	60	60	60	60
Ammonia (mg/l)		36	39	39	39	39	39	39	39
TP (mg/l)		8	9	9	9	9	9	9	9
pH		7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1
Alkalinity (mg/l)		250	250	250	250	250	250	250	250
Temp (deg-C)		22	22	22	22	22	22	22	22
Chemical Feed									
Ferrous Chloride		2,600 lb Fe	0	0	0	0	0	0	0
Lime		19,600 lb Ca	15,021 lb Ca	0	0	0	0	0	0
Effluent									
CBOD5 (mg/l)	2.9	2.6	2.2	1.8	1.7	1.7	1.8	1.3	1.5
TSS (mg/l)	5.0	4.0	2.9	2.8	2.8	2.8	2.8	1.2	1.2
Ammonia (mg/l)	0.50	0.70	0.50	0.50	0.50	0.32	0.37	0.28	0.35
Nitrate (mg/l)		16.1	13.4	3.5	3.6	0.6	0.6	0.8	0.7
TN (mg/l)	(Future 4.0 - Design 3.0)	19.0	16.1	6.1	6.3	2.9	3.0	2.9	3.0
TP (mg/l)	0.3 (Future 0.13 - Design 0.10)	0.3	0.7	0.58	0.35	0.27	0.10	0.12	0.04
pH		7.0	6.8	6.7	6.7	6.7	6.7	6.8	6.8
Alkalinity (mg/l)		232	168	113	113	123	123	122	122
Chemical Feed Costs									
Alum (gals/Yr)				590	250	170	-	20	-
Alum ($/day)				$ 1,281.02	$ 542.10	$ 368.63	$ -	$ 43.37	$ -
Alum ($/Yr)				$ 467,574	$ 197,867	$ 134,549	$ -	$ 15,829	$ -
Lime (Tons/Yr)				$ -	$ -	$ -	$ -	$ -	$ -
Lime ($/day)				$ -	$ -	$ -	$ -	$ -	$ -
Lime ($/Yr)				$ -	$ -	$ -	$ -	$ -	$ -
Supplimental Carbon (gals/Yr)				$ 66,757	$ 80,108	$ -	$ -	$ -	$ -
Supplimental Carbon ($/day)				$ 256	$ 307	$ -	$ -	$ -	$ -
Supplimental Carbon ($/Yr)				$ 93,459	$ 112,151	$ -	$ -	$ -	$ -
Total Annual Chemical Costs				**$ 561,033**	**$ 310,018**	**$ 134,549**	**$ -**	**$ 15,829**	**$ -**
Air Requirements									
Aeration Total Standard Oxygen Transfer Rate (lb/day)		165,080	309,542	298,699	305,750	281,750	279,751	273,884	273,068
Aeration Air (scfm)		19,240	39,695	47,326	47,943	47,495	47,085	55,259	55,059
Re-Aeration Standard Oxygen Transfer Rate (lb/day)						15,959	16,059		
Re-Aeration Air (scfm)						6,565	6,606		
Total Process Air (scfm)		19,240	39,695	47,326	47,943	54,060	53,691	55,259	55,059
Blower Efficiency (%)				75%	75%	75%	75%	75%	75%
Aeration Basin Blower Discharge (psi)				11.7	11.7	11.7	11.7	11.7	11.7
Aeration Blower Total Energy (BHp)				3,219	3,261	3,677	3,652	3,758	3,745
MBR Air (scfm)								19,303	19,334
MBR Basin Blower Discharge (psi)				6.3	6.3	6.3	6.3	6.3	6.3
MBR Blower Total Energy (BHp)				0	0	0	0	707	708
Total Blower Horsepower (BHP)				3,219	3,261	3,677	3,652	4,465	4,453
Power Cost per kW-Hr ($/kW-Hr)				$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09
Annual Blower Power Costs ($/Yr)				**$ 1,894,512**	**$ 1,919,211**	**$ 2,164,081**	**$ 2,149,310**	**$ 2,628,159**	**$ 2,620,821**
Solids									
Aeration SRT (days)		4.7	6.1	7.3	7.8	5.2	5.2	4.5	4.5
Total BNR SRT (days)		4.7	6.1	8.1	9.7	9.5	10.2	8.9	9.7
MLSS (mg/l)		3,900	4,015	3,769	3,758	3,816	3,834	8,077	8,067
Primary Clarifier SLR (lb/sft/day)		3	3	3	3	3	3	3	3
Primary Clarifier SOR (gal/sft/day)		1,180	1,058	1,086	1,086	1,086	1,086	1,070	1,070
Secondary Clarifier 1-5 SLR (lb/sft/day)		26	25	22	22	23	23	--	--
Secondary Clarifier 1-5 SOR (gal/sft/day)		500	433	398	398	398	398	--	--
Secondary Clarifier 6-8 SLR (lb/sft/day)		--	22	22	22	23	23	--	--
Secondary Clarifier 6-8 SOR (gal/sft/day)		--	380	427	427	427	427	--	--
RAS Flow (MGD)		21.00	36.10	36.30	36.30	36.30	36.30	99	99
IR (MGD)		--	--	175	175	175	175	175	175
Primary Sludge (lb/d)		47,048	71,254	84,628	84,647	84,691	84,756	82,716	82,751
WAS (lb/day)		69,690	109,780	88,327	88,064	89,434	89,847	92,963	92,846
WAS Concentration (mg/l)		10,440	9,396	8,820	8,794	8,930	8,972	12,108	12,093
WAS Flow (MGD)		0.80	1.40	1.20	1.20	1.20	1.20	0.92	0.92
Solids to Sludge Holding (lb/d)		113,255	175,545	168,538	168,308	169,653	170,111	171,032	170,955
Dewatered Solids (lb/d)		100,958	156,545	150,250	151,131	150,980	152,597	152,273	153,492
Dewatered % Solids		20%	19%	20%	20%	20%	20%	20%	20%
BioWin Model Version (For Ardurra Reference Only)		9.1	10E.0	90.3 A9	90.2 A10	90.0 A11	90.0 A12	91.1 A13	91.1 A14
30-Year Present Value Costs									
Total Annual Chemical/Power Costs ($/Yr)				$ 2,455,545	$ 2,229,228	$ 2,298,630	$ 2,149,310	$ 2,643,988	$ 2,620,821
Annual Interest Rate				5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Annual Inflation Rate				2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Discount Rate				2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
30-Year Present Worth Factor				20.93	20.93	20.93	20.93	20.93	20.93
30-Year Present Worth Value				**$51,395,269**	**$46,658,404**	**$48,111,005**	**$44,985,680**	**$55,339,440**	**$54,854,541**
CHEMICAL PHOSPHORUS REMOVAL									
Effluent TP after biological treatment (mg/L)				0.58	0.35	0.27	0.10	0.12	0.04
Effluent TP Desired (mg/L)				0.10	0.10	0.10	0.10	0.10	0.10
TP Removal Required (mg/L)				0.48	0.25	0.17	0.00	0.02	0.00
% TP Removal Required				83%	71%	63%	0%	17%	0%
Alum to TP ratio				16	13	13	13	13	13
Alum Dosage Required (mg/L)				7.68	3.25	2.21	0.00	0.26	0.00
Alum Feed (lb/d)				3,203	1,355	922	-	108	-
Liquid Alum Concentration				50%	50%	50%	50%	50%	50%
Daily Gallons of Liquid Alum Required (gpd)				590	250	170	-	20	-
Alkalinity Required @5:1 alk:TP ratio				3.8	1.6	1.1	0.0	0.1	0.0
Annual Gallon of Alum (gals)				215,273	91,099	61,947	-	7,288	-
(gpd)0 day storage volume (gals)				17,694	7,488	5,092	-	599	-
Weight Per Gallon (lbs)				11.11	11.11	11.11	11.11	11.11	11.11
Pounds of Dry Alum Per Gallon (lbs)				5.43	5.43	5.43	5.43	5.43	5.43
Cost of Alum ($/lb Dry Alum)				$ 0.40	$ 0.40	$ 0.40	$ 0.40	$ 0.40	$ 0.40
Cost of Alum ($/gal Liquid Alum)				$ 2.17	$ 2.17	$ 2.17	$ 2.17	$ 2.17	$ 2.17
Annual Costs of Alum ($/year)				$ 1,281.02	$ 542.10	$ 368.63	$ -	$ 43.37	$ -
Daily Costs of Alum ($/day)				$ 467,574	$ 197,867	$ 134,549	$ -	$ 15,829	$ -
SUPPLIMENTAL ALKALINITY ADDITION (as CaCO3)									
Alkalinity after Biological Treatment (mg/L)				113	113	123	123	122	122
Desired Effluent Alkalinity (mg/L)				100.0	100.0	100.0	100.0	100.0	100.0

Supplimental Alkalinty Required(mg/L)	0.00	0.00	0.00	0.00	0.00	0.00
Supplimental Ca(OH)2 Required (mg/L)	-	-	-	-	-	-
Supplimental Ca(OH)2 Required (lbs/day)	-	-	-	-	-	-
Supplimental Ca(OH)2 Required (Tons/day)	-	-	-	-	-	-
Supplimental Ca(OH)2 Required (Tons/yr)	-	-	-	-	-	-
Hyradated Lime Cost per ton ($/ton)	$ 120.00	$ 120.00	$ 120.00	$ 120.00	$ 120.00	$ 120.00
Daily Amount of Lime Required ($/day)	$ -	$ -	$ -	$ -	$ -	$ -
Annual Amount of Lime Required ($/yr)	$ -	$ -	$ -	$ -	$ -	$ -
SUPPLIMENTAL CARBON ADDITION						
2nd Anoxic Inf TN Concentration (mg/L)	3.5	3.6	0.6	0.6	0.8	0.7
Target Effluent TN Concentration (mg/L)	3.0	3.0	3.0	3.0	3.0	3.0
Amount of NO2/NO3 to remove (mg/L)	0.50	0.60	-	-	-	-
2nd Anoxic Inf NO2/NO3 Conc. (mg/L)	84,628	84,647	84,691	84,756	82,716	82,751
Amount of NOX to Remove (mg/L)	0.5	0.6	0.0	0.0	0.0	0.0
Effluent TN Concentration (mg/L)	3.0	3.0	0.6	0.6	0.8	0.7
Mass of NOX to Remove (lb/d)	208.5	250.2	0.0	0.0	0.0	0.0
Supplimental Carbon Feed Ratio	5.0	5.0	5.0	5.0	5.0	5.0
Daily Amount of Supplimental Carbon (lb/d)	1,043	1,251	-	-	-	-
Volume of Supplimental Carbon (gpd)	182.9	219.5	-	-	-	-
Volume of Supplimental Carbon (gpy)	66,756.6	80,107.9	-	-	-	-
Supplimental Carbon Cost ($/gal)	$ 1.40	$ 1.40	$ 1.40	$ 1.40	$ 1.40	$ 1.40
Supplimental Carbon Cost ($/day)	$ 256.05	$ 307.26	$ -	$ -	$ -	$ -
Supplimental Carbon Cost ($/ry)	$ 93,459	$ 112,151	$ -	$ -	$ -	$ -

Supplemental Present Value Analysis

Lifecycle Cost Considerations for Membrane Alternatives

The present worth value evaluation presented herein is intended for planning-level comparison of alternatives and primarily reflects annual power consumption and process-related operating costs. The evaluation does not explicitly include future membrane cassette replacement costs, membrane-specific chemical cleaning costs, membrane integrity testing, or other membrane maintenance activities. Budgetary information received from membrane suppliers indicates that future membrane replacement and maintenance activities may represent an additional planning-level present value cost of approximately $20 million to $25 million over a 30-year evaluation period. Actual lifecycle costs will depend upon membrane supplier selection, warranty provisions, membrane useful life, cleaning frequency, operating conditions, and future operating practices and should be refined during subsequent phases of project development.
A planning-level membrane lifecycle cost evaluation supporting this estimate is summarized in Appendix G.4.

Membrane Replacement Assumptions

- Year 10: Replace 50% of membrane inventory.
- Year 20: Replace remaining 50% of membrane inventory
- Replacement value = 50% of original membrane equipment cost.Conventional treatment technologies simplify startup and commissioning.

Using the Kubota budgetary proposal:

- Original membrane equipment = ~$40M.
- Year 10 replacement = $20M nominal.
- Year 20 replacement =$20M nominal.

Applying a 2.5% discount rate, the present value becomes approximately:

- Year 10 PV = $7,811,985
- Year 20 PV =$6,102,711

Total membrane replacement present value = $13.9M

Additional Chemical Cleaning Allowance

The Kubota proposal also identifies:

- Semiannual sodium hypochlorite cleaning.
- Periodic citric/oxalic acid cleaning.
- CIP system operation.

The following is an estimated detailed chemical consumption planning allowance of $150,000 per year for membrane specific cleaning and maintenance. Based on the calculated Present Worth Factor of 20.93, **Present Value of Membrane Cleaning = $3.1M**.

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Total Additional Present Value

Item	Present Value
Membrane Replacement	~$19.8M
Membrane Cleaning & Maintenance	~$3.1M
Total Additional Membrane Lifecycle Cost	**~$23M**

For planning-level comparison purposes, the lifecycle cost evaluation for membrane-based alternatives should consider periodic membrane replacement and membrane-specific operation and maintenance costs. Based on vendor budgetary information received during development of this Facilities Plan, a planning-level allowance of approximately $20 million to $25 million present value may be associated with membrane replacement and membrane maintenance activities over a 30-year evaluation period. Actual replacement frequencies, warranty provisions, cleaning requirements, and lifecycle costs will depend upon the membrane supplier, operating conditions, and long-term operating strategy selected during future project development.

SECTION 6

APPENDIX 6

(APPENDICIES C, D, E, F, G)

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Alternative A11.3

50 MGD 4-Stage Bardenpho Process with Deep Bed Denitrifying Filters

A11.3 offers one of the most straightforward construction sequencing approaches among the Set "A" alternatives because most major treatment facilities can be constructed and commissioned independently of existing biological treatment operations.

Preliminary Sequencing Risk Rating

Low to Moderate

Key Sequencing Advantages

- New BNR facilities can be built independently of existing biological processes.
- Most treatment capacity remains operational throughout construction.
- Clarification expansion can occur before major process transitions.
- Conventional treatment technologies simplify startup and commissioning.
- Lower sequencing complexity than alternatives requiring extensive reuse of existing aeration basins.

Key Sequencing Challenges

- Deep bed filter and UV cutovers must maintain continuous permit compliance.
- Multiple critical process facilities must be commissioned in sequence.
- Significant new piping and conveyance infrastructure required.
- Adjacent parcel utility connections and easement requirements may affect schedule.
- Coordination required between new and rehabilitated secondary clarification facilities.

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Process Improvement Summary

Total Major New Process Facilities

- 5 New Primary Clarifiers
- 10 New 2.67 MG 4-Stage Bardenpho Basins
- New Primary Sludge Pump Station
- New Primary Clarifier Influent Splitter Box
- 3 New Secondary Clarifiers
- Rehabilitate 5 Existing Secondary Clarifiers and RAS/WAS Pumps
- New Secondary Clarifier Influent Splitter Box
- New RAS/WAS Pump Station
- New BNR Blower Building
- New 115 MGD Deep Bed Denitrifying Filter Facility
- New UV Disinfection Facility
- 3 New Scum Pump Stations and Associated Process Piping Facilities
- Headworks screening expansion and grit system upgrades

Comparative Position Within Set "A"

Compared with A14.1 and A14.2, Alternative A11.3 offers a straightforward construction sequence because most major treatment facilities can be constructed independently of the existing process trains. Compared with A15, A11.3 requires less overall biological volume and infrastructure, reducing the number of major treatment cutovers required during implementation. Its primary sequencing advantage is the ability to construct the majority of new facilities while maintaining existing treatment operations. Its primary sequencing challenge is coordination of the tertiary filtration and UV transition while maintaining permit compliance.

Construction Sequencing Concept

Phase 1 – Site Development and Capacity Improvements

Construct improvements that are largely independent of the biological treatment process:

- Expand influent screening facilities.
- Upgrade grit removal facilities with new new grit removal facilities.
- Construct primary clarifier influent splitter box.
- Construct five new primary clarifiers.
- Construct primary sludge pump station.
- Install underground process piping and site utilities.
- Construct BNR blower building shell and associated electrical facilities.

Purpose

Increase hydraulic handling capacity and establish infrastructure needed for downstream treatment expansion while maintaining existing plant operations.

Phase 2 – New Biological Treatment Facilities

Construct new treatment infrastructure without impacting existing aeration basin operations:

- Construct ten new 2.67 MG 4-Stage Bardenpho basins.
- Complete blower installation and process air systems.
- Install internal process piping and instrumentation.
- Complete process control integration.

Purpose

Provide all future biological treatment capacity while allowing the existing plant to remain fully operational during construction. This phase carries relatively low operational risk.

Phase 3 – Clarification Expansion

Construct and commission secondary clarification facilities:

- Construct three new 150-foot secondary clarifiers.
- Construct secondary clarifier influent splitter box.
- Construct new RAS/WAS pump station.
- Construct new scum pump stations.
- Rehabilitate five existing secondary clarifiers and associated RAS/WAS facilities.

Purpose

Bring new clarification facilities online prior to major process cutovers and establish full 50 MGD clarification capacity.

Phase 4 – Tertiary Treatment and Disinfection

Construct new tertiary treatment facilities:

- Construct 115 MGD deep bed denitrifying filter facility.

- Construct new UV disinfection system.
- Complete tertiary pumping, controls, and effluent conveyance.

Purpose

Provide full tertiary treatment and disinfection capacity before transitioning flow from the existing treatment trains. Maintaining simultaneous operation of existing and new tertiary systems may be required during startup and optimization.

Phase 5 – Process Cutover and Optimization

Transition treatment operations into the new process train:

- Sequentially route flow through new primary clarification facilities.
- Place BNR facilities into operation.
- Commission secondary clarifiers.
- Commission new deep bed filters.
- Commission UV system.
- Conduct performance testing and optimization.

Purpose

Maintain permit compliance while transitioning from existing treatment processes to the new 50 MGD treatment configuration. Cutovers should be staged to avoid simultaneous startup of multiple critical process units.

Phase 6 – Final Integration and Site Restoration

- Complete demolition of facilities no longer required.
- Final site grading and paving.
- Final instrumentation integration.
- Performance verification and operator training.
- Substantial completion.

Purpose

Transition from construction mode to long-term operation while minimizing disruption to plant staff.

Alternative A14.1

50 MGD 5-Stage Bardenpho Process with Tertiary Membranes

Alternative A14.1 requires one of the more complex construction sequencing approaches among the Set "A" alternatives because successful implementation depends upon rehabilitation and conversion of existing treatment facilities while simultaneously integrating a new membrane process into an operating wastewater treatment plant.

Preliminary Sequencing Risk Rating

Moderate to High

Key Sequencing Advantages

- Minimal dependence on adjacent parcel utilization.
- Eliminates need for new secondary clarifier construction.
- Eliminates need for deep bed denitrifying filter construction and startup.
- Smaller overall project footprint than conventional filtration alternatives.
- Makes significant use of existing infrastructure.

Key Sequencing Challenges

- Existing aeration basins must remain operational while portions are converted into a 5-Stage Bardenpho process.
- New membrane facilities must be integrated into an operating plant.
- Existing primary clarifiers must remain operational until replacement facilities are commissioned.
- Multiple process cutovers required between existing and new biological treatment systems.
- Startup and optimization of a new membrane treatment process introduces operational transition risk.

Process Improvement Summary

Total Major New Process Facilities

- 5 New Primary Clarifiers
- 3 New 2.4 MG BNR Basins (Anaerobic / Pre-Anoxic / Aeration)
- Existing Aeration Basins Reconfigured into 5-Stage Bardenpho Process
- New Primary Sludge Pump Station
- New Primary Clarifier Influent Splitter Box
- New BNR Blower Building
- New 50 MGD Tertiary Membrane Treatment Facility
- New 160 MGD MLSS Band Screen Facility (2-mm Screens)
- New UV Disinfection Facility
- Multiple Blower Upgrades and Associated Process Piping Modifications

Comparative Position Within Set "A"

Compared with A11.3 and A15, Alternative A14.1 requires less site area and fewer new treatment structures but introduces greater sequencing complexity due to the need to modify existing biological treatment facilities while maintaining operations. Compared with A14.2, the overall process configuration is similar, but the site layout offers fewer opportunities for construction staging and process isolation. Its primary sequencing advantage is reduced need for large new treatment facilities, while its primary sequencing challenge is coordinating biological process conversions and membrane startup without impacting permit compliance.

Construction Sequencing Concept

Phase 1 – Site Development and Headworks Improvements

Construct improvements with minimal impact to active treatment processes:

- Expand influent screening facilities.
- Upgrade grit removal facilities.
- Install underground utilities and process piping.
- Construct new primary clarifier splitter box.
- Begin construction of new primary clarifiers.
- Construct new primary sludge pump station.
- Construct BNR blower building.

Purpose

Establish hydraulic capacity and process infrastructure needed for expansion while maintaining existing treatment operations and minimizing disruption to permit compliance.

Phase 2 – New Biological Process Facilities

Construct treatment facilities that can be developed independently of existing aeration basin operations:

- Construct three new 2.4 MG anaerobic/pre-anoxic/aeration basins.
- Install blower systems, instrumentation, and process controls.
- Complete biological process piping and internal recycle infrastructure.
- Upgrade existing blower facilities.

Purpose

Create sufficient new biological treatment capacity so that portions of the existing aeration basin system can later be removed from service and converted into the 5-Stage Bardenpho process. This phase helps minimize temporary treatment impacts.

Phase 3 – Membrane Treatment Facilities

Construct new tertiary membrane facilities prior to major biological process conversions:

- Construct 50 MGD tertiary membrane treatment facility.
- Construct 160 MGD MLSS band screen facility.
- Complete membrane air systems, instrumentation, controls, and process piping.
- Construct associated electrical systems and standby provisions.

Purpose

Bring membrane facilities substantially to completion before significant modifications are made to existing process trains. This reduces schedule risk and allows membrane startup to occur as a controlled event later in the project.

Phase 4 – Biological Conversion and Facility Cutovers

Transition existing facilities into the final 5-Stage Bardenpho configuration:

- Rehabilitate existing aeration basins.
- Convert existing basins into aeration, post-anoxic, and post-aeration zones.
- Bring new primary clarifiers online.
- Transition flows from existing primary clarifiers.
- Commission upgraded blower systems.

Purpose

Implement the final biological process configuration while maintaining available treatment capacity throughout the transition. Sequencing of basin conversions should occur incrementally to avoid loss of treatment capability.

Phase 5 – Membrane Startup and Optimization

Transition treatment flow through the membrane system:

- Commission MLSS screening facilities.
- Commission membrane treatment facilities.
- Optimize membrane operations.
- Commission UV disinfection facilities.
- Conduct process performance testing.

Purpose

Maintain permit compliance while transitioning to membrane treatment and achieving stable process performance before major demolition activities proceed. Membrane startup represents the most critical operational transition in this alternative.

Phase 6 – Demolition and Final Integration

- Demolish existing primary clarifiers.
- Demolish abandoned aeration basin facilities.
- Complete final site grading and paving.
- Complete SCADA integration and operator training.
- Conduct acceptance testing and performance verification.

Purpose

Finalize the site configuration and transition from construction mode to long-term operation while minimizing impacts on facility staff and plant reliability.

Alternative A14.2

50 MGD 5-Stage Bardenpho Process with Tertiary Membranes (Alternative Layout)

Alternative A14.2 offers the most favorable construction sequencing approach among the Set "A" alternatives because it combines the footprint advantages of membrane technology with an optimized facility arrangement that improves construction staging, reduces interference with existing operations, and minimizes dependence on adjacent property.

Preliminary Sequencing Risk Rating

Low to Moderate

Key Sequencing Advantages

- Optimized site layout improves construction access and staging.
- Minimal dependence on adjacent parcel development and utility crossings.
- Eliminates need for construction of new secondary clarifiers.
- Eliminates need for deep bed denitrifying filter construction and startup.
- Improved separation between existing operations and new construction activities compared to A14.1.
- Reduced overall site congestion during construction.

Key Sequencing Challenges

- Existing aeration basins must remain operational during conversion to the 5-Stage Bardenpho configuration.
- Membrane treatment facilities must be integrated and commissioned within an active treatment plant.
- Existing primary clarifiers must remain online until replacement facilities are operational.
- Requires coordinated startup of membrane treatment and MLSS screening facilities.
- Successful implementation depends on careful sequencing of process conversions and flow transitions.

Process Improvement Summary

Total Major New Process Facilities

- 5 New Primary Clarifiers
- 3 New 2.47 MG BNR Basins (Anaerobic / Pre-Anoxic / Aeration)
- Existing Aeration Basins Reconfigured into 5-Stage Bardenpho Process
- New Primary Sludge Pump Station
- New Primary Clarifier Influent Splitter Box
- New BNR Blower Building
- New 50 MGD Tertiary Membrane Treatment Facility
- New 160 MGD MLSS Band Screen Facility (2-mm Screens)
- New UV Disinfection Facility
- Multiple Blower Upgrades and Associated Process Piping Modifications

Comparative Position Within Set "A"

Compared with A11.3 and A15, Alternative A14.2 significantly reduces the amount of new conventional treatment infrastructure requiring construction and startup. Compared with A14.1, the optimized layout improves facility arrangement, staging opportunities, and isolation between construction activities and existing treatment operations. Its primary sequencing advantage is improved constructability through site layout optimization, while its primary sequencing challenge remains the startup and integration of membrane treatment technology.

Construction Sequencing Concept

Phase 1 – Site Development and Headworks Improvements

Construct improvements that can be completed with minimal impact to active treatment facilities:

- Expand influent screening facilities.
- Upgrade grit removal facilities.
- Install site utilities and underground piping.
- Construct new primary clarifier splitter box.
- Construct five new primary clarifiers.
- Construct primary sludge pump station.
- Construct BNR blower building and associated electrical facilities.

Purpose

Establish hydraulic and process infrastructure needed to support future treatment expansions while maintaining uninterrupted plant operations and permit compliance.

Phase 2 – New Biological Process Facilities

Construct independent biological treatment facilities:

- Construct three new 2.47 MG anaerobic/pre-anoxic/aeration basins.
- Install process piping, controls, instrumentation, and internal recycle systems.
- Complete blower upgrades.
- Prepare new facilities for startup.

Purpose

Provide sufficient biological treatment capacity to enable subsequent modification and conversion of existing aeration basins with minimal treatment disruption. This phase minimizes operational risk while building future treatment capacity.

Phase 3 – Membrane Treatment Facilities

Construct and prepare the membrane treatment system:

- Construct 50 MGD membrane treatment facility.
- Construct 160 MGD MLSS screening facility.
- Install membrane air systems and electrical systems.
- Complete instrumentation and SCADA integration.
- Complete process piping and controls.

Purpose

Complete membrane facilities before major process cutovers occur. The optimized A14.2 layout provides improved staging and access during this phase compared to A14.1.

Phase 4 – Biological Conversion and Facility Cutovers

Convert existing facilities into the final 5-Stage Bardenpho configuration:

- Rehabilitate existing aeration basins.
- Convert basins into aeration, post-anoxic, and post-aeration zones.
- Bring new primary clarifiers into service.
- Transfer flow from existing primary clarification facilities.
- Commission upgraded biological treatment systems.

Purpose

Implement the final biological treatment configuration while maintaining available treatment capacity and minimizing risk to permit compliance. Basin conversions should occur incrementally to preserve operational flexibility.

Phase 5 – Membrane Startup and Process Optimization

- Commission MLSS band screening facilities.
- Start up membrane treatment facilities.
- Transition process flow through membrane treatment.
- Commission UV disinfection facilities.
- Optimize membrane and biological treatment performance.
- Conduct process performance testing.

Purpose

Achieve stable process performance prior to major demolition activities. The improved site arrangement provides greater flexibility during startup and troubleshooting compared to the A14.1 configuration.

Phase 6 – Demolition and Final Integration

- Demolish existing primary clarifiers.
- Demolish abandoned aeration basin facilities.
- Complete final grading and paving.
- Complete final SCADA integration.
- Conduct operator training and system acceptance testing.
- Achieve substantial completion.

Purpose

Finalize the site layout and transition the facility to long-term operation with minimal disruption to plant operations and staff.

Alternative A15

50 MGD 5-Stage Bardenpho Process with Deep Bed Denitrifying Sand Filters

Alternative A15 provides a relatively straightforward construction sequencing approach because most major treatment facilities can be constructed independently of existing treatment operations. However, it requires the largest overall amount of new infrastructure, the greatest biological treatment footprint, and the most extensive site development effort among the Set "A" alternatives.

Preliminary Sequencing Risk Rating

Moderate

Key Sequencing Advantages

- Most major treatment facilities can be constructed independent of existing operations.
- Utilizes conventional and familiar treatment technologies.
- Avoids membrane startup and membrane O&M transition risks.
- New primary, biological, secondary, and tertiary facilities can generally be commissioned before major cutovers occur.
- Provides significant flexibility for future expansion and future regulatory compliance.

Key Sequencing Challenges

- Largest overall amount of new infrastructure among the Set "A" alternatives.
- Greater dependence on adjacent parcel development and airport easement coordination.
- Construction of twelve new BNR basins requires substantial site development and utility extensions.
- Deep bed filter and UV cutovers must maintain permit compliance.
- Significant coordination required between new and rehabilitated secondary clarification facilities.

Process Improvement Summary

Total Major New Process Facilities

- 5 New Primary Clarifiers
- 12 New 2.4 MG 5-Stage Bardenpho Basins
- New Primary Sludge Pump Station
- New Primary Clarifier Influent Splitter Box
- 3 New Secondary Clarifiers
- Rehabilitate 5 Existing Secondary Clarifiers and RAS/WAS Pumps
- New Secondary Clarifier Influent Splitter Box
- New RAS/WAS Pump Station
- New BNR Blower Building
- New 115 MGD Deep Bed Denitrifying Filter Facility
- New UV Disinfection Facility
- 3 New Scum Pump Stations and Associated Process Piping Facilities

Comparative Position Within Set "A"

Compared with A11.3, Alternative A15 requires a larger biological treatment footprint and greater infrastructure investment but provides additional biological treatment volume and operational flexibility through the 5-Stage Bardenpho configuration. Compared with A14.1 and A14.2, A15 eliminates the need for membrane treatment facilities and associated operational transition risks but requires considerably more site area and construction activity. Its primary sequencing advantage is the ability to build most facilities independently of existing operations, while its primary sequencing challenge is the scale of construction required to fully implement the expansion.

Construction Sequencing Concept

Phase 1 – Site Development and Capacity Improvements

Construct facilities that can be developed independently of the existing treatment process:

- Expand influent screening facilities.
- Upgrade grit removal facilities.
- Construct primary clarifier influent splitter box.
- Construct five new primary clarifiers.
- Construct primary sludge pump station.
- Install major underground utilities and process piping.
- Construct BNR blower building and associated electrical facilities.

Purpose

Establish hydraulic handling capacity and supporting infrastructure needed for future treatment expansion while minimizing impacts to active plant operations.

Phase 2 – Major Biological Treatment Expansion

Construct the new biological treatment complex:

- Construct twelve new 2.4 MG 5-Stage Bardenpho basins.
- Install process air systems.
- Complete biological treatment piping and instrumentation.
- Complete internal recycle pumping and process controls.

Purpose

Provide full biological treatment capacity for future 50 MGD operation while maintaining uninterrupted use of the existing biological treatment process. This phase represents the largest construction effort within Alternative A15.

Phase 3 – Clarification Expansion

Construct and rehabilitate clarification facilities:

- Construct three new 150-foot secondary clarifiers.
- Construct secondary clarifier influent splitter box.
- Construct new RAS/WAS pump station.
- Construct scum pump stations.
- Rehabilitate five existing secondary clarifiers and associated pumping facilities.

Purpose

Provide full secondary clarification capacity prior to process cutovers and ensure adequate solids handling capacity for future flows.

Phase 4 – Tertiary Treatment and Disinfection

Construct tertiary treatment facilities:

- Construct 115 MGD deep bed denitrifying filter facility.

- Construct new UV disinfection system.
- Install tertiary process controls and instrumentation.
- Complete effluent conveyance improvements.

Purpose

Establish tertiary treatment and disinfection capacity before transition into the new process train. Maintaining parallel operation of existing and new tertiary systems may be required during startup and optimization.

Phase 5 – Process Cutover and Startup

Transition operations into the new treatment facilities:

- Place new primary clarifiers into operation.
- Commission 5-Stage Bardenpho basins.
- Transition flow into new and rehabilitated secondary clarifiers.
- Commission RAS/WAS systems.
- Commission deep bed denitrifying filters.
- Commission UV disinfection system.
- Conduct process optimization and performance testing.

Purpose

Maintain permit compliance while transitioning from existing facilities to the final treatment configuration. Process startup should occur incrementally to avoid simultaneous commissioning of multiple critical treatment systems.

Phase 6 – Final Integration and Site Restoration

- Demolish facilities no longer required.
- Complete final paving and grading.
- Complete SCADA integration.
- Conduct operator training.
- Perform acceptance and performance testing.
- Achieve substantial completion.

Purpose

Finalize facility improvements and transition the expanded South Cobb WRF into long-term operation while minimizing impacts to plant staff and ongoing operations.

Alternative A11.3

50 MGD 4-Stage Bardenpho Process with Deep Bed Filters

Comparative Position Within Set "A"

Compared with Alternatives A14.1 and A14.2, Alternative A11.3 utilizes conventional clarification and filtration technologies and avoids the operational transition associated with membrane treatment systems. However, it requires additional secondary clarification and tertiary filtration infrastructure and a larger overall footprint. Its primary constructability advantage is the use of familiar, proven treatment technologies, while its primary constructability challenge is the amount of new infrastructure and site area required to implement the consolidated 4-Stage Bardenpho process.

In a Constructability only comparison A11.3 would rank 2nd.

Constructability Narrative

Alternative A11.3 is considered one of the more constructible conventional biological treatment alternatives because the proposed 4-Stage Bardenpho process is consolidated into a new biological treatment complex rather than distributed between the existing South Cobb WRF site and the adjacent parcel. The alternative minimizes process fragmentation and creates a single cohesive biological nutrient removal (BNR) facility while allowing significant portions of the existing treatment plant to remain operational during construction. The layout includes construction of ten new 2.67 MG BNR basins, five new 110-foot diameter primary clarifiers, three new 150-foot diameter secondary clarifiers, a new BNR blower facility, new denitrifying filtration, and associated process support facilities.

From a construction sequencing perspective, the majority of the new treatment facilities can be constructed independent of existing active process units, reducing risk to ongoing plant operations. New primary clarification facilities can be constructed and commissioned before removal or modification of existing facilities. Similarly, the new BNR basins, blower facilities, secondary clarification facilities, and associated conveyance systems can be developed as stand-alone infrastructure prior to final process cutovers. This approach minimizes operational disruption and improves the likelihood of maintaining permit compliance throughout construction.

The principal constructability challenge associated with Alternative A11.3 is the requirement for a large amount of new treatment footprint and supporting conveyance infrastructure. This alternative depends upon construction of an entirely new BNR process train and requires sufficient site area to accommodate the consolidated biological treatment facilities, associated clarifiers, and tertiary filtration systems. If use of the adjacent parcel is required for implementation, easement acquisition and utility crossing coordination will become critical schedule considerations. However, unlike alternatives that split biological treatment functions between multiple locations, Alternative A11.3 maintains operational simplicity by consolidating the biological process into a single facility.

A second constructability consideration is the proposed 115 MGD denitrifying deep bed filter system and expanded UV disinfection facilities. These facilities must be phased carefully to avoid impacts to existing tertiary treatment and disinfection operations. Depending upon final configuration, temporary treatment capacity or modified facility siting may be required to maintain permit compliance during the transition from existing to new tertiary treatment facilities.
Overall, Alternative A11.3 is considered to have **moderate constructability risk**. While it requires significant new infrastructure and site area, it benefits from a consolidated treatment process, minimizes reliance on existing biological facilities, reduces process fragmentation, and allows major treatment units to be constructed largely independent of active operations.

Preliminary Constructability Rating

Moderate

Key Advantages

- Consolidated 4-Stage Bardenpho process.
- Limited dependence on existing aeration basin conversions.
- New facilities generally constructed independently of active treatment processes.
- Reduced operational complexity compared to split-site BNR alternatives.

Key Challenges

- Significant new treatment footprint required.
- Potential dependency on adjacent parcel and utility crossings.
- Tertiary filtration and UV replacement sequencing must maintain permit compliance.
- Large capital program requiring multiple major process cutovers.

Alternative A14.1

50 MGD 5-Stage Bardenpho Process with Tertiary Membranes

Comparative Position Within Set "A"

Compared with Alternative A11.3 and A15, Alternative A14.1 generally requires less site area and less reliance on offsite property, but it introduces greater operational complexity through implementation of membrane technology and modification of existing biological treatment facilities. Its primary constructability advantage is footprint efficiency, while its primary constructability challenge is integration of new membrane treatment systems within an operating plant.

In a Constructability only comparison A14.1 would rank 4th.

Constructability Narrative

Alternative A14.1 is considered a highly efficient site utilization alternative because it combines a 5-Stage Bardenpho biological nutrient removal (BNR) process with a tertiary membrane treatment system, significantly reducing the overall treatment footprint compared to conventional clarification and filtration alternatives. The layout maximizes use of existing treatment infrastructure through rehabilitation and repurposing of existing aeration basins while supplementing capacity with three new 2.4 MG biological treatment basins, new primary clarification facilities, and a new 50 MGD tertiary membrane treatment system.

From a constructability perspective, this alternative benefits from avoiding construction of new secondary clarifiers and eliminating the need for large tertiary deep-bed filter facilities. However, it introduces greater complexity because successful implementation requires substantial modification and conversion of existing treatment processes while the facility remains operational. Existing aeration basins are proposed to be rehabilitated and converted to operate as portions of the 5-Stage Bardenpho process, requiring careful sequencing and temporary operational measures to maintain treatment capacity throughout construction.

A major advantage of Alternative A14.1 is that it minimizes dependence on the adjacent parcel and reduces overall land requirements. The alternative relies primarily on redevelopment and intensification of the existing site through installation of tertiary membranes, construction of new primary clarifiers, rehabilitation of existing process infrastructure, and strategic demolition of abandoned facilities. This approach reduces risk associated with future property acquisition, utility crossings, and airport easement coordination.

The principal constructability challenge associated with Alternative A14.1 is integration of the new membrane treatment system into an active wastewater treatment facility. Construction and startup of the membrane facilities, MLSS screening system, associated process piping, blower improvements, and supporting infrastructure must be coordinated carefully with ongoing plant operations. In addition, demolition of existing primary clarifiers and abandoned process facilities must be sequenced so that treatment reliability and permit compliance are maintained throughout implementation.

Unlike the conventional filtration alternatives, membrane facilities generally provide a smaller footprint but introduce additional equipment, process controls, maintenance requirements, and operational complexity. As a result, implementation of Alternative A14.1 would require both construction planning and operational transition planning to support successful startup and long-term operation of the membrane process.

Overall, Alternative A14.1 is considered to have **moderate-to-high constructability risk**. While it benefits from reduced site requirements and eliminates dependence on large tertiary filtration facilities, it requires substantial modification of existing process infrastructure and introduces a new membrane treatment technology that must be integrated into ongoing plant operations.

Preliminary Constructability Rating

Moderate to High

Key Advantages

- Smallest overall footprint among the Set "A" alternatives.
- Minimizes dependence on adjacent property and airport easements.
- Eliminates need for secondary clarifier expansion.
- Eliminates large deep-bed denitrification filter facilities.
- Makes significant use of existing treatment infrastructure.

Key Challenges

- Significant rehabilitation and conversion of existing aeration basins.
- Integration of a new 50 MGD membrane treatment system.
- Requires transition of operations to a new treatment technology.
- Demolition and replacement activities must occur adjacent to active treatment facilities.
- Increased operational and maintenance complexity relative to conventional clarification alternatives.

Alternative A14.2

50 MGD 5-Stage Bardenpho Process with Tertiary Membranes (Alternative Layout)

Comparative Position Within Set "A"

Compared with Alternatives A11.3 and A15, Alternative A14.2 requires significantly less overall footprint and reduces dependency on adjacent property and airport easements. Compared with Alternative A14.1, A14.2 provides a more favorable site layout and construction staging arrangement while retaining the benefits associated with membrane treatment technology. Its primary constructability advantage is efficient site utilization, while its primary challenge remains the integration and long-term operation of membrane treatment facilities within an active wastewater treatment plant.

In a Constructability only comparison A14.2 would rank 1st.

Constructability Narrative

Alternative A14.2 is a variation of the 5-Stage Bardenpho with tertiary membrane alternative that was developed to improve overall site utilization and constructability compared to Alternative A14.1. Similar to A14.1, this alternative relies on rehabilitation of existing aeration basins, construction of new primary clarification facilities, installation of a 50 MGD tertiary membrane treatment system, expansion of influent screening and grit removal capacity, and implementation of a high-capacity MLSS fine screening system. However, the revised layout improves facility arrangement and construction access, which was a primary reason CCWS initially ranked this alternative higher than A14.1 within the Set "A" alternatives.

From a constructability perspective, Alternative A14.2 benefits from maintaining a relatively compact footprint while minimizing dependence on the adjacent parcel. Similar to A14.1, this alternative avoids the need for new secondary clarification facilities and large tertiary deep-bed filtration facilities. The compact arrangement reduces overall site impacts and decreases potential risk associated with property acquisition, airport easements, and utility corridor crossings.

The major construction challenge associated with Alternative A14.2 is the need to integrate new biological treatment infrastructure and membrane facilities into an active plant while simultaneously rehabilitating portions of the existing treatment process. Existing aeration basins must be transitioned into their new 5-Stage Bardenpho operating roles, requiring careful phased construction and temporary operational measures to maintain treatment performance during implementation. Demolition of the existing primary clarifiers and abandoned aeration facilities must also be coordinated with construction of new primary clarification facilities and associated conveyance systems.

The membrane treatment system introduces additional constructability considerations associated with MLSS screening, membrane process equipment, instrumentation and controls, airflow

requirements, and startup sequencing. While the membrane process reduces overall footprint requirements and eliminates secondary clarifier expansion, it requires substantial process integration and a significant operational transition following commissioning. The 160 MGD 2-mm MLSS screening facilities are a critical component of the membrane process and must be operational before membrane startup.

Compared to the conventional clarification alternatives, A14.2 reduces dependency on large tertiary treatment structures and extensive site expansion. Compared to A14.1, the revised layout appears to provide improved construction staging opportunities, more efficient facility arrangement, and reduced interference with existing operations. These advantages are partially responsible for its higher ranking within CCWS's preliminary Set "A" evaluation.

Overall, Alternative A14.2 is considered to have **moderate constructability risk**. The alternative benefits from efficient site utilization, reduced reliance on adjacent property, and improved facility arrangement, but still requires integration of a new membrane treatment technology and significant modification of existing plant infrastructure while maintaining continuous operations.

Preliminary Constructability Rating

Moderate

Key Advantages

- Compact site layout with improved facility arrangement.
- Minimizes dependence on adjacent property and airport easements.
- Eliminates need for new secondary clarifiers.
- Eliminates need for large deep-bed denitrification filter facilities.
- Improved construction staging opportunities compared to A14.1.
- Preserves operational flexibility while maximizing use of existing infrastructure.

Key Challenges

- Requires transition to membrane technology.
- Significant rehabilitation and conversion of existing aeration basins.
- Integration of new 50 MGD membrane treatment facilities within an operating plant.
- Requires installation and operation of 160 MGD MLSS fine screening.
- Demolition and replacement activities must maintain permit compliance during implementation.

Alternative A15

50 MGD 5-Stage Bardenpho Process with Deep Bed Denitrifying Sand Filters

Comparative Position Within Set "A"

Compared with Alternatives A14.1 and A14.2, Alternative A15 requires substantially more site area but avoids the operational and maintenance complexities associated with membrane technology. Compared with Alternative A11.3, A15 provides additional biological treatment stages and greater nutrient removal capability while requiring a somewhat larger treatment footprint. Its primary constructability advantage is the use of conventional treatment technologies and consolidated process trains, while its primary challenge is the amount of land, infrastructure, and construction activity required to fully implement the expansion.

In a Constructability only comparison A15 would rank 3rd.

Constructability Narrative

Alternative A15 represents the largest conventional treatment expansion evaluated within the current Set "A" alternatives. The alternative consists of a fully developed 5-Stage Bardenpho biological nutrient removal (BNR) process supported by new primary clarification facilities, additional secondary clarification capacity, deep bed denitrifying filtration, expanded headworks capacity, and upgraded blower infrastructure. The layout includes construction of twelve new 2.4 MG 5-Stage BNR basins, five new 110-foot diameter primary clarifiers, three new 150-foot diameter secondary clarifiers, a new blower building, a new 115 MGD tertiary deep bed denitrifying filter system, and associated process support facilities.

From a constructability perspective, Alternative A15 benefits from being a relatively straightforward conventional wastewater treatment expansion that utilizes familiar treatment technologies and operating philosophies. Unlike the MBR alternatives, this option does not require implementation of membrane systems, MLSS band screening facilities, or the operational transition associated with membrane treatment technology. The process configuration remains consistent with conventional activated sludge treatment principles while incorporating enhanced biological nutrient removal capability.

A significant constructability advantage of Alternative A15 is that most major treatment facilities can be constructed independently of active process units. New primary clarifiers, BNR basins, secondary clarifiers, filtration facilities, blower facilities, and associated piping systems can generally be developed and commissioned before major process cutovers occur. This approach reduces operational risk and provides flexibility for maintaining permit compliance during implementation.

The primary constructability challenge associated with Alternative A15 is the substantial amount of new infrastructure required. This alternative requires the largest overall biological treatment footprint among the Set "A" alternatives and will likely depend upon effective utilization of the adjacent parcel.

As a result, implementation is tied more closely to site availability, utility corridor development, and airport easement considerations than the membrane-based alternatives. Construction of the expanded BNR facilities, associated conveyance infrastructure, and tertiary treatment systems will require extensive site development and multiple major process integrations.

A second constructability consideration is the implementation of the 115 MGD deep bed denitrifying filter facility and expanded UV disinfection system. These facilities must be phased carefully to maintain continuous tertiary treatment and disinfection capacity throughout construction. The final location and sequencing of the tertiary treatment facilities will be important considerations in minimizing operational impacts and avoiding temporary treatment restrictions.

Overall, Alternative A15 is considered to have **moderate constructability risk**. While it requires the largest overall footprint and the greatest amount of new infrastructure among the Set "A" alternatives, it utilizes proven conventional treatment technologies, maintains a consolidated biological process, and allows many facilities to be constructed independently of existing plant operations prior to final process transitions.

Preliminary Constructability Rating

Moderate

Key Advantages

- Utilizes conventional and well-understood treatment technologies.
- Maintains a consolidated 5-Stage Bardenpho treatment process.
- Avoids implementation of membrane treatment systems.
- Allows many major facilities to be constructed prior to process cutover.
- Provides significant long-term biological treatment capacity and nutrient removal capability.

Key Challenges

- Largest overall footprint among the Set "A" alternatives.
- Greater reliance on adjacent parcel utilization and airport easement coordination.
- Requires extensive new treatment infrastructure and conveyance systems.
- Incorporates large tertiary denitrifying filter facilities requiring careful sequencing.
- Multiple major process cutovers required during final implementation.

Alternative A11.3

50 MGD 4-Stage Bardenpho Process with Deep Bed Denitrifying Filters

A11.3 offers one of the most straightforward construction sequencing approaches among the Set "A" alternatives because most major treatment facilities can be constructed and commissioned independently of existing biological treatment operations.

Preliminary Sequencing Risk Rating

Low to Moderate

Key Sequencing Advantages

- New BNR facilities can be built independently of existing biological processes.
- Most treatment capacity remains operational throughout construction.
- Clarification expansion can occur before major process transitions.
- Conventional treatment technologies simplify startup and commissioning.
- Lower sequencing complexity than alternatives requiring extensive reuse of existing aeration basins.

Key Sequencing Challenges

- Deep bed filter and UV cutovers must maintain continuous permit compliance.
- Multiple critical process facilities must be commissioned in sequence.
- Significant new piping and conveyance infrastructure required.
- Adjacent parcel utility connections and easement requirements may affect schedule.
- Coordination required between new and rehabilitated secondary clarification facilities.

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Process Improvement Summary

Total Major New Process Facilities

- 5 New Primary Clarifiers
- 10 New 2.67 MG 4-Stage Bardenpho Basins
- New Primary Sludge Pump Station
- New Primary Clarifier Influent Splitter Box
- 3 New Secondary Clarifiers
- Rehabilitate 5 Existing Secondary Clarifiers and RAS/WAS Pumps
- New Secondary Clarifier Influent Splitter Box
- New RAS/WAS Pump Station
- New BNR Blower Building
- New 115 MGD Deep Bed Denitrifying Filter Facility
- New UV Disinfection Facility
- 3 New Scum Pump Stations and Associated Process Piping Facilities
- Headworks screening expansion and grit system upgrades

Comparative Position Within Set "A"

Compared with A14.1 and A14.2, Alternative A11.3 offers a straightforward construction sequence because most major treatment facilities can be constructed independently of the existing process trains. Compared with A15, A11.3 requires less overall biological volume and infrastructure, reducing the number of major treatment cutovers required during implementation. Its primary sequencing advantage is the ability to construct the majority of new facilities while maintaining existing treatment operations. Its primary sequencing challenge is coordination of the tertiary filtration and UV transition while maintaining permit compliance.

Construction Sequencing Concept

Phase 1 – Site Development and Capacity Improvements

Construct improvements that are largely independent of the biological treatment process:

- Expand influent screening facilities.
- Upgrade grit removal facilities with new headcell technology.
- Construct primary clarifier influent splitter box.
- Construct five new primary clarifiers.
- Construct primary sludge pump station.
- Install underground process piping and site utilities.
- Construct BNR blower building shell and associated electrical facilities.

Purpose

Increase hydraulic handling capacity and establish infrastructure needed for downstream treatment expansion while maintaining existing plant operations.

Phase 2 – New Biological Treatment Facilities

Construct new treatment infrastructure without impacting existing aeration basin operations:

- Construct ten new 2.67 MG 4-Stage Bardenpho basins.
- Complete blower installation and process air systems.
- Install internal process piping and instrumentation.
- Complete process control integration.

Purpose

Provide all future biological treatment capacity while allowing the existing plant to remain fully operational during construction. This phase carries relatively low operational risk.

Phase 3 – Clarification Expansion

Construct and commission secondary clarification facilities:

- Construct three new 150-foot secondary clarifiers.
- Construct secondary clarifier influent splitter box.
- Construct new RAS/WAS pump station.
- Construct new scum pump stations.
- Rehabilitate five existing secondary clarifiers and associated RAS/WAS facilities.

Purpose

Bring new clarification facilities online prior to major process cutovers and establish full 50 MGD clarification capacity.

Phase 4 – Tertiary Treatment and Disinfection

Construct new tertiary treatment facilities:

- Construct 115 MGD deep bed denitrifying filter facility.

- Construct new UV disinfection system.
- Complete tertiary pumping, controls, and effluent conveyance.

Purpose

Provide full tertiary treatment and disinfection capacity before transitioning flow from the existing treatment trains. Maintaining simultaneous operation of existing and new tertiary systems may be required during startup and optimization.

Phase 5 – Process Cutover and Optimization

Transition treatment operations into the new process train:

- Sequentially route flow through new primary clarification facilities.
- Place BNR facilities into operation.
- Commission secondary clarifiers.
- Commission new deep bed filters.
- Commission UV system.
- Conduct performance testing and optimization.

Purpose

Maintain permit compliance while transitioning from existing treatment processes to the new 50 MGD treatment configuration. Cutovers should be staged to avoid simultaneous startup of multiple critical process units.

Phase 6 – Final Integration and Site Restoration

- Complete demolition of facilities no longer required.
- Final site grading and paving.
- Final instrumentation integration.
- Performance verification and operator training.
- Substantial completion.

Purpose

Transition from construction mode to long-term operation while minimizing disruption to plant staff.

Alternative A14.1

50 MGD 5-Stage Bardenpho Process with Tertiary Membranes

Alternative A14.1 requires one of the more complex construction sequencing approaches among the Set "A" alternatives because successful implementation depends upon rehabilitation and conversion of existing treatment facilities while simultaneously integrating a new membrane process into an operating wastewater treatment plant.

Preliminary Sequencing Risk Rating

Moderate to High

Key Sequencing Advantages

- Minimal dependence on adjacent parcel utilization.
- Eliminates need for new secondary clarifier construction.
- Eliminates need for deep bed denitrifying filter construction and startup.
- Smaller overall project footprint than conventional filtration alternatives.
- Makes significant use of existing infrastructure.

Key Sequencing Challenges

- Existing aeration basins must remain operational while portions are converted into a 5-Stage Bardenpho process.
- New membrane facilities must be integrated into an operating plant.
- Existing primary clarifiers must remain operational until replacement facilities are commissioned.
- Multiple process cutovers required between existing and new biological treatment systems.
- Startup and optimization of a new membrane treatment process introduces operational transition risk.

Process Improvement Summary

Total Major New Process Facilities

- 5 New Primary Clarifiers
- 3 New 2.4 MG BNR Basins (Anaerobic / Pre-Anoxic / Aeration)
- Existing Aeration Basins Reconfigured into 5-Stage Bardenpho Process
- New Primary Sludge Pump Station
- New Primary Clarifier Influent Splitter Box
- New BNR Blower Building
- New 50 MGD Tertiary Membrane Treatment Facility
- New 160 MGD MLSS Band Screen Facility (2-mm Screens)
- New UV Disinfection Facility
- Multiple Blower Upgrades and Associated Process Piping Modifications

Comparative Position Within Set "A"

Compared with A11.3 and A15, Alternative A14.1 requires less site area and fewer new treatment structures but introduces greater sequencing complexity due to the need to modify existing biological treatment facilities while maintaining operations. Compared with A14.2, the overall process configuration is similar, but the site layout offers fewer opportunities for construction staging and process isolation. Its primary sequencing advantage is reduced need for large new treatment facilities, while its primary sequencing challenge is coordinating biological process conversions and membrane startup without impacting permit compliance.

Construction Sequencing Concept

Phase 1 – Site Development and Headworks Improvements

Construct improvements with minimal impact to active treatment processes:

- Expand influent screening facilities.
- Upgrade grit removal facilities with new headcell technology.
- Install underground utilities and process piping.
- Construct new primary clarifier splitter box.
- Begin construction of new primary clarifiers.
- Construct new primary sludge pump station.
- Construct BNR blower building.

Purpose

Establish hydraulic capacity and process infrastructure needed for expansion while maintaining existing treatment operations and minimizing disruption to permit compliance.

Phase 2 – New Biological Process Facilities

Construct treatment facilities that can be developed independently of existing aeration basin operations:

- Construct three new 2.4 MG anaerobic/pre-anoxic/aeration basins.
- Install blower systems, instrumentation, and process controls.
- Complete biological process piping and internal recycle infrastructure.
- Upgrade existing blower facilities.

Purpose

Create sufficient new biological treatment capacity so that portions of the existing aeration basin system can later be removed from service and converted into the 5-Stage Bardenpho process. This phase helps minimize temporary treatment impacts.

Phase 3 – Membrane Treatment Facilities

Construct new tertiary membrane facilities prior to major biological process conversions:

- Construct 50 MGD tertiary membrane treatment facility.
- Construct 160 MGD MLSS band screen facility.
- Complete membrane air systems, instrumentation, controls, and process piping.
- Construct associated electrical systems and standby provisions.

Purpose

Bring membrane facilities substantially to completion before significant modifications are made to existing process trains. This reduces schedule risk and allows membrane startup to occur as a controlled event later in the project.

Phase 4 – Biological Conversion and Facility Cutovers

Transition existing facilities into the final 5-Stage Bardenpho configuration:

- Rehabilitate existing aeration basins.
- Convert existing basins into aeration, post-anoxic, and post-aeration zones.
- Bring new primary clarifiers online.
- Transition flows from existing primary clarifiers.
- Commission upgraded blower systems.

Purpose

Implement the final biological process configuration while maintaining available treatment capacity throughout the transition. Sequencing of basin conversions should occur incrementally to avoid loss of treatment capability.

Phase 5 – Membrane Startup and Optimization

Transition treatment flow through the membrane system:

- Commission MLSS screening facilities.
- Commission membrane treatment facilities.
- Optimize membrane operations.
- Commission UV disinfection facilities.
- Conduct process performance testing.

Purpose

Maintain permit compliance while transitioning to membrane treatment and achieving stable process performance before major demolition activities proceed. Membrane startup represents the most critical operational transition in this alternative.

Phase 6 – Demolition and Final Integration

- Demolish existing primary clarifiers.
- Demolish abandoned aeration basin facilities.
- Complete final site grading and paving.
- Complete SCADA integration and operator training.
- Conduct acceptance testing and performance verification.

Purpose

Finalize the site configuration and transition from construction mode to long-term operation while minimizing impacts on facility staff and plant reliability.

Alternative A14.2

50 MGD 5-Stage Bardenpho Process with Tertiary Membranes (Alternative Layout)

Alternative A14.2 offers the most favorable construction sequencing approach among the Set "A" alternatives because it combines the footprint advantages of membrane technology with an optimized facility arrangement that improves construction staging, reduces interference with existing operations, and minimizes dependence on adjacent property.

Preliminary Sequencing Risk Rating

Low to Moderate

Key Sequencing Advantages

- Optimized site layout improves construction access and staging.
- Minimal dependence on adjacent parcel development and utility crossings.
- Eliminates need for construction of new secondary clarifiers.
- Eliminates need for deep bed denitrifying filter construction and startup.
- Improved separation between existing operations and new construction activities compared to A14.1.
- Reduced overall site congestion during construction.

Key Sequencing Challenges

- Existing aeration basins must remain operational during conversion to the 5-Stage Bardenpho configuration.
- Membrane treatment facilities must be integrated and commissioned within an active treatment plant.
- Existing primary clarifiers must remain online until replacement facilities are operational.
- Requires coordinated startup of membrane treatment and MLSS screening facilities.
- Successful implementation depends on careful sequencing of process conversions and flow transitions.

Process Improvement Summary

Total Major New Process Facilities

- 5 New Primary Clarifiers
- 3 New 2.47 MG BNR Basins (Anaerobic / Pre-Anoxic / Aeration)
- Existing Aeration Basins Reconfigured into 5-Stage Bardenpho Process
- New Primary Sludge Pump Station
- New Primary Clarifier Influent Splitter Box
- New BNR Blower Building
- New 50 MGD Tertiary Membrane Treatment Facility
- New 160 MGD MLSS Band Screen Facility (2-mm Screens)
- New UV Disinfection Facility
- Multiple Blower Upgrades and Associated Process Piping Modifications

Comparative Position Within Set "A"

Compared with A11.3 and A15, Alternative A14.2 significantly reduces the amount of new conventional treatment infrastructure requiring construction and startup. Compared with A14.1, the optimized layout improves facility arrangement, staging opportunities, and isolation between construction activities and existing treatment operations. Its primary sequencing advantage is improved constructability through site layout optimization, while its primary sequencing challenge remains the startup and integration of membrane treatment technology.

Construction Sequencing Concept

Phase 1 – Site Development and Headworks Improvements

Construct improvements that can be completed with minimal impact to active treatment facilities:

- Expand influent screening facilities.
- Upgrade grit removal facilities with new headcell technology.
- Install site utilities and underground piping.
- Construct new primary clarifier splitter box.
- Construct five new primary clarifiers.
- Construct primary sludge pump station.
- Construct BNR blower building and associated electrical facilities.

Purpose

Establish hydraulic and process infrastructure needed to support future treatment expansions while maintaining uninterrupted plant operations and permit compliance.

Phase 2 – New Biological Process Facilities

Construct independent biological treatment facilities:

- Construct three new 2.47 MG anaerobic/pre-anoxic/aeration basins.
- Install process piping, controls, instrumentation, and internal recycle systems.
- Complete blower upgrades.
- Prepare new facilities for startup.

Purpose

Provide sufficient biological treatment capacity to enable subsequent modification and conversion of existing aeration basins with minimal treatment disruption. This phase minimizes operational risk while building future treatment capacity.

Phase 3 – Membrane Treatment Facilities

Construct and prepare the membrane treatment system:

- Construct 50 MGD membrane treatment facility.
- Construct 160 MGD MLSS screening facility.
- Install membrane air systems and electrical systems.
- Complete instrumentation and SCADA integration.
- Complete process piping and controls.

Purpose

Complete membrane facilities before major process cutovers occur. The optimized A14.2 layout provides improved staging and access during this phase compared to A14.1.

Phase 4 – Biological Conversion and Facility Cutovers

Convert existing facilities into the final 5-Stage Bardenpho configuration:

- Rehabilitate existing aeration basins.
- Convert basins into aeration, post-anoxic, and post-aeration zones.
- Bring new primary clarifiers into service.
- Transfer flow from existing primary clarification facilities.
- Commission upgraded biological treatment systems.

Purpose

Implement the final biological treatment configuration while maintaining available treatment capacity and minimizing risk to permit compliance. Basin conversions should occur incrementally to preserve operational flexibility.

Phase 5 – Membrane Startup and Process Optimization

- Commission MLSS band screening facilities.
- Start up membrane treatment facilities.
- Transition process flow through membrane treatment.
- Commission UV disinfection facilities.
- Optimize membrane and biological treatment performance.
- Conduct process performance testing.

Purpose

Achieve stable process performance prior to major demolition activities. The improved site arrangement provides greater flexibility during startup and troubleshooting compared to the A14.1 configuration.

Phase 6 – Demolition and Final Integration

- Demolish existing primary clarifiers.
- Demolish abandoned aeration basin facilities.
- Complete final grading and paving.
- Complete final SCADA integration.
- Conduct operator training and system acceptance testing.
- Achieve substantial completion.

Purpose

Finalize the site layout and transition the facility to long-term operation with minimal disruption to plant operations and staff.

Alternative A15

50 MGD 5-Stage Bardenpho Process with Deep Bed Denitrifying Sand Filters

Alternative A15 provides a relatively straightforward construction sequencing approach because most major treatment facilities can be constructed independently of existing treatment operations. However, it requires the largest overall amount of new infrastructure, the greatest biological treatment footprint, and the most extensive site development effort among the Set "A" alternatives.

Preliminary Sequencing Risk Rating

Moderate

Key Sequencing Advantages

- Most major treatment facilities can be constructed independent of existing operations.
- Utilizes conventional and familiar treatment technologies.
- Avoids membrane startup and membrane O&M transition risks.
- New primary, biological, secondary, and tertiary facilities can generally be commissioned before major cutovers occur.
- Provides significant flexibility for future expansion and future regulatory compliance.

Key Sequencing Challenges

- Largest overall amount of new infrastructure among the Set "A" alternatives.
- Greater dependence on adjacent parcel development and airport easement coordination.
- Construction of twelve new BNR basins requires substantial site development and utility extensions.
- Deep bed filter and UV cutovers must maintain permit compliance.
- Significant coordination required between new and rehabilitated secondary clarification facilities.

Process Improvement Summary

Total Major New Process Facilities

- 5 New Primary Clarifiers
- 12 New 2.4 MG 5-Stage Bardenpho Basins
- New Primary Sludge Pump Station
- New Primary Clarifier Influent Splitter Box
- 3 New Secondary Clarifiers
- Rehabilitate 5 Existing Secondary Clarifiers and RAS/WAS Pumps
- New Secondary Clarifier Influent Splitter Box
- New RAS/WAS Pump Station
- New BNR Blower Building
- New 115 MGD Deep Bed Denitrifying Filter Facility
- New UV Disinfection Facility
- 3 New Scum Pump Stations and Associated Process Piping Facilities

Comparative Position Within Set "A"

Compared with A11.3, Alternative A15 requires a larger biological treatment footprint and greater infrastructure investment but provides additional biological treatment volume and operational flexibility through the 5-Stage Bardenpho configuration. Compared with A14.1 and A14.2, A15 eliminates the need for membrane treatment facilities and associated operational transition risks but requires considerably more site area and construction activity. Its primary sequencing advantage is the ability to build most facilities independently of existing operations, while its primary sequencing challenge is the scale of construction required to fully implement the expansion.

Construction Sequencing Concept

Phase 1 – Site Development and Capacity Improvements

Construct facilities that can be developed independently of the existing treatment process:

- Expand influent screening facilities.
- Upgrade grit removal facilities with new headcell technology.
- Construct primary clarifier influent splitter box.
- Construct five new primary clarifiers.
- Construct primary sludge pump station.
- Install major underground utilities and process piping.
- Construct BNR blower building and associated electrical facilities.

Purpose

Establish hydraulic handling capacity and supporting infrastructure needed for future treatment expansion while minimizing impacts to active plant operations.

Phase 2 – Major Biological Treatment Expansion

Construct the new biological treatment complex:

- Construct twelve new 2.4 MG 5-Stage Bardenpho basins.
- Install process air systems.
- Complete biological treatment piping and instrumentation.
- Complete internal recycle pumping and process controls.

Purpose

Provide full biological treatment capacity for future 50 MGD operation while maintaining uninterrupted use of the existing biological treatment process. This phase represents the largest construction effort within Alternative A15.

Phase 3 – Clarification Expansion

Construct and rehabilitate clarification facilities:

- Construct three new 150-foot secondary clarifiers.
- Construct secondary clarifier influent splitter box.
- Construct new RAS/WAS pump station.
- Construct scum pump stations.
- Rehabilitate five existing secondary clarifiers and associated pumping facilities.

Purpose

Provide full secondary clarification capacity prior to process cutovers and ensure adequate solids handling capacity for future flows.

Phase 4 – Tertiary Treatment and Disinfection

Construct tertiary treatment facilities:

- Construct 115 MGD deep bed denitrifying filter facility.

- Construct new UV disinfection system.
- Install tertiary process controls and instrumentation.
- Complete effluent conveyance improvements.

Purpose

Establish tertiary treatment and disinfection capacity before transition into the new process train. Maintaining parallel operation of existing and new tertiary systems may be required during startup and optimization.

Phase 5 – Process Cutover and Startup

Transition operations into the new treatment facilities:

- Place new primary clarifiers into operation.
- Commission 5-Stage Bardenpho basins.
- Transition flow into new and rehabilitated secondary clarifiers.
- Commission RAS/WAS systems.
- Commission deep bed denitrifying filters.
- Commission UV disinfection system.
- Conduct process optimization and performance testing.

Purpose

Maintain permit compliance while transitioning from existing facilities to the final treatment configuration. Process startup should occur incrementally to avoid simultaneous commissioning of multiple critical treatment systems.

Phase 6 – Final Integration and Site Restoration

- Demolish facilities no longer required.
- Complete final paving and grading.
- Complete SCADA integration.
- Conduct operator training.
- Perform acceptance and performance testing.
- Achieve substantial completion.

Purpose

Finalize facility improvements and transition the expanded South Cobb WRF into long-term operation while minimizing impacts to plant staff and ongoing operations.

Alternative A11.3

50 MGD 4-Stage Bardenpho Process with Deep Bed Denitrifying Filters

Alternative A11.3 provides favorable site utilization characteristics because most major treatment facilities can be constructed in new, independent work zones with limited interaction with existing treatment operations. However, the alternative requires significant overall site area, substantial contractor laydown and staging requirements, and likely utilization of the adjacent CCWS property to fully accommodate the new biological treatment, clarification, filtration, and support facilities.

One-Line Takeaway

A11.3 provides good separation between construction and ongoing operations and is expected to accommodate approximately 70-80% of construction activities within the existing South Cobb WRF property; however, an estimated 8-12 acres of adjacent CCWS-owned property would likely be required for contractor staging, laydown areas, utility corridors, and future treatment facilities.

Preliminary Site Utilization Rating

Moderate

Key Site Utilization Advantages

- Most new facilities can be constructed outside active treatment operations.
- Large portions of the work can occur in dedicated construction zones.
- Conventional treatment facilities are generally easier to stage and construct than membrane systems.
- New facilities can be brought online before significant process cutovers occur.
- Provides flexibility for construction access routes and material deliveries.

Key Site Utilization Challenges

- Requires one of the larger overall footprints within the Set "A" alternatives.
- Likely requires utilization of adjacent CCWS property for full implementation.
- Large excavation program associated with BNR basins, clarifiers, filters, and process piping.
- Significant contractor laydown, equipment staging, and material storage areas required throughout construction.
- Construction traffic volumes likely greater than membrane alternatives due to increased concrete, excavation, and structural work.

Process Improvement Summary

Total Major New Process Facilities

- 5 New Primary Clarifiers
- 10 New 2.67 MG 4-Stage Bardenpho Basins
- New Primary Sludge Pump Station
- New Primary Clarifier Influent Splitter Box
- 3 New Secondary Clarifiers
- Rehabilitate 5 Existing Secondary Clarifiers and RAS/WAS Pumps
- New Secondary Clarifier Influent Splitter Box
- New RAS/WAS Pump Station
- New BNR Blower Building
- New 115 MGD Deep Bed Denitrifying Filter Facility
- New UV Disinfection Facility
- 3 New Scum Pump Stations and Associated Process Piping Facilities
- Headworks screening expansion and grit system upgrades.

Comparative Position Within Set "A"

Compared with A14.1 and A14.2, Alternative A11.3 requires considerably more site area and contractor work space because of the addition of new secondary clarifiers and deep bed filtration facilities. However, unlike the membrane alternatives, most facilities can be constructed in independent work areas, reducing interference with active treatment operations. Compared with A15, A11.3 requires less biological treatment volume and a smaller overall footprint while maintaining similar treatment philosophy and site development approaches. Its primary site utilization advantage is work-zone separation from active operations, while its primary challenge is the amount of land area required to construct the new conventional treatment facilities.

Site Utilization Impact Assessment

Existing Facility Operations

The A11.3 layout generally allows the majority of new facilities to be developed without significant encroachment into existing treatment operations. Existing biological treatment facilities can remain operational for much of the construction period, reducing risk to permit compliance and minimizing operational disruptions. This separation between construction and operations is one of the primary site utilization advantages of A11.3.

Purpose

Maintain existing plant operations while creating dedicated work zones for contractors and construction activities.

Construction Staging and Laydown Areas

The volume of new infrastructure associated with A11.3 will require substantial contractor support space throughout construction.

Expected requirements include:

- Contractor office trailers.
- Construction worker parking.
- Equipment staging areas.
- Pipe and materials storage.
- Reinforcing steel storage.
- Structural steel laydown.
- Temporary dewatering areas.
- Temporary utility connections.

Based upon the overall scope of facilities, it is reasonable to assume that approximately **8 to 12 acres** of temporary construction support area may be required at peak construction. Some portion of this area will likely need to occur on the adjacent CCWS property to avoid conflicts with ongoing facility operations.

Purpose

Provide sufficient contractor workspace without restricting access to critical treatment facilities.

Adjacent Property Utilization

Alternative A11.3 will likely require substantial use of the adjacent CCWS-owned parcel for:

- New BNR facilities.
- Construction access.
- Temporary staging.
- Utility corridor development.
- Future expansion flexibility.

This reliance is significantly less than A15 but notably greater than either membrane alternative. Utilization of the adjacent property may also improve sequencing flexibility by allowing separation between active operations and construction zones.

Purpose

Reduce congestion within the existing treatment plant while maintaining safe construction access.

Environmental and Permitting Considerations

Potential site-development considerations that should be evaluated during future design include:

- Proximity to the Chattahoochee River corridor.
- Temporary erosion and sedimentation control requirements.
- Wetland impact avoidance.
- Utility relocations.
- Tree clearing and grading.
- Stormwater management modifications.
- Construction access permitting.
- Temporary dewatering requirements.

Because A11.3 involves extensive new excavation and earthwork activities, permitting complexity is expected to be greater than for the membrane alternatives but less than the larger A15 buildout.

Purpose

Maintain regulatory compliance while minimizing environmental impacts associated with facility expansion.

Community and Traffic Considerations

Construction of A11.3 will generate significant truck traffic associated with:

- Concrete deliveries.
- Excavation and backfill activities.
- Process equipment deliveries.
- Structural components.
- Deep bed filter construction.

However, because most facilities can be located within dedicated work zones, construction traffic can largely be isolated from daily plant operations. Traffic impacts are expected to be moderate compared with the larger A15 alternative.

Purpose

Maintain reliable plant access while supporting the large volume of construction activity associated with expansion.

Alternative A14.1

50 MGD 5-Stage Bardenpho Process with Tertiary Membranes

Alternative A14.1 provides one of the smallest overall site footprints among the Set "A" alternatives by maximizing reuse of existing treatment infrastructure and eliminating the need for new secondary clarifiers and deep bed filtration facilities. However, this footprint advantage comes at the cost of increased interaction between construction activities and active plant operations due to rehabilitation of existing treatment facilities and implementation of membrane technology within the operating plant.

One-Line Takeaway

A14.1 minimizes overall site requirements and may accommodate approximately 90-95% of construction activities within the existing South Cobb WRF footprint; however, an estimated 2-5 acres of temporary contractor staging, parking, and laydown area may still be beneficial to reduce conflicts between construction activities and ongoing plant operations.

Preliminary Site Utilization Rating

Low

Key Site Utilization Advantages

- Smallest overall footprint among the Set "A" alternatives.
- Minimal dependence on adjacent CCWS property.
- Eliminates construction of new secondary clarifiers.
- Eliminates large deep bed filtration facilities.
- Maximizes use of existing plant infrastructure.
- Reduces long-term site development requirements compared with A11.3 and A15.

Key Site Utilization Challenges

- Construction activities occur closer to active treatment operations.
- Existing aeration basin rehabilitation reduces flexibility for contractor access and staging.
- Membrane facilities require concentrated construction activity in an already developed portion of the site.
- Contractor laydown and material storage areas may compete with operational access routes.
- Temporary operations support facilities may be required during aeration basin conversions and demolition activities.

Process Improvement Summary

Total Major New Process Facilities

- 5 New Primary Clarifiers
- 3 New 2.4 MG BNR Basins (Anaerobic / Pre-Anoxic / Aeration)
- Existing Aeration Basins Reconfigured into 5-Stage Bardenpho Process
- New Primary Sludge Pump Station
- New Primary Clarifier Influent Splitter Box
- New BNR Blower Building
- New 50 MGD Tertiary Membrane Treatment Facility
- New 160 MGD MLSS Band Screen Facility (2-mm Screens)
- New UV Disinfection Facility
- Multiple Blower Upgrades and Associated Process Piping Modifications

Comparative Position Within Set "A"

Compared with A11.3 and A15, Alternative A14.1 requires substantially less site area and reduces dependence on adjacent property, utility corridors, and airport-related considerations. Compared with A14.2, the treatment approach is effectively the same; however, the A14.1 layout provides less separation between construction zones and active treatment operations, reducing flexibility for contractor access and staging. Its primary site utilization advantage is minimizing overall footprint requirements, while its primary challenge is maintaining efficient construction access while major facility rehabilitation occurs within the existing plant footprint.

Site Utilization Impact Assessment

Existing Facility Operations

Alternative A14.1 relies heavily on reuse and modification of existing treatment facilities. As a result, construction activities will occur in close proximity to active operations throughout much of the project. Existing aeration basins, blower facilities, and process piping systems must remain accessible while portions of the treatment train are rehabilitated and converted into the final 5-Stage Bardenpho configuration.

Purpose

Maximize use of existing infrastructure while maintaining uninterrupted treatment operations and permit compliance.

Construction Staging and Laydown Areas

Because A14.1 minimizes new site development, available onsite staging space will be more limited than for A11.3 or A15.

Expected contractor requirements include:

- Temporary construction trailers.
- Construction worker parking.
- Membrane equipment staging.
- MLSS screening equipment storage.
- Process piping and electrical materials storage.
- Temporary utility facilities.
- Instrumentation and controls storage areas.

Based on the anticipated facility arrangement, approximately **2 to 5 acres** of temporary support area would likely be beneficial during peak construction activities. These areas could potentially be accommodated within portions of the existing facility property or adjacent CCWS-controlled property depending on final layout and construction phasing.

Purpose

Provide construction support space while minimizing interference with plant operations and routine maintenance activities.

Adjacent Property Utilization

One of the principal advantages of A14.1 is its reduced reliance on the adjacent parcel.

Potential uses of adjacent property may include:

- Temporary contractor parking.
- Equipment laydown.
- Material stockpiling.
- Temporary utility routing.

However, unlike A11.3 and A15, implementation of A14.1 is generally not dependent upon major treatment facilities being located outside the existing South Cobb WRF footprint.

Purpose

Provide supplemental construction support space rather than core treatment infrastructure.

Environmental and Permitting Considerations

Because A14.1 minimizes new site development, environmental impacts are expected to be lower than the conventional expansion alternatives.

Potential considerations include:

- Temporary erosion and sedimentation controls.
- Utility relocations.
- Demolition waste management.
- Stormwater management modifications.
- Chattahoochee River corridor proximity.
- Construction dewatering associated with new structures.

The reduced amount of new excavation and grading may lower permitting complexity relative to A11.3 and A15.

Purpose

Limit environmental impacts while supporting facility expansion and modernization.

Community and Traffic Considerations

Compared with A11.3 and A15, Alternative A14.1 is expected to generate lower overall construction traffic because of the smaller volume of earthwork, concrete placement, and new treatment structures.

Primary construction traffic sources include:

- Membrane equipment deliveries.
- Mechanical and electrical equipment deliveries.
- Process piping and structural materials.
- Demolition activities.
- Routine contractor access.

Although construction traffic volumes are expected to be moderate, impacts within the existing plant footprint may be more concentrated due to the compact nature of the project layout.

Purpose

Maintain operational access while accommodating construction activities within a constrained project footprint.

Alternative A14.2

50 MGD 5-Stage Bardenpho Process with Tertiary Membranes (Alternative Layout)

Alternative A14.2 provides the most efficient overall site utilization among the Set "A" alternatives because it combines the compact footprint advantages of membrane technology with an improved facility layout that enhances construction staging, contractor access, operational separation, and long-term flexibility when compared to A14.1.

One-Line Takeaway

A14.2 offers the most efficient use of the existing South Cobb WRF property and is expected to accommodate approximately 90-95% of construction activities within the existing site; only 1-3 acres of adjacent property would likely be needed for temporary staging, contractor parking, and laydown activities.

Preliminary Site Utilization Rating

Very Low

Key Site Utilization Advantages

- Most efficient overall site utilization among the Set "A" alternatives.
- Minimal dependence on adjacent CCWS property.
- Improved separation between construction zones and active treatment operations compared to A14.1.
- Eliminates new secondary clarifiers and deep bed filtration facilities.
- Compact footprint minimizes clearing, grading, and site disturbance.
- Improved facility arrangement creates better contractor access and future maintenance access.

Key Site Utilization Challenges

- Existing aeration basin rehabilitation still occurs within active plant operations.
- Membrane facilities require concentrated construction activity in constrained work areas.
- Contractor laydown areas remain limited relative to A11.3 and A15.
- Future expansion opportunities may be somewhat more constrained due to the efficient site buildout.
- Construction traffic will remain concentrated within existing plant access corridors.

Process Improvement Summary

Total Major New Process Facilities

- 5 New Primary Clarifiers
- 3 New 2.47 MG BNR Basins (Anaerobic / Pre-Anoxic / Aeration)
- Existing Aeration Basins Reconfigured into 5-Stage Bardenpho Process
- New Primary Sludge Pump Station
- New Primary Clarifier Influent Splitter Box
- New BNR Blower Building
- New 50 MGD Tertiary Membrane Treatment Facility
- New 160 MGD MLSS Band Screen Facility (2-mm Screens)
- New UV Disinfection Facility
- Multiple Blower Upgrades and Associated Process Piping Modifications

Comparative Position Within Set "A"

Compared with A11.3 and A15, Alternative A14.2 requires substantially less land area, less excavation, fewer large process structures, and significantly less dependence on adjacent property. Compared with A14.1, the treatment process is essentially identical; however, the facility arrangement provides improved construction staging, reduced operational conflicts, and more efficient access throughout the project. Its primary site utilization advantage is maximizing use of the existing site while minimizing impacts to ongoing operations, while its primary challenge is maintaining flexibility for future plant modifications within a compact overall footprint.

Site Utilization Impact Assessment

Existing Facility Operations

Alternative A14.2 was specifically developed to improve upon the site arrangement associated with A14.1. The revised layout creates improved separation between active treatment operations and proposed construction work zones, reducing the potential for conflicts between construction personnel and plant operators. Existing treatment systems remain heavily utilized, but construction impacts can be more effectively isolated.

Purpose

Maximize operational continuity while reducing interference between construction activities and routine plant maintenance.

Construction Staging and Laydown Areas

Construction support requirements include:

- Contractor office trailers.
- Construction worker parking.
- Membrane equipment staging.
- MLSS screening equipment storage.
- Electrical and controls storage.
- Process piping laydown areas.
- Temporary utility facilities.

Due to the improved facility arrangement, A14.2 is expected to require less temporary construction support area than A14.1. Approximately **1 to 3 acres** of temporary contractor support space is anticipated during peak construction activities. Portions of this support area may be accommodated within existing plant property while preserving access to critical process facilities.

Purpose

Provide sufficient contractor workspace while minimizing the need for offsite staging areas and reducing disruption to plant operations.

Adjacent Property Utilization

Alternative A14.2 has the least dependence on adjacent property among the Set "A" alternatives. Potential uses of adjacent property may include:

- Temporary contractor parking.
- Limited equipment staging.
- Temporary material storage.
- Short-term construction support activities.

Unlike A11.3 and A15, major treatment facilities are generally not dependent upon development of the adjacent parcel. The property primarily provides operational flexibility rather than serving as a critical project component.

Purpose

Provide contingency construction support space while maximizing use of the existing South Cobb WRF footprint.

Environmental and Permitting Considerations

Because A14.2 minimizes new site development, potential environmental impacts are expected to be among the lowest of the Set "A" alternatives.

Potential considerations include:

- Temporary erosion and sedimentation control measures.
- Utility relocations.
- Construction dewatering.
- Stormwater management modifications.
- Chattahoochee River corridor proximity.
- Demolition waste handling and disposal.

Compared with A11.3 and A15, reduced excavation, grading, and site clearing requirements may simplify permitting and reduce environmental disturbance.

Purpose

Support facility expansion while minimizing environmental impacts and permitting complexity.

Community and Traffic Considerations

Alternative A14.2 is expected to generate lower construction traffic volumes than A11.3 and A15 because fewer major concrete structures are required and overall earthwork quantities are reduced.

Primary traffic sources include:

- Membrane equipment deliveries.
- Mechanical and electrical equipment deliveries.
- Construction workforce traffic.
- Process piping and structural material deliveries.
- Demolition and debris removal activities.

Because most construction activities occur within the existing plant footprint, contractor logistics must be carefully coordinated to avoid conflicts with plant operations. However, overall impacts to neighboring properties are expected to be lower than the conventional expansion alternatives.

Purpose

Maintain operational access and limit community impacts while supporting construction of the upgraded facility.

Alternative A15

50 MGD 5-Stage Bardenpho Process with Deep Bed Denitrifying Sand Filters

Alternative A15 requires the largest overall site commitment among the Set "A" alternatives because it incorporates the greatest biological treatment volume, the largest conventional treatment expansion, and the greatest amount of new infrastructure. However, this additional site commitment provides the highest level of operational redundancy, future expansion flexibility, and long-term regulatory compliance capability.

One-Line Takeaway

A15 requires the greatest amount of site development and is expected to accommodate approximately 60-70% of construction activities within the existing South Cobb WRF property; an estimated 10-15 acres of adjacent CCWS-owned property would likely be required for treatment facilities, contractor staging, laydown areas, utility corridors, future expansion reserves, and construction support functions.

Preliminary Site Utilization Rating

High

Key Site Utilization Advantages

- Provides the greatest long-term expansion flexibility among the Set "A" alternatives.
- Allows substantial separation between construction activities and active treatment operations.
- Provides abundant room for future process modifications and regulatory upgrades.
- Conventional treatment facilities are generally easier to operate, maintain, and access.
- Creates opportunities for dedicated maintenance, operations, and future expansion areas.

Key Site Utilization Challenges

- Largest footprint among the Set "A" alternatives.
- Most dependent on adjacent CCWS property utilization.
- Greatest amount of site clearing, grading, excavation, and utility installation.
- Largest contractor staging and laydown area requirements.
- Greater exposure to airport easement, utility corridor, and permitting coordination issues.

Process Improvement Summary

Total Major New Process Facilities

- 5 New Primary Clarifiers
- 12 New 2.4 MG 5-Stage Bardenpho Basins
- New Primary Sludge Pump Station
- New Primary Clarifier Influent Splitter Box
- 3 New Secondary Clarifiers
- Rehabilitate 5 Existing Secondary Clarifiers and RAS/WAS Pumps
- New Secondary Clarifier Influent Splitter Box
- New RAS/WAS Pump Station
- New BNR Blower Building
- New 115 MGD Deep Bed Denitrifying Filter Facility
- New UV Disinfection Facility
- 3 New Scum Pump Stations and Associated Process Piping Facilities

Comparative Position Within Set "A"

Compared with A11.3, Alternative A15 requires a larger treatment footprint, more biological process volume, and more extensive site development but provides additional regulatory and operational flexibility. Compared with A14.1 and A14.2, A15 requires substantially more land area and construction support space but offers the greatest long-term capacity for future expansion and process modifications. Its primary site utilization advantage is long-term flexibility and operational separation, while its primary challenge is the amount of land and construction support area required to fully implement the expansion.

Site Utilization Impact Assessment

Existing Facility Operations

Alternative A15 allows a significant percentage of construction activities to occur outside existing treatment operations because most major facilities are constructed as entirely new process units. This reduces operational conflicts during construction and allows substantial portions of the plant to remain in service until final process cutovers occur.

Purpose

Maintain plant reliability and permit compliance while constructing the ultimate conventional treatment buildout.

Construction Staging and Laydown Areas

A15 will require the largest contractor support area among the Set "A" alternatives due to the scale of the project.

Expected requirements include:

- Contractor office complexes.
- Construction worker parking.
- Large equipment staging areas.
- Structural steel and reinforcing steel laydown.
- Pipe and valve storage.
- Deep bed filter equipment staging.
- Temporary dewatering areas.
- Excavation stockpile areas.
- Temporary utility facilities.
- Concrete batch support areas if required.

Based on the volume of new infrastructure, approximately **10 to 15 acres** of temporary construction support area may be required during peak construction. Significant portions of this area will likely need to occur on adjacent CCWS property.

Purpose

Provide sufficient contractor workspace while preventing congestion within active plant operations.

Adjacent Property Utilization

Alternative A15 is expected to have the greatest reliance on adjacent property among the Set "A" alternatives.

Potential uses include:

- New BNR basin construction.
- Utility corridor development.
- Contractor parking.
- Material stockpiling.
- Equipment staging.
- Future treatment facility expansion.
- Long-term operational support areas.

Unlike the membrane alternatives, utilization of the adjacent parcel is likely fundamental to efficient implementation of A15. The property functions as both a construction support area and a future treatment expansion area.

Purpose

Provide sufficient area to accommodate the ultimate facility buildout while maintaining operational separation between construction and treatment activities.

Environmental and Permitting Considerations

Because A15 represents the largest expansion footprint, environmental and permitting considerations are expected to be greater than the other Set "A" alternatives.

Potential considerations include:

- Proximity to the Chattahoochee River corridor.
- Wetland avoidance and mitigation.
- Erosion and sedimentation control.
- Tree clearing and grading.
- Stormwater management revisions.
- Utility relocations.
- Construction dewatering.
- Floodplain evaluations.
- Airport easement coordination.
- Additional environmental permitting associated with extensive site development.

Purpose

Manage environmental compliance while supporting the largest proposed treatment expansion program.

Community and Traffic Considerations

Alternative A15 is expected to generate the highest overall construction traffic volume among the Set "A" alternatives.

Primary traffic sources include:

- Mass excavation activities.
- Concrete deliveries.
- Structural steel deliveries.
- Mechanical equipment deliveries.
- Deep bed filter equipment deliveries.
- Utility construction activities.
- Contractor workforce traffic.

Although overall traffic volumes will be greater than the other alternatives, the larger project footprint may provide more opportunities to separate contractor traffic from daily plant operations. Neighbor and corridor impacts will need to be carefully managed throughout construction.

Purpose

Maintain safe plant access while supporting a large-scale multi-year construction program.

Alternative A11.3 - 50 mgd MMADF 4-Stage BNR with Clarifiers on New Site					
Item No.	Work Process Description	Unit Process Major Equipment			
		Units	Quantity	Unit Price	Total Costs
1	Septage Receiving	LS	1	$ 8,000,000.00	**$ 8,000,000.00**
2	Influent Screening 10 mgd Capacity Expansion	LS	1	$ 1,300,000.00	**$ 1,300,000.00**
3	50 mgd Ugrade to Influent Grit Removal System	LS	1	$ 17,500,000.00	**$ 17,500,000.00**
4	New Primary Clarifier Influent Splitter Box	LS	1	$ 2,000,000.00	**$ 2,000,000.00**
5	New 110' Circular Primary Clarifiers	EA	5	$ 4,400,000.00	**$ 22,000,000.00**
6	New 42" Diam. MLSS New Clarifier Inf Piping	LF	500	$ 3,000.00	**$ 1,500,000.00**
7	New Primary Clarifier Sludge and Scum Pump Station	EA	5	$ 3,000,000.00	**$ 15,000,000.00**
8	Demolition of 5 Existing Primary Clarifiers/Pumps	LS	1	$ 2,500,000.00	**$ 2,500,000.00**
9	Modifications to Inf. & Eff. Prim. Clar. Channels	LS	1	$ 2,200,000.00	**$ 2,200,000.00**
10	2 New 60" Diam. Prim. Eff. Pipes To New Aeration Basins	LF	1000	$ 4,500.00	**$ 4,500,000.00**
11	Demolition of Abandoned RAS Tanks and EQ Basin	LS	1	$ 3,000,000.00	**$ 3,000,000.00**
12	New Aeration Basin Influent Splitter Box	LS	1	$ 3,000,000.00	**$ 3,000,000.00**
13	New Offsite 4-stage Biological Nutrient Removal Basins	MG	26.6	$ 3,000,000.00	**$ 79,687,500.00**
14	New Offsite Aeration Basin Aeration System and Piping	EA	12	$ 300,000.00	**$ 3,600,000.00**
15	New Offsite Anoxic Zone Mixers	EA	48	$ 40,000.00	**$ 1,920,000.00**
16	New Offsite 12 mgd NRCY Pumps and Piping	EA	10	$ 500,000.00	**$ 5,000,000.00**
17	New 325 Hp Offsite Aeration Basin Blowers	EA	13	$ 1,350,000.00	**$ 17,550,000.00**
18	New Offsite Blower Building with Electrical	SF	6,000	$ 250.00	**$ 1,500,000.00**
19	New Offsite SST Blower Piping, Meters, and Valves	EA	12	$ 450,000.00	**$ 5,400,000.00**
20	New AB 60" Diam. MLSS Piping to Existing AB Inf Channel	LF		$ 10,000.00	**$ -**
23	Existing AB 60" Diam Eff, Piping to New Clarifies Splitter Box	LS	700	$ 6,000.00	**$ 4,200,000.00**
24	New Clarifier MLSS Influent Splitter Structure	LS	1	$ 1,500,000.00	**$ 1,500,000.00**
25	New 42" Diam. MLSS New Clarifier Inf Piping	LS	500	$ 3,000.00	**$ 1,500,000.00**
26	3 New 150' Diam. Secondary Clarifers	EA	3	$ 5,000,000.00	**$ 15,000,000.00**
27	New RAS/WAS PS and Pumps for New Clarifiers	LS	1	$ 1,000,000.00	**$ 1,000,000.00**
28	New RAS/WAS Pump Building	SF	800	$ 250.00	**$ 200,000.00**
29	New Clarifier Scum pumps	EA	3	$ 450,000.00	**$ 1,350,000.00**
30	Rehab of 5 Existing Secondary Clarifiers/RAS/WAS Pumps	EA	5	$ 1,500,000.00	**$ 7,500,000.00**
31	New 42" Diam. Secondary Effluent Piping	LF	150	$ 4,500.00	**$ 675,000.00**
32	New 60" Diam. Secondary Effluent Piping to New Effluent Filters	LF	1,200	$ 6,000.00	**$ 7,200,000.00**
33	Tie Existing Secondary Effluent Piping to New Effluent Filters	LS	1	$ 500,000.00	**$ 500,000.00**
34	New 42" RAS Piping from New Clarfiers to ABs Inf. Spitter Box	LF	1,200	$ 4,500.00	**$ 5,400,000.00**
35	New 24" WAS Piping from New Clarifiers to Thickening System	LS	1,200	$ 2,400.00	**$ 2,880,000.00**
36	Demolition of 5 ExistingEffluent Filters	LS	1	$ 1,200,000.00	**$ 1,200,000.00**
37	New 125 mgd (Peak Flow) Denitrifying Deep Bed Sand Filters	LS	1	$ 18,400,000.00	**$ 18,400,000.00**
38	Expansion to Existing Chemical Feed and Storage System	LS	1	$ 1,000,000.00	**$ 1,000,000.00**
32	New 60" Diam. Secondary Effluent Piping to New Effluent Filters	LF	1,200	$ 6,000.00	**$ 7,200,000.00**
39	New In-line UV Disinfection System	LS	1	$ 1,000,000.00	**$ 1,000,000.00**
40	New In-Channel UV Disinfection System	LS	1	$ -	**$ -**
41	Site Work	AC	3	$ 100,000.00	**$ 300,000.00**
42	Stormwater	LS	per Alt	$ 1,500,000.00	**$ 1,500,000.00**
43	Roadway	SF	25,000	$ 25.00	**$ 625,000.00**
44	General Demolition	LS	per Alt	$ 500,000.00	**$ 500,000.00**
45	Electrical	LS	per Alt	$ 3,000,000.00	**$ 3,000,000.00**
46	I&C	LS	per Alt	$ 8,000,000.00	**$ 8,000,000.00**
				Subtotal Construction Costs	**$ 288,787,500.00**
32	Contractor Mobilization	%	Cap		$ 1,500,000.00
33	Contractor Bonds and Insurance	%	Cap		$ 3,000,000.00
34	Contractor Markups	%	20%		$ 58,657,500.00
35	Contingency	%	0%		$ -
				Subtotal Constractor Markup Costs	**$ 63,157,500.00**
				Total Construction Costs	**$ 351,945,000.00**
	Engineering Costs	%	6%		$ 21,116,700.00
				Total Project Costs	**$ 373,061,700.00**

Alternative A14 - 50 mgd MMADF 5-Stage BNR with Clarifiers on Existing Site					
Item No.	Work Process Description	Unit Process Major Equipment			
		Units	Quantity	Unit Price	Total Costs
1	Septage Receiving	LS	1	$ 8,000,000.00	**$ 8,000,000.00**
2	Influent Screening 10 mgd Capacity Expansion	LS	1	$ 1,300,000.00	**$ 1,300,000.00**
3	50 mgd Ugrade to Influent Grit Removal System	LS	1	$ 17,500,000.00	**$ 17,500,000.00**
4	New Primary Clarifier Influent Splitter Box	LS	1	$ 2,000,000.00	**$ 2,000,000.00**
5	New 110' Circular Primary Clarifiers	EA	5	$ 4,400,000.00	**$ 22,000,000.00**
6	New 42" Diam. MLSS New Clarifier Inf Piping	LF	500	$ 3,000.00	**$ 1,500,000.00**
7	New Primary Clarifier Sludge and Scum Pump Station	EA	5	$ 3,000,000.00	**$ 15,000,000.00**
8	Demolition of 5 Existing Primary Clarifiers/Pumps	LS	1	$ 2,500,000.00	**$ 2,500,000.00**
9	Modifications to Inf. & Eff. Prim. Clar. Channels	LS	1	$ 2,200,000.00	**$ 2,200,000.00**
10	2 New 60" Diam. Prim. Eff. Pipes To New Aeration Basins	LF	600	$ 4,500.00	**$ 2,700,000.00**
11	Demolition of Abandoned RAS Tanks and EQ Basin	LS	1	$ 1,000,000.00	**$ 1,000,000.00**
12	New Aeration Basin Influent Splitter Box	LS	1	$ 3,000,000.00	**$ 3,000,000.00**
13	New 5-stage Biological Nutrient Removal Basins	MG	4.2	$ 3,000,000.00	**$ 12,500,001.00**
14	New Aeration Basin Aeration System and Piping	EA	6	$ 300,000.00	**$ 1,800,000.00**
15	New Anaerobic Zone Mixers	EA	6	$ 40,000.00	**$ 240,000.00**
15	New Anoxic Zone Mixers	EA	10	$ 40,000.00	**$ 400,000.00**
15	New PostAnoxic Zone Mixers	EA	10	$ 40,000.00	**$ 400,000.00**
16	New 12 mgd NRCY Pumps and Piping	EA	10	$ 500,000.00	**$ 5,000,000.00**
17	New 550 Hp Aeration Basin Blowers	EA	6	$ 2,000,000.00	**$ 12,000,000.00**
18	New Blower Building with Electrical	SF	6,000	$ 250.00	**$ 1,500,000.00**
19	New SST Blower Piping, Meters, and Valves	EA	5	$ 650,000.00	**$ 3,250,000.00**
20	New AB 60" Diam. MLSS Piping to Existing AB Inf Channel	LF	50	$ 10,000.00	**$ 500,000.00**
21	Ugrades and Modifications to Existing ABs	EA	6	$ 500,000.00	**$ 3,000,000.00**
22	Ugrades and Expansions to Existing Aeration Basin Blowers	EA	7	$ 1,500,000.00	**$ 10,500,000.00**
34	New 42" RAS Piping from New Clarfiers to ABs Inf. Spitter Box	LF	1,200	$ 4,500.00	**$ 5,400,000.00**
35	New 24" WAS Piping from New Clarifiers to Thickening System	LS	1,200	$ 2,400.00	**$ 2,880,000.00**
14	New AB MLSS Piping to MBR Basin Influent Channel	LS	1	$ 220,000.00	**$ 220,000.00**
15	New MLSS Piping From Exist AB Eff Channel to MBR Inf. Channel	LS	1	$ 450,000.00	**$ 450,000.00**
16	New 160 mgd 2 mm MLSS Band Screen Screening Facility	LS	1	$ 12,000,000.00	**$ 12,000,000.00**
17	New 50 mgd 12 Train MBR Basin	LS	1	$ 5,000,000.00	**$ 5,000,000.00**
18	New MBR Equipment, Blowers, RAS/WAS/Pemiate Pumps	LS	1	$ 63,000,000.00	**$ 63,000,000.00**
19	New MBR Pump/Blower/Electrical Building	LS	1	$ 2,000,000.00	**$ 2,000,000.00**
38	Expansion to Existing Chemical Feed and Storage System	LS	1	$ 1,000,000.00	**$ 1,000,000.00**
39	New In-line UV Disinfection System	LS	1	$ 1,000,000.00	**$ 1,000,000.00**
40	New In-Channel UV Disinfection System	LS	1	$ -	**$ -**
41	Site Work	AC	3	$ 100,000.00	**$ 300,000.00**
42	Stormwater	LS	per Alt	$ 1,500,000.00	**$ 1,500,000.00**
43	Roadway	SF	25,000	$ 25.00	**$ 625,000.00**
44	General Demolition	LS	per Alt	$ 500,000.00	**$ 500,000.00**
45	Electrical	LS	per Alt	$ 3,000,000.00	**$ 3,000,000.00**
46	I&C	LS	per Alt	$ 8,000,000.00	**$ 8,000,000.00**
				Subtotal Construction Costs	**$ 236,665,001.00**
32	Contractor Mobilization	%	Cap		$ 1,500,000.00
33	Contractor Bonds and Insurance	%	Cap		$ 3,000,000.00
34	Contractor Markups	%	20%		$ 48,233,000.20
35	Contingency	%	0%		$ -
				Subtotal Constractor Markup Costs	**$ 52,733,000.20**
				Total Construction Costs	**$ 289,398,001.20**
	Engineering Costs	%	6%		$ 17,363,880.07
				Total Project Costs	**$ 306,761,881.27**

Alternative A15 - 50 mgd MMADF 5-Stage BNR with Clarifiers on New Site					
Item No.	Work Process Description	Unit Process Major Equipment			
		Units	Quantity	Unit Price	Total Costs
1	Septage Receiving	LS	1	$ 8,000,000.00	**$ 8,000,000.00**
2	Influent Screening 10 mgd Capacity Expansion	LS	1	$ 1,300,000.00	**$ 1,300,000.00**
3	50 mgd Ugrade to Influent Grit Removal System	LS	1	$ 17,500,000.00	**$ 17,500,000.00**
4	New Primary Clarifier Influent Splitter Box	LS	1	$ 2,000,000.00	**$ 2,000,000.00**
5	New 110' Circular Primary Clarifiers	EA	5	$ 4,400,000.00	**$ 22,000,000.00**
6	New 42" Diam. MLSS New Clarifier Inf Piping	LF	500	$ 3,000.00	**$ 1,500,000.00**
7	New Primary Clarifier Sludge and Scum Pump Station	EA	5	$ 3,000,000.00	**$ 15,000,000.00**
8	Demolition of 5 Existing Primary Clarifiers/Pumps	LS	1	$ 2,500,000.00	**$ 2,500,000.00**
9	Modifications to Inf. & Eff. Prim. Clar. Channels	LS	1	$ 2,200,000.00	**$ 2,200,000.00**
10	2 New 60" Diam. Prim. Eff. Pipes To New Aeration Basins	LF	600	$ 4,500.00	**$ 2,700,000.00**
11	Demolition of Abandoned RAS Tanks and EQ Basin	LS	1	$ 1,000,000.00	**$ 1,000,000.00**
12	New Aeration Basin Influent Splitter Box	LS	1	$ 3,000,000.00	**$ 3,000,000.00**
13	New Offsite 5-stage Biological Nutrient Removal Basins	MG	28.6	$ 3,000,000.00	**$ 85,937,500.00**
14	New Offsite Aeration Basin Aeration System and Piping	EA	14	$ 300,000.00	**$ 4,200,000.00**
15	New Offsite Anaerobic Zone Mixers	EA	28	$ 40,000.00	**$ 1,120,000.00**
15	New Offsite Anoxic Zone Mixers	EA	28	$ 40,000.00	**$ 1,120,000.00**
15	New Offsite Post Anoxic Zone Mixers	EA	28	$ 40,000.00	**$ 1,120,000.00**
16	New Offsite 12 mgd NRCY Pumps and Piping	EA	10	$ 500,000.00	**$ 5,000,000.00**
17	New 275 Hp Offsite Aeration Basin Blowers	EA	15	$ 1,150,000.00	**$ 17,250,000.00**
18	New Offsite Blower Building with Electrical	SF	6,000	$ 250.00	**$ 1,500,000.00**
19	New Offsite SST Blower Piping, Meters, and Valves	EA	14	$ 650,000.00	**$ 9,100,000.00**
20	New AB 60" Diam. MLSS Piping to Existing AB Inf Channel	LF	1,000	$ 10,000.00	**$ 10,000,000.00**
23	Existing AB 60" Diam Eff, Piping to New Clarifies Splitter Box	LS	700	$ 6,000.00	**$ 4,200,000.00**
24	New Clarifier MLSS Influent Splitter Structure	LS	1	$ 1,500,000.00	**$ 1,500,000.00**
25	New 42" Diam. MLSS New Clarifier Inf Piping	LS	500	$ 3,000.00	**$ 1,500,000.00**
26	3 New 150' Diam. Secondary Clarifers	EA	3	$ 5,000,000.00	**$ 15,000,000.00**
27	New RAS/WAS PS and Pumps for New Clarifiers	LS	1	$ 1,000,000.00	**$ 1,000,000.00**
28	New RAS/WAS Pump Building	SF	800	$ 250.00	**$ 200,000.00**
29	New Clarifier Scum pumps	EA	3	$ 450,000.00	**$ 1,350,000.00**
30	Rehab of 5 Existing Secondary Clarifiers/RAS/WAS Pumps	EA	5	$ 1,500,000.00	**$ 7,500,000.00**
31	New 42" Diam. Secondary Effluent Piping	LF	150	$ 4,500.00	**$ 675,000.00**
32	New 60" Diam. Secondary Effluent Piping to New Effluent Filters	LF	1,200	$ 6,000.00	**$ 7,200,000.00**
33	Tie Existing Secondary Effluent Piping to New Effluent Filters	LS	1	$ 500,000.00	**$ 500,000.00**
34	New 42" RAS Piping from New Clarfiers to ABs Inf. Spitter Box	LF	1,200	$ 4,500.00	**$ 5,400,000.00**
35	New 24" WAS Piping from New Clarifiers to Thickening System	LS	1,200	$ 2,400.00	**$ 2,880,000.00**
36	Demolition of 5 ExistingEffluent Filters	LS	1	$ 2,000,000.00	**$ 2,000,000.00**
37	New 125 mgd (Peak Flow) Denitrifying Deep Bed Sand Filters	LS	1	$ 18,400,000.00	**$ 18,400,000.00**
38	Expansion to Existing Chemical Feed and Storage System	LS	1	$ 1,000,000.00	**$ 1,000,000.00**
32	New 60" Diam. Secondary Effluent Piping to New Effluent Filters	LF	1,200	$ 6,000.00	**$ 7,200,000.00**
39	New In-line UV Disinfection System	LS	1	$ 1,000,000.00	**$ 1,000,000.00**
40	New In-Channel UV Disinfection System	LS	1	$ -	**$ -**
41	Site Work	AC	3	$ 100,000.00	**$ 300,000.00**
42	Stormwater	LS	per Alt	$ 1,500,000.00	**$ 1,500,000.00**
43	Roadway	SF	25,000	$ 25.00	**$ 625,000.00**
44	General Demolition	LS	per Alt	$ 500,000.00	**$ 500,000.00**
45	Electrical	LS	per Alt	$ 3,000,000.00	**$ 3,000,000.00**
46	I&C	LS	per Alt	$ 8,000,000.00	**$ 8,000,000.00**
				Subtotal Construction Costs	**$ 307,477,500.00**
32	Contractor Mobilization	%	Cap		$ 1,500,000.00
33	Contractor Bonds and Insurance	%	Cap		$ 3,000,000.00
34	Contractor Markups	%	20%		$ 62,395,500.00
35	Contingency	%	0%		$ -
				Subtotal Constractor Markup Costs	**$ 66,895,500.00**
				Total Construction Costs	**$ 374,373,000.00**
	Engineering Costs	%	6%		$ 22,462,380.00
				Total Project Costs	**$ 396,835,380.00**

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TECHNICAL MEMORANDUM

Technical Memorandum No. 3 – South Cobb WRF Initial Findings and Urgent Issues Report

PREPARED FOR:	Cobb County Water System (CCWS), South Cobb WRF Staff
PREPARED BY:	Ardurra
DISTRIBUTION:	CCWS Ardurra Project Team
PROJECT NUMBER:	2024-1468-00 (100368.01)
PROJECT NAME:	Facility Planning for South Cobb Water Reclamation Facility Program No. T3025
DATE:	July 7, 2025

1 Executive Summary

Following is an executive summary of the Technical Memorandum No. 3 – South Cobb Water Reclamation Facility (SCWRF) Initial Findings and Urgent Issues Report (TM3) highlighted during multiple site visits and records research on the SCWRF.

The following four items are recommended for urgent action. However, it should be noted that three of these four issues are interrelated (i.e. the following items: 2., 3., and 4.). The interconnectivity between each of these highlighted urgent issues will require further evaluation to help Cobb County Water System (CCWS) most effectively prioritize their address.

The four identified urgent items of concern are as follows:

1. **Stormwater:** A finalized "Condition and Performance Report" (CPR) is pending for the SCWRF site evaluation. Reports provided by plant staff and the CCWS Storm Water (SW) Division indicated that intermittent testing and monitoring had identified an elevated fecal presence in SW sampling. It is believed by staff that these elevated levels are associated with runoff that may be coming from offsite. The elevated fecal results are believed to come from one of the four offsite SW conveyance connection points located along the west and north boundaries of the SCWRF property. All SW from these offsite locations move through onsite piping with ultimate discharge into the Chattahoochee River. CCWS plant staff believe that this elevated fecal result may come from one of these four offsite connection points, raising this issue too urgent. It is recommended that CCWS initiate steps to confirm source confirmation and address or have all four offsite connections independently re-piped per the County MS4 NPDES permit requirements.

2. **Rags:** At the time of the initial site visits, CCWS had awarded the construction of South Cobb WRF Headworks Improvements – T3017. This project will remove the four climber screens and replace them with four new multi-rake screens and screenings diverter chutes with a 5th channel being prepped for future use and installation of a 5th climber screen. Current site assessments noted rags moving past the headworks through multiple processes downstream. Rag loading is believed to have increased following the startup of the South Cobb Tunnel Influent Lift Station (ILS) and is elevated when additional pumping capacity is initiated from the South Cobb Tunnel ILS. Rags not removed at the headworks move downstream and are collected in the aerated grit removal system, the primary clarification system, the secondary clarification system, within each step in the solids handling systems, and then also within the reuse water system. Once these new multi-rake screens and screenings diverter chutes are started up, and the existing system is purged of rags, the urgency of this concern should be reduced accordingly.
3. **Solids Management Pumps**: One of the first items identified by CCWS operations and maintenance (O&M) staff was the number of hours maintenance staff spend per day on the maintenance of the various solids' pumps located throughout the SCWRF. It was noted that, on average, each weekday, the RAS, WAS, and the three Centrifuge feed pumps each required half a day of maintenance. Reasons given for this maintenance included lack of effective grit removal in the aerated grit removal system, the lack of effective removal of solids through the Dissolved Air Flotation Thickener (DAFT) system, and the recycling of solids back to the head of the plant. Each of these concerns, combined with the lack of effective rag removal noted in item 2 above, are causing increased maintenance and each need to be addressed. In addition, the age and reliability of each of the centrifuge feed pumps adds to the urgency of this concern. It should be noted that CCWS has recently awarded a project to replace the DAFT system with a Rotary Drum Thickener (RDT) system to a consultant. Once this RDT project is completed it should increase the effectiveness of the removal of solids and minimize the recycling of solids back through the plant.
4. **Reuse Water System**: The impact of rags traversing the treatment systems and entering the plant reuse water pumping system was noted by maintenance staff as a recurring and compounding issue. Breaks in reuse piping around the secondary clarifiers 3, 4, and 5 have continued to increase, as has the difficulty in making reliable repairs. Rags that pass through the pumps and lodge in the piping system cause pressure spikes. These spikes reduce pipe structural integrity and then, over time, result in pipe breaks. Repairs made in the past have caused a domino effect of pipe breaks upstream/downstream highlighting the urgency of this concern.

Each of these items will be discussed in greater detail within this TM3 and within future TMs and CPRs. Other areas and items of concern have also been highlighted in TM3, that has not yet been elevated to the level of Urgent.

2 Introduction

The Cobb County Water System (CCWS) owns and operates four water reclamation facilities that serve major basins within the County and portions of neighboring counties. The South Cobb Water Reclamation Facility (SCWRF) is located on the Chattahoochee River just north of where the river crosses I-20 on the west side of Atlanta. This permitted 40 MGD, monthly average, facility serves the southwestern quadrant of Cobb County, including portions of the Cities of Marietta and Smyrna; the Cities of Austell, Mableton, and Powder Springs; as well as areas outside of the county in Douglas and Paulding Counties.

The purpose of this project is to evaluate the facility, develop a long-range expansion plan for providing treatment capacity of 50 MGD (maximum month); evaluate which upgrades are needed to address aging infrastructure, evaluate ways to increase reliability, reduce maintenance throughout the plant, identify alternatives and provide recommendations for unit processes for wastewater treatment and biosolids handling to efficiently meet current and projected permit requirements; and develop a capital improvement program, including a schedule for improvements and opinions of probable cost, for the facility out to the year 2040. The plan shall include recommendations for land and space requirements and ancillary support facilities that will assist the facility in achieving efficient and effective operations.

CCWS has determined the necessity of a plant expansion in the immediate future and has begun projects for the headworks and new RDT unit for a capacity of 50-mgd. The overall treatment approach (i.e., in which existing processes will have additional units added or be replaced in total) has not been determined. CCWS has contracted with Ardurra for the evaluation and development of this long-range plan for providing treatment capacity of 50 MGD by 2040 and to provide a range of alternatives for consideration that will meet the flow capacity requirements and potential future effluent limits.

3 Purpose

The Ardurra team scheduled initial site visit assessments for various SCWRF processes and systems between 11/26/2024 and 02/27/2025 to begin the process of facility assessment evaluation. Interviews with key CCWS staff were also conducted to identify issues of concern. A Technical Memorandum No. 4 – SCWRF Evaluation of Facilities and Equipment (TM4) to capture each key equipment and unit processes at the SCWRF will follow. That specific TM4 will highlight components recommended for replacement and/or upgrade concerning the age/obsolescence of equipment, to increase the redundancy of unit processes, and to provide the capacity necessary for the facility to continue to receive, treat, and dispose of wastewater in compliance with its NPDES permit limits at projected 50MGD (maximum month) capacity. That TM4 and other "South Cobb WRF - Condition and Performance Reports" (CPRs) are pending.

The purpose of this TM3 is to provide an assessment of initial findings from the initial site visits that could be classified as urgent issues. This Initial Findings and Urgent Issues Report TM3 will also highlight at a high level certain existing process mechanical equipment at the plant that will be summarized in greater detail in the noted pending TMs or CPRs. Those TMs and CPRs will summarize the current condition of the equipment along with providing recommendations based on need, condition, and other mitigating factors. An opinion of probable cost will also be initiated at that time for key components in each unit process. The results and recommendations of the TM/CPR analysis will be used in prioritizing improvements that will lead to future capital improvement projects to be included in the SCWRF Facility Plan and Final CIP.

4 Historical Plant Improvements and Existing Record Drawing Review

The original SCWRF treatment chain was constructed in 1963 on an 18-acre site in the 18th District on the Chattahoochee River. The plant was originally sized to treat 2 million gallons per day (MGD). In 1970 a design was completed to expand the liquid process train to treat 8 MGD with construction completed in 1973. A second liquid process train was added in 1976, increasing the plant capacity to 24 MGD. A biosolids pellitization plant was also installed for solids handling at that time.

In 1986 a design for improvements to the SCWRF was initiated and completed in 1989. This work increased the plant capacity to 28 MGD. In 1990 a ferrous chloride feed facility was constructed to help settling in the primaries. In 1991 a design was prepared for the biosolids gravity thickeners to be converted to a dissolved air flotation thickener system, which was completed and put in service in 1992. In 1998 a project was completed that combined two existing liquid process trains into one, increasing the permitted plant capacity to 40 MGD. This work also included the installation of belt presses replacing the pellitization system in the solids handling facility.

Interim improvements, modifications, renovations, and rehabilitation projects have been completed or are in process since the plant capacity was increased to 40 MGD. In 2004 there was a project, extending the influent channel, and adding a bar screen and an odor control system at the headworks. A new chlorination/dechlorination system was constructed in 2005. Effluent Filter (tertiary treatment) installations and additional secondary clarification capacity were completed in 2012. In 2015 a project replaced the belt filter presses with centrifuges. A new South Cobb tunnel and ILS feeding into SCWRF were put into service in 2014. In January 2024 effluent filter rehab was initiated and in February 2024 improvements at the SCWRF headworks were initiated.

Ardurra completed a review of historical record drawings of the SCWRF provided by CCWS. As part of that review, Ardurra implemented a naming and numbering protocol to help provide internal clarity in document research. PDF drawings were labeled with a sequential number reflecting the chronological order of installation, modifications and rehabilitation work performed at this site/location. This document renaming included the site, followed by the engineering firm name, the CCWS title of the project, the CCWS assigned Program/Project assignment number, and the date of the document. Additional naming did include other information such as drawing sets for G (General), C (Civil), A (Architectural), P&ID, S (Structural), M (Mechanical), H (HVAC), I (Instrumentation), and E (Electrical) drawings, when appropriate.

Figures 4.1.1 and 4.2.1 that follow provide a summary of these renamed drawings and historical documents. Attachment 1 noted in Section 8 of this TM provides a crosswalk between the historical drawings and documents as named when shared by CCWS with the renamed drawings and documents as noted in the followings Figures 4.1.1 and 4.2.1.

4.1 Record Drawings

CCWS provided twenty-seven (27) sets of drawings. Ardurra implemented the naming and numbering protocol as detailed above on the drawings, to help provide clarity in document research internally. This new chronological naming is noted in Figure 4.1.1 below.



Figure 4.1.1 – CCWS SCWRF Record Drawings in Chronological Order

4.2 Historical Documents

CCWS also provided thirty-five (35) historical documents, reports, technical memoranda, and assessments. Ardurra again implemented the same naming and numbering protocol used on the drawings in Section 4.1, to help provide clarity in document research internally.



Figure 4.2.1 – CCWS SCWRF Documents in Chronological Order

4.3 Process Equipment Summary

The following table 4.3.1 provides a summary of Processes, Equipment, and Quantities for each step in the existing SCWRF treatment process. See Attachment 2 in "Section 8 – Attachments" of this TM for more detailed descriptions with notes added. The noted equipment will be evaluated in more detail as a part of the forthcoming TM4 and CPRs.

Location	Equipment	Qty
Pretreatment	Bar Screens	4
Pretreatment	Conveyors	3
Pretreatment	Aerated Grit Systems	2
Pretreatment	Degritting System	2
Pretreatment	Flow Equalization	Inactive
Primary Treatment	Primary Sedimentation (two chain and flights in each basin)	5 (10)
Primary Treatment	Primary Scum Pumps	3
Primary Treatment	Scum Collectors	3
Primary Treatment	Primary Sludge Pumps	5
Primary Treatment	Primary Drain Pumps	2
Primary Treatment	Ferrous Chloride System	1
Secondary Treatment	Lime Feed System	1
Secondary Treatment	Aeration Basins	5
Secondary Treatment	Blowers	3
Secondary Treatment	Clarifiers	5
Secondary Treatment	RAS Pumping	10
Secondary Treatment	WAS Pumping	3
Secondary Treatment	Secondary Scum Pump Stations	3
Secondary Treatment	Secondary Drainage Pumps	2
Tertiary Treatment	ABW Filters	7
Tertiary Treatment	Filter Effluent Pumps	5
Tertiary Treatment	Sodium Hypochlorite System	1
Tertiary Treatment	Sodium Bisulfite System	1
Plantwide	Reuse Water System	1
Plantwide	SCADA	1
Plantwide	Recycle Pump Station Pumps	4
Solids Treatment	Thickened Sludge Holding Tanks	2
Solids Treatment	DAFT	2
Solids Treatment	Polymer Feed System	1
Solids Treatment	Centrifuges	3
Solids Treatment	Dewatered Sludge Conveyors	3

Table 4.3.1 – Summary of Process Equipment

5 Urgent Issues – Staff Interviews and Previous Assessments

5.1 CCWS Staff Interviews

Staff interviews were completed with key CCWS leadership, operations, and maintenance staff during the months of December 2024, and January and February 2025.

"**Staff Interview Highlights**" are noted in bold within each of the following System Overview Sections where applicable. Previous assessment highlights from Historical Documents as provided and noted in Figure 4.2.1 above are also offered in the following system Overview Sections when appropriate. Note that not all specific issues noted in the CCWS provided Historical Documents were detailed below, however these may be expounded upon in the forthcoming Assessment TMs and CPRs when appropriate.

5.2 System Overviews and Previous Assessments

An Executive Summary of Systems and Previous Assessment Highlights are provided for the following eleven (11) systems/processes which are critical to the SCWRF Final Facilities Plan and Final CIP deliverables.

5.2.1 South Cobb Tunnel and Influent Lift Station

The SCWRF is located at 490 Lee Industrial Boulevard, Austell, GA 30168. Raw wastewater is currently pumped into the treatment plant via the South Cobb Tunnel Influent Lift Station (ILS), the Six Flags Pump Station (PS), and the Sweetwater PS. The I-20 PS was previously pumped to SCWRF, but was replaced in 1991 by the Sweetwater PS. The Sweetwater PS was temporarily taken out of service after the ILS was placed in service in 2014 and several other sewers were diverted to Douglas County. On December 30, 2018, a flooding incident disabled the ILS. At that time, the Sweetwater PS was placed back in service and will remain in service until the ILS is fully repaired following the 2018 flooding incident. The ILS has a rated capacity of 130 MGD with six dry well duty pumps, each rated at 32.5 MGD and two drain pumps, each rated at 10 MGD. The Tunnel contains 80 MGD of storage capacity.

Staff Interview Highlights: Rag loading is initially increased following the startup of the South Cobb Tunnel ILS system and is elevated when additional pumping capacity is initiated from the South Cobb Tunnel ILS. Rags not removed at the headworks move downstream and are collected in the aerated grit removal system, the primary clarification system, the secondary clarification system, within each step in the solids handling systems, and then also within the reuse water system.

5.2.2 Headworks (Pretreatment – Bar Screens and Conveyors)

The existing headworks facility was constructed in 1994 to provide screenings and grit removal for the SCWRF. In 2004, additional screenings capacity was constructed before the ILS construction commenced. The 2004 facility consists of four 25-MGD influent climber-style bar screens (bar screen numbers BSN-1011, BSN-1021, BSN-1031 and

BSN-1051 with the channel for housing BSN-1041 currently vacant of any equipment) followed by two aerated grit removal basins. The existing climber-style bar screens have ½" opening size screens. The 1993 design development report (DDR) noted that each bar screen channel would be able to convey 51.5-MGD per channel. Current influent screening is performed by four (4) operational channels with the additional channel available for future expansion and currently does not contain any mechanical equipment. An overflow channel is provided between channels 4 and 5 in case of excessive screen blinding and/or high flow rates. This overflow channel also serves as a bypass where the 24-inch plant recycle line and the 8-inch septage line discharge into. The stand-alone septage receiving station was removed from service in the late 1990's and currently septage trucks drive up to the Influent Channel and drop a flexible hose into the channel to unload septage. Each active channel includes an influent and effluent isolation slide gate, one (1) 18" Parshall flume, and associated instruments such as ultrasonic flow sensors. CCWS has a project currently underway to make improvements to the Headworks under CCWS Project "T3017 South Cobb WRF Headworks Improvements" project. This project replaces the existing four (4) mechanically cleaned bar screens (screen numbers BSN-1011, BSN-1021, BSN-1031, and BSN-1051) and a conveyor system which feeds into aerated grit chambers for grit removal, with new multi-rake screens with ¼" opening size screens and screenings diverter chutes (screen numbers BSN-1021, BSN-1031, BSN-1041, and BSN-10510.The DDR for this T3017 project noted new screens would be installed with "n+1" redundancy wherein three of the four screens would pass the peak flow rate of 100 MGD or 33.33 MGD per screen with an additional 5th screen to be installed at a later date. This project will replace the existing screw conveyors with a new conveyor system, and construct new electrical, cabinets, and controls. Also, four new actuators and gates will be provided.

The existing 18-inch flumes are rated to handle up to 15.9 MGD, per channel, in a free flow discharge condition. At the peak wet weather flow, each channel conveys 25 MGD which means that the Parshall flumes are undersized. This was noted in T3017 TM1 dated 4/12/2018 with recommendation for wider throat width upgrades to Parshall flumes to increase maximum submergence in each channel from 79% to 50%.

Staff Interview Highlights: The Influent Lift Station (ILS) ragging impact as noted in Section 5.2.1 creates the binding of rags in the climber bar screens. Rags are dumped on the deck next to the bar screens and shoveled up. Staff indicated that the new multi-rake bar screens selected for installation as part of T3017 are intended to provide lower head loss and additional capacity with a finer opening size (¼-inch) than the existing climber-style bar screens (½-inch). The hope is that the additional capacity will reduce the potential for screen blinding while also maximizing capture efficiency. Maintenance staff noted that a bobcat for management of the rags and containment facilities with effective access wherein rags could be unloaded, were items that would help in the rag management issues at the headworks.

5.2.3 Aerated Grit Removal (Pretreatment)

The existing preliminary or pretreatment facility was constructed between 1994 and 1998 to provide screening and grit removal for the SCWRF. The pretreatment facility consists of four influent screens followed by two aerated grit removal channels and associated grit pumping, classification and conveyance equipment. The piping in Grit Tank No. 1 was

replaced via a maintenance task within the last 5 years, but the piping in Grit Tank No. 2 has not been replaced since their original installation. These two aerated grit tanks were designed to meet specific hydraulic residence times within given length, width, and depth ratios to ensure development of a roll pattern conducive for grit settling. See the following Figure 5.2.3.1 depicting this flow pattern in Grit Tank No. 2.

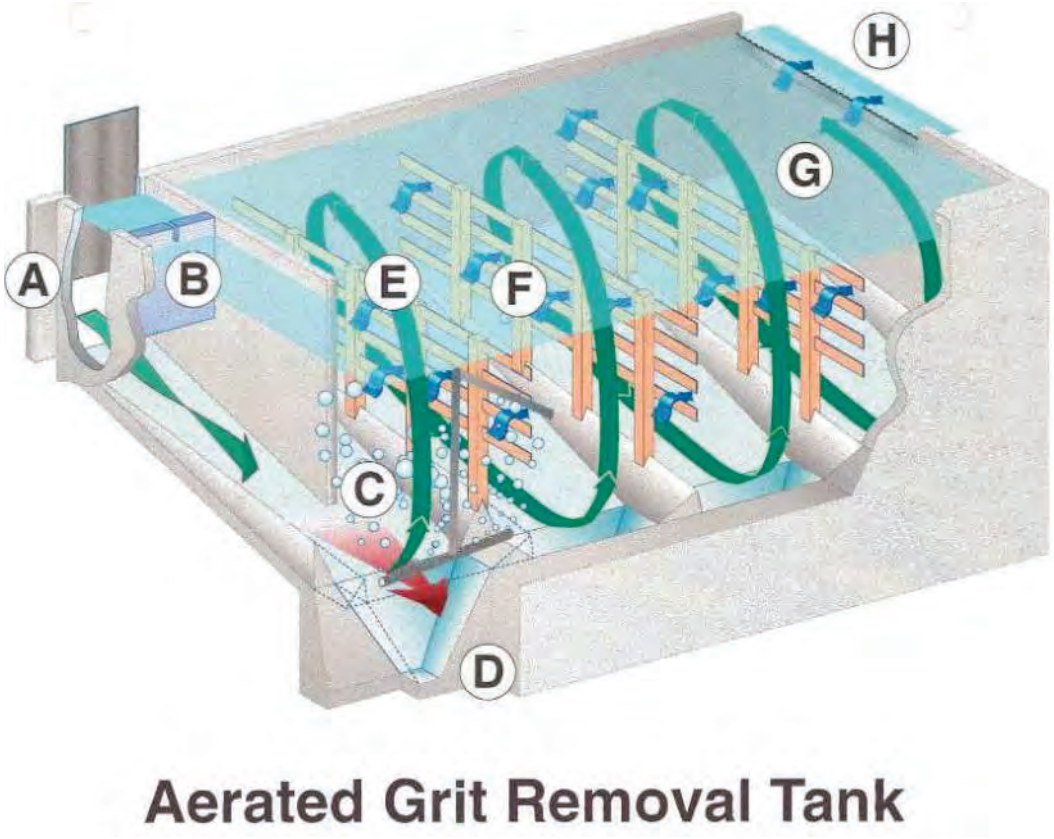


Figure 5.2.3.1 – CCWS Aerated Grit Removal Tank Overview

In TM No. 2, *Grit Removal Evaluation,* dated May 15, 2028, by Hazen Sawyer/Engineering Strategies Inc. (Hazen), detention time is also a factor in the poor operational performance: Detention times for the existing tanks are 5 minutes at peak flow, while WEF MOP 8 (Detention Time, Depth (D), Length (L), Width (W), W:D & L:W Ratios and Slope) recommends 2-5 minutes, with 3 minutes being the optimal. In Table 4.1 of the Hazen TM No. 2, the L:W ratios were outside the MOP8 design parameters. The report recommended that basin width be reduced to increase the L:W ratio to within the WEF MOP8 recommended range. It was also noted that diffused air was not clearly directed upwards, due to the lack of parallel walls, which reduces the desired roll pattern creating more aggressive solids buildup. This solids buildup likely impacts grit retention, creating higher velocities which could compound rag loading and grit transfer in downstream processes. Figure 5.2.3.1 notes the steps for two aerated grit removal tanks are channeled through two influent isolation gates (A) located in the center of the grit distribution channel downstream from the bar screens (bar screen effluent channel). A baffle wall (B) at the tank inlet forces flows downward toward the hopper at the bottom of the first bay. Air diffusers (C) at the end of the bay force flow upward creating a spiral

flow pattern. Grit is intended to deposit into the collection trough (D) at the end of each bay. The spiral flow pattern (E) forces flow back to the front of the tank and into the next bay where the cycle starts over again. Flow exits the tank by passing over a weir (G) into an effluent channel that flows by gravity to the Primary Sedimentation Tanks (H). This Figure was pulled from the 1998 Brown and Caldwell Operator Training O&M manual noting how the Aerated Grit Tanks work.

One of the keys to aerated grit removal is a constant supply of diffused air. Two air compressors, eight air headers, and fifty-six air diffusers are used to supply a continuous air supply to the grit tanks to increase grit settling. Grit settling is also aided by a guided channel entrance, sloped chamber floor, and baffle walls to prevent short-circuiting through the treatment process. Once grit has settled, it is to be removed from the tanks by eight horizontal recessed impeller pumps, with four pumps per grit tank. The grit is concentrated by eight grit cyclones and then dewatered by two grit classifiers before disposal in a dumpster. Each channel is covered with flat aluminum covers to contain odors. In the 2018 Hazen evaluation it was noted that each grit chamber has approximately 182,000 gallons with a projected 5.2-minute detention time assuming peak flow of 100 MGD. Computational fluid dynamic (CFD) modeling in 2022 completed by Hazen recommended having both aerated grit tanks online to more evenly distribute flow to the Primary Sedimentation basins.

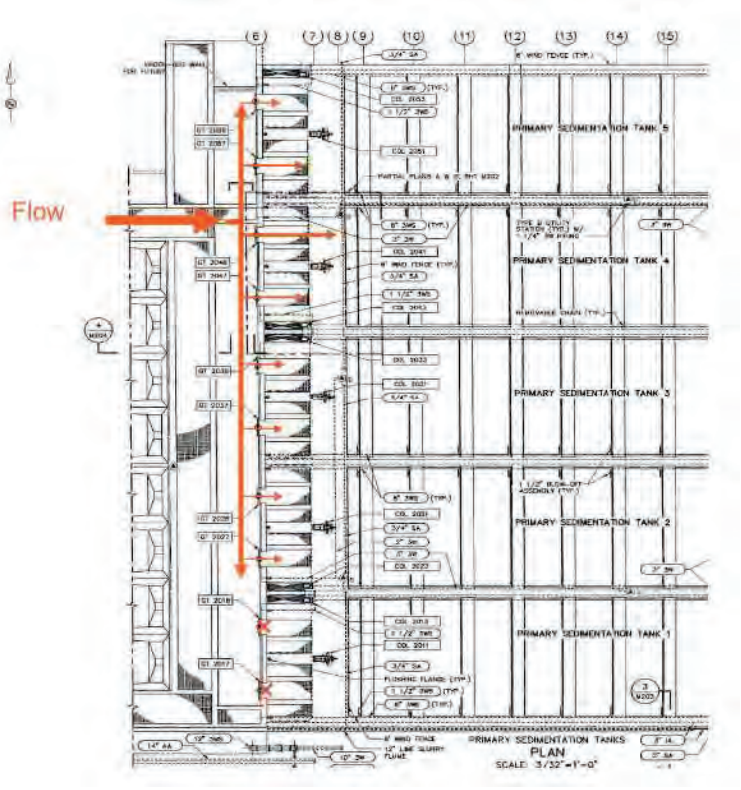


Figure 5.2.3.2 – CCWS Aerated Grit Single Tank Flow

At the time of the noted site visits, only aerated grit removal tank 2 was in operation. The SCWRF staff noted that while grit removal tank 2 was in operation, the gate to grit removal tank 2 stayed open to allow the liquid treatment train to continue to the Primary Clarifiers with little to no grit removal. The 2018 evaluation offered a flow diagram provided above in Figure 5.2.3.2 which highlighted flow impact downstream to Primary Sedimentation from aerated grit unit feed to a single channel to the north of aerated grit tank 2.

The referenced 2018 Hazen evaluation concluded with a recommendation that the SCWRF can be improved by either modifying and upgrading the existing aerated grit system to improve grit settling, converting to a stirred vortex grit removal system, or converting to a stacked tray removal system. The grit removal technologies under consideration at that time had similar costs and would provide improved grit capture compared to the existing system. The stirred vortex tanks were recommended to provide improved grit removal efficiency and to simplify operations by reducing the number of grit pumps and the associated downstream piping and cyclones and were estimated to cost approximately $4,210,000, at that time.

Staff Interview Highlights: Staff indicated that past efforts to remove all solids materials from the aerated grit tanks have been attempted, and additionally that key devices have been restored to their original operating conditions. However, the grit removal process does not function as originally intended, in that it does not keep the grit aerated and moving in the rolling pattern as envisioned by the design. At the time of site visits, the southern aerated grit tank 1 was isolated and not in operation. Staff noted that grit settling in the bar screen effluent channel downstream has been negatively affected by rag and grit loading. The aluminum covers on top of the aerated grit removal tanks were chained off to address safety concerns. To prevent continued deterioration, the 2018 Hazen evaluation recommended the reinstatement of the odor control system to ventilate the head space in the tanks. The SCWRF Headworks Improvements project's (No. T3017) scope will replace all existing aluminum covers. Staff indicated that the two (2) air compressors feeding the aerated grit system were not operational. Staff noted that Wemco grit pumps installed in 1981 are not currently operational, and further, were inconsistent and inefficient at removing grit even when they were in operation. Staff noted that the two (2) grit washers work when they get grit. Staff noted that there is no air fluidization through the aerated grit system. Staff noted that the water lines and the primary piping gallery in the screening building are experiencing significant corrosion and pipe repairs are becoming more difficult. Staff struggle with maintaining operational compatibility between the grit washers, grit tanks and pumps. Some guidance on ratios and operating scenarios would be of assistance to the O&M staff.

5.2.4 Primary Sedimentation (Primary Treatment)

The existing primary sedimentation facility was placed into service in 1996. The five (5) rectangular primary clarifiers and the associated primary gallery were constructed in

1998 CCWS T3101 Project titled SCWRF Expansion to 40MGD project with drawings prepared by Brown & Caldwell. Each clarifier unit is approximately 34 feet wide and 180 feet long with an operating depth of 12 feet. Once wastewater falls over the level control weirs of the aerated grit chambers, it enters channels to the south and north of aerated grit removal units no. 1 and no. 2, respectively. These channels feed into the primary clarifier influent channel. The primary clarifier influent channel is 10-foot wide and distributes flow between the five (5) primary clarifier basins as noted in Figure 5.2.3.2 above.

Each primary clarifier basin has two (2) 48-inch influent gates, for a total of 10 influent gates, that isolate the flow for each basin. As primary sludge settles it is collected by a chain and flight scraper mechanism located at the bottom of the basin. There are two (2) chain and flight collection systems within each clarifier basin which are driven by a single (1) drive motor for each of the five basins. This drive motor is located above the basin on the deck west of the basins. Each basin has a short wall at the bottom which divides the floor into two sections, one for each chain and flight mechanism. Settled primary sludge is scraped into the sludge hopper via a skimmer at the upstream end of the basin. Each clarifier basin has one (1) sludge hopper and one (1) primary sludge pump that is hard piped to the bottom of each sludge hopper. The existing primary sludge pumps are Yoemans/Morris recessed impeller centrifugal pumps located in the primary gallery and pump primary sludge to the biosolids thickening facility. As scum accumulates on the primary clarifier water surface, a spray water system pushes the scum toward the upstream end of each basin where it is collected by helical collectors into a scum box. There are three (3) scum boxes; one (1) that serves primary clarifiers 1 and 2, one (1) that serves primary clarifiers 3 and 4, and one (1) that serves primary clarifier 5.

The existing spray water system does not currently move the scum as required and there is significant scum buildup. The spray water system has deteriorated and has exceeded its useful life. There is one (1) helical collector per clarifier basin which runs on a timer. Each scum box has one (1) dedicated scum pump that pumps scum to the biosolids thickening facility. The existing scum pumps are Pit Bull single stage pneumatic ejector pumps. The scum pumps discharge into the primary sludge force main inside of the primary gallery to become a combined discharge. Primary clarifier effluent flows into submerged Launder Tube on the downstream side of each basin. The basin water level is controlled by motorized actuated valves on the effluent Launder Tube and is based on a water surface elevation setpoint. The water surface elevation of the primary clarifiers is currently being measured in the primary clarifier influent channel by two ultra-sonic level instruments and transmitters.

In a Hazen South Cobb WRF Primary Clarifier CFD Modeling presentation dated April 14, 2022, on slide 7 it was offered that “Sampling and sludge characterization indicated poor settling resulting from solids recycling”. This presentation highlighted primary clarifier overloading (poor TSS removal and poor settling), increased blanket depth, level control reliability, uneven flow splitting, and equipment reliability impact. It noted that Primary Sedimentation blankets are high. In 2021 Hazen provided an evaluation titled, *“FY21 SCWRF Facility Improvements, Program No. T3020”* which conducted a review of historical operations data from January 2016 thru December 2020. Primary influent TSS showed notable variation. A facility mass balance identified significant recycling of solids from the solids handling process (DAFT and centrifuges). Possible increased TSS values

were also suspected to come from washout of solids settled in the Tunnel ILS during wet weather. This Hazen 2021 Primary Clarifier evaluation titled, "*FY21 SCWRF Primary Clarifier Rehabilitation and Biosolids Thickening, Program No. T3022"* concluded with a recommendation to replace the loop chain systems with a stainless-steel chain system.

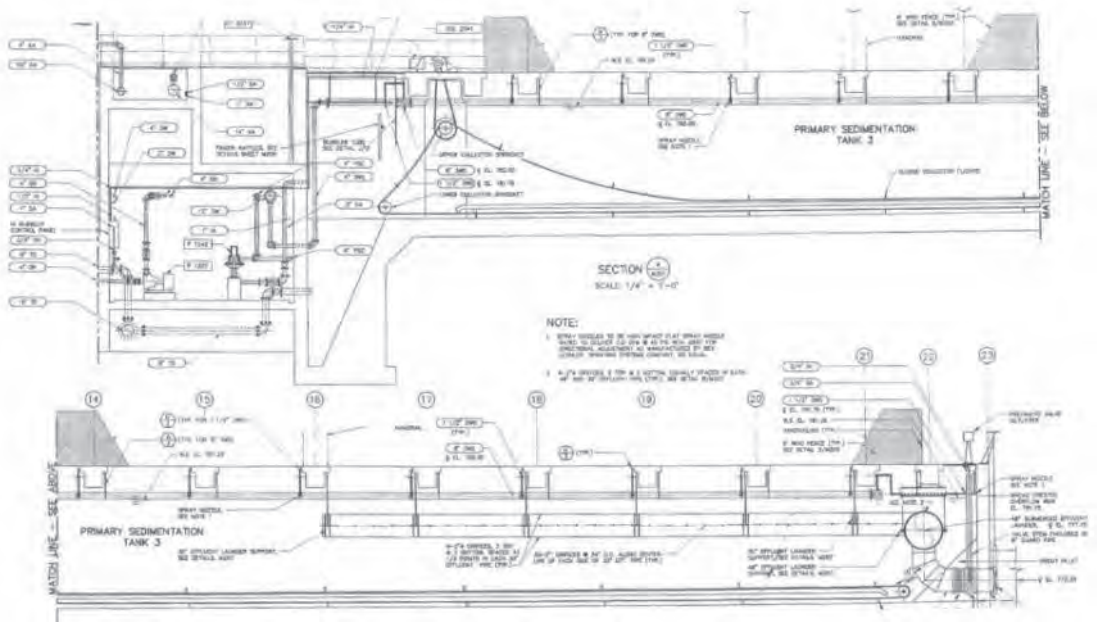


Figure 5.2.4.1 – Primary Sedimentation Tank Profile

Staff Interview Highlights: Staff expressed concerns about shear pins breaking under normal operations. When this happens the chain and flights slip off the sprockets while the drive motor continues running. Rags come in the trough causing individual nozzles to clog up. The Pit bull pumps were designed to pump FOG and are not designed to pump rags creating solids removal issues. The Pit bulls are on a common header back to DAFT and difficult to isolate. CCWS staff have experienced ongoing operational issues with these pumps and have noted that the issue may be with the 2" diameter suction pipe that runs through the gallery wall; it is thought that this may need to be increased to prevent solids clogging to increase reliability. There are no reported issues with the submerged orifice piping; however, CCWS has indicated there are issues with slow response time of the primary level control valve actuators. The previously mentioned existing level instruments are not effective. Overtopping of the launders downstream occurs because of rags and solids removal not being effectively handled. In interviews, plant staff indicated that they would like to install three additional ultrasonic-level instruments, giving a total of 5 sensors. The plant staff indicated that the ultrasonic-level instruments are more desirable than the in-channel bubble tube level measurement system due to easier and less intensive maintenance. The additional ultra-sonic instruments would reduce the error caused by foam in the Primary Clarifier and provide more accurate readings than the in-channel bubble tube level. The primary clarifier basins need to be taken out of service and drained due to the condition of key components within each primary clarifier and to repair the failed parts.

5.2.5 Aeration Basins (Secondary Treatment)

Aeration tanks were initially installed at the SCWRF in 1963. In 1976, these tanks were converted into oxygenation tanks. Subsequently, in 1994, the oxygenation tanks were modified to form five aeration basin treatment trains, each consisting of four aeration zones.

The aeration basins receive effluent from the primary clarifiers. Flow exits the primary clarifiers into a primary effluent channel, which then enters flow into an aeration influent channel. The Aeration Influent channel splits flow into the five aeration basins through two cutthroat flumes, for a total of 10 flumes. The aeration basins then overflow into a mixed liquor effluent channel which splits the aeration basin effluent flow into each of the five secondary clarifiers. The aeration basin effluent weir is used as the downstream controlling water surface elevation for the primary clarifier hydraulic profile. As a critical component of the biological treatment process, the aeration basins facilitate the degradation of organic pollutants by supplying oxygen to support microbial activity. The microorganisms within the basin break down organic matter and reduce ammonia concentrations through the process of nitrification which takes Ammonia (NH_3) and converts to nitrites (NO_2) and then converts nitrites to nitrates (NO_3). The aeration basins at the plant were originally designed to achieve full nitrification. Air and oxygen are introduced to promote microbial growth and ensure proper mixing throughout the basin.

Following treatment, microorganisms settle in the secondary clarifier, forming activated sludge. A portion of this sludge is recycled back into the aeration basin, as return activated sludge (RAS), to maintain healthy microbial populations. The original design parameters of the aeration basins are presented in Table 5.2.5.1 below.

Item	Design
Number of Trains	5
Number of Zones/Train	4
Length per Zone (ft.)	50
Width per Zone (ft.)	55
Sidewater Depth (ft.)	22
Total Volume (million gallons)	9.05
Solids Retention Time (days)	8
MLVSS/MLSS (mg/L)	1,800/2,400
F/M (lb BOD5 / lb MLVSS)	0.4
Air Requirements (SCFM)	45,000

Table 5.2.5.1 – Original Aeration Basin Design Parameters

As part of the CCWS SCWRF Improvements, Project No. T3020 conducted in 2021 by Hazen, a set of evaluations were conducted on the Primary and Secondary Clarifiers at the SCWRF. The Hazen T3020 South Cobb WRF Primary Clarifiers Evaluation dated November 2021 noted in Section 4.4.1 “Further Investigation Recommended” on page 37 to follow up in the future to analyze solids distribution to the aeration tanks by collection from each aeration basin. The RAS from Secondary Clarifier 5 returns to the primary clarifier effluent channel, which flows to the aeration basin influent channel in proximity to Aeration Basin 5. See the following Figure 5.2.5.2 from the Hazen Report noting the Secondary Clarifiers to Aeration Basins piping and flow diagram.

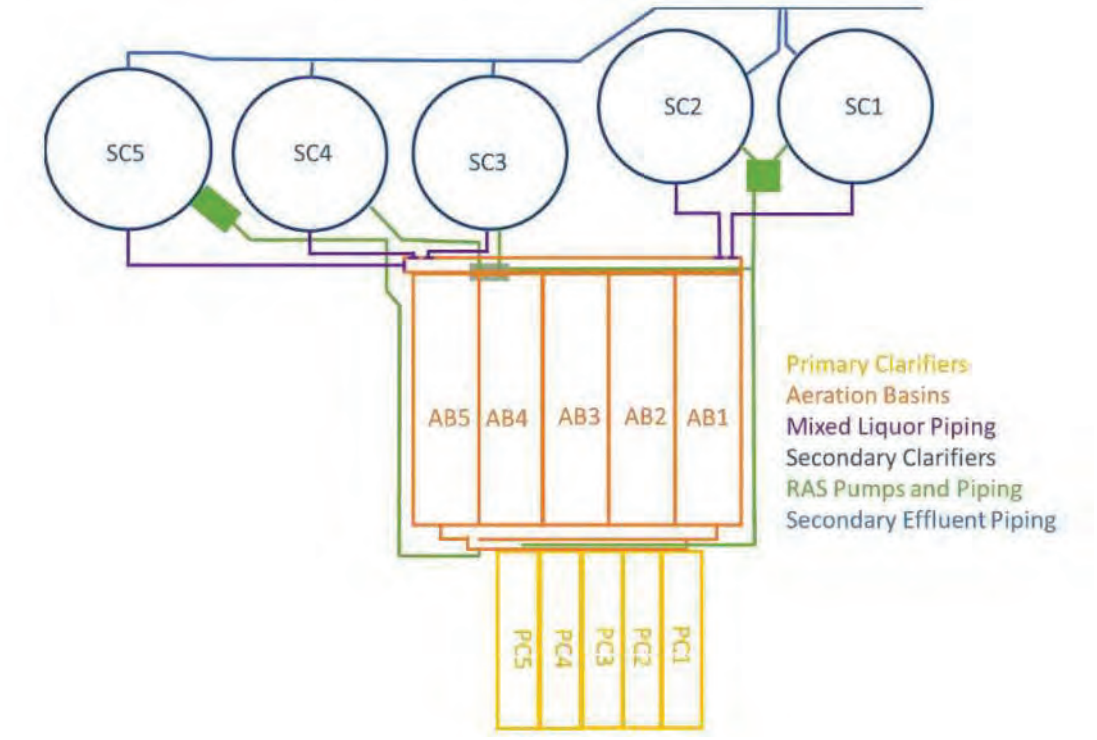


Figure 5.2.5.2 – CCWS Aerated Grit Single Tank Flow

Based on the relative proximity of the Aeration Basin 5 influent cutthroat flumes to the Secondary Clarifier 5 RAS feed and the Aeration Basin 5 discharge in relationship to the Secondary Clarifier 5 feed, Aeration Basin 5 may preferentially feed Secondary Clarifier 5. Note that Aeration Basin 5 discharges into the common 10' x 8' mixed liquor (ML) effluent channel for distribution to all five aeration basins. The 54" ML pipe to Secondary Clarifier 5 exits the ML channel very near the discharge of Aeration Basin 5 to the ML channel. In Section 3.2.3 of the T3020 South Cobb WRF Improvements Secondary Clarifier Evaluation dated November 2021, Hazen noted that this could result in minimal mixing occurring between Aeration Basin 5 and Aeration Basins 1-4. Hazen also noted that Secondary Clarifier Blanket Differences could be attributed to “whether a solids splitting issue exists” and this could be confirmed by taking MLSS samples in each aeration basin to determine if the solids are evenly distributed. Specifically, it was noted that RAS and primary effluent may not be mixed evenly in the aeration basin influent channel. The RAS mixers in the primary effluent channel currently are not operational.

Without proper mixing in the aeration basin influent channel, there may be a local "ecosystem" in which Aeration Basin 5 has different mixed liquor suspended solids relative to the other basins because it is preferentially fed from Secondary Clarifier 5 RAS. It was also indicated by Hazen that the facility operates at a higher MLSS concentration and RAS ratio than the design to achieve full denitrification in the aeration basins.

Staff Interview Highlights: The RAS mixers within the primary effluent channel are not in operation and have not been in operation for 10 years. The incomplete mixing of aeration influent and RAS within the aeration basins can result in incomplete nitrification and uneven sludge blankets within the secondary clarifiers. The plant staff have indicated issues associated with maintaining a sludge blanket in Secondary Clarifier #5. Plant staff also offered that they run higher mixed liquor numbers because their removal and nitrification are satisfactory. It was noted by staff that detention times are too short for loading. Typically, less than 1/2 of the time needed, sometimes less than 1/3 that is needed. During high flow events, detention times in aeration basins are well below 2 hours, often as little as 1.5 hours. The rehabilitation of the RAS mixers would assist the mixing process within the aeration basins and ensure treatment, adequate flow, and solids splitting is occurring. Staff noted the need to replace the RAS and Scum pumps due to current models being obsolete and are no longer supported by manufacturers.

5.2.6 Secondary Clarifiers and RAS Pumping (Secondary Treatment)

There are currently five secondary clarifiers at SCWRF. Secondary Clarifiers 1-2 and the associated return activated sludge (RAS) pump station were constructed in 1976 and rehabilitated as noted in the 1998 CCWS T3101 Project titled SCWRF Expansion to 40MGD project with drawings prepared by Brown & Caldwell. Two additional clarifiers (Secondary Clarifiers 3-4) and the Secondary Gallery were constructed per 1998 CCWS T3101 Project titled SCWRF Expansion to 40MGD project with drawings prepared by Brown & Caldwell. In 2012, a fifth secondary clarifier (Secondary Clarifier 5) and its associated RAS pumps were constructed. Each clarifier is approximately 135 ft in diameter, center-fed, with an operating depth of 20 ft. Secondary Clarifiers 1-4 have a launder with a weir on each side which is set about 15 ft inside the perimeter of the secondary clarifier (concentrically). Secondary Clarifier 5 includes a peripheral weir set against the exterior wall with a density current baffle to minimize short-circuiting. The secondary clarifiers receive flow from the mixed liquor effluent channel, which carries the effluent from the aeration basins. See Figure 5.2.5.2 above. The mixed liquor effluent channel contains gates and cutthroat flumes to split flow to each online secondary clarifier.

Secondary Clarifiers #1-4 have Envirex Tow-bro mechanisms which were installed during the 1998 CCWS T3101 Project titled SCWRF Expansion to 40MGD project with drawings prepared by Brown & Caldwell. Secondary Clarifier #5 utilizes an Ovivo C3D mechanism. Each of these mechanisms operates on similar principles. The clarifier continuously removes settled solids from the bottom of the tank through suction orifices on the rake arms. The rake arms rotate to remove the sludge equally along the bottom of the clarifier. Scum is removed with a scum skimmer arm, which rakes the scum into a scum beach which drains by gravity to a scum pit. Clarifiers #1-2 are designed with the bottom of the clarifiers sloped inward towards the tank drain located at the center pier. Clarifiers #3-5 bottoms gently slope outward to the tank drain along the outer wall. In project *SCWRF*

Secondary Clarifier Rehabilitation, Program No. T3019, rehabilitation to Secondary Clarifiers 1-4 was initiated. The drives of each of the clarifiers were replaced along with certain wear parts. The project also included rehabilitation of the sludge collector mechanisms.

The following Figures 5.2.6.1, 5.2.6.2 and 5.2.6.3 provide profile views of each set of Secondary Clarifiers.

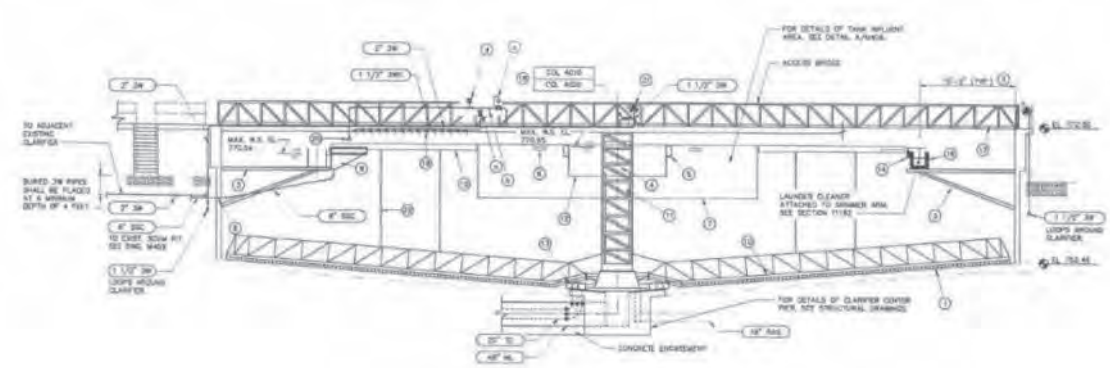


Figure 5.2.6.1 –Secondary Clarifiers #1-2 Profile View

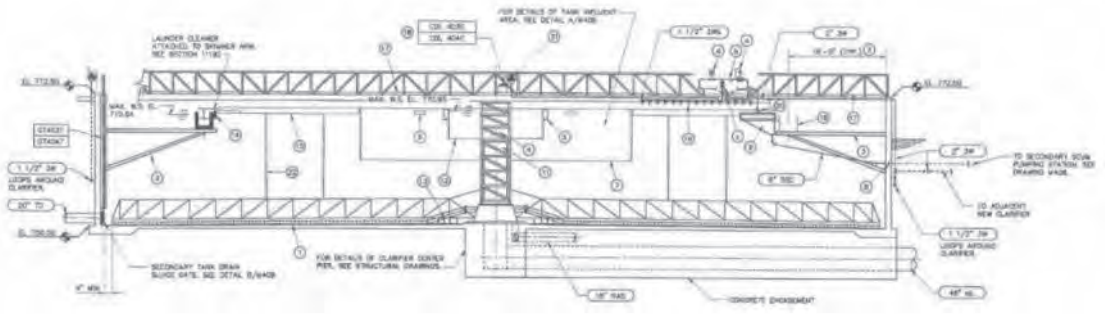


Figure 5.2.6.2 –Secondary Clarifiers #3-4 Profile View

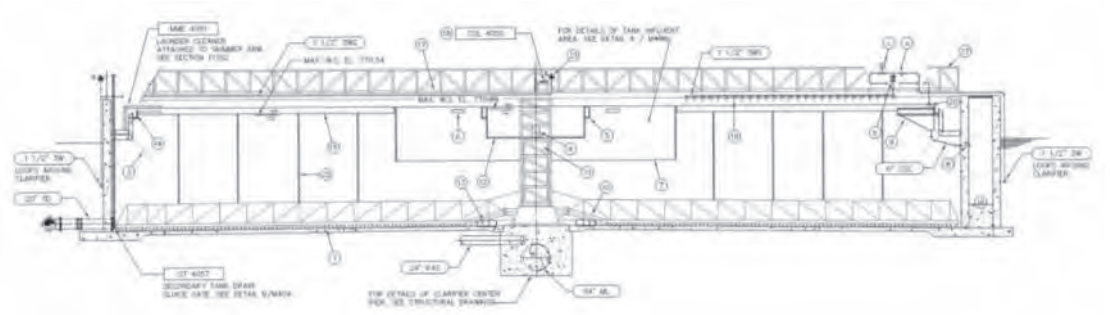


Figure 5.2.6.3 –Secondary Clarifier #5 Profile View

An evaluation conducted by Hazen in 2021 titled *"South Cobb Improvements Secondary Clarifier Evaluation", CCWS Project No. T3020* on the Secondary Clarifiers noted the following items of concern and recommendations. As a general conclusion in this

evaluation, it was noted that Secondary Clarifiers 1-4 are reaching the end of their useful life due to the difficulty to maintain the launder and weir and structural deterioration of the clarifiers. Bug holes, loss of concrete paste, spalling of concrete, and observable cracks were noted and analyzed in the evaluation. The loss of concrete paste is indicative of a chemical attack likely caused by ferrous chloride and hydrogen sulfide exposure. The observable cracks did not see any water seepage or any groundwater seepage into the tanks but were noted as potential fault points and were recommended to be injected with polyurethane chemical grout. This 2021 evaluation also looked at both solids loading and hydraulic capacity. Influent data for the period of January 2016 through December 2020 was analyzed. A statistical analysis was performed to determine historical average concentrations and load peaking factors for the plant historical data set.

Historical plant operations data was also reviewed to conclude with an offered "black box" approach for plant influent flows, concentrations and operational parameters to estimate primary sludge and WAS loads based on plant influent using the following key assumptions:

- Influent TSS will be 250 mg/L
- VSS:TSS ratio will be 0.88
- Influent CBOD will be 200 mg/L
- Primary clarifier TSS removal will be allowed to vary between 50-65%
- Average Annual Flow = 30 MGD influent + 15 MGD RAS
- Peak Flow = 100 MGD influent + 50 MGD RAS, 100-year flood river elevation of 765.40 ft

With these assumptions, it was estimated that primary sludge would normally range between 29,000–38,000 lbs./day and the WAS would normally range between 29,000-32,000 lbs./day. The anticipated overall solids production would be between 61,000-67,000 lbs./day.

RAS Pumps: The Return Activated Sludge (RAS) pumps pull sludge from the Secondary Clarifiers and pump sludge back to combine with primary effluent in the primary effluent channel that feeds the five aeration basins. There are four (4) vertical centrifugal pumps in the RAS pump station which pull RAS from Secondary Clarifiers 1 and 2. There are four (4) horizontal centrifugal pumps in the Secondary Gallery and pull RAS from Secondary Clarifiers 3 and 4. These eight (8) RAS pumps for Secondary Clarifiers 1–4 were installed in 1996.

There are two (2) RAS vertical turbine solids handling pumps with a "can" type arrangement with motors for these pumps resting on a pad adjacent to the clarifier that pull RAS from Secondary Clarifier 5. These two (2) RAS pumps for Secondary Clarifier 5 were installed in 2012. The configuration of the RAS piping currently limits two dedicated pumps to pull RAS off each clarifier. The RAS pumps are in three separate locations: the RAS Pump Station, the Secondary Gallery, and a concrete pad near Secondary Clarifier 5.

A summary of key RAS pump information is provided in the following Table 5.2.6.1:

Category	Description		
Equipment Name	RAS Pumps #1-4	RAS Pumps #5-8	RAS Pumps #9-10
Equipment Number	P4511, P4512, P4513, P4514	P4245, P4246, P4247, P4248	P4519, P4520
Clarifiers Served/ Location	Clarifiers 1-2/RAS Pump Station	Clarifiers 3-4/ Secondary Gallery	Clarifier 5/ Concrete Pad
Type	Vertical, Non-Clog Centrifugal	Horizontal, Non-Clog Centrifugal	Vertical Turbine Solids Handling
Quantity	2 Duty per Clarifier	2 Duty per Clarifier	2 Duty per Clarifier
Year Installed	1996	1996	2012
Rating / Capacity	3,470 gpm at 34 ft	3,470 gpm at 41.5 ft	3,472 gpm at 23 ft
Motor Horsepower	75 hp	75 hp	30 hp
Power Supply	460V, 3-Phase, 60 Hz	460V, 3-Phase, 60 Hz	460V, 3-Phase, 60 Hz
Manufacturer	Aurora Pump	Aurora Pump	Fairbanks Morse

Table 5.2.6.1 –RAS Pump Summary

The 2021 evaluation noted that some of the 1996 pumps have either been rebuilt or replaced due to wear. Pumps 2, 3, and 6 have been rebuilt and Pump 4 has been replaced. Discharge check valves, isolation plug valves, and some of the associated discharge piping has also been replaced. In the Evaluation assessment it was noted that several of the pumps have a water seal issue. The 2021 evaluation assessment did conclude that all pumps were in good condition, with a conditional note to replace these pumps with larger capacity pumps when they are prioritized for replacement. However, increasing staff maintenance to maintain reliability and availability of these pumps suggests that this is now an urgent priority.

RAS Pumps Converted to WAS Pumps: Three pumps, referred to as waste mixed liquor pumps, reside in the Secondary Gallery. When they were installed in 1996, they were used to waste mixed liquor off the activated sludge processes. Now, these pumps pull RAS off the RAS line to maintain wasting rates. The pumped RAS (or more appropriately waste activated sludge (WAS) combines with secondary scum and is conveyed to solids handling.

A summary of information about these three (3) existing WAS pumps is provided in the following Table 5.2.6.2:

Category	Description		
Equipment Name	WAS Pump #1	WAS Pump #2	WAS Pump #3
Equipment Number	P4201	P4202	P4203
Location	Secondary Gallery	Secondary Gallery	Secondary Gallery
Type	Horizontal, Non-Clog Centrifugal	Horizontal, Non-Clog Centrifugal	Horizontal, Non-Clog Centrifugal
Year Installed	1996	1996	1996
Rating / Capacity	694 gpm at 46 ft	694 gpm at 46 ft	694 gpm at 46 ft
Motor Horsepower	20 hp	20 hp	20 hp
Power Supply	460V, 3-Phase, 60 Hz	460V, 3-Phase, 60 Hz	460V, 3-Phase, 60
Manufacturer	Aurora Pump	Aurora Pump	Aurora Pump

Table 5.2.6.2 –WAS Pump Summary

The 2021 evaluation recommendation was to replace these pumps with rotary lobe pumps to provide better flexibility for future changes in solids handling.

Secondary Scum Pumps and Sump Pumps: The scum pumps convey scum from the scum pit to the solids processes. There is one scum pump in each of Secondary Clarifiers 1 and 2. Secondary Clarifiers 3 and 4 share a scum pit, with one scum pump. Secondary Clarifier 5 has its own scum pump. There are sump pumps to collect and remove drainage in the RAS Pump Station (near Clarifiers 1-2) and the Secondary Gallery. Secondary Clarifiers 3 and 4 share a sump pump and scum pit. The sump pump in the RAS Pump Station failed and has been replaced by a temporary sump pump. Tables 1-3 and 1-7 in the 2021 Secondary Clarifier evaluation can be referenced for more information on these seven (7) pumps. These pumps were not highlighted by staff requiring urgent address.

The final recommendation from the Hazen November 2021 Secondary Clarifier evaluation was that for the Secondary Clarifier area, each item be narrowed down to a single alternative, with optional additional costs for RAS pump replacements and structural upgrades. The secondary clarifier upgrades will need to include new secondary mechanisms, scum pumps, a new RAS pump station sump pump, and new WAS pumps. These items are either in need of replacement, or in the case of the WAS pumps, require additional flexibility in potential change in future head conditions or other future operational conditions. The evaluation from 2021 recommended replacing the existing RAS pumps of 3,500 gpm capacity to 4,200 gpm capacity. Upgrading the RAS

pumps would not give a full N+1 redundancy but would redundancy and increase RAS capacity for high flow conditions.

Recommendations from the T3020 South Cobb Improvements Secondary Clarifier Evaluation completed by Hazen in November 2021 included the following recommendations:

- Secondary mechanisms: Replace mechanisms for Clarifiers 1-4; configuration will be center feed with peripheral overflow (like Secondary Clarifier 5).
- Secondary scum pumps 1-3: Replace with recirculating chopper pumps.
- Sump pumps: Replace in kind with a submersible pump.
- WAS pumps: Replace with rotary lobe pumps to provide better flexibility for future changes in solids handling.
- RAS pumps: Replace with larger capacity pump. This may not be a priority and is provided as an optional cost.
- Structural upgrades: Resurface Secondary Clarifiers 1-4 and recoat the Secondary Clarifier 5 effluent launder weir wall. This is provided as an optional cost, as this work could be deferred for several years.

Staff Interview Highlights: SCWRF staff offered that they cannot afford to have any of the solids pumps offline during peak flows. Plant staff also indicated that when the facility experiences flow around 90 MGD or higher, the RAS pumps have not been able to keep up. It was noted that ideally, when additional RAS pumping needs are considered as part of the SCWRF upgrade to the piping of the current configuration to allow a full N+1 redundancy to be achieved since currently only two pumps are connected to the RAS piping from each of the individual clarifiers. This leaves no way to connect adjacent/additional pumps. Staff recommended that re-configuration of RAS piping should be included in modifications to RAS pumping scope. Maintenance staff offered that they typically work on 13 pumps in less than 2 hours daily to maintain pumping capacity. This can be accomplished because they are stocking spare parts. However, because the Aurora pumps are obsolete, this daily staff investment maintaining these pumps is becoming more difficult to maintain. It was also believed that because these pumps pump into a common header, the pump efficiency is impacting pump reliability.

5.2.7 Effluent Filters (Tertiary Treatment)

In 2002 Cobb County Water System (CCWS) completed a capacity assessment that compared deep and shallow bed effluent filters with a primary driver to manage phosphorus limits, and a secondary benefit to assist in treatment of suspended solids and biochemical oxygen demand (BOD) during peak plant flows.

In 2012 an effluent filter facility was installed as part of the T3003B CCWS project. The filter structure includes an influent distribution channel with 150 MGD capacity and a 12’ wide by 12’ sidewater depth. The filter structure spans 85 feet in width and 222 feet in length, housing seven (7) shallow-bed traveling bridge effluent filters each sized 16’ wide by 120’ long with each filter containing 1920-sf, and a total surface area of 13,440-sf. The original design capacity of this filter system was 60-MGD with a hydraulic capacity of 75-MGD peak at roughly 4-gpm/sf. The hydraulic loading rate, accounting for one filter being out of service, is 3.6 gallons per minute per square foot (gpm/ft^2) at design capacity and 4.5 gpm/ft^2 at hydraulic capacity. The solids loading rate (SLR) and hydraulic loading rate

(HLR) at 5 mg/L total suspended solids (TSS) (with one filter out of service) are 0.22 lb. TSS/ft^2-day and 0.27 lb. TSS/ft^2-day, respectively. Each filter includes a dedicated submersible washwater pump capable of delivering a backwash rate of 15 gpm/ft^2, equating to 300 gpm per pump. Additionally, each filter is equipped with a submersible backwash collection pump with a capacity of 350 gpm per pump. The filter effluent collection channel, measuring 12 feet by 12 feet, is designed to at 150 MGD effluent flow capacity.

Flow into the effluent filters is regulated at the filters influent channel, which receives secondary clarifier effluent from the chlorine contact junction box. This flow is introduced into the filter influent channel via a 78-inch pipe stub, designed to distribute flow evenly by directing it upwards into the channel. The isolation sluice gates, controlled by motorized actuators, regulate the flow entering each filter. To ensure balanced distribution, a weir is located behind each sluice gate, allowing flow to split evenly among the filters. Under low-flow conditions, water free-falls over the weirs, while at higher flows, the weirs become submerged to maintain even distribution. Once the flow passes through the filters, it exits over a weir into the filter effluent channel, where two venturi meters measure the final effluent flow. The effluent filters can be bypassed via two options as noted in the following Figure 5.2.7.1.

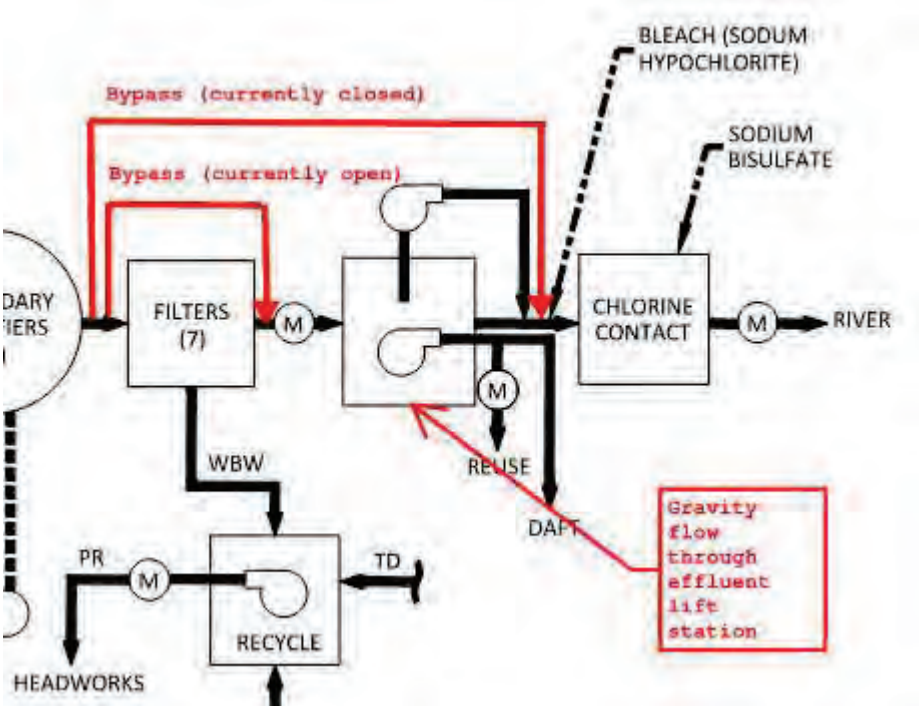


Figure 5.2.7.1 –Effluent Filter Current Bypass Setup

Because these filters have been removed from service since 2018-2019, no further analysis was performed.

Staff Interview Highlights: Staff noted that by 2018-2019, the filters had become non-operational due to iron fouling (chemical fouling), which blinded the filters and rendered them ineffective. A consultant was hired to investigate the issue, ultimately recommending chemical cleaning to remove the iron deposits. Due to an existing

contract for sodium bisulfite, this chemical was selected for the cleaning process. However, the cleaning achieved only limited success, and the filters remained out of service. In 2024, a full rehabilitation project was initiated and awarded to a contractor to restore the effluent filters to operational status. The scope of work includes: complete media replacement, replacement of the underdrain system, carriage drive replacement, and full refurbishment of the traveling bridge system. The filters are expected to be fully operational again by the end of 2025.

5.2.8 Dissolved Air Flotation Thickener (DAFT) (Solids Treatment)

The existing DAFT facility was placed into service in 1992. The two (2) DAFT tanks were converted from old gravity thickener tanks to provide primary/secondary sludge co-thickening and were originally constructed in 1978. The current DAFT facility consists of two exterior circular dissolved air flotation tanks, with associated pressurization and pumping equipment in an adjacent building. Primary sludge, primary scum, secondary sludge, filtrate and secondary scum were initially set up to be wasted to the sludge blending tank at the DAFT system. The DAFT sludge was originally pumped to the BioGro sludge pellitization facility for dewatering until the pelletization facility was replaced with belt presses in 1998, which were in turn replaced with centrifuges in 2015. Note in Figure 5.2.8.1 below that the contrate recycle from the centrifuges was pumping to the front of the headworks as part of the CCWS T3014 Dewatering Improvement project.

ESI/Hazen provided the T3017 South Cobb WRF Headworks Improvement TM No. 4 – DAFT Sludge Thickening Facility dated 12/10/2018. In Section 1.1 Existing Facilities on page 5 of 42 in this report it states that the DAFT sludge thickening system at the time of that evaluation co-thickens primary sludge and waste activated sludge (WAS) on a continuous basis. Two air compressors, three pressurized water pumps, and three pressurization tanks saturate either secondary effluent or supernatant with air. Pressurized water containing dissolved air is added to mixed sludge at the DAFT tank inlet. Polymer can also be added at the tank inlet to improve capture and/or float solids content; however, the plant currently operates without polymer addition.

Float sludge is removed by a skimmer, thickened bottom sludge is removed by a rake, and supernatant is removed by a submerged launder. The supernatant is removed from the middle of the tank at an elevation below the float sludge, but above the settled sludge. The supernatant is labeled as air flotation effluent (AFE), in the 1990's plant drawings. The supernatant is a recycled flow that is typically low in solids content and is recycled back to the head of the plant and was used to feed the DAFT air saturation tanks (up to 30% returned to DAFT). The DAFT equipment is now at the end of its useful life. The concrete tanks are nearly 50 years old and the interior wall surfaces have suffered from deterioration due to hydrogen sulfide (H2S) induced corrosion. The performance of the DAFT system has been marginal over the last several years.

In the December 2018 evaluation the following excerpt from that evaluation labeled Figure 5.2.8.1 provides the solids process flow diagram that was in place at the time of the evaluation. A capacity analysis was performed to determine the current available process capacity of the existing DAFT thickening equipment. It was assumed that all existing equipment will be repaired and returned to service. The second flotator tank and the third pressurized water system were considered as redundant units. This evaluation also included sludge thickening alternatives. The alternatives evaluated included (1)

restore/repair DAFT's, (2) gravity belt thickeners (GBT's), and (3) Rotary Drum Thickeners (RDT's). In lieu of repair, the final recommendation provided an alternate installation of gravity belt thickener (GBT) units at a design solid loading rate of 750 lb. TS/hr. per meter and a design hydraulic loading rate of 200 gpm per meter each. This evaluation was concluded in a January 2024 DDR and Options Evaluation titled, "*SCWRF Primary Clarifier Rehabilitation and Biosolids Thickening, Program No. T3022"* with recommendation to replace the DAFT biosolids thickening unit with GBTs, over rotary drum thickeners (RDTs) based on lower capital cost and less operational complexity due to the use of three process trains instead of four RDTs. Following further evaluation CCWS moved forward with RDTs due to lower capital and operating cost and a smaller footprint than GBTs.

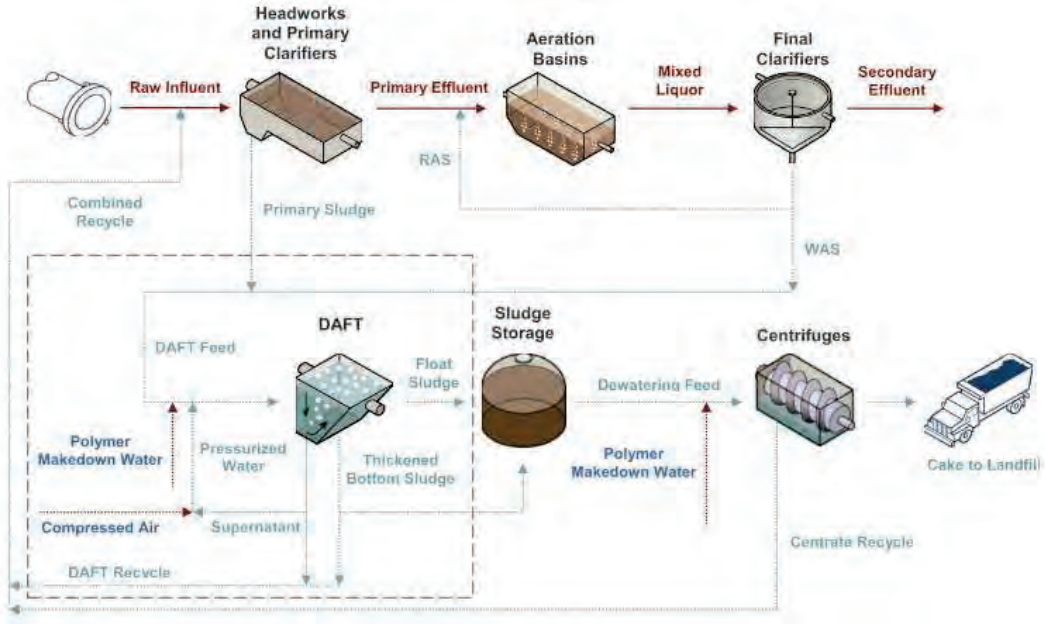


Figure 5.2.8.1 – Solids Process Flow Diagram

Since that January 2024 evaluation was presented, CCWS released the SCWRF - Biosolids Thickening System Replacement: Program No. T3027. The stated purpose was to select a consulting firm to provide professional and design services for the replacement of the existing dissolved air flotation tanks (DAFTs) with rotary drum thickeners as the means of thickening treated sewage solids prior to its dewatering and disposal.

Staff Interview Highlights: The existing DAFT system has been in service since 1993 and has exhausted its useful life. The DAFT system is operationally intensive and difficult to maintain within its performance envelope. It, and these units and key components within the DAFT system, are at the end of their useful life. Staff noted that there are no more DAFT gearbox/turntables left that will retrofit the existing system as a rehab option. It was noted that historically and operationally, that on a good day there was a 90% capture rate and on an average day it was 60%. Staff also offered that when the polymer feed system is running, there is no gain in capture rate noted. The Recycle Pump Station (RPS) was not evaluated as part of this Urgent process overview. Those four (4) recycle pumps process flows back to the headworks of the SCWRF. The RPS specifically receives

backwash from the effluent filters, centrifuge centrate, and DAFT air flotation effluent and thickened basin sludge recycle. Staff noted that in 2009-2010 when DAFT only received primary and WAS that they were removing solids. However, since the installation of the RPS in 2012 the plant staff will see high DO when the pumps are running. However, it was noted that if the pumps do not run, then the DAFTs do not work properly. No urgent action was highlighted because of this pending award and address via RP-T3027.

5.2.9 Thickened Solids Holding Tanks (Solids Treatment)

There are currently two thickened sludge storage tanks at SCWRF, each with a capacity of 850,000 gallons of storage. Thickened sludge is stored in these thickened sludge holding tanks (SHTs) prior to sludge dewatering via centrifuges. The SHTs are 90 feet in diameter and have a max sidewater depth of 18 feet. The SHTs were originally constructed as aerobic digesters in 1963 and 1970 respectively. These aerobic digesters were then converted to the SHTs in 1994. Currently, one of the storage tanks is out of service. These SHTs receive float sludge and settled sludge from the DAFT which receives the primary sludge (PS) and waste activated sludge (WAS) from the Secondary Clarifiers. The sludge from the storage tanks is then pumped via sludge pumps to the centrifuges to be dewatered. The resultant dewatered cake from the centrifuges is disposed of into landfills. SCWRF does have the option to send the dewatered cake to R.L. Sutton's incinerator via trucking.

Hazen conducted an evaluation conducted in In March 2022 of the thickened solids holding tanks titled, "*SCWRF Thickened Sludge Storage Evaluation, Program No. T3020*". Hazen concluded that the thickened sludge storage tanks were sufficient for five days of storage.

There are three different types of mechanical equipment utilized with the sludge storage tanks: thickened sludge storage mixers, thickened sludge pump and grinders, and thickened sludge pump station sludge pumps. All mechanical equipment was installed in 1996. The storage tanks were designed with three submersible mixers per tank. The mixers are no longer in service and were only in service for approximately the first 10 years after their installation. The mixers are rated with 440-rpm motors at 10-hp. The storage tanks were designed to have three pumps, one for each centrifuge, and two grinders, one for each tank. The pumps pull thickened sludge from the tanks and pump to the centrifuges while the grinders macerate the sludge as it is being pulled. The three Lobeline pumps are on VFD's and are rated for 160 gpm at 50 feet of head. The VFD's were replaced in 2017. The two grinders are 10-inch grinders that are rated for 330 gpm. Two sump pumps were installed to pump floor drainage and seal water from the building in between the two tanks. The Pentair sump pumps pull from a sump tucked under the building stairwell in the lower level. The sump pumps are rated at 210 gpm at 25 feet of head.

The Hazen 2022 Report included a structural condition assessment performed on the sludge storage tanks. The inspection revealed observable cracks in the exterior concrete wall surfaces. The cracks were concluded to have been present since the original construction. The cracks were noted to be leaking in two locations on Tank 1. The

location of the leaks indicated the embedded reinforcement had corrosion due to the notable spalling observed. Recommendations were given to inject the leaking cracks with hydrophilic chemical grout and the spalled areas to be repaired by patching.

Additionally, the following two process mechanical recommendations were offered by Hazen:

- Determine best replacement for the inoperable thickened sludge storage tank mixers. Other mixing technologies should be considered in addition to submersible mixers.
- Consider a larger space for the pump building to provide better clearances around equipment and better access to equipment.

Staff Interview Highlights: SCWRF staff noted leaks and/or erosion issues outside the holding tanks around the primary entrance to the head house located between the two SHTs. See Section 6 of this TM under Civil/Site Stormwater item 1 for more information on this item. Another item of concern was the main beam across the head house noted in the previously completed structural assessment in this building.

5.2.10 Plant Reuse Water System (Plantwide)

The SCWRF project completed in 1998 under the CCWS T3101 Project titled SCWRF Expansion to 40MGD project with drawings prepared by Brown & Caldwell.", which increased the plant capacity to 40 MGD, specifically included the addition of a new reuse water pumping station and reuse piping installations throughout the SCWRF. This project included the installation of new stainless-steel piping for reuse water line installations (noted as W3 in yard piping drawings from this project) and included tying into existing piping in certain locations. The previously installed reclaimed water pump station that was in service prior to this 1998 upgrade remains fully operational and serves as a backup system. It primarily remains in an idle state, activated only when needed to support the new reuse water system.

The following Figure 5.2.10.1 depicts one quadrant of the yard piping that was part of this project completed in 1998, on which we have highlighted the red quadrant of note from the overall SCWRF site, and we have highlighted in yellow both the existing and newly installed W3 piping in that quadrant from the referenced 1998 record drawings. Ardurra did not calculate the LF of this W3 piping, but if requested could provide that information. Figure 5.2.10.1 is primarily offered to provide insight into the potential volume, expanse and complexity of this piping system.

The Reuse Water Pump Station contains four (4) vertical centrifugal pumps which are designed to provide 1500-gpm capacity at 300-ft total dynamic head each, providing a reuse water system throughout the plant. The new and previously installed reuse piping system was captured as one complete system in this TM3.

Summary information about the four (4) existing reuse pumps is provided in the following Table 5.2.10.1:

Category	Description			
Equipment Name	Reuse Pump #1	Reuse Pump #2	Reuse Pump #3	Reuse Pump #4
Equipment Number	P4701	P4702	P4703	P4704
Location	Reuse Pump Station	Reuse Pump Station	Reuse Pump Station	Reuse Pump Station
Type	Vertical Turbine Pump 9 Stage Size: 14D250	Vertical Turbine Pump 9 Stage Size: 14D250	Vertical Turbine Pump 9 Stage Size: 14D250	Vertical Turbine Pump 2 Stage Size: 14D276
Year Installed	2011	2011	2011	2011
Rating / Capacity	1,500 gpm at 300 ft	1,500 gpm at 300 ft	1,500 gpm at 300 ft	2,000 gpm at 46 ft
Motor Horsepower	150 hp	150 hp	150 hp	40 hp
Power Supply	460V, 3-Phase, 60 Hz	460V, 3-Phase, 60 Hz	460V, 3-Phase, 60 Hz	460V, 3-Phase, 60 Hz
Manufacturer	Ruhrpumpen	Ruhrpumpen	Ruhrpumpen	Ruhrpumpen

Table 5.2.10.1 –Reuse Water Pump Summary

The limited options for managing flow around the plant from the reuse piping layout, and the historical reliability issues of the stainless steel pipe, are the primary drivers for this system being highlighted as one of the top four urgent issues at the SCWRF. A secondary issue associated with the reuse water is scum cleaning in the Rotary Screenings Building. The volume of the current hot water heater is not adequate to allow effective cleaning and maintenance. See the below Figure 5.2.10.2 – Limited SCWRF Reuse Piping – Yard Piping Highlight which notes that reuse pipe is noted as entry into the screenings building and is adjacent to the aerated grit removal tanks. This water is used to washdown scum, and scum processing equipment in this area. CCWS checked with the plant staff and scum from the primary clarifiers is currently piped with the primary sludge to the DAFTs. Therefore, washdown in the Screenings Building would be limited to degritting systems. a

Once the new multi-rake screens and screenings diverter chutes being installed as part of CCWS Project “T3017 South Cobb WRF Headworks Improvements” project are started up, and the existing system is purged of rags, the urgency of this concern should be reduced accordingly.

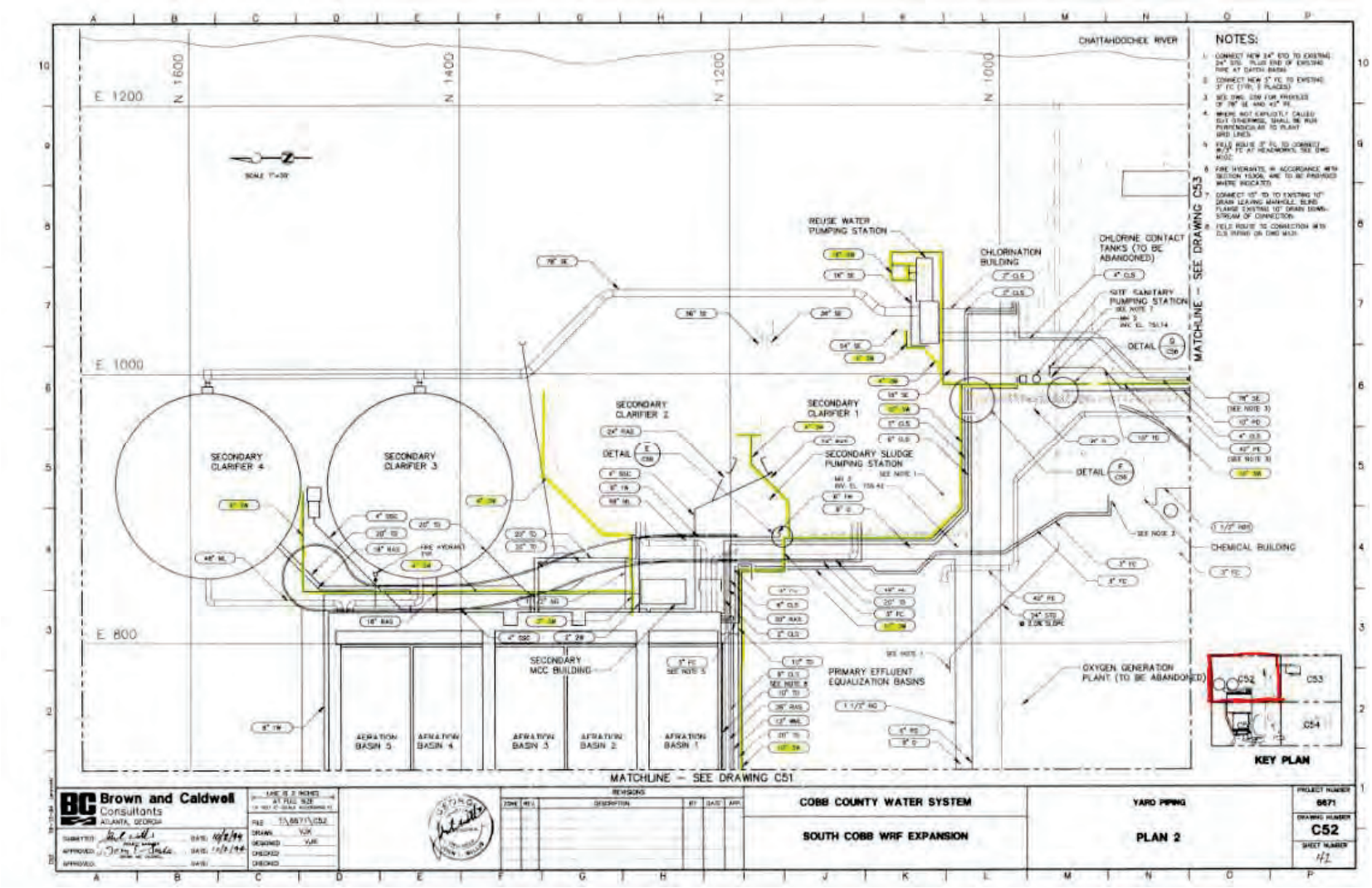


Figure 5.2.10.1 –Limited SCWRF Reuse Piping – Yard Piping Highlight

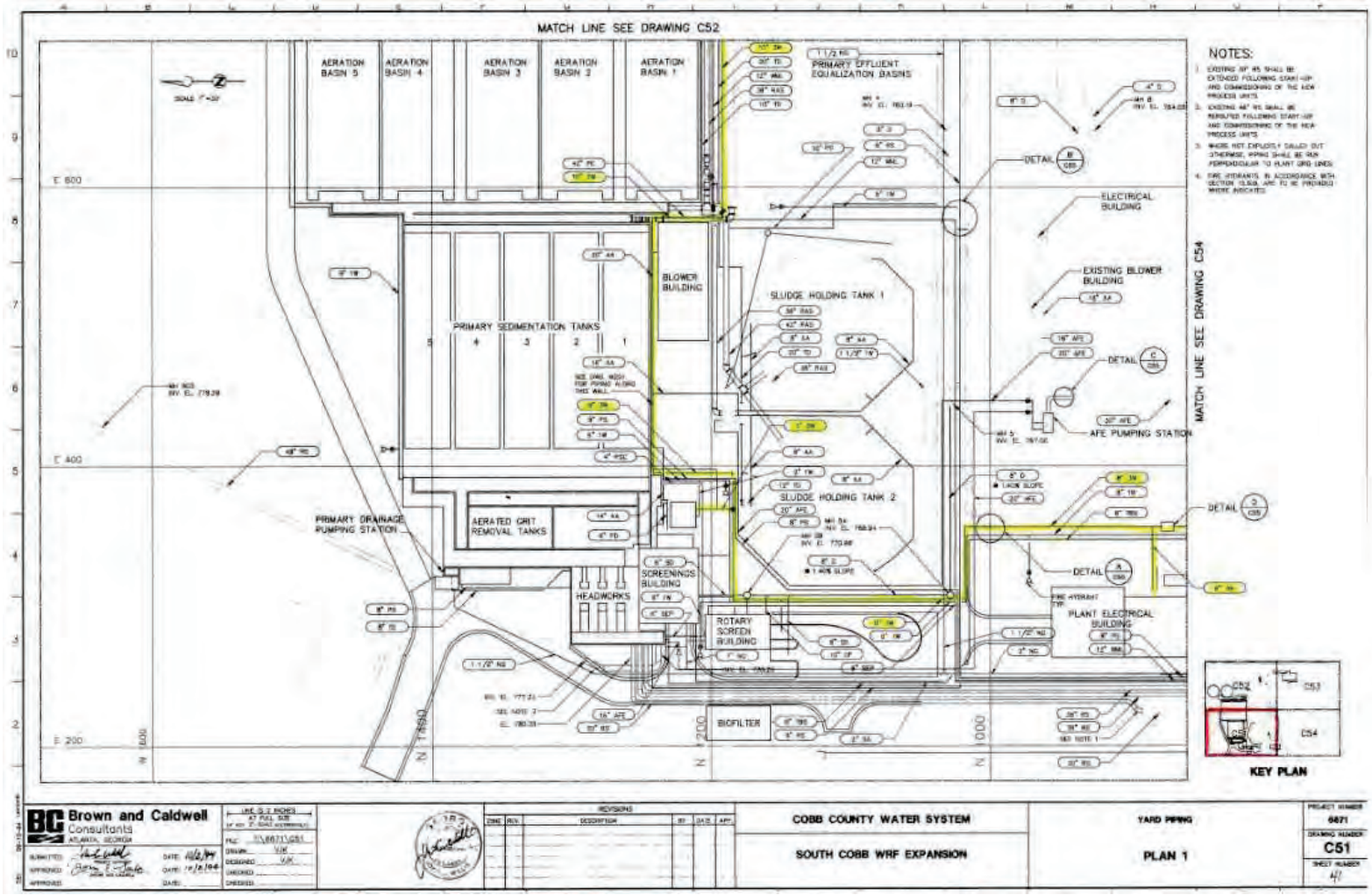


Figure 5.2.10.2 –Limited SCWRF Reuse Piping – Yard Piping Highlight

Staff Interview Highlights: Staff indicated all reuse piping is galvanized. Because the reuse pump station feeds seal water throughout the plant site, rags that make it past the bar screens will make their way through the treatment process to the recycle pump station and will feed into the reuse piping system. The reuse piping system has no valving which requires a complete shutdown to make repairs. Starting the system back up causes issues with pressure spikes creating a domino effect of breaks, once break repairs are started. It was noted by staff that Reuse piping break issues around secondary clarifiers 3, 4, and 5 are significant. Staff noted that because the hot water heater was not sufficiently sized, piping modifications were made in the past to plumb scum to go to the DAFT system. The other option offered to address this lack of capacity was to get a larger water heater. However, a larger water heater would have been classified as a boiler and would have created other issues in operations and maintenance of that system.

5.2.11 SCADA (Plantwide)

No formalized evaluations from outside entities were provided by Cobb County Water System (CCWS) on the SCWRF nor any of the CCWS supervisory control and data acquisition (SCADA) systems that Ardurra was made aware of. Multiple previously noted evaluations conducted at various times over recent years have evaluated SCADA systems with no issues highlighted in any of these assessments. One key change in the historical approach by CCWS was the provision and implementation of P&ID drawings plantwide as part of the project completed in 1998 which increased the plant capacity to 40 MGD. Projects completed after this date did typically include P&ID drawings.

Staff Interview Highlights: A SCWRF site visit was completed on Friday, January 3, 2025, with Jason Methvin, Technical Services Group Manager for CCWS. Key takeaways in the information sharing endeavor were that the CCWS WRFs use WinCC software with physical servers configured to run a redundant pair of virtual servers hosting and running the WinCC HMI (human machine interface) application. One key item brought forward in site visits was the note that the main programmable logic controllers (PLC) hardware being used at the SCWRF, and its associated I/O modules (S7-300 and -400) are considered obsolete by the manufacturer and have been discontinued. The manufacturer offers Models S7-300 and -1500 as replacement units. Replacement of these units are currently being planned for and should be initiated at the earliest. Additional information has been requested by Ardurra staff, and more detail will be offered in the follow up TM or CPR on the SCADA system. Information yet anticipated includes SCADA screen shots, standards for instrumentation and hardware, and PLC panel drawings.

6 Site Visits – Initial Findings & Urgent Issues

The Ardurra team scheduled and completed site visits for each of the noted processes and systems as follows:

- Structural field assessments completed 12/02/2024 and 12/03/2024.
- Electrical field assessment completed 12/13/2024.
- Mechanical/equipment field assessments completed 11/26/2024 and 12/03/2024.
- Stormwater/drainage field assessment completed 02/27/2025.
- Survey hydraulics assessment completed 12/03/2024.
- Operations field review completed 12/03/2024.
- HVAC and odor control field assessment completed 12/23/24.
- I&C field assessment completed 01/03/25.

As noted in the previous section, projects were awarded, and rehab work is currently being performed under Project T3023 on the Effluent Filters and under Project T3017 on the Headworks. Each of these locations were not evaluated for this TM No.3 nor is it anticipated that Ardurra will include full assessments in the forthcoming TMs or CPRs.

Key findings from the initial assessments for items not considered Urgent were limited. The following are some of those key items summarized from the noted site visits. More details will be provided in the supporting TMs and CPRs envisioned and currently under development and will provide alternatives to providing an additional 10 MGD capacity increase at the SCWRF.

Ardurra Structural team items of note:

1. Building #14 – Between the two Thickened Sludge Holding Tanks:
    - The building appears to have suffered significantly from erosion and possible flooding. The cracking in the masonry walls is severe and the attachment of the roof structure to the tanks looks to be suspected at the least. Repairing the building would most likely be cost inefficient but possible.
2. Corrosion of odor control pipe supports located at the headworks:
    - This item is addressed in the current construction plans.
3. Exposed rebar at Primary Clarifier Effluent Valves (3 Places):
    - There are three areas of exposed rebar, Valves 1, 2, and 5, that need to be addressed.
4. Exposed aggregate in concrete beams at the Aerated Grit Removal Tanks:
    - The concrete beams that support the aluminum planks at the aerated grit tanks show significant signs of deterioration. The aluminum covers on the Removal Tank are recommended to be removed as well. The current construction project, SCWRF Headwork Improvement, Program No. T3017, is resolving both of these issues.

Ardurra Electrical team items of note:

1. Generator Issue in Power Generation Building 1:

- Based on information provided by the plant electrician, the plant generators and controls in this building are experiencing capacity limitations and challenges with its auto-start capability. This poses a risk to critical operations during power outages and should be reviewed promptly.

2. Electrical Gear in DAFT Building 15:
   - The electrical gear in DAFT Building 15 shows signs of degradation, which could lead to operational inefficiencies or potential failures if not addressed promptly. The conversion to RDT's should address these concerns associated with electrical gear.
3. Electrical Gear in Thickened Sludge Building 14:
   - Similarly, the electrical gear in Building 14 is experiencing issues that could compromise the system's reliability. A detailed inspection and potential replacement should be prioritized.

*As part of these reviews, it is essential to verify the process equipment that will remain or be added to these electrical gears after the implementation of upcoming improvement projects to ensure system compatibility.

Ardurra Civil/Site Stormwater team items of note:

1. Building #14 – Between the two Thickened Sludge Holding Tanks
   - Observed areas where ponding occurs are causing erosion. Rip rap berm diverter in place. Site drainage in this immediate area needs to be reviewed. It is possible to install an inlet or under drain that ties to driveway drainage to restore positive drainage to this area.
2. General Maintenance Items:
   - Standing Water at Chem Delivery pad to be corrected. Possible clogged outfall pipe/valve from trench drain.
   - General Site Stabilization: areas of exposed soil / unstabilized earth outside of active construction areas, should be grassed, sodded, or otherwise permanently stabilized to prevent erosion.
   - Asphalt degraded into areas showing signs of ponding and erosion. Areas of severe degradation should be repaved to prevent erosion and further degradation.
   - Curbing, particularly on driveway radii, is showing degradation and failure with exposed rebar is many areas. Curbing should be replaced to prevent runoff flow over the curbline and direct runoff to inlets.
   - Stormwater Curb Inlets:
     - Many curb inlet slabs are cracked or collapsed, limiting or preventing runoff from entering the storm drainage system. These inlets should be repaired.
     - All inlets are equipped with straw wattles to prevent turbidity or litter from runoff entering inlets. Wattles in place that have degraded beyond effective quality should be replaced.

7 Conclusions and Recommendations

7.1 Conclusions

The following four items are recommended for urgent action. However, it should be noted that three of these four issues are interrelated (i.e. the following items: 2., 3., and 4.). The interconnectivity between each of these highlighted urgent issues will require further evaluation to help Cobb County Water System (CCWS) most effectively prioritize their address.

The four identified urgent items of concern are as follows:

7.1.1 Stormwater: A finalized "Condition and Performance Report" (CPR) is pending for the SCWRF site evaluation. Reports provided by plant staff and the CCWS Storm Water (SW) Division indicated that intermittent testing and monitoring had identified an elevated fecal presence in SW sampling. It is believed by staff that these elevated levels are associated with runoff that may be coming from offsite. The elevated fecal results are believed to come from one of the four offsite SW conveyance connection points located along the west and north boundaries of the SCWRF property. All SW from these offsite locations move through onsite piping with ultimate discharge into the Chattahoochee River. CCWS plant staff believe that this elevated fecal result may come from one of these four offsite connection points, raising this issue too urgent. It is recommended that CCWS initiate steps to confirm source confirmation and address or have all four offsite connections independently re-piped per the County MS4 NPDES permit requirements.

7.1.2 Rags: At the time of the initial site visits, CCWS had awarded the construction of South Cobb WRF Headworks Improvements – T3017. This project will remove the four climber screens and replace them with four new multi-rake screens and screenings diverter chutes with a 5th channel being prepped for future use and installation of a 5th climber screen. Current site assessments noted rags moving past the headworks through multiple processes downstream. Rag loading is believed to have increased following the startup of the South Cobb Tunnel Influent Lift Station (ILS) and is elevated when additional pumping capacity is initiated from the South Cobb Tunnel ILS. Rags not removed at the headworks move downstream and are collected in the aerated grit removal system, the primary clarification system, the secondary clarification system, within each step in the solids handling systems, and then also within the reuse water system. Once these new multi-rake screens and screenings diverter chutes are started up, and the existing system is purged of rags, the urgency of this concern should be reduced accordingly.

7.1.3 Solids Management Pumps: One of the first items identified by CCWS operations and maintenance (O&M) staff was the number of hours maintenance staff spend per day on the maintenance of the various solids' pumps located throughout the SCWRF. It was noted that, on average, each weekday, the RAS, WAS, and the three Centrifuge feed pumps each required half a day of maintenance. Reasons given for this maintenance included lack of effective grit removal in the aerated grit removal system, the lack of effective removal of solids through the Dissolved Air Flotation Thickener (DAFT) system, and the recycling of solids back to the head of the plant. Each of these concerns, combined with the lack of effective rag removal noted in item 2 above, are causing increased maintenance and each need to be addressed. In addition, the age and reliability of each of the centrifuge feed pumps adds to the urgency of this concern. It should be noted that CCWS has recently awarded a project to replace the DAFT system with a Rotary Drum Thickener (RDT) system to a consultant. Once this RDT project is completed it should increase the effectiveness of the removal of solids and minimize the recycling of solids back through the plant.

7.1.4 Reuse Water System: The impact of rags traversing the treatment systems and entering the plant reuse water pumping system was noted by maintenance staff as a recurring and compounding issue. Breaks in reuse piping around the secondary clarifiers 3, 4, and 5 have continued to increase, as has the difficulty in making reliable repairs. Rags that pass through the pumps and lodge in the piping system cause pressure spikes. These spikes reduce pipe structural integrity and then, over time, result in pipe breaks. Repairs made in the past have caused a domino effect of pipe breaks upstream/downstream highlighting the urgency of this concern.

7.2 Recommendations

Concerning the four "urgent" issues noted in Conclusion Section 7.1 above, Ardurra offers the following Recommendations:

7.2.1 Stormwater

CCWS should initiate steps to evaluate and confirm potential origins of elevated fecal sampling results. If it is discovered that they originate from SCWRF offsite locations, CCWS should work with neighboring property owners to re-pipe SW systems to avoid entry onto CCWS property, or to provide easements for SW piping independent of SCWRF property influence or impact.

7.2.2 Rags

Once the new multi-rake screens and screenings diverter chutes are put in service, CCWS should work towards purging the existing system of rags to alleviate further impact.

7.2.3 Solids Management Pumps

Once the RDT project is put in service, CCWS should evaluate the Recycle Pump Station (RPS) to discern how the four (4) recycle pumps process flows back to the headworks of the SCWRF and confirm efficiency and effectiveness of this process.

7.2.4 Reuse Water System

Once the new multi-rake screens and screenings diverter chutes are put in service, CCWS should work towards purging the existing system of rags to alleviate further impact.

7.2.5 Other Systems of Note

In addition to the Urgent Recommendations, the following were noted as potential concerns that will be expounded upon in TM4, TM5, TM6 and the FINAL SCWRF Facility Plan and Final CIP:

7.2.5.1 South Cobb Tunnel and ILS: CCWS should develop a Maintenance of Plant Operations (MOPO) for flow loading based on the multiple pumped flow scenarios from the operations of the South Cobb Tunnel ILS, the Six Flags PS, and the Sweetwater PS under different flow management scenarios.

7.2.5.2 Secondary Clarification Capacity: Both Average Annual Flow and RAS Peak Flow have historically been noted as a restriction in SCWRF treatment capacity. This along with the RAS, WAS, and secondary scum pump high maintenance and low reliability place an evaluation and address of this process at a high level.

8. Attachments

- Attachment 1 – CCWS Shared Information Crosswalk to Ardurra Renamed Documents
- Attachment 2 – Process Equipment Summary Sheet

Attachment 1 – CCWS Shared Information Crosswalk to Ardurra Renamed Documents - Record Drawings (sheet 1 of 2)

Ardurra Implemented Renaming (PDFs)	Original CCWS Shared File Name/Format	CCWS Shared File(s) Location
1_SCWRF 2MGD Hensley Schmidt 18 acre site E-105 1963	S01955; S02442-S02481 – TIF files	3. Asbuilt Drawings\g. South Cobb Sewage Treatment Plant-1963, Project E-105\
2_SCWRF Expansion to 8 MGD Hensley Schmidt Contract 3 E4050 04.24.1970	COVERSHEET, INDEX, 4050-E-3.2 thru 73.1 varied – TIF files	3. Asbuilt Drawings\h. S Cobb STP Expansion,Contract No. 3-1970, Project No. E-4050\
3_SCWRF Expansion to 24 MGD Hensley Schmidt Design Dwgs E5848 09.01.1976	E-5848_4-IB-231 thru E-5848_4-IB-263.2 varied – TIF files	3. Asbuilt Drawings\k. SC WWTP Expansion-1976, Project No. E-5848 (design)\
4_SCWRF Expansion to 24 MGD Hensley Schmidt Record Dwgs Contract 4 E5848 09.03.1976	5660J-1.0,7398-E_M-1.0, C-5660-1.0, COVERSHEET, INDEX, INDEX2, E-6182_1.0 and 2.0, E-5660_4-I-3.1 thru 309.2 varied – TIF files	3. Asbuilt Drawings\i. SC WWTP Expansion, Contract No. 4-1976, Asbuilts, E-5660\
5_SCWRF Expansion to 24 MGD SCE Inc Shop Dwgs Contract 4 E5660 08.17.1979	SC-0037-20-0 thru SC-0037-20-33 varied – TIF files	3. Asbuilt Drawings\m. SC WWTP Expansion, Contract No. 4-1978 S.C.E Markups, E-5660\
6_SCWRF Prim & Sec Clarifier Mods Hensley Schmidt E7470 August 1984	Cover Sheet, E1.0 (LSMod.) thru S2.2 varied PDF individual sheets	3. Asbuilt Drawings\n. South Cobb Water and Sewer Modifications-1984, Project No. E-7470\
7_1-20 LF SCWRF Prim & Sec Clarifier Mods Hensley Schmidt E7470 01.08.1985	PDF Combined Drawings	Via supplemental data request
8_SCWRF Advanced Plant Imprvmnts to 28 MGD Hensley Schmidt E8336 11.21.1986	COVERSHEET, E-8336_2.1 thru 42.1 varied – TIF files	3. Asbuilt Drawings\j. SC Advanced WWTP Improvements-1988, Project No. E-8336\
9_SCWRF Brown & Caldwell Chemical Feed Facility E5072 July 1990	COVERSHEET, INDEX, A901 thru S904 varied – TIF files	3. Asbuilt Drawings\l. SC Wastewater Treatment Plant Chemical Feed Facility-1990, Project No. 5072\
10_SCWRF Brown & Caldwell Sludge Thickening System November 1991	COVERSHEET, A801 thru S805 varied – TIF files; E801 (Addendum No.1) thru S805 (Addendum No. 2) varied – PDF files	3. Asbuilt Drawings\f. South Cobb WTP Sludge Thickening System (DAFT)-Design Drawings Only\
11_SCWRF Brown & Caldwell DAFT (Envirex) Shop Drawings1992	12108-201 thru 12108-210 varied – TIF files	3. Asbuilt Drawings\o. DAFT (Envirex) Shop Drawings-1992\
12_SCWRF GSS&A Control Bldg Roof Replacement 04.16.1993	Control Bldg Roof Replacement Dwgs - PDF	Via supplemental data request
13_SCWRF Exp to 40 MGD Brown & Caldwell Vol 5 G_C_P&ID_A_S Dwgs T3101 October 1994	COVERSHEET, A1 thru S902 varied – PDF individual sheets	3. Asbuilt Drawings\b. SCWRF Expansion to 40 mgd, T3101 (TPSC9101) (Volume 5 of 6)\
14_SCWRF Exp to 40 MGD Brown & Caldwell Vol 6 M_HVAC_I_E Dwgs T3101 October 1994	COVER, E1 thru M902 varied – PDF individual sheets	3. Asbuilt Drawings\b. SCWRF Expansion to 40 mgd, T3101 (TPSC9101) (Volume 6 of 6)\
15_SCWRF Brown & Caldwell Solids Handling Improvements December 1996	COVERSHEET, Drawing C085 thru Drawing S935 varied – PDF individual sheets	3. Asbuilt Drawings\b. SCWRF Expansion to 40 mgd, Addendum-Solids Handling Improvements (design)\
16_SCWRF NB+A Architects New Control Building T3007 04.08.2003	PDF Combined Drawings	3. Asbuilt Drawings\ s. SCWRF, New Control Building, T3007 (Design Drawings)
17_SCWRF Brown & Caldwell Chlorination Dechlorination Upgrade T3010 April 2004	PDF Combined Drawings	3. Asbuilt Drawings\ e. SCWRF Chlorination Dechlorination Facility Upgrade, T3010
18_SCWRF Earth Tech Headworks Improvements T3006 April 2004	Cover Sheet, 01-G-1 thru 99-S-3 varied PDF individual sheets	3. Asbuilt Drawings\d. South Cobb WRF Headworks Improvements-2004, T3006\
19_SCWRF CH2M Hill Sludge Transfer Pump Stations August 2004	SCWRF Transfer Pump Station Drawings - PDF	Via supplemental data request
20_SCWRF Arcadis Sludge Handling Facility T3012 October 2006	Sludge Handling Facility T3012 - PDF	Via supplemental data request
21_SCWRF Brown & Caldwell Filter mods Add Sec Clar Vol 6 G_C_P&ID_S Dwgs T3003B May 2012	PDF Combined Drawings	3. Asbuilt Drawings\ c. South Cobb WRF Upgrades, T3003B-May 2012, Volume 6
22_SCWRF Brown & Caldwell Filter mods Add Sec Clar Vol 7 M_HVAC_I_E Dwgs T3003B May 2012	PDF Combined Drawings	3. Asbuilt Drawings\ c. South Cobb WRF Upgrades, T3003B-May 2012, Volume 7
23_SCWRF ESI Chemical Systems Upgrade T3015 May 2014	PDF Combined Drawings	3. Asbuilt Drawings\ q. SC Water Reclamation Facility Chemical Systems Upgrade-2014, Program No. T3015
24_SCWRF EDT Inc Dewatering Improvements T3014 Record Dwgs 06.29.2015	PDF Combined Drawings	3. Asbuilt Drawings\ p. South Cobb WRF Dewatering Improvements-June 2014, T3014
25_SC Tunnel Inf LS Jacobs Vol. 2 of 2 $3017 Record Dwgs Sept 2015	Architectural – 11x 17 thru Structural- 11x 17 PDF individual sheets	3. Asbuilt Drawings\r. SC Tunnel, Vol. 2 of 2 (ILS)-2015, Program No. S3017\
26_SCWRF Jacobs Effluent Filter Rehab T3023 Construction Dwgs Jan 2024	SCWRF Effluent Filter Rehab-Construction Drawings - PDF	Via supplemental email request
27_SCWRF ESI Headworks Improvements T3017 Conformed Dwgs 02.08.2024	PDF Combined Drawings	a. South Cobb WRF Headworks Improvements, T3017 (Conformed Drawings)

Attachment 1 – CCWS Shared Information Crosswalk to Ardurra Renamed Documents - Historical Documents (sheet 2 of 2)

Ardurra Implemented Renaming (PDFs)	Original CCWS Shared File Name/Format (all PDF)	CCWS Shared File(s) Location
1_RL Sutton and SCWRF Brown & Caldwell Phosphorus Control Plan May 1990	d. Phosphorous Control Plan for SCWRF and Sutton WRF (May 1990)	15. Other
2_SCWRF Brown & Caldwell Sludge Treatment & Disposal Evaluation Sept 1990	g. Sludge Treatment and Disposal Evaluation for the South Cobb WWTP (September 1990)	15. Other
3_SCWRF Brown & Caldwell Oxygen Transfer Alts 06.27.1991	b. Oxygen Transfer Alternatives	12. Project Reports\South Cobb WRF Expansion to 40 MGD, Program No. T3101 (TPSC9101)\
4_SCWRF MSE Flooding Potential Eval Oct 1991	h. South Cobb WTP Flooding Potential Evaluation (October 1991)	8. Environment Reports
5_SCWRF DAFT Atl Testing & Eng Subsurface Exploration Report 55728 10.31.1991	a. Report of Subsurface Exploration-DAFT (10-31-1991)	8. Environment Reports
6_SCWRF Expansion Atl Testing & Eng Subsurface Exploration Report 56920 01.27.1992	c. Report of Subsurface Exploration-SCWRF,TPSC9101 (January 1992)	8. Environment Reports
7_SCWRF Expansion Atl Testing & Eng Subsurface Exploration Report 67975 11.13.1992	d. Supplemental Subsurface Exploration Report -SCWRF, TPSC9101 (November 1992)	8. Environment Reports
8_SCWRF Expansion BC-MSE Design Development Report July 1993	a. DDR (July 1993)	12. Project Reports\South Cobb WRF Expansion to 40 MGD, Program No. T3101 (TPSC9101)\
9_SCWRF Brown & Caldwell Phase II ESA Nov 1993	f. Phase II Environmental Site Assessment-Former BHG Site (November 1993)	15. Other
10_SCWRF Brown & Caldwell DRAFT Sludge Thickening Facilites Operations Manual 07.07.1994	a. DAFT Operations Manual	12. Project Reports\South Cobb WTP Sludge Thickening System (DAFT)\
11_Brown & Caldwell Process Safety Regulations & Risk Management Plan proposal 06.27.1997	g. Process Safety Regulations (June 27, 1997) - PDF	8. Environment Reports
12_SCWRF Brown & Caldwell Filter Deletion from Expansion CCWS Memo 10.15.1998	b. ESI HS SCWRF Headworks TM - Screenings (April 12, 2018)	12. Project Reports\South Cobb WRF Headworks Improvements, T3017\
13_SCWRF ESI Hazen Headworks T3017 Grit Removal Evaluation TM 2_05.15.2018	c. ESI HS SCWRF Headworks TM-Grit Removal (May 15, 2018)	12. Project Reports\South Cobb WRF Headworks Improvements, T3017\
14_SCWRF ESI Hazen Headworks T3017 Influent Screening Evaluation TM 1 04.12.2018	d. ESI HS SCWRF Headworks TM-Septage Receiving (June 29, 2018)	12. Project Reports\South Cobb WRF Headworks Improvements, T3017\
15_SCWRF ESI Hazen Headworks T3017 Septage Receiving Evaluation TM 3_06.29.2018	e. ESI HS SCWRF Headworks TM-Sludge Thickening (Dec 2018)	12. Project Reports\South Cobb WRF Headworks Improvements, T3017\
16_SCWRF ESI Hazen Headworks T3017 DAFT Sludge Thickening TM4_12.10.2018	b. South Cobb Capacity Assessment, Task 4.0-Filters (April 10, 2000)	15. Other
17_SCWRF Brown & Caldwell Capacity Study Design Notebook March 2000	b. Process-Mechanical Design Notebook (2001)	12. Project Reports\South Cobb WRF Upgrade, T3003B\
18_SCWRF Brown & Caldwell Deep-Shallow Bed Filter Capacity Comparison TM 04.10.2000	b. Report of Subsurface Exploration-SCWRF, T3003B (5-31-2001)	8. Environment Reports
19_SCWRF Expansion Brown & Caldwell PDR Design Calcs SC5 Eff Fit & PS Rcy PS 2001	a. Preliminary Design Report, Draft (July 2001)	12. Project Reports\South Cobb WRF Upgrade, T3003B\
20_SCWRF QORE Subsurface Exploration Report T3003 Scrns 4 & 5 SC5 Fitrs 05.31.2001	b. Report of Subsurface Exploration-SCWRF, T3003B (5-31-2001)	8. Environment Reports
21_SCWRF Brown & Caldwell DRAFT PDR - Odor Control Headworks July 2001	e. SCWRF Predemolition Asbestos and Lead-Based Paint Survey (February 2005)	8. Environment Reports
22_SCWRF Brown & Caldwell DRAFT PDR SC5 Eff Fit & PS Rcy PS SW 07.2001	c. Preliminary Engineering Report (May 2005)	12. Project Reports\South Cobb Tunnel, S3017\
23_SCWRF Predemolition Asbestos and Lead-Based Paint Survey NESHAP February 2005	c. South Cobb WRF Centrifuge Installation Alternatives Evaluation	15. Other
24_South Cobb Tunnel LS Parsons PDR $3017 May 2005	a. Secondary Clarifier 301 Inspection Report	12. Project Reports\SCWRF Secondary Clarifiers Rehabilitation, T3019\
25_South Cobb Tunnel ERPD & DDR June 2007	d. Secondary Clarifier 304 Inspection Report	12. Project Reports\SCWRF Secondary Clarifiers Rehabilitation, T3019\
26_SCWRF CH2M Hill Centrifuge Installation Alternatives Evaluation 05.04.2010	c. Secondary Clarifier 303 Inspection Report	12. Project Reports\SCWRF Secondary Clarifiers Rehabilitation, T3019\
27_SCWRF United R2T Condition Eval SClarifier 301_10.22.2020	f. Technical Memo (Primary Clarifier Evaluation)	12. Project Reports\FY SCWRF Improvements, T3020\
28 SCWRF United R2T Inspection Report SClarifier 304_01.11.2021	g. Technical Memo (Secondary Clarifier Evaluation)	12. Project Reports\FY SCWRF Improvements, T3020\
29_SCWRF United R2T Inspection Report SClarifier 303_02.11.2021	h. Technical Memo (Thickened Sludge Storage Evaluation)	12. Project Reports\FY SCWRF Improvements, T3020\
30_SCWRF Hazen Primary Clarifiers Eval T3020 Nov 2021	d. CFD Modeling (Primary Clarifiers)	12. Project Reports\FY SCWRF Improvements, T3020\
31_SCWRF Hazen Secondary Clarifiers Eval T3020 Nov 2021	b. Options Evaluation (January 2024)	12. Project Reports\SCWRF PC Rehab. & Biosolids Thickening, T3022\
32_SCWRF Hazen Thickened Sludge Storage Eval T3020 Mar 2022	a. Design Development Report (May 2024)	12. Project Reports\SCWRF PC Rehab. & Biosolids Thickening, T3022\
33_SCWRF Hazen Primary Clarifiers CFD Modeling T3020 04.14.2022	d. CFD Modeling (Primary Clarifiers)	12. Project Reports\FY SCWRF Improvements, T3020\
34_SCWRF ESI Hazen PC Rehab & Biosolids Thickening DDR - Options Evaluation Jan 2024	b. Options Evaluation (January 2024)	12. Project Reports\SCWRF PC Rehab. & Biosolids Thickening, T3022\
35_SCWRF ESI Hazen PC Rehab & Biosolids Thickening DDR T3022 May 2024	a. Design Development Report (May 2024)	12. Project Reports\SCWRF PC Rehab. & Biosolids Thickening, T3022\

Attachment 2 – Process Equipment Summary Sheet

Location	Equipment	Qty	Notes
Pretreatment	Bar Screens	4	
Pretreatment	Conveyors	3	
Pretreatment	Aerated Grit Systems	2	8 Grit Pumps, 2 Air Compressors
Pretreatment	Degritting System	2	2 Classifiers, 8 Cyclones
Pretreatment	Flow Equalization	Abandoned	
Primary Treatment	Primary Sedimentation (two chain and flights in each basin)	5 (10)	5 drive units, each drive unit drives two independent collector systems.
Primary Treatment	Primary Scum Pumps	3	
Primary Treatment	Scum Collectors	3	Helical Scum Collectors
Primary Treatment	Primary Sludge Pumps	5	
Primary Treatment	Primary Drain Pumps	2	
Primary Treatment	Ferrous Chloride System	1	3 Tanks, 4 pumps
Secondary Treatment	Lime Feed System	1	Powdered lime storage and slaker system.
Secondary Treatment	Aeration Basins	5	Three Turblex Blowers
Secondary Treatment	Clarifiers	5	
Secondary Treatment	RAS Pumping	10	
Secondary Treatment	WAS Pumping	4	
Secondary Treatment	Secondary Scum Pump Stations	3	SC 1/2, SC 3/4, SC 5 (three Pump Stations, 5 total pumps)
Secondary Treatment	Secondary Drainage Pumps	2	
Tertiary Treatment	Filters	7	
Tertiary Treatment	Filter Effluent Pumps	5	
Tertiary Treatment	Sodium Hypochlorite System	1	2 Storage Tanks, 5 hose pumps.
Tertiary Treatment	Sodium Bisulfite System	1	2 Storage Tanks, 2 Pumps
Plantwide	Reuse Water System	1	3 Pumps; Reuse system includes reuse piping as part of T3101 and previously installed reuse piping combined
Plantwide	SCADA	1	
Plantwide	Recycle Pump Station	1	4 Pumps
Solids Treatment	Thickened Sludge Holding Tanks	2	3 Sludge Feed Pumps, 2 Grinders, 6 Mixers (3 per tank), 2 Sump Pumps
Solids Treatment	DAFT	2	3 Pressure Water Pumps, 2 TBS Pumps, 4 FSP Pumps, 2 Drive Units, 1 Compressor (should be 2), 2 grinders, 1 polymer system (abandoned)
Solids Treatment	Polymer Feed System	1	Neat Polymer Tank, Polymer Mix Tank, Polymer Aging Tank, 1 Transfer Pumps, 1 make down unit, 2 mixers, 3 feed pumps
Solids Treatment	Centrifuges	3	
Solids Treatment	Dewatered Sludge Conveyors	3	

Technical Memorandum No. 4 – South Cobb WRF Evaluation of Facilities and Equipment

PREPARED FOR:	Cobb County Water System (CCWS), South Cobb WRF Staff
PREPARED BY:	Ardurra
DISTRIBUTION:	CCWS Ardurra Project Team
PROJECT NUMBER:	2024-1468-00 (100368.01)
PROJECT NAME:	Facility Planning for South Cobb Water Reclamation Facility Program No. T3025
DATE:	June 27, 2025

1 Executive Summary

The following is an executive summary of the Evaluation of Facilities and Equipment TM4 highlighted during multiple site visits and records research on the South Cobb Water Reclamation Facility (WRF).

The following Table 4.1.1 provides a guide for graded assessments of equipment resulting from the multiple site visits. Emphasis is provided when previous assessments from Reports highlighted in Section 4.2 Historical Documents provided greater detailed analysis of operating conditions, estimates of remaining useful life, or sense of reliability and overall performance consistency. A score of (1-5) was assigned to each process with 5 being the most critical. In addition, a general condition scoring of 1-5 with 5 being the worst condition was assigned for each process. Facility information was collected including notations of general condition, as well as a general sense of remaining useful life for the process. The combination of Condition Description and Performance Description are combined and divided by two to get an overall rating of each piece of equipment that was evaluated.

Table 4.1.1 Condition and Performance Assessment Grading

Grading	Condition Description	Performance Description
1	Excellent	Good
2	Slightly Visible Deterioration	Fair
3	Visible Deterioration	Moderate
4	Slightly Compromised Integrity	Poor
5	Notably Compromised Integrity	Out-of-service or Failing
NA	Not enough information to evaluate	Not enough information to evaluate

Table 5.1.1 provides an Assessment Summary Table for each Process with Consequence of Failure Grade, and the combined Condition and Performance Assessment Grade with key CIP Items tabulated within this Table. This table will be the critical reference to building of the forthcoming Master Plan recommendations, and the corresponding CIP prioritization report.

Each of these items will be discussed in greater detail within this TM No. 4, is referenced within other TMs and CPRs, and will be highlighted in the Final Master Plan and prioritized CIP to elevate the level of Urgent address.

2 Introduction

The Cobb County Water System (CCWS) owns and operates four water reclamation facilities that serve major basins within the County and portions of neighboring counties. The South Cobb Water Reclamation Facility (SCWRF) is located on the Chattahoochee River just north of where the river crosses I-20 on the west side of Atlanta. This permitted 40 MGD, monthly average, facility serves the southwestern quadrant of Cobb County, including portions of the Cities of Marietta and Smyrna; the Cities of Austell, Mableton, and Powder Springs; as well as areas outside of the county in Douglas and Paulding Counties.

The purpose of this project is to evaluate the facility, develop a long-range expansion plan for providing treatment capacity of 50 MGD (maximum month);evaluate which upgrades are needed to address aging, evaluate ways to increase reliability, reduce maintenance throughout the plant, identify alternatives and provide recommendations for unit processes for wastewater treatment and biosolids handling to efficiently meet current and projected permit requirements; and develop a capital improvement program, including a schedule for improvements and opinions of probable cost, for the facility out to the year 2040. The plan shall include recommendations for land and space requirements and ancillary support facilities that will assist the facility in achieving efficient and effective operations.

CCWS has determined the necessity of a plant expansion in the near future and has begun projects for the headworks and new RDT unit for a capacity of 50-mgd. The overall treatment approach (i.e., which existing processes will have additional units added or be replaced in total) has not been determined. CCWS has contracted with Ardurra for the evaluation and development of this long-range plan for providing treatment capacity of 50 MGD by 2040 and to provide a range of alternatives for consideration that will meet the flow capacity requirements and potential future effluent limits.

3 Purpose

The Ardurra team scheduled initial site visit assessments for various SCWRF processes, systems and equipment between 11/26/2024 and 02/27/2025 to begin the process of facility assessment evaluation. Interviews with key CCWS staff were also conducted to identify issues of concern. A Technical Memorandum (TM) No. 3 to provide an assessment of initial findings from the initial site visits that could be classified as urgent issues also includes Condition Performance Reports (CPRs) from those initial assessments by Ardurra personnel who evaluated stormwater/site, structural, HVAC, electrical, and instrumentation & controls. TM3 summarized the current condition of the equipment along with providing recommendations based on need, condition, and other mitigating factors for urgent address.

The purpose of this TM is to summarize the current condition of the equipment along with providing recommendations based on need, condition, and other mitigating factors. An opinion of probable cost will also be initiated at that time for each unit process. The results and recommendations of this TM will be used in prioritizing improvements that will lead to future capital improvement projects to be included in the Facility Plan.

4 Historical Plant Improvements and Existing Record Drawing Review

The original SCWRF treatment chain was constructed in 1963 on an 18-acre site in the 18th District on the Chattahoochee River. The plant was originally sized to treat 2 million gallons per day (MGD). In 1970 a design was completed to expand the liquid process train to treat 8 MGD with construction completed in 1973. A second liquid process train was added in 1976, increasing the plant capacity to 24 MGD. A biosolids pellitization plant was also installed for solids handling at that time.

In 1986 a design for improvements to the SCWRF was initiated and completed in 1989. This work increased the plant capacity to 28 MGD. In 1990 a ferrous chloride feed facility was constructed to help settling in the primaries. In 1991 a design was prepared for the biosolids gravity thickeners to be converted to a dissolved air flotation thickener system, which was completed and put in service in 1992. In 1998 a project was completed that combined two existing liquid process trains into one, increasing the permitted plant capacity to 40 MGD. This work also included the installation of belt presses replacing the pellitization system in the solids handling facility.

Interim improvements, modifications, renovations, and rehabilitation projects have been completed or are in process since the plant capacity was increased to 40 MGD. In 2004 there was a project, extending the influent channel, adding a bar screen and an odor control system at the headworks. A new chlorination/dechlorination system was constructed in 2005. Effluent Filter (tertiary treatment) installations and additional secondary clarification capacity, by installing a fifth secondary clarifier, were completed in 2012. In 2015 a project replaced the belt filter presses with centrifuges. A new South Cobb tunnel and influent pump station feeding into SCWRF were put into service in 2014. In January 2024 effluent filter rehab was initiated and in February 2024 improvements at the SCWRF headworks were initiated.

Ardurra completed a review of historical record drawings of the SCWRF provided by CCWS. As part of that review, Ardurra implemented a naming and numbering protocol to help provide internal clarity in document research. PDF drawings were labeled with a sequential number reflecting the chronological order of installation, modifications and rehabilitation work performed at this site/location. This document renaming included the site, followed by the engineering firm name, the CCWS title of the project, the CCWS assigned Program/Project assignment number, and the date of the document. Additional naming did include other information such as drawing sets for G (General), C (Civil), A (Architectural), P&ID, S (Structural), M (Mechanical), H (HVAC), I (Instrumentation), and E (Electrical) drawings, when appropriate.

Figures 4.1.1 and 4.2.1 that follow provide a summary of these renamed drawings and historical documents. Attachment 1 noted in Section 8 of this TM provides a crosswalk between the historical drawings and documents as named when shared by CCWS with the renamed drawings and documents as noted in the followings Figures 4.1.1 and 4.2.1.

4.1 Record Drawings

CCWS provided twenty-seven (27) sets of drawings. Ardurra implemented the naming and numbering protocol as detailed above on the drawings, to help provide clarity in document research internally. This new chronological naming is noted in Figure 4.1.1 below.



Figure 4.1.1 – CCWS SCWRF Record Drawings in Chronological Order

4.2 Historical Documents

CCWS also provided thirty-five (35) historical documents, reports, technical memoranda, and assessments. Ardurra again implemented the same naming and numbering protocol used on the drawings in Section 4.1, to help provide clarity in document research internally.

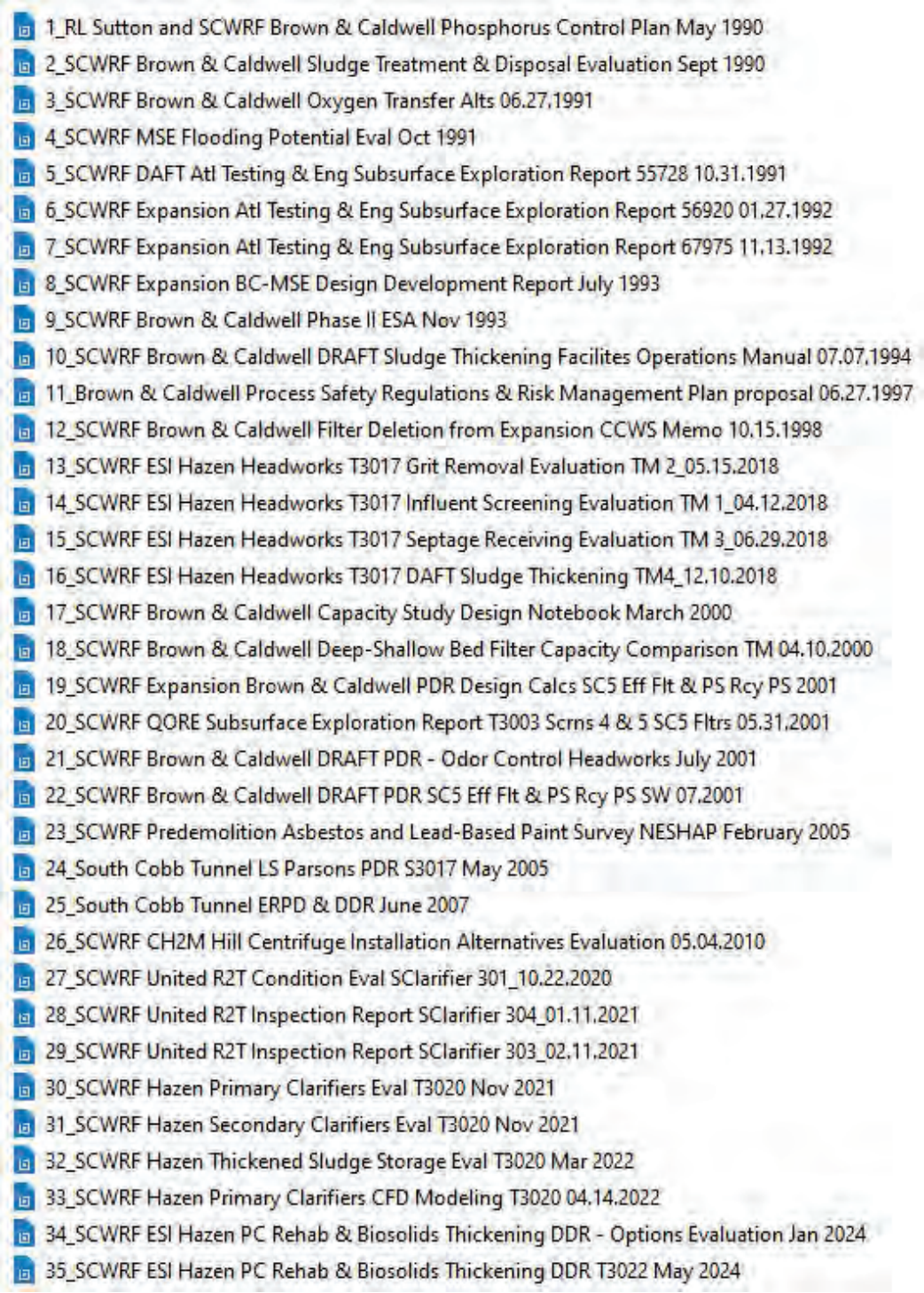


Figure 4.2.1 – CCWS SCWRF Documents in Chronological Order

4.3 Process Equipment Summary

The following table 4.3.1 provides a summary of Processes, Equipment, and Quantities for each step in the existing SCWRF treatment process. See Attachment 2 in "Section 8 – Attachments" of this TM for more detailed descriptions with notes added. The noted equipment will be evaluated in more detail as a part of the forthcoming TMs and CPRs.

Location	Equipment	Qty
Pretreatment	Bar Screens	4
Pretreatment	Conveyors	3
Pretreatment	Aerated Grit Systems	2
Pretreatment	Degritting System	2
Pretreatment	Flow Equalization	Inactive
Primary Treatment	Primary Sedimentation (two chain and flights in each basin)	5 (10)
Primary Treatment	Primary Scum Pumps	3
Primary Treatment	Scum Collectors	3
Primary Treatment	Primary Sludge Pumps	5
Primary Treatment	Primary Drain Pumps	2
Primary Treatment	Ferrous Chloride System	1
Secondary Treatment	Lime Feed System	1
Secondary Treatment	Aeration Basins	5
Secondary Treatment	Blowers	3
Secondary Treatment	Clarifiers	5
Secondary Treatment	RAS Pumping	10
Secondary Treatment	WAS Pumping	3
Secondary Treatment	Secondary Scum Pump Stations	3
Secondary Treatment	Secondary Drainage Pumps	2
Tertiary Treatment	ABW Filters	7
Tertiary Treatment	Filter Effluent Pumps	5
Tertiary Treatment	Sodium Hypochlorite System	1
Tertiary Treatment	Sodium Bisulfite System	1
Plantwide	Reuse Water System	1
Plantwide	SCADA	1
Plantwide	Recycle Pump Station Pumps	4
Solids Treatment	Thickened Sludge Holding Tanks	2
Solids Treatment	DAFT	2
Solids Treatment	Polymer Feed System	1
Solids Treatment	Centrifuges	3
Solids Treatment	Dewatered Sludge Conveyors	3

Table 4.3.1 – Summary of Process Equipment

5 Condition & Performance Summary

Section 5 will outline Ardurra's equipment evaluation assessments and gradings from multiple site vists, maintenance and operations interviews, and review of available historical documentation to identify equipment, systems, and processes that…

1. Receive a high overall condition and performance grade.
2. Receive a high consequence of failure grade.

The following Table 5.1.1 provides a guide for graded assessments of equipment resulting from the multiple site visits. Emphasis is provided when previous assessments from Reports highlighted in Section 4.2 Historical Documents provided greater detailed analysis of operating conditions, estimates of remaining useful life, or sense of reliability and overall performance consistency. A score of (1-5) was assigned to equipment with 5 being the most critical. In addition, a general condition scoring of 1-5 with 5 being the worst condition was assigned for equipment as well. Facility information was collected including notations of general condition, as well as a general sense of remaining useful life for the equipment. The combination of Condition Description and Performance Description are combined and divided by two to get an overall rating of each piece of equipment that was evaluated.

Table 5.1.1 Condition and Performance Assessment Grading

Grading	Condition Description	Performance Description
1	Excellent/5+ years Useful Life Remaining	Good
2	Slightly Visible Deterioration/<5-yrs Useful Life Remaining	Fair
3	Visible Deterioration/At or Beyond Useful Life	Moderate
4	Slightly Compromised Integrity	Poor
5	Notably Compromised Integrity/Failed	Out-of-service or Failing
NA	Not enough information to evaluate	Not enough information to evaluate

In addition to the condition and performance grading, a Consequence of Failure grade was also assigned to the equipment assessed. The consequence of failure grade considers two (2) independent parameters to determine a grade of "high", "medium" or "low". Table 5.1.2 provides a guide for the Consequence of Failure Grading.

Table 5.1.2 Consequence of Failure Grading

Grading	Hydraulic/Health & Safety	Failure Impacts Ability to Meet Permit
High	Both are caused in the event of failure.	
Medium	Either one or the other is caused in the event of a failure.	
Low	Neither are caused in the event of failure.	

Attachment 2 provides an Assessment Summary Table for equipment with Consequence of Failure Grade, and the combined Condition and Performance Assessment Grade with key

CIP Items tabulated within this Table. This table will be the critical reference to building of the forthcoming Master Plan recommendations, and the corresponding CIP prioritization report.

Attachment 3 provides the equipment data sheets prepared for each piece of equipment evaluated and listed in Attachment 2.

The final TM-4 will provide rolled-up scoring for each system and overall treatment process based on aggregate scores for the equipment evaluated to provide an overall high-level summary of problematic systems and processes at SCWRF.

5.1 Pretreatment

The pretreatment process at SCWRF consists of four (4) climber-type bar screens, three (3) shaftless screw conveyors (to remove screenings), two (2) aerated grit basins, and two (2) grit classifying systems (each with four (4) grit cyclones). The pretreatment process as it stands today was largely installed during the 1994 Brown and Caldwell SCWRF Expansion project. However, the 2004 Earth Tech Headworks Improvements project installed the fourth (4) bar screen and included significant improvements to the grit piping.

5.1.1 Climber Type Bar Screens

The currently installed climber-type bar screens are manufactured by Schloss Engineered Equipment, models Mark CL-2 (Bar Screens 1 through 3) and Mark CL-2SH (Bar Screen 4) with ½" bar spacing. Of the four bar screens currently installed, one is out-of-service. The other three (3) struggle to maintain performance with inconsistent influent flows and a substantial rag loading coming in through the influent as the ½: bar spacing is not suited to removing rags. The rags are causing substantial issues for the plant downstream. One (1) overflow channel and one (1) bypass channel allow the bar screens to be bypassed during high flow periods or when the screens blind excessively. Given an estimated useful life of 15 to 20-years, the existing screens are due for replacement to ensure continued reliability.

The ongoing 2024 South Cobb WRF Headworks Improvements project includes the replacement of all four (4) climber-type bar screens with four (4) Huber multi-rake bar screens with ¼" openings. The multi-rake bar screens should be suited to rag removal and should help alleviate the downstream ragging issues mentioned throughout this TM. The new screens are to be installed to provide "n+1" redundancy with three (3) screens being capable of handling the peak flow rate of 100-MGD.

The 2024 South Cobb WRF Headworks Improvements project should resolve the known issues with the screenings system in terms of performance and will provide new equipment. Therefore, a performance and condition grade of 1 have been assigned, leading to an overall grade of 1. A "medium" consequence of failure grade has been assigned because failures of the bar screens lead to the headworks overflowing, but do not have significant impacts to the plant's ability to meet permit requirements.

5.1.1.1 Bar Screen Conveyors

Screenings for the existing climber-type bar screens are removed via three (3) existing shaftless screw conveyors utilized in a series. The existing conveyors are manufactured by JDV Equipment and can remove up to 90-lbs/cf of screenings. However, at peak flows, the

conveyors are quickly overwhelmed and must be manually dumped to the headworks deck. Dumped screenings are then removed from the deck utilizing a skid steer and portable dumpsters. According to staff interviews, the main reason for the clogging is the heavy rag loading impeding the screw, and the overall amount of trash coming into the conveyors from the screens, and ultimately the influent pump station.

As with the influent bar screens, the existing shaftless screw conveyors are set to be replaced under the ongoing 2024 South Cobb WRF Head Improvements project. The proposed conveyors are also shaftless screw conveyors. The proposed design includes "n+1" redundancy and eliminates the third shaftless screw conveyor simplifying the existing conveyor design slightly.

The 2024 South Cobb WRF Headworks Improvements project should resolve the known issues with the screenings system in terms of performance and will provide new equipment. Therefore, a performance and condition grade of 1 have been assigned, resulting in an overall grade of 1. A "medium" consequence of failure grade has been assigned because failures of the bar screens lead to the headworks overflowing, but do not have significant impacts to the plant's ability to meet permit requirements.

5.1.2 Grit Removal System

The aerated grit removal system was originally installed under the 1994 Brown and Caldwell SCWRF Expansion project, and it has largely remained unmodified since its installation. The aerated grit removal system consists of eight (8) recessed impeller grit pumps, two (2) air compressors, and two (2) aerated grit tanks with all associated piping and appurtenances. The existing grit removal system is ineffective at best, and currently provides little to no grit removal for the plant.

Currently, one (1) of the two (2) aerated tanks is offline and all flow is directed through a single basin. The existing tanks are covered and ventilated by an odor control system that is no longer in operation. The lack of ventilation is causing significant corrosion issues for both the concrete tanks and the existing covers.

5.1.2.1 Grit Air Compressors

The grit removal air compressors are Ingersoll Rand Model IRN100-H-CC. These units are 100-HP and designed to provide 435-CFM at 100-PSIG to the aerated grit tanks. Both of the existing units are completely inoperable. Maintenance staff indicated that supplemental air is being provided from the DAFT compressor at a significantly reduced pressure and volume when available to the aerated grit tanks.

With the compressors failed and out-of-service a performance grade of 5 has been assigned. The visual condition of the existing compressors is not terrible, but since they have been out of service for over a year, and maintenance doors have been left open and exposed to the elements, a condition grade of 4 has been assigned. This brings to the grit compressors to an overall grade of 4.5. Since a failure of the grit compressor system does not lead to any hydraulic or permit failures, a consequence of failure grade of "low" has been assigned.

5.1.2.2 Grit Pumps

The grit pumps appear to be original to the aerated grit system construction in 1994. They are centrifugal recessed impeller pumps by Yeomans. There are eight (8) pumps total, four (4) for each aerated grit basin. They withdrawal grit from the aerated grit basins utilizing positive suction and discharge grit at the grit classification system. Ardurra understands that the grit lines clog regularly during operation due to ragging and trash not removed by upstream screening.

The grit pumps are far beyond their useful life, and they show visible deterioration due to their age. Therefore, a condition grade of 3 has been assigned. During Ardurra's site visits, no grit pumps were in operation, so a performance grade of 5 has been assigned. The grit pumps overall grade comes out to a 4. Similarly to the grit compressors, a the failure of the grit pumps leads to no hydraulic or permit related issues. Therefore, a consequence of failure grade of "low" has been assigned.

5.1.2.3 Grit Classifiers

The grit classifiers were installed during the same 2004 SCWRF Expansion project as the aerated grit removal system. The eight (8) grit pumps send flow to eight (8) Krebs grit vortex units, one for each pump, which discharge to two (2) Schloss grit classifiers.

Staff reports that the grit classifiers work well enough, but they are not operated due to the grit system being out of service. However, Ardurra would note that the existing grit classifiers have reached the end of their standard useful life, and continued operation may lead to a lack of reliability.

Since the classifiers are out of service, they are assigned a performance grade of 5. The classifiers condition grade was assigned as a 3. This equates to an overall equipment score of 4 for the grit classifiers. Since the grit classifiers cause no major hydraulic or process disruptions the consequence of failure grade was assigned as "low".

5.2 Primary Treatment

SCWRF utilizes five (5) primary treatment tanks to remove readily settleable solids from the influent. The existing primary clarifier tank system was installed during the 1994 Brown and Caldwell SCWRF Expansion project. Each primary tank is 180-ft long by 34-ft wide and has a 12-ft sidewall depth. Primary effluent is removed via a submerged launder system with a modulating butterfly valve for water surface elevation (WSE) control. Level control was stated to be an issue as the modulating valves often do not keep up with changes in WSE cause inadvertent overflow events.

The primary treatment system consists of chain and flight collectors, scum collection and removal equipment, and primary sludge pumps. Each of these systems are evaluated in more detail in the following sections.

5.2.1 Flight & Chain Collectors

The flight and chain collectors appear to be original to the 1994 SCWRF Expansion project and were manufactured by Walker Process. The flight and chain collectors are not currently being operated, and the primary basins are filling with collected sludge as a result. There are

two (2) chain and flight collector systems within each clarifier basin which are driven by one (1) drive motor located above the basin. Each basin has a short wall at the bottom which divides the floor into two sections, one for each chain and flight mechanism.

Settled primary sludge is transported to the sludge hopper at the upstream end of the basin. Multiple operations and maintenance personnel reported issues with failing flights, and the inability to visually inspect the flights due to the low-profile nature of the collectors, resultant from the primary clarifier's overall width and the short-wall design. With an estimated useful life of 30-years maximum, and considering the on-going issues with the existing system, immediate replacement is recommended.

Due to the reported issues with the flights failing, and the overall age of the equipment, a condition grade of 4 has been assigned to the flight and chain collectors. Due to the collectors being out-of-service (failed) a performance grade of 5 was assigned. This equates to an overall score of 4.5. Due to the primary clarifiers having significant downstream treatment impacts, and hydraulic overflow issues, a "high" consequence of failure grade has been assigned.

5.2.2 Primary Sludge Pumps

Primary sludge is removed from the clarifiers utilizing five (5) Yeomans/Morris recessed impeller centrifugal pumps. The pumps appear to be original to the 1994 upgrades project, which indicates they have reached the end of their estimated useful life. Recent studies on these pumps have indicated that they are not able to pump at their design capacity any longer (250-gpm), and they also experience issues with clogging and air-binding. The clogging is likely due to the significant rag loading that is making its way past the influent screens. The air-binding is theorized to be caused by the combined scum/primary sludge line and the pneumatic Pit Bull scum pumps adding air into the system.

Since the chain and flight collectors are not being operated, neither are the primary sludge pumps, therefore a performance grade of 5 has been assigned to these pumps. Due to the age of the pumps themselves, their overall visual condition, and the reported issues a condition grade of 5 has been assigned. This equates to an overall score of 5 for the primary sludge pumps. Because a lack of sludge removal from the primary clarifiers leads to increased solids loadings in downstream processes and decreased hydraulic capacity within the primary clarifiers a "high" consequence of failure grade has been assigned.

5.2.3 Primary Scum System

The primary scum system consists of helical collectors driven by 3W scum spray water system, and three (3) Pit Bull air diaphragm pumps that pump scum to the solids handling system. As scum accumulates on the primary clarifier water surface, a spray water system pushes the scum toward the upstream end of each basin where it is collected by helical collectors into a scum box. There are three (3) scum boxes; one (1) that serves primary clarifiers 1 and 2, one (1) that serves primary clarifiers 3 and 4, and one (1) that serves primary clarifier 5. The spray water system has deteriorated to the point that it cannot push the scum to the collectors as required. As a results, there is significant scum buildup within the primary clarifiers.

The existing scum pumps are pneumatically operated Pit Bull pumps. Interviews with maintenance staff indicated that the Pit Bull pumps are relatively reliable, but previous

evaluations indicate that the scum pumps could be causing downstream air binding for the combined scum/primary sludge discharge. Due to the overall expected useful life of these pumps, replacement should be considered.

5.2.3.1 Primary Scum Collectors

The primary scum collectors are Envirex Helical Collectors that are driven by a 3W spray water system. This system is original to the 1994 installation project. The five (5), one per basin, skimmers that collect scum and deposit it into the scum boxes reportedly struggle with ragging and trash, but handle fats/oils/grease (FOG) well. Collected scum is routed to the scum pump system via a 4" suction line. Visually, the helical collectors are in good condition. Although they are at the end of their estimated useful life, they could remain a reliable option for the future.

The primary scum collectors have received a condition grade of 3 largely due to the equipment having reached the end of its estimated useful life and not being operated regularly. Due to being out-of-service, the equipment is considered failed and has been assigned a performance score of 5. The scum collectors therefore receive an overall score of 4. Due to accumulating scum leading to increased solids loading downstream, a "medium" consequence of failure grade has been assigned.

5.2.3.2 Primary Scum Pumps

The existing scum pumps are pneumatically operated Pit Bull pumps. Interviews with maintenance staff indicated that the Pit Bull pumps are reliable, but previous evaluations have indicated that the scum pumps could be causing downstream air binding for the combined scum/primary sludge discharge. This air binding has lead to significantly increased maintenance requirements. Due to the overall expected useful life of these pumps, replacement should be considered.

The primary scum pumps are visibly worn, have far exceeded their expected useful life, and reportedly caused the primary sludge lines to air bind. Due to these issues, a condition grade of 4 has been assigned. The primary scum pumps are currently out of service and are therefore considered failed, leading to a performance grade of 5. The primary scum pumps receive a calculated overall grade of 4.5. The primary scum pumps receive a "low" consequence of failure grade due to no hydraulic or treatment process implications result from their failure.

5.2.4 Ferrous Chloride Chemical Feed

The Ferrous Chloride chemical storage and feed system is located near the sodium hypochlorite and sodium bisfulfite chemical systems. The system provides ferrous chloride to the primary clarifier influent channel to facilitate phosphorus removal via sedimentation in the primary clarifiers. Alternate chemical feed locations were provided at the Aeration Basin Effluent and at the raw wastewater influent forcemains. The ferrous chloride system was installed in 2014 under the ESI Chemical Systems Upgrades project. Prior to this upgrade, SCWRF utilized Ferric Chloride for chemical phosphorus removal.

The system itself consists of the following major process equipment:

- Ferrous Chloride Storage Tanks

- Ferrous Chloride Feed Pumps

5.2.4.1 Ferrous Chloride Tanks

SCWRF utilized three (3) 12,000-gallon Assmann Corporation tanks for Ferrous Chloride Storage. The tanks onsite are fully heat-traced and insulated.

Operations and Maintenance staff did not mention any issues with the Ferrous Chloride tanks. Visually the tanks are in good condition, but chemical staining is evident through the system and containment areas.

Based on information gathered by Ardurra the Ferrous Chloride tanks receive a Condition grade of 2, Performance grade of 1, for an overall grade of 1.5. Ferrous Chloride poses issues for both safety and permit, so it receives a "high" Consequence of Failure grade.

5.2.4.2 Ferrous Chloride Pumps

The chemical feed pumps are Verder Dura 35 units to match those utilized for the sodium hypochlorite and sodium bisulfite chemical feed systems. The ferrous pumps are 2-hp pumps capable of delivering up to 542-gph at 50-psi each. Despite the ferrous chloride pumps being installed at the same time as the sodium hypochlorite and sodium bisulfite pumps, they are in visually worse condition. Corrosion is evident on the motors, support stands, and conduit throughout the pump building. This is likely due to the corrosive nature of the ferrous as compared to the hypochlorite and bisulfite systems. The pumps are in good working order, but reduced useful life should be aniticipated with this system due to the nature of the chemical being utilized.

The Ferrous Chloride pumps receive a Condition grade of 3, Performance grade of 1, and overall grade of 2. Pump failure poses a lesser threat to health and safety issues, so the Consequence of Failure grade is reduced slightly to "medium".

5.2.5 Primary/Grit Drain Pump Station

The primary/grit drain pump station is a supplemental non-treatment system that allows SCWRF the ability to complete drain both the aerated grit tanks and primary clarifiers when required. The primary/grit wet well also receives flow from all process and floor drains in the primary/grit pump gallery.

The pumps reportedly work well but are utilized infrequently. With the grit removal and primary clarifier systems being inoperable, these pumps have been operated recently.

The pumps are past their estimated useful life, but they are in decent visual condition. A condition grade of 3 has been assigned. Since these pumps are operable, and simply not used due to over process outages, they have been assigned a performance grade of 1. This results in the primary/grit drain pumps receiving an overall grade of 2. Since this system has not impacts on plant hydraulics or treatment capabilities, it receives a "low" consequence of failure grade.

5.2.6 Biological Treatment (Aeration)

Primary Effluent is received in a common effluent channel and routed to the aeration basins. Five (5) rectangular aeration basins, 200-ft long by 55-ft wide, by 22-ft SWD. Each aeration

basin is split into four (4) zones with the first zone being physically separated from the other three via slotted baffling. The aeration basins were constructed as a part of the 1994 Brown and Caldwell SCWRF Expansion project. One (1) aeration basin was offline during each of Ardurra's site visits (different basin each time), and ragging was clearly observed blinding the slotted baffles separating Zone 1 from the other three (3) Zones. Maintenance staff also mentioned that the ragging causes damage to the baffling and that the baffles are routinely replaced.

The biological treatment equipment consists of blowers, with secondary considerations for the diffusers and supplemental alkalinity systems.

5.2.6.1 Aeration Basins Blowers

SCWRF utilizes three (3) 1500-hp Turblex blowers to provide air to the aeration basins. Each blower can provide 23,200-scfm for a total of 69,900-scfm total capacity with actual air flow being controlled by the measured dissolved oxygen (DO) in each zone.

The in-service blowers appear original to the 1994 SCWRF Upgrades project, however the blower controls have been updated since the original installation. Operations and Maintenance staff reported no major issues with the existing blowers. Blower useful life is generally estimated at 20-years, so replacement could be considered if not for reliability than for efficiency.

The blowers are showing signs of aging and normal wear-and-tear. Given this visual wear-and-tear and the estimated useful life of the blowers, a condition grade of 3 has been assigned. The Blowers operate as designed and intended for the current plant process configuration. Therefore, a performance grade of 1 has been assigned. This leads to an overall score of 2 for the existing blowers. The blowers have been assigned a "medium" consequence of failure grade due to the permit implications associated with a blower failure. Blower failure has no hydraulic repercussions.

5.2.6.2 Aeration Basin Diffusers

The existing aeration basin diffusers were installed under the 1994 Expansion project. The diffusers are laid out into grids separated into four zones. The first zone is divided from the rest of the aeration basin via two sets of baffles, one at the influent and one at the effluent. The diffuser density in each zone decreases from Zone 1 to Zone 4.

Ardurra visually inspected the diffuser grid systems in Aeration Basin #1 and Aeration Basin #3 during site visits made to the plant. The grids and distribution piping appear to be in good overall condition, which no notable breaks or issues seen. Similarly, Ardurra inspected the air distribution in all five (5) aeration basins during site visits with only one minor boiling issue noted in Aeration Basin #3 near Zone 4. All indications from visual inspections conducted indicated the diffusers and grids are in good condition.

Maintenance staff indicated that aeration basins are routinely taken offline, and discs are replaced as issues arise (along with Zone 1 Baffles being repaired). Given the regular maintenance and repairs made, and the good overall condition of the diffusers despite length of installation, less weight to useful life will be considered in the subsequent scoring of the aeration basin diffusers.

Results of the visual inspections of the aeration diffusers and grids results in a condition grade of 2. Consistent operation and ability to meet permit even with higher than ideal solids loadings and short detention times results in a performance grade of 1. The aeration basin diffusers overall grade is therefore a 1.5. Given a failure of the diffusers will only cause a permit issue for the plant, the diffusers were assigned a "medium" Consequence of Failure grade.

5.2.6.3 Lime Feed System

The Lime Feed (Lime Slaker) System was significantly rehabilitated and relocated to its current location during the 1994 Brown and Caldwell SCWRF Expansion project. The lime provides additional alkalinity to the biological treatment process. It consists of a quick lime silo, and a lime slaker system to produce slaked lime to be dosed just upstream of the aeration basins. The lime is transported to the aeration basin via a FRP open-channel flume.

The lime system is unconventional and past its estimated useful life. The FRP open channel system is functional, but it cannot be cleaned because the lime build-up is both holding the flume together and stopping leaks. At the chemical addition point, lime freefalls from the flume system into the channel. Substantial lime build-up as occurred in the area, and the build-up is now referred to as the "Limeberg". The lime slaker system is messy, and has forced staff to relocate the lime electrical systems to protect them. Additionally, the lime slaker system poses health concerns as powdered lime is often airborne in and around the system. Cleaner, safer and more conventional lime feed systems are available and should be considered.

Considering the state of the open-channels, age of the slaker system and silo, and health and safety concerns voiced by plant staff the lime system has been assigned a condition grade of 5. Given the lime system can still provide adequate alkalinity for treatment, a performance score of 2 has been assigned. The overall score for the lime system is a 3.5. A Consequence of Failure grade of "medium" has been assigned because a failure of the lime system would only impact treatment capabilities, not hydraulics.

5.2.6.4 Foam Wasting Pumps

The Foam Wasting Pumps have been completely removed from the process, and therefore no equipment was available to be assessed. They will not be considered in this evaluation further.

5.3 Secondary Treatment

Five (5) circular secondary clarifier tanks, their return activated sludge and waste activated sludge pumping systems, and their scum pumping systems make up the secondary treatment process at SCWRF. The secondary treatment system has been expanded and modified overtime to reflect the needs of the plant. Secondary Clarifiers 1 & 2 were originally installed in 1976 under the Hensley Schmidt Expansion project. Secondary Clarifiers 3 & 4 were added under the 1994 Brown & Caldwell Expansion project, and this project also completely replaced the Secondary Clarifier 1 & 2 mechanisms so all four units would be similar. Secondary Clarifier 5 was installed in 2012 under the Brown & Caldwell Upgrades project.

5.3.1 Secondary Clarifiers 1 & 2

Secondary Clarifiers 1 & 2 were constructed in 1976, but the mechanisms were replaced in 1994. The clarifiers utilize Envirex Tow-Bro mechanisms and are equipped with in-board launders and a middle sloping bottom. The clarifiers are 133-ft in diameter with a 18.5-ft side water depth.

Visual inspections of Secondary Clarifiers revealed failed baffles, uneven weir flow distribution and broken weirs throughout the basins. Evidence of a high solids loading, trash, and ragging was also observed along with algae growth throughout the basins.

The secondary tanks themselves are approaching 50 years of life, with 50 years being a general recommendation for a structure's estimated useful life period. Similarly, the mechanism is now over 30 years old with 25 years being the estimated useful life period.

Given the observed issues with the baffles, launders and weirs in combination with the estimated useful life considerations, Secondary Clarifiers 1 & 2 receive a condition grade of 5. In terms of performance, the only issue noted to Ardurra was uneven flow distribution throughout the secondary basins. Therefore, Secondary Clarifiers 1 & 2 receive a Performance grade of 2 for an overall grade of 3.5. Failure of the secondary clarifiers can lead to both hydraulic and treatment issues, so Secondary Clarifiers 1 & 2 receive a "high" Consequence of Failure Grade.

5.3.1.1 Secondary Clarifier 1 & 2 RAS Pumping

Secondary Clarifiers 1 & 2 utilize a dedicated RAS Pump Station with four (4) Aurora Vertical Non-Clog centrifugal pumps. Each pump is rated for 3,500-gpm and is 50-hp. The pump station is original to the 1976 secondary clarifier construction, but the pumps were installed during the 1994 upgrades project.

The RAS pumps struggle with ragging from the high trash loading in the secondary clarifiers and have to be rebuilt regularly. The Aurora pumps themselves are now obsolete and are no longer supported by the Manufacturer. Operations and Maintenance staff also reported issues with pump isolation between Secondary Clarifiers 1 & 2. All four pumps were running during both site visits by Ardurra.

Maintenance intensive pumps, combined with obsolescence leads to a condition grade of 5. The RAS pumps receive a Performance grade of 2 for an overall grade of 3.5. A lack of RAS capability, especially without WAS, could result in process and hydraulic disruptions leading to a "high" Consequence of Failure grade.

5.3.1.2 Secondary Clarifiers 1 & 2 Scum Pumping

Secondary Clarifier 1 & 2 are each equipped with an independent scum pump station with submersible pumps. As with other equipment in the secondary treatment process, the scum pumps struggle with trash and ragging issues; and maintenance and operation staff voiced desires to utilize chopper pumps as an alternative technology. Visual inspections of the mechanism yielded poor scum collection performance within the clarifiers themselves.

The scum pumping system receives an condition, performance and overall score of 3. Since scum removal does not directly impact hydraulics or performance a "low" Consequence of Failure grade has been assigned.

5.3.2 Secondary Clarifiers 3 & 4

Secondary Clarifiers 3 & 4 were installed in 1994 and have matching mechanisms to SCs 1 & 2 with Envirex Tow-Bro mechanisms with in-board launders. Secondary Clarifiers 3 & 4 are 135-ft in diameter with 19.8-ft side water depths with outward sloping bottoms.

Visually, Secondary Clarifiers 3 & 4 are in the same state as Secondary Clarifiers 1 & 2. Baffles are failings, weirs are failing (or clogged), and trash is evident throughout the tanks.

Visual inspections and useful life analysis yielding similar results to Secondary Clarifiers 1 & 2, returns the same condition score of 5 for Secondary Clarifiers 3 & 4. The Performance grade for Secondary Clarifiers 3 & 4 also remains the same at 2 for an overall score of 3.5. Failure of the secondary clarifiers can lead to both hydraulic and treatment issues, so Secondary Clarifiers 1 & 2 receive a "high" Consequence of Failure Grade.

5.3.2.1 Secondary Clarifier 3 & 4 RAS Pumping

Secondary Clarifiers 3 & 4 utilize a dedicated RAS Pump Station with four (4) Aurora Horizontal Non-Clog centrifugal pumps. Each pump is rated for 3,500-gpm and is 75-hp. The pump station is original to the 1994 secondary clarifier construction.

The RAS pumps struggle with ragging from the high trash loading in the secondary clarifiers and have to be rebuilt regularly. Maintenance staff even reported unclogging efforts occur daily. Operations staff voiced concerns with a lack of operational flexibility with this pump station since the suction header is split between Secondary Clarifier 3 and 4 limiting their operational flexibility with the pumps. Additionally, the Aurora pumps themselves are now obsolete and are no longer supported by the Manufacturer.

Maintenance intensive pumps, combined with obsolescence leads to a condition grade of 5. The RAS pumps receive a Performance grade of 2 for an overall grade of 3.5. A lack of RAS capability could result in both process and hydraulic disruptions leading to a "high" Consequence of Failure grade.

5.3.2.2 Secondary Clarifier 3 & 4 WAS Pumping

Secondary Clarifiers 3 & 4 are the only WAS capable secondaries in the system. The WAS pump station utilized four (4) Aurora Horizontal non-clog centrifugal pumps. Each pump is rated for 691-gpm and is 20-hp.

The WAS pumps struggle with ragging from the high trash loading in the secondary clarifiers and have to be rebuilt regularly. Maintenance staff even reported unclogging efforts occur daily. Operationally, the WAS pumps are limited in several way. First, WAS can only be withdrawn from two (2) of the five (5) secondary clarifiers onsite. Second, the WAS suction header is fed directly from the RAS discharge header via a retrofitted discharge pipe. As with the RAS pumps, the Aurora pumps themselves are obsolete and are no longer supported by the Manufacturer.

Maintenance intensive pumps, combined with obsolescence leads to a condition grade of 5. The WAS pumps receive a Performance grade of 2 for an overall grade of 3.5. A lack of WAS capability could result in process but not hydraulic disruptions leading to a "medium" Consequence of Failure grade.

5.3.2.3 Secondary Clarifier 3 & 4 Scum Pumping

Secondary Clarifiers 3 & 4 share a single Scum Pump Station located between the two tanks. The pump station utilizes submersible Flygt pumps. As with other equipment in the secondary treatment process, the scum pumps struggle with trash and ragging issues; and maintenance and operation staff voiced desires to utilize chopper pumps as an alternative technology. Visual inspections of the mechanism yielded poor scum collection performance within the clarifiers themselves.

The scum pumping system receives an condition, performance and overall score of 3. Since scum removal does not directly impact hydraulics or performance a "low" Consequence of Failure grade has been assigned.

5.3.3 Secondary Clarifier #5

Secondary Clarifier #5 was constructed in 2012 and utilizing an Ovivo C3D mechanism. It utilizes an outboard launder system and an outward sloping bottom. Secondary Clarifier 5 is 142-ft in diameter and has a 19.8-ft side water depth matching Secondary Clarifiers 3 & 4.

Visually, Secondary Clarifier 5 is in substantially better condition than the others. Baffles and weirs appear to be in good condition, and the trash loading appears to be less than in the other secondaries. Algae and plant growth is minimal. Performance wise, operations reported that Secondary Clarifier 5 receives the highest solids loading via hydraulic imbalances between the secondaries.

Secondary Clarifier 5 is assigned a condition grade of 1 and performance grade of 2. With an overall score of 1.5, Secondary Clarifier 5 is in good condition. Failure of the secondary clarifiers can lead to both hydraulic and treatment issues, so Secondary Clarifier 5 receives a "high" Consequence of Failure Grade.

5.3.3.1 Secondary Clarifier 5 RAS Pumping

Secondary Clarifier 5 utilizes a dedicated RAS Pump Station with two (2) Fairbank-Morse Vertical Turbine Solids Handling (VTSH) pumps. Each pump is rated for 3,472-gpm and is 30-hp. The pump station is original to the 2012 secondary clarifier construction.

The RAS pumps struggle with ragging from the high trash loading in the secondary clarifiers, but seemingly to a lesser degree than the other RAS pump stations. Fewer issues with these pumps were reported by both operations and maintenance staff during interviews, and the pump station itself is in fairly good condition visually.

Newer less maintenance intensive pumps leads to a condition score of 2. The RAS pumps receive a Performance grade of 2 for an overall grade of 2. A lack of RAS capability could result in both process and hydraulic disruptions leading to a "high" Consequence of Failure grade.

5.3.3.2 Secondary Clarifier 5 Scum Pumping

Secondary Clarifiers 5 has a dedicated Scum Pump Station located on the North side of the tank. The pump station utilizes submersible Hayward Gordon pumps. As with other equipment in the secondary treatment process, the scum pumps struggle with trash and

ragging issues; and maintenance and operation staff voiced desires to utilize chopper pumps as an alternative technology.

The scum pumping system receives an condition, performance and overall score of 3. Since scum removal does not directly impact hydraulics or performance a "low" Consequence of Failure grade has been assigned.

5.3.4 Secondary Clarifier Drain Pump Station

A single secondary drain pump station allows complete draining of the five (5) secondary clarifiers, and the aeration basins. The five aeration basins are drained via three (3) 20" tank drain lines. Secondary Clarifiers 1 & 2 have independent tank drains. Secondary Clarifers 3, 4 and 5 are tied into a single drain. The aeration basins are tied to a single common drain that drains to the secondary drainage wetwell opposite of the secondary clarifiers. A single VTSH pump can discharge the drained aeration tanks directly to the effluent mixed liquor channel to be fed to the secondary clarifiers. However this pump is infrequently utilized and therefore will not be considered in grading. Two (2) additional pumps operate to pump the drained secondary tanks back to primary clarifier effluent channel.

The secondary drain pump station consists of two (2) Gormann-Rupp T6 pumps. Each pump is rated for 1,000-gpm and is 20-hp. The existing pumps were recently installed with tags dated 2020, and appear to be in good overall condition. Maintenance staff did mention these pumps struggle with ragging.

The secondary clarifier drain pumps receive a Condition grade of 2 and a Performance grade of 1 for an overall grade of 1.5. These pumps do not have a major impact on hydraulics or process treatment and therefore receive a "low" Consequence of Failure Grade.

5.4 Tertiary Treatment

Secondary Effluent is routed to tertiary treatment via 78" secondary effluent line and series of junction boxes. Tertiary treatment consists of Traveling Bridge filters, and a chlorine contact tank with stair-step aeration at the effluent. Chlorine and sodium bisulfite are dosed at the influent and effluent sides of the chlorine contact basin respectively.

5.4.1 Traveling Bridge Filters

The traveling bridge filters were constructed as a part of the 2012 Brown & Caldwell SCWRF Facility Upgrades project. Seven (7) 16x120 (1920-sf/filter) traveling bridge filters treat up to 75-MGD peak at roughly 4-gpm/sf, though the original design indicates the filters can handle up to 100-MGD.

The traveling bridge filters have been offline and bypassed since the 2018-2019 time period. SCWRF personnel has indicated that the filters were experiencing iron fouling which completely blinded them. SCWRF tried to implement a chemical cleaning process to unblind the filters, but the cleaning saw limited success.

In 2024, Jacobs initiated the SCWRF Effluent Filter Rehabilitation project to rebuild the effluent filters so that they could be placed back into operation.

Rehabilitation of the traveling bridge filters includes the following:

- Replacement of the existing filter media in-kind
    - 11-inches anthracite, 11-inches sand.
- New Porous Plate Underdrain System.
- New ½-hp drive mechanisms (bridge to be reused).
- Replace all backwash and washwater hoses.

The SCWRF Effluent Filter Rehabilitation project should resolve the known issues with the effluent filters once completed. Therefore the traveling bridge filters have been graded with a Condition, Performance, and Overall grade of 1. The filters aren't likely to cause hydraulic issues, and the plant has met permit without them for five years or more, so a "low" Consequence of Failure grade has been assigned.

5.4.2 Filter Effluent Pump Station

The filter effluent pump station consists of five (5) vertical turbine pumps that that discharge to the overhead portion of the chlorine contact basin. There is room for two (2) additional pumps to be installed at some point in the future as needed. It is Ardurra's understanding that this pump station is largely abandoned in place, and that the system can operate as required by Operations via gravity. Further evaluation of the 2012 B&C drawings indicate that the pumps are only be needed while the Chattahoochee River is at or near its 100-year flood elevation.

On the basis of the useful life alone, these pumps are likely to be in good overall condition. However, long periods without operation is not ideal, and these pumps could not operate as intended if required in an urgent situation. Regular maintenance operation of these pumps would be recommended to ensure their reliability.

Overall, the Filter Effluent Pumps receive a condition grade of 2, based on visual inspection alone, and a performance grade of a 5. This equates to an overall grade of 3.5. Failure of these pumps could cause SCWRF issues with discharging treated effluent while the river is at its 100-yr flood elevation, but since this issue has never occurred, Ardurra assigned a "low" Consequence of Failure grade to this system.

5.4.3 Chlorine Contact Tanks

As with most of the main process treatment train at SCWRF, the Chlorine Contact Tanks were constructed under the 1994 Brown & Caldwell Facility Upgrades project. The old chlorine contact basin was abandoned-in-place.

There are three chlorine contact basin trains fed from a single influent channel and common effluent channel. A single reaeration stair-stepper adds dissolved oxygen back to the treated effluent before it is discharged to the Chattahoochee River. Overall, the chlorine contact basin structure appears to be in good overall condition.

Sodium Hypochlorite is fed to the chlorine contact basin for disinfection and is injected at the influent junction box. Sodium bisulfite is fed for dechlorination at the discharge of the combined chlorine contact basin effluent channel prior to the reaeration structure.

5.4.3.1 Sodium Hypochlorite Chemical Feed System

The sodium hypochlorite building was constructed in 2004 as a part of the Brown and Caldwell South Cobb WRF Chlorination-Dechlorination Upgrades project. Prior to the installation of the sodium hypochlorite feed system, SCWRF utilized chlorine gas mixed into solution for disinfection. SCWRF currently feeds a 12.8% sodium hypochlorite solution. The sodium hypochlorite system was later partially rehabilitated in 2014 under the ESI/Hazen Chemical Systems Upgrade project in which the feed pumps were replaced.

5.4.3.1.1 Sodium Hypochlorite Tanks

Sodium Hypochlorite solution is stored in two (2) 20,000-gallon FRP storage tanks manufactured by Industrial Plastic Systems. The tanks have been installed since the original 2004 construction, and appear to be in good overall condition. Maintenance staff did note minor issues with delamination, but these issues are minor on the Sodium Hypochlorite tanks.

The slight delamination present on the tanks yields a Condition grade of 2 for the storage tanks. No reported or noted issues with the performance of the tanks yields a Performance grade of 1. The Sodium Hypochlorite tanks receive an overall grade of 1.5. Tank failure will not impact plant hydraulics, but could pose a health risk. Tank failures could also result in the plant struggling to meet permit requirements. Therefore a "high" Consequence of Failure grade has been assigned.

5.4.3.1.2 Sodium Hypochlorite Pumps

Five (5) Verder hose pumps are utilized to pump chlorine solution to injection points throughout the plant. These pumps were installed in 2014. There are three (3) larger 400-gph pumps that are 2-hp each, and two (2) smaller 78-gph pumps that are 1-hp each. The three larger pumps feed the plant influent and effluent. The two smaller pumps feed the RAS and Reuse pump stations. Overall, the sodium hypochlorite feed pumps and associated systems are in very good condition, and no issues were reported by the staff.

The Sodium Hypochlorite hose pumps receive a Condition grade of 2 due to slight wear from use and exposure to the harsh chemical. A Performance grade of 1 has been assigned for an overall grade of 1.5. A lesser risk of chemical exposure with pump failure, when compared to the storage tanks, but an equal risk of permit issues with failure yields a "medium" Consequence of Failure grade.

5.4.3.2 Sodium Bisulfite Chemical Feed System

SCWRF utilizes a 38% sodium bisulfite solution to dechlorinate final effluent just prior to reaeration and discharge to the Chattahoochee River. The original sodium bisulfite storage and feed system was constructed under the Brown & Caldwell 1994 Facilities Upgrades project. The original tank was located outside of the Ferrous Sulfate Building and pumps were housed in the Ferrous Sulfate Building. The system was later upgraded under the 2004 Chlorination and Dechlorination Upgrades project with a containment area, second storage tank, and new pumps were provided for the system. Finally, the 2014 ESI Chemical System Upgrades project installed new pumps for the system.

5.4.3.2.1 Sodium Bisulfite Tanks

Sodium bisulfite is stored in two (2) 8,100-gal FRP storage tanks constructed by Industrial Plastic Systems and installed in 2004. Despite being the same age as the Sodium Hypochlorite tank, these tanks are in visibly worse condition. Delamination is evident and appears to be worsening. Numerous repairs have been made to them in the recent past as well. Despite these issues, they remain in operation, and continue to serve their overall purpose.

The increased issues with delamination on the Sodium Bisulfite tanks result in a Condition grade of 3. Impacts on performance due to tanks being taken offline for repairs regularly result in a Performance grade of 2. An overall grade of 2.5 is assigned for the Sodium Bisulfite tanks. Tank failure will not impact plant hydraulics, but it could pose a health risk. Tank failures could also result in the plant struggling to meet permit requirements. Therefore a "high" Consequence of Failure grade has been assigned.

5.4.3.2.2 Sodium Bisulfite Pumps

As mentioned above, the sodium bisulfite pumps were last replaced under the 2014 ESI Chemical System Upgrades project. The current pumps are Verder Dura 35s capable of pumping 90-gph at 50-psi. Sodium Bisulfite is only fed to the chlorine contact basin effluent channel, so the two pumps provided meet requirements for N+1 redundancy. The current pumps are in good overall condition.

The Sodium Bisulfite hose pumps receive a Condition grade of 2 due to slight wear from use and exposure to the harsh chemical. A Performance grade of 1 has been assigned for an overall grade of 1.5. A lesser risk of chemical exposure with pump failure, when compared to the storage tanks, but an equal risk of permit issues with failure yields a "medium" Consequence of Failure grade.

5.5 Solids Handling

The Solids Handling process at SCWRF consists of thickening, equalization/holding, and dewatering. Thickening is accomplished via two (2) DAFT units. Thickened sludge is then pumped to the Thickened Sludge Equalization Tanks, before being fed to the centrifuge dewatering system.

5.5.1 Dissolved Air Floatation Thickeners

The DAFT system was constructed under the 1991 Brown & Caldwell SCWRF Sludge Thickening System project. However, the actual DAFT tanks themselves appear to have been constructed under the 1976 Hensley-Schmidt Modifications project as gravity thickeners. This puts the age of the tanks themselves at just under 50-years. One of the DAFT systems is currently out-of-service, and has been for an extended period of time.

The DAFT system itself is one of the more complex and equipment intensive processes at the SCWRF. Major equipment involved with the DAFT system includes pressure water pumps, saturation air tanks, float sludge pumps, thickened bottom sludge pumps, sludge collectors, influent grinders, polymer feed system, and various instruments, valves and accessories. Most of this equipment is at or is quickly approaching the end of its expected useful life, and the process itself is inefficient.

Cobb County Water System (CCWS) recently advertised a project to replace the existing DAFT system with a Rotary Drum Thickener (RDT) system to improve thickening prior to

digestion, reduce the amount of solids being recycled through the plant, and improve overall thickening efficiency.

Ardurra has provided a summary of the visual inspections of the DAFT system conducted during site visits in the following sections. However, due to the DAFT system being replaced by RDTs soon, all DAFT equipment has been scored with a Condition, Performance and Overall grade of 1. Similarly, all the DAFT equipment was assigned a "low" Consequence of Failure grade.

5.5.1.1 Pressurized Water Pumps

The pressurized water pumps provide air saturated water to the DAFT. The pumps are 200-hp horizontal-centrifugal pumps originally installed as a part of the 1991 DAFT project. The pumps designed to produce 3,070-gpm at 154-ft of total dynamic head. One (1) of the three pumps appears to have been replaced since the original installation, but the other two appear original. These pumps are leaking and are in poor condition overall. All three have surpassed their anticipated useful life.

5.5.1.2 Thickened Bottom Sludge Pumps

The thickened bottom sludge (TBS) pumps remove settled sludge from the DAFT tanks and recycle it back to the headworks or to the thickened sludge equalization tanks. The existing TBS pumps are WEMCO Model C designed for 350-gpm at 39-ft TDH, and appear to be original to the 1991 construction. Similarly to the pressurized water pumps, these pumps are past their expected useful life, and are in poor overall condition.

5.5.1.3 Float Sludge Pumps

The float sludge pumps (FSPs) remove the floating thickened sludge removed by the DAFT mechanism and pump it to the thickened sludge equalization tanks. The existing pumps are WEMCO Lobeline rotary lobe pumps. There are four (4) total FSPs, two are located inside the DAFT Control Building and two are located outside in pits adjacent to the float sludge wells. The FSPs are heavily corroded and some are leaking. Like the other DAFT process equipment they are past their anticipated useful life.

5.5.1.4 Mechanism and Drive Units

The DAFT mechanisms are 2-hp Envirex units capable of producing 59,620-ft-lbs of force. They collect both TBS and FSP from the DAFT tanks to be pumped elsewhere. The units appear to be original to the 1991 construction. The mechanisms in general are extremely corroded and have reached the end of their expected useful life.

5.5.1.5 Air Compressors

The DAFT air compressor provide air to the pressurized water to be saturated to facilitate sludge rising to the surface of the DAFT tanks. There are two (2) air compressors currently utilized onsite, and they are Quincy units capable of providing 54-scfm at 100-psig. These compressors are not original to the construction, and appear to have been installed sometime around 2018. Maintenance staff reported that they operate as intended, and are in better condition than most of the DAFT process equipment.

5.5.1.6 Influent Grinders

Two (2) inline grinders grinder mixed primary sludge and WAS prior to enter each DAFT tank. The grinders are in-place to protect downstream process equipment from ragging and to ensure a consistent flowable sludge is provided to the DAFT. The grinders were installed under the Brown & Caldwell 1991 Sludge Thickening System project. One (1) of the two grinders appears to have been replaced recently, while the other looks to original.

The newer grinder is a JWC Muffin Monster with a 4,000-gpm capacity and 10-hp motor. The exact date of the grinder could not be determined. The other grinder was not online during the visit, and exact details of it's make and capacity are unknown, but are assumed to be equal or similar to the Muffin Monster.

5.5.1.7 Polymer Feed System

The DAFT polymer feed system was not observed while Ardurra was onsite. However, Ardurra understands that the polymer system has been abandoned in place and is no longer utilized in the DAFT process. From the report data and as-builts available, the polymer system appears to be a DynaBlend system with 4.5-gph pumps. Further investigation of this system will be required if it is still utilized.

5.5.2 Thickened Sludge Equalization/Holding Tanks

Following thickening at the DAFT system, the thickened float sludge or bottom sludge is routed to the thickened sludge equalization tanks. These tanks were originally constructed in 1970 as aerobic digesters. The system itself consists of two (2) concrete tanks with fixed tops, and a thickened sludge pump building positioned between them. The tanks and thickened sludge pump building are approaching the end of their expected useful life. The Thickened Sludge Pump Building floods during heavy rainfall event, and severe structural issues with this structure have been noted in the past. Additionally, the Thickened Sludge Pump Building pump gallery is difficult to access and leaves little to no room to work on the existing equipment.

The Thickened Sludge Equalization Tanks have been modified repeatedly throughout SCWRF's life. In 1994 Brown & Caldwell Facilities Upgrades project converted the aerobic-digesters into open-top Solids Equalization tanks with aeration mixing. In 1996 the tanks were modified further with the addition of three submersible mixers per tank and fixed tops. The existing aerated mixing system was abandoned in place. Today, the Thickened Sludge Equalization Tanks consist of Centrifuge Feed Pumps, Submersible Mixers, and Thickened Sludge Grinders. Additional considerations to be Thickened Sludge sump pumps will be made as well.

5.5.2.1 Centrifuge Feed Pumps

Three (3) WEMCO Lobeline rotary lobe pumps withdrawal thickened sludge from the Sludge Equalization Tanks and feed it the centrifuges at the Solids Handling Facility. There is a dedicated feed pump for each centrifuge. Each pump is designed to provide 160-gpm to the centrifuges (previously belt filter presses (BFP)). These pumps do not appear to have been replaced when SCWRF made the switch from BFPs to Centrifuges in 2015.

Overall, the pumps appear to be in good condition and were stated to be in good working order, despite them being beyond their expected useful life.

5.5.2.2 Mixers

The submersible mixers have been abandoned in place. Ardurra did not expect or have knowledge of the mixers during site visits. Information available from the As-Builts indicate that three (3) 20-hp mixers were installed in each Sludge Equalization Tank in 1996 to keep the thickened sludge in suspension.

5.5.2.3 Grinders

Two (2) Muffin Monster in-line grinders grinder the sludge prior to pumping via the Centrifuge Feed pumps to the Centrifuges. The grinder motors have been replaced recently, and they appear to be in good overall condition.

5.5.3 Dewatering

SCWRF utilizes three (3) centrifuges onsite to dewater thickened sludge. These centrifuges are supported with the following supplementary equipment systems, a polymer feed system and sludge conveyors. The dewatering system as it stands today was installed under the 2015 Dewatering Improvements project.

5.5.3.1 Centrifuges

The existing Centrifuges are manufactured by Alfal Laval. They are stated to be designed for 210-gpm hydraulic capacity, although the existing feed pumps may only be able to provide 160-gpm. The centrifuges are driven by three (3) motors, a 300-hp main drive unit, a 40-hp back-drive unit, and a ½-hp lubrication system.

The existing Centrifuges are new and in good overall condition. Maintenance and Operation staff did report issues with efficiency related to rags and grit from upstream process failures. The Centrifuges receive a Condition, Performance and Overall grade of 2. Processing Solids through the plant is important to ensure solids recycling through the plant isn't excessive, but a failure would not hydraulic impact the plant. Therefore the Centrifuges are assigned a "medium" Consequence of Failure grade.

5.5.3.2 Polymer System

The Centrifuge Polymer System is key to operation of the Centrifuges and the dewatering process overall. As with the centrifuges themselves, the existing polymer system was installed in 2015 under the Dewatering Improvements project.

The polymer system is fairly complex and includes a neat polymer, polymer solution mixing and polymer solution aging tanks. Along with the storage tanks, a polymer make-down unit, transfer pump, and series of centrifuge feed pumps are also included in the overall process. The following subsections evaluate each key piece of equipment in more detail.

5.5.3.2.1 Neat Polymer Storage Tank

Neat polymer is stored in a 9.500-gallon Augusta Fiberglass FRP storage tank. The tank is 12-ft in diameter and an estimated 15-ft in height. The polymer storage tank is in good condition.

The tank includes a 5-hp top mounted propeller mixer. While the mixer was not accessible for inspection during Ardurra's site visits, discussion with maintenance revealed that the polymer mixers in general are maintenance intensive.

Issues the mixers yield a Condition grade of 2. Satisfactory performance with a relatively new system yields a Performance grade of 1. An Overall calculated score of 1.5 is assigned to the neat polymer storage tank. The polymer system receives a "low" Consequence of Failure score.

5.5.3.2.2 Polymer Make-Down Unit

The polymer make-down unit is a skid mounted polymer mixing system that takes neat polymer and mixes it into a polymer solution. The polymer make-down unit includes a 1-hp Moyno polymer transfer pump, and a 15-hp horizontal centrifugal water booster pump. A venturi mixing system is utilized to mix polymer into a solution and deposit it into the Polymer Solution Mixing Tank. The make-down unit also includes the main polymer system control panel.

Overall, the Polymer Make-Down unit appears to be in good condition, but it would appear that some equipment on the make-down unit have been replaced. For example, the Moyno pump is dated as installed in 2024. This indicates maintenance issues within this system.

Minor wear-and-tear combined with evidence of equipment failing prior to its estimated useful life leads to a Condition, Performance and Overall grade of 2. The polymer system receives a "low" Consequence of Failure score.

5.5.3.2.3 Polymer Solution Mixing Tank

Polymer solution is stored in a 5,000-gallon Augusta Fiberglass FRP storage tank. Maintenance and Operations noted issues with foaming following mixing the polymer into solution at the make-down unit, and as a result a defoamer is now mixed into the polymer at this point in the system. The tank is 8-ft in diameter and an estimated 12-ft in height. The polymer storage tank is in good condition.

The tank includes a 2-hp top mounted propeller mixer. While the mixer was not accessible for inspection during Ardurra's site visits, it was notably out of service during both of Ardurra's site visits. Discussion with maintenance revealed that the polymer mixers in general are maintenance intensive, and the Mixing Tank mixer is the most problematic.

Significant issues the mixers yield a Condition grade of 3. Performance is graded at a 2 due to issues with foaming following mixing. An Overall calculated score of 2.5 is assigned to the mixing polymer storage tank. The polymer system receives a "low" Consequence of Failure score.

5.5.3.2.4 Polymer Solution Transfer Pump

Polymer solution is transferred from the mixing tank to the Aging Tank via a single 10-hp Moyno E412 positive displacement pump. The pump was installed in 2015, and therefore still has useful life remaining. No issues with operation or maintenance were noted by staff or Ardurra during site visits. Therefore, the Polymer Solution Transfer pump receives a Condition, Performance and Overall grade of 1. The polymer system receives a "low" Consequence of Failure score.

5.5.3.2.5 Polymer Solution Aging Tank

The polymer aging tank stores polymer solution following mixing prior to being dosed at the centrifuges. The tank is a 5,000-gallon Augusta Fiberglass FRP storage tank. It is 8-ft in diameter and an estimated 12-ft in height. The polymer storage tank is in good condition. No mixing occurs in the aging tank.

The Polymer Solution Aging Tank receives a Condition, Performance and Overall grade of 1. The polymer system receives a "low" Consequence of Failure score.

5.5.3.2.6 Polymer Feed Pumps

Polymer solution is fed to the centrifuges via three (3) 5-hp 215K Moyno positive displacement pumps. Each pump is dedicated to a centrifuge, but discharge cross-connection valves are present for some operational flexibility if needed.

The pumps appear to be in good condition, but the middle pump recently had its motor replaced indicating some maintenance issues with fairly new equipment. No major concerns were noted from operations or maintenance staff.

Evidence of motor failure lead to a Condition grade of 2. No noted issues with performance lead to a Performance grade of 1. An overall score of 1.5 has been calculated for the feed pumps. The polymer system receives a "low" Consequence of Failure score.

5.5.3.3 Sludge Conveying System

Dewatered sludge discharges from each centrifuge into a series of screw conveyors to transport the dewatered sludge to haul trucks. Three (3) 15-hp conveyors make-up this system.

Dewatered sludge from all three centrifuges is captured in a single screw conveyor. The screw conveyor then conveys the sludge to one of two distribution conveyors that have four (4) discharge gates each to fill the haul trucks.

Maintenance staff indicated that the conveyor system works well, but they also stated that is was very difficult to access for routine maintenance. The access issues were a major safety concern as well.

Based on the information provided to Ardurra during site visits and visual inspections of the sludge conveyors they receive a Condition, Performance and Overall grade of 1. A "medium" consequence of failure grade has been assigned due to the safety concerns associated with access to these conveyors for maintenance.

5.6 Supplemental Systems

5.6.1 Reuse Pump Station

The current Reuse Water Pump Station was constructed under the 2012 Brown and Caldwell South Cobb WRF Upgrades project. Four (4) vertical centrifugal pumps provide up to 1500-gpm at 300-ft total dynamic head to the reuse water system through the plant. One (1) of the four pumps was not installed during Ardurra's site visits. The that are installed are all 150-hp Ruhrpumpen Model 14D250.

Reports indicate that the reuse water pumps work as intended, and there are no major problems with them. However, the reuse water distribution system is stated to be systemically failing. The older parts of the reuse water distribution system are cast-iron and have corroded to the point of failure throughout the system. Maintenance staff reports constant issues with broken reuse water lines that require repair.

Reuse water is utilized as an important source of water for many key treatment processes throughout the plant, making these reuse water distribution failures a larger impact than would be expected. As a result, the reuse pump station receives a Condition grade of 4, and a Performance grade of 5 for net overall grade of 4.5. A "medium" consequence of failure grade was assigned as upstream process system may not be able to operate in the event of a complete failure.

5.6.2 Recycle Pump Station

Four (4) 60-hp Fairbanks Morse Vertical Turbine Solids Handling pumps recycle waste process flows back to the headworks of the SCWRF. This pump station was originally constructed in 2012 under the Brown & Caldwell SCWRF Upgrades project. Specifically, this pump station receives traveling bridge filter backwash, centrifuge centrate, and daft AFE/TBS which is pumped back to the headworks.

These pumps reportable operate very well, and they historically have required little to no regular maintenance. As a result, the pumps receive a condition, performance and overall grade of 1. The recycle pump station could hydraulically cause issues for the plant, but it does not directly affect the plants ability to meet permit. Therefore, it has received a "medium" Consequence of Failure grade.

6. Conclusions and Recommendations

Attachment 2 provides an Assessment Summary Table for the equipment evaluated with Consequence of Failure Grade, and the combined Condition and Performance Assessment Grade. Attachment 3 provides an Assessment Summary Table for each Treatment System utilizing calculated averages of the Condition and Performance Grades, and an overall Consequence of Failure Grade. Attachment 4 provides an Assessment Summary Table for each Process utilizing calculated averages of the Condition and Performance Grades, and an overall Consequence of Failure Grade. These tables will be the critical reference to building of the forthcoming Master Plan recommendations, and the corresponding CIP prioritization report. Attachment 5 provides the equipment data sheets prepared for each piece of equipment evaluated and listed in Attachment 2.

7. Attachments

- Attachment 1 – CCWS Shared Information Crosswalk to Ardurra Renamed Documents
- Attachment 2 – Equipment Assessment Summary Table
- Attachment 3 – Treatment System Assessment Summary Table
- Attachment 4 – Process Assessment Summary Table
- Attachment 5 – Equipment Evaluation Summary Data Sheets

Attachment 1 – CCWS Shared Information Crosswalk to Ardurra Renamed Documents - Record Drawings (sheet 1 of 2)

Ardurra Implemented Renaming (PDFs)	Original CCWS Shared File Name/Format	CCWS Shared File(s) Location
1_SCWRF 2MGD Hensley Schmidt 18 acre site E-105 1963	S01955; S02442-S02481 – TIF files	3. Asbuilt Drawings\g. South Cobb Sewage Treatment Plant-1963, Project E-105\
2_SCWRF Expansion to 8 MGD Hensley Schmidt Contract 3 E4050 04.24.1970	COVERSHEET, INDEX, 4050-E-3.2 thru 73.1 varied – TIF files	3. Asbuilt Drawings\h. S Cobb STP Expansion,Contract No. 3-1970, Project No. E-4050\
3_SCWRF Expansion to 24 MGD Hensley Schmidt Design Dwgs E5848 09.01.1976	E-5848_4-IB-231 thru E-5848_4-IB-263.2 varied – TIF files	3. Asbuilt Drawings\k. SC WWTP Expansion-1976, Project No. E-5848 (design)\
4_SCWRF Expansion to 24 MGD Hensley Schmidt Record Dwgs Contract 4 E5848 09.03.1976	5660J-1.0,7398-E_M-1.0, C-5660-1.0, COVERSHEET, INDEX, INDEX2, E-6182_1.0 and 2.0, E-5660_4-I-3.1 thru 309.2 varied – TIF files	3. Asbuilt Drawings\i. SC WWTP Expansion, Contract No. 4-1976, Asbuilts, E-5660\
5_SCWRF Expansion to 24 MGD SCE Inc Shop Dwgs Contract 4 E5660 08.17.1979	SC-0037-20-0 thru SC-0037-20-33 varied – TIF files	3. Asbuilt Drawings\m. SC WWTP Expansion, Contract No. 4-1978 S.C.E Markups, E-5660\
6_SCWRF Prim & Sec Clarifier Mods Hensley Schmidt E7470 August 1984	Cover Sheet, E1.0 (LSMod.) thru S2.2 varied PDF individual sheets	3. Asbuilt Drawings\n. South Cobb Water and Sewer Modifications-1984, Project No. E-7470\
7_1-20 LF SCWRF Prim & Sec Clarifier Mods Hensley Schmidt E7470 01.08.1985	PDF Combined Drawings	Via supplemental data request
8_SCWRF Advanced Plant Imprvmnts to 28 MGD Hensley Schmidt E8336 11.21.1986	COVERSHEET, E-8336_2.1 thru 42.1 varied – TIF files	3. Asbuilt Drawings\j. SC Advanced WWTP Improvements-1988, Project No. E-8336\
9_SCWRF Brown & Caldwell Chemical Feed Facility E5072 July 1990	COVERSHEET, INDEX, A901 thru S904 varied – TIF files	3. Asbuilt Drawings\l. SC Wastewater Treatment Plant Chemical Feed Facility-1990, Project No. 5072\
10_SCWRF Brown & Caldwell Sludge Thickening System November 1991	COVERSHEET, A801 thru S805 varied – TIF files; E801 (Addendum No.1) thru S805 (Addendum No. 2) varied – PDF files	3. Asbuilt Drawings\f. South Cobb WTP Sludge Thickening System (DAFT)-Design Drawings Only\
11_SCWRF Brown & Caldwell DAFT (Envirex) Shop Drawings1992	12108-201 thru 12108-210 varied – TIF files	3. Asbuilt Drawings\o. DAFT (Envirex) Shop Drawings-1992\
12_SCWRF GSS&A Control Bldg Roof Replacement 04.16.1993	Control Bldg Roof Replacement Dwgs - PDF	Via supplemental data request
13_SCWRF Exp to 40 MGD Brown & Caldwell Vol 5 G_C_P&ID_A_S Dwgs T3101 October 1994	COVERSHEET, A1 thru S902 varied – PDF individual sheets	3. Asbuilt Drawings\b. SCWRF Expansion to 40 mgd, T3101 (TPSC9101) (Volume 5 of 6)\
14_SCWRF Exp to 40 MGD Brown & Caldwell Vol 6 M_HVAC_I_E Dwgs T3101 October 1994	COVER, E1 thru M902 varied – PDF individual sheets	3. Asbuilt Drawings\b. SCWRF Expansion to 40 mgd, T3101 (TPSC9101) (Volume 6 of 6)\
15_SCWRF Brown & Caldwell Solids Handling Improvements December 1996	COVERSHEET, Drawing C085 thru Drawing S935 varied – PDF individual sheets	3. Asbuilt Drawings\b. SCWRF Expansion to 40 mgd, Addendum-Solids Handling Improvements (design)\
16_SCWRF NB+A Architects New Control Building T3007 04.08.2003	PDF Combined Drawings	3. Asbuilt Drawings\ s. SCWRF, New Control Building, T3007 (Design Drawings)
17_SCWRF Brown & Caldwell Chlorination Dechlorination Upgrade T3010 April 2004	PDF Combined Drawings	3. Asbuilt Drawings\ e. SCWRF Chlorination Dechlorination Facility Upgrade, T3010
18_SCWRF Earth Tech Headworks Improvements T3006 April 2004	Cover Sheet, 01-G-1 thru 99-S-3 varied PDF individual sheets	3. Asbuilt Drawings\d. South Cobb WRF Headworks Improvements-2004, T3006\
19_SCWRF CH2M Hill Sludge Transfer Pump Stations August 2004	SCWRF Transfer Pump Station Drawings - PDF	Via supplemental data request
20_SCWRF Arcadis Sludge Handling Facility T3012 October 2006	Sludge Handling Facility T3012 - PDF	Via supplemental data request
21_SCWRF Brown & Caldwell Filter mods Add Sec Clar Vol 6 G_C_P&ID_S Dwgs T3003B May 2012	PDF Combined Drawings	3. Asbuilt Drawings\ c. South Cobb WRF Upgrades, T3003B-May 2012, Volume 6
22_SCWRF Brown & Caldwell Filter mods Add Sec Clar Vol 7 M_HVAC_I_E Dwgs T3003B May 2012	PDF Combined Drawings	3. Asbuilt Drawings\ c. South Cobb WRF Upgrades, T3003B-May 2012, Volume 7
23_SCWRF ESI Chemical Systems Upgrade T3015 May 2014	PDF Combined Drawings	3. Asbuilt Drawings\ q. SC Water Reclamation Facility Chemical Systems Upgrade-2014, Program No. T3015
24_SCWRF EDT Inc Dewatering Improvements T3014 Record Dwgs 06.29.2015	PDF Combined Drawings	3. Asbuilt Drawings\ p. South Cobb WRF Dewatering Improvements-June 2014, T3014
25_SC Tunnel Inf LS Jacobs Vol. 2 of 2 $3017 Record Dwgs Sept 2015	Architectural – 11x 17 thru Structural- 11x 17 PDF individual sheets	3. Asbuilt Drawings\r. SC Tunnel, Vol. 2 of 2 (ILS)-2015, Program No. S3017\
26_SCWRF Jacobs Effluent Filter Rehab T3023 Construction Dwgs Jan 2024	SCWRF Effluent Filter Rehab-Construction Drawings - PDF	Via supplemental email request
27_SCWRF ESI Headworks Improvements T3017 Conformed Dwgs 02.08.2024	PDF Combined Drawings	a. South Cobb WRF Headworks Improvements, T3017 (Conformed Drawings)

Attachment 1 – CCWS Shared Information Crosswalk to Ardurra Renamed Documents - Historical Documents (sheet 2 of 2)

Ardurra Implemented Renaming (PDFs)	Original CCWS Shared File Name/Format (all PDF)	CCWS Shared File(s) Location
1_RL Sutton and SCWRF Brown & Caldwell Phosphorus Control Plan May 1990	d. Phosphorous Control Plan for SCWRF and Sutton WRF (May 1990)	15. Other
2_SCWRF Brown & Caldwell Sludge Treatment & Disposal Evaluation Sept 1990	g. Sludge Treatment and Disposal Evaluation for the South Cobb WWTP (September 1990)	15. Other
3_SCWRF Brown & Caldwell Oxygen Transfer Alts 06.27.1991	b. Oxygen Transfer Alternatives	12. Project Reports\South Cobb WRF Expansion to 40 MGD, Program No. T3101 (TPSC9101)\
4_SCWRF MSE Flooding Potential Eval Oct 1991	h. South Cobb WTP Flooding Potential Evaluation (October 1991)	8. Environment Reports
5_SCWRF DAFT Atl Testing & Eng Subsurface Exploration Report 55728 10.31.1991	a. Report of Subsurface Exploration-DAFT (10-31-1991)	8. Environment Reports
6_SCWRF Expansion Atl Testing & Eng Subsurface Exploration Report 56920 01.27.1992	c. Report of Subsurface Exploration-SCWRF,TPSC9101 (January 1992)	8. Environment Reports
7_SCWRF Expansion Atl Testing & Eng Subsurface Exploration Report 67975 11.13.1992	d. Supplemental Subsurface Exploration Report -SCWRF, TPSC9101 (November 1992)	8. Environment Reports
8_SCWRF Expansion BC-MSE Design Development Report July 1993	a. DDR (July 1993)	12. Project Reports\South Cobb WRF Expansion to 40 MGD, Program No. T3101 (TPSC9101)\
9_SCWRF Brown & Caldwell Phase II ESA Nov 1993	f. Phase II Environmental Site Assessment-Former BHG Site (November 1993)	15. Other
10_SCWRF Brown & Caldwell DRAFT Sludge Thickening Facilites Operations Manual 07.07.1994	a. DAFT Operations Manual	12. Project Reports\South Cobb WTP Sludge Thickening System (DAFT)\
11_Brown & Caldwell Process Safety Regulations & Risk Management Plan proposal 06.27.1997	g. Process Safety Regulations (June 27, 1997) - PDF	8. Environment Reports
12_SCWRF Brown & Caldwell Filter Deletion from Expansion CCWS Memo 10.15.1998	b. ESI HS SCWRF Headworks TM - Screenings (April 12, 2018)	12. Project Reports\South Cobb WRF Headworks Improvements, T3017\
13_SCWRF ESI Hazen Headworks T3017 Grit Removal Evaluation TM 2_05.15.2018	c. ESI HS SCWRF Headworks TM-Grit Removal (May 15, 2018)	12. Project Reports\South Cobb WRF Headworks Improvements, T3017\
14_SCWRF ESI Hazen Headworks T3017 Influent Screening Evaluation TM 1 04.12.2018	d. ESI HS SCWRF Headworks TM-Septage Receiving (June 29, 2018)	12. Project Reports\South Cobb WRF Headworks Improvements, T3017\
15_SCWRF ESI Hazen Headworks T3017 Septage Receiving Evaluation TM 3_06.29.2018	e. ESI HS SCWRF Headworks TM-Sludge Thickening (Dec 2018)	12. Project Reports\South Cobb WRF Headworks Improvements, T3017\
16_SCWRF ESI Hazen Headworks T3017 DAFT Sludge Thickening TM4_12.10.2018	b. South Cobb Capacity Assessment, Task 4.0-Filters (April 10, 2000)	15. Other
17_SCWRF Brown & Caldwell Capacity Study Design Notebook March 2000	b. Process-Mechanical Design Notebook (2001)	12. Project Reports\South Cobb WRF Upgrade, T3003B\
18_SCWRF Brown & Caldwell Deep-Shallow Bed Filter Capacity Comparison TM 04.10.2000	b. Report of Subsurface Exploration-SCWRF, T3003B (5-31-2001)	8. Environment Reports
19_SCWRF Expansion Brown & Caldwell PDR Design Calcs SC5 Eff Fit & PS Rcy PS 2001	a. Preliminary Design Report, Draft (July 2001)	12. Project Reports\South Cobb WRF Upgrade, T3003B\
20_SCWRF QORE Subsurface Exploration Report T3003 Scrns 4 & 5 SC5 Fitrs 05.31.2001	b. Report of Subsurface Exploration-SCWRF, T3003B (5-31-2001)	8. Environment Reports
21_SCWRF Brown & Caldwell DRAFT PDR - Odor Control Headworks July 2001	e. SCWRF Predemolition Asbestos and Lead-Based Paint Survey (February 2005)	8. Environment Reports
22_SCWRF Brown & Caldwell DRAFT PDR SC5 Eff Fit & PS Rcy PS SW 07.2001	c. Preliminary Engineering Report (May 2005)	12. Project Reports\South Cobb Tunnel, S3017\
23_SCWRF Predemolition Asbestos and Lead-Based Paint Survey NESHAP February 2005	c. South Cobb WRF Centrifuge Installation Alternatives Evaluation	15. Other
24_South Cobb Tunnel LS Parsons PDR $3017 May 2005	a. Secondary Clarifier 301 Inspection Report	12. Project Reports\SCWRF Secondary Clarifiers Rehabilitation, T3019\
25_South Cobb Tunnel ERPD & DDR June 2007	d. Secondary Clarifier 304 Inspection Report	12. Project Reports\SCWRF Secondary Clarifiers Rehabilitation, T3019\
26_SCWRF CH2M Hill Centrifuge Installation Alternatives Evaluation 05.04.2010	c. Secondary Clarifier 303 Inspection Report	12. Project Reports\SCWRF Secondary Clarifiers Rehabilitation, T3019\
27_SCWRF United R2T Condition Eval SClarifier 301_10.22.2020	f. Technical Memo (Primary Clarifier Evaluation)	12. Project Reports\FY SCWRF Improvements, T3020\
28 SCWRF United R2T Inspection Report SClarifier 304_01.11.2021	g. Technical Memo (Secondary Clarifier Evaluation)	12. Project Reports\FY SCWRF Improvements, T3020\
29_SCWRF United R2T Inspection Report SClarifier 303_02.11.2021	h. Technical Memo (Thickened Sludge Storage Evaluation)	12. Project Reports\FY SCWRF Improvements, T3020\
30_SCWRF Hazen Primary Clarifiers Eval T3020 Nov 2021	d. CFD Modeling (Primary Clarifiers)	12. Project Reports\FY SCWRF Improvements, T3020\
31_SCWRF Hazen Secondary Clarifiers Eval T3020 Nov 2021	b. Options Evaluation (January 2024)	12. Project Reports\SCWRF PC Rehab. & Biosolids Thickening, T3022\
32_SCWRF Hazen Thickened Sludge Storage Eval T3020 Mar 2022	a. Design Development Report (May 2024)	12. Project Reports\SCWRF PC Rehab. & Biosolids Thickening, T3022\
33_SCWRF Hazen Primary Clarifiers CFD Modeling T3020 04.14.2022	d. CFD Modeling (Primary Clarifiers)	12. Project Reports\FY SCWRF Improvements, T3020\
34_SCWRF ESI Hazen PC Rehab & Biosolids Thickening DDR - Options Evaluation Jan 2024	b. Options Evaluation (January 2024)	12. Project Reports\SCWRF PC Rehab. & Biosolids Thickening, T3022\
35_SCWRF ESI Hazen PC Rehab & Biosolids Thickening DDR T3022 May 2024	a. Design Development Report (May 2024)	12. Project Reports\SCWRF PC Rehab. & Biosolids Thickening, T3022\

Attachment 2 – Process Equipment Summary Sheet

Location	Equipment	Qty	Notes
Pretreatment	Bar Screens	4	
Pretreatment	Conveyors	3	
Pretreatment	Aerated Grit Systems	2	8 Grit Pumps, 2 Air Compressors
Pretreatment	Degritting System	2	2 Classifiers, 8 Cyclones
Pretreatment	Flow Equalization	Abandoned	
Primary Treatment	Primary Sedimentation (two chain and flights in each basin)	5 (10)	5 drive units, each drive unit driving two independent collector systems.
Primary Treatment	Primary Scum Pumps	3	
Primary Treatment	Scum Collectors	3	Helical Scum Collectors
Primary Treatment	Primary Sludge Pumps	5	
Primary Treatment	Primary Drain Pumps	2	
Primary Treatment	Ferrous Chloride System	1	3 Tanks, 4 pumps
Secondary Treatment	Lime Feed System	1	Powdered lime storage and slaker system.
Secondary Treatment	Aeration Basins	5	Three Turblex Blowers
Secondary Treatment	Clarifiers	5	
Secondary Treatment	RAS Pumping	10	
Secondary Treatment	WAS Pumping	4	
Secondary Treatment	Secondary Scum Pump Stations	3	SC 1/2, SC 3/4, SC 5 (three Pump Stations, 5 total pumps)
Secondary Treatment	Secondary Drainage Pumps	2	
Tertiary Treatment	Filters	7	
Tertiary Treatment	Filter Effluent Pumps	5	
Tertiary Treatment	Sodium Hypochlorite System	1	2 Storage Tanks, 5 hose pumps.
Tertiary Treatment	Sodium Bisulfite System	1	2 Storage Tanks, 2 Pumps
Plantwide	Reuse Water System	1	3 Pumps
Plantwide	SCADA	1	
Plantwide	Recyle Pump Station	1	4 Pumps
Solids Treatment	Thickened Sludge Holding Tanks	2	3 Sludge Feed Pumps, 2 Grinders, 6 Mixers (3 per tank), 2 Sump Pumps
Solids Treatment	DAFT	2	3 Pressure Water Pumps, 2 TBS Pumps, 4 FSP Pumps, 2 Drive Units, 1 Compressor (should be 2), 2 grinders, 1 polymer system (abandoned)
Solids Treatment	Polymer Feed System	1	Neat Polymer Tank, Polymer Mix Tank, Polymer Aging Tank, 1 Transfer Pumps, 1 make down unit, 2 mixers, 3 feed pumps
Solids Treatment	Centrifuges	3	
Solids Treatment	Dewatered Sludge Conveyors	3	

TECHNICAL MEMORANDUM NO. 5 – SOUTH COBB WRF PROCESS MODEL AND HYDRAULICS

To: Cobb County Water System

From: Ardurra Group

Date: September 4, 2026

Re: South Cobb WRF Expansion and Upgrade – Program No. T3025
Process Model and Hydraulics

1 Background

The Cobb County Water System (CCWS) headquartered in Marietta, Georgia owns and operates four (4) water reclamation facilities that serve major basins within the County and portions of neighboring counties. One of those facilities is South Cobb Water Reclamation Facility (WRF) which is a 40 million gallon per day (MGD) maximum month average daily flow (MMF) WRF located at 490 Lee Industrial Boulevard in Austell, Georgia 30168. The South Cobb WRF serves the southwestern quadrant of Cobb County, including portions of the Cities of Marietta and Smyrna; the Cities of Austell, Mableton, and Powder Springs; as well as areas outside of the County in Douglas and Paulding Counties. The South Cobb WRF treats influent wastewater and discharges the treated effluent to the Chattahoochee River in accordance with the limits of its National Pollutant Discharge Elimination System (NPDES) Permit GA0026158.

CCWS contracted with Ardurra to evaluate the South Cobb WRF and develop a long-range plan for providing treatment capacity of 50 MGD (MMF) which will include a schedule for improvements for unit processes and equipment for the facility to 2050.

The South Cobb WRF is currently designed to treat an annual average daily flow (ADF) of 33 MGD, a MMF of 40 MGD, and a peak wet weather flow (PWWF) of 86 MGD. The Facility Plan will result in a capital spending plan based on the recommended improvements for the facility to provide the increased capacity and meet effluent limits through 2050. Ardurra has prepared 4 previous Technical Memorandums (TM) as part of the project including:

- TM 1 – Sampling Plan
- TM 2 – Population and Flow Projections
- TM 3 – Initial Findings and Urgent Issues
- TM 4 – Equipment Assessment

TM 1 and TM 2 will be provided to the Design-Builder after Award

2 Purpose

The revised purpose of this Technical Memorandum is to establish the process modeling and hydraulic basis for development and evaluation of treatment alternatives capable of supporting expansion of the South Cobb WRF from 40 MGD MMF to 50 MGD MMF while achieving current WLA requirements and evaluating future planning-level nutrient objectives. This memorandum documents development of the existing facility process model, calibration of biological treatment performance, evaluation of hydraulic conditions, and establishes the basis of design utilized for alternatives development in TM No. 6.

3 Influent and Effluent Basis of Design

3.1 Influent Flow

CCWS provided historical information from January 2017 – October 2024. The chart provided in *Figure 3.1.1* shows the influent daily flow, 30-day rolling average flow, and the 3-month rolling average daily flow over this period.

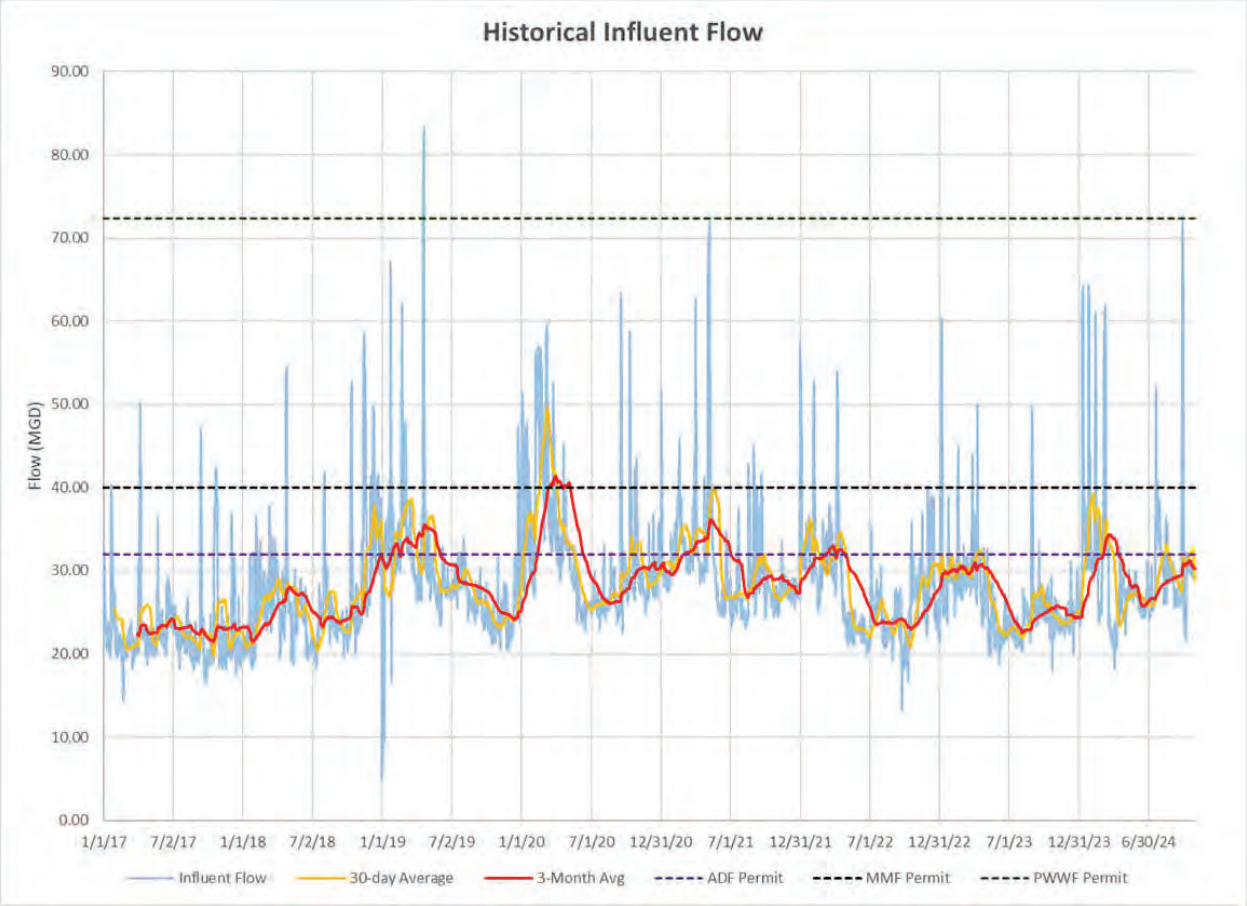


FIGURE 3.1.1

Ardurra previously analyzed the flow data in TM 2 which provided population and flow projections. A summary of information regarding the South Cobb WRF flow relative to this TM is listed below:

- Currently designed to treat an ADF of 33 MGD
- Current design/permitted to treat a MMF of 40 MGD
- Current PWWF is 86 MGD
- MMF to ADF ratio set as 1.25
- Max Peak Day Flow (PDF) to ADF ratio ranged from 1.96 to 2.63, average ratio was 2.26

- Average of 90 gallons/capita/day (gpcd)
- Time to start planning for expansion at ADF of 29.2 MGD and MMF of 36.5 MGD

A typical peak hour flow (PHF) for the treatment process would be calculated using the *Recommended Standard for Wastewater Facility*, equation based on population. Using the current ADF of 33 MGD and the average 90 gpcd, a population of 366,666 persons was calculated which results in a PHF:ADF of 1.60. This would result in a PHF of 52.9 MGD. However, the reported PDF and PWWF are both greater than this flow and ratio. In discussions with operation personnel, Ardurra determined that the PHF at the plant should be based on the Six Flags Influent Lift Station (ILS) pumping that the plant has experienced which is 94 MGD.

Future influent flow is based on the planned plant expansion of MMF to 50 MGD. Based on the ratio of MMF:ADF of 1.25 the future ADF is calculated as 40 MGD. The future PDF was estimated based on PDF:ADF of 2.25 which would be 90 MGD. The future PHF for the expansion is based on the pumping capabilities in the sewer system and hydraulic capabilities at the plant which will be evaluated at 94 MGD. The hydraulic capabilities will be explored further in Section 5 of this TM.

TABLE 3.1.1

	ADF (MGD)	MMF (MGD)	PDF (MGD)	PHF (MGD)
Current (2024)	28.6	35	75.3	
Existing Design	32	40	84	
Future Design	40	50	90	94

3.2 Influent Biological Parameters

The South Cobb WRF influent data was reviewed from January 2017 – October 2024 for $CBOD_5$, TSS, VSS, Ammonia, and TP. Nitrogen Data was provided from November 2022 – December 2024. Additional sampling was conducted in accordance with TM1. This sampling was conducted from January 2025 – March 2025 for COD and $CBOD_5$ data.

Due to some high influent concentrations in CBOD and TSS in the past relating to the ILS, it was determined to focus on the last three years of data from November 2021 – October 2024. Influent Loading was calculated for $CBOD_5$, TSS, VSS, Ammonia, TKN, and TP with the information available.

3.2.1 Influent $CBOD_5$ and COD

The influent $CBOD_5$ concentration is shown in *Figure 3.2.1* for January 2017 – October 2024. The trendline in this chart shows that the concentration of influent $CBOD_5$ has been increasing over time. In the past three years the average concentration was 185 mg/l and max 30-day concentration was 248 mg/l.

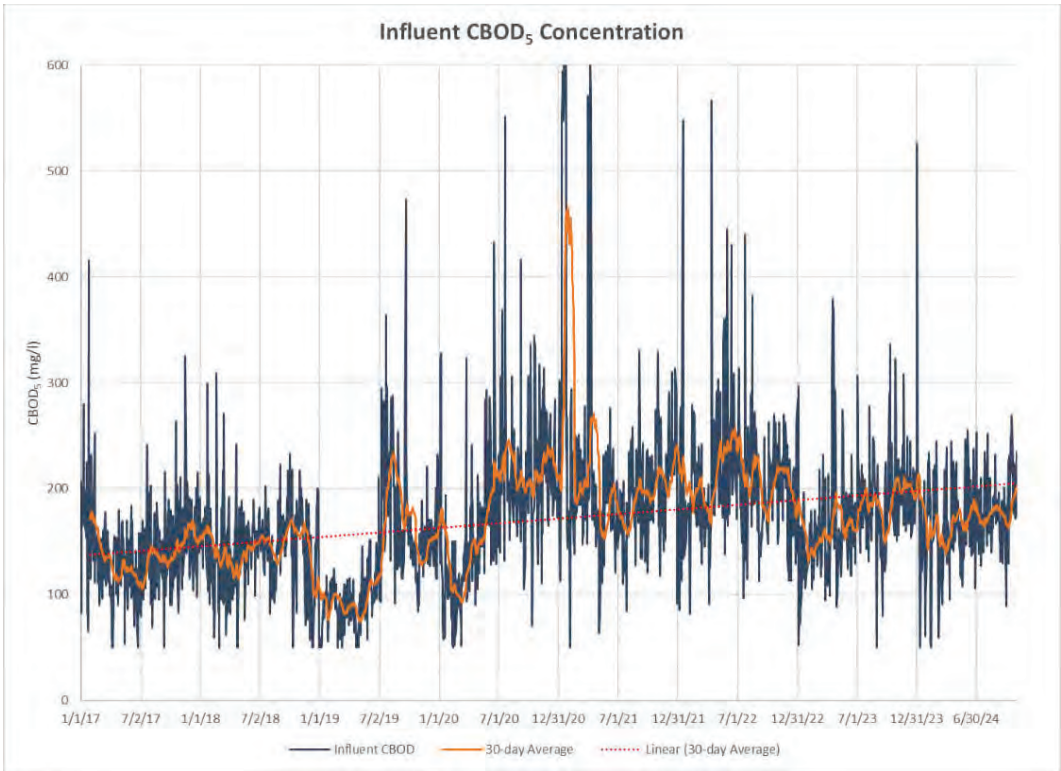


FIGURE 3.2.1

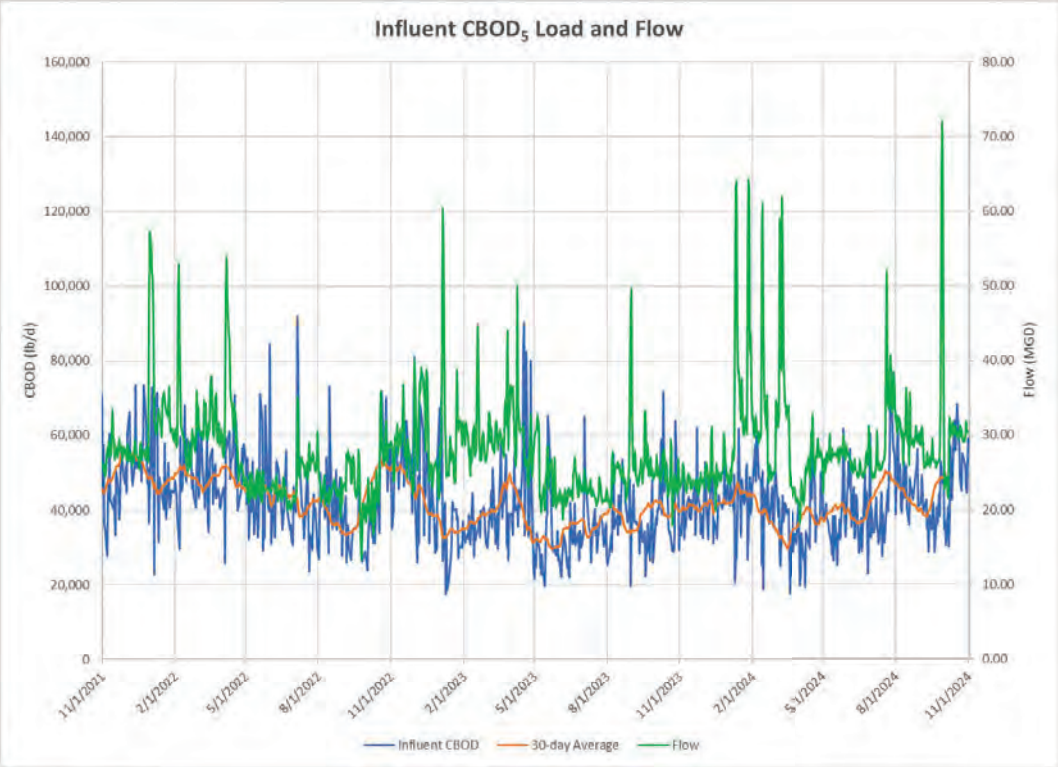


FIGURE 3.2.2

The influent $CBOD_5$ loading and influent flow from November 2022 – December 2024 is depicted in *Figure 3.2.2*. The loading chart shows the daily loading and 30-day rolling average load. The average daily load was 42,048 lb/day and the max 30-day average load was 56,057 lb/day. The average flow during this duration was 27.9 MGD and max 30-day rolling average flow was 39.29 MGD. Using this data it was calculated that the average influent $CBOD_5$ was 180 mg/l and max month influent concentration was 171 mg/l.

Reviewing the $CBOD_5$ data indicates that the average load and concentration represent similar design points for processing through the biological system. The max 30-day concentration would represent a higher burden to the biological process than would be required if using the actual load to the plant. For the purposes modeling an existing max month condition, a $CBOD_5$ concentration of 225 mg/l was used which represents an intermediate value between the calculated loading and the historical concentration value.

The future $CBOD_5$ value to use for design of the plant expansion took into consideration the historical increasing $CBOD_5$ and advances in construction materials/new installations that reduce water usage as well as inflow and infiltration (I&I). Therefore, Ardurra proposes that the plant expansion should be designed around an $CBOD_5$ average concentration of 250 mg/l and max month concentration of 300 mg/l.

Influent Sampling was conducted at the South Cobb WRF in accordance with TM 1. This included sampling for influent and effluent COD and $CBOD_5$ between January 12, 2025 – March 3, 2025. The chart below shows the sampled values in *Figure 3.2.3*. The sampled COD values ranged from 239 to 828 mg/l. One sample in February showed a COD of 1349 mg/l; however, this was determined to be an outlier and was not included in the results summary as the $CBOD_5$ sampled this day was below average. The sampled $CBOD_5$ values ranged from 59 to 311 mg/l.

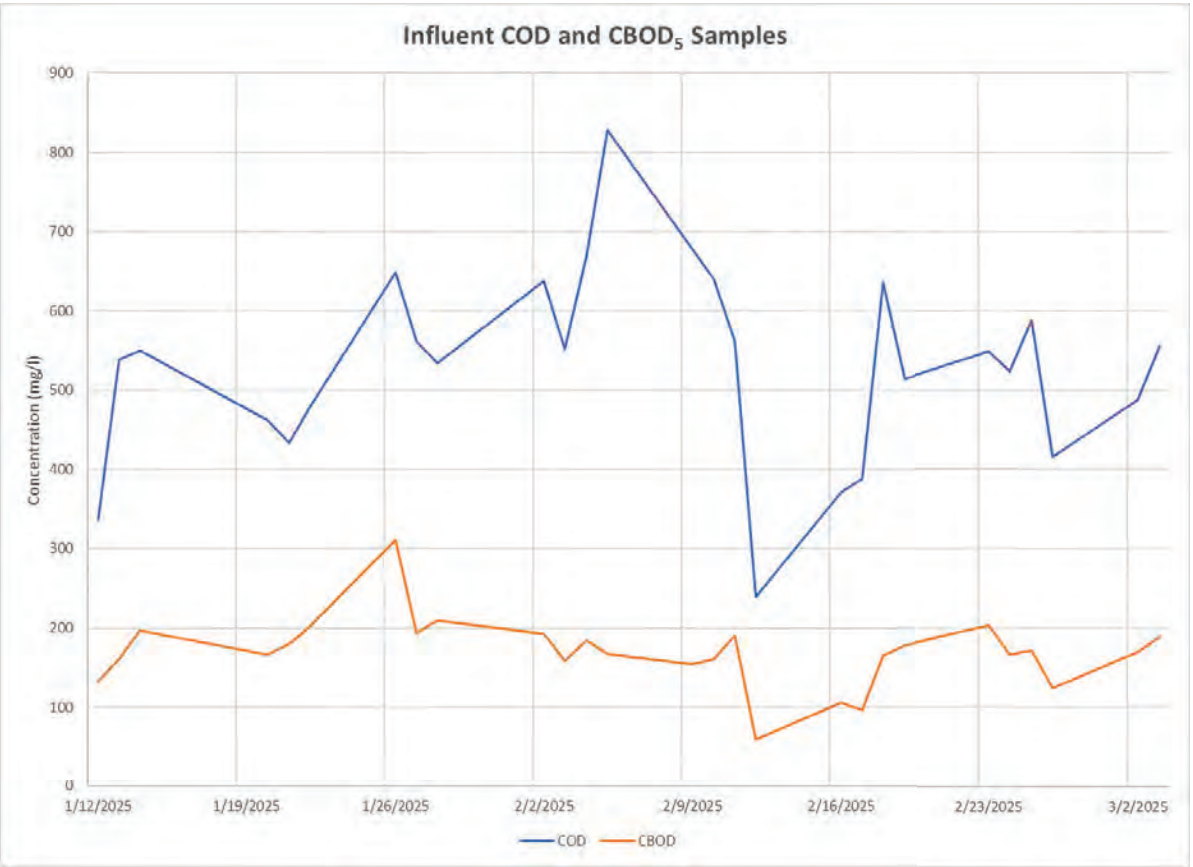


FIGURE 3.2.3

Influent COD average concentration was 527 mg/l. The average COD concentration was about 3 times that of the $COBD_5$ data sampled. Therefore, a ratio of COD:$CBOD_5$ of 3 will be used for current and future concentration values.

3.2.2 Influent TSS and VSS

The influent TSS concentration is shown in *Figure 3.2.4* for January 2017 – October 2024. The trendline shows that the influent TSS concentration is increasing slightly. In the past three years the average TSS concentration was 217 mg/l and the max 30-day concentration was 416 mg/l.

The influent TSS loading and influent flow from November 2022 – December 2024 is depicted in *Figure 3.2.5*. The loading chart shows the daily loading and 30-day rolling average load. The average daily load was 49,064 lb/day and the max 30-day average load was 91,381 lb/day. The average flow during this duration was 27.9 MGD and max 30-day rolling average flow was 39.29 MGD. Using this data it was calculated that the average influent TSS was 211 mg/l and max month influent concentration was 279 mg/l.

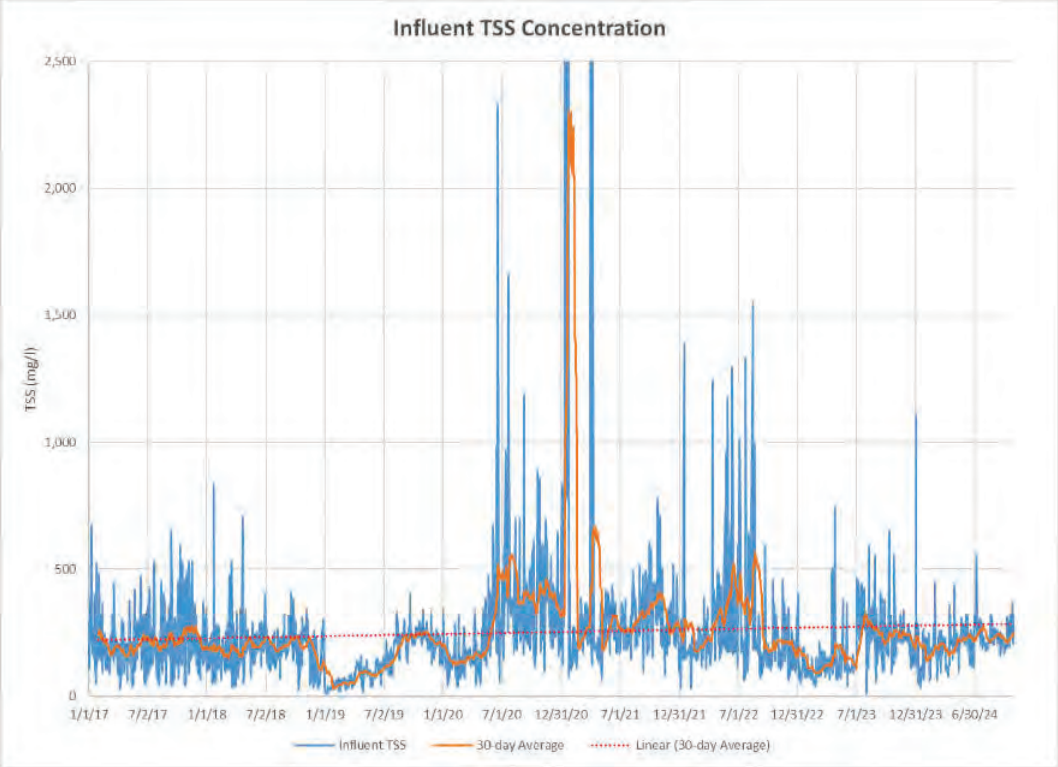


FIGURE 3.2.4

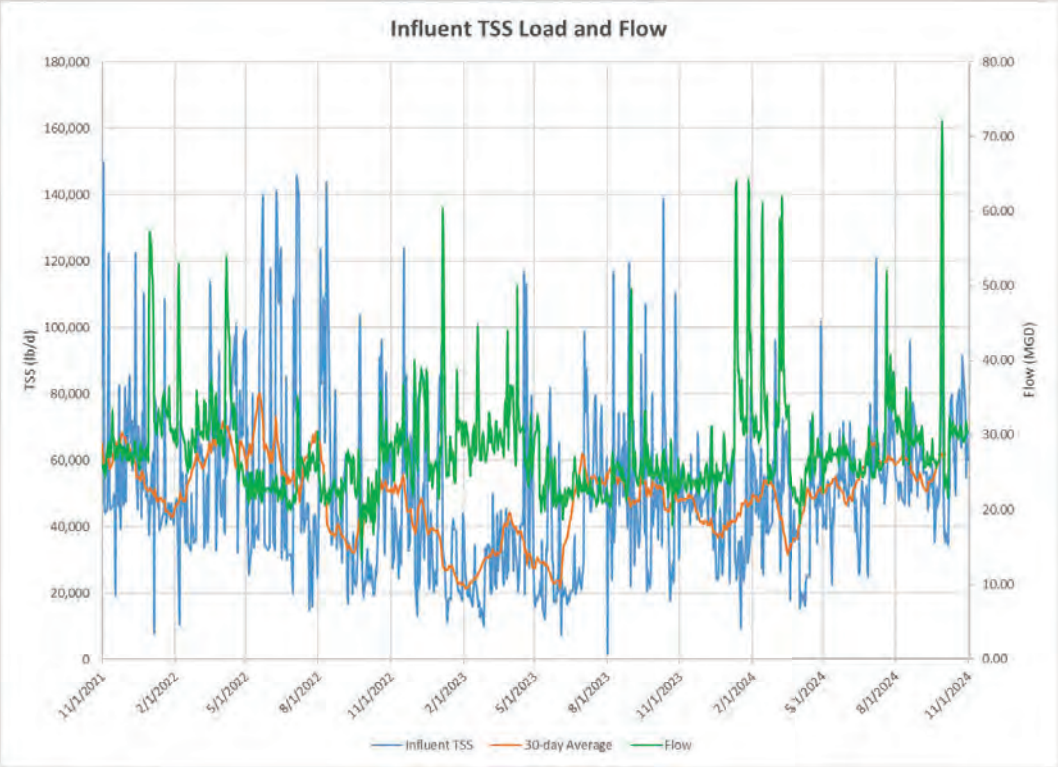


FIGURE 3.2.5

Comparing the influent TSS average concentration and load indicates these represent similar amounts to be processed by the biological system. However, the max 30-day concentration to the plant represents a high amount for the biological system to process than the actual load to the plant. For the purposes of modeling an existing max month condition, a TSS concentration of 280 mg/l will be used.

The future TSS value to use for design of the plant expansion took into consideration the historical increasing TSS and advances in construction materials/new installations that reduce water usage as well as inflow and infiltration (I&I). Therefore, Ardurra proposes that the plant expansion should be designed around a TSS average concentration of 250 mg/l and max month concentration of 300 mg/l.

The influent VSS concentration is shown in *Figure 3.2.6* for January 2017 – October 2024. The trendline shows that the influent VSS concentration is increasing slightly. In the past three years the average VSS concentration was 188 mg/l and the max 30-day concentration was 331 mg/l.

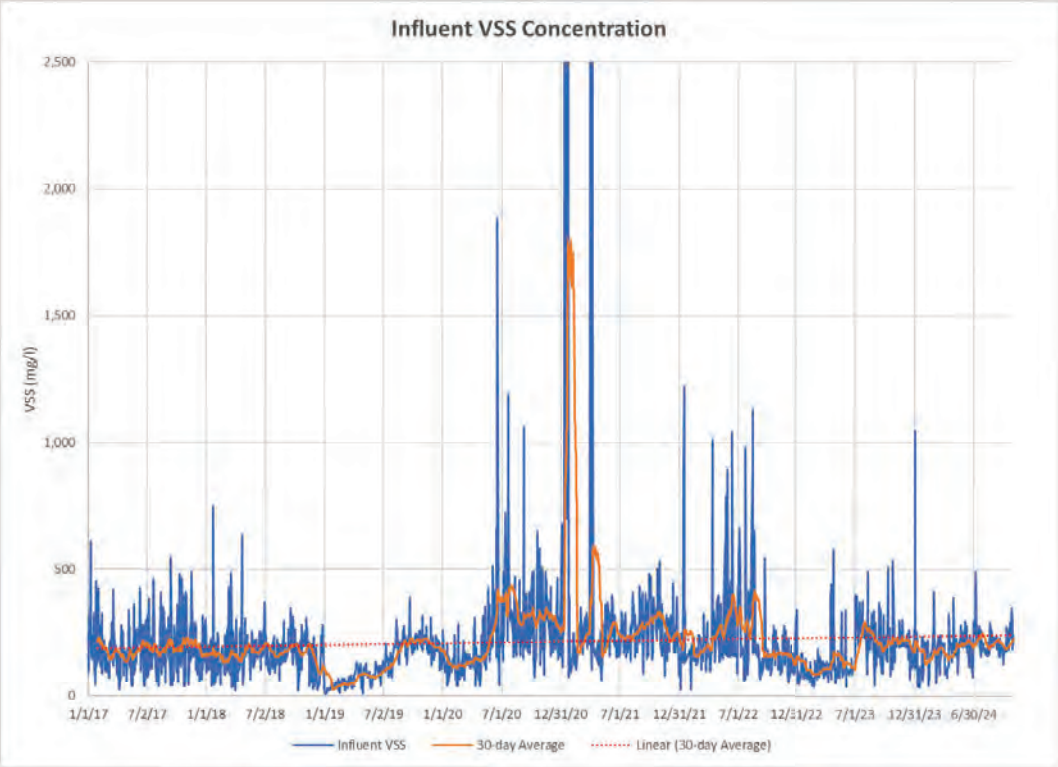


FIGURE 3.2.6

The influent VSS loading and influent flow from November 2022 – December 2024 is depicted in *Figure 3.2.7*. The loading chart shows the daily loading and 30-day rolling average load. The average daily load was 42,401 lb/day and the max 30-day average load was 74,313 lb/day. The average flow during this duration was 27.9 MGD and max 30-day rolling average flow was 39.29 MGD. Using this data it was calculated that the average influent VSS was 182 mg/l and max month influent concentration was 227 mg/l.

Ratio of VSS to TSS was reviewed to be about 85% on average.

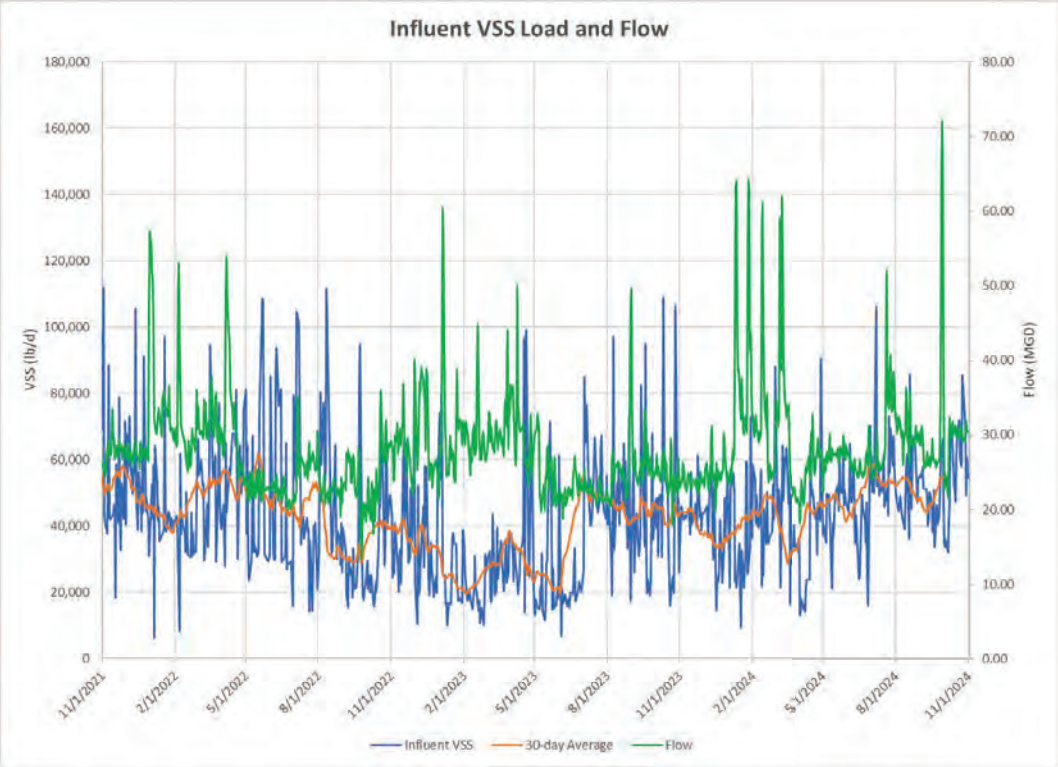


FIGURE 3.2.7

3.2.3 Influent TKN and Ammonia

TKN is currently sampled one per month and data was provided for November 2022 – December 2024 as depicted in *Figure 3.2.8*. The influent TKN average concentration was 38 mg/l and max concentration was 52 mg/l over this time. The influent TKN average load to the plant was 9,210 lb/d which calculates to a concentration of about 40 mg/l. The max load to the plant was 19,187 lb/d which calculates to a concentration of about 59 mg/l. These concentration and loads provide similar results for which the biological system would be required to process.

The influent Ammonia average concentration over the past three years was 27 mg/l and the max 30-day concentration was 36 mg/l.

The influent ammonia loading over the last three years averaged 6,231 lb/d and max 30-day load was 8,122 lb/d. This equates to a calculated average concentration of 27 mg/l and a max 30-day concentration of 25 mg/l.

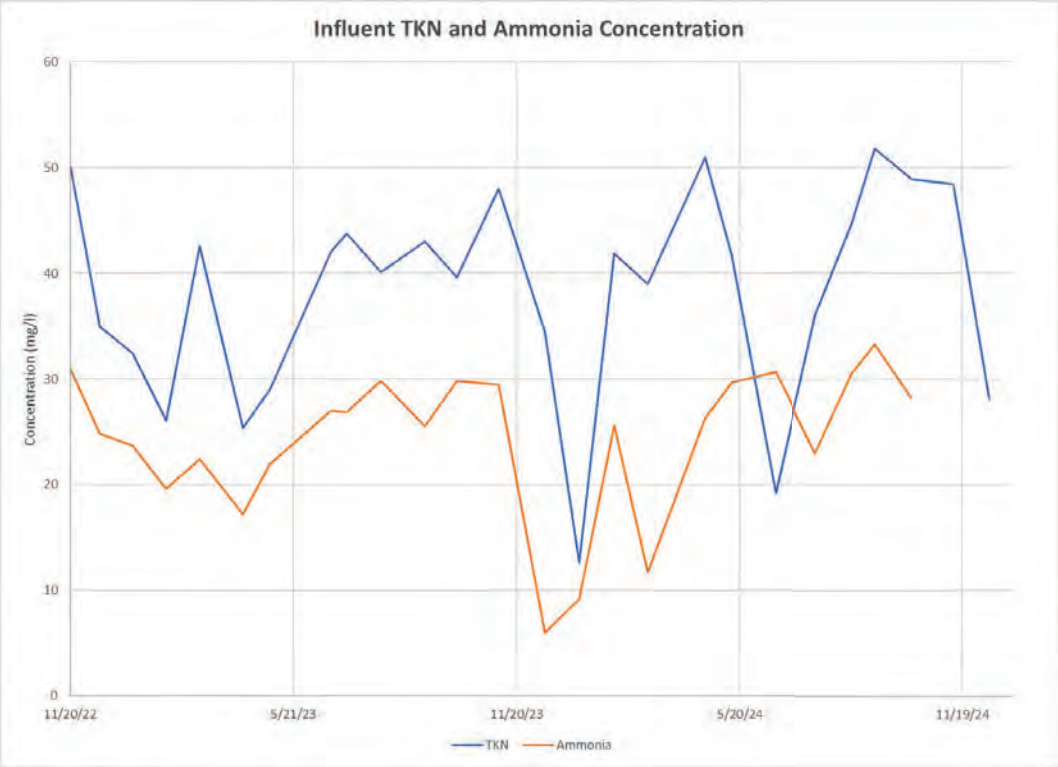


FIGURE 3.2.8

The ratio of ammonia to TKN was averaged and determined to be about 65%. The ratio of TKN to $CBOD_5$ was reviewed and averaged around 25%.

3.2.4 Influent TP

The influent total phosphorus (TP) was reviewed for the past three years. *Figure 3.2.9* shows the influent concentration to the treatment plant and *Figure 3.2.10* represents the flow and loading.

The average concentration was 6.1 mg/l and max 30-day concentration was 9.8 mg/l. The average load was calculated as 1,383 lb/d which represents an equivalent concentration of 5.9 mg/l. The max 30-day load was calculated as 2,037 lb/d which represents an equivalent concentration of 6.2 mg/l.

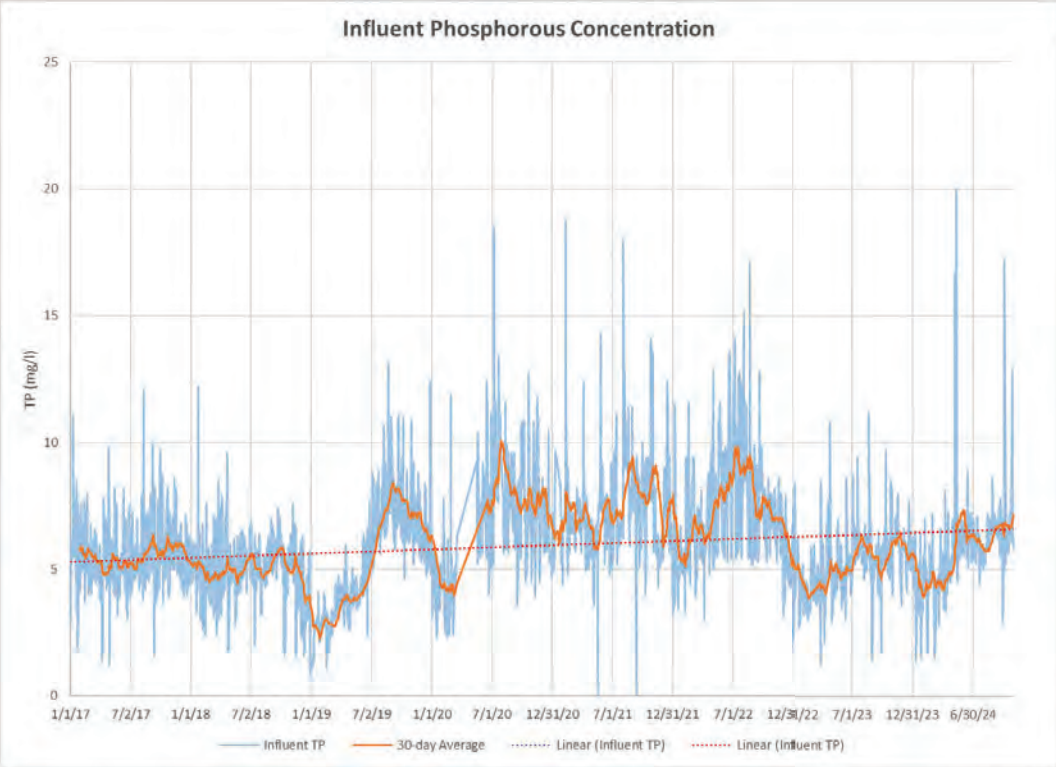


FIGURE 3.2.9

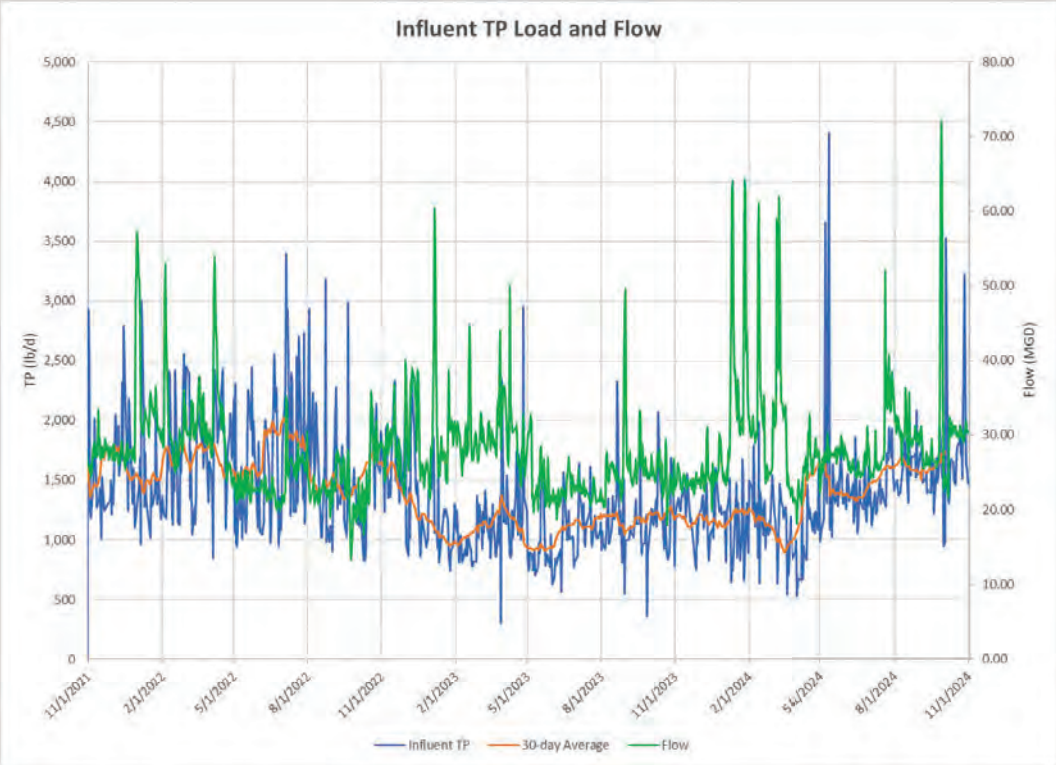


FIGURE 3.2.10

3.2.5 Influent Summary

A summary of the influent concentration discussed in Section 3.2 based on Historical ADF, Historical MMF, Future ADF, and Future MMF are listed in *Table 3.2.1*. The Historical ADF is based on analysis of the average influent concentration and loadings. The Historical MMF is based on the analysis of the 30-day max influent concentration and loadings. The Future ADF Concentrations will be used as the basis of design for the plant expansion at an ADF of 40 MGD. The Future MMF Concentrations will be used as the basis of design for the plant expansion at a MMF of 50 MGD.

TABLE 3.2.1

Influent Parameter	Historical ADF Concentration (mg/l)	Historical MMF Concentration (mg/l)	Future ADF Concentration (mg/l)	Future MMF Concentration (mg/l)
$CBOD_5$	180	225	250	300
TSS	220	280	250	300
VSS	187	238	212.5	255
TKN	45	55	50	60
Ammonia	29	36	33	39
TP	6	8	6	9
COD	540	675	750	900

3.3 Existing Permit and Effluent Limits

Ardurra reviewed the existing effluent limits provided in the GEPD permit. The effluent limits represent a waste load allocation (WLA) that the South Cobb WRF can discharge to the Chattahoochee River.

TABLE 3.3.1

Parameters	Discharge limitations in mg/L (lbs/day) unless otherwise specified		Monitoring Requirements		
	Monthly Average	Weekly Average	Measurement Frequency	Sample Type	Sample Location
Flow (MGD)	40.0	50.0	Seven Days/Week	Continuous Recording	Effluent
Carbonaceous Five-Day Biochemical Oxygen Demand [1]	13.0 (4,337)	19.5 (5,421)	Five Days/Week	Composite	Influent & Effluent
Total Suspended Solids [1]	10 (3,336)	15 (4,170)	Five Days/Week	Composite	Influent & Effluent
Ammonia, as N [2]	1.8 (600)	2.7 (751)	Five Days/Week	Composite	Effluent
Total Phosphorus, as P [3] [4]	0.52 (173)	0.79 (217)	Five Days/Week	Composite	Effluent
Fecal Coliform Bacteria (#/100 mL)	200	400	Three Days/Week	Grab	Effluent

A new WLA was requested and provided by GEPD for the monthly average flow of 50 MGD. This future discharge limit is shown in the table below.

TABLE 3.3.2

Effluent Parameter	WLA Load (lb/d)	WLA Monthly Average (mg/l)
$CBOD_5$	1,210	2.9
TSS	2,085	5.0
Ammonia	210	0.5
TP	125	0.3

The WLA establishes planning-level treatment objectives for future operation at 50 MGD MMF. In addition to the WLA requirements, CCWS requested that future treatment alternatives also be evaluated against more stringent planning-level nutrient objectives intended to provide long-term regulatory flexibility. These future planning targets include Total Nitrogen (TN) of approximately 4.0 mg/L and Total Phosphorus (TP) of approximately 0.13 mg/L. These values do not represent currently enforceable permit limits but were incorporated into the alternatives evaluation process to assess future resiliency and regulatory adaptability. Additional discussion regarding the Regulatory Planning Basis utilized throughout this memorandum is provided in Section 3

3.4 Regulatory Planning Basis

Expansion of the South Cobb Water Reclamation Facility (WRF) from its current permitted Maximum Month Flow (MMF) capacity of 40 MGD to a future capacity of 50 MGD requires consideration of both existing regulatory requirements and anticipated future nutrient removal objectives. As part of the Facility Planning process, the Georgia Environmental Protection Division (EPD) issued Wasteload Allocation (WLA) No. WLA000309 dated November 10, 2025, establishing planning-level effluent limitations for future operation of the South Cobb WRF at 50 MGD MMF.

Unlike the existing NPDES permit, which primarily focuses on conventional wastewater treatment parameters and phosphorus removal, the WLA establishes significantly more stringent effluent objectives for $CBOD_5$, TSS, ammonia, and total phosphorus. Additionally, the WLA specifically notes that future Total Nitrogen limitations may ultimately be required to address nutrient impacts associated with downstream West Point Lake.

During development of the South Cobb WRF Facilities Plan, Cobb County Water System directed that treatment alternatives be evaluated not only for compliance with the WLA requirements, but also for future planning-level nutrient targets intended to provide long-term regulatory flexibility. These future planning targets are not current regulatory requirements, but were utilized as planning assumptions during process modeling, alternative development, and technology screening to evaluate the resiliency of future facility improvements under increasingly stringent nutrient removal scenarios.

Accordingly, three regulatory planning levels were utilized during evaluation of alternatives:

1. Existing Permit Requirements.
2. Future 50 MGD WLA Requirements.
3. Long-Term Planning Targets established for Facilities Planning purposes.

TABLE 3.4.1

Parameter	Existing Permit	WLA Target	Future Planning Basis
Flow	40 MGD MMF	50 MGD MMF	50 MGD MMF
$CBOD_5$ (mg/l)	13.0	2.9	2.9
TSS (mg/l)	10.0	5.0	5.0
Ammonia-N (mg/l)	1.8	0.5	0.5
Total Phosphorus (mg/l)	0.52	0.30	0.13
Total Nitrogen (mg/l)	Monitoring Only	Monitoring Only	4.0

Future Planning Basis values were utilized for evaluation of treatment alternatives and long-term regulatory flexibility and do not represent currently enforceable permit limits.

The WLA requirements and future planning targets became the primary basis for development of the process models presented in this memorandum. Existing conditions were calibrated against current operating performance, while future process configurations were evaluated against both WLA requirements and the future planning targets shown in *Table 3.4.1*. This approach allowed

the Facilities Planning effort to assess not only whether alternatives could satisfy future permit requirements, but also whether those alternatives would provide sufficient flexibility to accommodate future nutrient management initiatives that may be established by Georgia EPD.

3.5 Historical Effluent Parameters

Historical effluent parameters were reviewed over the past three years to review the plant operations. This information will be used in calibrating the biological model. The historical average and max 30-day effluent parameters are summarized in *Table 3.5.1*.

TABLE 3.5.1

Parameter	Existing Effluent ADF	Existing Effluent MMF
Flow (MGD)	28	35
$CBOD_5$ (mg/l)	2.7	3
TSS (mg/l)	5.7	9
VSS (mg/l)	4.3	6.5
TN (mg/l)	11	16
Ammonia (mg/l)	0.7	1.5
TP (mg/l)	0.2	0.3
COD (mg/l)	27.54	42

3.6 Summary

The historical data reviewed in Section 3 for influent and effluent parameters will be used for modeling and calibrating the existing system. *Table 3.6.1* provides a summary of this information.

TABLE 3.6.1

Parameter	Existing Influent ADF	Existing Influent MMF	Permit Effluent Limit	Effluent Calibration
Flow (MGD)	28	35	40	35
$CBOD_5$ (mg/l)	180	225	13	3
TSS (mg/l)	220	280	10	9
VSS (mg/l)	187	238	--	6.5
TN (mg/l)	45	55	--	16
Ammonia (mg/l)	29	36	1.8	1.5
TP (mg/l)	6	8	0.52	0.3
COD (mg/l)	540	675	--	42

The basis of design for the plant expansion was developed based on historical information, best engineering practices, and estimated projections. A summary of the basis of design for the plant expansion is listed in *Table 3.6.2*.

TABLE 3.6.2

Parameter	Expansion Influent ADF	Expansion Influent MMF	Expansion Effluent Limit	Future Planning Basis
Flow (MGD)	40	50	50	50
$CBOD_5$ (mg/l)	250	300	2.9	2.9
TSS (mg/l)	250	300	5	5
VSS (mg/l)	212.5	255	--	--
TN (mg/l)	50	60	--	4.0
Ammonia (mg/l)	33	39	0.5	0.5
TP (mg/l)	6	9	0.3	0.13
COD (mg/l)	750	900	--	--

Future Planning Basis values were utilized for alternatives evaluation and long-term regulatory compliance planning and do not represent currently enforceable permit limits. Future planning values reflect assumptions established through the Facility Planning process and Allowance Directive No. 1 for evaluation of long-term treatment flexibility and potential nutrient management requirements.

4 Biological Process Model

4.1 Process Basins

Ardurra created a biological process model for the existing South Cobb WRF. This model used the historical max month influent data as summarized in Section 3.5 of this TM. The existing model created assuming that all process existing process systems and current processes under improvement were online. The existing model includes the following processes:

- Five (5) Primary Clarifiers
- Five (5) Aeration Basins
- Five (5) Secondary Clarifiers
- Filter System
- Rotary Drum Thickening
- Sludge Holding
- Dewatering
- Chemical Feed

Record drawings were reviewed for each of the existing process basis to determine the dimension and volume to be used in the process model. *Table 4.1.1* provides the volumes used in the existing system process model.

TABLE 4.1.1

Process Basin	Number of Units	Volume Each (MG)
Primary Clarifiers	5	0.584
Aeration Basins	5	2.01
Secondary Clarifiers 1-2	2	1.88 (133’ diameter)
Secondary Clarifier 4-5	3	2.14 (135’diameter)
Sludge Holding	2	0.995 (110’ diameter)

Process models developed as part of this memorandum were utilized to evaluate existing facility performance, establish calibration conditions, and assess the capability of future treatment alternatives to achieve both the WLA requirements and future planning-level nutrient objectives. Consequently, model development was performed using the Regulatory Planning Basis established in Section 3.4 rather than solely the requirements of the current NPDES permit. This approach allowed evaluation of treatment alternatives relative to both the current expansion requirements and potential future nutrient removal objectives identified during development of the South Cobb WRF Facilities Plan.

4.2 Process Model Settings and Results

The existing process model was set up with some engineering estimates regarding the system operation. The model includes the following system settings:

- 50% TSS removal at Primary Clarifiers at 2% solids
- Aeration Basin DO setting at 1.5 mg/l
- 99.75% removal in the Secondary Clarifiers
- 60% Secondary Clarifier Underflow (RAS/WAS)
- Filter capture setting at 75%
- RDT solids capture rate of 95% with target of 5% solids
- Dewater solids capture rate of 95% with target of 18-20% solids

A schematic of the model layout is shown in *Figure 4.2.1*. This schematic represents the process basins/systems and flow diagram through the system.

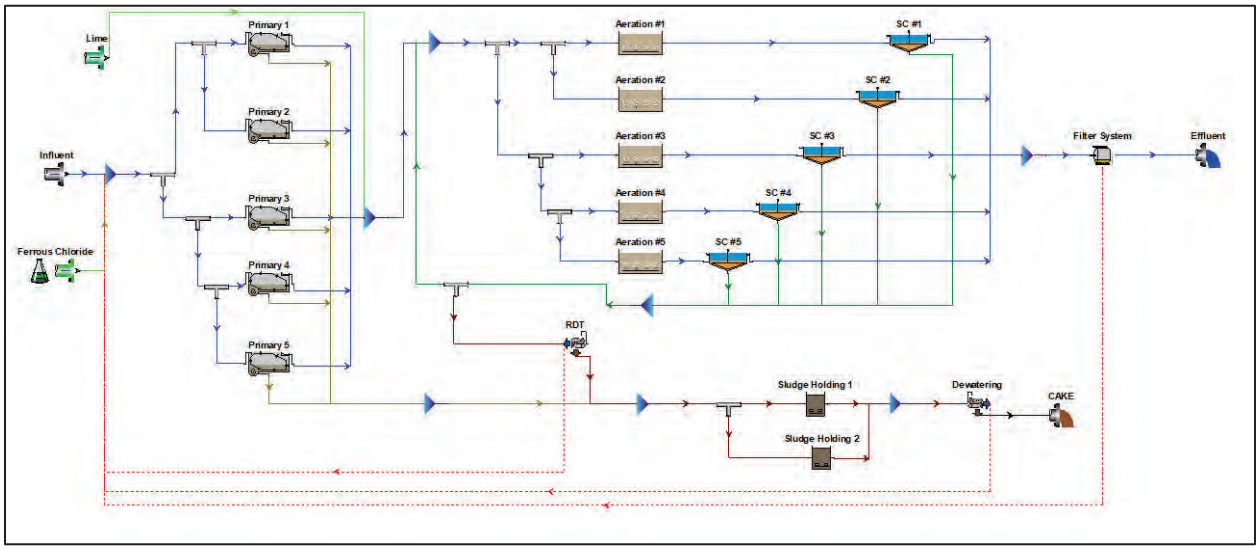


FIGURE 4.2.1

Table 4.2.1 below provides a summary of the influent and effluent results of the existing system model. These results also include information regarding the required aeration system operation and solids system to achieve the model effluent output.

TABLE 4.2.1

	Existing System
Influent Flow (MGD)	35.0
Influent Parameters	
CBOD5 (mg/l)	225

COD (mg/l)	675
TSS (mg/l)	280
VSS (mg/l)	238
TKN (mg/l)	55
Ammonia (mg/l)	36
TP (mg/l)	8
pH	7.1
Alkalinity (mg/l)	250
Temp (deg-C)	22
Chemical Feed	
Ferrous Chloride	2,600 lb Fe
Lime	19,600 lb Ca
Effluent Parameters	
CBOD5 (mg/l)	2.6
TSS (mg/l)	4.0
Ammonia (mg/l)	0.70
Nitrate (mg/l)	16.1
TN (mg/l)	19.0
TP (mg/l)	0.3
pH	7.0
Alkalinity (mg/l)	232
Air Requirements	
Aeration Basin Standard Oxygen Transfer Rate (lb/day)	165,080
Total Aeration Zone Air (scfm)	19,240
Diffuser Transfer Efficiency	34.3%
Solids	
Aeration SRT (days)	4.7
MLSS (mg/l)	3,900
Primary Clarifier SLR (lb/sft/day)	3
Primary Clarifier SOR (gal/sft/day)	1,180
Existing Clarifier SLR (lb/sft/day)	26
Existing Clarifier SOR (gal/sft/day)	500
RAS Flow (MGD)	20.2
Primary Sludge (lb/d)	47,048
WAS (lb/day)	69,690
WAS Concentration (mg/l)	10,440
WAS Flow (MGD)	0.80
Solids to Sludge Holding (lb/d)	113,255
Dewatered Solids (lb/d)	100,958
Dewatered % Solids	20%

These results indicate that the existing system is able to meet the current effluent permit limits as outlined in Section 3.3 of this TM. The TP permit limit was met through the chemical addition of ferrous chloride to the system.

For domestic wastewater BOD removal, an aeration solids retention time (SRT) of 3-5 days is required with additional days required to achieve nitrification. Ardurra notes that the aeration SRT of 4.7 days is sufficient for BOD removal and the process is able to provide nitrification to achieve an effluent ammonia of 0.7 mg/l.

Even with the primary clarifiers online the secondary clarifier solid loading rate (SLR) in the model is slightly higher than the 25 lb/sft/day Ardurra recommends during a max month event. This indicates that as the flows to the South Cobb WRF increase the secondary clarifiers may experience issues with solids, especially if the primary clarifiers remain offline as is currently the case. Therefore, the current biological system process is solids limited, and this will need to be taken into account when expanding the treatment plant.

The BioWin output report for the existing process is included as Appendix 6.2. Process alternative models will be evaluated for the plant expansion to 50 MGD under a separate TM.

4.2.1 Existing System Model Findings

The calibrated existing conditions model demonstrated the following:

- The existing treatment process is capable of achieving current permit requirements for $CBOD_5$, TSS, ammonia, and phosphorus under modeled conditions.
- Chemical phosphorus removal remains necessary to achieve current phosphorus performance.
- The existing biological process configuration does not provide sufficient Total Nitrogen removal capability to achieve the future planning target of 4.0 mg/L. Modeled effluent TN was approximately 19 mg/L under existing conditions.
- Secondary clarification loading approaches or exceeds recommended planning criteria during maximum month conditions, indicating future solids separation improvements are required as part of expansion planning.
- Future expansion to 50 MGD MMF while achieving WLA and future nutrient objectives will require significant biological process modifications, additional treatment volume, and enhanced nutrient removal capability.
- The modeled existing treatment process satisfies current permit requirements but does not demonstrate sufficient regulatory flexibility to accommodate the future planning targets utilized during alternatives evaluation.

5 Plant Hydraulics

Ardurra reviewed record drawing for previous project and compiled the existing system structural elevations. Additionally, a survey was conducted to obtain key structure elevations. A preliminary hydraulic profile showing these structural elevations is presented in the appendices.

A hydraulic model of the existing treatment processes (including those currently offline) was developed by Ardurra. This model includes process basis and piping between the treatment processes. Processes included in the hydraulic model were:

- Screen Channels
- Aerated Grit Removal Tank
- Primary Clarifiers
- Aeration Basin
- Secondary Clarifiers
- Filter Channels
- Chlorine contact Basin
- Re-Aeration Structure

The hydraulic model was developed for the permit flow of 40 MGD and based on the Outfall 100-year flood elevation of 765.4 at the Chattahoochee River. Figure 5.1.2 shows the water surface elevation (WSE) at each process channel and pipeline included in the existing model. Additional flows and evaluations will be reviewed for the plant expansion in a separate TM.

A layout of the hydraulic model and output files are included in the appendices.

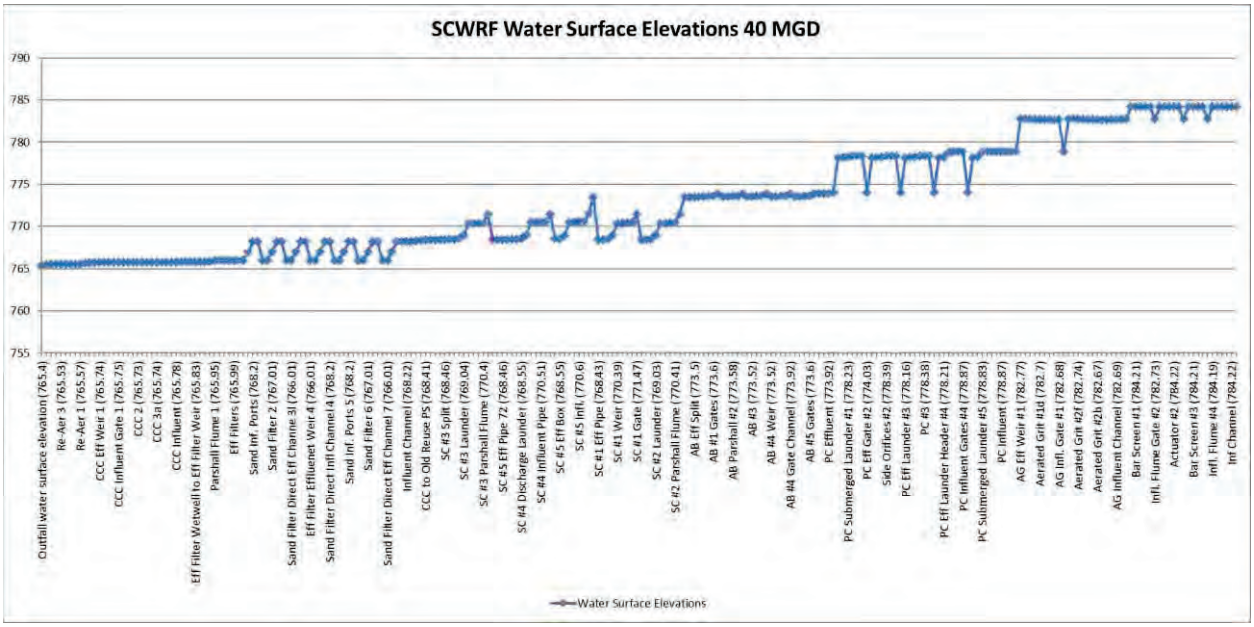


FIGURE 5.1.2

Review of the existing hydraulic profile indicates that the South Cobb WRF is capable of accommodating current permitted flow conditions; however, several hydraulic constraints become increasingly important as facility flow approaches future expansion conditions. Existing secondary clarification facilities, tertiary treatment facilities, and selected hydraulic control points were identified as significant factors influencing future treatment configurations. These hydraulic findings, in combination with the process modeling results presented previously, established the basis for development of the preliminary treatment alternatives evaluated under TM No. 6.

ALTERNATIVE SELECTION CONFIRMATION MEMORANDUM

To: Ram Jeedigunta, P.E.
Jake Murray, P.E.
Cobb County Water System

From: Ardurra Group

Date: August 18, 2026

Re: South Cobb Water Reclamation Facility Expansion & Upgrade
Program No. T3025
Master Facility Plan – Alternatives Selection

1 Purpose

The purpose of this memorandum is to document the preliminary alternative advancement framework discussed during and following Check-In Workshop #2 and establish the basis for the Technical Refinement Phase of the South Cobb WRF Facility Plan.

2 Check-In Workshop #2 Summary

During Check-In Workshop #2, Ardurra presented additional supporting documents providing evaluations for the four (4) Set "A" alternatives including:

- Constructability
- Construction Sequencing
- Tiered Implementation Strategies
- Site Utilization Impacts
- Lifecycle Cost Considerations
- Future TN Compliance Considerations

Based on these evaluations, all four Set "A" alternatives remain technically viable and capable of supporting expansion of the South Cobb WRF to 50 MGD. Current modeling indicates that supplemental carbon addition is not required for any of the Set "A" alternatives under modeled conditions.

The following advancement framework reflects discussions that occurred during and following Check-In Workshop #2 and is provided for CCWS review, comment, and confirmation prior to commencement of the Technical Refinement Phase.

3 Preliminary Alternative Advancement Framework

Based on discussions to date, the following framework is proposed for CCWS review and confirmation:

3.1 Primary Alternatives

Alternative	Description
A11.3	4-Stage Bardenpho + Deep Bed Filters
A14.2	5-Stage Bardenpho + MBR (Alternate Layout)

3.2 Secondary Alternatives

Alternative	Description
A12	5-Stage Bardenpho
A13	4-Stage Bardenpho + MBR
A14.1	5-Stage Bardenpho + MBR
A15	5-Stage Bardenpho + Deep Bed Filters

3.3 Alternatives Not Advanced Further

Alternative	Description
A9	2-Stage BNR
A10.1	3-Stage BNR
A10.2	3-Stage BNR (Alternate Layout)
A11.1	4-Stage Bardenpho + Deep Bed Filters
A11.2	4-Stage Bardenpho + Deep Bed Filters

4 Technical Refinement Phase

Following confirmation of alternative advancement, Ardurra will proceed with refinement of the selected alternatives including:

- BioWin validation
- Capital and lifecycle cost updates
- Constructability refinements

- Construction sequencing refinements
- Site utilization evaluations
- Implementation schedule development
- Facility Plan updates

Alternatives not advanced further will remain documented within the Facility Plan together with their key advantages and challenges for future reference.

5 Requested CCWS Direction

CCWS and Jacobs are requested to review this memorandum and confirm:

1. Primary Alternatives
2. Secondary Alternatives
3. Alternatives Not Advanced Further
4. Any additional refinement activities desired during the Technical Refinement Phase

Upon receipt of direction, Ardurra will proceed with the next phase of Facility Plan development and preparation for Workshop #3.

6 Alternative Advancement Confirmation

CCWS has reviewed the information contained herein and confirms the following advancement framework for continued Facility Plan development:

Primary Alternatives

☐ Confirm as Presented

Secondary Alternatives

☐ Confirm as Presented

Alternatives Not Advanced Further

☐ Revise as Noted

Additional Comments (provided by CCWS 08/18/2026):

The preferred alternatives should incorporate tiered implementation strategy by looking at worst case and backwards engineering

Comments on Meeting Minutes:

- Revise MBR capital cost estimates to reflect Kubota flat-plate technology. The MBR budgetary quotes provided appear to be severely undersized (?). We will need updated, ballpark MBR cost estimates by the end of this week for an important internal CCWS meeting next week.
- Ardurra's confirmation that the MBR alternatives are hydraulically sized and priced to accommodate 115 MGD peak flow event.
- Ardurra to ensure cost estimates reflect recommended contingency percentages, considering their accurate engineers estimate on our recent UV project.

Comments on the Schedules:

- The 8 to 10-year schedule drafts are incompatible with our capacity constraints based on flow projections.

- Draft schedules do not seem to leverage the PDB delivery method by incorporating early work packages immediately following 60% design/ GMP phase. Ardurra will correct.

Confirmed By

Via CCWS email.

TECHNICAL MEMORANDUM NO. 6 – SOUTH COBB WRF DEVELOPMENT OF PRELIMINARY SCENARIOS

To: Cobb County Water System

From: Ardurra Group

Date: September 8, 2026

Re: South Cobb WRF Expansion and Upgrade – Program No. T3025
Development of Preliminary Scenarios

1 Background

The Cobb County Water System (CCWS) headquartered in Marietta, Georgia owns and operates four (4) water reclamation facilities that serve major basins within the County and portions of neighboring counties. One of those facilities is South Cobb Water Reclamation Facility (WRF) which is a 40 million gallon per day (MGD) maximum month flow (MMF) WRF located at 490 Lee Industrial Boulevard in Austell, Georgia 30168. The South Cobb WRF serves the southwestern quadrant of Cobb County, including portions of the Cities of Marietta and Smyrna; the Cities of Austell, Mableton, and Powder Springs; as well as areas outside of the County in Douglas and Paulding Counties. The South Cobb WRF treats influent wastewater and discharges the treated effluent to the Chattahoochee River in accordance with the limits of its National Pollutant Discharge Elimination System (NPDES) Permit GA0026158.

CCWS contracted with Ardurra to evaluate the South Cobb WRF and develop a long-range Facilities Plan supporting expansion of the facility from 40 MGD MMF to 50 MGD MMF which will include a schedule for improvements for unit processes and equipment for the facility to 2050.

The South Cobb WRF is currently designed to treat an annual average daily flow (ADF) of 33 MGD, a MMF of 40 MGD, and a peak wet weather flow (PWWF) of 86 MGD. The Facility Plan will result in a capital spending plan based on the recommended improvements for the facility to provide the increased capacity while meeting the planning-level effluent objectives established by Georgia EPD's November 2025 Wasteload Allocation (WLA) for expansion to 50 MGD MMF and evaluating future nutrient removal requirements identified during the Facilities Planning process. Ardurra has prepared 5 previous Technical Memorandums (TM) as part of the project including:

- TM 1 – Sampling Plan
- TM 2 – Population and Flow Projections
- TM 3 – Initial Findings and Urgent Issues
- TM 4 – Equipment Assessment
- TM 5 – Process Model and Hydraulics

2 Purpose

The purpose of this Technical Memorandum is to develop and evaluate preliminary treatment scenarios capable of supporting expansion of the South Cobb WRF from its current permitted capacity of 40 MGD MMF to a future capacity of 50 MGD MMF. Alternatives were developed using the process modeling and hydraulic basis established in Technical Memorandum No. 5 and were evaluated relative to the planning-level treatment objectives established by Georgia Environmental Protection Division (EPD) WLA No. WLA000309 issued on November 10, 2025.

This memorandum evaluates multiple biological treatment configurations to determine their ability to achieve future hydraulic capacity requirements, maintain reliable treatment performance, satisfy WLA effluent objectives, and provide flexibility for potential future nutrient management requirements. Evaluation of each alternative included assessment of treatment performance, nutrient removal capability, process configuration, site requirements, and compatibility with existing South Cobb WRF infrastructure.

The preliminary scenarios presented herein establish the technical basis for subsequent alternatives screening, refinement, constructability evaluation, implementation planning, and development of recommendations incorporated into the South Cobb WRF Facilities Plan.

2.1 Design Criteria Summary

The basis of design for the plant expansion was developed in TM No. 5 based on historical operating data, process modeling, hydraulic evaluations, and the Regulatory Planning Basis established for the South Cobb WRF expansion. A summary of the design criteria utilized for development and evaluation of alternatives is provided in *Table 2.1.1*.

TABLE 2.1.1

Parameter	Expansion Influent ADF	Expansion Influent MMF	Expansion Effluent Limit	Future Planning Basis
Flow (MGD)	40	50	50	50
$CBOD_5$ (mg/l)	250	300	2.9	2.9
TSS (mg/l)	250	300	5	5
VSS (mg/l)	212.5	255	--	--
TN (mg/l)	50	60	--	4.0
Ammonia (mg/l)	33	39	0.5	0.5
TP (mg/l)	6	9	0.3	0.13
COD (mg/l)	750	900	--	--

The design criteria summarized in *Table 2.1.1* are based on the Regulatory Planning Basis established in TM No. 5. As summarized in *Table 3.6.2* of TM No. 5, alternatives evaluated in this

memorandum were assessed against both the November 2025 Georgia EPD WLA requirements and future planning-level nutrient objectives developed as part of the South Cobb WRF Facilities Planning process. These future planning objectives included Total Nitrogen (TN) of 4.0 mg/L and Total Phosphorus (TP) of 0.13 mg/L which were utilized to evaluate long-term treatment flexibility and future regulatory adaptability. These values do not represent current permit requirements but were incorporated into the alternatives evaluation process to support long-range facility planning and technology selection.

3 Biological Process Model

3.1 Introduction

Development of preliminary treatment scenarios for the South Cobb WRF was completed using the process modeling results, hydraulic evaluations, facility assessments, and planning criteria established during the preceding phases of the Facilities Planning effort. The alternatives presented in this memorandum build directly upon the process model and hydraulic basis developed in Technical Memorandum No. 5 and were developed to evaluate treatment configurations capable of supporting expansion of the South Cobb WRF from 40 MGD MMF to 50 MGD MMF.

During development of the Facilities Plan, the Georgia EPD issued WLA No. WLA000309 establishing planning-level effluent objectives for future 50 MGD operation. The WLA requirements significantly influenced development of future treatment alternatives by requiring evaluation of treatment technologies capable of achieving more stringent effluent limitations for $CBOD_5$, TSS, ammonia, and total phosphorus than those contained in the current NPDES permit.

Accordingly, the alternatives presented in this memorandum were developed not only to provide additional hydraulic and treatment capacity, but also to evaluate biological nutrient removal capabilities, solids separation technologies, operational flexibility, and long-term regulatory adaptability. Alternative development considered varying combinations of conventional activated sludge treatment, Biological Nutrient Removal (BNR) processes, secondary clarification, tertiary filtration, and membrane treatment technologies to identify treatment approaches capable of supporting future facility objectives.

The process evaluations presented herein establish the technical basis for subsequent alternatives screening, refinement, cost evaluation, constructability review, and ultimately selection of alternatives advanced for continued development within the South Cobb WRF Facilities Plan.

Evaluation of the existing process facilities demonstrated that the South Cobb WRF contains substantial treatment infrastructure that can be incorporated into future expansion concepts. However, the process modeling completed under TM No. 5 indicated that the existing treatment configuration does not provide sufficient capacity or nutrient removal capability to reliably satisfy the planning-level treatment objectives established by the November 2025 Georgia EPD WLA for future 50 MGD operation. Consequently, development of the preliminary treatment scenarios focused on identifying combinations of additional biological treatment volume, solids separation facilities, and nutrient removal processes capable of achieving future treatment objectives while maximizing the practical use of existing infrastructure.

3.2 Process Basins

Ardurra created a biological process model alternatives for the South Cobb WRF Expansion. The model used the MMF influent data as summarized in Section 2.1 of this TM. The models assumed that all existing process systems and current processes under improvement were online and alternatives were developed for the expansion of the biological process using conventional treatment process, a BNR process, or incorporation of an MBR system. Some alternatives include replacement of existing process systems where needed.

3.2.1 Existing Process Basins

The existing process basins to be considered in the alternatives include the following:

- Five (5) Primary Clarifiers
- Five (5) Aeration Basins
- Five (5) Secondary Clarifiers
- Filter System
- Rotary Drum Thickening
- Sludge Holding
- Dewatering
- Chemical Feed

Record drawings were reviewed for each of the existing process basis to determine the dimension and volume to be used in the process model. *Table 3.2.1* provides the volumes used in the existing system process model.

TABLE 3.22.1

Process Basin	Number of Units	Volume Each (MG)
Primary Clarifiers	5	0.584
Aeration Basins (Train 1-5)	5	2.01
Secondary Clarifiers 1-2	2	1.88 (133' diameter)
Secondary Clarifier 4-5	3	2.14 (135'diameter)
Thickened Sludge Holding	2	1.0

Ultimately it was determined that the existing primary clarifiers would be replaced in all expansion alternatives because future treatment objectives, hydraulic requirements, and facility configurations were better served through construction of new primary clarification facilities. The existing aeration basins and secondary clarifiers were retained and incorporated into selected alternatives where practical to maximize the use of existing infrastructure and improve implementation flexibility. The thickening system remained in operation for all alternatives utilizing the rotary drum thickeners currently being implemented at the South Cobb WRF.

Ardurra additionally reviewed existing structures not currently in use at the South Cobb facility to determine functional use or demolition of the structure was required. It was determined that the following structures would be demolished to provide additional space for new construction:

- Two (2) abandoned thickened WAS storage tanks
- Abandoned deoxygenation basins

- Five (5) primary clarifiers (not currently in use)

The process configurations evaluated in this memorandum were developed using the existing facilities summarized above together with new treatment infrastructure necessary to support future expansion to 50 MGD MMF. Alternative development focused on determining the combinations of biological treatment volume, solids separation facilities, and process modifications required to achieve the WLA effluent objectives while providing flexibility for future nutrient management requirements. These evaluations are presented in the following section.

3.3 Process Model Alternatives

Process alternatives were developed to evaluate treatment configurations capable of achieving the planning-level treatment objectives established by Georgia EPD WLA No. WLA000309 for future operation at 50 MGD MMF. Alternative development focused on identifying biological treatment and solids separation technologies capable of achieving the WLA requirements while providing flexibility for potential future nutrient removal requirements identified during the Facilities Planning process. Alternatives were evaluated using the process modeling framework and design criteria established in TM No. 5.

Ardurra evaluated seven treatment process alternatives together with multiple site layout configurations to determine practical approaches for expanding the South Cobb WRF from 40 MGD MMF to 50 MGD MMF while achieving future treatment objectives. All the alternatives included new primary clarifiers. Additionally, expansion or revision of the disinfection process would be required for plant expansion; however, the disinfection process is not included in BioWin modeling as it is not related to the biological operation of the treatment plant. The alternatives evaluated were:

- **Conventional Process** - Expansion of Conventional Aeration Process with expanded aeration trains, new secondary clarifiers, and increased filter capacity.
- **2-stage Process –** New pre-anoxic zone and additional aeration volume. Three (3) new secondary clarifiers with new split utilized to evenly distribute the ML flow between the existing and new secondary clarifiers based on their surface area. Increased filter system capacity.
- **3-stage (MLE) Process –** New anaerobic zone, new pre-anoxic zone, and additional aeration volume provided. Three (3) new secondary clarifiers with new split utilized to evenly distribute the ML flow between the existing and new secondary clarifiers based on their surface area. Increased filter system capacity.
- **4-stage Process –** New pre-anoxic zone, additional aeration volume, new post-anoxic zone, and new re-aeration zone. Three (3) new secondary clarifiers with new split utilized to evenly distribute the ML flow between the existing and new secondary clarifiers based on their surface area. Increased filter system capacity.
- **5-stage Process –** New anaerobic zone, new pre-anoxic zone, additional aeration volume, new post-anoxic zone, and new post-aeration zone. Three (3) new secondary clarifiers with new split utilized to evenly distribute the ML flow between the existing and new secondary clarifiers based on their surface area. Increased filter system capacity.

- **4-stage MBR system** - New pre-anoxic zone, additional aeration volume, new post-anoxic zone, and new re-aeration/membrane basin.
- **5-stage MBR system** – New anaerobic zone, new pre-anoxic zone, additional aeration volume, new post-anoxic zone, and new re-aeration/membrane basin.

The alternatives were intentionally structured to evaluate increasing levels of biological nutrient removal capability and future regulatory flexibility. Lower-stage alternatives focused primarily on conventional capacity expansion approaches, while the more advanced BNR and membrane-based alternatives were developed to evaluate compliance with the more stringent nutrient removal objectives established in the WLA and future planning criteria. The biological process models were set up with some engineering estimates regarding the system operation across all the alternatives modeled. All model alternatives include the following system settings:

- 50% TSS removal at Primary Clarifiers at 2% solids
- Aeration trains DO setting at 2.0 mg/l using fine bubble diffusers
- Re-Aeration zone DO setting at 2.0 mg/l using coarse bubble diffusers for the BNR system and fine bubble diffusers for the membrane system
- Secondary Clarifiers modeled with SVI of 80 at MLSS of 4,000 mg/l
- Filter solids capture setting at 75%
- RDT solids capture rate of 95% with target of 5% thickened waste solids
- Dewater solids capture rate of 95% with target of 18-20% dewatered solids
- No Ferrous Chloride included in model alternatives
- No Lime included in model alternatives

All the process models included five (5) new 110 ft diameter primary clarifiers. The model alternatives that included expanding the existing secondary clarifier system were designed based on three (3) new 150 ft diameter secondary clarifiers with a new splitter structure. The model systems for the MBR process included 125 cassettes. The process volumes used for the aeration/BNR/MBR systems are included in the table below.

TABLE 3.3.1 AERATION/BNR/MBR VOLUMES

Stage	Aeration Only	2-stage	3-stage	4-stage	5-stage	4-stage MBR	5-stage MBR
Anaerobic (MG)	0	0	2.083	0	2.083	0	1.042
Pre-Anoxic (MG)	0	3.125	3.125	6.25	6.25	3.125	3.125
Aeration (MG)	20	20.5	22.0	14.583	14.583	6.25	6.25
Post-Anoxic (MG)	0	0	0	4.688	4.688	2.083	2.083

Re-Aeration/ MBR (MG)	0	0	0	1.042	1.042	0.9	0.9
Total Volume (MG)	**20**	**23.625**	**27.208**	**26.563**	**28.646**	**12.358**	**13.4**

The process volumes presented above were developed through iterative BioWin modeling and represent preliminary sizing necessary to achieve the treatment performance objectives established for alternatives evaluation. These process configurations were subsequently evaluated relative to the WLA treatment objectives and future planning-level nutrient targets established during development of the South Cobb WRF Facilities Plan. The results for all the modeled alternatives are provided in **Appendix 5.1**. Ardurra developed several preliminary expansion layouts for the modeled alternatives as included in **Appendix 5.2**. The layout options included:

- 1 layout for the 2-stage process (A9)
- 2 layouts for the 3-stage process (A10.1-10.2)
- 3 layouts for the 4-stage process (A11.1-11.3)
- 2 layout for the 5-stage process (A12 and A15)
- 1 layout for the 4-stage MBR system (A13)
- 2 layouts for the 5-stage MBR system (A14.1-14.2)

Significant differences in treatment performance, nutrient removal capability, solids separation requirements, site utilization, and future regulatory flexibility were observed among the alternatives evaluated. Consequently, the alternatives and associated site layouts were reviewed collaboratively with CCWS to identify the scenarios most suitable for continued refinement during subsequent phases of the Facilities Planning effort. After reviewing all the model alternatives along with possible layout options during workshops with Cobb County, it was determined to focus on 2 primary alternatives and 4 secondary alternatives as identified in the Alternative Selection Confirmation Memorandum (**Appendix 5.3**).

Primary Alternatives:

- **Alternative A11.3**: 4-stage process
- **Alternative A14.2**: 5-stage MBR process

Secondary Alternatives:

- **Alternative A12**: 5-stage process
- **Alternative A13**: 4-stage MBR system
- **Alternative A14.1**: 5-stage MBR system
- **Alternative A15**: 5-stage process (alternate layout)

The models for the primary and secondary alternatives are discussed further in the sections below.

3.3.1 Alternative A11.3: 4-stage Process

Alternative A11.3 includes the five (5) new circular primary clarifiers, new 4-stage BNR process, three (3) new secondary clarifiers, new secondary clarifier splitter, and increased filter capacity. The filters in the model estimate tertiary filtration only and do not account for any benefits provided by denitrifying deep bed sand filters. The waste system includes thickening of the WAS, combined primary sludge and thickened WAS storage, and sludge dewatering.

A schematic of the model 4-stage process is shown in *Figure 3.1*. This schematic represents the processes utilized in the model and flow diagram through the system.

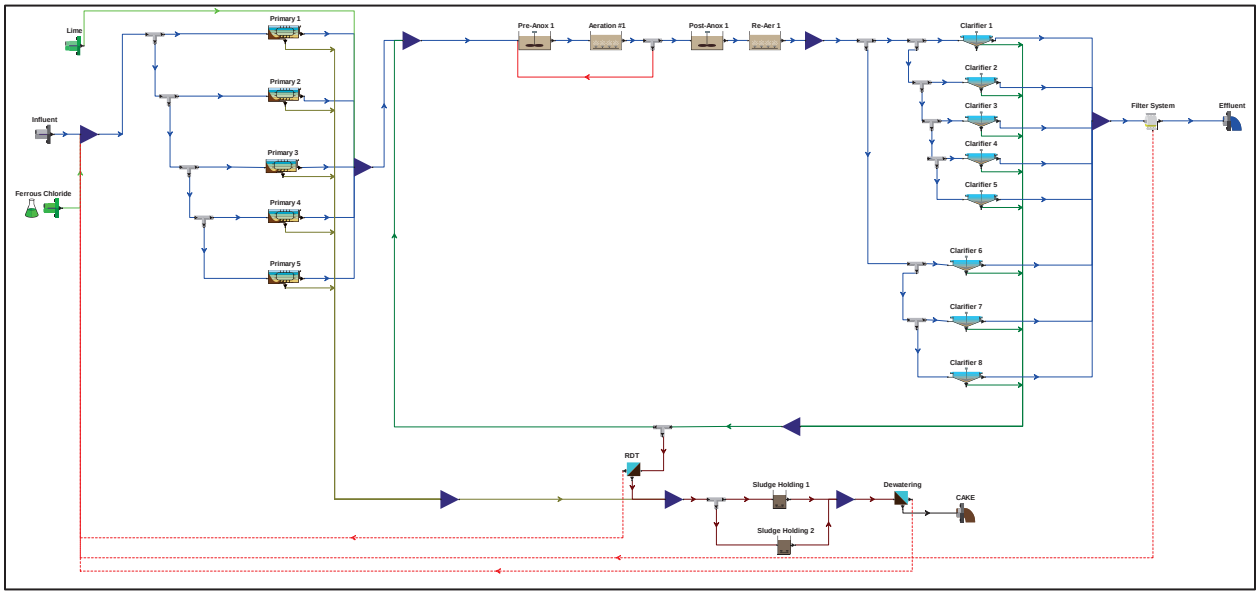


FIGURE 3.1 4-STAGE PROCESS MODEL LAYOUT

The following additional model settings were used for Alternative A11.3:

- Secondary Clarifier 1-5 Underflow (RAS/WAS) at 9% of influent flow each for a total of 45% of influent flow
- Secondary Clarifier 6-7 Underflow (RAS/WAS) at 10% of influent flow each for a total of 30% of influent flow

Table 3.2.2 below provides a summary of the influent and effluent results of Alternative A11.3. These results also include information regarding the required aeration system operation and solids system to achieve the model's effluent output.

TABLE 3.3.2 4-STAGE PROCESS RESULTS

	Alternative A11.3
Influent Flow (MGD)	50.0

Influent Parameters	
CBOD5 (mg/l)	300
COD (mg/l)	900
TSS (mg/l)	300
VSS (mg/l)	255
TKN (mg/l)	60
Ammonia (mg/l)	39
TP (mg/l)	9
pH	7.1
Alkalinity (mg/l)	250
Temp (deg-C)	22
Effluent Parameters	
CBOD5 (mg/l)	1.7
TSS (mg/l)	2.8
Ammonia (mg/l)	0.32
Nitrate (mg/l)	0.6
TN (mg/l)	2.9
TP (mg/l)	0.27
pH	6.7
Alkalinity (mg/l)	123
Air Requirements	
Aeration Standard Oxygen Transfer Rate (lb/day)	281,750
Aeration Air (scfm)	47,495
Aeration Diffuser Transfer Efficiency	23.7%
Re-Aeration Standard Oxygen Transfer Rate (lb/day)	15,959
Re-Aeration Air (scfm)	6,565
Re-Aeration Diffuser Transfer Efficiency	9.7%
Total Air (scfm)	54,060
Solids	
Aeration SRT (days)	5.2
Total 4-stage SRT (days)	9.5
MLSS (mg/l)	3,816
Primary Clarifier SLR (lb/sft/day)	3

Primary Clarifier SOR (gal/sft/day)	1,086
Secondary Clarifier 1-5 SLR (lb/sft/day)	23
Secondary Clarifier 1-5 SOR (gal/sft/day)	398
Secondary Clarifier 6-7 SLR (lb/sft/day)	23
Secondary Clarifier 6-7 SOR (gal/sft/day)	427
RAS Flow (MGD)	36.3
Primary Sludge (lb/d)	84,691
WAS (lb/day)	89,434
WAS Concentration (mg/l)	8,930
WAS Flow (MGD)	1.20
Solids to Sludge Holding (lb/d)	169,653
Dewatered Solids (lb/d)	150,980
Dewatered % Solids	20%

These results indicate that Alternative A11.3 can meet the expansion effluent limits as outlined in Section 2.1 of this TM.

Alternative A11.3 also demonstrated the ability to achieve the future planning-level TN and TP objectives utilized during alternatives evaluation. This combination of biological nutrient removal and downstream solids separation provides a treatment platform capable of satisfying the WLA requirements while maintaining flexibility for future nutrient management objectives.

For domestic wastewater BOD removal, an aeration solids retention time (SRT) of 3-5 days is required with additional days required to achieve nitrification. Ardurra notes that the total SRT of 9.5 days is sufficient for BOD removal following the primary clarifiers and the process is able to provide nitrification to achieve an effluent ammonia of 0.32 mg/l.

With the new primary clarifiers and secondary clarifiers online, the existing secondary clarifier 1-5 solid loading rate (SLR) result of 23 lb/sft/day is lower than the recommended rate of 25 lb/sft/day that Ardurra would use for a max month event. Therefore, this alternative provides sufficient solids removal.

The preferred configuration for the 4-stage process is Alternative A11.3, which includes construction of the new 4-stage BNR process on the undeveloped parcel north of the existing treatment facilities. This arrangement maximizes constructability, consolidates biological treatment infrastructure, and provides flexibility for future facility expansion and nutrient removal improvements.

3.3.2 Alternative A14.2: 5-stage MBR System

Alternative A14.2 includes five (5) new primary clarifiers, new 5-stage MBR system. The waste system includes thickening of the MBR waste, combined primary sludge and thickened waste storage, and sludge dewatering.

The schematic of the model layout is shown in *Figure 3.2*. This schematic represents the processes utilized in the model and flow diagram through the system.

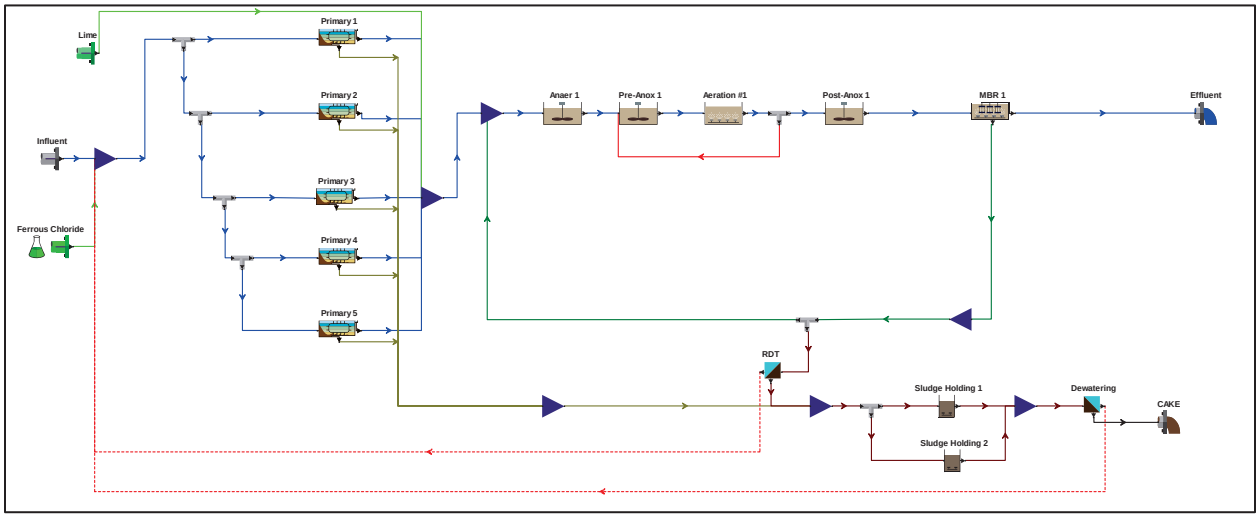


FIGURE 3.2 5-STAGE MBR MODEL LAYOUT

The following additional model settings were used for Alternative A14.2:

- MBR Underflow (ML recycle and waste) set for a total of 100 MGD which is 200% of the influent flow.

Table 3.2.3 below provides a summary of the influent and effluent results of Alternative A14.2. These results also include information regarding the required aeration system operation and solids system to achieve the model's effluent output.

TABLE 3.3.3 5-STAGE MBR RESULTS

	Alternative A14.2
Influent Flow (MGD)	50.0
Influent Parameters	
CBOD5 (mg/l)	300
COD (mg/l)	900
TSS (mg/l)	300
VSS (mg/l)	255
TKN (mg/l)	60
Ammonia (mg/l)	39

TP (mg/l)	9
pH	7.1
Alkalinity (mg/l)	250
Temp (deg-C)	22
Effluent Parameters	
CBOD5 (mg/l)	1.5
TSS (mg/l)	1.2
Ammonia (mg/l)	0.35
Nitrate (mg/l)	0.7
TN (mg/l)	3.0
TP (mg/l)	0.04
pH	6.8
Alkalinity (mg/l)	122
Air Requirements	
Aeration Standard Oxygen Transfer Rate (lb/day)	273,068
Aeration Air (scfm)	55,059
Aeration Diffuser Transfer Efficiency	19.8%
MBR (scfm)	19,334
Total Air (scfm)	74,393
Solids	
Aeration SRT (days)	4.5
Total 5-stage SRT (days)	9.7
MLSS (mg/l)	8,067
Primary Clarifier SLR (lb/sft/day)	3
Primary Clarifier SOR (gal/sft/day)	1,070
MBR Recycle Flow (MGD)	99
Primary Sludge (lb/d)	82,751
WAS (lb/day)	92,846
WAS Concentration (mg/l)	12,093
WAS Flow (MGD)	0.92
Solids to Sludge Holding (lb/d)	170,995
Dewatered Solids (lb/d)	153,492
Dewatered % Solids	20%

These results indicate that Alternative A14.2 can meet the expansion effluent limits as outlined in Section 2.1 of this TM.

Alternative A14.2 also demonstrated the ability to achieve the future planning-level TN and TP objectives utilized during alternatives evaluation. The combination of advanced biological nutrient removal and membrane treatment provides enhanced solids separation capability while supporting future regulatory flexibility.

Ardurra notes that the total SRT of 9.7 days is sufficient for BOD removal following the primary clarifiers and the process is able to provide nitrification to achieve an effluent ammonia of 0.35 mg/l.

The preferred configuration for the 5-stage MBR process is Alternative A14.2. This arrangement incorporates conversion of the existing aeration basins into portions of the 5-stage BNR process while utilizing new membrane treatment facilities and additional biological treatment volume. The layout maximizes use of existing infrastructure while minimizing site development requirements and dependence on adjacent property.

3.3.3 Alternative A12: 5-stage Process

Alternative A12 includes five (5) new primary clarifiers, new 5-stage BNR process, three (3) new secondary clarifiers, new secondary clarifier splitter, and increased filter capacity. The filters in the model estimate tertiary filtration only and do not account for any benefits provided by deep bed sand filters.

The new secondary clarifier split would distribute the ML flow between the existing and new secondary clarifiers based on their surface area so that about 60% of the flow would go to existing secondary clarifiers 1-5 and 40% of the flow would go to the new secondary clarifiers 6-8.

The schematic of the model layout is shown in *Figure 3.3*. This schematic represents the processes utilized in the model and flow diagram through the system.

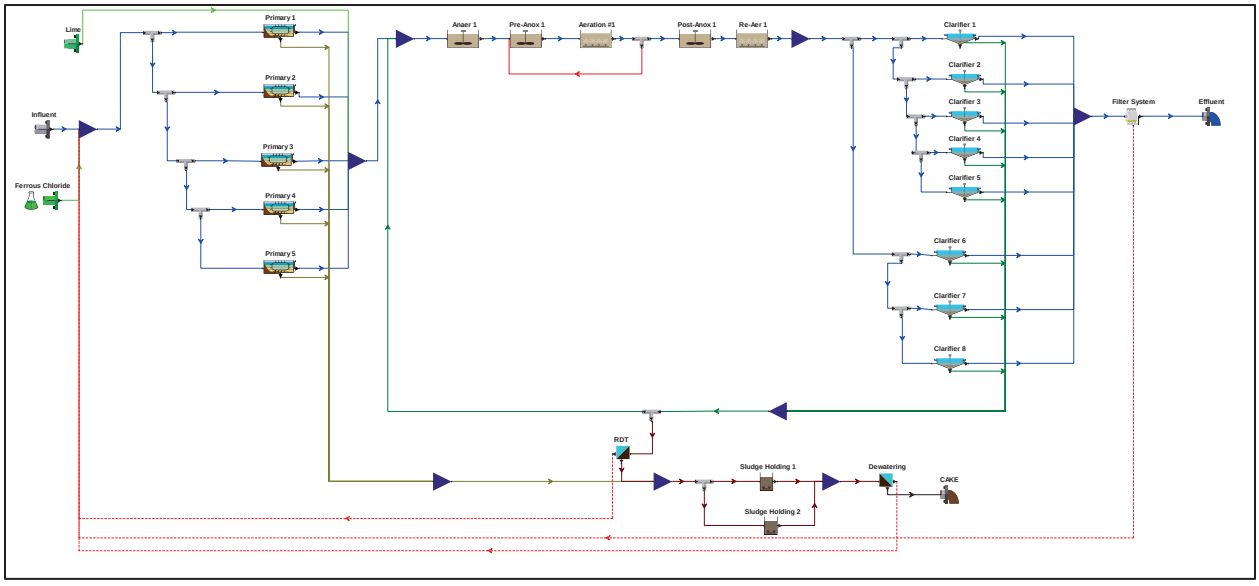


FIGURE 3.3 5-STAGE PROCESS MODEL LAYOUT

The following additional model settings were used for Alternative A12:

- Secondary Clarifier 1-5 Underflow (RAS/WAS) at 9% of influent flow each for a total of 45% of influent flow
- Secondary Clarifier 6-8 Underflow (RAS/WAS) at 10% of influent flow each for a total of 30% of influent flow

Table 3.2.4 below provides a summary of the influent and effluent results of Alternative A12. These results also include information regarding the required aeration system operation and solids system to achieve the model's effluent output.

TABLE 3.3.4 5-STAGE PROCESS RESULTS

	Alternative A12
Influent Flow (MGD)	50.0
Influent Parameters	
CBOD5 (mg/l)	300
COD (mg/l)	900
TSS (mg/l)	300
VSS (mg/l)	255
TKN (mg/l)	60
Ammonia (mg/l)	39
TP (mg/l)	9
pH	7.1
Alkalinity (mg/l)	250
Temp (deg-C)	22
Effluent Parameters	
CBOD5 (mg/l)	1.8
TSS (mg/l)	2.8
Ammonia (mg/l)	0.37
Nitrate (mg/l)	0.6
TN (mg/l)	3.0
TP (mg/l)	0.1
pH	6.7
Alkalinity (mg/l)	123
Air Requirements	
Aeration Standard Oxygen Transfer Rate (lb/day)	279,751
Aeration Air (scfm)	47,085

Aeration 1-5 Diffuser Transfer Efficiency	23.7%
Re-Aeration Standard Oxygen Transfer Rate (lb/day)	16,059
Re-Aeration Air (scfm)	6,606
Re-Aeration Diffuser Transfer Efficiency	9.7%
Total Air (scfm)	53,691
Solids	
Aeration SRT (days)	5.2
Total 5-stage SRT (days)	10.2
MLSS (mg/l)	3,834
Primary Clarifier SLR (lb/sft/day)	3
Primary Clarifier SOR (gal/sft/day)	1,086
Secondary Clarifier 1-5 SLR (lb/sft/day)	23
Secondary Clarifier 1-5 SOR (gal/sft/day)	398
Secondary Clarifier 6-8 SLR (lb/sft/day)	23
Secondary Clarifier 6-8 SOR (gal/sft/day)	427
RAS Flow (MGD)	36.3
Primary Sludge (lb/d)	84,756
WAS (lb/day)	89,847
WAS Concentration (mg/l)	8,972
WAS Flow (MGD)	1.2
Solids to Sludge Holding (lb/d)	170,111
Dewatered Solids (lb/d)	152,273
Dewatered % Solids	20%

These results indicate that Alternative A12 is able to meet the expansion effluent limits required.

Alternative A12 demonstrated nutrient removal performance comparable to the primary alternatives and satisfied the future planning-level TN and TP objectives utilized during evaluation. Although technically viable, subsequent review identified implementation and operational considerations that resulted in Alternative A12 being retained as a secondary alternative rather than advanced for detailed refinement.

Ardurra notes that the total SRT of 10.2 days is sufficient for BOD removal following the primary clarifiers and the process is able to provide nitrification to achieve an effluent ammonia of 0.37 mg/l.

The layout for the 5-stage BNR system is arrangement A12. This arrangement includes rehab of the existing aeration basins and construction of a portion of the new 5-stage BNR process on the undeveloped parcel to the north of the existing system.

3.3.4 Alternative A13: 4-stage MBR System

Alternative A13 includes the addition of five (5) new primary clarifiers and new 4-stage MBR system. The waste system includes thickening of the MBR waste, combined primary sludge and thickened waste storage, and sludge dewatering..

The schematic of the model layout is shown in *Figure 3.4*. This schematic represents the processes utilized in the model and flow diagram through the system.

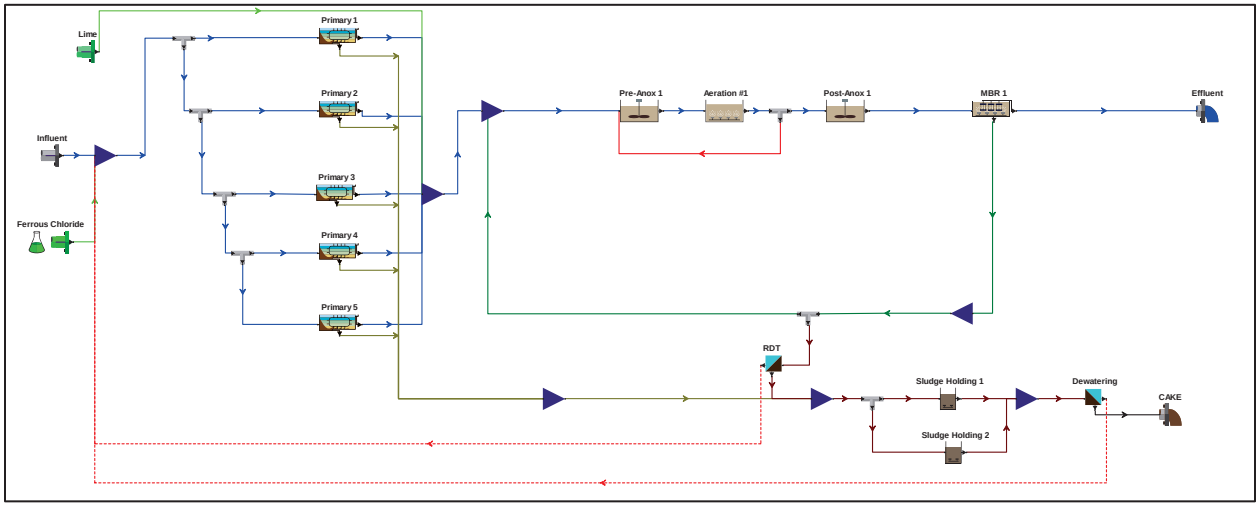


FIGURE 3.4 4-STAGE MBR MODLE LAYOUT

The following additional model settings were used for Alternative A13:

- MBR Underflow (ML recycle and waste) set for a total of 100 MGD which is 200% of the influent flow.

Table 3.2.5 below provides a summary of the influent and effluent results of Alternative A13. These results also include information regarding the required aeration system operation and solids system to achieve the model's effluent output.

TABLE 3.3.5 4-STAGE MBR RESULSTS

	Alternative A13
Influent Flow (MGD)	50.0
Influent Parameters	
CBOD5 (mg/l)	300

COD (mg/l)	900
TSS (mg/l)	300
VSS (mg/l)	255
TKN (mg/l)	60
Ammonia (mg/l)	39
TP (mg/l)	9
pH	7.1
Alkalinity (mg/l)	250
Temp (deg-C)	22
Effluent Parameters	
CBOD5 (mg/l)	1.3
TSS (mg/l)	1.2
Ammonia (mg/l)	0.28
Nitrate (mg/l)	0.8
TN (mg/l)	2.9
TP (mg/l)	0.12
pH	6.8
Alkalinity (mg/l)	122
Air Requirements	
Aeration Standard Oxygen Transfer Rate (lb/day)	273,884
Aeration Air (scfm)	55,259
Aeration Diffuser Transfer Efficiency	19.8%
MBR Air (scfm)	19,334
Total Air (scfm)	74,393
Solids	
Aeration SRT (days)	4.5
Total 4-stage SRT (days)	8.9
MLSS (mg/l)	8,077
Primary Clarifier SLR (lb/sft/day)	3
Primary Clarifier SOR (gal/sft/day)	1,070
MBR Recycle Flow (MGD)	99
Primary Sludge (lb/d)	82,716
WAS (lb/day)	92,963
WAS Concentration (mg/l)	12,108
WAS Flow (MGD)	0.92

Solids to Sludge Holding (lb/d)	171,032
Dewatered Solids (lb/d)	152,273
Dewatered % Solids	20%

These results indicate that Alternative A13 can meet the expansion effluent limits as outlined in Section 2.1 of this TM.

Alternative A13 achieved nutrient removal performance comparable to Alternative A14.2; however, subsequent evaluation indicated that Alternative A14.2 provided a more favorable overall site arrangement and implementation framework. Alternative A13 was therefore retained as a secondary alternative for comparison purposes.

Ardurra notes that the total SRT of 8.9 days is sufficient for BOD removal following the primary clarifiers and the process is able to provide nitrification to achieve an effluent ammonia of 0.28 mg/l.

The preferred layout for the 4-stage MBR system is arrangement A13. This arrangement includes revisions to the existing aeration basin, construction of new basins for a portion of the BNR process to the south-west of the existing aeration basin, and construction of new MBR basins to the south of the existing aeration basins.

3.3.5 Alternative A14.1: 5-stage MBR System (Alternate Layout)

Alternative A14.1 process is an alternate layout from the 5-stage MBR system as modeled in Section 3.2.2 (Alternative A14.2). No changes to the model are included for this alternative layout and results are the same as provided for Alternative A14.2.

Alternative A14.1 utilizes the same treatment philosophy as Alternative A14.2 and therefore achieved comparable process modeling results. The distinguishing factor between the two alternatives was not treatment performance, but rather site utilization, constructability, and implementation flexibility. Consequently, Alternative A14.2 was advanced as a primary alternative while Alternative A14.1 was retained as a secondary alternative.

The layout for Alternative A14.1 arrangement includes revisions to the existing aeration basin, construction of new basins for a portion of the BNR process to the south-west of the existing aeration basin, and construction of new MBR basins to the south of the existing aeration basins.

3.3.6 Alternative A15: 5-stage Process (Alterative Layout)

Alternative A15 process is an alternate layout from the 5-stage process as modeled in Section 3.3.3 (Alternative A12). No changes to the model are included for this alternative layout and results are the same as provided for Alternative A12.

Alternative A15 demonstrated strong nutrient removal capability and provided the highest level of biological treatment redundancy and future treatment flexibility among the alternatives evaluated. However, subsequent evaluations identified significant site development, constructability, and capital cost implications relative to Alternatives A11.3 and A14.2, resulting in retention of Alternative A15 as a secondary alternative.

The layout for Alternative A15 configuration includes construction of the new 5-stage BNR process on the undeveloped parcel to the north of the existing system.

3.4 Summary

A comparison of all modeled alternatives is included in Appendix 5.1. Evaluation of the treatment scenarios demonstrated that multiple process configurations are capable of supporting expansion of the South Cobb WRF from 40 MGD MMF to 50 MGD MMF while achieving the planning-level treatment objectives established by Georgia EPD WLA No. WLA000309. Significant differences were observed, however, with respect to nutrient removal capability, process complexity, solids separation requirements, site utilization, implementation flexibility, and long-term regulatory adaptability. Of the alternatives evaluated, four treatment configurations consistently demonstrated the ability to satisfy the WLA effluent objectives while also achieving the future planning-level TN and TP targets utilized during alternatives evaluation. These alternatives included:

- 4-stage process
- 5-stage process
- 4-stage MBR process
- 5-stage MBR process

In addition to analyzing the process models, Ardurra developed site layouts for the expansion options. Some of the expansion options included multiple layout options for the configuration of equipment and basins on-site. Review of these model results and layout arrangement with Cobb County resulted in 2 primary alternatives and 4 secondary alternatives.

Following review of the process modeling results, preliminary site layouts, and implementation considerations, CCWS and Ardurra collaboratively identified alternatives for continued refinement. Alternatives were selected based not only on treatment performance, but also on their ability to support future implementation, maintain operational continuity, provide regulatory flexibility, and accommodate future nutrient management objectives.

Primary Alternatives:

- **Alternative A11.3**: 4-stage process
- **Alternative A14.2**: 5-stage MBR process

Secondary Alternatives:

- **Alternative A12**: 5-stage process
- **Alternative A13**: 4-stage MBR system
- **Alternative A14.1**: 5-stage MBR system
- **Alternative A15**: 5-stage process

The alternatives advanced for continued evaluation represent both conventional and membrane-based treatment approaches. Alternative A11.3 provides a conventional biological nutrient

removal strategy supplemented by downstream solids separation, while Alternative A14.2 relies on advanced membrane treatment to provide enhanced solids removal and nutrient compliance flexibility. Retention of both alternatives allows comparison of two substantially different treatment philosophies while preserving flexibility during subsequent phases of Facilities Plan development.

4 Recommendations

The primary alternatives for expansion of the South Cobb WRF from 40 mgd to 50 mgd include the 4-stage BNR process and 5-stage MBR system. Each of these processes will be evaluated further by Ardurra for cost, constructability, and site utilization in the Facilities Plan.

An overview of the site layout for Alternative A11.3 and 2 can be seen in *Figure 4.1* and *Figure 4.2* below and Appendix 5.2

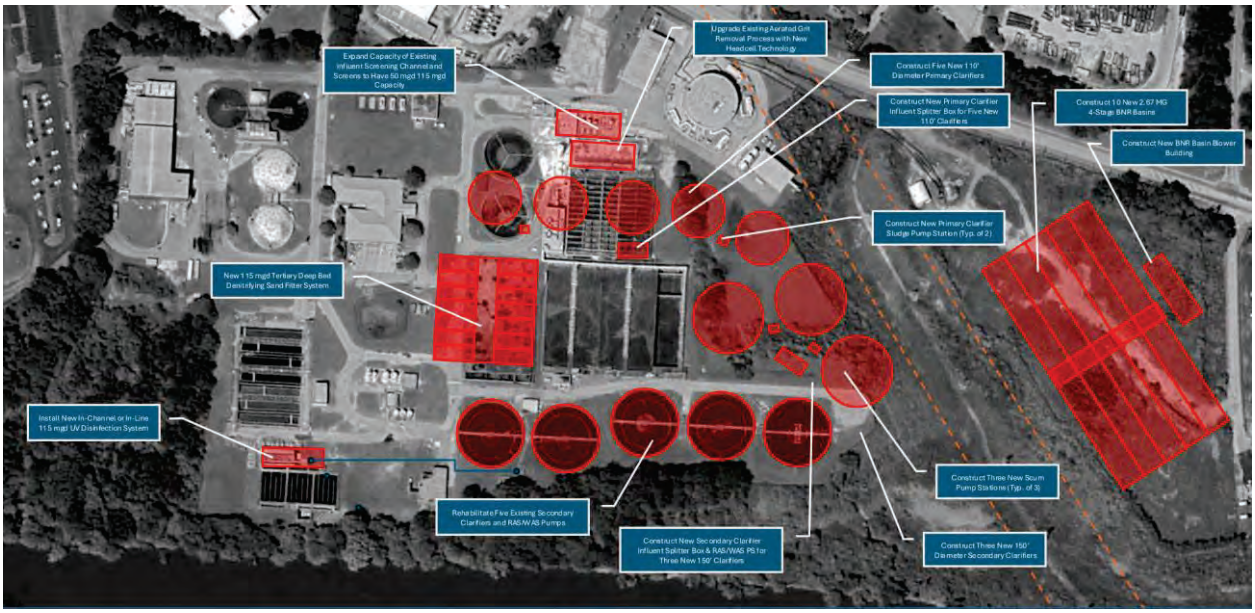


FIGURE 4.1 ALTERNATIVE A11.3: 4-STAGE BNR

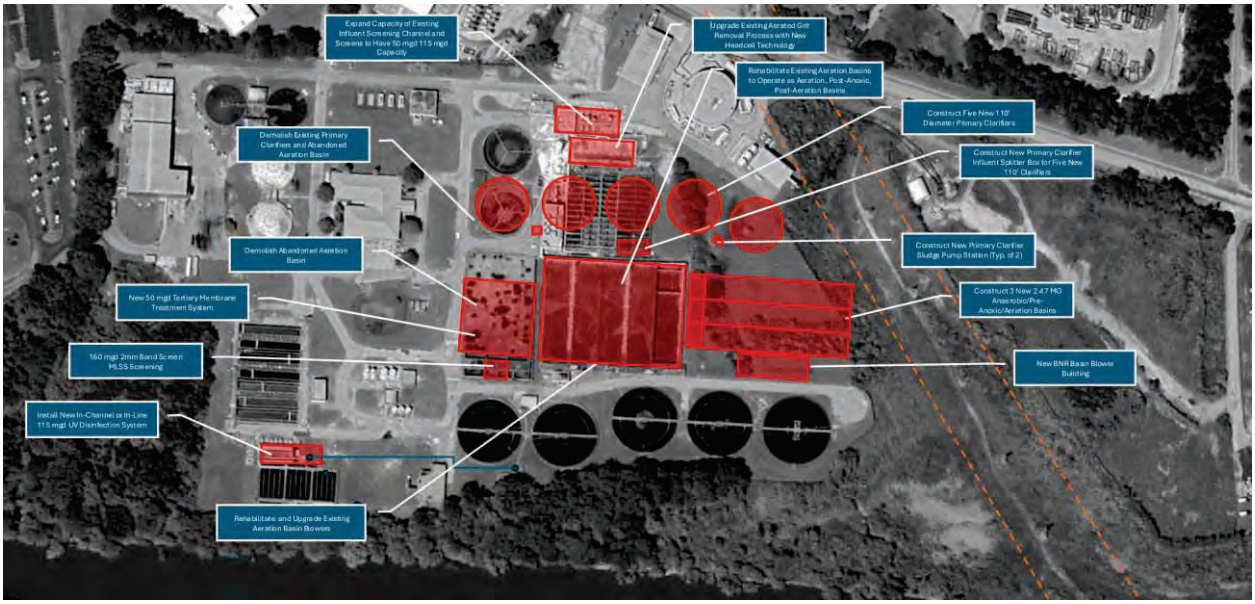


FIGURE 4.2 ALTERNATIVE A14.2: 5-STAGE MBR

5 Appendices

- Appendix 5.1 – Alternative Model Comparison Table
- Appendix 5.2 – Alternative Site Layouts

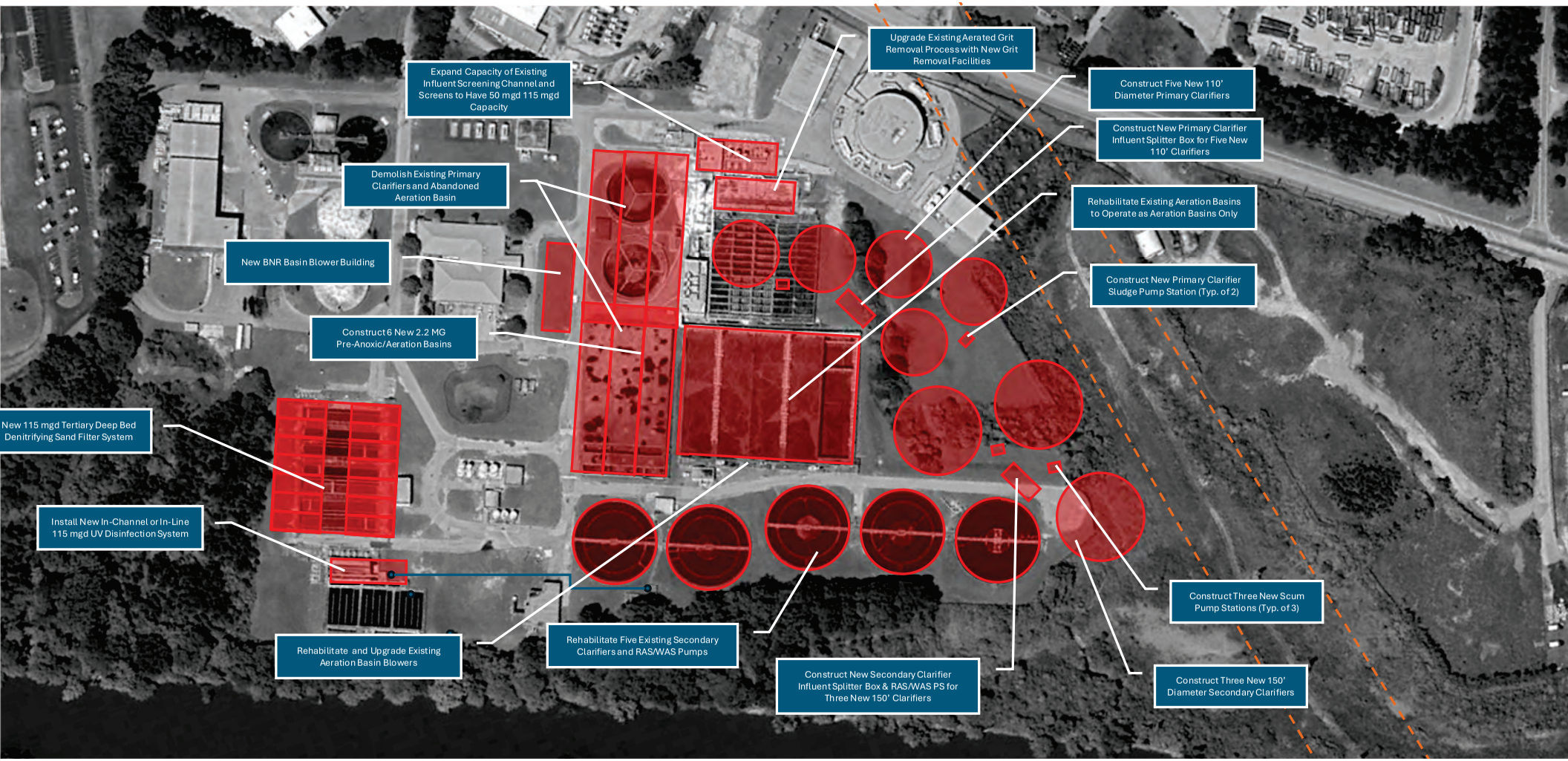
South Cobb WRF

BioWin Model Alternative Comparison - Revised based on WLA

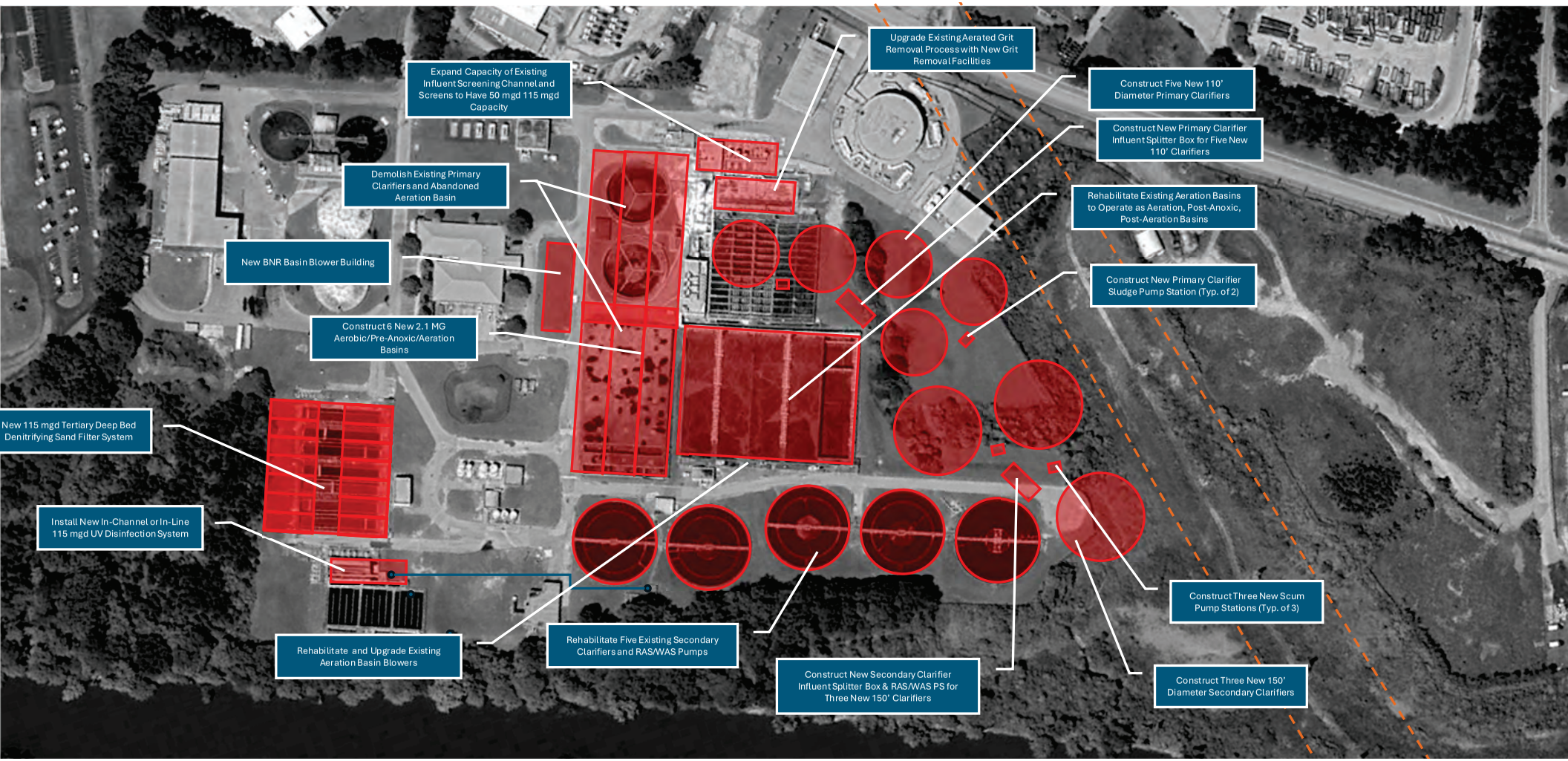
	Expansion WLA Limits	Existing System with Improvements	Existing System Expanded	2-Stage Bardenpho Process	3-Stage Bardenpho process	4-Stage Bardenpho process	5-Stage Bardenpho process	4-Stage MBR Bardenpho process	5-Stage MBR Bardenpho process
Layout Alternatives		Existing		A9	A10.1 - 10.2	A11.1 - 11.3	A12 and A15	A13	A14.1 - A14.2
Primary Clarifiers		5 online @ 50% TSS removal - PS to 2%	3 New Rectangular	5 New 110' Diameter	5 New 110' Diameter	5 New 110' Diameter	5 New 110' Diameter	5 New 110' Diameter	5 New 110' Diameter
Aeration Basins		5 online @ DO 1.5 mg/l	Expanded Aeration (20 MG Total)	2-stage BNR (23.625 MG)	3-stage BNR (27.21 MG)	4-stage BNR (26.56 MG)	5-stage BNR (28.65 MG)	4-stage MBR (12.4 MG)	5-stage MBR (13.4 MG)
Secondary Clarifiers		5 online	5 Existing & 3 New 150' Diameter	5 Existing & 3 New 150' Diameter	5 Existing & 3 New 150' Diameter	5 Existing & 3 New 150' Diameter	5 Existing & 3 New 150' Diameter	None	None
MBR		None	None	None	None	None	None	125 Cassettes	125 Cassettes
Thickening		RDT - WAS to 5%	RDT - WAS Only	RDT - WAS Only	RDT - WAS Only	RDT - WAS Only	RDT - WAS Only	RDT - WAS Only	RDT - WAS Only
Influent									
Total Flow (MGD)	**50.00**	**35.00**	**50.00**	**50.00**	**50.00**	**50.00**	**50.00**	**50.00**	**50.00**
CBOD5 (mg/l)		225	300	300	300	300	300	300	300
COD (mg/l)		675	900	900	900	900	900	900	900
TSS (mg/l)		280	300	300	300	300	300	300	300
VSS (mg/l)		238	255	255	255	255	255	255	255
TKN (mg/l)		55	60	60	60	60	60	60	60
Ammonia (mg/l)		36	39	39	39	39	39	39	39
TP (mg/l)		8	9	9	9	9	9	9	9
pH		7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1
Alkalinity (mg/l)		250	250	250	250	250	250	250	250
Temp (deg-C)		22	22	22	22	22	22	22	22
Chemical Feed									
Ferrous Chloride		2,600 lb Fe	0	0	0	0	0	0	0
Lime		19,600 lb Ca	15,021 lb Ca	0	0	0	0	0	0
Effluent									
CBOD5 (mg/l)	2.9	2.6	2.2	1.8	1.7	1.7	1.8	1.3	1.5
TSS (mg/l)	5.0	4.0	2.9	2.8	2.8	2.8	2.8	1.2	1.2
Ammonia (mg/l)	0.50	0.70	0.50	0.50	0.50	0.32	0.37	0.28	0.35
Nitrate (mg/l)		16.1	13.4	3.5	3.6	0.6	0.6	0.8	0.7
TN (mg/l)	(Future 4.0 - Design 3.0)	19.0	16.1	6.1	6.3	2.9	3.0	2.9	3.0
TP (mg/l)	0.3 (Future 0.13 - Design 0.10)	0.3	0.7	0.58	0.35	0.27	0.10	0.12	0.04
pH		7.0	6.8	6.7	6.7	6.7	6.7	6.8	6.8
Alkalinity (mg/l)		232	168	113	113	123	123	122	122

	Expansion WLA Limits	Existing System with Improvements	Existing System Expanded	2-Stage Bardenpho Process	3-Stage Bardenpho process	4-Stage Bardenpho process	5-Stage Bardenpho process	4-Stage MBR Bardenpho process	5-Stage MBR Bardenpho process
Layout Alternatives		Existing		A9	A10.1 - 10.2	A11.1 - 11.3	A12 and A15	A13	A14.1 - A14.2
Air Requirements									
DO Setting (mg/l)		1.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Aeration Total Standard Oxygen Transfer Rate (lb/day)		165,080	309,542	298,699	305,750	281,750	279,751	273,884	273,068
Aeration Air (scfm)		19,240	39,695	47,326	47,943	47,495	47,085	55,259	55,059
Diffuser Efficiency (%)			28.2 - 34.8%	25.2%	25.5%	23.7%	23.7%	19.8%	19.8%
Re-Aeration Standard Oxygen Transfer Rate (lb/day)		--	--	--	--	15,959	16,059	--	--
Re-Aeration Air (scfm)		--	--	--	--	6,565	6,606	--	--
MBR Air (scfm)		--	--	--	--	--	--	19,303	19,334
Total Process Air (scfm)		19,240	39,695	47,326	47,943	54,060	53,691	74,562	74,393
Solids									
Aeration SRT (days)		4.7	6.1	7.3	7.8	5.2	5.2	4.5	4.5
Total BNR SRT (days)		4.7	6.1	8.1	9.7	9.5	10.2	8.9	9.7
MLSS (mg/l)		3,900	4,015	3,769	3,758	3,816	3,834	8,077	8,067
Primary Clarifier SLR (lb/sft/day)		3	3	3	3	3	3	3	3
Primary Clarifier SOR (gal/sft/day)		1,180	1,058	1,086	1,086	1,086	1,086	1,070	1,070
Secondary Clarifier 1-5 SLR (lb/sft/day)		26	25	22	22	23	23	--	--
Secondary Clarifier 1-5 SOR (gal/sft/day)		500	433	398	398	398	398	--	--
Secondary Clarifier 6-8 SLR (lb/sft/day)		--	22	22	22	23	23	--	--
Secondary Clarifier 6-8 SOR (gal/sft/day)		--	380	427	427	427	427	--	--
RAS Flow (MGD)		20.20	36.10	36.30	36.30	36.30	36.30	99	99
IR (MGD)		--	--	175	175	175	175	175	175
Primary Sludge (lb/d)		47,048	71,254	84,628	84,647	84,691	84,756	82,716	82,751
WAS (lb/day)		69,690	109,780	88,327	88,064	89,434	89,847	92,963	92,846
WAS Concentration (mg/l)		10,440	9,396	8,820	8,794	8,930	8,972	12,108	12,093
WAS Flow (MGD)		0.80	1.40	1.20	1.20	1.20	1.20	0.92	0.92
Solids to Sludge Holding (lb/d)		113,255	175,545	168,538	168,308	169,653	170,111	171,032	170,955
Dewatered Solids (lb/d)		100,958	156,545	150,250	151,131	150,980	152,597	152,273	153,492
Dewatered % Solids		20%	19%	20%	20%	20%	20%	20%	20%

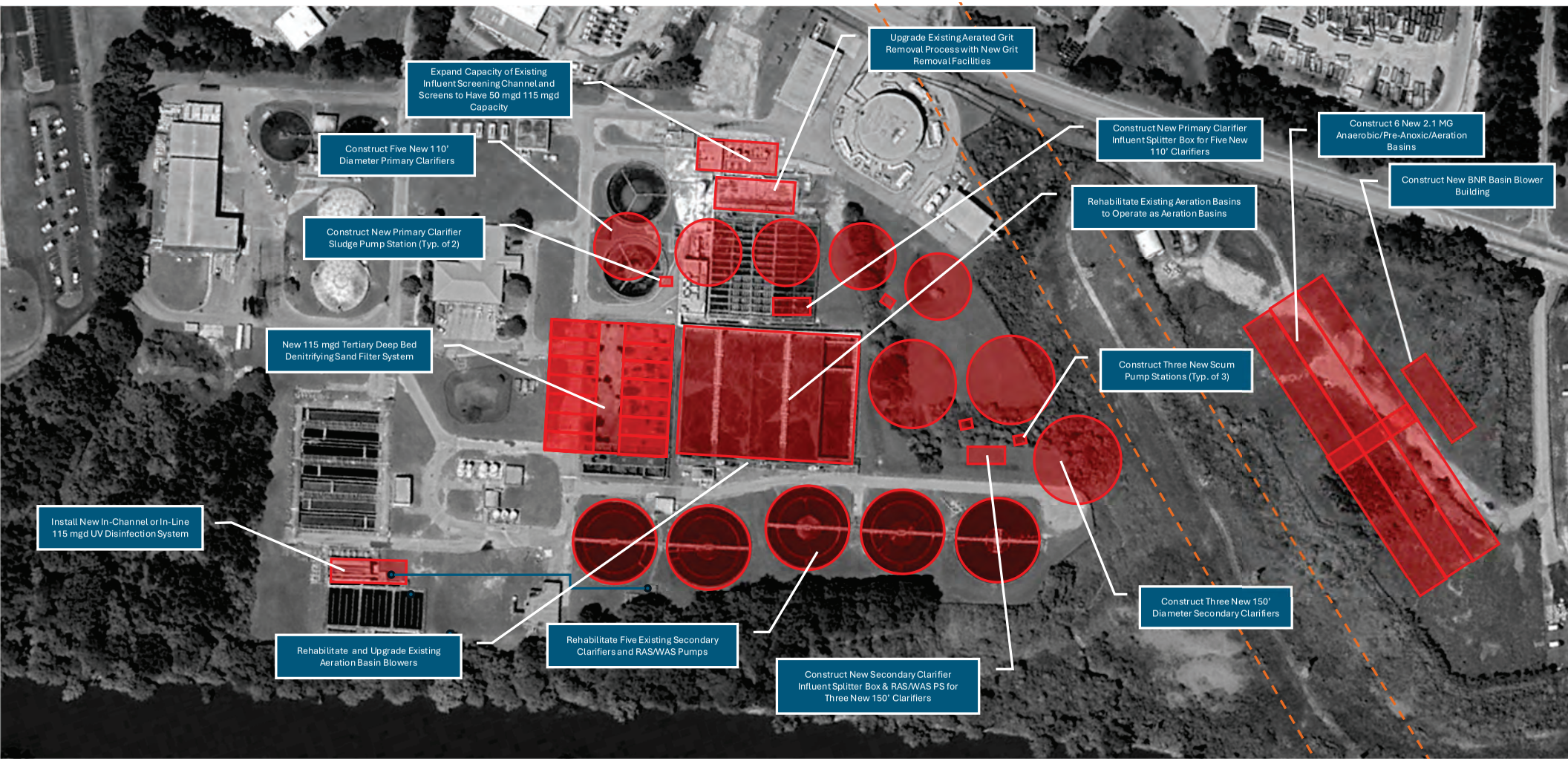
Alternative A9 – Expand Existing Process to 50 mgd (MLE 2-Stage Bardenpho BNR Process) with Deep Bed Denitrifying Sand Filters



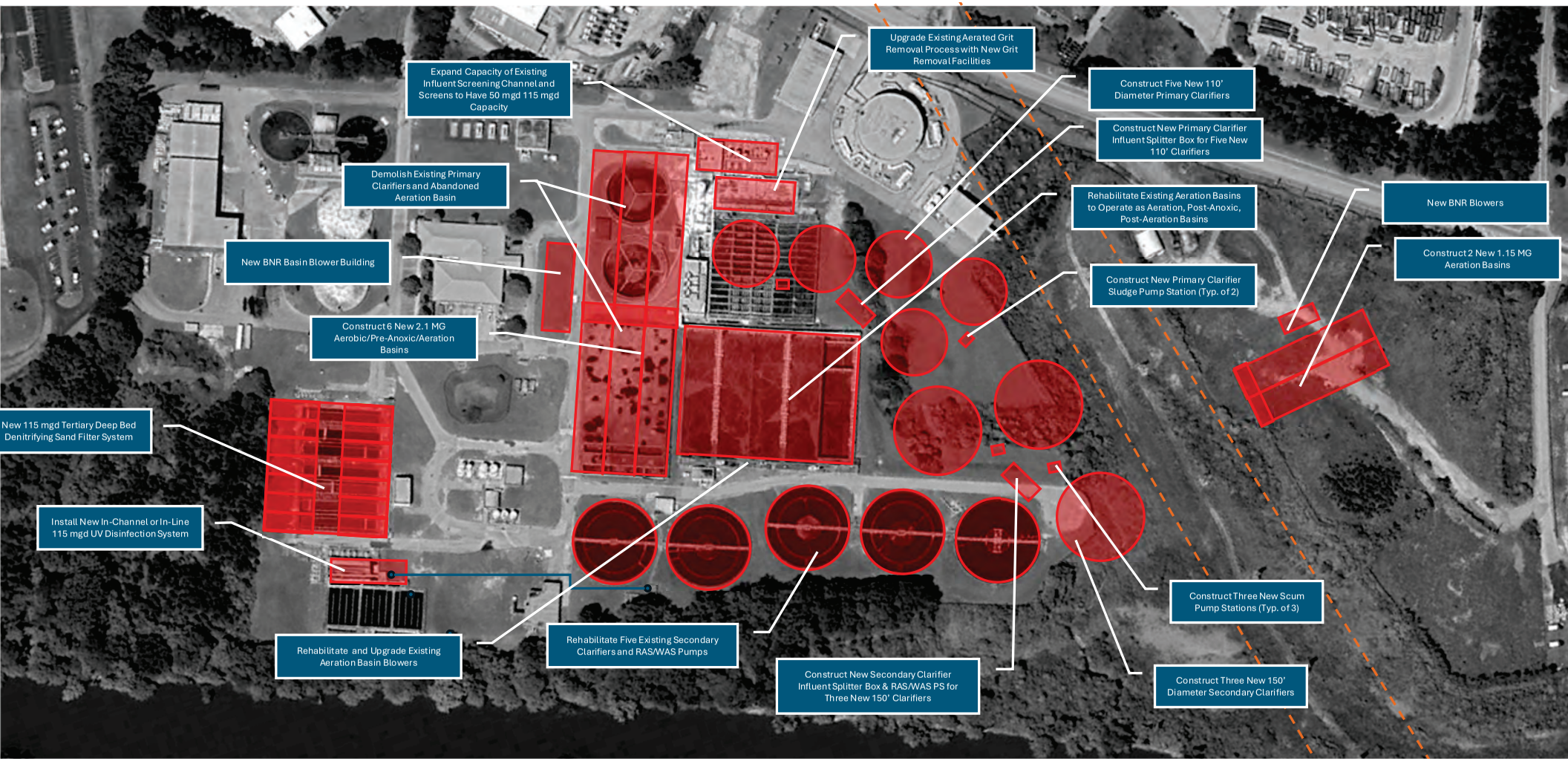
Alternative A10.1 – Expand Existing Process to 50 mgd (3-Stage Bardenpho BNR Process) with Deep Bed Denitrifying Sand Filters



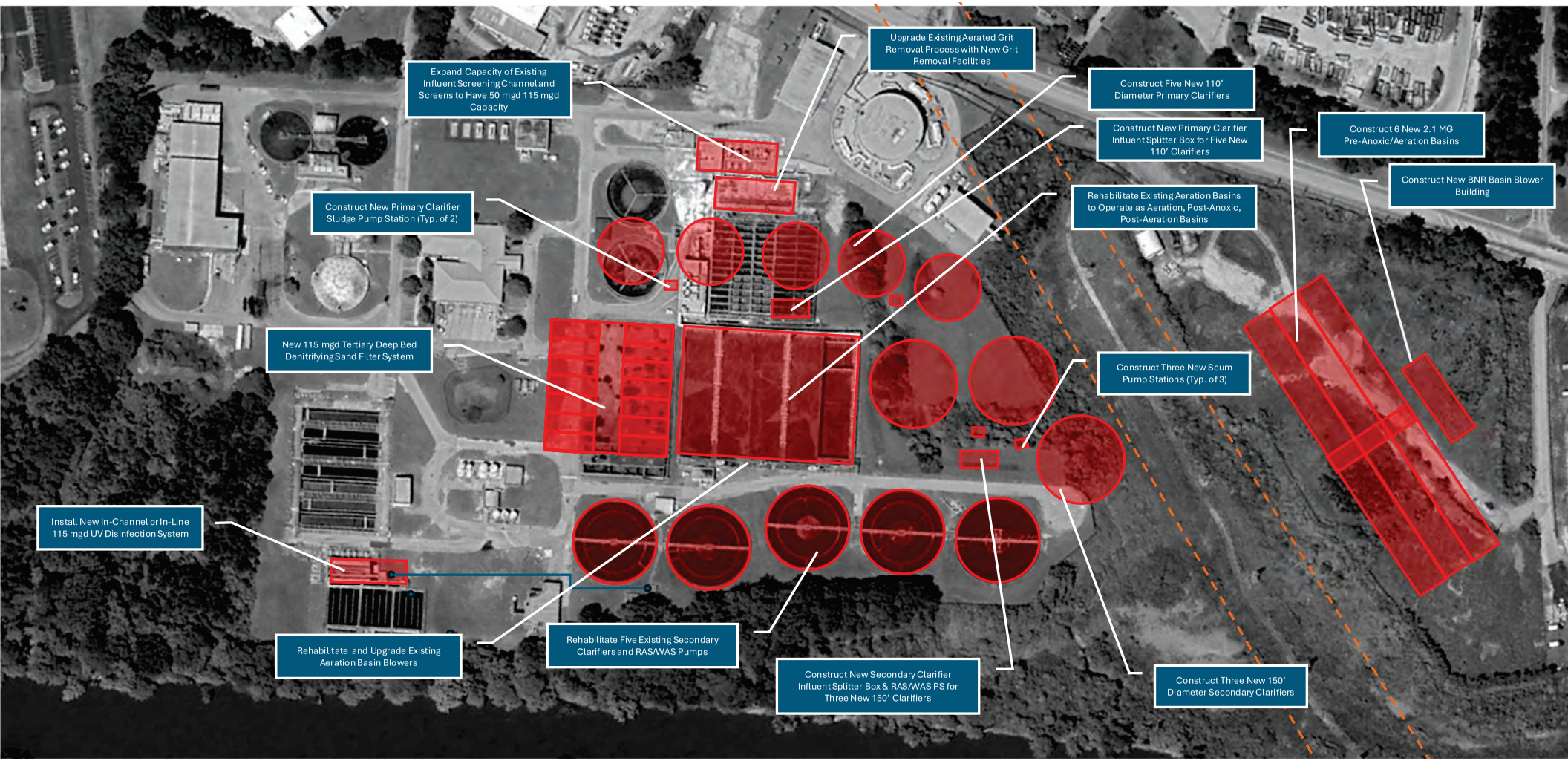
Alternative A10.2 – Expand Existing Process to 50 mgd (3-Stage Bardenpho BNR Process) with Deep Bed Denitrifying Sand Filters



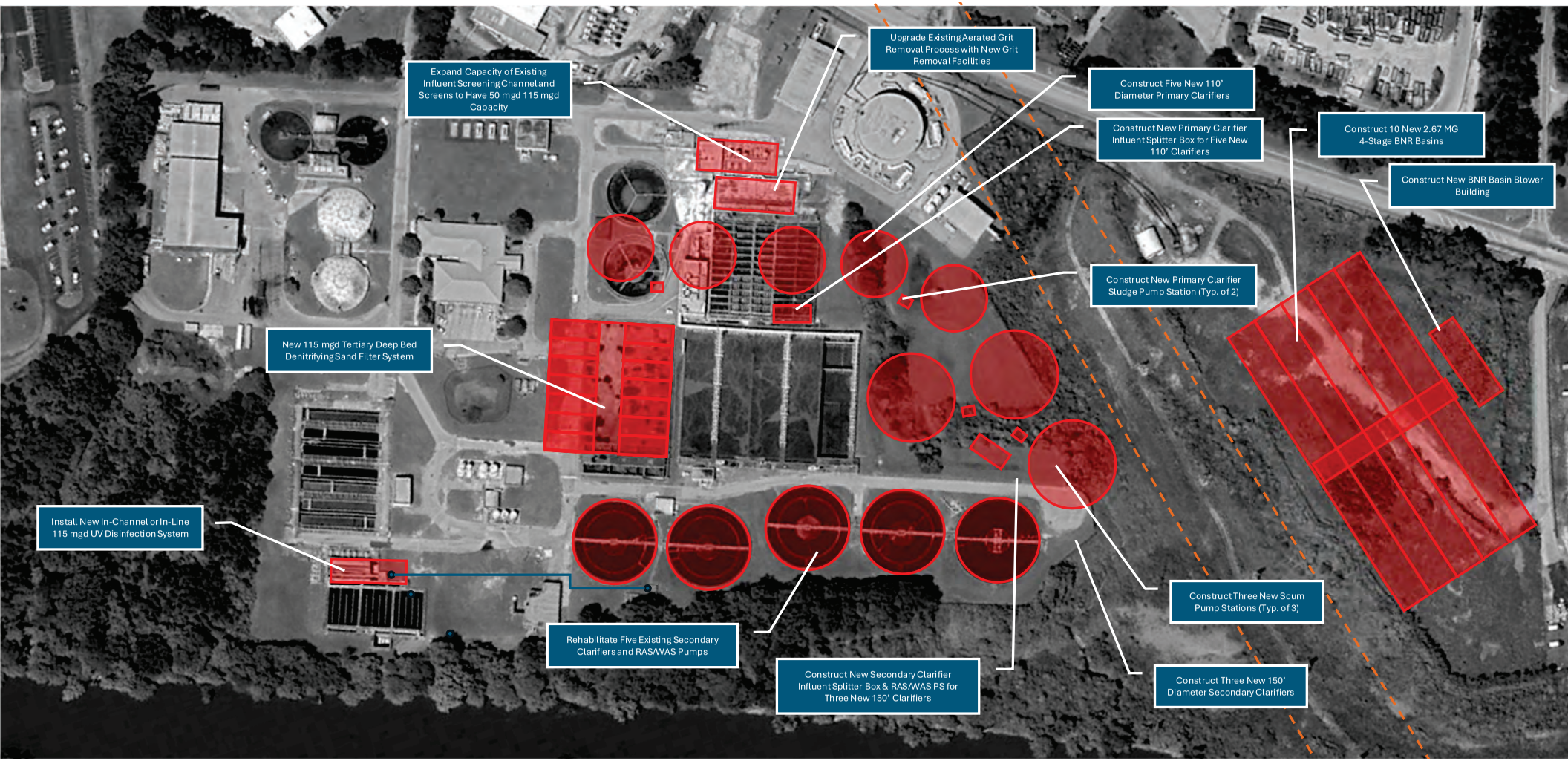
Alternative A11.1 – Expand Existing Process to 50 mgd (4-Stage Bardenpho BNR Process) with Deep Bed Denitrifying Sand Filters



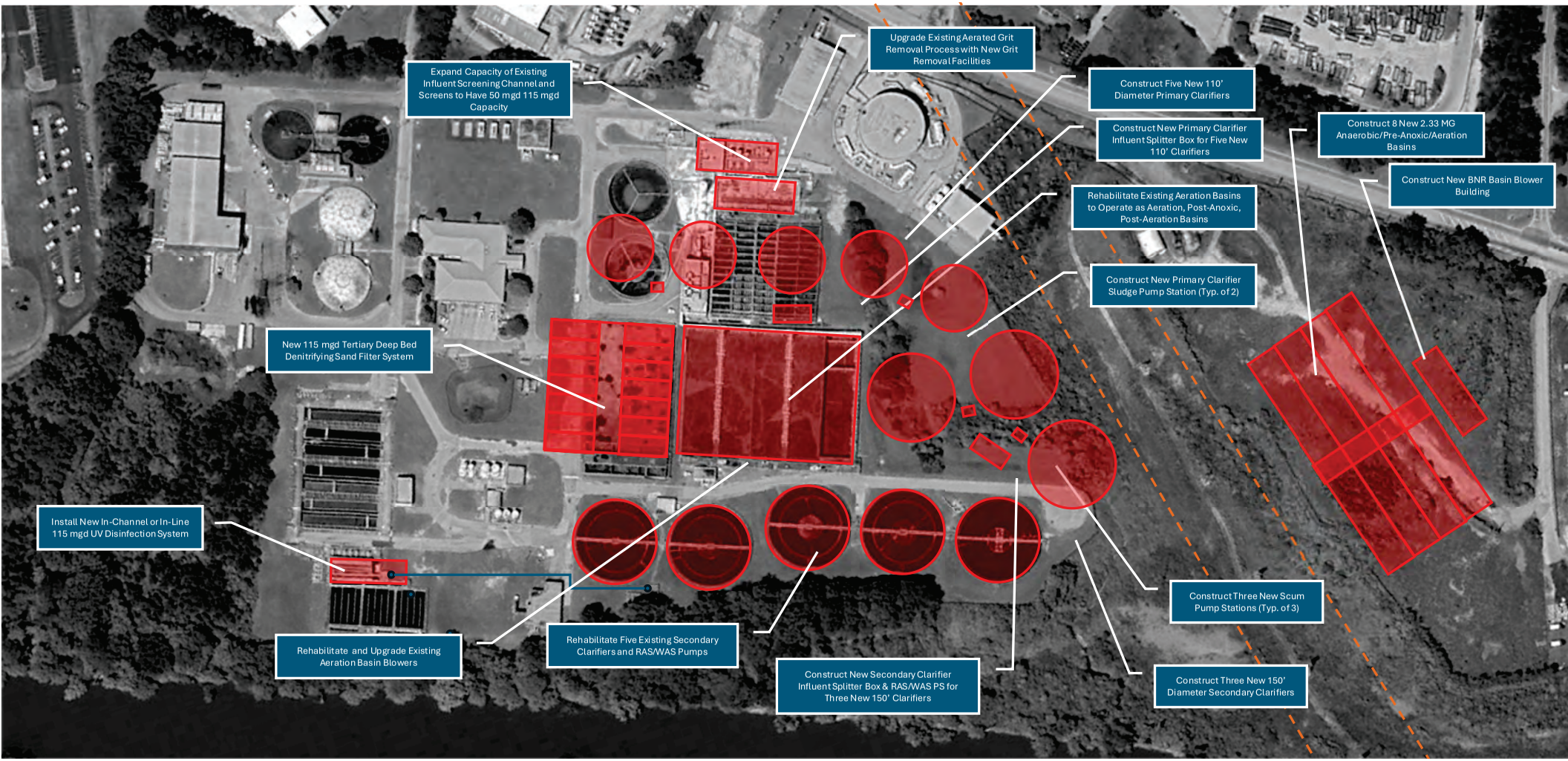
Alternative A11.2 – Expand Existing Process to 50 mgd (4-Stage Bardenpho BNR Process) with Deep Bed Denitrifying Sand Filters



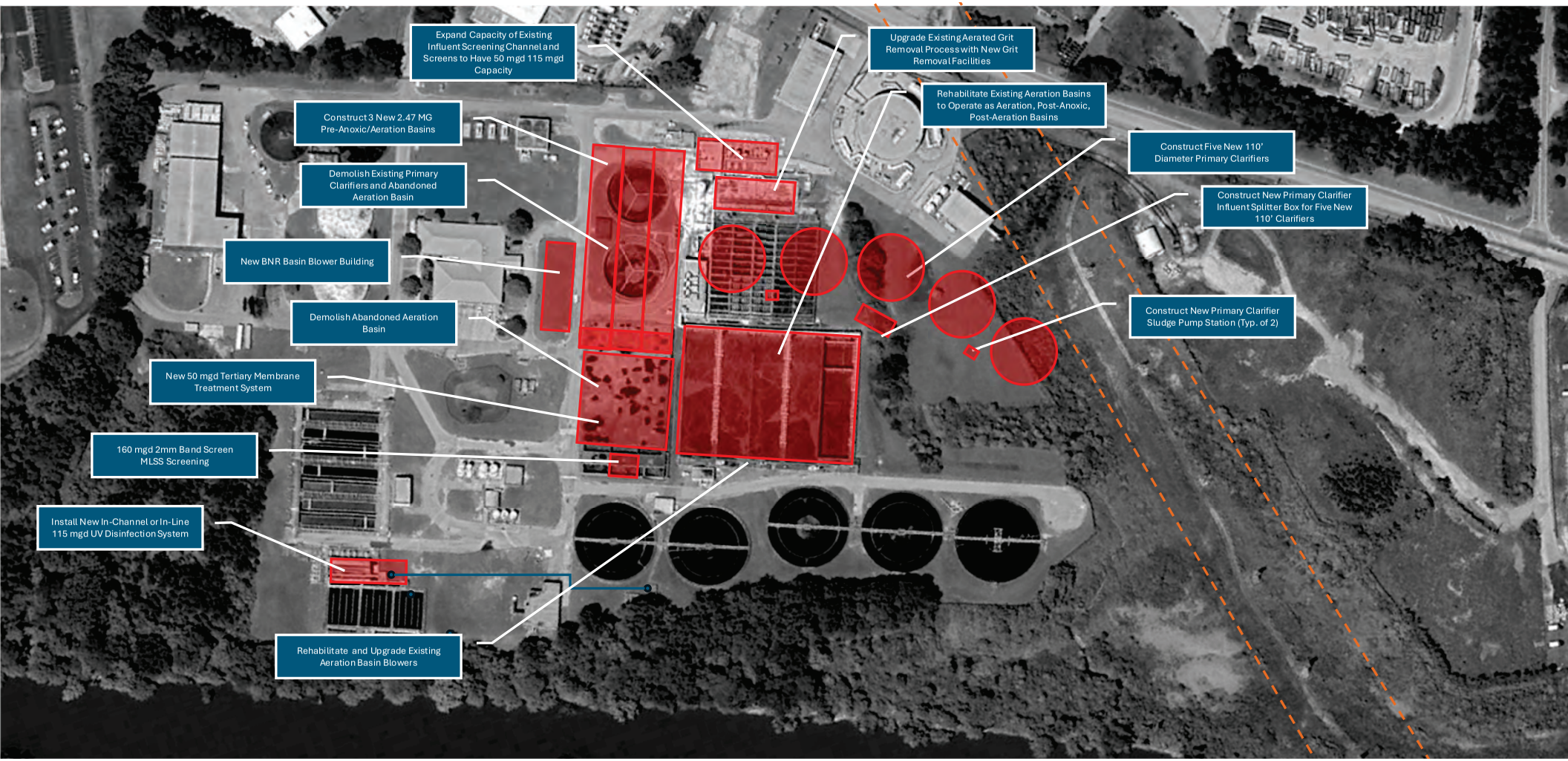
Alternative A11.3 – Expand Existing Process to 50 mgd (4-Stage Bardenpho BNR Process) with Deep Bed Denitrifying Sand Filters



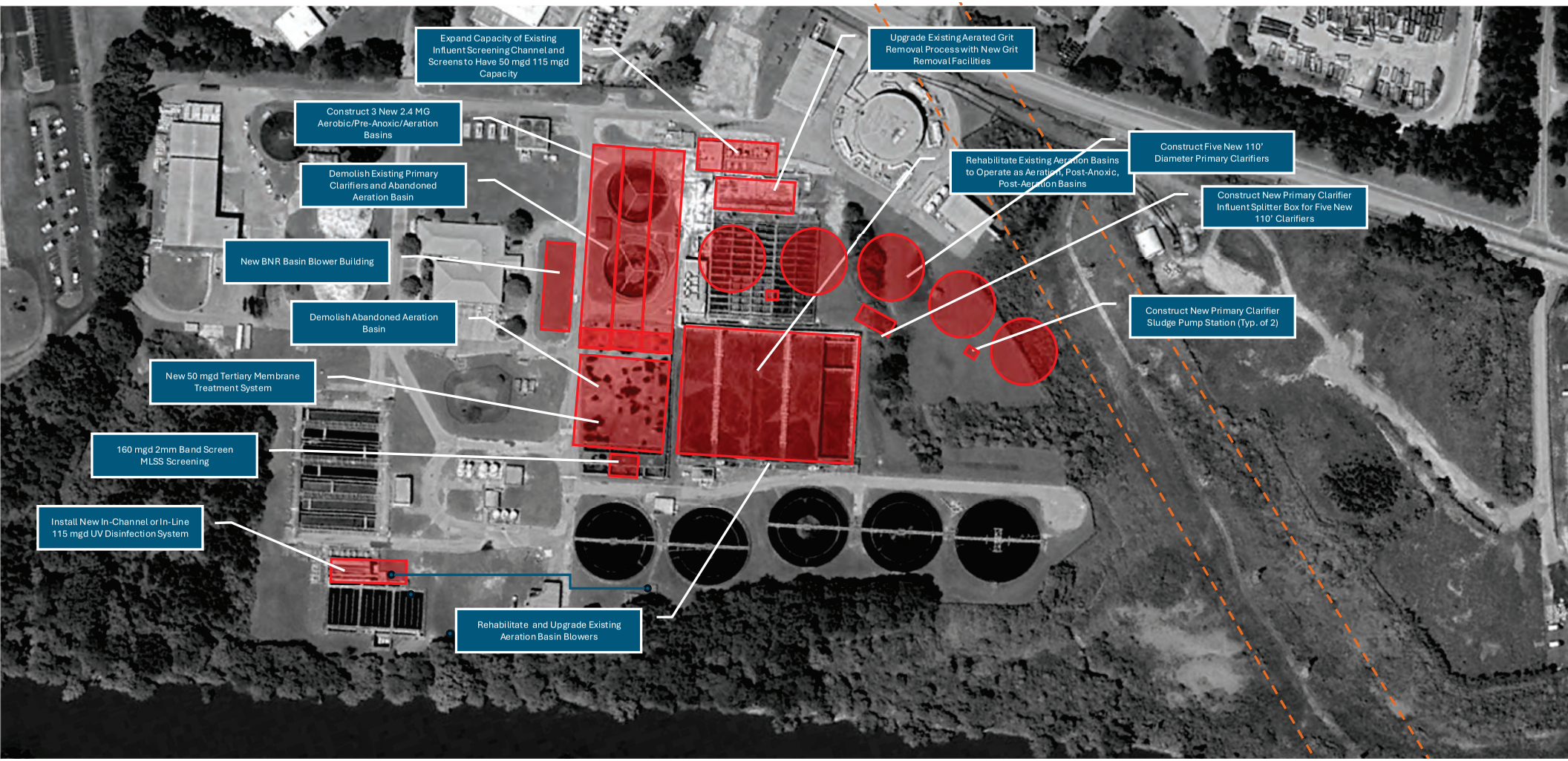
Alternative A12 – Expand Existing Process to 50 mgd (5-Stage Bardenpho BNR Process) with Deep Bed Denitrifying Sand Filters



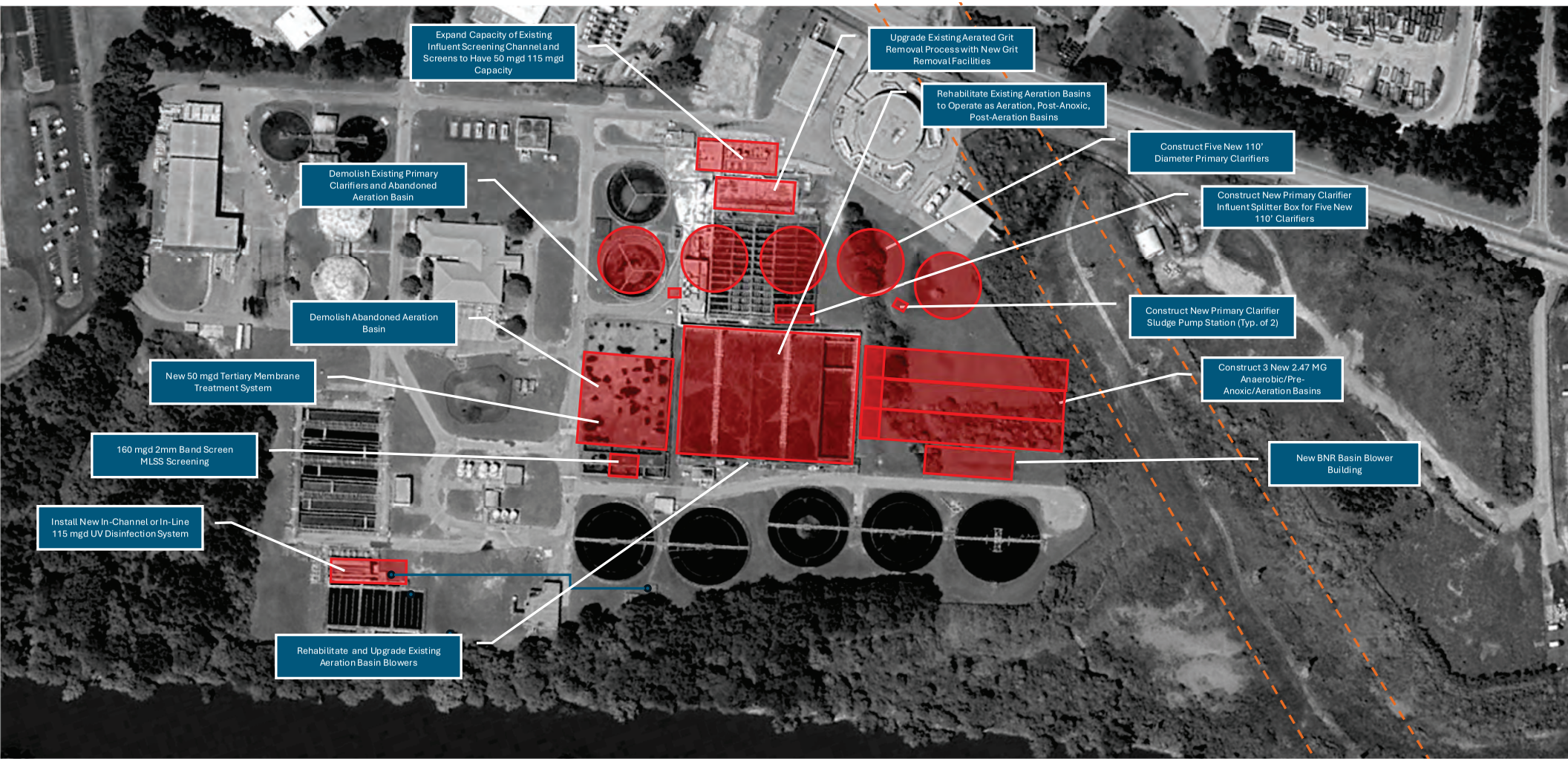
Alternative A13 – Expand Existing Process to 50 mgd (4-Stage Bardenpho BNR Process) with Tertiary Membranes



Alternative A14.1 – Expand Existing Process to 50 mgd (5-Stage Bardenpho BNR Process) with Tertiary Membranes



Alternative A14.2 – Expand Existing Process to 50 mgd (5-Stage Bardenpho BNR Process) with Tertiary Membranes



Alternative A15 – Expand Existing Process to 50 mgd (5-Stage Bardenpho BNR Process) with Deep Bed Denitrifying Sand Filters

