JOHNSTON COUNTY
NORTH•CAROLINA

Wastewater Treatment Expansion

August 2, 2022 - Raleigh

August 4, 2022 - Kinston

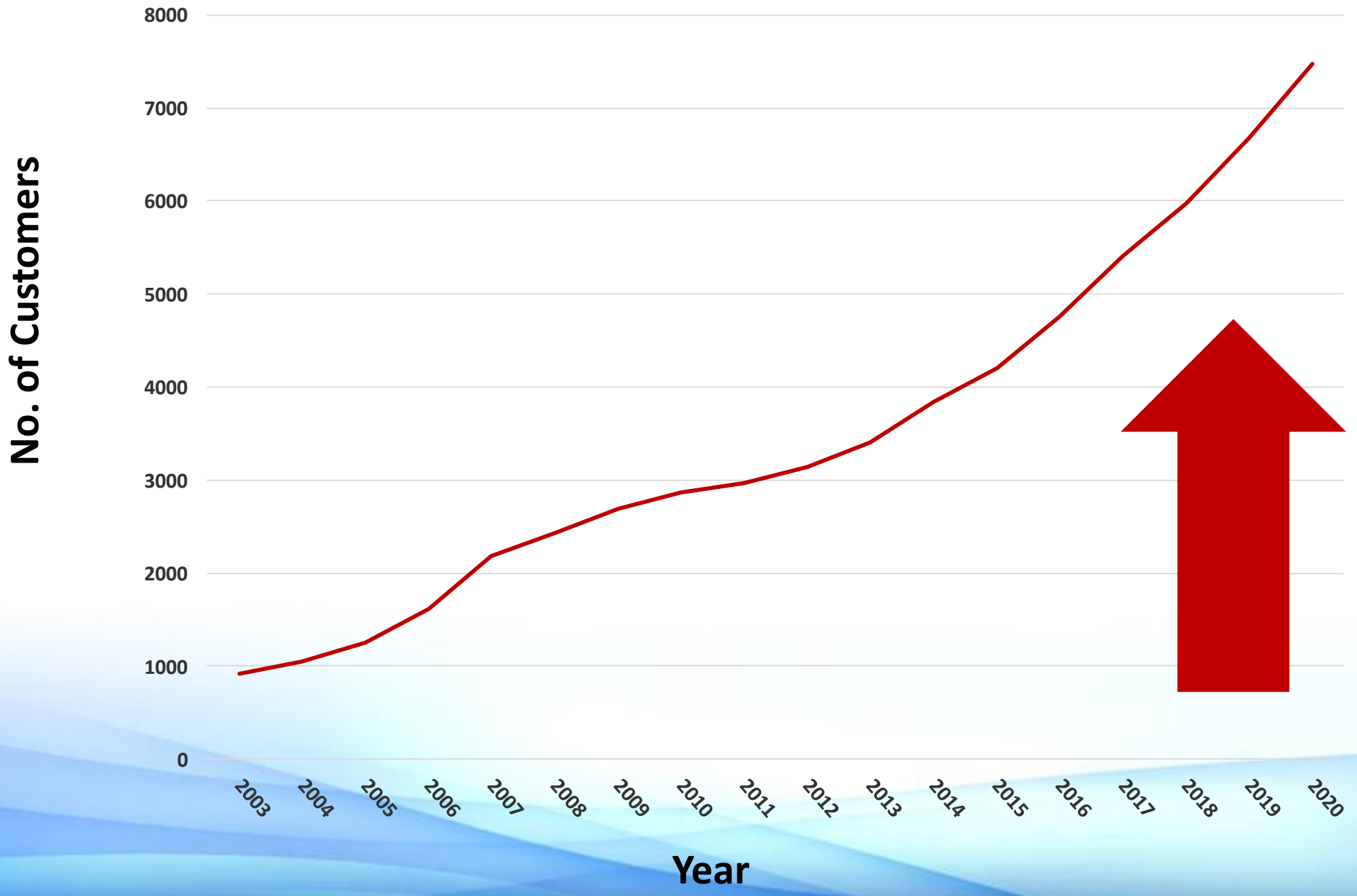
Wastewater System & Services Overview

- Approx. 8,400 retail customers (mostly in Cleveland and McGee's Crossroads areas)
- Retail customer growth approx. 10% per year
- Bulk Service:

  Four Oaks — Smithfield
  Clayton — Pine Level
  Selma — Utilities, Inc. (private utility)
  Aqua (private utility)

- Operate and maintain:
  - 136 miles of gravity sewers
  - 150 miles of force mains
  - 61 wastewater pump stations
  - 9.5 MGD WWTP

Wastewater Retail Customer Growth

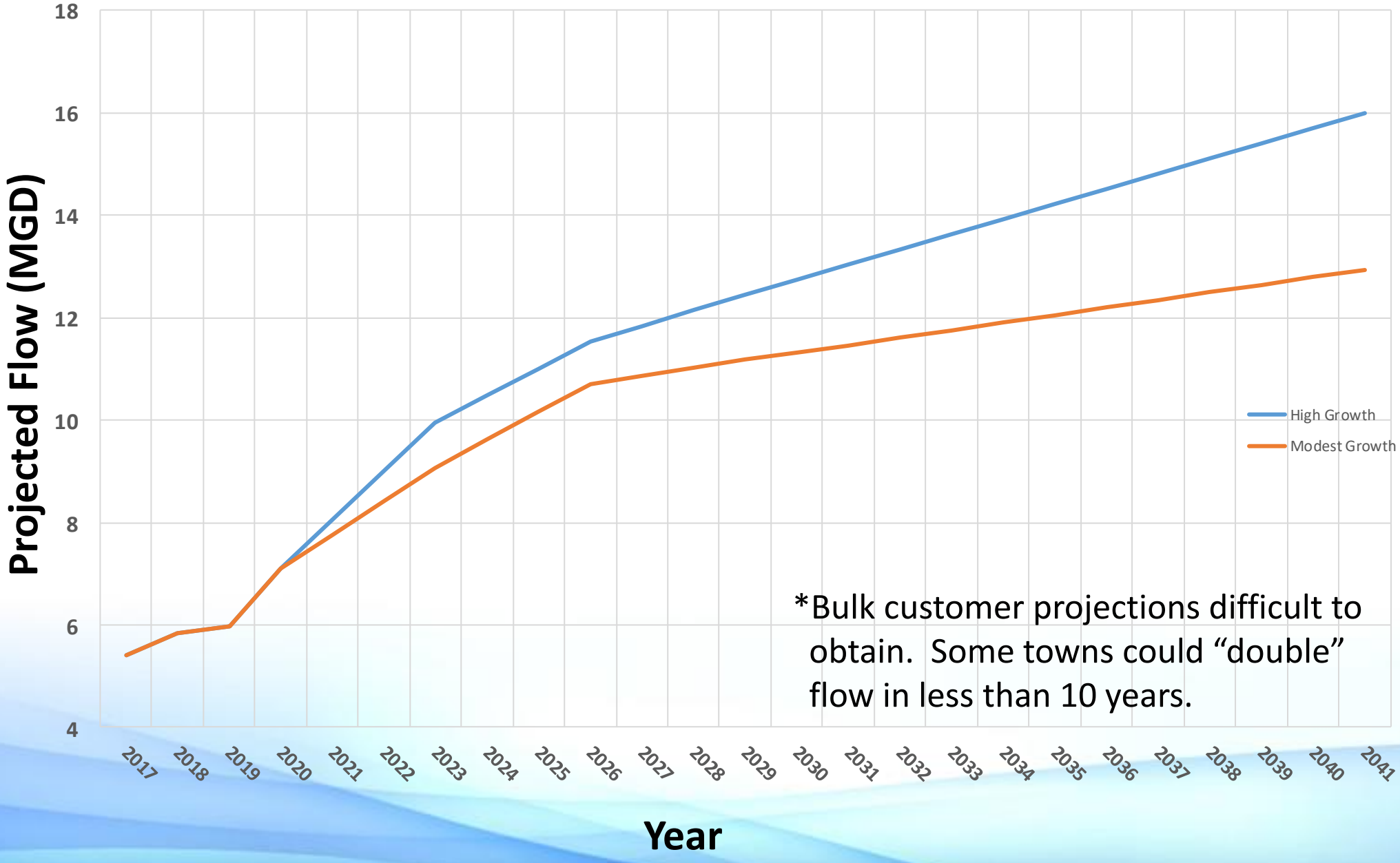


Wastewater Treatment Capacity

- Existing WWTP Permitted Capacity = 9.5 MGD
  - Average Daily Flow = 6.69 MGD (70.4% of capacity)
  - Committed "Paper" Flow = 2.08 MGD
    8.77 MGD (92.3% of capacity)
- Future Contract Commitments = 0.51 MGD
- Available Capacity CJCRWWTF = 0.22 MGD*
- Capacity Under Construction = 2.00 MGD

	2017	2018	2019	2020	2021
Total Retail Customers	5,405	5,983	6,678	7,482	8,209
No. of New Retail Customers	655	578	695	804	727
Retail Customer Growth Rate (%)	13.8	10.7	11.6	12.0	9.7
Average Daily Flow (MGD)	5.40	5.84	5.97	7.09	6.69

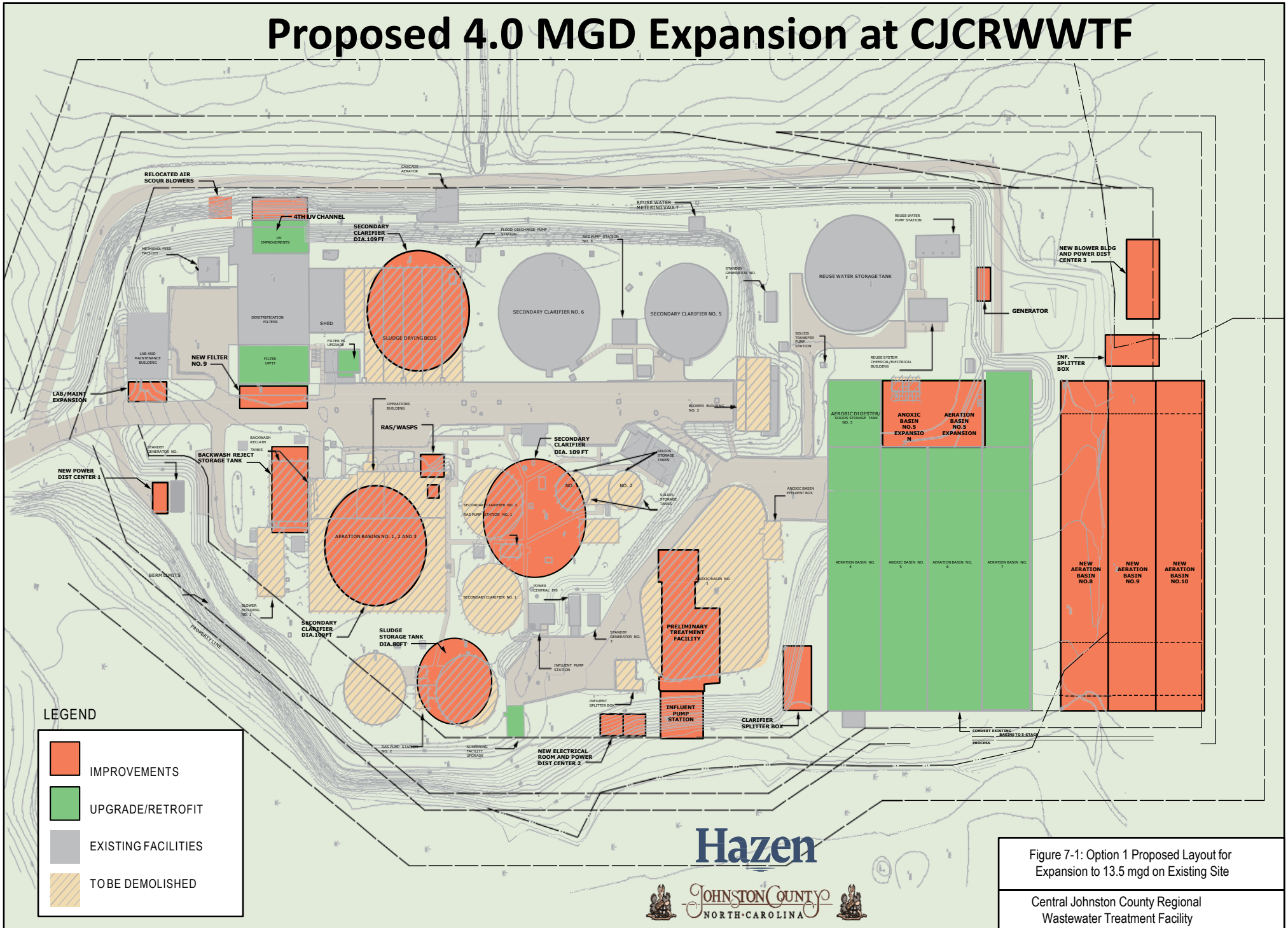
Wastewater: 20 Year Flow Projections



Central Johnston County Regional Wastewater Treatment Facility (CJCRWWTF) Expansion

- CJCRWWTF Treatment Capacity = 9.5 MGD (NPDES Permit to 13.5 MGD)
- Transmission Capacity to CJCRWWTF = 7.5 MGD
- 2016:
  - Completed BioWin modeling
  - Preliminary design for 4.0 MGD Expansion
  - Design additional transmission improvements to JCRWWTF (parallel main interceptor to plant)

Proposed 4.0 MGD Expansion at CJCRWWTF



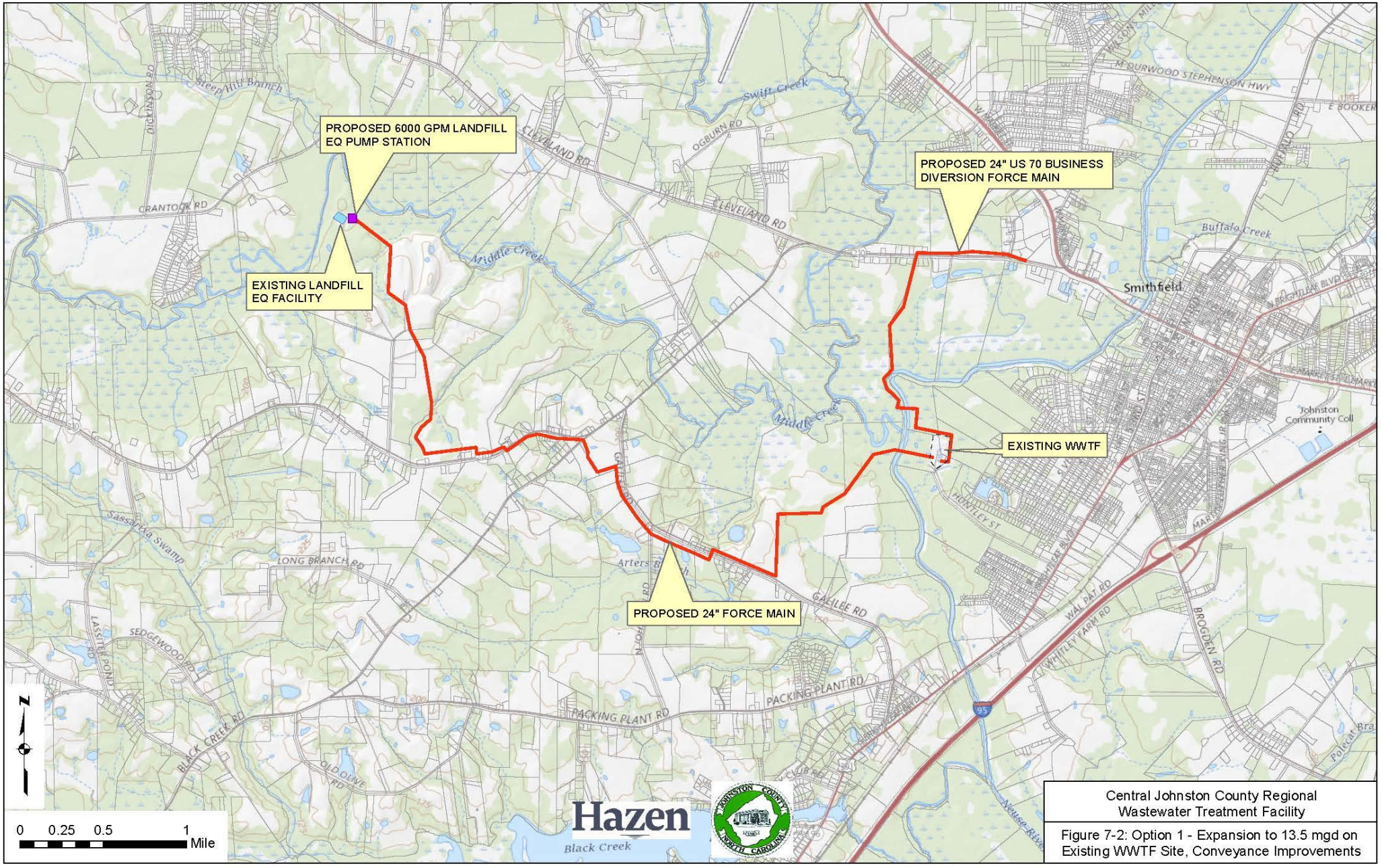
Hazen

JOHNSTON COUNTY NORTH CAROLINA

Figure 7-1: Option 1 Proposed Layout for Expansion to 13.5 mgd on Existing Site

Central Johnston County Regional Wastewater Treatment Facility

Transmission Improvements for 4.0 MGD Expansion at CJCRWWTF

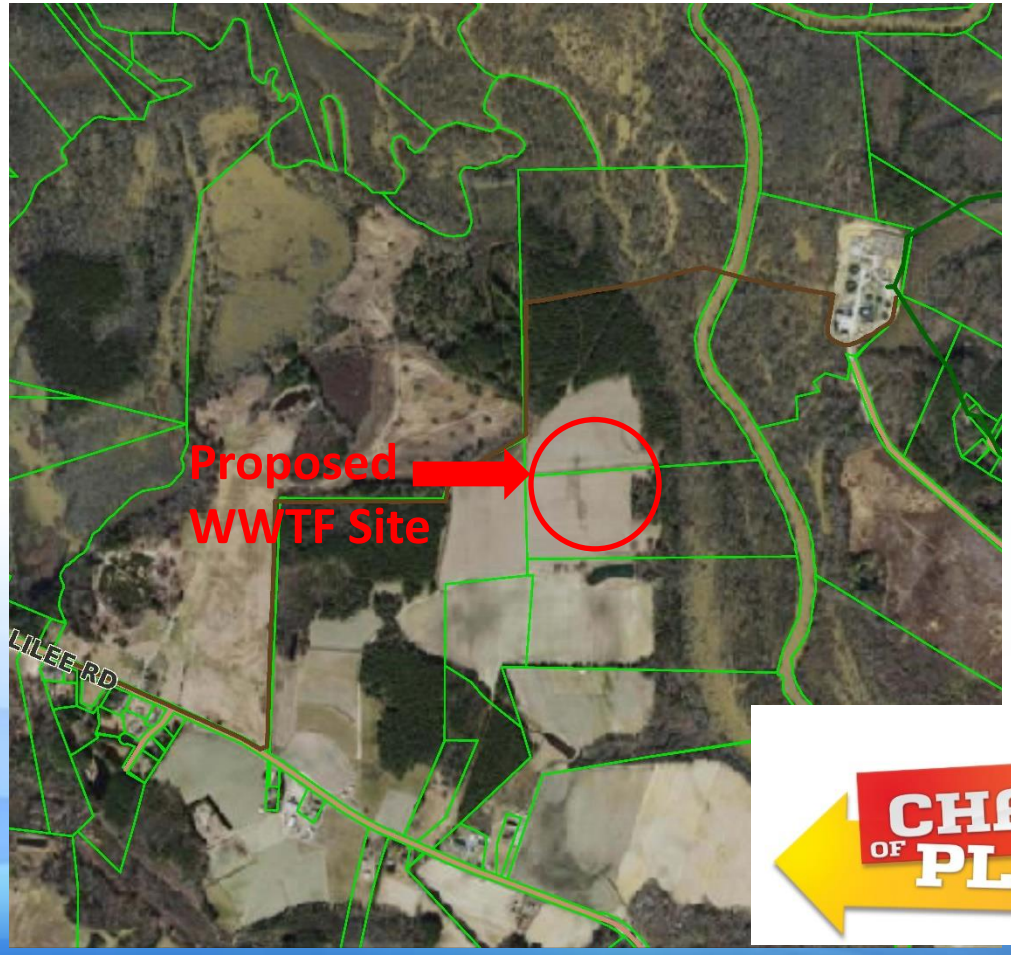


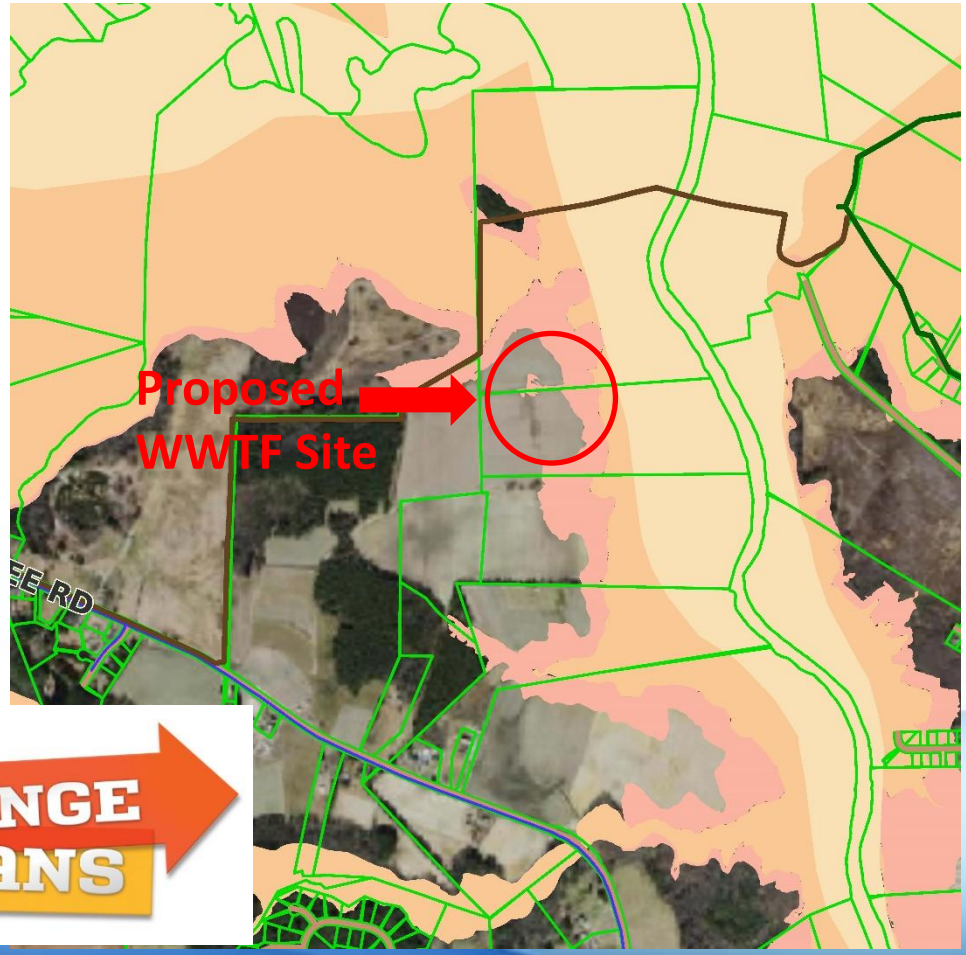
CJCRWWTF – Hurricane Matthew (October 2016)

- Plant off-line for approx. 1 week
- Effluent compliant when back on-line
- Complete site restoration took approx. one year
- Flood protection dike raised (completed early 2022 – FEMA mitigation)

Option #2 - WWTF Expansion at New Site (Across River)

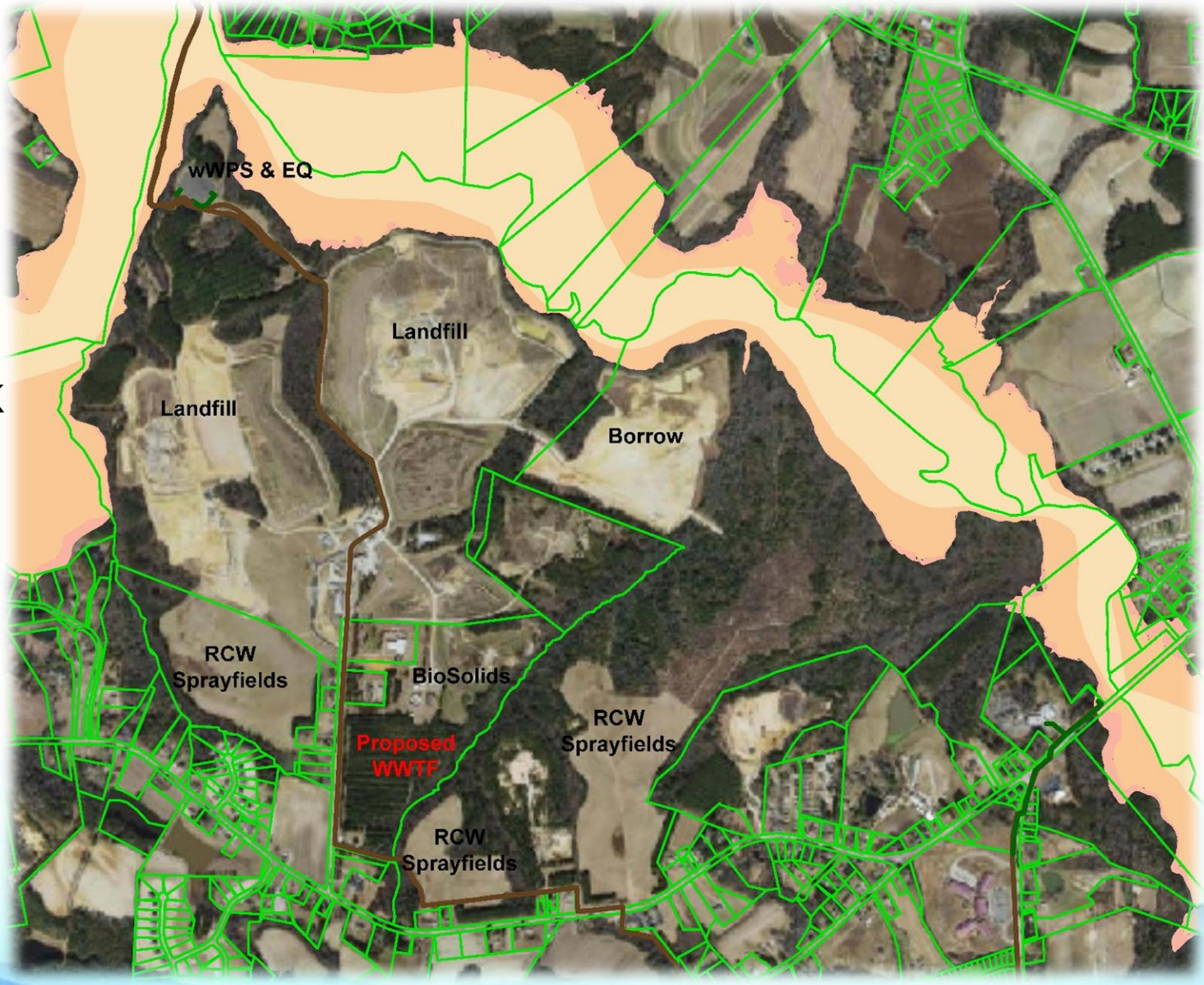
- County Owned Property across Neuse River from WWTP
- Completed preliminary WWTF layout on property
- Hydrologic Evaluation of Future Flood Zone
    - Less than 30 acres outside 100 year floodplain
    - Less than 20 acres outside 500 year floodplain
- Must build structures up to protect critical infrastructure from future flooding
- Insufficient land area outside of floodplain to serve future needs





Option # 3 - WWTF Expansion/New Facility at JC Landfill (NC 210)

- ✓ County owned
- ✓ 1,100 acres
- ✓ Next to Landfill
- ✓ Next to Biosolids
- ✓ Next to RCW Tank
- ✓ Zoned for County use
- ✓ Away from **floodplain**
- ✓ Sufficient area for future expansion



210 WWTF

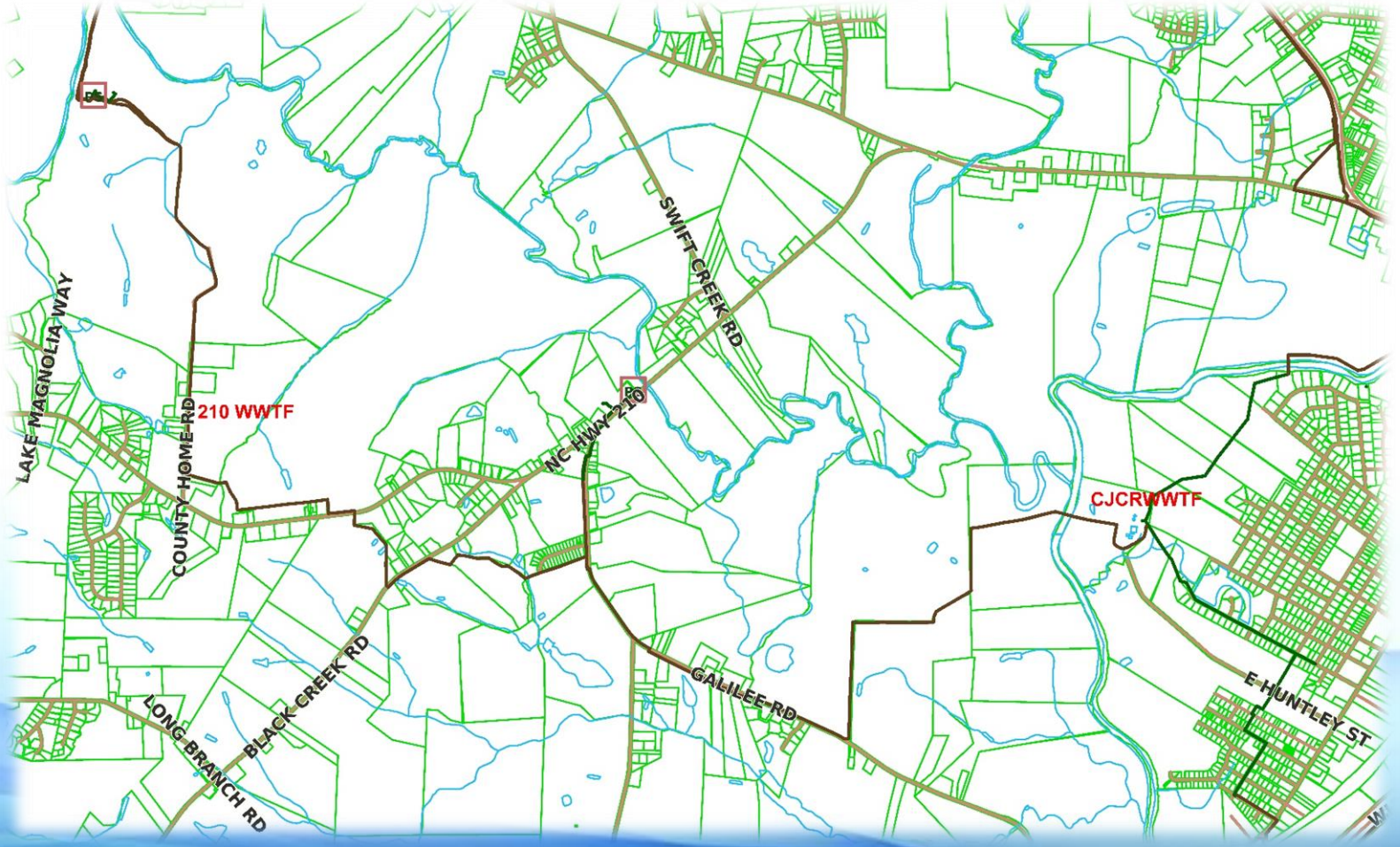
- Site zoned for all County uses, **BUT**

  Special Use Permit recorded in 2002 required 800’ setback for all land disturbance on property. Further research and review of minutes revealed that intent of zoning was to require 800’ setback along NC 210 only.

- 800’ setback = not sufficient area
- Must request Special Use Permit modifications
- Special Use Permit requires Planning Board approval and Board of Commissioner approval (both public hearings)
- County hosted a community meeting to discuss request and plans with area residents, prior to both public hearings
- Request approved (6 month process)

210 WWTF

- Site area large enough to accommodate up to 24 MGD without relocation of any existing facilities
- Close to Middle Creek, but discharge into Middle Creek not feasible to retain existing limits (per NPDES staff)
- Approx. 4.5 mile effluent force main required to existing discharge in Neuse River (follow existing easement that includes reclaimed water main, WAS line and force main)
- Start design **AGAIN** from "scratch"
- Modify transmission improvements plan **AGAIN**



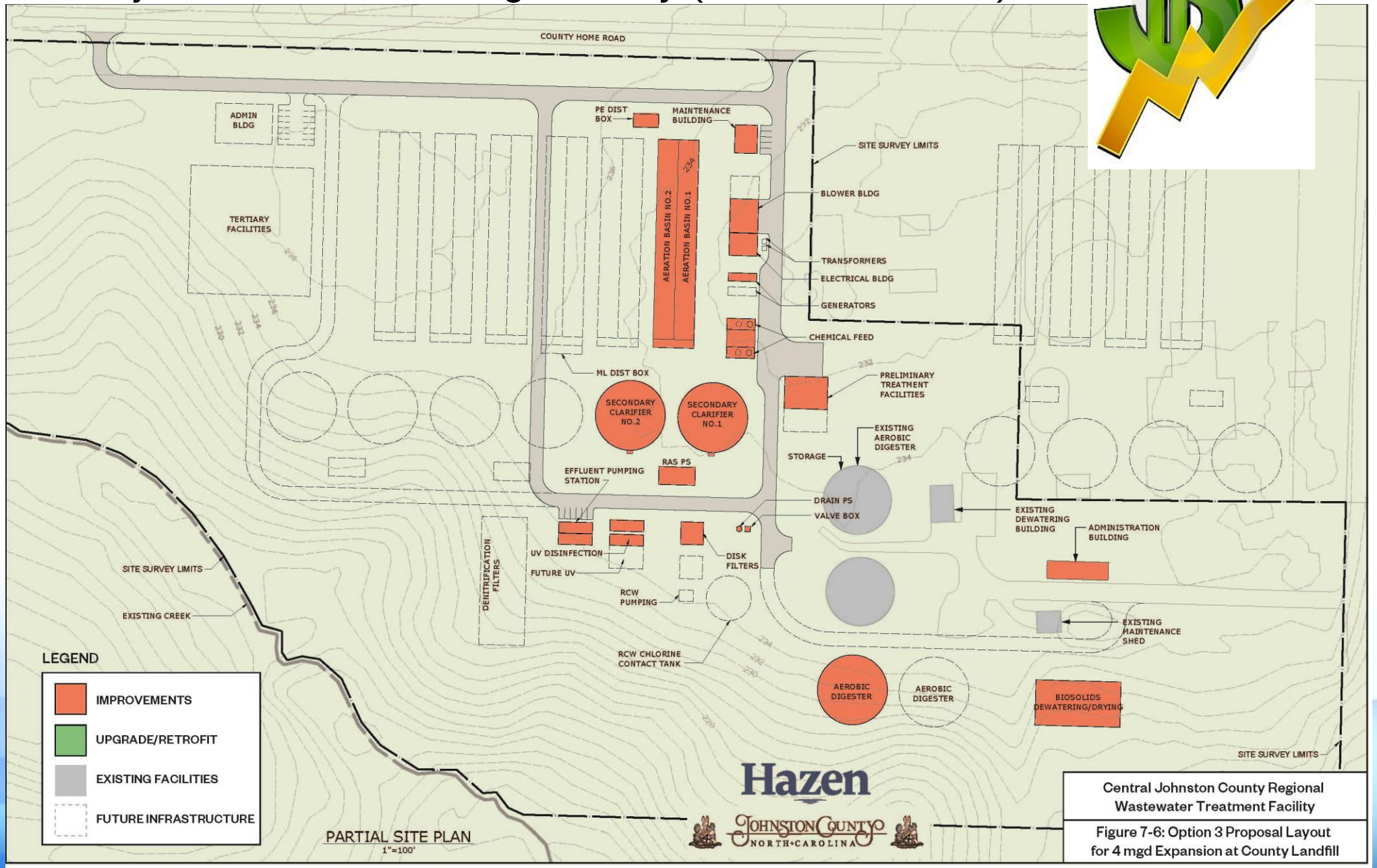
210 WWTF

What treatment process will we use? What type of wastewater will we receive?

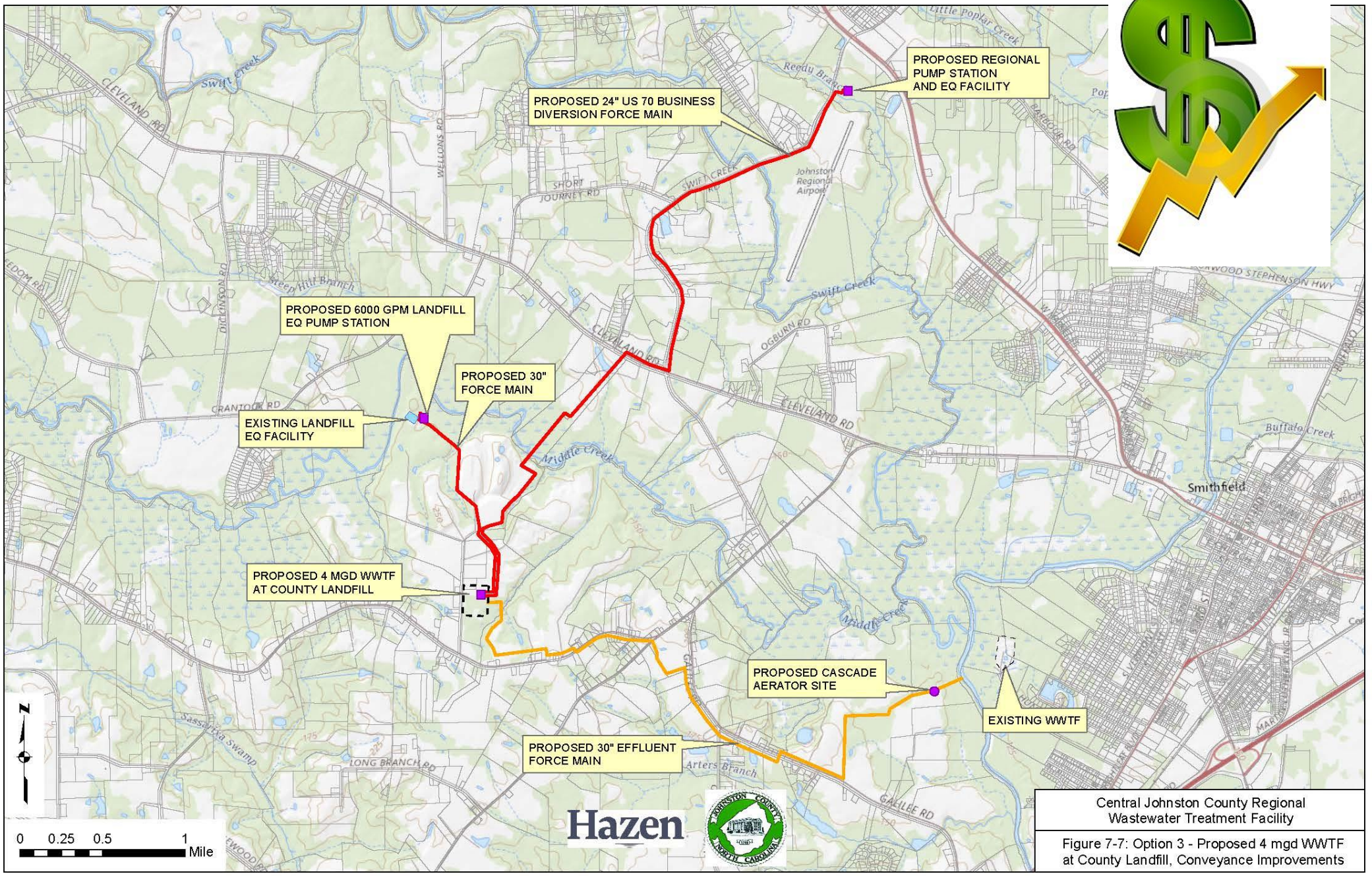
- Factors to consider:
  - Existing contract to receive up to 0.9 MGD "high strength" from industrial facility (BOD, COD, TSS, TN) - **25% of 4.0 MGD WWTF**
  - Dissolved Organic Nitrogen (DON) study (1.58 mg/L vs. typical domestic of 1.0 mg/L) - NBDON study
  - TDS study: High TDS impacts aeration, biological phosphorus removal, nitrification, denitrification, UV disinfection, whole effluent toxicity, floc integrity/biosolids dewatering, reclaimed water (irrigation and industrial cooling), corrosion
  - High-strength Study: 0.9 MGD of "high strength" industrial flow reduces domestic flow capacity of plant by 0.7 MGD
- Design recommendations:
  - 5-stage Bardenpho process for optimal nutrient removal
  - Terminate high strength agreement and/or design transmission system to "split" high strength flow for treatment at both plants
  - Install cascade aerator at river discharge (approx. 4.5 mi from WWTF)

210 WWTF

- 30% design completed in March 2019
- Project cost increased significantly ($30 M vs. $75 M)



210 WWTF – Transmission Improvements Plan

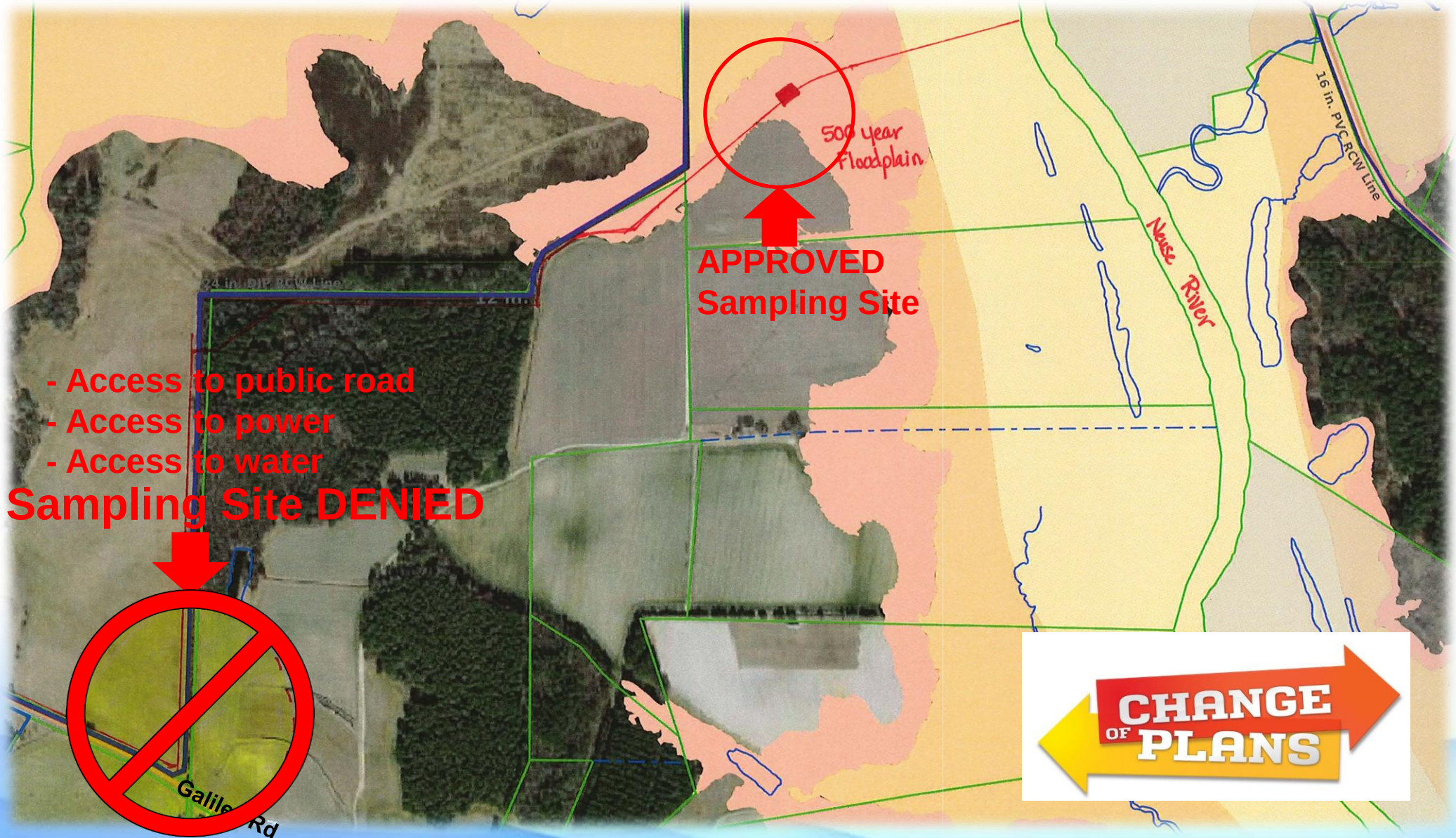


210 WWTF

- September 2017 – Submitted NPDES permit renewal (exp. date 3/31/2018)
- February 2018 – Requested NDPES permit limits at 11.5 MGD and 13.5 MGD
  - N allocation in permit required 1.74 mg/L at 13.5 MGD
  - County derate existing CJCRWWTF from 9.5 MGD to 7.5 MGD to ensure sufficient nitrogen allocation = 11.5 MGD Total Capacity After Expansion
  - Net additional treatment capacity = 2.0 MGD
- 30% design in March 2019
- 60% design in June 2019
- RFQ and pre-selection of Disk Filters and UV System in July 2019
- 90% design in December 2019
- April 2020 – Received draft NPDES permit
  - Required monitoring for **fecal coliform**, pH and DO at discharge to river
  - County and consultants cannot confidently say no biofilm will deposit on and scour from effluent pipe walls - How to ensure consistent fecal coliform permit compliance at end of pipe?
  - Multiple virtual meetings with NPDES staff and attorneys

210 WWTF Effluent Main

6,500 LF of 30”/48” effluent main from Galilee Road to Neuse River



210 WWTF Effluent Main

- County opted to eliminate UV and feed hypochlorite
- Sampling locations for fecal coliform, pH, DO and TRC defined in NPDES permit dated **May 2021**
  (within 1,800 LF of receiving stream)
- Disinfection change required design modifications = **DELAYS**:
  - Eliminate UV and add chemical feed/storage at 210 WWTF
  - Add dechlorination chemical (sodium bisulfite) feed/storage at effluent (remote site with no staffed personnel) – **Unanticipated Cost**
  - Access:
    - County could use existing farm path for prior planned operations (daily pick-up truck)
    - Design permanent access for chemical deliveries, etc. – **Unanticipated Cost**
  - Utilities:
    - Extend power to site – **Unanticipated Cost**
    - Potable Water Source – **Unanticipated Cost**
  - Safety/Security of unstaffed site with chemical storage/feed

210 WWTF Projects

- Design and Construction Contracts – 3 separate
  - 210 WWTF: 4.0 MGD "liquid" treatment
  - BioSolids Improvements: Replace existing belt presses with centrifuges and expand for additional capacity
  - Effluent Force Main: 30/48" effluent outfall to Neuse River (8.0 MGD)

Project	2021 Engineer Estimate	Bid Date	Bid Amount	Anticipated Completion Date
210 WWTF (4.0 MGD)	$58.3 M	October 2021	$68.75 M	July 2024
BioSolids Improvements	$18.4 M	November 2021	$25.1 M	January 2024
Effluent Force Main	$8.6 M	August 2022	TBD ($12 M)	April 2024
TOTAL	$85.3 M		$106 M*	

***24% increase from early 2021**

**Project list does not include approx. $50 M in transmission projects under construction and additional other projects under design

210 WWTF Funding

- Updated financial modeling with WIFIA and SRF funding options
- Applied for WIFIA (opted to deny WIFIA)
- SRF Loan = Approx. $93 M (4 rounds of funding applications)
- Plan to submit additional SRF application in Fall 2022 (max. loan per entity to $200M)

- Existing County ARPA funds appropriated
- Repay Debt:
  - **Growth Pay for Growth**
  - County collects System Development Fees (SDFs) from all retail customers ($4,090 per residential unit)
  - Capacity Fees: Bulk customer agreements
  - Financial Modeling (min. 5% rate increase per year for 4 years)

- Maintain reasonable user rates, SDFs (system development fees) and bulk capacity fees, but sustainable to support growing system demands
- 20 Year Wastewater CIP = $220 M

Future Treatment Capacity – Next Steps

- Where do we go from here?
  - Nutrient credit allocation from private mitigation bank
    - Utilize transport factor
    - Credits released incrementally (60% by 2024)
    - Add credits to NPDES permit by 2024? – Allowing County to re-rate "old" plant or build additional capacity at new plant = 13.5 MGD
    - Additional N allocation required to exceed 13.5 MGD
  - Next 4.0 MGD expansion at 210 WWTF (Total 8.0 MGD at 210 WWTF)
    - RFQ issued
    - Original design includes up to 8.0 MGD for several treatment components (ex. preliminary treatment, chemical feeds, etc.)
  - NPDES Permit Expansion Study Underway
    - Up to 24 MGD
    - Includes N acquisition options evaluation

Wastewater Treatment Expansion - Summary

- Site Selection – Option #3
  - New Design
  - Delayed project and increased cost

- Additional delays and cost increases due to permit requirements for sampling
- Funding
  - Cost increases with each modification
  - Cost increases due to delays
  - Funding agency approvals
  - Multiple rounds of funding

- Treatment Capacity and Transmission improvements CIP – **TIMING is critical!**
- Growing demands from retail service areas and bulk customers
- COVID? Supply chain delays? Material shortages? Material cost escalations?

Wastewater Treatment Expansion - Summary

- At least **4 years** delayed and **350% over** "original" budget, **BUT** the County began implementation of a critical wastewater plan that:
  - Meets long-term demands
  - Ensures resiliency
  - Provides redundancy
  - Provides reliability of operation
  - Protects the environment
  - Protects public health
  - Is financially feasible

Questions?