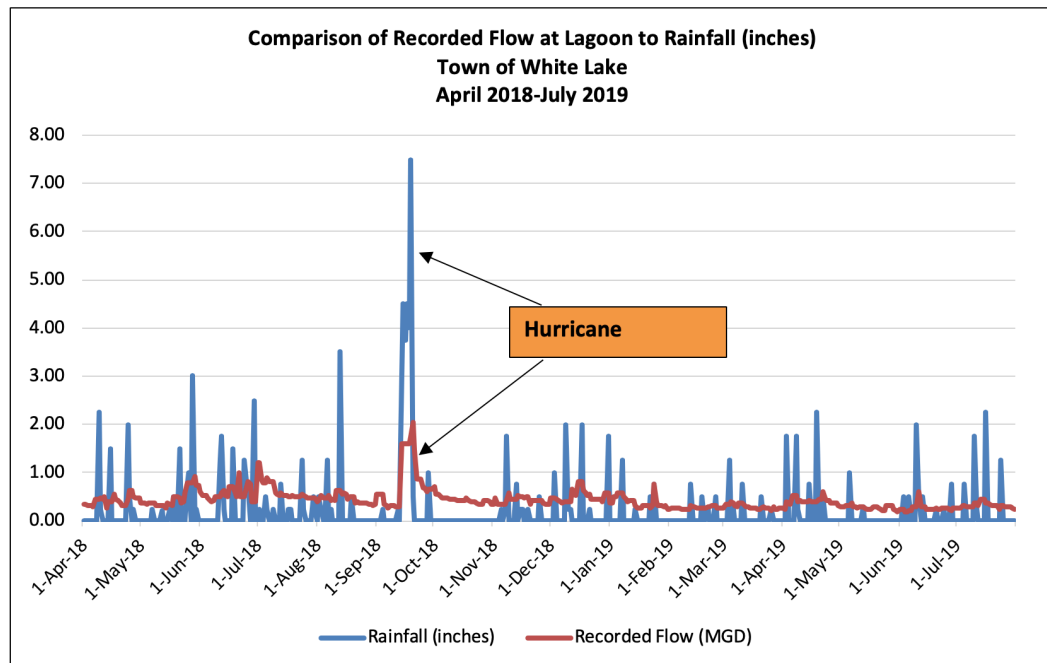


Aging Wastewater Infrastructure at White Lake

A municipality's wastewater infrastructure is one of the most valuable assets in the community, and as a result, can be one of the more costly to maintain. Many systems were developed during a period in which Federal grants were generous; however, Federal funding to states for wastewater infrastructure now consists primarily of loans (with 30-year terms), which are disbursed through State Revolving Fund (SRF) programs.

The wastewater collection system at White Lake consists of both gravity lines (no energy needed, as lines are situated in the ground so as to allow flow towards the treatment plant) and force mains (placed in areas where there is not sufficient gradient for gravity lines) with pump stations serving to actively move water towards the treatment plant. As pump stations use electricity, making accommodations for unexpected power outages (which occur during extreme weather events such as hurricanes) can prevent wastewater backups and spills—this is commonly done by having pumper trucks on standby (which has been done at Lake Waccamaw, for example) or acquiring generators. The Town of White Lake has recently purchased new generators for the pump stations (also referred to as lift stations) in its system.

Condition assessments of a wastewater system can provide information on problem areas which require renewal and/or replacement. Older collection systems develop a variety of problems which can result in collection of more than wastewater—stormwater and groundwater inputs can often increase dramatically after rainfall events, and this is referred to as inflow and infiltration (I&I). This increased flow can exceed the capacity for the wastewater treatment system to function effectively. The wastewater treatment plant (WWTP) at White Lake is a lagoon, which provides primary treatment, with effluent (treated and disinfected water) sent to Colly Creek. It has a permitted maximum flow capacity of 0.8 million gallons per day (MGD). There have been times, associated with large rainfall events, in which flow has exceeded the permitted limit, as the following graph (provided by the Lumber River Council of Governments) indicates:



The following excerpt was taken from an I&I report (from the Town's engineer) based on video assessments and smoke testing of the town's wastewater lines:

From: TOWN OF WHITE LAKE PRELIMINARY ENGINEERING REPORT (on Inflow & Infiltration), provided by ENGINEERING SERVICES, PA Updated January 30, 2019

CONCLUSION AND RECOMMENDATIONS

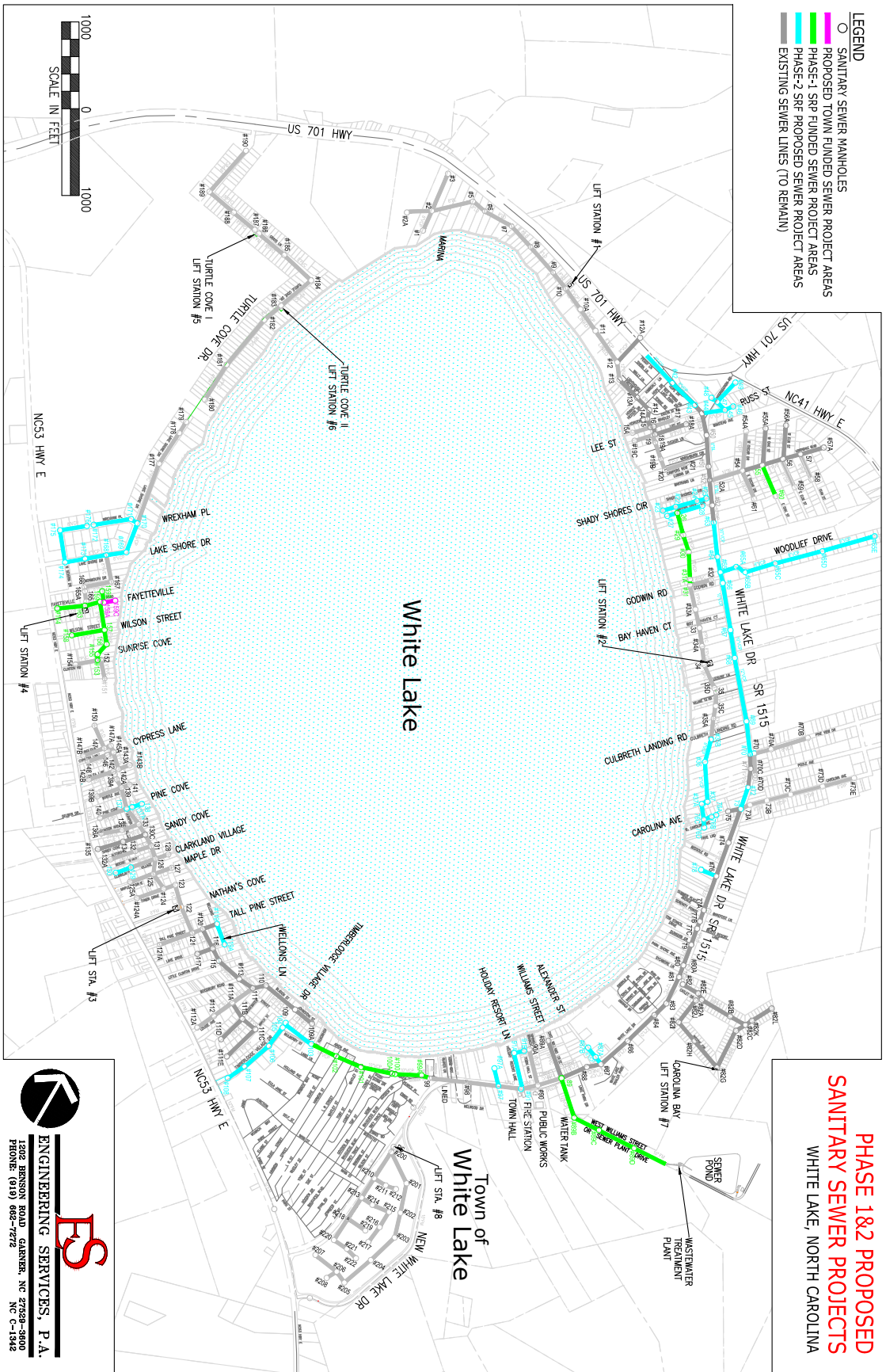
Older sections of the collection system are a significant contributor to the Town's I&I. These sections feature mostly vitrified clay (VC) lines and brick/mortar manholes, which have not been addressed by previous projects. Smoke testing and video inspection conducted as part of an I&I study identified the following problems that require correction:

- Collection lines—VC lines are in very poor condition and experience significant deterioration. Consistent defects were offset joints, large separations at the joints, sheared lateral connections, and continuous infiltration. Poor pipe and lateral conditions also allow a great deal of inflow during rain events. Continuous infiltration identifiers were apparent and plentiful. Lines had collapsed at some locations.
- Manholes—Brick manholes are full of holes, with some missing bricks. Some manholes joints were compromised. Joints are missing mortar and the concrete and brick inside chimneys or cone sections is broken, cracked, and chipped. Manhole conditions allow increased inflow during rain events or storms.
- Cleanouts—Smoke testing located and identified locations where cleanouts were broken or where caps were missing. These deficiencies serve as inflow sources for stormwater runoff.
- Root intrusions—Video inspection of collection lines located several line segments experiencing root intrusions at offset joints, cracked lines, and service laterals. Hydraulic root cutters were used at some locations to clear roots to provide access for the video camera. Many locations were noted as active infiltration sources, providing either a steady drip or continuous flow of groundwater. Root intrusions can also create points where grease, trash, and other debris can collect and cause blockages.

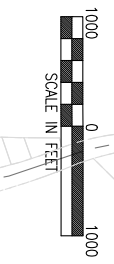
Rehabilitation of the collection lines is typically done by a process called slip lining, in which the interior of the existing pipe is lined with a seamless material that is “pulled” through the line from manhole to manhole. Replacement of sections of pipe (often with PVC) is done in situations where there are structural issues with the existing pipe (such as collapses).

The work identified in the Engineering Services report is being done in two Phases, with SRF loans serving as the funding source. The first Phase (slightly over \$2 million worth of work) will be out for bids in February 2020, while the second Phase (around \$3 million worth of work) has been approved for funding with a proposed spring-summer 2021 start. The following map (provided by Engineering Services PA) indicates the areas to be addressed in each phase:

- LEGEND**
- SANITARY SEWER MANHOLES
 - PROPOSED TOWN FUNDED SEWER PROJECT AREAS
 - █ PHASE-1 SRP FUNDED SEWER PROJECT AREAS
 - █ PHASE-2 SRP FUNDED SEWER PROJECT AREAS
 - █ EXISTING SEWER LINES (TO REMAIN)

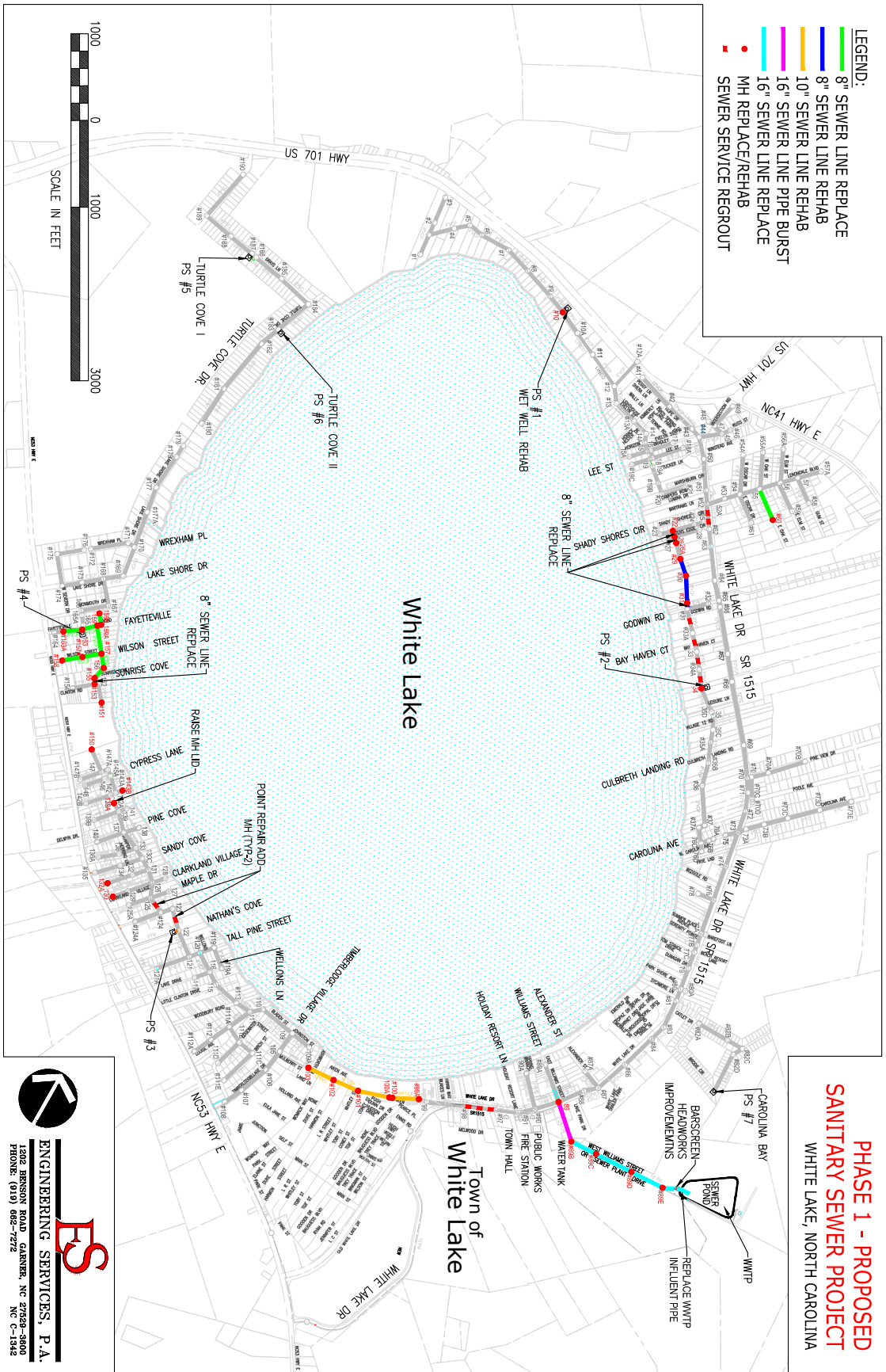


**PHASE 1&2 PROPOSED
SANITARY SEWER PROJECTS
WHITE LAKE, NORTH CAROLINA**



ENGINEERING SERVICES, P.A.
 1202 BENSON ROAD GARNER, NC 27928-3000
 PHONE: (919) 682-7272
 NC C-1342

- LEGEND:**
- 8" SEWER LINE REPLACE
 - 8" SEWER LINE REHAB
 - 10" SEWER LINE REHAB
 - 16" SEWER LINE PIPE BURST
 - 16" SEWER LINE REPLACE
 - MH REPLACE/REHAB
 - SEWER SERVICE REGROUT



**PHASE 1 - PROPOSED
SANITARY SEWER PROJECT
WHITE LAKE, NORTH CAROLINA**

ENGINEERING SERVICES, P.A.
 1202 BENTON ROAD, GARDNER, NC 27839-3000
 PHONE: (919) 682-7272

Conclusions and Recommendations, Wastewater Infrastructure:

1. An asset management grant application was submitted to the NC DEQ Division of Water Infrastructure in September 2019, and the town has recently been notified that their grant will be awarded (\$150,000). The proposal includes funding for video assessments of portions of the system that have never been assessed, and areas where exfiltration (movement of wastewater out of lines into the groundwater) would pose a particular concern given the proximity to White Lake (as noted by Shank and Zamora's 2019 report). These areas are found in the eastern and northeastern regions of shoreline, and in the southwest, around Timberlodge Court. In addition, the proposal includes funding to evaluate the condition of the pump stations as well as future treatment options (given the limitation of the existing WWTP) including possible regionalization of the system.
2. Educate property owners on the need to maintain the service lines on their property, including clean outs. The collection system is not a drainage system, and clean outs need to be capped so that stormwater from gutters and yards does not enter the wastewater line.
3. Educate residents and businesses on the need to keep everything but the Three P's—pee, poo, and paper—out of the wastewater system. Flushable wipes are particularly bad, creating costly to remedy clogs of service lines and pumps at pump stations. Fats, oils and grease (FOG) also create costly clogs of the system and should be disposed of in the trash or in the case of restaurants, collected for recycling.
4. Evaluate the options (matching grants, incentives, service line maintenance program) for promoting replacement of laterals (service lines) on private property when appropriate (starting in the oldest neighborhoods or commercial areas, for example). These smaller lines are often where significant I&I (and exfiltration) is located (and as repairs to the larger lines are made, I&I generally becomes more problematic in the smaller lines).
5. The Town has recently completed an individual metering project that has resulted in increased water and wastewater revenues and has also raised rates overall for water and wastewater service. The additional funding will be needed to pay debt service on the SRF loans. The Town should also evaluate how much cash-funded work (small projects and assessments, for example) could be done each fiscal year so that improvements are ongoing.