AGENDA
Lower Cape Fear Water & Sewer Authority
1107 New Pointe Boulevard, Suite # 17, Leland, North Carolina
9:00 a.m. – Regular Monthly Board Meeting
October 11, 2021

MEETING CALL TO ORDER: Chairman Leonard

INVOCATION

PLEDGE OF ALLEGIANCE

APPROVAL OF CONSENT AGENDA

C1 - Minutes of September 13, 2021 Regular Board Meeting
C2 - Kings Bluff Monthly Operations and Maintenance Report
C3 - Bladen Bluffs Monthly Operations and Maintenance Reports
C4 - Resolution recognizing Imagine a Day without Water 2021

PRESENTATION – Overview of PowerSecure NESHAP Management Services by Brian Mellor

NEW BUSINESS

NB1-Resolution Accepting the Lower Cape Fear Water and Sewer Authority Kings Bluff Regional Raw Water Supply Facilities FY 2020-2021 Annual Inspections Report (Tony Boahn, P.E., McKim and Creed)

NB2-Resolution Accepting the Lower Cape Fear Water and Sewer Authority Bladen Bluffs Regional Raw Water Supply Facilities FY 2020-2021 Annual Inspections Report (Tony Boahn, P.E., McKim and Creed)

ENGINEER'S COMMENTS

ATTORNEY COMMENTS

EXECUTIVE DIRECTOR REPORT

EDR1–Comments on Customers' Water Usage and Raw Water Revenue for Fiscal Year to Date Ending September 30, 2021
EDR2–Operating Budget Status, Ending August 31, 2021.
EDR3–Summary of Activities

CLOSED SESSION

CS1 - Closed Session in Accordance with N.C.G.S. Sec.143-318.11 (a)(3) for the Purpose of Discussion with General Counsel Regarding Litigation Involving Chemours

DIRECTOR'S COMMENTS AND/OR FUTURE AGENDA ITEMS

PUBLIC COMMENT

ADJOURNMENT

The next board meeting of the Lower Cape Fear Water & Sewer Authority is scheduled for Monday, November 8 at 9:00 a.m. in the Authority's office located at 1107 New Pointe Boulevard, Suite 17, Leland, North Carolina.

Consent Agenda (CA)	Lower Cape Fear Water & Sewer Authority

AGENDA ITEM

To: CHAIRMAN LEONARD AND BOARD MEMBERS

From: TIM H. HOLLOMAN, EXECUTIVE DIRECTOR

Date: October 11, 2021

Re: Consent Agenda

Reviewed and approved as to form: MATTHEW A. NICHOLS, AUTHORITY ATTORNEY

Please find enclosed the items of a routine nature for consideration and approval by the Board of Directors with one motion. However, that does not preclude a board member from selecting an item to be voted on individually, if so desired.

C1- Minutes of September 13, 2021, Regular Board Meeting
C2- Kings Bluff Monthly Operations and Maintenance Report
C3- Bladen Bluffs Monthly Operations and Maintenance Report
C4- Resolution recognizing Imagine a Day without Water 2021

Action Requested: Motion to approve/disapprove Consent Agenda.

Lower Cape Fear Water & Sewer Authority
Regular Board Meeting Minutes
September 13th, 2021

Chairman Leonard called to order the Authority meeting scheduled on September 13, 2021, 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 Milliken gave the invocation.

Roll Call by Chairman Leonard:

Present: Norwood Blanchard, Patrick DeVane, Wayne Edge, Al Leonard, Al Milliken, Chris Smith, Bill Sue, Frank Williams, and Rob Zapple

Present by Virtual Attendance: Jackie Newton, Charlie Rivenbark, and Bill Saffo

Absent: Harry Knight and Phil Norris

Staff: Tim H. Holloman, Executive Director; Matthew Nichols, General Counsel; Tony Boahn P.E., McKim & Creed, Sam Shore, COG, Joshua Trouton, Computer Warriors, and Danielle Hertzog, Financial Administration Assistant

Guests Present: Anthony Colon, Kenneth Waldrop, and Glen Walker

Guests Virtual Attendance: Frank Styers, John Nichols, and John Malone

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

APPROVAL OF CONSENT AGENDA

C1 - Minutes of Regular Board Meeting August 9, 2021
C2 - Kings Bluff Monthly Operations and Maintenance
C3 - Bladen Bluffs Monthly Operations and Maintenance Reports
C4 – Line Item Adjustment
C5 – Resolution in Recognition of National Source Water Protection Week

Motion: Director Zapple **MOVED**; seconded by Director Blanchard, approval of the Consent Agenda Items as presented. Upon vote, the **MOTION CARRIED UNANIMOUSLY.**

	For	Against	Abstained	Absent
Norwood Blanchard	X			
Wayne Edge	X			
Patrick DeVane	X			
Harry Knight				X
Al Leonard	X			
Jackie Newton	X			
Phil Norris				X
Al Milliken	X			
Charlie Rivenbark	X			
Bill Saffo	X			
Chris Smith	X			
Bill Sue	X			
Frank Williams	X			
Rob Zapple	X			
	12	0	0	2

OLD BUSINESS

OB1- Review of Demand Response Automation Response – Cost-Benefit Analysis with Tony Boahn.

Tony confirmed LCFWASA joined the Demand Response Automation Program in December of 2010, and at the time, the monthly credit was $2,250, but now it is up to $5,312.50 monthly for just participating in the program. That is a cumulative annual credit total of $63,750. A curtailment event is when Duke calls Kings Bluff and says they need them to go on generator power. We have a minimum of three and a maximum of ten each year, and as long as Kings Bluff can be on the generators within thirty minutes, we have met the curtailment event. We also get credit for that curtailment event in addition to the monthly credit. The credit varies based on the length of event time and depending on the time of year. Director Zapple wanted to know if we get any additional notice other than just the thirty minutes. Glenn Walker advised they call and email twenty-four hours in advance. Tony stated that they give a twenty-four-hour notice and then have thirty minutes to transfer over to generators once the final call has been given. If you miss the event, you default the monthly credit. Tony advised in the ten years and twenty-six events, we have only missed one event. That missed event was due to cold weather issues. We received a one-time credit of $57,824 for us joining the program. In 2019 we had to step out of the program because we did not meet emission standards on the generators. We evaluated what needed to happen to the generators and ultimately added an oxidation catalyst on the generators. Once completed, we were able to rejoin the program. Since joining the program, the total monthly cumulative credit amount is $445,525. The cumulative curtailment event credit total is $254,026. Director Blanchard asked if these credits would cover the cost of new generators. Tony stated it would depend on the loan and debt service agreement, but there will be some value due to the credits. The total cumulative fuel and labor cost is $65,000. An additional charge was for the oxidation catalyst with a cumulative cost of $152,000. When you take the fuel and labor combined with the oxidation catalyst and subtract the total credits, you get a net savings of $540,374. Tony analyzed the cost of the oxidation catalyst and initially said it would pay off at the end of 2023. Still, the oxidation catalyst will be paid off ahead of the forecast by June of 2022 with just the monthly credit amount. Director Milliken questioned the life of the oxidation catalyst. Tony advises they will last longer than the generators. Director Zapple wanted to know the cost of replacing one of the generators. Tony reported they are working on the CIP now, but the two generators were in the nine million range when they studied it a few years back. Director Zapple also wanted to know what security system is attached to the generators. Glenn Walker advised the SCADA system. Director DeVane stated that since the generators are four million each, it would be good to stagger the purchases. Tony said they wanted redundancy with a backup generator, and they could not do that if they stagger the purchase. He also stated we need to have an engineering study done on the generators before deciding the fuel and size of the new generator. Director Zapple questioned that the main difference between the old generator and the new generator is size and/or technology. Tony advised it is the technology that has significantly advanced and a smaller footprint. Director Blanchard and Sue wanted to know the number of hours on the generators. Glenn Walker reported 1%. Director Newton wanted to know how much it would cost to have these generators fully refurbished for service. Tony stated in 2006, they rebuilt the engines for the generators, but he will get the cost to have the generators fully renovated. Director Zapple has some concern that critical parts are no longer being manufactured. Glenn Walker advised we have a third-party company that will refurbish the parts that we send to them, and we have companies that can machine various parts for us.

OB2- Settlement Agreement and Release of Easement with William Grainger.

Matt Nichols advised critical points of the settlement for the Grainger manufactured home on Port Royal Road. Mr. Grainger will relocate the manufactured home with all these related structures, facilities outside of the easement area within 120 days. Mr. Grainger would do this at his own cost and coordinate with The Authority in advance to ensure that the line identifies the issues when it's lowered. LCFWASA would agree to reimburse Mr. Grainger up to a maximum of $5,000 toward those relocation expenses. To implement that, the Authority would issue a check to Mr. Grainger's attorney's trust account. Mr. Grainger would be giving a full release of the Authority.
Therefore, The Authority would be released and held harmless for anything related to removing the manufactured home. We would expressly not be responsible for any overages, causing extra costs, lodging, and other expenses that are foreseen or unforeseen. Mr. Grainger has signed the agreement.

Motion: Director Blanchard **MOVED**; seconded by Director Williams, approval of the Consent Agenda Items as presented. Upon vote, the **MOTION CARRIED UNANIMOUSLY.**

	For	Against	Abstained	Absent
Norwood Blanchard	X			
Wayne Edge	X			
Patrick DeVane	X			

Harry Knight				X
Al Leonard	X			
Jackie Newton	X			
Phil Norris				X
Al Milliken	X			
Charlie Rivenbark	X			
Bill Saffo	X			
Chris Smith	X			
Bill Sue	X			
Frank Williams	X			
Rob Zapple	X			
	12	0	0	2

ENGINEER'S COMMENTS

Tony Boahn gave an update on the 54-inch parallel raw water main. Currently our contract value is 37,203,838. That includes one change order of $25,812. Currently, we have paid out $33.9 million. Tony thinks we're running about two to three months ahead of schedule. Jess Powell was here last month on Tony's behalf. He brought the board up to speed on the Rattlesnake Branch pipeline that had floated. That pipeline at Rattlesnake Branch has been replaced, and Grainger replaced it with all new pipes. There was no cost to anyone as Grainger recognized the error was theirs. Next month we will move on to pressure testing the 54-inch pipeline.

ATTORNEY COMMENTS

Matthew Nichols spoke to Stephen Johnston from Baron and Budd, who represents LCFWAS in litigation against Chemours Company FC LLC, The Chemours and Company, and The Chemours Company. Mr. Johnson is going to prepare a status memorandum for the board. Matthew Nichols is hopeful Mr. Johnson will have the completed by the October Board Meeting.

EXECUTIVE DIRECTOR REPORT

EDR1 – Comments on Customers' Water Usage and Raw Water Revenue for Fiscal Year to Date Ending August 31, 2021

Executive Director Holloman reported that during the month of August 2021, Brunswick County, CFPUA, and Pender County were all above projections. Monthly revenue was up as well.

EDR3 – Summary of Activities

Executive Director Holloman informed the board that he Presented 50th Anniversary Plaques to Bladen, City of Wilmington, New Hanover County and Pender County. He is working with McKim & Creed to schedule Kings Bluff and Bladen Bluffs annual inspections. Executive Director Holloman has a "Take or Pay" discussion with Partners to be held on September 14.

DIRECTOR'S COMMENTS AND/OR FUTURE AGENDA ITEMS

Director Williams wanted to know if the operation fund performance 20% were one-time expenses. Director Zapple questioned the auditor fees. Director Smith wanted to thank Executive Director Holloman for the tour of the Kings Bluff plant. Director Zapple wished to recognize the staff for getting the video conference up to date.

PUBLIC COMMENT

Anthony Colon wanted to express his sincere gratitude to Executive Director Holloman and Glenn Walker for the help with the discrepancies Pender County had on the raw water flows.

ADJOURNMENT

There being no further business, Chairman Leonard adjourned the meeting at 9:49 a.m.

Respectfully Submitted:

_____

Norwood Blanchard, Secretary

COUNTY OF BRUNSWICK
PUBLIC UTILITIES DEPARTMENT
Kings Bluff Pump Station

246 Private Road
Riegelwood, NC 28456
(910) 655-4799 Office
(910) 655-4798 FAX

TO: Tim Holloman

FROM: Jack Hogan

DATE: 10/1/2021

SUBJECT: Monthly maintenance report for September 2021

Mr. Holloman,

The Maintenance and Operations of the king's bluff facility for the month of September was performed as prescribed in the station SOP'S and other items are as follows.

The diesel drive booster pumps along with the standby SCADA generator located at the raw tank and the SCADA generator located at INVISTA / CFPUA vaults off HWY 421 were ran and tested weekly and verified standby ready.

KB personnel completed all locates issued by the 811 system.

KB personnel along with Brunswick Co. Generator dept. completed the conversion of the # 1 EMD generator pre and post lube motors over to 24 volt from the 84 volt system.

KB personnel completed the painting of the 900 gallon tank to be used for mobile fuel tank.

KB personnel completed the repair of the Halon fluid strainer drain line on the old side.

KB personnel are working with Garney on filling parallel line for pressure testing.

KB personnel washed and flushed the cooling coils on the # 1 & 3 HVAC units located at the VFD building.

KB personnel repaired oil leak on # 2 EMD generator.

KB personnel completed KBPS and right of way inspection with McKim & Creed personnel.

Brunswick Co. I&C dept. completed flow meter relocation on the old and new discharge lines at KBPS and completed flow calibrations on both meters.

Contractors:

Saf-Way Recyclers picked up and hauled off used oil that was in storage at KBPS.

Underwood Pump Co. completed changing out the hydraulic actuator on # 5 Val Matic valve located on the # 5 pump discharge line.

NCDOL Boiler Division completed and passed all small air tanks located throughout the KBPS and property and # 3 Surge tank that were scheduled for inspection.

Thank You,

Jack Hogan
Kings Bluff Pump Station

Smithfield®

To: Tim Holloman - LCFWASA

From: James Kern – Bladen Bluffs SWTP ORC

Date: 10/5/21

Subject: September 2021 Operations

During the month of September, Bladen Bluffs SWTP operated a total of 21 days, treating 47.838 million gallons of water.

We used:

32,756 lbs. of aluminum sulfate (Alum)

9,214 lbs. of sodium hydroxide (Caustic)

1,717 lbs. of sodium hypochlorite (3,448 gallons of 6% Chlorine Bleach)

James Kern
Water Treatment Plant
Supervisor

(910) 862-3114
(910) 862-3146
(910) 733-0016 mobile
jkern@smithfield.com

Smithfield
Good food. Responsibly.®

Bladen Bluffs Surface Water Treatment
Plant
17014 Highway 87 West
Tar Heel, NC 28392
www.smithfieldfoods.com

Bladen Bluffs SWTP Maintenance Report

Date: 10/1/2021

ISSUE:	PLAN OF ACTION:
Air on finished water line (from GAC)	Replaced valves - COMPLETED
Running spare cl2 lines to settled/finished	Getting quotes
Fire system supply redesign	Inspected - passed
Sump pump check valve needs replacement	Scheduled repair
Chlorine Transfer Pump #1 NA	REPLACED
Parking Lot needs to be resealed/painted	COMPLETE
Two caustic pumps leaky valves	FIXED
CL2 pump #3 clogged to rapid mix	Inspected, test Monday
RPZ in hotbox needs repair kit	FIXED

Value of Water CAMPAIGN

Resolution recognizing
Imagine a Day Without Water 2021

Recognizing the annual National Day of Advocacy, "Imagine a Day Without Water," held on October 21, 2021, as an organized effort to educate the public about where water comes from, where it goes, and the challenges local water utilities and providers face, that clean, accessible, and reliable water is critical, and it is necessary to maintain and rebuild our water systems.

Whereas, the infrastructure that brings over 300,000 residents and businesses water on a daily basis; and

Whereas, water infrastructure is the lifeline of our communities; a day without water would be a public health and safety crisis, limiting the abilities of safety personnel, such as firefighters and hospitals staff, as well as businesses and homes to function; and

Whereas, communities and families need jobs, and closing the gap in water infrastructure investment would bring new jobs to our communities and families and raise the household disposable income; and

Whereas, our water infrastructure is necessary for a thriving economy, and a single nationwide day without water service would put our entire economy at risk; and

Whereas, America's water infrastructure is aging and failing—and two million Americans are living without water infrastructure, often relying on bottled water, potentially living in unsafe and unsanitary conditions; and

Whereas, valuing and investing in water systems provides a path to economic sustainability; now;

THEREFORE, BE IT RESOLVED, by the Chairman and the Board of Directors for the Lower Cape Fear Water & Sewer Authority recognizes water is essential to the quality of life and economic competitiveness and acknowledges the importance of educating the public about the value of water through the "Imagine a Day Without Water" campaign.

BE IT FURTHER RESOLVED, that Lower Cape Fear Water and Sewer Authority is dedicated to investing in safe and reliable water infrastructure and calls on our federal partners to bring much-needed funding and innovation to protect and restore our critical water infrastructure.

PRESENTATION	Lower Cape Fear Water & Sewer Authority

AGENDA ITEM

To: CHAIRMAN LEONARD AND BOARD MEMBERS

From: TIM H. HOLLOMAN, EXECUTIVE DIRECTOR

Date: 10/11/2021

Re: Presentation-Power Secure-NESHAP Management Services

Reviewed and approved as to form: MATTHEW A. NICHOLS, AUTHORITY ATTORNEY

Background: In 2019, the Lower Cape Fear Water and Sewer Authority entered into a contract with Power Secure to monitor and inspection of emission devices and catalysts to ensure compliance with NESHAP National Emission Standards for Hazardous Air Pollutants.

The Authority continues to utilize Power Secure Services, which is also associated with the running and activation of our current generators at Kings Bluff.

New Business (NB1)

Lower Cape Fear Water & Sewer Authority

AGENDA ITEM

To: CHAIRMAN LEONARD AND BOARD MEMBERS

From: TIM H. HOLLOMAN, EXECUTIVE DIRECTOR

Date: October 11, 2021

Re: Resolution Accepting the *Lower Cape Fear Water & Sewer Authority Kings Bluff Regional Raw Water Supply Facilities FY 2020-2021 Annual Inspection Report* (Tony Boahn, P.E., McKim & Creed)

Background: The existing Standard Provisions for Water Supply Agreements with all customers and the existing Bond Order requires an annual inspection of all the facilities associated with the pump station by a qualified engineer to report on readiness, identify any deficiencies, and make recommended repairs and capital improvements. A copy of the report will be provided to Brunswick County Utilities as operator of the facility.

Enclosed is an excerpt of the report providing a summary of the inspection items.

Mr. Boahn will present an overview of the report.

Action Requested: Motion to approve/disapprove

Resolution Accepting the *Lower Cape Fear Water & Sewer Authority Kings Bluff Regional Raw Water Supply Facilities FY 2020-2021 Annual Inspection Report*

Lower Cape Fear Water & Sewer Authority
Kings Bluff Regional Raw Water Supply Facilities

FY 2021-2022 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

September 2021

LOWER CAPE FEAR WATER AND SEWER AUTHORITY
KINGS BLUFF REGIONAL RAW WATER SUPPLY SYSTEM
ANNUAL INSPECTION REPORT
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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 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.
- One Low-Duty Diesel Powered 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 on 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 in order 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 wetwell 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 (IBS), which is located at the 3 MG ground tank site. The IBS 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 IBS consists primarily of three (3) diesel driven pumps that will deliver increased flow and pressure to meet peak summer demands for Authority customers. Originally, the IBS 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 IBS is a now permanent facility completely owned and operated by the Authority.

Primary Components of the IBS 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 ultimately 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

A new 54-inch raw water main is currently under construction to increase the raw water conveyance capacity of the Kings Bluff Raw Water Pump Station. The 14-mile pipe will parallel 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 will be constructed of welded steel with a polyurethane coating and cathodic protection will be installed for the entire pipeline route. Three primary interconnections with the existing 48-inch raw water main will be constructed to provide resiliency and operational flexibility for the conveyance system. As of the date of this report, approximately 74,000 feet of the pipeline has been installed. Construction began in December 2019 and contractual completion is scheduled for September 2022. With completion of the pipeline, the Kings Bluff Raw Water Pump Station will have a firm permitted capacity of 62 MGD. The contractor is currently in the final stages of the project with final testing procedures and restoration efforts under way.

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 2020. The proposed schedule is to complete design in the fall of 2020 and submit a permit modification to NCDEQ Public Water Supply to increase the firm station capacity to an anticipated 90 MGD. It is anticipated that the modified permit will be approved in early 2021; however, the 54-inch parallel pipeline noted above must be complete

and operational for the Authority to fully realize the increased capacity that would be available from the 4th pump.

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 2021- 2022 inspection of the Authority's facilities was conducted during September 2021.

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
- One light duty (480 Volt) generator
- 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

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

Existing Conditions

- *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 in order 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 withing Air Quality constraints.

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 Facilities***

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 excellent condition and meeting the needs of the Authority's customers (See ***Appendix F -Photograph A***). During the 2013 inspection it was noted that Pump 4 was experiencing a bearing temperature issue. Subsequently, staff worked directly with Charles Underwood Pump Company to address this issue. The motor was removed for evaluation and no specific issues were found. Staff indicated that both GE (motor Mfr.) and Kingsbury (bearing Mfr.) did not consider the temperature excessive and stated they would be concerned if the temperatures were to increase to a much higher level that what is currently being experienced.

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 Pumps 1 and 5 (or slightly lower). 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 the 2016 inspection staff suspected the 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.

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.

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 B***). It is recommended that the wall separation continue to be monitored.

Adjacent to the new electrical control room is a new HVAC room housing the HVAC equipment). In this year's inspection, the air handling unit intake screens, located outside of the new HVAC room, were observed to be clean.

- *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.

2.4 EXTERNAL DIESEL FUEL TANKS

The two 3.0 Mega Watt standby generators are supplied fuel 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. The external fuel tanks were inspected and found to be in acceptable condition. Rainwater collects in the containment area and is drained by LCFWSA operator after each significant rain event. On both tanks during past inspections, significant efflorescence was noted. During this year's inspection, both tanks were observed to be in excellent condition; although, they were missing the proper signage (See ***Appendix F - Photograph C***).

During the 2016 inspection, staff indicated that they are no longer using the lube oil tank. Instead, oil is being supplied via disposable containers. Staff indicated that this method is providing better results. In view of this fact, it was suggested that the tank be removed so as to

not pose an unnecessary spill risk. As of this year's inspection, the lube oil tank has been removed.

During the 2019 inspection, staff noted that the interior of both fuel tanks have been recently cleaned and fuel treated. As recommended in the 2018-year report, a new interstitial tank leak sensor has been installed on the west tank. During this inspection, one of the two interstitial sensors was in alarm status and requires servicing. (See ***Appendix F - Photograph D***).

2.5 PUMP STATION BUILDINGS

The combined new and old buildings were inspected and found to be in good overall condition. It is noted in this inspection report that the Hellan Strainer backwash drain, located in the new pump station piping gallery, no longer leaks, which was noted during the last inspection. (See ***Appendix F – Photograph E)***. No major problems were found with the station's structure; however, cracks in the concrete flooring of the pump room remain, but do not appear to be detrimental to operations and 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 storage of oil 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. No water/moisture was present during the inspection and staff reported the drain and sealant appear to be working. During the 2019 inspection, staff indicated they had placed approximately 12 inches on concrete in the pit area and recoated with sealant. During this inspection no evidence of leaking was observed. (See ***Appendix F- Photographs F)***.
- During this year's inspection, it was noted that both pump station piping rooms need to be cleaned out due to bugs and debris.

- Also, during this year's inspection, it was noted the emergency light in the new station pipe gallery has a battery failure alarm. Light should be serviced. (See *Appendix F-Photographs G)*

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 or noted 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. Previously the small generator located in front of the pump station was showing signs of rust likely due to moist conditions that existed prior to plant staff addressing flooding issues. During this visit it was noted that the generator and fuel tank had been painted and there are no signs of rust or corrosion; although, it is missing the proper signage. (*See Appendix F - Photographs H*).

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 2014 review, it was noted that insulation provided on the drains of each tank had been replaced since

the 2013 inspection. Staff indicated that they were investigating vinyl covers for the insulation to protect it from the weather. Insulation covering is necessary, given the insulation location and proximity to the ground and moisture. Also, the 1-inch make-up airline extending from Tank 2 to Tank 3 requires support similar to that provided at all other locations. As noted in the 2014 inspection, the make-up coupling on the 4-inch diameter equalization line extending from Tank 1 to Tank 2 is significantly out of alignment. Such couplings are used to make up for alignment issues; however, the amount of deflection observed appears to be beyond the manufacturer's recommended range and thus should be replaced as necessary. Tanks had been painted by staff during the 2014 inspection; however, the coating was failing, mainly below the liquid level maintained in the tank.

During the 2019 inspection, it was noted that all tanks had been painted and 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 this 2021 inspection, six (6) drain valves were observed to have been replaced (See ***Appendix F – Photograph P)*** During the last inspection, it was noted all were cracked. Staff has replaced all and disconnected them from the drain lines to which they were attached. This was done as the drain lines discharged into the old pump station wet well. Additionally, staff indicated the vessels were cleaned and during that cleaning the vessels were found to be approximately half full of mud. Based on this finding, it is recommended that the vessels be cleaned periodically.

With regards to surge tank control panels located inside the pump station, several indicator lights require replacement. At the time of inspection, surge tanks 1 and 2 had their respective controls turned on however no indicator lights worked thus actual operation could not be confirmed. Previously staff indicated they turned the older systems off because the three control systems would interfere with each other at times. This interference is thought to be a result of all three tanks being manifolded off a single air fill line. As noted previously, both older existing systems were turned on and the third (newer) system appeared to be on; however, the selector

switches for the control solenoids were manually closed using the AOC switches. (*See Appendix F - Photographs I*). It is recommended that the surge system operation be examined, and proper operation confirmed.

2.8 PIER

The pipe corridor of the 60-inch intake pipeline is located parallel and adjacent to the existing pier. A review of this area indicated that vegetative cover is established and that the area is slightly flooded. (See *Appendix F - Photograph J*).

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 Further, as noted on previous reports, several areas on the older building's wall panels are still showing signs of rot. As of the 2021 inspection, the dock was in worse condition with some areas being blocked off because the deck was completely compromised. (See *Appendix F - Photographs K and L*). The old backwash building remains in need of repair as wall boards are rotted. The indicator lights need to be replaced in the older buildings The air valve needs to be cleaned of dust and bugs in the older building (See *Appendix F – Photograph M*). It is noted that the LCFWSA has identified replacement of the pier and air backwash buildings as a future Capital Project, however, it is recommended that the pier and buildings be maintained until such time that 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 though all exhaust fans were running and the exterior roll up doors were open. Staff noted the excessive heat caused 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, 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 previously noted during prior inspections, the building interior insulation surface appears to have been affected by the heat making it brittle **(See *Appendix F – Photograph N*).** Because of this, surface repair tape will not attach thus making tear or rip repairs not possible. Replacement of the insulation should be investigated. The generator radiators were observed to be in good condition.

During this inspection, staff stated that the extreme heat conditions that existed in the generator building have been addressed. Staff has flushed the generators and radiators and during that flushing found that cooling passages contained significant rust and etc. which impacted the cooling system efficiency.

Also, during this inspection, it was noted building doors have rusted to an extent that holes have appeared. It is not recommended that they be replaced at this time however should be monitored and replaced in the future when they are further compromised. **(See *Appendix F – Photograph O*).**

In addition, it was observed that the breaker panel located in the generator room had an excessive amount of failed indicator lights and thus should be serviced. **(See *Appendix F – Photograph P*).** The Pneumercator alarm panel located in the generator building electrical room is in alarm and shows a leak is present. This issue should be addressed. **(See *Appendix F – Photograph Q*).**

2.10 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.

2.11 RADIO ANTENNA

The antenna, fencing, and support equipment appeared to be in good working order.

2.12 ON SITE POTABLE WELL

As noted in previous reports, water quality for the on-site potable well has historically been of poor quality; however, in-line filters have been added to improve water quality.

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 thus mitigating the quality issue. There were no water quality issues noted in this year's inspection.

2.13 INTAKE SCREEN AND WARNING SIGNS

As of this inspection, there is no signage in the river to indicate the screens' locations and warn boaters. Staff indicated the sign swept away by flooding due to Hurricane Mathew. 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. Staff indicated they visually check the river before backwashing and thus the replace of the signage was unnecessary. It is our recommendation that a sign be placed on the bank as low flow conditions in the river could create issues for deep draft vessels that could potentially damage the screens.

2.14 SEPTIC SYSTEM

The facility is provided 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 raw water reservoir is located near Brunswick County's Northwest Water Treatment Plant and is surrounded by an earthen berm to hold any overflow which may arise from 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 reservoir is in good condition as are most of the other components at the reservoir site.

The reservoir is a pre-stressed concrete tank, 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 calcified due to leaks, but no visibly wet seams were noted (See ***Appendix F - Photograph O***). 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. (See ***Appendix F - Photograph P***).

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 as a result of abnormally low temperatures during this time frame. 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 is in 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 bids received, the Authority chose to delay the improvements to a future date.

SECTION 4 - PIPELINE

4.1 GENERAL

The Authority's initial pipeline (Phase I) was comprised of approximately 73,000 feet of 48-inch diameter pre-stressed concrete cylinder pipe. Air relief/vacuum valves are located at high points on the pipeline 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. The Phase 2 raw water main extension was comprised of approximately 52,300 feet of 60-inch and 48-inch diameter pre-stressed concrete cylinder and ductile iron pipe. The Phase II pipeline is also similarly equipped with air relief/vacuum and isolation valves. 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 major 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, a future pigging project should be considered to maintain maximum transmission capacity.

4.2 RIGHT-OF-WAY

The pipeline right-of-way was inspected and found to be in generally good condition. 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 large 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. Recent mowing took place in November/December 2020 and is generally in good condition. It was noted that the pipeline right-of-way that traverses the previous DAK facilities is not maintained nor are the access roads through the Dak property used to access the right of way. It is noted that the LCFWSA is investigating/planning for right of way maintenance and it is recommended this area be included as well.

In 2005, all vaults and blow offs were marked in 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***) and should be replaced and/or repainted. These measures have been successful in eliminating the majority of such encroachments and there have been no major problems.

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. All blue markers need to be updated at roadway crossings throughout the pipeline corridor.

The 54-inch parallel pipeline under construction will ultimately provide "Blue" utility markers to denote the location of new pipeline along the right-of-way corridor. However, this will be from Kings Bluff Pump Station to the 3 MGD Ground Tank only. The remainder of the Right-of-way should be reviewed and marker posts replaced or added as needed.

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 that exist on the raw water mains consist of a 6-inch main 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. One specific issue to note is the ARV in front of Phelps Truck Sales on US 421. The

pipe is exposed in this manhole, and the concrete "diaper" that protects the joint has broken away on the top of the pipe exposing steel (See *Appendix F - Photograph DD*). It is recommended that this joint be inspected and that the concrete "diaper" be re-poured to protect the steel. During the 2020 inspection the exposed steel remains but there appears to be no signs of further degradation. See *Appendix C* for a list of inspected air relief valves.

4.4 BLOW-OFF VALVES

The blow-off valves located on the 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 post set on each side. See *Appendix D* for a comprehensive list of inspected blow-off valves. See *Photograph BB* of existing blow-off with deteriorated PVC markers.

4.5 METER VAULTS

Metering facilities are installed at the customer connections at Brunswick County, Praxair Inc., Invista and the 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 if 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 annual inspection in September 2021. All check valves appear to be in good condition and no major problems were identified during the annual inspection (See *Appendix E*). It is recommended that all valves be evaluated and routinely painted at each vault if required. (*See Appendix F-Photograph CC- 48" Check Valve at" The Bluffs"*).

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 right of way in this area is not maintained and should be included in the recurring right of way maintenance. The connection is shown in (*Appendix F – Photograph EE.*)

4.8 NEW 54-Inch PARALLEL RAW WATER MAIN

The new 54-inch parallel raw water main is currently under construction and progressing on schedule. As of the date of this report, the contractor (Garney Construction) has installed all of the 54-inch main, which is approximately 74,000 linear feet of pipe. Currently construction is in the testing and restoration phase. Samples of installation and restoration are noted as follows

- 54-inch RWM Re-Installation in Rattlesnake Branch **(See Appendix F- Photographs GG)**
- Sodding at Peterson's Tennis Courts **(See Appendix F- Photograph HH)**

As of the date of this report, the remaining work to be completed includes pressure testing of the new parallel main and installation of 3 primary interconnections to the existing 48-inch raw water main.

Clearing of Authority's existing 75-foot right-of-way has been completed from the Kings Bluff Pump Station to 3 MGD Ground Tank behind Northwest Water Treatment Plant. **(See Appendix F - Photograph II).**

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 has 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 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 staffs' 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 also 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. **(New)** Address emergency light battery failure alarm in the pipe gallery.
5. **(New)** Clean surge tank vessels periodically
6. **(New)** 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 pier leading to air backwash buildings. Note that 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 all facilities to remove debris and bugs
11. Investigate surge tank system for proper configuration and operation.
12. Replace surge tank system indicator lights.
13. Monitor and repaint surge tank piping mounted to pump station exterior wall as required on a yearly basis.
14. Investigate tank turnover requirements for proper maintenance and water quality within the surge tanks – clean periodically.
15. **(New)** Install proper insulation for the drain valves to prevent future valves from cracking.
16. **(New)** The Pneumercator alarm panel located in the generator building electrical room is in alarm and shows a leak is present.
17. Recommend yearly monitoring and painting of 1,000-gallon surge air tanks
18. **(New)** Add proper signage to the light duty generator.

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 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.
3. Consider construction of future shelter or structure to improve protection of the station from freezing and sun damage (as currently identified in the Authority's Capital Improvements Plan).

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. Repaint, replace or upgrade PVC pole markers.
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

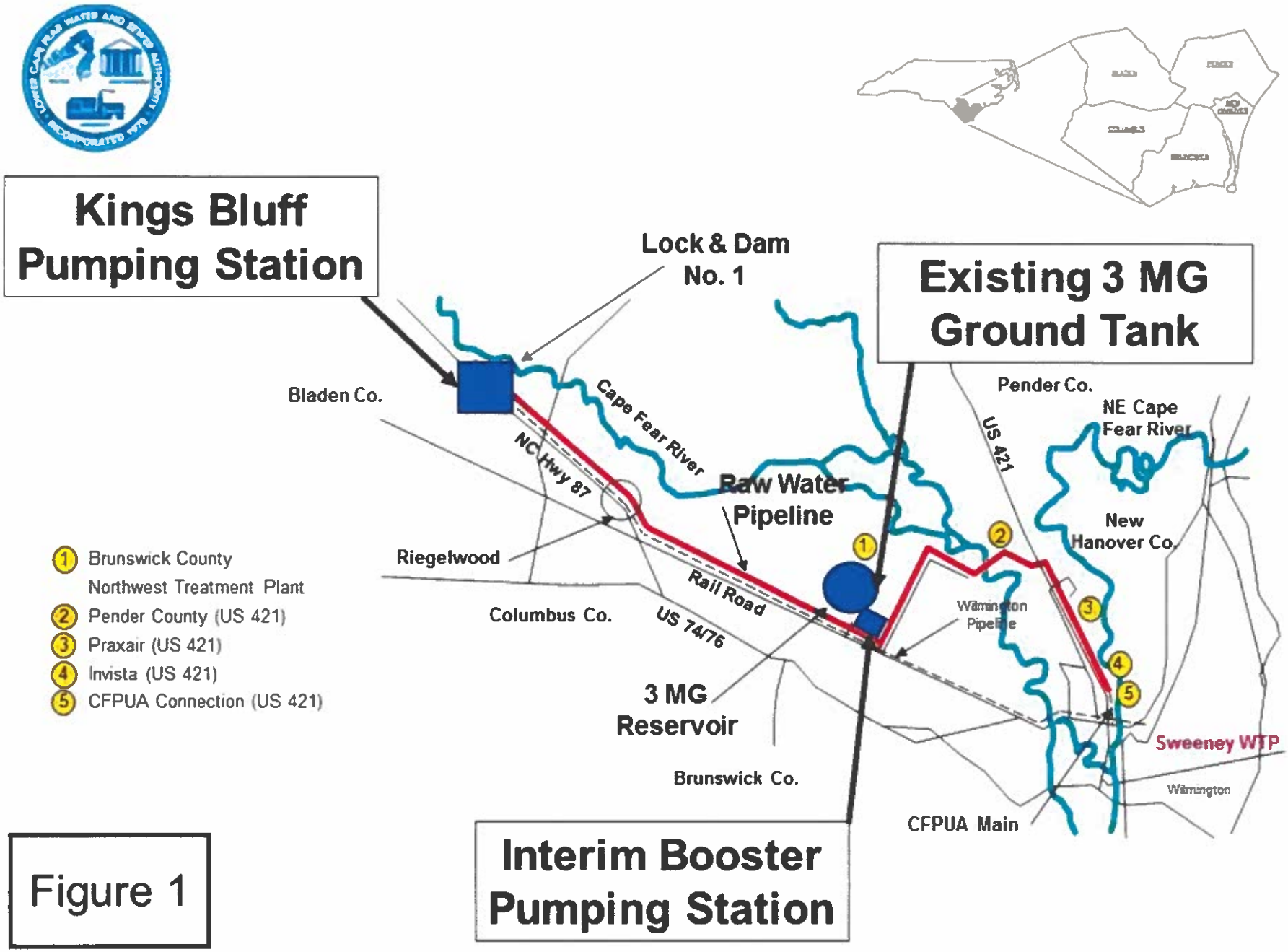
Kings Bluff Pumping Station
Lock & Dam No. 1
Existing 3 MG Ground Tank
Bladen Co.
Cape Fear River
NC Hwy 87
Raw Water Pipeline
Pender Co.
US 421
NE Cape Fear River
New Hanover Co.
Riegelwood
Rail Road
Columbus Co.
US 74/76
Wilmington Pipeline
3 MG Reservoir
Brunswick Co.
Sweeney WTP
Wilmington
CFPUA 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		
Valve Hand wheel Operators	X		
Original Pumping Station			
Structure	X		
Flooring	X		
Old Control Room			
Air Conditioning - Office	X		Both units not operational however, considered non-essential under current operations
Lights	X		
Plumbing	X		
Water Heater	X		

Equipment	Satisfactory	Needs Attention	Remarks
Well	X		Water supply converted to Bladen County – well no longer in operation.
Ceiling	X		
Service Sink	X		
Roof	X		
Bathroom	X		
Old Pump Room			
Lights	X		
Air Compressors #1	X		
Air Compressors #2	X		
Air Storage Tank #1	X		
Air Storage Tank #2	X		
Air Dryer	X		
Pump #1	X		
Pump #2 Slot	X		Pump removed and opening capped.
Pump #3 Slot	X		Pump removed and opening capped.
Light Duty Generator		X	Missing signage
Surge Tank Air and Water Piping & Control System Piping		X	Replace indicator lights. Evaluate operational requirements of the surge system.
Surge Tanks	X		Install proper insulation for the drain valves to prevent future valves from cracking.
Original Pipe Gallery			
Structure		X	Clean for bugs, debris, etc.
Lights	X		

Equipment	Satisfactory	Needs Attention	Remarks
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			
Pump #4	X		
Pump #5	X		
Structure	X		
Lights	X		
Piping	X		
Flooring	X		
HVAC	X		
New Pipe Gallery			

Equipment	Satisfactory	Needs Attention	Remarks
Structure		X	Needs to be cleaned due to bugs and leaves etc. Thermostat needs to be replaced. Replace cover on light switch.
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.
Overhead Doors	X		
New HVAC Room and HVAC Equipment			
Ceiling	X		
Floors	X		
Walls	X		
Equipment	X		
Pier			
Structure		X	Broken /Rotted walk boards and railing need to be replaced
Old Control Building		X	Bldg. needs to be cleaned of storm debris. Evaluate building for replacement of rotten boards.
New Control Building	X		
Intake Pipe Site Restoration	X		

Equipment	Satisfactory	Needs Attention	Remarks
Old Electrical			
Air Line	X		
Air Tank	X		
48-Inch Intake Screens			
Piping	X		
Air Backwash	X		
Controls	X		
New Electrical			
Air Line	X		
Air Tank	X		
60-Inch Intake Screens			
Air Backwash		X	Install warning signage in readable and observable condition on riverbank.
Controls	X		
1,000 Gallon Air Tank		X	Replace lights, replace indicator lights, bldg. need to be cleaned of bugs and debris, air valves need to be cleaned of dust and bugs.
2,000 Gallon Air Tank	X		Air valve positions do not match 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

Equipment	Satisfactory	Needs Attention	Remarks
Interim Booster Pump Station System Testing	X		Completed operation of all 3 pumps to 2200 RPM during site visit.
Grounds	X		
Control Building	X		
Tower	X		
Instrumentation	X		
Pig Launcher	X		
Meter Vaults			
Brunswick Northwest			***New Vault with 54" RWM Project***
Meter	X		
Piping	X		
Sump Pump	X		
Grounds	X		
Praxair			
Meter	X		
Piping	X		
Sump Pump	X		
Grounds	X		
Structure	X		
Invista			
Meter	X		
Piping	X		
Sump Pump	X		
Grounds	X		
Structure	X		

Equipment	Satisfactory	Needs Attention	Remarks
CFPUA			
Meter	X		
Piping	X		
Sump Pump	X		
Grounds		X	*Clean up vines/grass*
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	Exterior doors rusting – have holes
Oil Tank	X		
Fuel Tank Area			
Exterior Piping	X		
Containment	X		
Tank #1	X		Pneumercator panel inoperable
Tank #2	X		
Tank Signage		X	Install missing signage on tanks
Diesel Tank Piping	X		
Garage Area			
Storage Area	X		
Flooring	X		
Generator Room			
Generators and Piping	X		
Air Start System	X		
Lights	X		
Ceiling/Roof		X	Insulation failing in several locations.
Electrical Room		X	Pneumercator panel in alarm- needs to be addressed
Roll-Up Doors	X		
Flooring	X		

Pipeline Annual Inspection

Lower Cape Fear Water and Sewer Authority

Appendix C – Summary Air Relief Valve Annual Inspection

Air Relief Valve No.	Station	Conditions/Remarks
1.	4+00	At Entrance Road to Kings Bluff Pump Station – Good Condition
2.	37+65	Bar Pit Road- Good Condition – Access is through a locked gate. R/W is cleared now and was accessed
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- MCE investigated pilings and found no structural defects.
10.	394+50	Behind Momentive Chemicals (Neil's Eddy Rd at Bethel Baptist Church) - OK. Access is through locked gate that LCF Operators have key.
11.	416+00	Ellis Farm Road - Good condition-
12.	426+80	In field off 410 Ellis Farm Road.
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

Air Relief Valve No.	Station	Conditions/Remarks
17.	651+50	Between Rattlesnake Branch and Hood Creed,
18.	730+00	LCFWSA- Near 3 MG Raw Tank- Ground water present, underwater.
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 Heavy ground cover at MH structure.
22.	248+90	DAK Industries/ DuPont at Hill- Good Condition –Heavy ground cover at MH structure
23.	295+57	DAK Industries- At Test Well # 11- Good Condition – Heavy ground cover at MH structure.
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
26.	486+69	At Praxair on US Hwy 421 North- Good Condition- Good condition

Summary of Recommended Action Items:

1. All concrete vaults appear to be in good condition. Recommend repainting all manhole ring and covers and concrete flat-tops. Repaint all 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 maybe 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 R/W where LCFWSA raw water transmission main crosses roadways. Also provide painted 2-inch PVC poles painted "orange" to mark each Air Release Manhole structure.

Previous poles were installed by LCFWSA Operators. All of these poles and markers have degraded or are missing from the LCFWSA R/W. All poles and markers are recommended to be updated and painted in the upcoming fiscal year.

4. R/W was last cut in Nov/Dec 2020; there are many areas of overgrown brush that remain around vaults and within the R/W. Crews should 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. Given that some of the areas along the right-of-way are in accessible by standard vehicles, the purchase of a 4x4 side-by-side ATV or similar vehicle may be beneficial to operations staff. It is recommended that the Authority consider purchase of such a vehicle as part of the future parallel raw water main project, as the right of way will be fully cleared at that time and access will be significantly improved.
7. Repair concrete diaper at ARV near Phelps Truck Sales on US 421. Concrete flat-top of structure has been degraded by bush-hogging and mowers cutting ROW.
8. Install bollards for protection at the ARV manhole located along the entrance to "The Bluffs" development.
9. R/W is not maintained throughout DAK property now since the Plant is shut down. There is no DAK personnel that maintains the R/W since the Industry is no longer there.

Pipeline Annual Inspection

Lower Cape Fear Water and Sewer Authority

Appendix D – Summary 12" Blow-Off Valves Annual Inspection

12" Blow Off Valves	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

Summary of Recommended Action Items:

1. Recommend operation of blow-offs on an annual basis.
2. Recommend painted 2-inch PVC poles painted "orange" to mark each blow-off structure.
3. Recommend all blow-off structures to be re-painted "blue" as paint has faded and deteriorated.
4. Brush/ Grass from all structures needs to be cut.

Pipeline Annual Inspection

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 located just west of John L. Riegel Road. Good condition – new valve recently installed during repair of the leak after Hurricane Matthew. 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 90degree 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 markers needed to mark valve locations.

Appendix F – Photographs

Photograph A – Pump #4 and #5

Photograph B – Electrical Building Wall Separation (Exterior)

Photograph C – Diesel Storage Tanks

Photograph D – Alarmed Diesel Tank Leak Panel

Photograph E – Hellan Strainer

Photograph F – Storage Room

Photograph G – Pipe Gallery Emergency Light Requires Service

Photograph H - Generator and Storage Tank Require Signage

Photograph I - All Three Surge Tank Control Panels

Photograph J - River Access Walkway

Photograph K – Compromised Dock Floor

Photograph L- Compromised Dock Handrail

Photograph M- Old Air Tank Building Failed Wall Panels

Photograph N- Generator Building Insulation

Photograph O – Generator Building Personnel Doors

Photograph P – Breaker Panel in Generator Building

Photograph Q – Pneumercator Panel in Generator Electrical Room

Photograph O – 3 MG Ground Storage Reservoir

Photograph P – Interim Booster Station

Photograph AA – Overgrown Area along Right-of-Way

Photograph BB – Orange Painted Structure Marker Deterioration

Photograph CC – Interior of Manhole with 48" Check Valve at "The Bluffs"

Photograph DD – Exposed Steel at ARV at Phelps Truck Sales (US 421)

Photograph EE- Emergency Intake Pipe Adjacent to Pond behind DAK / DuPont

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

Photograph GG- 54-Inch Steel Raw Water Main Re-Installation in Rattlesnake Branch

Photograph HH- Laying Down Centipede Sod at Mrs. Peterson's Property

Photograph II- Access Road from Brunswick County Vault to 3 MGD Ground Tank