Lower Cape Fear Water & Sewer Authority
Regular Board Meeting Minutes
October 14th, 2024

Chairman Knight called to order the Authority meeting scheduled on October 14th, 2024, at 9:00 a.m. and welcomed everyone present. The meeting was held at the Authority's office located at 1107 New Pointe Boulevard, Suite 17, Leland, North Carolina. Director DeVane gave the invocation.

Roll Call by Chairman Knight:

Present: Norwood Blanchard, Patrick DeVane, Wayne Edge, Harry Knight, Scott Phillips, Charlie Rivenbark, Bill Sue, Phil Tripp, Frank Williams, and Rob Zapple

Present by Virtual Attendance: Al Leonard, Jackie Newton, Bill Saffo, and Chris Smith

Absent: None

Staff: Tim H. Holloman, Executive Director; Matthew Nichols, General Counsel; Sam Boswell, COG; Tony Boahn P.E., McKim & Creed; Jess Powell P.E., McKim & Creed; and Danielle Hertzog, Financial Administration Assistant

Guests Present: Jorgen Holmberg, Computer Warriors; Glenn Walker, Brunswick County Water Resources Manager; Anthony Colon, Pender County Director of Utilities; James Proctor, Pender County Deputy Director of Utilities

Guests Virtual Attendance: Larry Froelich, Stepan Company Plant Manager; Craig Wilson, Cape Fear Public Utility Authority Engineering Manager

PLEDGE OF ALLEGIANCE: Chairman Knight led the Pledge of Allegiance.

APPROVAL OF CONSENT AGENDA

C1 – Minutes of September 9, 2024, Regular Board Meeting
C2 – Kings Bluff Monthly Operations and Maintenance Report
C3 – Bladen Bluffs Monthly Operations and Maintenance Reports
C4 – Line-Item Adjustment for August 31, 2024

Motion: Director Rivenbark **MOVED**; seconded by Director Blanchard, approval of the Consent Agenda Items C1-C4. Upon voting, the **MOTION CARRIED UNANIMOUSLY.**

NEW BUSINESS

NB1- Resolution Accepting the Lower Cape Fear Water and Sewer Authority Kings Bluff Regional Raw Water Supply Facilities FY 2024-2025 Annual Inspections Report (Tony Boahn, P.E., McKim and Creed)

As required by the Authority's authorizing bond order and water supply agreements with its customers, McKim & Creed conducted the annual inspection of the King Bluff Raw Water Pump Station (KBRWPB) and submitted the Lower Cape Fear Water & Sewer Authority Kings Bluff Regional Raw Water Supply Facilities FY 2024-2025 Annual Inspection Report. Mr. Powell provided a PowerPoint presentation of the King's Bluff annual report with an overview of the system, including intake and pier, pump station, electrical building, generator facilities, the three-million-gallon ground tank, the booster pump station, raw water main right of way, the 48-inch raw water main, and the 54-inch parallel raw water main. Mr. Powell commended Brunswick County for doing a magnificent job maintaining Kings Bluff due to only finding minor concerns during the inspections. Mr. Powell advised there is a leak in the check valve on pump number one, and Russell Underwood is working to repair the leak. A copy of the report is hereby incorporated as part of these minutes.

Motion: Director Rivenbark **MOVED**; seconded by Director Williams, to approve the *Resolution Accepting the Lower Cape Fear Water & Sewer Authority Kings Bluff Regional Raw Water Supply Facilities FY 2024-2025 Annual Inspection Report* as presented Upon voting, the **MOTION CARRIED UNANIMOUSLY.**

NB2- Resolution Accepting the Lower Cape Fear Water and Sewer Authority Bladen Bluffs Regional Raw Water Supply Facilities FY 2024-2025 Annual Inspections Report (Tony Boahn, P.E., McKim and Creed)

The Authority's Special Facility Revenue Bond Series 2010 requires an annual inspection of the Bladen Bluffs Regional Surface Water Treatment facilities by a qualified engineer to report on readiness, identify deficiencies, and make recommendations on needed repairs and capital improvements. McKim & Creed conducted the inspection and submitted the report dated September 2024. Mr. Powell presented a PowerPoint presentation of the inspection's results and findings, including the intake and raw water pump station, treatment processes, residual basins, chemical

systems, and administrative facilities. Mr. Powell concluded that the items identified in the report are minor maintenance items, and the facility is well maintained. Jess advised there is a new item, which is the Chemical Building chlorine tank leak and corroding column, and that will be addressed by staff. Chairman Knight is concerned that both inspection reports show routine maintenance items listed for multiple years. Director Williams requested a quarterly update for the board on outstanding items on the annual inspection if the item is from the previous year, the urgency for the repair, and the consequences of not completing the repair. A copy of the report is hereby incorporated as part of these minutes.

Motion: Director Phillips **MOVED**; seconded by Director Blanchard, approval *of the Resolution Accepting the Lower Cape Fear Water & Sewer Authority Bladen Bluffs Regional Surface Water Treatment Facilities Fiscal Year 2024-2025 Annual Inspection Report* as presented. Upon voting, the **MOTION CARRIED UNANIMOUSLY.**

NB3- Resolution of the Lower Cape Fear Water and Sewer Authority Board of Directors Establishing Criteria for a Design-Build Delivery Method and Authorizing Use of the Design-Build Delivery Method for the Kings Bluff Raw Water Pump Station Air Backwash Building and Access Walkway Replacement

Executive Director Holloman advised that the air backwash building and access walkway at the Kings Bluff Raw Water Pump Station need replacement, and the walkway replacement is KB-6 of the Master Planning Document approved by the Board. Due to the nature, size, scope, complexity, and anticipated schedule of the proposed project, the Executive Director recommends that the Board consider the design-build delivery method. Director Zapple wanted to confirm the design team will be looking at all possible options. Executive Director Holloman advised that they would look at all possible options to make the best decision

Motion: Director Edge **MOVED**; seconded by Director Rivenbark, approval of the Resolution of the Lower Cape Fear Water and Sewer Authority Board of Directors Establishing Criteria for a Design-Build Delivery Method and Authorizing Use of the Design-Build Delivery Method for the Kings Bluff Raw Water Pump Station Air Backwash Building and Access Walkway Replacement. Upon voting, the **MOTION CARRIED UNANIMOUSLY.**

ENGINEER'S COMMENTS

No comments.

ATTORNEY COMMENTS

No comments.

EXECUTIVE DIRECTOR REPORT

EDR1 – Comments on Customers' Water Usage and Raw Water Revenue for Fiscal Year to Date Ending August 31, 2024

Executive Director Holloman reported that during September, CFPUA was above projections.

DIRECTOR'S COMMENTS AND/OR FUTURE AGENDA ITEMS

No comments.

PUBLIC COMMENT

No comments.

ADJOURNMENT

There being no further business, Chairman Knight adjourned the meeting at 9:46 a.m.

Respectfully Submitted:

Scott Phillips, Secretary

Lower Cape Fear Water & Sewer Authority

Kings Bluff Regional Raw Water Supply Facilities

FY 2024-2025 Annual Inspection Report

Kings Bluff Raw Water Pump Station

Interim Raw Water Booster Pump Station

Prepared by

McKIM&CREED

243 North Front Street
Wilmington North Carolina
F-1222

Prepared for

October 2024

NORTH CAROLINA PROFESSIONAL SEAL 046997 ENGINEER JESSE E. POWELL
10/3/24

LOWER CAPE FEAR WATER AND SEWER AUTHORITY
KINGS BLUFF REGIONAL RAW WATER SUPPLY SYSTEM
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SECTION 1 - INTRODUCTION

1.1 FACILITIES

The Lower Cape Fear Water and Sewer Authority is a regional organization with sponsoring members that are comprised of Bladen, Brunswick, Columbus, New Hanover, and Pender Counties, and the City of Wilmington. The Authority was created to aid development of a water supply system for the sponsoring member governments, which are primarily located in southeastern North Carolina (Refer to Figure 1 for a map of the Authority's current service area). The Authority's current facilities at King's Bluff consist of the following:

- Two (2) Raw Water Intake Pipes and Associated Intake Screens
- Kings Bluff Raw Water Pumping Station
- Interim Booster Pumping Station
- Raw Water Transmission Main Piping
- Raw Water Storage Reservoir
- Miscellaneous items such as, SCADA, Metering Vaults, Air Release Valves, etc.
- Pump Station Standby Power (Kings Bluff Raw Water Pumping Station) consisting of Two Separately Housed Primary Diesel-Powered Generators with Automatic Transfer Switchgear.
- Two (2) oxidation catalysts installed on each primary standby generator.
- Transmission Main Pigging Facilities
- Air Surge Tank System

The Authority obtains raw water from the Cape Fear River via two (2) raw water intake pipes (48-inch and 60-inch diameter) located just above Lock & Dam No. 1 in Bladen County. Raw water is conveyed by various raw water transmission mains to several governmental and industrial users in the region. The Authority's current customers are as follows:

- Brunswick County (governmental entity)
- Cape Fear Public Utility Authority (CFPUA - governmental entity)
- Pender County (governmental entity)
- Invista (private industry)
- Praxair Incorporated (private industry)

Phase I of the Authority's facilities, completed in 1984, consists of a 45 million gallon per day (MGD) raw water pumping station and intake structure, approximately 14 miles of 48-inch transmission main, and a 3 million-gallon (MG) storage reservoir. Phase 2 extended the system

approximately 10 miles to serve the industries of Invista and Praxair along US 421 and the City of Wilmington. This phase consisted of 60-inch and 48-inch transmission lines that were placed into service in April 1992. The Phase 1 and Phase 2 facilities are shown in Figure 1.

In December 2003, the two 3.0 Megawatt (MW) standby generators were placed into full-time operational status at the Kings Bluff Pumping Station. The generators are housed in a separate building co-located with the pumping facilities at the Kings Bluff site. Major components of the standby power facilities include (2) reconditioned generators, automatic electrical switchgear, and (2) 12,000-gallon capacity fuel tanks. In 2007 the Authority completed a major rebuild of both 3.0 MW standby generators.

In 2005 it was recommended that the Authority conduct pigging of the 48-inch raw water transmission main to clean the pipe of the sedimentation and sand accumulation that was reducing the output due to increased friction in the pipeline. This project included the installation of pig launch and retrieval facilities and the completion of four (4) 'pig' runs to scour the pipe interior. The pig launch facility is located near the Kings Bluff Pumping Station, while the pig retrieval facility is located at the storage reservoir site.

In 2009 a comprehensive expansion and upgrade to the Kings Bluff Pumping Station was completed that included the following major components:

- Three (3) new 1,600 HP vertical turbine raw water pumps
- Additional wet well expansion to accommodate a total of five (5) raw water pumps
- New electrical building housing three (3) variable frequency drives
- New operations office with restrooms, shower facilities, and overnight accommodations
- SCADA and telemetry upgrades
- Valving and raw water main piping modifications for future parallel raw water main connection
- Retention of two (2) existing 1,000 HP vertical turbine raw water pumps (note that both 1,000 HP pumps have recently been permanently removed from the facility)
- Additional air surge tank

In 2010, a new 60-inch diameter parallel raw water intake pipe and three (3) intake screens were constructed at the Kings Bluff Pumping Station. The 60-inch intake was placed into service in December 2010 and was constructed parallel to the existing 48-inch intake pipe. The 60-inch intake piping and existing 48-inch intake pipe were designed and constructed such that the station can be supplied raw water from either intake pipe or both simultaneously, thus providing ultimate operational flexibility at the Kings Bluff facility. In conjunction with the intake project, a new integrated air backwash system and building was constructed adjacent to the original air backwash building. The purpose of the backwash system is to allow for periodic

cleaning of silt and debris buildup at the intake screens via a pressurized air burst through the screen assemblies.

Primary components of the parallel 60-inch intake system are as follows:

- 1,100 feet of 60-inch ductile iron intake pipe
- Three (3) *Johnson* stainless steel intake screens rated at 27.5 MGD each
- New air backwash building
- *Johnson Hydro-burst* integrated air backwash system and 2,000 Gallon air tank

Interim Booster Pump Station

In 2013 the Authority completed construction of the Interim Booster Pump Station (IBPS), which is located at the 3 MG ground tank site. The IBPS provides a capacity of 29.1 MGD, as well as increased pressures, to customers on the US Highway 421 portion of the system, which are Pender County, Invista, Praxair, and CFPUA. The IBPS consists primarily of three (3) diesel driven pumps that deliver increased flow and pressure to meet peak summer demands for Authority customers. Originally, the IBPS pumps, fuel cells, and standby generator were provided under rental agreement to the Authority with *Mersino Pumps*. However, the Authority has since purchased this equipment and the IBPS is a now permanent facility completely owned and operated by the Authority.

Primary Components of the IBPS are as follows:

- Three (3) diesel-driven pumps
- Three (3) 500-gallon capacity diesel fuel storage tanks
- One (1) 45 KW diesel generator
- 265 feet of 24-inch ductile iron pipe
- 700 feet of 48-inch ductile iron pipe
- Piping, valves, miscellaneous appurtenances
- SCADA/Telemetry controls for operation of the IBS

Hurricane Matthew Raw Water Main Failure

On October 13, 2016, a significant failure of the LCFWSA's existing 48-inch PCCP raw water transmission main was identified by staff in the community of Riegelwood, Columbus County, NC. The failure occurred in a low topographical area that has limited drainage and is prone to flooding. Upon identification of the leak, a multi-organizational effort to repair and restore the pipeline was undertaken. The repair effort included extensive dewatering, a temporary access

road, a temporary repair band, a temporary by-pass pipe, and full replacement of the failed pipe sections with DIP.

Based on evaluation of the failed transmission pipeline, it was determined that the pipe bedding and foundation had been undermined and that the pipe had settled causing the joints to separate and leak. In review of events leading up to the pipe failure, it was determined that Hurricane Matthew had passed the area on October 8, 2016, delivering 8-inches of rain over a 24-hour period. After this event, the nearby Cape Fear River crested at approximately 28 feet on October 13th-14th, 2016 which directly coincided with the pipeline failure of October 13, 2016. It was surmised that the flooded conditions and the significant impacts attributed to Hurricane Matthew undermined the pipe bedding and foundation, causing settlement of the pipe, separation of the pipe joints, and failure of the pipeline.

Repair efforts included the following:

- Installation of approximately 1,000 linear feet of 36-inch HDPE bypass piping with two (2) wet taps on the existing 48-inch main.
- Removal of approximately 80 linear feet of 48-inch PCCP raw water main.
- Installation of approximately 80 linear feet of new 48" DIP raw water main.
- New in-line 48-inch gate valve
- New 48-inch Tee

The total project cost to repair the pipeline was $2,766,690, which was 100% reimbursed through FEMA disaster relief funds.

Pure Technologies SmartBall Inspection

As a result of the pipe failure and age of the existing 48-inch PCCP raw water main, the Authority contracted with *Pure Technologies* to perform a leak inspection of the 14-mile pipeline section from the Kings Bluff Raw Water Pump Station to the 3 MG Ground Tank. The inspection involved insertion of a "SmartBall" acoustic device in the pipeline for the length of pipe to be inspected. The "SmartBall" travels along the pipeline and utilizes acoustic methods to determine potential leaks along the pipeline. The field inspection of the pipeline was completed on May 18, 2017. Results from the inspection indicated no major leaks but did note a potential small leak near the 3 MGD Ground Tank. Based on the Pure *Technologies* report, the leak was likely the result of "bleed through" of the existing valve at the 3 MG ground tank and did not represent an actual leak from the pipe. No further action was taken upon completion of the report; however, McKim & Creed recommends that the existing valve at the 3 MG ground tank be monitored for potential leaks or other issues.

54-Inch Parallel Raw Water Main

In December of 2019, construction of a new parallel 54-inch raw water transmission main began and was placed into service in November of 2021. The project was subsequently completed in April of 2022 after installing strategic interconnections with the existing 48-inch pipeline. The new 14-mile pipeline now parallels the existing 48-inch raw water main from the Kings Bluff Raw Water Pump Station to the 3-million-gallon ground tank near the Brunswick County Northwest Water Treatment Plant. The pipe was constructed of welded steel with a cement mortar liner and exterior polyurethane coating. Cathodic protection for the new pipe was installed along the entire pipeline route. Four primary interconnections with the existing 48-inch raw water main were constructed to provide resiliency and operational flexibility for the conveyance system. With the completion of the new parallel pipeline, the Kings Bluff Raw Water Pump Station has a firm permitted capacity of 62 MGD.

Kings Bluff Raw Water Pump Station 4th Pump Design & Permitting

The Board of Directors authorized the design and permitting of a new 4th raw water pump for the Kings Bluff facility in July of 2020. The design was completed in the fall of 2020 and a permit modification was submitted to NCDEQ Public Water Supply to increase the station capacity to an anticipated 90 MGD. The modified permit was approved in February of 2021; however, the 54-inch parallel pipeline noted was not complete and operational at the time for the Authority to fully realize the increased capacity that would be available from the 4th pump; therefore, the project was put on hold until after completion of the pipeline. The Authority's master planning document outlines that the project will begin in fiscal year 2024 and will be complete and operational by fiscal year 2026.

48-Inch Raw Water Main Failure near DAK Industries Site

On November 3, 2021, a pressure spike in the raw water transmission main system resulted in a significant failure of the LCFWSA's existing 48-inch PCCP raw water transmission main. The failure was identified by Brunswick County staff in the area behind the DAK Industries site near the Cape Fear River. Upon identification of the leak, a multi-organizational effort to repair and restore the pipeline was undertaken as downstream customers (CFPUA, Pender, 421 Industries) were receiving reduced flows as a result of the failure in the pipeline.

Brunswick County utilized their emergency services contract with State Utilities to mobilize personnel and equipment to the project area and begin installation of bypass piping and repair of the damaged pipe sections (approximately 220 feet total). The repair of the section of 48" pipe was completed on January 15th, 2022, and the line was restored to service. The total cost to complete the emergency repair was $2,521,503.84.

Black Rock Rd. Raw Water Main Repair

In April of 2022 during a punch list inspection for the 54-inch raw water transmission main project, McKim & Creed staff observed water bubbling up from the ground along the 48-inch pipeline alignment near Black Rock Rd. With the new 54-inch pipeline in service, LCFWASA staff were able to isolate the section of pipeline to excavation and identify the leak. Brunswick County staff received bids to remove the two pipe segments on either side of the damaged joint and replace them with 48" ductile iron pipe the Authority had in storage. TA Loving was placed under contract to make the repairs, and this work was completed in August of 2022. The total cost of the repair was $85,474.80.

Access Walkway over Livingston Creek

In January of 2023 Intracoastal Marine completed the installation of a walkway connecting the 54" steel pipe access walkway to a new walkway spanning the aerial portion of the existing 48" PCCP pipe. This new structure will be used for future maintenance and inspections of the existing 48" PCCP pipe.

Also completed by Intracoastal Marine during the same time was a joint repair on the existing 48" PCCP elevated pipe where degradation of one of the existing joints had occurred. The contractor repaired the joint in accordance with specifications provided by the pipe manufacturer and at the direction of McKim & Creed's structural engineer. (**See Photograph II**)

54-Inch Parallel Raw Water Main – Phase 2

The Authority is currently designing Phase 2 of the 54-inch raw water main project, which is a 7-mile extension of the previous project. The project will extend from the existing 3 MG tank, crossing the Cape Fear River, to the Pender County meter vault where an interconnection is proposed. Construction of Phase 2 is anticipated to begin in January 2025 and with completion expected in April 2026. Phase 2 will be fully funded with Federal ARPA and NC General Assembly infrastructure grant funds.

54-Inch Parallel Raw Water Main – Phase 3

The Phase 3 project is a 3-mile extension from Phase 2 and will provide a complete parallel pipeline for the full length of the Kings Bluff system. The project will extend from the existing Pender County meter vault to the CFPUA meter vault where an interconnection is proposed. Contracts are currently under negation and design is expected to begin in October 2024. Construction is expected to begin following the completion of the Phase 2 pipeline. Phase 3 is partially funded with NC General Assembly infrastructure grant funds. An interlocal agreement has been executed to fund the remainder of the project.

1.2 BASIS OF ANNUAL INSPECTION

A condition of the authorizing Bond Order requires an annual inspection of all facilities by a qualified Engineer who shall report on their readiness, identify any deficiencies, and make recommendations on capital improvements.

1.3 OPERATING ARRANGEMENTS

The Authority maintains limited full-time staff, consisting of an Executive Director and an Administrative Assistant, for the administration of the Authority's programs and the coordination of water supply activities in the Region. The Authority contracts for operations and maintenance of the Regional Water Supply System with Brunswick County. The Brunswick County Utilities Department provides the personnel and resources to operate and maintain the Authority's raw water facilities and administers outside maintenance contracts as needed for effective operation of the system. Thus, Brunswick County is designated the "Contract Operator" of the system.

1.4 SCOPE OF WORK

The annual inspection program is comprised of several major focus points:

- Detailed in-the-field inspection of the Kings Bluff Pumping Station, pipeline route, air relief valve assemblies, line valves, metering stations, reservoir facilities and grounds, and general appurtenances throughout, to assess general level of maintenance and to identify the need for equipment replacement, repairs, or remedial activities.
- Review of Authority's operation and maintenance records, protocols, and processes to identify the level of maintenance and potential adjustment toward improved efficiency.
- The identification of capital improvements or major repairs that merit immediate attention or further investigation and definition.

The results and findings of this annual inspection are summarized in the following sections of this report. The FY 2024 - 2025 inspection of the Authority's facilities was conducted during September 2024.

SECTION 2 - KINGS BLUFF PUMPING STATION

2.1 GENERAL STATUS

The components of the Kings Bluff Pumping Station consist of:

- A 48-inch raw water intake pipe with three 15 MGD intake screens and air backwash system with a total rated capacity of 45 MGD
- A 60-inch raw water intake pipe with three 27.5 MGD intake screens and air backwash system with a total rated capacity of 82.5 MGD
- Three 1,600 HP vertical turbine pumps with variable frequency drives
- Two 3.0 MW (medium Voltage) primary backup generators with oxidation catalysts
- Two 12,000-gallon concrete diesel fuel tanks
- Electrical building and operators control room
- SCADA and telemetry system for monitoring and control
- 24 miles of 48-inch and 60-inch raw water transmission main
- Three (3) air surge tanks
- Pig Launcher & Pig Retriever on 54" RWM
- 14 miles of 54-inch raw water transmission main
- 4- Interconnections between "48" RWM and 54" RWM
- 24" & 30" Pressure Reducing Valve Assemblies
- New Flow Meter Vault
- New Elevated Platform with ARV and piping over Livingston Creek for both 48" PCCP pipe and 54" STL pipe.

2.2 EQUIPMENT AND SYSTEM INSPECTION SUMMARY

An inspection of all major equipment was completed, and the findings are tabulated in ***Appendix A***.

2.3 PUMP OPERATIONS

Power Sources

Primary power is purchased from Duke Energy Progress at Medium Voltage levels (4,160 Volts). The level of service provided enables the pumping station to be operated at its full rated capacity with two of the three 1,600 HP electrically driven pumps operating in parallel.

In the event of primary power interruption, the two 3.0 Mega Watt generators at the Kings Bluff pumping station energize automatically to provide dedicated, and reliable power to the pumping station. The generators allow the raw water pumps to be started and operated in order to meet the raw water demands of the Authority's customers. Overall, the generators were inspected and found to be in good operating condition.

In addition to providing emergency power to the station, LCFWSA entered into a power curtailment agreement (Demand Response Automation – DRA) with Duke Power. Under this agreement, the Authority's emergency power system was activated when requested by Duke causing the plant load to be shed from the main utility power system. For each activation, the Authority received compensation which was then used to offset the cost of operating the pump station. The generators are equipped with catalytic converters that meet required NCDEQ Air Quality Emissions standards to maintain participation in the DRA program. LCFWSA has a separate contract with PowerSecure to monitor the performance of the catalytic converters to ensure they are operating within the Air Quality constraints.

During this year's inspection (2024), the station's generators were not started. Additionally minor items requiring correction were noted and are listed in Appendix A.

The Authority's SCADA system and main computers, upgraded in 2009 as part of the pump station expansion/upgrade, are sufficient for current operations.

Pumps, Electrical, and HVAC Facilities

Noted in the 2014 inspection, Pumps 2 and 3 (1,000 HP each) have been permanently removed from the old pump station section. Openings have been capped and conductor conduits have been capped flush with the slab.

During the 2016 inspection staff suspected that Pump 4 had a cooling water leak in the upper bearing chamber that could be contributing to the high temperature. It was recommended that this be inspected and addressed immediately. The Authority staff did investigate this issue and no leak was found. As a protective measure, the Authority has purchased a spare cooling coil in the event of failure of a cooling coil on the 1600 HP pumps. The coil is interchangeable with each pump.

In June 2017, Pump 4 was removed from service due to an oil leak and was then repaired by Charles Underwood Pump Company. After the pump was placed back in service, the bearing was observed to be operating at a lower temperature, similar to or slightly lower than Pumps 1 and 5. A definitive answer was not provided by the pump manufacturer as to the reduction in bearing temperature; however, it has continually operated in a normal range since this repair and appears to be in satisfactory condition.

During this year's inspection, the 1,600 HP vertical turbine pumps (installed as part of the 2009 expansion/upgrade of the Kings Bluff facility) were inspected and found to be in good condition and meet the needs of the Authority's customers (See ***Appendix F -Photograph A***). Staff indicated that the scheduled service of Pump 1 was completed this year (2024).

During this visit, it was noted that the check valve on Pump 1 was significantly leaking. Staff indicated that Underwood recently installed a rebuilt unit that did not initially leak; however, over time, the valve began to leak. Staff indicated Underwood would be reviewing the installation next week in hopes of addressing the issue (See ***Appendix F - Photographs B***).

While on site, the current operation of the pump station was discussed. Currently, Pump 5 is being operated at a constant speed all day and Pumps 1 and 4 are in automatic mode and are being used to meet demands. This current control method is not a standard operating procedure and is being used temporarily until the check valve associated with Pump 5 is serviced. Staff indicated the hydraulic cushioning feature of the Pump 5 check valve was inoperable and when the pump turned off, the valve would slam. By running the pump in manual mode at a constant speed, it would minimize the number of shutdowns and thus number of slams. Staff indicated Underwood would be on site next week to investigate and resolve the issue (See ***Appendix F - Photographs C***).

Additionally, staff indicated the lighting in the old station was scheduled to be replaced with LED lighting and the existing was outdated florescent type. The roof replacement project at the old pump station (previously funded and awarded) was underway and approximately 25% complete (See ***Appendix F - Photographs D***).

During this inspection, failing paint on the interior wall adjacent to the personnel door leading to the pier from the new pump station was observed (See ***Appendix F - Photographs E***). After further inspection, failing paint was observed on the exterior of the same wall along with a failing mortar joint located 1 block course above the base slab. Minor block spalling was also observed (***See Appendix F- Photograph F***). It is recommended this area be investigated and addressed.

The 1,600 HP pumps are controlled by a separate electrical control room housing variable frequency drives and motor starters. During the 2016 inspection, it appeared that the masonry wall to wall joints located inside the new pump station electrical building had shifted producing cracked paint at the intersection of the walls. The most noticeable crack is located on the

masonry wall joint located west of the western most roll up door. Since the 2016 inspection, Engineer reviewed the joints and found that the issue was not structurally detrimental; however, it was recommended that staff should continue to monitor the issue. During this inspection, visual observation indicated that the size of the separation did not appear to have increased (See ***Appendix F - Photographs G***). It is recommended that the wall separation continue to be monitored.

Adjacent to the new electrical control room is an HVAC room housing the HVAC equipment (See ***Appendix F - Photographs H***). As noted during the 2023 inspection, a new HVAC unit had been installed outside with an associated air handler inside. All exterior HVAC units were reviewed and were clear of any debris blocking the condenser coils; however, it was noted that the insulation on the exterior HVAC piping had failed in several areas. It is recommended that the failing insulation be addressed (See ***Appendix F - Photographs I***).

While on site, staff indicated they were having issues with one of the exterior condensing units and that a service technician had investigated the concern. The results of the investigation indicated cooling fins were compromised in one unit and are scheduled to be replaced.

Pump Station Metering

The raw water pump station is provided with two flow meters that measure flow leaving the station. In the past, the flow meter readings at the station have been significantly different than the sum of the customer flow meters. Historically, the summation of the customer meters has been generally within 1-2% of the station meter totals. Per our understanding, County staff has conducted field testing and determined that the customer flow meters appear to be within acceptable ranges; therefore, customer billing appears to be normal and generally accurate. It is recommended that the County and Authority continue to monitor the metering conditions for accuracy at the Kings Bluff Pump Station. No issues were reported as a result of this year's inspection. The flow meter vault was inspected and found to be in good condition ***Appendix F - Photographs J***).

2.4 EXTERNAL DIESEL FUEL TANKS

The two 3.0 Mega Watt standby generators are supplied by (2) 12,000-gallon concrete fuel tanks, which are located adjacent to the generator building. The tanks were installed with a 110% secondary containment wall to capture overflow, ruptures, or spills of diesel fuel. During previous inspections, significant efflorescence was noted to exist on the tanks, suggesting coatings failure. During this inspection, the external fuel tanks were found to be repaired. Staff indicated a contractor had started repairing the coating; however, the work is suspended until weather conditions become favorable to complete the work (See ***Appendix F – Photograph K***). Also noted during the inspection, a diesel leak alarm was present on the interior leak detection display located inside the generator building. A local leak test alarm was also found inoperable at the diesel storage area (See ***Appendix F - Photographs L***).

2.5 PUMP STATION BUILDINGS

The combined new and old pump station buildings were inspected and found to be in good overall condition.

During a previous inspection, cracks were found in the concrete flooring of the new pump room. These cracks were analyzed and monitored and do not appear to be detrimental to operations. Both pump station piping galleries need to be cleaned for bugs, debris, etc. All observed issues detailed below are also noted in ***Appendix A***:

- During the time of the 2011-2012 inspection, O&M staff noted that the containment area provided in the new pump station building for oil storage floods and then subsides with heavy rains. Staff has addressed this issue by installing a French drain outside of the facility. The drain was placed against the wall and appears to be reducing the hydrostatic water load against the wall. In addition, staff applied another layer of sealant to the interior face of the CMU wall. During the 2019 inspection, staff indicated they had placed approximately 12 inches of concrete in the pit area and recoated with sealant. No water, moisture, or leaking was observed during this inspection and staff reported the drain and sealant appear to be working well.
- During this year's inspection, it was noted that both pump station piping rooms need to be cleaned out due to bugs and debris. With respect to the new pump station storage room, this room was found to be sustainably filled with stored items during the last inspection. Since then, items have been relocated/stored to not impede access to the exit door (See ***Appendix F – Photograph M***).

2.6 GROUNDS

The grounds consist of a paved access drive and parking area, and the grassed area surrounding the pumping station. During 2003 a new chain link security fence was installed around the complete pump station site. The new fence has an electronically controlled gate with a keypad entry system which was installed during the spring of 2003. The fence provides an enhanced level of security for the pumping station and the maintenance staff.

In recent years, sink holes have appeared behind the pump station, at the generator building transformers, and at the small generator. The Authority recently implemented repairs to a leaking storm drainpipe as well as capping an abandoned pipe that was suspected of contributing to the sink hole issues. During this inspection, sink holes or drainage issues were not observed and appear to have been corrected.

During the 2018 inspection, it was noted that several valve operator wheels were broken. The handwheels were replaced with operator nuts, correcting the problem, as documented in the 2019 inspection.

As of this inspection, the walkway that crosses the elevated ditch near the generator facility is in very poor condition (See ***Appendix F - Photographs N***). It is recommended that the walkway be

removed from service and replaced. In its current condition, it is not recommended that the walkway be utilized to cross the elevated ditch near the generator facility.

2.7 AIR SURGE TANK SYSTEM

The air surge tank system consists of three tanks and provides for surge relief and protection from water 'hammer.' During the 2019 inspection, it was noted that the anchor bolts which secure the steel air tank piers to the concrete base footings had been replaced.

During the 2019 inspection, it was noted that all tanks had been painted and the fill line has been provided with heat tracing and insulation to prevent freezing as previously recommended. Additionally, surge tank 3 exterior air piping has been painted as previously recommended.

During the 2021 inspection, six (6) drain valves were observed to have been replaced.

During this inspection (2024), it was noted that the paint was failing in several areas especially on the tank drain valves and tank #3 (See ***Appendix F – Photograph O and P).*** Staff are in the process of addressing the situation.

During the 2023 inspection, the surge tank control panels located inside of the pump station were observed to have several indicator lights that required replacement. Lights have since been replaced as of this inspection. Also, during this inspection, all surge tanks had their respective controls turned on (***See Appendix F – Photograph Q***).

With regards to tank 3 exterior level controls, it is recommended that the control and level piping mounted to the tank be heat traced insulated. All that piping is small in diameter and thus susceptible to freezing.

2.8 PIER

The pipe corridor of the 60-inch intake pipeline is located parallel and adjacent to the existing pier. An inspection of this area indicated that vegetative cover is established, and that the area is slightly flooded (See ***Appendix F - Photograph R***). Additionally, overgrown vegetation was in the process of being cleared but the work was not yet complete, as significant growth was observed near the building (***See Appendix F – Photograph S***). Staff indicated clearing was delayed but would resume shortly.

During the 2018 inspection, it was observed that the pier and walkways to the air-backwash control buildings needed repair. Several deck boards and handrails were in poor shape. During the 2019 inspection, it was noted that some repairs had been made (stair and plank replacement); however, more are still required. Also noted in previous reports, several areas on the older building's wall panels are still showing signs of rot. As of this inspection, the dock remains in poor condition (See ***Appendix F - Photographs T***). The old backwash building remains in need of repair as wall boards are rotted. It is noted that the LCFWSA is currently under contract with McKim & Creed to evaluate options for replacement of the pier and air

backwash buildings; however, it is recommended that the pier and buildings be maintained until the project is completed.

2.9 GENERATOR BUILDING

The generator building was inspected, and findings are presented in ***Appendix B***. The facility was found to be in good condition. Staff noted that during the Duke Energy curtailments (and other events) excessive heat is generated inside the building even when all exhaust fans are on and the exterior roll up doors are open. Staff noted the excessive heat causes damage to the batteries adjacent to the generators.

To eliminate the battery damage issue, the staff has completed the installation of an air start system on the generators. In addition, the staff is currently working to replace the 84v pre-lube motors with 24v motors. Once completed, all deep cell batteries can be removed and replaced with two standard car batteries and thus the impact of the heat will be significantly diminished.

As noted during prior inspections, the building interior insulation surface has been damaged by the heat, making it brittle. Because of this, surface repair tape will not attach, causing tearing and rip repairs to be impossible. As of this inspection, the above remains true and replacement of the insulation should be investigated. The generator radiators were observed to be in good condition.

Noted during previous inspections, exterior personnel doors were rusted to such an extent that holes appeared. The doors were replaced at the time of this inspection. **(See *Appendix F – Photograph U).***

Also noted during previous inspections, it was observed that the breaker panel located within the generator room had several failing indicator lights that should be replaced. At the time of this inspection, only one light was observed to need replacement.

Generator radiators were inspected during this visit and were found to be in operable condition; however, rust has advanced significantly on the underside fan shroud. It is recommended that staff monitor the area and address the issue in the future. Staff noted they were in the process of replacing one of the fan drive motors. The motor was delivered while on site for inspection.

As noted previously, the pneumercator panel located within the generator electrical room was found to be in alarm status. It is recommended that staff address the issue.

2.10 LIGHT DUTY GENERATOR

Staff indicated during this visit that the light duty generator is no longer in operation and will not be serviced further. A portable generator was on site to fulfill the purpose of the light duty generator. The diesel tank associated with the light duty generator will no longer be serviced

and will serve as storage for the portable generator. Once all diesel is exhausted, the tank will be retired (See ***Appendix F - Photographs V***).

2.11 STAFFING

The Authority currently contracts with Brunswick County Utilities for O&M staffing for its raw water facilities and does not directly employ any O&M staff. Generally, the station is not manned 24 hours per day and on-site operator duties are shared by multiple County employees on staggered work shifts.

2.12 RADIO ANTENNA

The antenna, fencing, and support equipment appeared to be in good working order. The antenna was struck by lightning within the past year and was serviced as a result. Due to the lightning strike, a new PLC was installed in the communication cabinet. During this work, Staff installed a new empty 2-inch conduit from the antenna to the generator building for a future fiber optic connection to the tower.

2.13 ON SITE POTABLE WELL

In 2019, staff installed a water line (1-inch service) from a Bladen County water line tap to the pump station. The existing well system was switched over to County water, mitigating the quality issue. There was no water quality issues noted in this year's inspection.

2.14 INTAKE SCREEN AND WARNING SIGNS

As of this inspection, there is no signage in the river to indicate the location of the screens to warn boaters. Staff indicated the sign was swept away by flooding due to Hurricane Matthew. Staff indicated visuals checks of the river are performed prior to backwashing, thus replacement of the signage was unnecessary. It is recommended that signage be placed on the riverbank, as low water levels in the river could cause deep draft vessels to damage the screens.

During the 2019 inspection, Staff indicated that the automated system for backwashing the screens had been disabled and the operation is conducted manually at the backwash buildings. During this inspection, the backwash system was not energized for observation. Staff indicated the air header ruptured during a recent automatic backwash. Consequentially, they are currently conducting backwashes in manual mode weekly rather than automatic mode. They indicated they are using manual mode because it puts less stress on the air header and reduces the chances of a blowout.

2.15 SEPTIC SYSTEM

The facility provides wastewater disposal via a small pump system with an on-site subsurface drain field. In 2019, Staff indicated the system grinder pump had been replaced recently and

that the system was operating without issues. During this inspection, there was no indication of septic issues observed.

SECTION 3 - RESERVOIR & INTERIM BOOSTER STATION

3.1 GENERAL

The three-million-gallon (MG) raw water ground tank is located near Brunswick County's Northwest Water Treatment Plant and is surrounded by an earthen berm to hold any overflow which may spill out of the storage tank. There is a small control building adjacent to the tank and the entire site is enclosed within a chain link fence. The ground tank is in good condition as are most of the other components at the 3 MG ground tank site.

The tank is made of pre-stressed concrete, coated with an external paint system for protection and appearance. There are several places where visible seams on the outside wall of the tank appear to have calcification due to leaks, but no visibly wet seams were noted (See ***Appendix F - Photograph JJ***). During the previous inspections, O&M staff indicated that the *Crom Corporation* (original tank manufacturer) had been contacted to evaluate the seams and provide recommendations for repair.

Interim Booster Pump Station

The interim booster station (IBS) was inspected and found to be in excellent condition and no issues were present that required corrective action. It is recommended that O&M staff periodically test the system for functionality and develop/modify protocols as required for maintenance and operation. It is also recommended that the IBS be exercised and tested under actual flow conditions to ensure proper operation when the IBS is required.

Interim Booster Pump Station Freeze Damage

In January 2017, the interim booster station sustained damage as a result of freezing temperatures. The pumps are equipped with drain valves and air release valves, which froze and burst because of abnormally low temperatures during this period. Additionally, damage was sustained to electronic controllers used for pump operation, likely a result of a lightning strike. As of the date of this report, all pumps have been repaired and are operational. Brunswick County staff are in the process of conducting pump tests in conjunction with Pender County and CFPUA to verify operational viability of all components. It is our understanding that Brunswick County will also develop a Standard Operating Procedure to test the pumps periodically.

In November 2018, the Authority obtained bids to implement improvements to the facility to include a shelter-style cover, freeze protection, and additional lighting. Based on the bids received, the Authority chose to delay the improvements to a future date.

SECTION 4 - PIPELINE

4.1 GENERAL

The Authority's original pipeline was constructed in two phases. The first phase which was constructured in the early 1980s, was comprised of approximately 73,000 linear feet (LF) of 48-inch diameter pre-stressed concrete cylinder pipe. The raw water main was extended in the early 1990s which included approximately 52,300 feet of 60-inch and 48-inch diameter pre-stressed concrete cylinder and ductile iron pipe. Air relief/vacuum valves are located at high points on the pipelines to allow trapped air to be vented from the pipeline and to allow the introduction of air into the pipeline in the event that 'vacuum' conditions occur. No inspections were made of the underground sections of the raw water main, however, the pipes are safely within the expected useful life of their respective materials and no significant issues are anticipated with the raw water transmission system. The pipeline between the Kings Bluff station and the 3 MG ground tank was pigged in 2005. While not critical to current operations at this time, a future pigging project should be considered to maintain maximum transmission capacity.

The recent completion of the parallel 54" pipeline has added 73,000 feet of pipe to the system, paralleling the original 1980s Phase I pipeline. Phase II of the parallel 54" pipeline project is expected to begin construction in January 2025 which will extend from the 3 MG ground tank to the Pender County meter vault. Phase II will add an additional 35,000 feet of parallel raw water main to the system. Funding has now been secured for the third and final phase, which is anticipated to begin construction once Phase II is complete. The project will span from the Pender County meter vault to the CFPUA vault, extending the raw water main an additional 15,000 feet.

4.2 RIGHT-OF-WAY

The pipeline right-of-way was inspected and found to be in good condition; however, several wet areas are frequently inaccessible due to water levels in swampy areas and highly overgrown areas (See ***Appendix F - Photograph AA***). It is recommended that these areas be mowed/cleared when possible and inaccessible areas inspected. A substantial portion of the pipeline right-of-way includes a gravel/soil access road, and farmland or adjacent railroad right-of-way and is well maintained and in good condition. The majority of the right-of-way is well maintained with adequate accessibility. The entire right-of-way width of 75' was cleared during the construction of Phase I - Parallel 54" RWM. During this inspection, the pipeline right-of-way was found to be in good condition. Natural gas subcontractor, Northstar, is currently working on gas improvements and using areas of the right-of-way to access their pipeline in the area near the DAK facility.

In 2005, all vaults and blow offs were marked within the right-of-way with high visibility 8-foot PVC pipe markers. However, it is noted that the orange paint has faded, and the PVC pipes

show signs of deterioration (See ***Appendix F - Photograph BB***). Any deteriorated marker post should be replaced with blue marker post with LCFWSA name and number.

The raw water main is also identified in the field by markers, which are blue in color with the Kings Bluff phone number stenciled in front. It also has "Lower Cape Fear Water & Sewer Authority" identified on the front of the marker with the phone number to the main office listed. This provides a visual notification of the approximate location of the pipeline and can help avoid potential impacts from construction, etc. within the Authority's right-of-way. It is recommended that all blue markers be upgraded/replaced at roadway crossings throughout the pipeline corridor.

The recently completed Phase I - 54-inch parallel pipeline provided "blue" utility markers to denote the location of new pipeline along the right-of-way corridor. It is recommended that the remainder of the right-of-way be inspected, and marker posts replaced or added as needed ***(See Appendix F – Photograph CC)***

As previously noted, a valve manhole exists along the access road to "The Bluffs" development that is adjacent to the roadway. It is recommended that bollards be placed at this location to protect the manhole from a vehicular accident that could damage the manhole and/or the raw water transmission main.

4.3 AIR RELIEF VALVES

The air relief valves on the raw water mains consist of a 6-inch valve to expel air and a 2-inch air valve to allow air into the pipe when drained, thus preventing a vacuum. Periodic exercising and verification of "open condition" is necessary for these valves to protect the pipeline from excess air surges, and possible rupture. Similar to blow-off valves, it is recommended that these valves be exercised at least once per year to maintain operational viability. Additionally, there are 25 new air relief valves along the 54" RWM route as shown in ***Appendix F - Photograph DD***. The photos show the existing ARV and new ARV on the 54" RWM. See ***Appendix C*** for a list of inspected air relief valves.

4.4 BLOW-OFF VALVES

The blow-off valves located on the original Phase I and II pipelines were inspected and appear to be in good condition. It is recommended the blow off valves be exercised at least once per year to ensure continued operability. Additionally, the blow-off valves should be repainted regularly, and new marker posts set on each side. See ***Appendix D*** for a comprehensive list of inspected blow-off valves on the 48" RWM. There are a total of 8 new blow-offs along the Phase I - 54" RWM route. See ***Photographs GG*** of existing blow-off and new blow-offs on 54" RWM.

4.5 METER VAULTS

Metering facilities are installed at the customer connections at Brunswick County, Praxair Inc., Invista, and CFPUA. Standby power exists at all meters and allows the Authority to collect data during major power outages and minimizes the amount of non-billed water due to loss of commercial power. All meters were inspected and appear to be in good working condition. It is recommended that all piping be evaluated and routinely painted at each vault as required. A summary of the inspection of all meter vaults is provided in ***Appendix A***.

4.6 CHECK VALVES

The 48-inch check valve manholes were opened during this inspection. All check valves appear to be in good condition and no major problems were identified (See ***Appendix E***). It is recommended that all valves be evaluated and routinely painted at each vault as required.

4.7 EMERGENCY CONNECTION – PREVIOUS DAK INDUSTRIES SITE

During repair of the pipeline that failed following Hurricane Matthew, Brunswick County installed an emergency connection to the existing raw water main near the former Dak Industries site. The connection consists of a tap on the main line, a valve, and an above ground connection pipe. The intent of this connection is to provide a potential emergency water source, whereby water could be withdrawn from the previous Dak Industries fire pond or possibly from the nearby Cape Fear River. Based on field inspection, this emergency connection is in good condition and requires no corrective action. It is recommended that the valve be periodically operated, and the external piping painted on a yearly basis. Additionally, with the closure of Dak Industries, the easement in this area is not maintained and should be included in the recurring easement maintenance. The connection is shown in ***Appendix F – Photograph EE***.

4.8 PHASE I - NEW 54-INCH PARALLEL RAW WATER MAIN

Construction of the new 54-inch parallel raw water main was complete in April of 2022. Garney Construction has installed approximately 74,000 linear feet of 54-inch raw water transmission main pipe. The pipeline was placed into service in November of 2022 and the 48-inch PCCP raw water main was taken out of service to install strategic interconnections along the 14-mile alignment. There are a total of four interconnections between the 54-inch pipeline and the 48-inch pipeline between the pump station and the 3 MG tank. The interconnections are located at the flowing locations:

1.) Narrow Gap Road

2.) John Reigel Road

3.) Blue Banks Road

4.) Behind BC Northwest Water Treatment Plant adjacent to the new flow meter vault.

(See Appendix F – Photograph HH)

4.9 GENERAL

The Authority utilizes both electronic and manual record keeping monitoring the operation of its raw water facilities. The SCADA system provides indication of and continuously records vital operational statistics for the major mechanical components located at the pumping station, raw water storage reservoir and the metering vaults. The O&M staff have the capability to generate manual as well as electronic records reflecting the pumping station's normal operations. The current level of record keeping provides the O&M staff with a means to review information for critical analysis of system performance and diagnostics for critical malfunctions.

4.10 ELECTRONIC RECORD KEEPING

The SCADA system provides the capability to expand the O&M staff's electronic record keeping. Operators can utilize the SCADA system to create custom reports to reflect pumping station operations, log difficulties, maintain long-term records, and to provide 'trending' of the station operations. Internet access allows the operator to electronically receive and send files and provides efficient communication abilities. Operational trends for flow (total and specifically for each customer) can be easily obtained via the CITEK software that is utilized at the Kings Bluff Pumping Station. Thus, the Authority has instantaneous access to all relevant data collected by the SCADA system and the CITEK programming.

SECTION 5 - SUMMARY

5.1 READINESS

The Authority's Regional Water Supply System, consisting of the Kings Bluff Pumping Station, Interim Booster Pumping Station, standby generators, pipelines, metering vaults and the 3 MG raw water storage reservoir is in good condition and sufficient state of readiness. The facilities have been well maintained and are fully capable of providing a high level of service to its customers.

SUMMARY OF RECOMMENDED ACTION ITEMS

Items identified in this report that require attention or corrective actions are summarized as follows and detailed in the enclosed appendices. Items with a **(New)** designation are items that were observed during the current year inspection and all others are items that remain from the previous year inspection findings:

Kings Bluff Pump Station Facility, Raw Water Intakes & Air Backwash Systems

1. Continue to monitor bearing temperatures for all raw water pumps.
2. Continue to monitor meter accuracies at the Kings Bluff Pump Station.
3. Continue to Monitor storage containment area in pump building for leaks during rain events.
4. Clean surge tank vessels periodically
5. Repair overhead insulation in oil storage room.
6. Verify proper operation of surge tank control systems.
7. Continue to maintain warning signage for the intake screens in the Cape Fear River and ensure that it is in readable and viewable condition.
8. Continue to monitor and replace broken deck boards and handrails on piers leading to air backwash buildings. Note that the CIP project has been identified to replace the walkway at a future date.
9. Evaluate older air backwash building for structural repairs due to visible signs of rot on exterior walls.
10. Clean the old backwash building to remove debris and bugs.
11. Replace the light inside of the old backwash building and clean the air valve of dirt and bugs.
12. Monitor and repaint surge tank piping mounted to pump station exterior wall as required on a yearly basis.
13. **(New)** Service leaking Pump 1 check valve

14. **(New)** Service hydraulic system on Pump 5 check valve.

Generator Building

1. Evaluate generator building for replacement of failing insulation in conjunction with possible addition of exhaust fans to improve conditions in the generator building.
2. Monitor and repair diesel fuel storage tank coatings as required.
3. **(New)** Service diesel storage tank leak detection system.

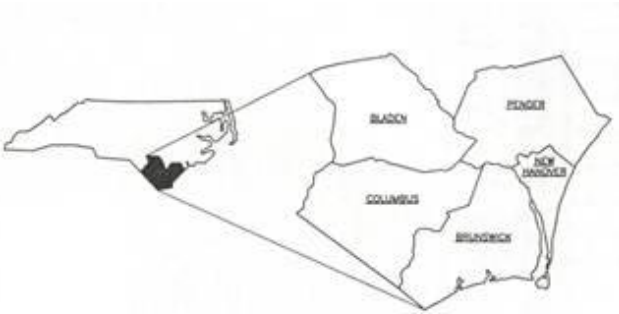
3 Million Gallon Ground Reservoir & Interim Booster Pump Station

1. Calcification present on exterior tank wall. O&M staff should continue to monitor the tank walls for any new cracks or leaks.
2. Recommend coordinating annual test of Interim Booster PS with CFPUA and Brunswick County.

Raw Water Main System

1. Mow/Clear overgrown areas along pipeline route.
2. Continue to monitor and evaluate need to paint manhole ring and covers and concrete flat-tops for manholes, valves, blow-offs where required.
3. **(New)** Replace or provide "Blue makers" as installed during 54" RWM project along 48" RWM R/W.
4. Exercise all valves and blow-offs annually.
5. Add bollards to protect manhole within "The Bluffs" development access drive.
6. Monitor and evaluate for repair the eroded pipe joint in the ARV manhole near Phelps Truck Sales on US-421.
7. Periodically operate the emergency connection at the Dak Industries (former) site.
8. Ensure that valves and ARV's can be properly operated with current valve box configuration. Noted that some valve boxes appeared to be out of plumb and could create issues with operations.

END OF REPORT



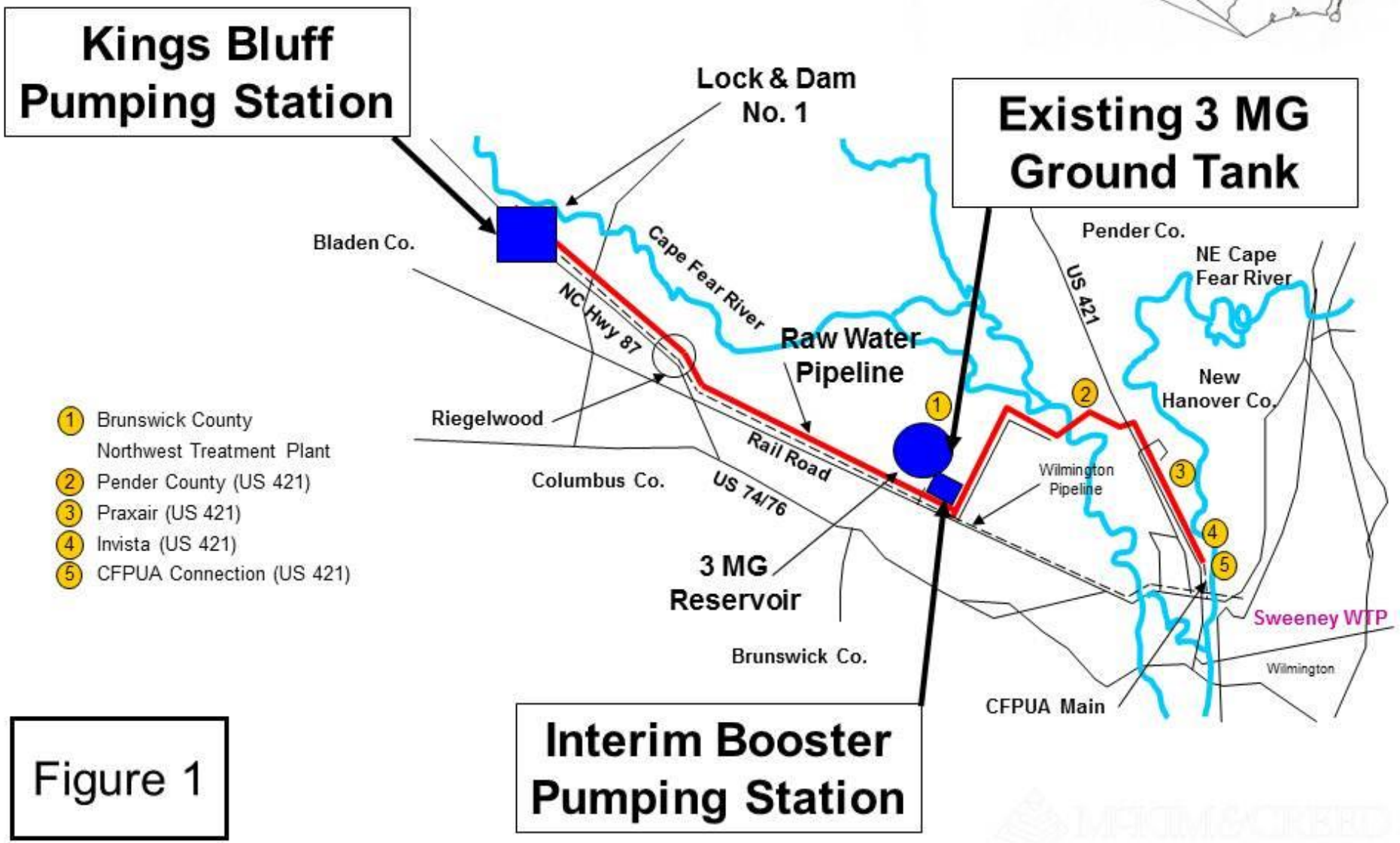

Kings Bluff Pumping Station
Lock & Dam No. 1
Existing 3 MG Ground Tank
Bladen Co.
Cape Fear River
NC Hwy 87
Raw Water Pipeline
Pender Co.
NE Cape Fear River
US 421
New Hanover Co.
Riegelwood
Rail Road
Columbus Co.
US 74/76
Wilmington Pipeline
3 MG Reservoir
Brunswick Co.
Sweeney WTP
Wilmington
CFPUA Main
Interim Booster Pumping Station
1 Brunswick County Northwest Treatment Plant
2 Pender County (US 421)
3 Praxair (US 421)
4 Invista (US 421)
5 CFPUA Connection (US 421)

Figure 1

Kings Bluff Pumping Station Annual Inspection

Lower Cape Fear Water and Sewer Authority

Appendix A – Pumping Station Facility, Ground Reservoir, Meter Vaults Annual Inspection

Equipment	Satisfactory	Needs Attention	Remarks
Grounds			
Septic Tank	X		
Pump Station	X		
Phone Line	X		
Drainage	X		
Fence	X		
Radio Tower	X		
Site		X	- Trench needs to be filled in and sidewalk repaired on water side of pump station. - Hole in grade near small generator needs to be filled in. - Walkway across ditch needs to removed/replaced. - Crushed valve box near connection of old and new force mains needs to be replaced.
Valve Hand wheel Operators	X		
Original Pumping Station			
Structure	X		
Flooring	X		
Roofing	X		Replacement under construction

Equipment	Satisfactory	Needs Attention	Remarks
Old Control Room			
Air Conditioning - Office	X		
Lights	X		
Plumbing	X		
Water Heater	X		
Ceiling	X		Few ceiling tiles need replacement
Service Sink	X		
Roof	X		
Bathroom	X		
Old Pump Room			
Lights	X		To be replaced
Air Compressors #1	X		
Air Compressors #2	X		
Air Storage Tank #1	X		
Air Storage Tank #2	X		
Air Dryer	X		
Pump #1		X	Discharge check valve needs to be serviced – Underwood currently investigating
Pump #2 Slot	X		
Pump #3 Slot	X		

Equipment	Satisfactory	Needs Attention	Remarks
Light Duty Generator	X		Removed from operation permanently
Surge Tank Air and Water Piping & Control System Piping		X	Evaluate operational requirements of the surge system. - Underwood currently investigating
Surge Tanks	X		Repair failing paint. Install heat trace and insulation on tank 3 controls and drain valves on all 3 tanks
Original Pipe Gallery			
Structure	X		Clean for bugs, debris, etc.
Lights	X		
Piping	X		
Equipment	X		
Water Strainer	X		
Heater	X		
Fan	X		
New Control Room			
Ceiling	X		
Flooring	X		
Structure	X		
Bathrooms	X		
Storage Room	X		
Break Room	X		
Oil Storage Room	X		
New Pump Room			

Equipment	Satisfactory	Needs Attention	Remarks
Pump #4	X		
Pump #5		X	Service/repair check valve
Structure		X	Address failing paint and failing masonry joints along East wall.
Lights	X		
Piping	X		
Flooring	X		
HVAC	X		
New Pipe Gallery			
Structure	X		Needs to be cleaned due to bugs and leaves etc.
Lights	X		
Piping	X		
Water Strainer	X		
Station Flow Meters	X		Continue to monitor flow meter accuracy
New Electrical Room			
Electrical Equipment	X		
Ceiling	X		
Floors	X		
Walls	X		Continue to monitor wall separation.
Doors		X	North door will not latch
Overhead Doors	X		
New HVAC Room and HVAC Equipment			
Ceiling	X		
Floors	X		

Equipment	Satisfactory	Needs Attention	Remarks
Walls	X		
Doors		X	Repair weather stripping on North door
Equipment	X		
Pier			
Structure		X	Broken/rotten deck boards and railing need to be replaced
Old Control Building		X	Evaluate building for replacement of rotten wall panels
New Control Building		X	North personnel door will not close
Intake Pipe Site Maintenance		X	Clearing on both sides of dock started however not completed
Old Electrical			
Air Line	X		
Air Tank/Valves		X	Air valves leaking and needed to be addressed

48-Inch Intake Screens			
Piping	X		
Air Backwash	X		
Controls	X		
60-Inch Intake Screens			
Air Backwash		X	Install warning signage in readable and observable condition on riverbank.
Controls	X		

Equipment	Satisfactory	Needs Attention	Remarks
1,000 Gallon Air Tank	X		
2,000 Gallon Air Tank		X	Air valve positions do not match the position on control panel. Issue needs to be addressed.
Instrumentation			
SCADA	X		
3 Million Gallon Reservoir & Interim Booster Pump Station			
Ground Storage Tank	X		Calcification remain on outside of tank
Interim Booster Pump Station System Testing	X		.
Grounds	X		
Control Building	X		
Tower	X		
Instrumentation	X		
Pig Launcher	X		
Meter Vaults			
Brunswick Northwest			
Meter	X		
Piping	X		
Sump Pump	X		
Grounds	X		
Praxair –(Linde)			
Meter	X		
Piping	X		
Sump Pump	X		
Grounds	X		

Equipment	Satisfactory	Needs Attention	Remarks
Structure	X		
Invista- (Stepan)			*At Maritime North Business Park*
Meter	X		
Piping	X		
Sump Pump	X		
Grounds	X		
Structure	X		
CFPUA			
Meter	X		
Piping	X		
Sump Pump	X		Groundwater Leaking into Vault
Grounds	X		
Structure	X		
54″ RWM Meter Vault	X		
Meter	X		New meter not in operation until Water Plant Expansion complete
Piping	X		
Sump Pump	X		
Grounds	X		
Structure	X		

Kings Bluff Pumping Station
Lower Cape Fear Water and Sewer Authority
Appendix B – Generator Building Annual Inspection

Equipment	Satisfactory	Needs Attention	Remarks
Grounds			
Fencing	X		
Driveway Entrance	X		
Building	X		
Fuel Tank Area			
Exterior Piping	X		Piping needs labeling
Containment	X		
Tank #1	X		Coating being replaced currently
Tank #2	X		Tank sensor test button inoperable. Coating being replaced currently
Tank Signage	X		
Diesel Tank Piping	X		
Generator Radiator	X		Significant rusting observed on underside-attention will be required in future
Garage Area			
Storage Area	X		
Flooring	X		
Generator Room			
Generators and Piping		X	Label all radiator piping
Air Start System	X		
Lights	X		
MCC	X		
Floors	X		
Ceiling/Roof		X	Insulation failing in several locations.
Electrical Room	X		
Roll-Up Doors	X		
Walls		X	Paint failing in one section. Repair/repaint.
Flooring	X		

Kings Bluff Pumping Station

Lower Cape Fear Water and Sewer Authority

Appendix C – Summary Air Relief Valve Annual Inspection

48″ RWM Air Relief Valve No.	Station	Conditions/Remarks
1.	4+00	At Entrance Road to Kings Bluff Pump Station – Good Condition
2.	37+65	Black Rock Road- Good Condition – Access is through a locked gate.
3.	97+50	Waterline Way – Off N.C. Hwy 11- Good Condition
4.	175+80	Narrow Gap Road- Good Condition.
5.	228+60	Carroll Johnson Farm- Good Condition
6.	268+50	Good Condition- Good condition "Big Field"
7.	293+15	Riegel Course Road (SR 1816) – Good condition
8.	322+60	Entrance to Federal Paper /IP (off Warren Ln.)
9.	383+00	At Livingston Creek on Elevated Pipe- Not Accessed
10.	394+50	Behind Momentive Chemicals (Neil's Eddy Rd at Bethel Baptist Church) - OK.
11.	416+00	Ellis Farm Road - Good condition-
12.	426+80	In the field off 410 Ellis Farm Road. Crops in field
13.	463+73	Mills Trail – Good condition. Off Port Royal Road
14.	529+55	Off access road adjacent to 5028 Gooseneck Road- Good condition.
15.	566+00	Off Vernon Rd.- In Pasture- Did not access MH structure
16.	617+00	Off Northwest Road (SR1423) - (Peterson Land) -Good condition
17.	651+50	Between Rattlesnake Branch and Hood Creed, did not cross Hood Creek.
18.	730+00	LCFWSA- Near 3 MG Raw Tank- Ground water present, underwater.

48" RWM Air Relief Valve No.	Station	Conditions/Remarks
19.	57+88	The Bluffs Entrance Road- Good Condition- Ground water present
20.	145+00	In landscaping along entrance road to "The Bluffs - Good condition
21.	235+86	CF River at 90-degree bend behind DAK Industries/ DuPont- OK
22.	248+90	DAK Industries/ DuPont at Hill- Good Condition
23.	295+57	DAK Industries- At Test Well # 11- Good Condition
24.	369+10	Behind PCU-WTP - Entrance gained via Pender County Water Treatment Facility – Ground water present - Good condition
25.	446+97	5400 US Hwy 421 North-Billy Phelps Trucking. Steel visible at coupling at pipe joint, New concrete collar may need to be poured. Flat-top is deteriorating and has rebar showing. Mowers /bush-hog hitting top of MH breaking off concrete
54" RWM Air Relief Valve No.	**Station**	**Conditions / Remarks**
1	101+75	Good Condition – Behind Generator Building
2	141+50	Good Condition – East of Macon Property-
3	200+25	Good Condition – Along Waterline Way
4	225+00	Good Condition – West side of Weyman Creek
5	279+56	Good Condition – Traynham Gate
6	321+25	Good Condition – Eastside of Double Branch
7	332+55	Good Condition – Woodburn Property
8	397+12	Good Condition – East of Reigel Course Road
9	425+81	Good Condition – Off John Reigel Road
10	468+25	Good Condition – Behind IP
11	477+50	Good Condition – Behind IP
12	488+66	Good Condition – Livingston Creek

48″ RWM Air Relief Valve No.	Station	Conditions/Remarks
13	500+10	Good Condition – East side of Livingston Creek
14	526+54	Good Condition – East side of Neils Eddy Road
15	534+25	Good Condition – Ellis Farm
16	568+79	Good Condition – Off Mills Trail / Port Royal Road
17	600+30	Good Condition -East side of Grice Property
18	634+86	Good Condition – Goose Neck Road
19	658+75	Good Condition – Carroll Farm
20	722+21	Good Condition – Peterson Farm
21	750+90	Good Condition – Duke Energy Easement- Did not access
22	755+87	Good Condition – East side of Duke Easement- Did not access
23	774+50	Good Condition – West side of Hood Creek – Did not access
24	792+75	Good Condition – East side of Hood Creek
25	800+83	Good Condition – Behind NW Water Plant

Summary of Recommended Action Items:

1. All concrete vaults appear to be in good condition. Recommend repainting all existing manhole ring and covers and concrete flat-tops. Repaint all existing air relief valves, blow-offs, check valves, butterfly valves and piping should be repainted "blue".
2. Blow-Off Valves and Air Release Valves need to be exercised on an annual basis. It was discussed with staff that some of the valve boxes are not plumb so getting to the top nut on the valve may be difficult. Recommend County review and ensure that valves can be accessed and operated as required to maintain the system.
3. New signage is needed along the entire right-of-way route and at edge of NCDOT right-of-way where LCFWSA raw water transmission main crosses roadways. Any new marker post to be "blue" with LCFWSA name and phone number on post.
4. The mowing contract was currently started in June 2024 and right-of-way has been easily accessed due to recent construction of new 54" RWM. LCFWSA / BC personnel are currently working to provide closer cutting and clearing to allow better access to all MH or vault structures.
5. Recommend new marker signs for raw water main routes adjacent to all roadways and along Hwy 421 North to show waterline route and throughout pipeline corridor.
6. Repair concrete diaper at ARV near Phelps Truck Sales on US 421. The concrete flat-top of structure has been degraded by bush-hogging and mowers cutting ROW.
7. Install bollards for protection at the ARV manhole located along the entrance to "The Bluffs" development.

Pipeline Annual Inspection

Lower Cape Fear Water and Sewer Authority

Appendix D – Summary 12″ Existing Blow-Off Valves Annual Inspection

12″ Blow Off Valves on 48″ RWM	Station	Conditions/Remarks
1.	70+00	Blanks Farm- OK -
2.	122+00	N.C. Hwy 11 / Weyman Creek- Good condition
3.	221+00	"Big Field" - Good condition
4.	358+00	At International Paper – Good condition.
5.	439+00	Off Ellis Farm Road - Good condition
6.	487+00	Gooseneck Road- Good condition
7.	685+80	Hood Creek, Behind NWWTP - Good condition

12″ Blow Off Valves on 54″ RWM	Station	Conditions/Remarks
1.	175+40	Beaver Dam Creek – Good Condition
2.	228+30	Weyman Creek- Good condition
3.	323+25	Woodburn Farm - "Big Field" - Good condition
4.	506+90	Mills Creek – Good condition.
5.	543+50	Ellis Farm - Good condition
6.	588+02	Bear Branch Road- Good condition
7.	749+50	Rattlesnake Branch - Good condition
8.	789+65	Hood Creek – Good condition

Summary of Recommended Action Items:

1. Recommend operation of blow-offs on an annual basis.
2. Recommend all blow-off structures on 48″ RWM to be re-painted “blue” as paint has faded and deteriorated.
3. Brush/ Grass from all structures needs to be cut.

Kings Bluff Pumping Station

Lower Cape Fear Water and Sewer Authority

Appendix E – Summary Check Valves, Butterfly Valves - Annual Inspection

48" Check Valves	Station	Conditions/Remarks
1.	730+00	At LCFWSA 3MG Raw Tank- Good condition, some rust present. Underwater during inspection.
2.	56+06	At Railroad Tracks on Green Loop Road. Good condition
3.	126+60	The Bluffs Entrance- Ground water present. Good condition
4.	236+50	Behind DAK - Good condition
48" Butterfly Valves or Gate Valves	**Station**	**Conditions/Remarks**
1.	310+25	Gate Valve is located just west of John L. Riegel Road. Good condition – new valve recently installed during repair of the leak after Hurricane Matthew. Currently inside fenced area for new Interconnect location.
2.	369+85	Butterfly Valve behind PCU WTP Facility. Good condition. New risers have been installed due to recent flooding from Hurricane Florence.
2.	235+50	Butterfly Valve behind DuPont/DAK. Has hand wheel. At Cape Fear River at 90-degree bend- Good condition – Groundwater present.

Summary of Recommended Action Items:

1. Recommend painted 2" PVC poles painted "orange" to mark each valve structure.
2. Recommend all valve structures to be re-painted "blue".
3. Additional "blue" marker posts are needed to mark valve locations.

<u>Appendix F</u> – Photographs

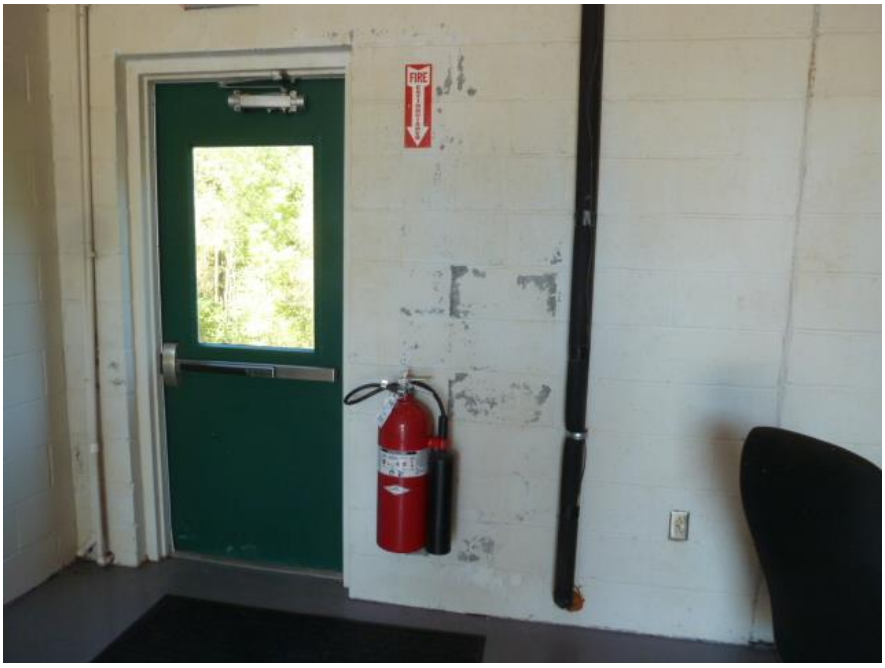
Photograph A – Pump #4 and #5

Photograph B – Check Valve on Pump #1 Leaking

5

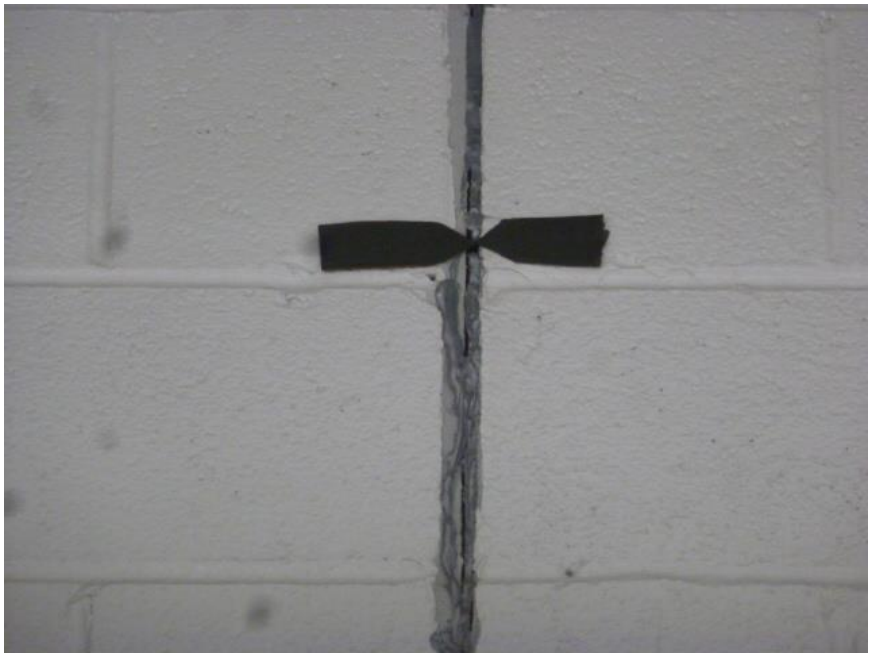
Photograph C – Failed Check Valve on Pump 5

Photograph D –Old Pump Station Roof Replacement



Photograph E –New Pump Station Paint Failure

Photograph F – New Pump Station Masonry Failure



Photograph G – New Electrical Room Existing Wall Crack

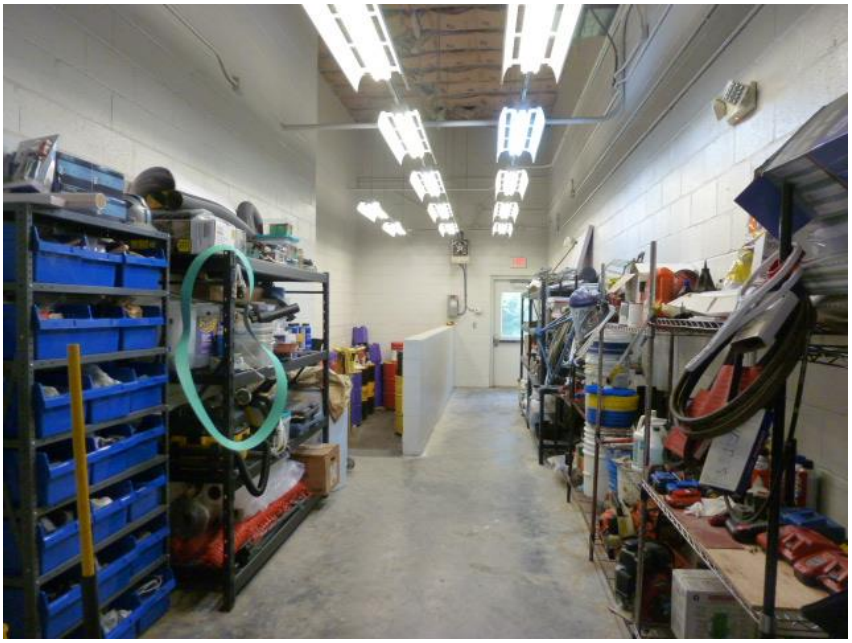
Photograph H –Electrical HVAC Room

Photograph I – HVAC Insulation

Photograph J – Plant Effluent Meter Vault

Photograph K –Diesel Storage Tank Coating Repairs

Photograph L- Generator Building Diesel Leak Detection Alarm



Photograph M- Lubricant Storage Room

Photograph N- Ditch Access Walkway

Photograph O – Surge Tank Drain Piping

Photograph P – Surge Tank Drain Piping

Photograph Q –Surge Tank Control Stations

Photograph R – Air Backwash Pier

Photograph S – Area near Backwash Building Overgrown

Photograph T – Pier Rotten Boards

Photograph U – Generator Building Doors Replaced

Photograph V – Small Generator Removed from Service

Photograph AA – Overgrown Area along Right-of-Way

Photograph BB – Orange Painted Structure Marker Deterioration

Photograph CC – New Blue Marker Post from 54″ RWM project.

Photograph DD – Old ARV on 48″ RWM and New ARV on 54″ RWM

Photograph EE- Emergency Intake Pipe Adjacent to Pond behind DAK

Photograph FF- Right-of-Way at US Hwy 421 from 2019 - 48″ RWM Relocation Project

Photograph GG- Old Blow-off on 48″ RWM and new Blow-off on 54″ RWM

Photograph HH- Interconnect off Blue Banks Loop Road

Photograph II- Walkway Access across Livingston Creek on Existing 48″ PCCP pipe

Photograph JJ- 3 Million Gallon Ground Storage Tank

Lower Cape Fear Water & Sewer Authority

Bladen Bluffs Regional Surface Water Treatment Facilities

FY 2024-2025 Annual Inspection Report

Prepared by

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Prepared For
Lower Cape Fear Water and Sewer Authority

October 2024

NORTH CAROLINA PROFESSIONAL SEAL 046997 ENGINEER JESSE E. POWELL
10/3/24

LOWER CAPE FEAR WATER AND SEWER AUTHORITY
BLADEN BLUFFS REGIONAL SURFACE
WATER TREATMENT FACILITY
ANNUAL INSPECTION REPORT
TABLE OF CONTENTS

SECTION 1 - INTRODUCTION

1.1 FACILITIES

The Lower Cape Fear Water and Sewer Authority is a regional organization with sponsoring members that are comprised of Bladen, Brunswick, Columbus, New Hanover, and Pender Counties, as well as the City of Wilmington. The Authority was created to aid development of a water supply system for the sponsoring member governments, which are primarily located in southeastern North Carolina. The Authority currently owns and operates, in partnership with Smithfield Farmland Corporation, the Bladen Bluffs Regional Surface Water Treatment Facility (BBRSWTF), which sources its raw water supply from the Cape Fear River. The facility is a 6.0 million gallon per day (MGD) drinking water facility located near the Town of Tar Heel in Bladen County, approximately opposite the Smithfield Farmland Corporation Facility on NC Highway 87. Construction was completed March 1, 2012, and the facility was placed into service on April 1, 2012. Primary components of the facility include:

- 30 MGD Raw Water Intake
- 12 MGD (Current Maximum Pumping Capacity) Raw Water Pumping Station & Raw Water Pipeline. The Raw Water Pumping Station includes two (2) - 6 MGD pumps, with a slot for a third future pump.
- Four (4) Sand Filters
- Flocculation and Settling Tanks
- Two (2) - 1.7 MG Residuals Basins
- Two (2) Standby Generators
- Four (4) Granular Activated Carbon Tanks
- Chemical Building
- Administration Building
- Two (2) - 2 MGD Clear Wells (Owned by Smithfield Farmland Corporation)

The Bladen Bluffs facility exclusively provides treated water to Smithfield Farmland Corporation, as there are no other customers served by BBRSWTF at this time.

1.2 BASIS OF ANNUAL INSPECTION & SCOPE OF WORK

A condition of the authorizing Bond Order requires the following shall be provided by an independent engineering firm:

- Inspect the project at least once each fiscal year
- Prepare a report that sets forth:

- ✓ Whether the properties or facilities have been maintained in good repair, working order, and condition
- ✓ Whether they have been operated efficiently and economically

- Recommendations with respect to maintenance, repair, and operation of the facility during the ensuing Fiscal Year, and an estimate of the appropriations that should be made for such purposes
- The insurance to be carried for the facility per the bond requirements
- Extensions, improvements, renewals, and replacements that should be made during the ensuing fiscal year
- Any necessary or advisable revisions to the service charges

The results and findings of this annual inspection are summarized in the following sections of this report. The FY 2024-2025 inspection of the Authority's facilities was conducted in September 2024.

1.3 OPERATING ARRANGEMENTS

The Authority maintains limited full-time staff, consisting of an Executive Director and an Administrative Assistant, for the administration of the Authority's programs and the coordination of water supply activities in the Region. The Authority contracts for operations and maintenance of BBRSWTF with Smithfield Farmland Corporation. Smithfield Farmland Corporation provides the personnel and resources to operate and maintain the Authority's water treatment facility and administers outside maintenance contracts as needed for effective operation of the system. Thus, Smithfield Farmland Corporation is designated the "Contract Operator" of the system. Currently, BBRSWTF generally operates on a 5-day work week (Sunday through Thursday) and the treatment process is in shut-down mode over most weekends. This schedule varies depending upon the production requirements of the Smithfield Farmland Corporation facility.

SECTION 2 - BLADEN BLUFFS SURFACE WATER TREATMENT FACILITIES – INSPECTION AND FINDINGS

A summary of the findings and recommendations, based on inspection of the Bladen Bluffs Surface Water Treatment Facility, is provided in ***Appendix A***. Detailed findings for each primary process or facility are summarized as follows.

2.1 RAW WATER PUMP STATION

A) Intake Screen

The intake screen system is submerged in the Cape Fear River (See ***Appendix B – Photograph A***). The raw water intake system is comprised of three (3) submerged screens, each with individual stainless-steel air backwash piping. Screen markers installed during previous repairs to the airlines in 2016 were removed by subsequent hurricanes. To date, markers have not been replaced. Additionally, the shoreline sign denoting the existence of the screens was damaged during Hurricanes Mathew and Florence but has since been replaced and was noted in good shape during the 2024 inspection. Also, in the Fall of 2018 Hurricane Florence impacted river air backwash piping and a significant portion of the shoreline eroded. This erosion exposed a portion of the stainless-steel backwash air piping. As a result of the erosion, LCFWSA applied for and was granted FEMA funding to restore the eroded bank. The restoration project, *Bladen Bluffs Regional Surface Water Treatment Facility Cape Fear Riverbank Restoration Project* was completed in 2020 and successfully restored the bank to its original condition. The project integrated a mixture of bioengineering techniques and rip rap to provide protection from future erosion along the riverbank. As noted in a previous inspection, erosion had re-occurred along the restored bank due to several high-water events. The bulk of the erosion had occurred on the upstream portion of the bank according to plant staff. The eroded area was repaired and replanted by a contractor. Due to the growth of vegetation along the slope, pictures of the area were difficult to attain; however, during this inspection what could be observed did not indicate any further erosion (See ***Appendix B – Photograph B***). During the 2024 inspection, it was observed that staff installed a camera near the intake warning sign, allowing them to continuously monitor the river level, even during backwashing events (See ***Appendix B – Photograph C***).

B) Grounds

The grounds at the Raw Water Pump Station and the 400-foot-long intake screen access boardwalk were found to be in good condition. All deck and handrail boards were replaced in 2020, with most still in good condition. During this inspection, it was noted that several walk boards had been replaced since the previous inspection, though some handrail boards still require replacement. Staff are aware of the issue and have materials on-site to complete the repairs soon. The area inside the fence and around the boardwalk has been weeded, and the

grass has been cut since the last inspection. During the last inspection, it was noted boardwalk lights were added along with security cameras for the pump station and surrounding area (See ***Appendix B – Photograph D and E***).

C) Wet Well and Pumps

The wet well and associated piping were reviewed during the inspection and found to be in good working order. (See ***Appendix B – Photograph F***).

D) Electrical Building

Building and electrical devices are in good condition (See ***Appendix B – Photograph G***). Bug infestation prevention measures installed four years ago by staff are working. According to the previous inspection report, the lighting circuit junction box on the east wall needed a cover to meet NEC compliance. During this inspection, it was observed that a cover has been installed.

E) Generator/Tank and Automatic Transfer Switch

During the field inspection, staff indicated that the generator and transfer switch are being exercised on a regular basis. No issues were noted that would require immediate corrective action; however, the diesel piping associated with tank and generator is rusting and will need to be addressed. As previously noted, cleaning the interior of the generator enclosure is recommended (See ***Appendix B – Photograph H and I***).

F) Access Road to Pump Station

Overall, the road is in excellent shape. Areas along the access road that were previously eroding during heavy rain events were addressed by raising the road elevation, preventing water from flowing over the road. Other areas that were eroding have been stabilized with rip rap and stone infill (See ***Appendix B – Photograph J and K***).

G) Air Backwash Compressor Skid

Staff indicated that all appears to be functioning correctly. Skid framing corrosion, previously noted, was addressed in 2020 and appears to be holding up (See ***Appendix B – Photograph L***).

2.2 INFLUENT FLOW METER VAULT

During the inspection, the vault was found to be in good condition, with all exposed instrument displays properly covered. Since a previous inspection, staff have implemented a regular vault-pumping schedule using a mobile sump pump system. However, it was observed that the fiberglass flow meter display box is deteriorating and should be replaced soon (see ***Appendix B – Photographs M and N).*** Additionally, it was noted that a vault ladder support connection appears to be compromised and will need attention.

2.3 FLOCCULATORS & RAPID MIX BASIN

The flocculators consist of two (2), four-part flocculation chambers with four (4) 1 horsepower mixers in each flocculator. This facility appeared to be operating properly and without issue.

The rapid mix basin equipment consists of the rapid mix structure and two (2) 10 horsepower mixers. No issues were observed for this facility during the inspection.

2.4 SEDIMENTATION BASINS

There are two (2) basins that are emptied and washed as necessary (See ***Appendix B – Photograph O***). The sludge from the basins is pumped directly into tanker trucks and is then hauled off for land application disposal utilizing a subcontractor. No issues were observed requiring corrective action for this facility during the inspection. Staff indicated that based on the level of solids observed in the basins at time of inspection, they would be emptied in the near future, provided the conditions of the disposal fields are acceptable for application.

2.5 FILTERS

The facility is equipped with four (4) sand filters, which are currently backwashed every 96 hours. All filters were in good working order.

2.6 FILTER PIPE AND VALVE GALLERY

A) Concrete Structure Walls

As observed during previous inspections, several calcified non-leaking cracks were observed. This type of crack is common in heavy cast-in-place concrete construction. During this inspection, cracks appeared to be as active as before. During the previous visit, high humidity was an issue in the area; however, during this inspection humidity was low (See ***Appendix B – Photographs P).*** As noted in the previous inspection report, a small leak was observed coming from behind the transformer located in the "additional" filter area. It is recommended that the staff monitor this leak and address it if it worsens (See ***Appendix B – Photographs Q).***

During this inspection, it was observed that the non-potable water system was leaking in the gallery in several locations. As this pipe is insulated, the location of the leaks will not be determined until the insulation is removed. It is recommended that these leaks be addressed as the leaks appear to be located above electrical equipment (See ***Appendix B – Photographs R).***

2.7 TRANSFER PUMP STATION AND VAULT

A) Pump Station

The pump station interior, exterior, and controls were inspected and found to be in good condition and operating properly (See ***Appendix B - Photograph*** S and T).

B) Pump Station Valve Vault

The valve vault was inspected and found to be in good working order; however, a small amount of water covered the floor (See ***Appendix B – Photograph U)***.

C) Transfer Pump Station Check Valve Vault

As observed during the last inspection, the valve vault was found to be flooded and the sump pump for the vault was not energized. It is recommended that the sump pump be repaired, and the vault be dewatered and inspected for any issues **(See *Appendix B - Photograph* V).**

2.8 GRANULAR ACTIVATED CARBON VESSELS

The GAC vessels are operational, as requested by the State. The vessels were filled with a new type of granular activated carbon recommended by Calgon (See ***Appendix B – Photograph W***). Corrosion of vessel supports was noted during a previous inspection and has since been addressed as of this inspection.

Mag-flow meters used to meter the flow through the filters appear to be in good condition and fully functional. It was noted in the 2020 inspection that the flow meter displays for the mag meters were missing covers to prevent deterioration from the sun. Covers were in place as of this inspection.

Vessel air release and vacuum air release valves (VARV) noted to be leaking during previous inspections were replaced and have been provided with drain pans to prevent leaking water from staining vessels and contributing to rust formation on the support frame. The vacuum portion of the Air Release Vacuum Valves (ARVs) atop the tanks were not leaking, which was observed in previous inspections.

During this inspection, significant corrosion was observed on the tank manways and the underside cleanouts of the vessels. The corrosion appears to be caused by past leaks from the VARVs, which allowed water to run down the tank and keep the manways constantly wet. Since the manways extend only a few inches beyond the vessel insulation, it is difficult to assess the full extent of the corrosion. It is recommended that the corrosion be addressed, and in doing so, the insulation should be removed/replaced as needed to facilitate the repair. **(See *Appendix B - Photograph* X).**

2.9 CHEMICAL ROOM

A) Chemical Tanks, Pumps, & Electrical

The Facility was inspected in its entirety and no issues were found. During a previous year inspection, staff indicated they had entered into a maintenance agreement for their chemical pumps. During this year's inspection, it was clear the agreement was providing a benefit to the Owner.

B) Building & Tankage

The structure and tankage were inspected, revealing two issues. First, as noted in the previous inspection, water piping along the west wall was leaking onto a column base plate, leading to significant rust (see ***Appendix B – Photograph Y***). It is recommended that both the leak and the resulting corrosion be addressed. Other column bases were also observed to have corrosion and should be repaired as well. The second issue noted was a possible leak in the chlorine chemical tank (see ***Appendix B – Photograph Z***), which staff indicated they would investigate and resolve immediately.

Aside from these issues, the building is in good condition. The electrical room was also inspected, and a significant amount of previously stored material has been removed. The room appeared to be in good condition, with the A/C functioning properly (see ***Appendix B – Photograph AA***).

C) Chemical Carrier Water

Previously, staff changed the chemical carrier water from the Bladen County system to increase reliability and reduce cost. In the process of doing so, the staff added a backflow preventer (RPZ) which is currently mounted in the caustic chemical containment area. In the unlikely event that the caustic tanks rupture, caustic could submerge the RPZ, thus preventing the RPZ from functioning as intended. It is recommended that Smithfield address the RPZ installation location with PWS (Public Water Supply) to verify there is no issue with its location from a regulatory standpoint. As of this review, the RPZ remains in its original location.

2.10 ADMINISTRATION BUILDING

No issues were noted in the administration building at the time of the inspection.

2.11 RESIDUALS BASINS

During the inspection, the basins were observed to be in good condition (See ***Appendix B – Photograph BB)***.

Previously, staff noted a tear in the liner at an outfall connection slab. The staff had a specialist review the issue and make recommendations for correction. To date, the repair has not been made but is scheduled to be conducted in the future when the basin is out of service.

2.12 BBRSWTF EMERGENCY POWER

A) Generator

The generator was inspected and found to be in good condition. No corrective actions are required.

B) Diesel Storage Tank Leak Detection Panel

During this inspection, the diesel tank level and leak detection panel were found to be in alarm status. It was recommended that this be corrected.

2.13 NPDES METER VAULT

The NPDES meter vault and associated chemical injection vault serve to control the discharge water for both pH adjustment and de-chlorination before entering the river. During this inspection, the meter vault was flooded with approximately 2 feet of water. An increased frequency of pumping down this structure may be necessary if the installed sump pump is inoperable (See ***Appendix B- Photograph CC***).

Similarly, the chemical injection vault associated with the NPDES vault was significantly flooded. Again, the flooding needs to be addressed by increased frequency of pumping down or making the sump pump operable (**See *Appendix B- Photograph DD***).

2.14 RECYCLE PUMP STATION/METER VAULT

During previous inspections, the recycle system was reviewed; however, according to staff information, the system was not in use due to economic reasons. Staff indicated, at that time, they were supporting other instruments by utilizing parts associated with the recycle system that were no longer functional. No further inspection of this facility was made.

2.15 SCADA – TELEMETRY SYSTEM

Based on conversations with Staff and cursory review of the SCADA system, there are no known issues that were identified for corrective measures at the time of the inspection. Staff previously incorporated a new VT Scada software which provides redundancy within their server system. In case there is an issue with one of their SCADA systems, there is now a standby system that can be utilized if required.

2.16 OPERATION OF FACILITY

Based upon observation of the facility and procedures currently employed by Staff, it is the opinion of McKim & Creed that the facility has been operated efficiently and effectively.

2.17 FISCAL YEAR APPROPRIATIONS

No major appropriations for the upcoming fiscal year are anticipated beyond the contracted operations and maintenance agreement responsibilities.

SECTION 3 - INSURANCE PROVISIONS AND SERVICE CHARGES

3.1 INSURANCE PROVISIONS

A cursory review of the Authority's fiscal year 2024/2025 insurance coverage was conducted and was noted to be similar to that of the previous year. At the time of this report, the coverage was deemed to be sufficient, and no major changes are recommended.

3.2 SERVICE CHARGES

At the time of this report, Smithfield Farmland Corporation is the only customer currently provided treated water from BBSWTF; therefore, no changes to the current service charges are applicable.

Appendix A – Summary of Inspection Items

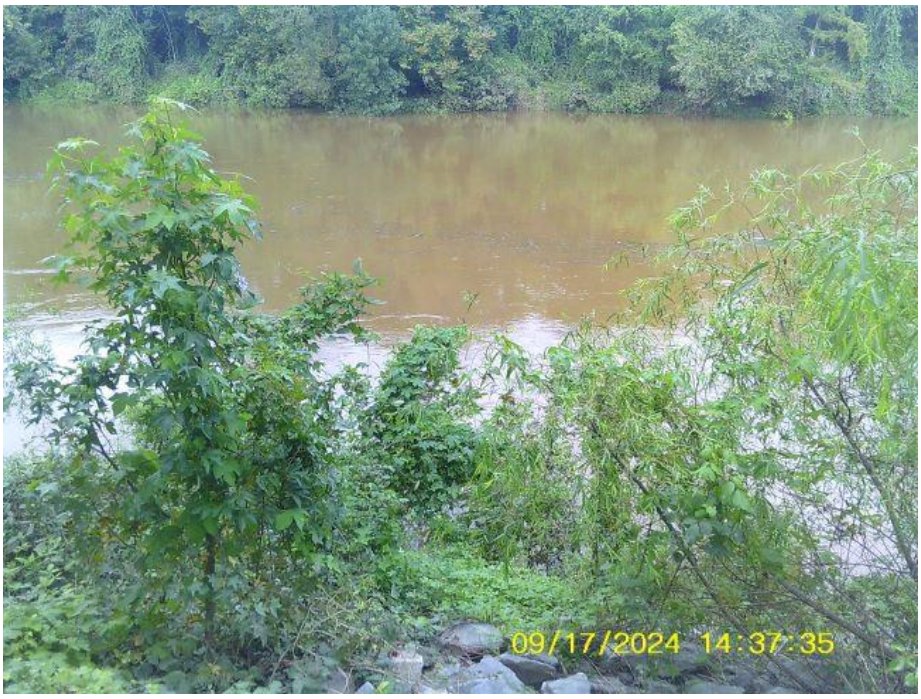
Bladen Bluffs Surface Water Treatment Facility - Annual Inspection

Lower Cape Fear Water and Sewer Authority

Facility	Satisfactory	Needs Attention	Remarks
Raw Water Pump Station			
Intake Screens	X		
Grounds	X		
Wet Well	X		
Dock	X		Replace a few handrail boards
Electrical Building	X		
Generator and ATS	X		Diesel fuel piping corroded-needs paint
Valve Vault	X		
Rapid Mix Basin			
Influent Flow Meter	X		
Structure	X		
Mixers	X		
Flocculators			
Flocculation Chambers	X		
Mixers	X		
Sedimentation Basins			
Basins	X		
Air Operated Sludge Pumps	X		Not Used
Filters			
Filters 1, 2 and 3	X		
Filter 4	X		Monitor wall leaks
Filter Pipe and Valve Gallery			
Structure Walls	X		Crack leakage needs to be monitored.
Structure Floors	X		
Piping		X	Leaks in water supply piping need to be addressed
Environment	**X**		
Transfer Pump Station & Vault			

Pump Station Valve Vault	X		
Pump Station Check Valve Vault		X	Address flooded vault
Granular Activated Carbon Vessels			
Vessel Exteriors	X		Significant corrosion noted at manways and other openings- needs to be addressed
Chemical Room			
Chemical Tanks	X		Leak at chlorine tank needs to be addressed
Piping	X		Leak along west water on water supply piping needs to be addressed
RPZ Location	X		
Building		X	Address column corrosion
Administration Building			
Building	X		Clean blower room
Residuals Basins			
Basins	X		Make liner repair as time allows
BBRSWTF Emergency Power			
Generator and ATS	X		
Diesel Storage Tank Panel		X	Address leak panel alarm issues
Effluent Flow Meter Vault			
Meter Digital Display	X		
NPDES Meter Vault			
Meter Digital Displays		X	Address flooding and vault leaks
Recycle Pump Station			
Meters and Displays	X		
Instrumentation			
SCADA & Telemetry	X		
NPDES Chemical Addition Vault			
Vault		X	Address flooded vault

Appendix B – Photographs



Photograph A – Intake Location

Photograph B – Cape Fear Riverbank Restoration Project Area

Photograph C – River Monitoring Camera

Photograph D – River Access Walkway

Photograph E – River Access Walkway

Photograph F - Raw Water Pump Station Wet Well

Photograph G – Pump Station Electrical Room

Photograph H – Diesel Storage

Photograph I – Diesel Storage Fuel Piping

Photograph J – Access Road to Pump Station

Photograph K -Access Road to Pump Station

Photograph L – Air Backwash Compressor

Photograph M – Influent Flow Meter Vault

Photograph N – Influent Flow Meter Vault

Photograph O – Sedimentation Basins

Photograph P – Filter Gallery Walls

Photograph Q – Filter Gallery Wall Leaks

Photograph R – Filter Gallery Piping Leaks

Photograph S –Transfer Pump Station

Photograph T –Transfer Pump Station

Photograph U –Transfer Pump Station Valve Vault

Photograph V- Transfer Pump Station Check Valve Vault

Photograph W –GAC Filters

Photograph X- GAC Filter Manway Corrosion

Photograph Y- Chemical Building Interior Piping Leak

Photograph Z- Chemical Building Chlorine Tank Leak

Photograph AA- Chemical Building Electrical Room

Photograph BB- Residuals Basins

Photograph CC- NPDES Compliance Wet Well

Photograph DD- NPDES Chemical Injection Vault