Town of Waynesville, NC
Board of Aldermen Regular Meeting

Town Hall, 9 South Main Street, Waynesville, NC 28786
Date: **September 11, 2018** Time: **6:30 p.m.**

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A. CALL TO ORDER - *Mayor Gavin Brown*

1. Welcome/Calendar/Announcements

2. Adoption of Minutes

Motion: To approve the minutes of the August 28, 2018 regular meeting as presented (or as corrected).

3. Proclamations
   a. National Day of Service and Remembrance – September 11, 2018
   b. Constitution Week – September 17-23, 2018

B. CONTINUED BUSINESS

4. McGill and Associates Engineering Report for the Waste Water Treatment Plant
   - McGill and Associates Representatives

C. COMMUNICATIONS FROM STAFF

5. Manager's Report
   - Town Manager Rob Hites

6. Attorney's Report
   - Town Attorney Bill Cannon

D. COMMUNICATIONS FROM THE MAYOR AND BOARD

E. CALL ON THE AUDIENCE

F. ADJOURN

TOWN OF WAYNESVILLE

PO Box 100
16 South Main Street
Waynesville, NC 28786
Phone (828) 452-2491 • Fax (828) 456-2000
www.waynesvillenc.gov

CALENDAR

September 11, 2018

2018	
Tuesday September 11 **6:30 PM** **Town Hall Board Room**	Board of Aldermen Meeting – Regular Session
Saturday September 15 **6:00 PM** **River Walk – Harrah's Casino**	Raise the Roof Haywood Habitat for Humanity
Saturday September 15 **7:00 PM**	BLOCK PARTY - sponsored by the Downtown Waynesville Association – partial street closure – Main Street
Tuesday September 25 **6:30 PM** **Town Hall Board Room**	Board of Aldermen Meeting – Regular Session
Friday September 28 **Main Street** **6:00 – 8:00 PM**	Mountain Street Dance Sponsored by Downtown Waynesville Association
Wednesday October 3rd **8:00 – 10:00 AM** **Smoky Mountain Roasters**	Coffee with a Cop Waynesville Police Department
Friday October 5 **5:00 PM – 9:00 PM**	Art after Dark Main Street – sponsored by the Downtown Waynesville Association
Tuesday October 9 **6:30 PM** **Town Hall Board Room**	Board of Aldermen Meeting – Regular Session
Saturday October 13 **10:00 AM – 5:00 PM** **Main Street**	Church Street Art & Craft Show
Saturday October 20 **10:00 AM – 5:00 PM** **Main Street**	Apple Harvest Festival
Monday October 22 **5:30 PM**	Council of Government Meeting Maggie Valley
Tuesday October 23 **6:30 PM** **Town Hall Board Room**	Board of Aldermen Meeting – Regular Session
Wednesday October 31 **5:00 PM – 7:00 PM** **Main Street**	Treats on the Street

Wednesday October 31 **5:30 – 8:30 PM**	Trunk or Treat First United Methodist Church
Friday November 2 **5:00 PM – 9:00 PM** **Main Street**	Art after Dark Main Street – sponsored by the Downtown Waynesville Association
Monday November 12	Veteran's Day – Town Offices Closed
Tuesday November 13 **6:30 PM** **Town Hall Board Room**	Board of Aldermen Meeting - Regular Session
Thursday & Friday **November 22 & 23**	Thanksgiving Town Offices Closed
Tuesday November 27 **6:30** **Town Hall Board Room**	Board of Aldermen Meeting – Regular Session
Friday November 30 **5:00 PM** **Oak Park Inn**	Community Christmas Tree Lighting Sponsored by Downtown Waynesville Association
Monday December 3 **6:00 PM** **Main Street**	Waynesville Christmas Parade
Saturday December 8 **6:00 PM – 9:00 PM** **Main Street**	A Night Before Christmas
Tuesday December 11 **6:30 PM** **Town Hall Board Room**	Board of Aldermen Meeting – Regular Session
Monday, Tuesday & Wednesday **December 24, 25, & 26**	Christmas Town Offices Closed

Board and Commission Meetings – September 2018

ABC Board	ABC Office – 52 Dayco Drive	**September 18th** 3rd Tuesdays 10:00 AM
Board of Adjustment	Town Hall – 9 S. Main Street	**September 4th** 1st Tuesdays 5:30 PM
Downtown Waynesville Association	UCB Board Room – 165 North Main	**September 27th** 4th Thursdays 12 Noon
Firefighters Relief Fund Board	Fire Station 1 – 1022 N. Main Street	**Meets as needed;** *No meeting currently scheduled*
Historic Preservation Commission	Town Hall – 9 S. Main Street	**September 5th** 1st Wednesdays 2:00 PM
Planning Board	Town Hall – 9 S. Main Street	**September 17th** 3rd Mondays 5:30 PM
Public Art Commission	Town Hall – 9 S. Main Street	**September 13th** 2nd Thursdays 4:00 PM
Recreation & Parks Advisory Commission	Rec Center Office – 550 Vance Street	**September 19th** 3rd Wednesdays 5:30 PM
Waynesville Housing Authority	Waynesville Towers – 65 Church Street	**September 19th** 3rd Wednesdays 3:30 PM

BOARD/STAFF SCHEDULE

September 10, 2018	Assistant Town Manager	Assist with Assessment Center for Transylvania County Finance Director position

RAISE The ROOF

Haywood Habitat for Humanity®

WHEN:

SATURDAY

SEPT 15, 2018

6:00 PM

WHERE:

RIVER WALK AT HARRAH'S CHEROKEE CASINO RESORT

777 Casino Drive, Cherokee, NC 28719

PURPOSE: *Raise enough money to build a Habitat home in Waynesville*

Fun evening in a beautiful riverside setting with delicious food, beverages (including signature cocktails), DJ, our famous Habitat hammering contest, raffle with great prizes including trips, brewery tours, exclusive dining and more!

$60

General Admission
Includes 1 drink ticket

$80

Admission, 1 drink ticket & round trip transportation from Waynesville

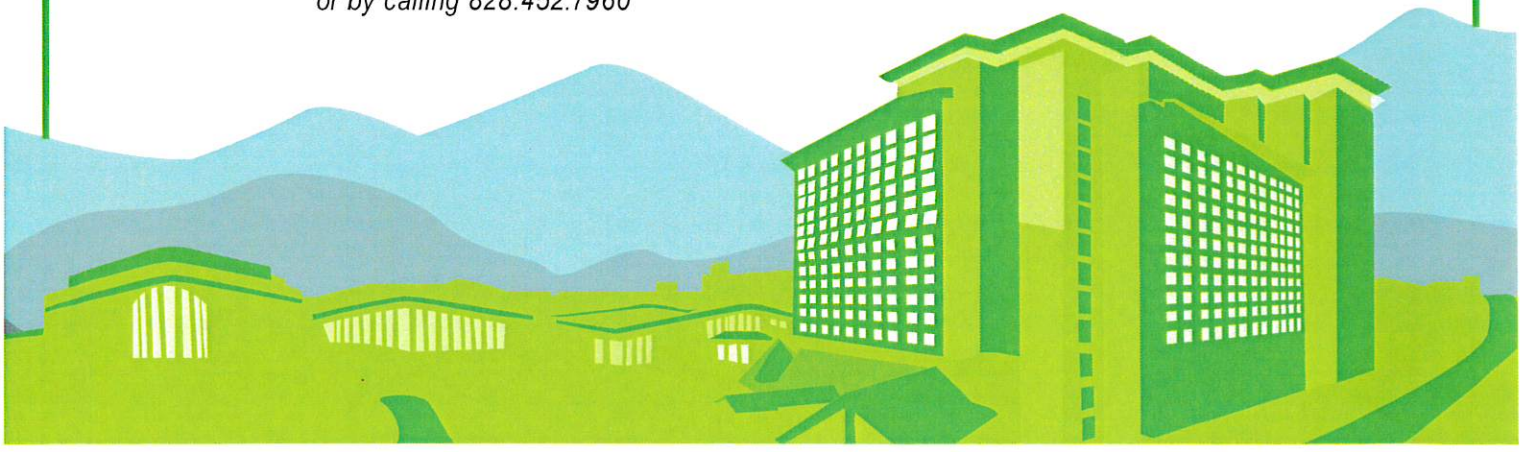
$140

Admission, 1 drink ticket & overnight acommodations at Quality Inn - Cherokee (Includes shuttle to & from Casino)

TICKETS AVAILABLE AT:

Haywood Habitat,
331 Walnut Street, Waynesville, NC
or by calling 828.452.7960

The Jeweler's Workbench,
80 N. Main St., Waynesville, NC



★ NATIONAL ★
Coffee WITH A Cop
★★★ DAY ★★★

BUILDING RELATIONSHIPS. ONE CUP AT A TIME.

Join your neighbors and police officers for coffee and conversation on National Coffee with a Cop Day.

Wednesday, Oct. 3rd, 2018	Smoky Mountain Roasters 444 Hazelwood Ave, Waynesville, N.C.	8:00 A.M. to 10:00 A.M.

The mission of Coffee with a Cop is to break down the barriers between police officers and the citizens they serve by removing agendas and allowing opportunities to ask questions, voice concerns, and get to know the officers in your neighborhood.

SMOKY MOUNTAIN COFFEE ROASTERS

THIS EVENT IS PRESENTED BY THE:

Waynesville Police Department

WAYNESVILLE POLICE N★C NORTH CAROLINA

QUESTIONS? PLEASE CONTACT:

828-456-5363

coffeewithacop.com

MINUTES OF THE TOWN OF WAYNESVILLE BOARD OF ALDERMEN
REGULAR MEETING
August 28, 2018

THE WAYNESVILLE BOARD OF ALDERMEN held its regular meeting on Tuesday, August 28, 2018 at 6:30 p.m. in the board room of Town Hall, 9 South Main Street, Waynesville, NC.

A. CALL TO ORDER

Mayor Gavin Brown called the meeting to order at 6:30 p.m. with the following members present:

Mayor Gavin Brown
Mayor Pro Tem Gary Caldwell
Alderman Jon Feichter
Alderman LeRoy Roberson

Alderman Julia Freeman was absent.

The following staff members were present:

Rob Hites, Town Manager
Bill Cannon, Town Attorney
Amie Owens, Assistant Town Manager
Eddie Ward, Town Clerk
Byron Hickox, Land Use Administrator
Elizabeth Teague, Development Services Director
Fire Chief Joey Webb
Fire Captain Mike Lentz
David Foster, Public Services Director
Lisa Burnette, Purchasing Manager
Daryl Hannah, Streets and Sanitation Supervisor

The following media representatives were present:

Becky Johnson, the Mountaineer

1. Welcome /Calendar/Announcements

Mayor Brown welcomed everyone to the meeting. From the events calendar, the following were mentioned:

- August 31- September 2nd – Smoky Mountain Folk Festival – Lake Junaluska
- September 3rd – Labor Day
- September 7th – Art After Dark

2. Adoption of Minutes

Alderman LeRoy Roberson made a motion, seconded by Alderman Gary Caldwell, to approve the minutes of the regular August 14th meeting as presented. The motion passed unanimously.

Alderman Gary Caldwell made a motion, seconded by Alderman LeRoy Roberson, to approve the minutes of the August 21st special meeting as presented. The motion carried unanimously.

Recognition of Michael Lentz for promotion to Captain of the Waynesville Fire Department

- Chief Joey Webb

Chief Webb stated that with the retirement of Captain Dee Massey earlier in the month, a captain position became available. He said there were nine firemen who applied for the job, and Michael Lentz was chosen after a strenuous assessment center. Captain Lentz has been with the Waynesville Fire Department for twenty years, and during that time has been an asset to the Fire Department. Captain Lentz was presented with his Captain's helmet, and his Captain's badge was pinned on by his mother.

B. PUBLIC HEARING

3. Public Hearing to consider a text amendment to add two new use categories, Neighborhood Commercial and Neighborhood Restaurant, to the Table of Permitted Uses (2.5.3), to be permitted within seven of the town's nine mixed-use overlay districts

- Byron Hickox, Land Use Administrator

Byron Hickox, Land Development Administration, stated that this Text Amendment was a recommendation from the Planning Board concerning non residential uses in seven of nine overlay districts in Waynesville. He explained that a zoning overlay district is established within an area that is otherwise a general residential district, along a corridor that is usually developed in a non residential pattern. The Land Development Standards describes a Mixed-Use Overlay District as:

> *"a zoning overlay district established to permit certain limited mixed uses within residential neighborhoods." LDS 2.6.2(A)*

The owners of four properties located along Dellwood City Road submitted formal application for map amendment to rezone their properties from Love Lane Neighborhood Residential Mixed-Use Overlay to Russ Avenue Regional Center, which is the highest area of nonresidential use. The Planning Board did not approve this request for map amendment, but the related discussion led to an interest in the creation of additional use categories that might designate retail establishments or restaurants at a scale that would be appropriate to Mixed-Use Overlays.

Based on direction from the Planning Board, planning staff suggested the addition of two new use categories, Neighborhood Commercial and Neighborhood Restaurant, to the Table of Permitted Uses

within seven of the town's nine mixed-use overlay districts. These uses would permit the establishment of general commercial or restaurant uses limited to 3,000 square feet.

Mr. Hickox defined the two new use categories recommended by the Planning Board as follows:

1. That the two new use categories, Neighborhood Commercial and Neighborhood Restaurant, be added to the Table of Permitted Uses (2.5.3), to be permitted with the designation "PL" within the following districts; Dellwood Residential Medium Density, Hazelwood Urban Residential, Love Lane Neighborhood Residential, Ninevah Neighborhood Residential, Raccoon Creek Neighborhood Residential, South Waynesville Residential Medium Density, and Walnut Street Neighborhood Residential; and

2. The two new use categories are defined in Section 17.3 of the Land Development Standards as follows:

> **Neighborhood Commercial** – A place of business limited to 3,000 gross square feet that provides the sale of goods directly to the consumer, with goods available for immediate purchase and removal from the premises by the purchaser.
>
> **Neighborhood Restaurant –** A place of business limited to 3,000 gross square feet that sells ready-to-eat food and/or beverages for on or off-premise consumption. Customers may be served from an ordering counter (cafeteria or limited service restaurant), at their tables (full-service restaurant), and/or at exclusively pedestrian-oriented facilities that serve from a walk-up ordering counter, but not from drive-thru windows.

Mr. Hickox said there were two districts that the Planning Board did not recommend the two new uses be added are: Francis Cove Residential Low Density, and Mixed Use Overlay in the Main Street Residential District. He added that all setback and buffering requirements would apply to the new district as they currently do.

Town Attorney Bill Cannon opened the Public Hearing at 6:45 pm., and asked if anyone wished to speak.

Kim Ferguson
Kim's Pharmacy
Waynesville, NC

Ms. Ferguson stated she felt that the 3,000 gross square feet stipulation was arbitrary, but she was in full support of the two new zoning districts.

Mr. Hickox explained that a survey of the mixed use districts to gather some of the non residential uses currently there was conducted. This included square footage, and the number seemed to hover around 3,000 square feet. He said the Planning Board discussed several other numbers for square footage and decided on 3,000.

Town Attorney Bill Cannon closed the Public Hearing at 6:48 pm.

The Mayor asked each Board member to give their thoughts on the proposed text amendment, and all were in full agreement.

Alderman Jon Feichter made a motion, seconded by Alderman LeRoy Roberson to adopt the following statement:

The proposed text amendment is approved and is consistent with the "Waynesville: Our Heritage, Out Future, The Town of Waynesville 2020 Land Development Plan" in that the amendment will:

- ***"Designate appropriate amounts of land to reflect desired development patterns and to accommodate the projected residential, commercial, industrial, institutional and recreational needs of the Town of Waynesville over the next twenty years."***
- ***"Promote infill development in the Town of Waynesville as an alternative to continued outward expansion."***
- ***"Work to preserve the important character and scale of each unique area within the larger Waynesville community by building on those elements identified as important to defining each area."***
- ***Allows Waynesville to maintain its walkability.***

Approval of the proposed text amendment is reasonable and in the public interest because it:

- ***Improves the character of the Town of Waynesville and provides expanded opportunities for economic development by providing additional commercial uses available for inclusion into mixed use overlay districts; and***
- ***Will provide for and promote re-use of existing commercial sites and infill development along existing transportation corridors.***

The motion carried unanimously.

A motion was made by Alderman Caldwell, seconded by Alderman Jon Feichter, to adopt Ordinance No. 0-14-18 amending the text of the Town of Waynesville Land Development Standards adding the new Neighborhood Commercial and Neighborhood Restaurant uses as presented. The motion carried unanimously.

C. NEW BUSINESS

4. Award Purchase of One (1) Rear Loading Refuse Truck for Public Services Street Division through NCSA (North Carolina Sheriff's Association)

- Lisa Burnett, Purchasing Supervisor,
- David Foster, Public Services Director
- Daryl Hannah, Street Superintendent

Ms. Lisa Burnett, Purchasing Supervisor, stated that a new trash truck had been budgeted in the 2019 Capital Budget for $160,000.00. She said that as provided by NCGS § 143-129 (e) (3) there exists an

exception to the state's formal bidding requirements, which allows NC municipalities to participate in qualified group purchasing programs (of which NCSA is one) in an arrangement similar to that offered under state contract or interlocal piggy-back bidding.

The NCSA is a nonprofit organization formed in 1922. The NCSA engages in a bidding process which meets all requirements of NC General Statutes. Upon the award by NCSA of a group purchasing contract, the terms of that purchase can then be made available to local governments without further bidding requirements on the part of the local government. Local governments achieve a lower cost of purchase due to the economics of scale which otherwise would likely not be available to a single local government operating unilaterally.

It is the intent of our Public Services and Purchasing staff to purchase through NCSA one (1)
New Way Viper 20 cubic yard refuse body mounted on a new 2019 International HV607 SBA for $147,914.73.

Alderman Jon Feichter made a motion, seconded by Alderman LeRoy Roberson to approve the purchase of one (1) New Way Rear Loading Refuse Truck from Amick Equipment, Lexington, SC through NCSA contract as presented. The motion carried unanimously.

D. COMMUNICATIONS FROM STAFF

6. Manager's Report –Town Manager Rob Hites

Manager Hites told the Board that the groundbreaking ceremony for the new hotel will be held on September 4th from 1:00 – 2:00pm, and lunch will be provided.

7. Attorney's Report – Town Attorney Bill Cannon

Attorney Cannon had nothing to report

E. CALL ON THE AUDIENCE

F. COMMUNICATION FROM THE MAYOR AND BOARD

8. Communication from the Board

South Main Street Planning
Alderman LeRoy Roberson noted that there is a summary of the South Main Street plan by the NCDOT available to the public. Mayor Brown added that as part of this planning, public input is required. Meetings were held by the NCDOT at Haywood Community College. Even though the public comment period ends on August 31, in an effort to provide citizens another opportunity to participate, the Board of Aldermen will hold a public comment session as part of the regular meeting on September 25, 2018. Information from the meeting will be forwarded to the NCDOT.

Big Cove Water Tank

Mayor Brown continued by noting that there had been a request for proposals (RFP) for the repair of the roof of a 2 million gallon water tank on Big Cove Road. There was only one bid received. Rather than award the bid at this time, the Board directed staff to re-post the RFP in an effort to solicit multiple bids. If no additional bids are received, information will be brought back to the Board for review and approval at a later date.

G. ADJOURN

There being no further business to discuss, Alderman Jon Feichter made a motion, seconded by Alderman Gary Caldwell to adjourn the meeting at 7:11 p.m. The motion carried unanimously.

ATTEST:

Gavin A. Brown, Mayor

Robert W. Hites, Jr., Town Manager

Eddie Ward, Town Clerk

Town of Waynesville
Proclamation

NATIONAL DAY OF SERVICE AND REMEMBRANCE
Tuesday, SEPTEMBER 11, 2018

WHEREAS, in an unprovoked and senseless act of terrorism, four civilian aircrafts were hijacked on September 11, 2001, and crashed in New York City, Pennsylvania and the Pentagon, resulting in a momentous loss of innocent U.S. lives of all heritages; and

WHEREAS, while we still continue to recover from the loss of innocent lives, the spirit of the U.S. has been revitalized, giving way to expressions of patriotism; and

WHEREAS, inspired by the heroism of our nation's public service personnel, military service members and countless volunteers, our nation found unity and strength; and

WHEREAS, from the tragedy of September 11 emerged a stronger nation, renewed by the spirit of national pride, and a true love of country; and

WHEREAS, Americans also have fought back against terror by choosing to overcome evil with good by loving their neighbors as they would like to be loved, contributing to relief efforts, and volunteering their time to aid those in need;

NOW, THEREFORE, BE IT RESOLVED, that I, Gavin A. Brown, by virtue of the authority vested in me as Mayor of the Town of Waynesville, do hereby proclaim September 11, 2018, as

NATIONAL DAY OF SERVICE AND REMEMBRANCE

in the Town of Waynesville and urge our citizens to recognize the heroism of firefighters, rescue and law enforcement personnel, military service members and the many volunteers who responded to these tragic events with courage, selfless compassion, determination and skill; and to remember the victims and innocent lives lost as a result of the tragic events on September 11, 2001.

This the 11th day of September, 2018.

_____
Gavin A. Brown, Mayor

Proclamation
Constitution Week
September 17-23, 2018

WHEREAS, September 17, 2018 marks the two hundred thirty-first anniversary of the drafting of the Constitution of the United States of America by the Constitutional Convention; and

WHEREAS, it is fitting and proper to accord official recognition to this magnificent document and its memorable anniversary, and to the patriotic celebrations which will commemorate the occasion, and

WHEREAS, Public Law 915 guarantees the issuing of a proclamation each year by the President of the United States of America designating September 17 through 23 as Constitution Week.

NOW, THEREFORE, I, Gavin A. Brown, by virtue of the authority vested in me as Mayor of the Town of Waynesville, North Carolina do hereby proclaim the week of September 17 through 23 as

Constitution Week

and ask our citizens to reaffirm the ideals the Framers of the Constitution had in 1787 by vigilantly protecting the freedom guaranteed to us through this guardian of our liberties, remembering that lost rights may never be regained.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Seal of the Town to be affixed this _____ day of September, of the year of our Lord two thousand eighteen.

Town of Waynesville, N.C.

_____
Gavin A. Brown
Mayor

ATTEST:

_____
Eddie Ward
Town Clerk

TOWN OF WAYNESVILLE BOARD OF ALDERMEN
REQUEST FOR BOARD ACTION
Meeting Date: September 11, 2018

SUBJECT: Engineering Report from McGill and Associates

AGENDA INFORMATION:

Agenda Location:	**Continued Business**
Item Number:	**4B**
Department:	Public Services/Administration
Contact:	David Foster, Public Services Director
	Preston Gregg, Town Engineer
Presenter:	Robert W. Hites, Jr. Town Manager

BRIEF SUMMARY: Representatives from McGill and Associates provided a presentation at the August 14th meeting surrounding the condition of the Waste Water Treatment Plant (WWTP). From this presentation, they were asked to complete their assessment and provide recommendations to the Board of Aldermen for discussion.

As noted in the previous meeting, a decision needs to be made as to which option to choose as the Special Order of Consent (SOC) that is required by the NC DEQ requires a plan for the future. By having an SOC, the existing plan can continue operating under new permitting parameters while the renovations are being completed.

Once the report is presented and discussed, the information will be posted on the website and available for the public. Public comments will be taken at the September 25th regular meeting.

MOTION FOR CONSIDERATION: No motion – just discussion

FUNDING SOURCE/IMPACT:

ATTACHMENTS:

- Engineering Report from McGill and Associates

MANAGER'S COMMENTS AND RECOMMENDATIONS:

PRELIMINARY ENGINEERING REPORT

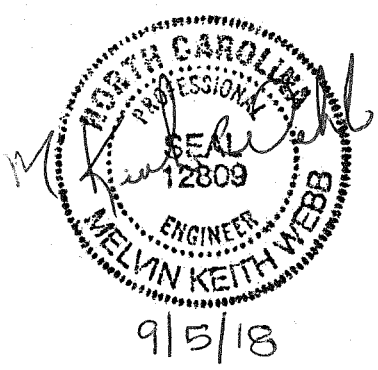
Wastewater Treatment Plant Evaluation

TOWN OF WAYNESVILLE

HAYWOOD COUNTY, NORTH CAROLINA

Keith Webb, PE

McGill ASSOCIATES
55 Broad Street, Asheville, NC 28801
PO Box 2259, Asheville, NC 28802-2259
Phone: 828-252-0575
Fax: 828-252-2518



SEPTEMBER 2018
16.00367

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The scope of this project includes six tasks:

1. Review Wastewater Treatment Plant Assessment completed by UTEC dated May 2017
2. Develop Future WWTP Flow and Loading Projections
   a. Flow and loading projections will be based on a 20-year planning horizon and will draw heavily from readily available data such as the Town's most recent Local Water Supply Plan and recent (3 years) of wastewater treatment plant flow data.
3. Review Discharge Permit and Compliance Issues
   a. Review effluent data and compliance status with current NPDES Permit.
   b. Identify approaches to effectively manage compliance issues.
   c. Evaluate process performance concerns suspected due to the industrial discharge of Giles Chemical.
   d. Review NC Department of Environmental Quality (DEQ)/Division of Water Resources (DWR) procedures and timeline for establishing speculative limits for future flows.
   e. As appropriate, meet with DEQ/DWR to discuss compliance steps and the development of speculative limits. One meeting is included in this scope.
4. Evaluate Treatment Process Alternatives
   a. Review the current activated sludge process and potential modifications to meet current and future flows and limits.
   b. Evaluate modifications of the current WWTP process for Biological Nutrient Removal (BNR).
   c. Evaluate other biological treatment alternatives including Sequencing Batch Reactors (SBR), oxidation ditch, IFAS, membrane bioreactors.
   d. Evaluation of the anaerobic digester for modifications and upgrades.
   e. Review Combined Heat and Power (CHP) improvements.
5. Provide Opinions of Probable Project Cost at a planning level for viable alternatives.
6. Provide a Capital Funding Source Review, including but not limited to State Revolving Fund (SRF) and USDA-Rural Development

The authors of this report do not take exception to the findings of the 2017 UTEC report. The Waynesville WWTP has a number of difficulties stemming from aging structures and equipment and a secondary clarifier design that does not meet current design standards.

The wastewater treatment plant averaged 4.13 MGD in 2017 with a peak day wet weather flow of 6.11 MGD. The historical trend has been relatively flat, tending toward a reduction in per capita wastewater flows even as the population of the town has increased. The wastewater treatment plant's average daily flow is not expected to reach 80% of capacity until 2040, implying that expansion need not be considered at this time.

In recent years the wastewater treatment plant has had difficulties staying in compliance with its National Pollutant Discharge Elimination System (NPDES) permit, which allows maximum effluent concentrations of 30 mg/l of biochemical oxygen demand (BOD) and total suspended solids (TSS) and seasonal limits of 9.0 mg/l of nitrogen as ammonia in the warmer seasons and 21.0 mg/l in the cooler seasons. Specifically, the WWTP has had a number of violations due to excessive TSS and ammonia nitrogen in its effluent, and fines have been paid with increasing frequency in the last year. It is believed that the majority of the compliance issues are caused by undersized, shallow, and underperforming secondary clarifiers, which permit suspended solids to pass through into the disinfection system and ultimately the outfall, and the contribution of unusual wastewater from a local industry which may be suppressing nitrification in the aeration basins, reducing the amount of ammonia that can be removed from the wastewater.

The recommended approach for dealing with these compliance issues is for the Town to seek a Special Order by Consent (SOC) from NCDEQ while a capital project is undertaken to solve the underlying problems. Once the SOC is obtained from NCDEQ, the Town will be able to avoid the imposition of further fines while the project is ongoing. A comprehensive WWTP improvement project should be identified and presented to NCDEQ as part of the application for the SOC, and the plant must be operated optimally while the improvements project is ongoing.

Four treatment alternatives for the current plant site are presented:

1. Rehabilitation of the existing suspended growth activated sludge process with replacement of the headworks and secondary clarifiers,
2. Modification of the existing aeration basins to function as sequencing batch reactors with construction of an additional flow equalization basin, and
3. Modification of the existing aeration basins to function as either integrated fixed-film activated sludge reactors or moving bed bioreactors with replacement of the headworks and secondary clarifiers.
4. Further discussion of a fourth alternative, the construction of a new wastewater treatment plant at a new location, is included in this report, but a preliminary design and detailed cost estimate are outside the scope of this evaluation.

The recommend alternative is rehabilitation of the existing suspended growth activated sludge process. A preliminary opinion of probable cost for this alternative of $14,652,900 has been presented in Section 5.0 below.

1.0 WASTEWATER TREATMENT PLANT ASSESSMENT

The original WWTP assessment performed by Utility Technology Engineers-Consultants (UTEC) in May 2017 focused heavily on electrical and mechanical equipment and after discussion of the condition of the plant equipment presented four suites of modifications to the existing plant and two alternatives for replacement of the existing plant with a new Sequencing Batch Reactor (SBR) plant. The UTEC assessment noted that the age of the plant and deterioration of equipment and structures is beginning to affect treatment performance.

In addition to the UTEC assessment, engineers from McGill Associates have visited the plant and spoken with Town staff about operations and maintenance concerns, and a structural engineering firm, Medlock & Associates Engineering, P.A., visited the plant and assessed the primary clarifiers, aeration basins, secondary clarifiers, digester, and sludge thickeners. The full text of the structural engineering evaluation is included as an appendix to this report.

1.1 Headworks

The previous report stated that the headworks appeared to be functioning adequately, although it was noted that the grit removal blowers were in need of replacement. Several electrical and support components appeared to be deficient and in need of replacement including the Lake Junaluska flow meter power supply, flow meter and logging computer shed, influent weir magnetic flow meter sensor cables, and grit separator control panel and stand.

The current headworks layout features a Parkson self cleaning bar screen and a secondary manually cleaned bar screen. Plant operators have pointed out that they are currently splitting flow to both screens during peak flows and have stated a preference that both screens have provisions for self cleaning in any future design. The grit removal system functions adequately, but discharges extremely wet grit. Improved technology for grit removal exists and should be incorporated in future upgrades.

The current headworks is also not connected to the plant's emergency generator. In the event of a power loss, the bar screen could only be cleaned manually and grit removal would be adversely affected over time as grit continued to build up in the chamber with no means of removal.

1.2 Primary Clarifiers

The primary clarifiers were noted in the previous report to be performing satisfactorily, however several components required either repair or replacement. The concrete walls and clarifier valves require repairs, while it was suggested that the sludge removal pumps and pipes be replaced since they were installed incorrectly. UTEC noted that metal railing around the clarifier and sludge pits did not meet OSHA regulations, and that some metal grating was needed between the tanks. An air compressor purchased in 2016 is functioning poorly and may also need replacement. Electrical panels, stands, and conduits are severely rusted and require replacement.

Town staff have pointed out that the weirs are in need of releveling and that the influent gate valves are difficult to operate and may need replacement. The grease removal system and weir clog frequently and must be cleaned manually. The access grating for the scum removal system is unsafe and has no rail. There are also no working lights in the area. Night shift staff must use flashlights to view the primary clarifiers.

The concrete of the primary clarifiers was noted by Medlock & Associates to be in generally good condition. Vertical cracks in both clarifiers are likely due to shrinkage and not stress of the wall. However it was noted that while the south clarifier's cracks are typically dry and spaced approximately 6 feet apart, the north clarifier shows indicators of minor leakage, spalling, and delaminating concrete.

1.3 Aeration Basin Influent Pump Station

The three Gorman Rupp T10 pumps installed in 2000 and retrofitted in 2018 with variable frequency drives (VFDs) replaced three original screw pumps designed to pump effluent from the primary clarifiers to the aeration basins. Each pump is sized for 3 MGD, and space is set aside in the pump station for a fourth pump.

Because the pump station was originally designed for a different type of pumping system, the wetwell is undersized for the centrifugal pumps that currently withdraw wastewater from it. The shallow, narrow layout of the pump station requires that wastewater levels be maintained within an extremely narrow range. The discharge line set aside for the fourth pump leaks, and the piping layout does not permit easy isolation and maintenance of the piping. The pump station also has no alarms that can be observed from the outside, requiring frequent visits from operators to check its condition. The building itself is poorly ventilated and the roof is in disrepair.

1.4 Aeration Basins and Blower Building

The aeration headers in the basins were observed by UTEC engineers to be leaking, and the existing coarse air diffusers are less efficient than modern fine diffusers. The blower motors have across-the-line starters instead of soft starts. Concrete structural failures are noted in the summary of the report, but not the main body.

The four 4,000-SCFM (standard cubic feet per minute) blowers in the blower building are currently operated between 2,000 and 3,000 SCFM. Fine adjustment of air flow is made through butterfly valves in the aeration basins. Plant personnel have stated that the blowers themselves have been fairly low maintenance, although the motors occasionally require replacement. The building has no crane or hoist system for lifting the motors. A small wheel-mounted hoist is available for lifting the blowers, but its capacity is not adequate to transport the much heavier motors.

Of the four aeration basins at the plant, two are being used for biological wastewater treatment. A third has been modified by plant operators to function as an aerobic digester, and a fourth

receives flows pumped out of the chlorine contact chamber. The aeration headers in the basins leak. One air line fell into the basin where it could not be retrieved, and the butterfly valve used to isolate the line leaks air audibly.

The end wall of the basin overhanging the secondary clarifiers appears to have shifted or moved in the past, and a supplemental wall was constructed against the inside face of the existing wall. The structural engineers' evaluation noted that the concrete of the aeration basin is in generally good condition, but exhibits greater deterioration than the concrete of the primary clarifiers. The basins exhibit some leakage at joints and inlet pipes. It was noted that deterioration of the concrete basins appears to be mostly due to the corrosive environment and freeze-thaw cycles, but that the basin is generally structurally sound, and that the interior walls have sufficient structural capacity to safely support hydraulic loads due to water level imbalances.

1.5 Secondary Clarifiers

The two vacuum type sludge removal systems that collect settled solids from the bottom of the clarifiers were observed to be leaking and are inefficient. The scum bridge is extremely deteriorated.

The structural engineers' evaluation noted that the concrete of the secondary clarifier is in generally good condition and typically sound, but shows regular vertical cracks similar to those observed on the primary clarifiers with areas of spalling and delamination. Seepage was observed at several locations.

1.6 Chlorine Contact Basin

The concrete of the chlorine contact basins has cracks, and the chlorine room ventilation does not work, but the chlorine basin functions well. Additional catwalk installation was recommended.

The chlorine contact basin is divided into two sections that can be operated independently. A baffle wall ensures that treated effluent is discharged from the bottom of the chamber, which allows floating solids to be retained in the chlorine contact basin. To control the buildup of floating solids, one section of the chlorine contact basin is isolated and pumped into the nearest section of the aeration basin.

1.7 RAS/WAS Pump Station

The return/waste activated sludge pump station was noted to be in good condition. UTEC engineers recommended new pump motors with VFDs to allow for better return sludge flow control. Since then, one pump and motor and both check valves have been replaced. The new pump is operated by a new VFD.

1.8 Sludge Handling Facilities

In the UTEC report the heading of sludge handling facilities encompassed a variety of equipment that holds and treats wastewater treatment byproducts, including the primary and secondary sludge thickeners, anaerobic digester, belt press, and lime stabilization system.

Several components of the sludge handling portion of the plant were noted in the previous report to be non-functioning, including the polymer feed system for the belt press and the recycle feed hopper and dust collection system for the lime pasteurization equipment. Electrical panels and conduits were observed to be severely deteriorated due to rust. Replacement of the trough and heater for the thermo-blender was recommended. It was recommended that the lime silo filter house be moved to ground level for safer maintenance and that the anaerobic digester be drained, inspected, and repaired as needed.

The sludge thickeners are typically structurally sound, but do have some leaks. The anaerobic digester is in generally good condition with minor seepage and cracks. Operations staff have noted that the location of the mechanical equipment on the roof of the digester makes maintenance difficult due to the lack of accessibility and the potential danger of operating welding equipment in close proximity to digester gas.

1.9 Electrical System

Overall, the electrical system was noted to be antiquated and in need of upgrades. The power service to the plant is 480 volt ungrounded delta. It was recommended that the plant either be converted to a more modern grounded wye system or that fault detectors be added to the existing power service.

Several plant-wide issues were identified, including deterioration of many of the electrical conduits and control panels as noted above and similar deterioration of most of the outdoor power distribution panels. Most of the electrical power panels in the plant were also noted to be sufficiently old that replacement breakers and other components are no longer in production, making repairs difficult. The area lighting at the plant is mostly non-functional.

1.10 Control Systems

The UTEC plant assessment finished by noting that the control panels and information recording systems for the various process components of the plant are not interconnected, so that there is no central location in the plant office where an operator would be able to observe process operations or be alerted to alarms remotely, as would be expected at a newer WWTP.

2.0 Future WWTP Flow and Loading Projections

Our analysis of the plant's historic flows drew from two sources: Daily Monitoring Report (DMR) data from the plant for 2015-2017, and Local Water Supply Plan (LWSP) data for 2007-2017. While LWSP data are available for 1997 and 2002, LWSPs were only prepared every five years and the data are old enough to be of limited utility in predicting current trends.

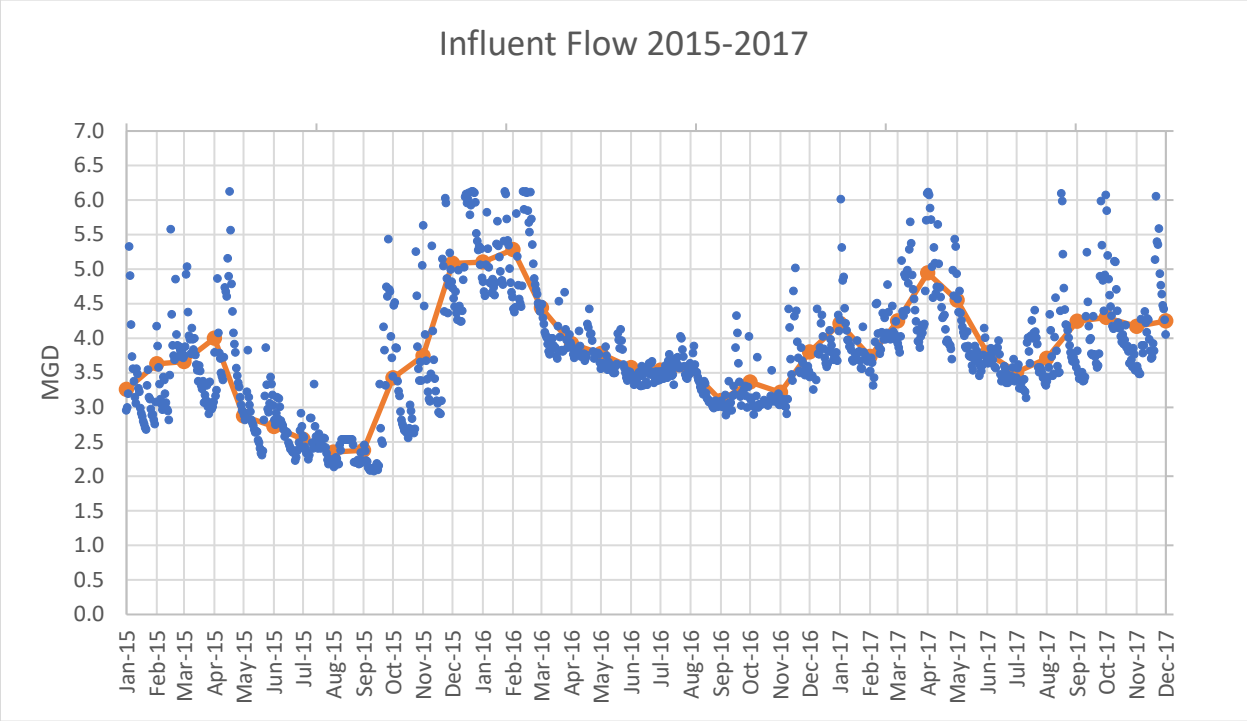


Figure 1. Waynesville WWTP Influent Flow

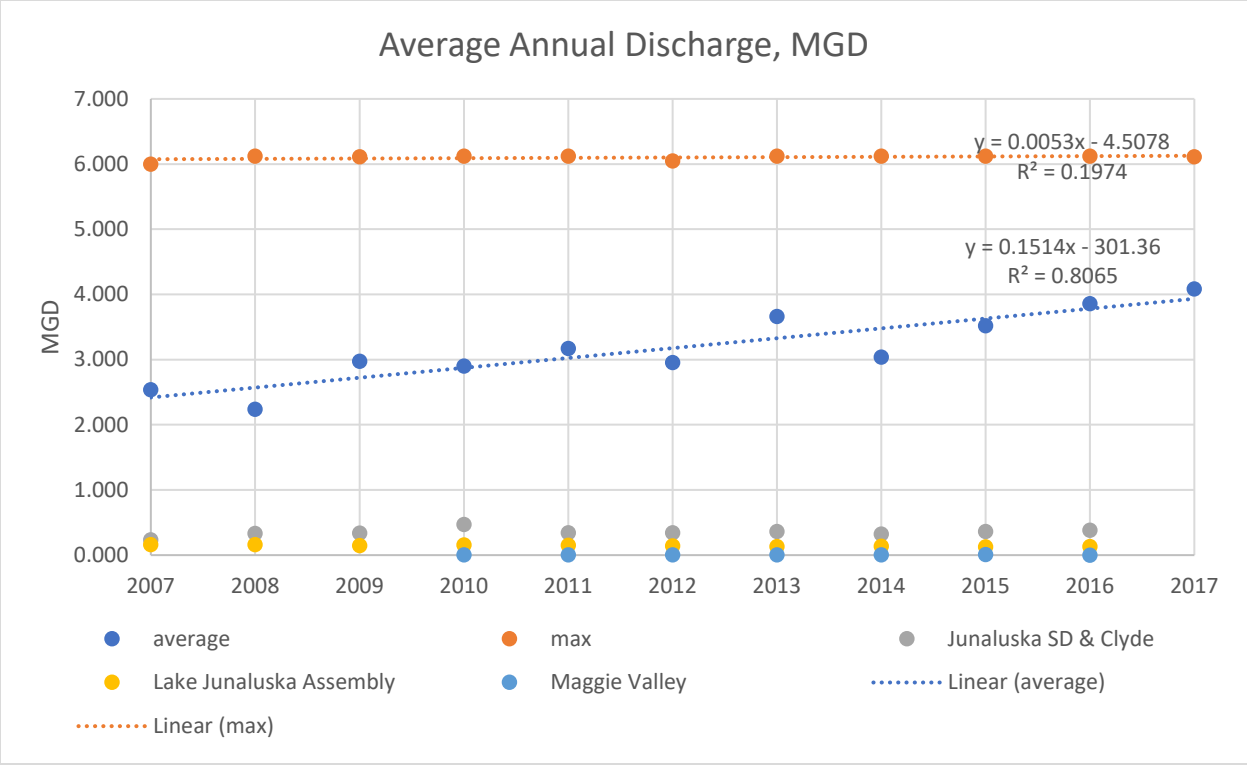


Figure 2. Waynesville and Connected WWTPs Average Annual Discharge

Average flows have trended upwards over the past ten years, while maximum day flows have remained relatively flat, barely exceeding the plant's permitted capacity of 6.0 MGD. These flows have not correlated strongly with Town population, which has been determined from US Census and North Carolina Office of State Budget and Management data.

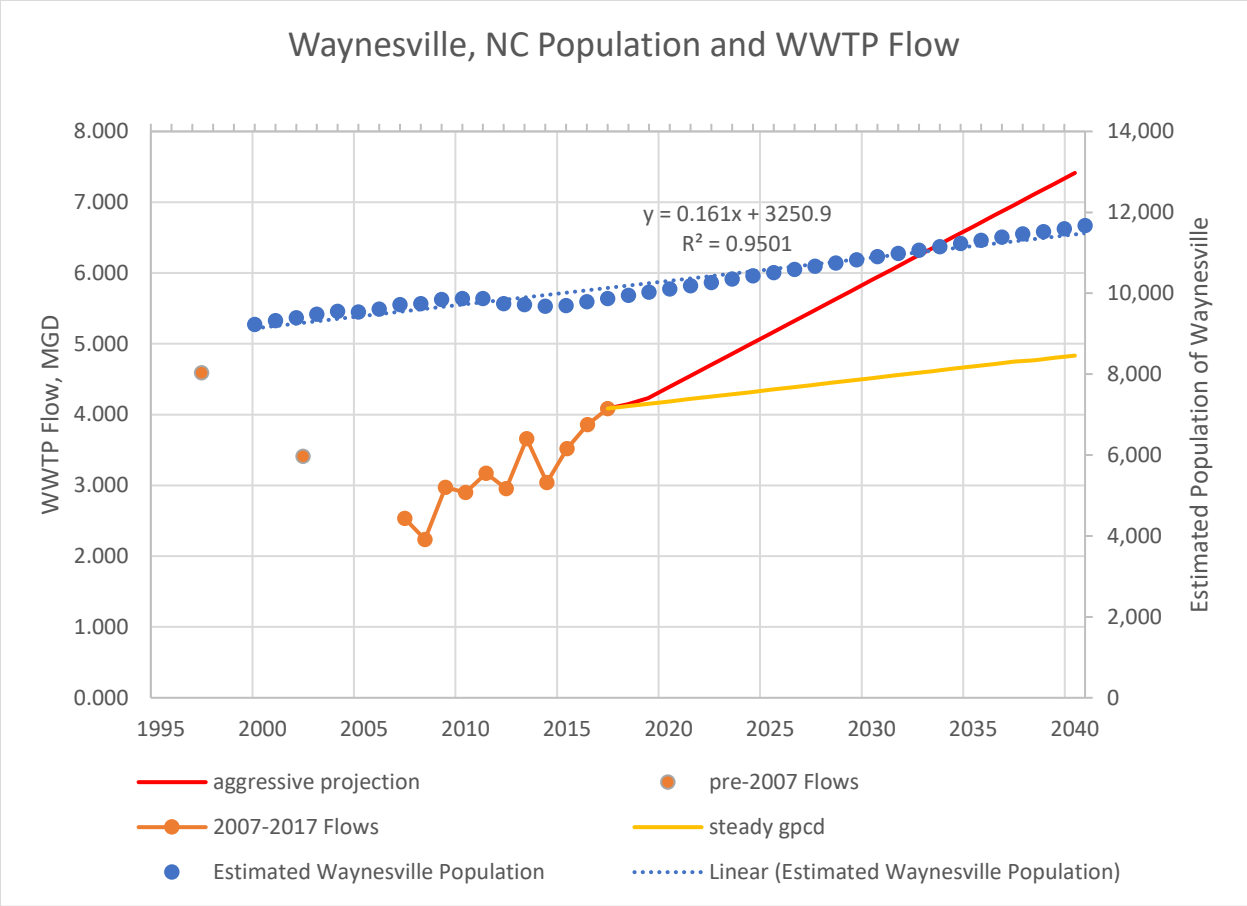


Figure 3. Waynesville Population and WWTP Flow Projections

The Town of Waynesville is projected to increase in population at a modest pace, while wastewater treatment plant flows have increased more sharply over the past ten years. Historic flows however were much higher in 1997 and 2002 when the Town's population was lower. This increase from 261 gpd per Waynesville resident in 2007 to 414 gallons per Waynesville resident per day in 2017 suggests that the primary driver of wastewater flows in the area is industrial rather than residential. The population of the town is projected to increase by approximately 1,730 residents to 11,675 by 2040 following the current trend. If flows increased in a linear fashion following their current ten-year trend, average daily flow in 2040 would be 7.4 MGD, corresponding to 635 gallons per capita per day (gpcd). If instead flows began to correlate more closely to population, average daily flow in 2040 would be 4.8 MGD, or 80% of permitted flow, even at the current high flow of 414 gpcd.

3.0 PERMIT AND COMPLIANCE ISSUES

3.1 Current Discharge Permit

The current discharge permit, renewed for five years on January 26, 2017, contains limits and monitoring requirements for several criteria.

Table 1. NPDES Discharge Limits and Monitoring Requirements

Effluent Characteristics	Limits	Monitoring Requirements				
	Monthly Average	Weekly Average	Daily Maximum	Measurement Frequency	Sample Type	Sample Location
Flow	6.0 MGD			continuous	recording	influent or effluent
BOD, 5-day, 20°C	30.0 mg/L or 15% of influent	45.0 mg/L		daily	composite	influent and effluent
TSS	30.0 mg/L or 15% of influent	45.0 mg/L		daily	composite	influent and effluent
NH3-N (April 1 - October 31)	9.0 mg/L	27.0 mg/L		daily	composite	effluent
NH3-N (November 1 - March 31)	21.0 mg/L	35.0 mg/L		daily	composite	effluent
Dissolved Oxygen				variable	grab	upstream and downstream
Dissolved Oxygen			6.0 mg/L (min)	daily	grab	Effluent
Fecal Coliform (geometric mean	200/100 mL	400/100 mL		daily	grab	Effluent
Temperature				variable	grab	upstream and downstream
Temperature				daily	grab	effluent
Total Residual Chlorine			28 µg/L	daily	grab	effluent
Total Nitrogen				quarterly	composite	effluent
Total Phosphorus				quarterly	composite	effluent
Chronic Toxicity			9% P/F	quarterly	composite	effluent
Cyanide				quarterly	grab	effluent
pH			6.0 (min) / 9.0 (max)	daily	grab	effluent
Mercury Minimization Plan						

3.2 Compliance Issues

The evaluation provided in this report addresses the current state of equipment and support facilities for the Waynesville WWTP. It includes a review of the UTEC Wastewater Treatment Plant Assessment. That assessment looked primarily at alternative energy opportunities, electrical systems and condition of treatment units and mechanical support system components. While the WWTP has significant issues related to pieces of mechanical equipment nearing the end of their operational lives, the UTEC assessment did not reference the Town's NPDES (National Pollutant Discharge Elimination System) Permit or the current compliance status of the Town relative to that permit and its regulatory relationship with the North Carolina Department of Environmental Quality, Division of Water Resources (DWR).

This regulatory relationship is extremely important and the ability of the WWTP to consistently comply with the limits in the permit not only represents a potential financial obligation (for recorded violations and assessment of civil penalties by DWR), but also jeopardizes the ability of the Town to extend wastewater services with its service area, particularly for new or potential developments, commercial operations and new or expanded manufacturing operations. Because NC law requires that WWTPs must be able to properly treat wastewater before new or expanded service can be added to a wastewater system, Waynesville currently runs the risk of being placed on wastewater "moratorium" under this legal provision. Because of violations and assessments of penalties within the last year, this chronic non-compliance may have laid the foundation for the agency to issue a moratorium.

McGill Associates' evaluation of the recent compliance history and the monitoring information from the Town shows a recent trend toward effluent issues with several parameters, particularly ammonia nitrogen. Notice of Violations (NOVs), (and in most cases, including an assessment of civil penalties) since the fall of 2016 through the end of 2017, were issued for fecal coliform, TSS, and ammonia. During the last half of 2017, several NOVs and assessments were made for ammonia.

Looking at influent and effluent data from the Town's monitoring 2016-2017, there is a consistent trend toward increasing influent levels for BOD-5 and NH3-N (ammonia). The included graphs of daily values for influent and effluent illustrate this trend. For TSS, influent levels seem to be relatively stable, while effluent levels show an upward trend.

These data likely illustrate a combination of increased influent loading to the WWTP and the ongoing deterioration of the treatment system. The ability to make adjustments in operational practice is limited. The overall facility is in marginal operational condition. The facility's ability to remove and manage solids is greatly impaired and the secondary clarifiers perform poorly, and multiple mechanical components are non-functional. While the data show some "ups and downs" relative to changing influent and effluent conditions, it is expected that chronic violations will continue, placing the Town in a precarious compliance status with the regulatory agency, likely resulting in the inability of the Town to extend new service.

As our evaluation concludes, the overall condition of the treatment facility requires a comprehensive WWTP improvements plan. Because such a plan will require significant funding,

it will be necessary to lay out a careful schedule for preliminary engineering, develop a viable funding approach, design the improvements needed (including an expansion component if appropriate), receive agency approval of the plans, bid the project, identify the contractor, construct the upgrade, and place the improved facility into operation.

3.2.1 Notices of Violation

Notices of Violation (NOVs) are issued for time periods in which the wastewater treatment plant reports effluent values exceeding the limits noted above. NCDEQ records are available for NOVs that have been received by the Town of Waynesville:

Table 2. Notices of Violation

Date of Notice	Parameter	Time of Occurrence	Effluent Value	Limit	Fine
October 17, 2016	Fecal Coliform	week of June 13-17, 2016	838	400	$500
June 23, 2017	Total Suspended Solids	week of January 17-20, 2017	66	45	$500
June 23, 2017	Total Suspended Solids	week of February 20-24, 2017	102.6	45	$500
	Total Suspended Solids	month of February 2017	42.9	30	$1,500
August 23, 2017	Ammonia	month of June 2017	12.44	9	none
November 1, 2017	bypass of primary effluent	October 22, 2017	620,000 gal	n/a	none
November 8, 2017	Ammonia	month of July 2017	12.86	9	$1,500
November 14, 2017	Ammonia	month of September 2017	11.21	9	$1,500
December 8, 2017	Ammonia	month of August 2017	13.27	9	$3,000
December 12, 2017	Total Suspended Solids	week of October 23-27, 2017	103.8	45	none
	Total Suspended Solids	month of October 2017	38.4	30	$3,000
April 12, 2018	Total Suspended Solids	week of February 17, 2018	47	45	
	Total Suspended Solids	month of February 2018	39.2	20	
May 23, 2018	Total Suspended Solids	week of March 3, 2018	59	45	$3,000
	Total Suspended Solids	month of March 2018	35.05	30	
July 3, 2018	Total Suspended Solids	month of May 2018	30.5	30	

3.2.2 Coliform

Individual daily fecal coliform counts exceeded the 200/100 ml monthly average discharge limit on 10.3% of the days on which effluent values were measured, and exceeded the 400/100 ml weekly geometric mean discharge limit on 6.8% of days.

Effluent fecal coliform count varies greatly, ranging from a maximum of 9,400/100 ml in November of 2016 to a minimum below the detection limit.

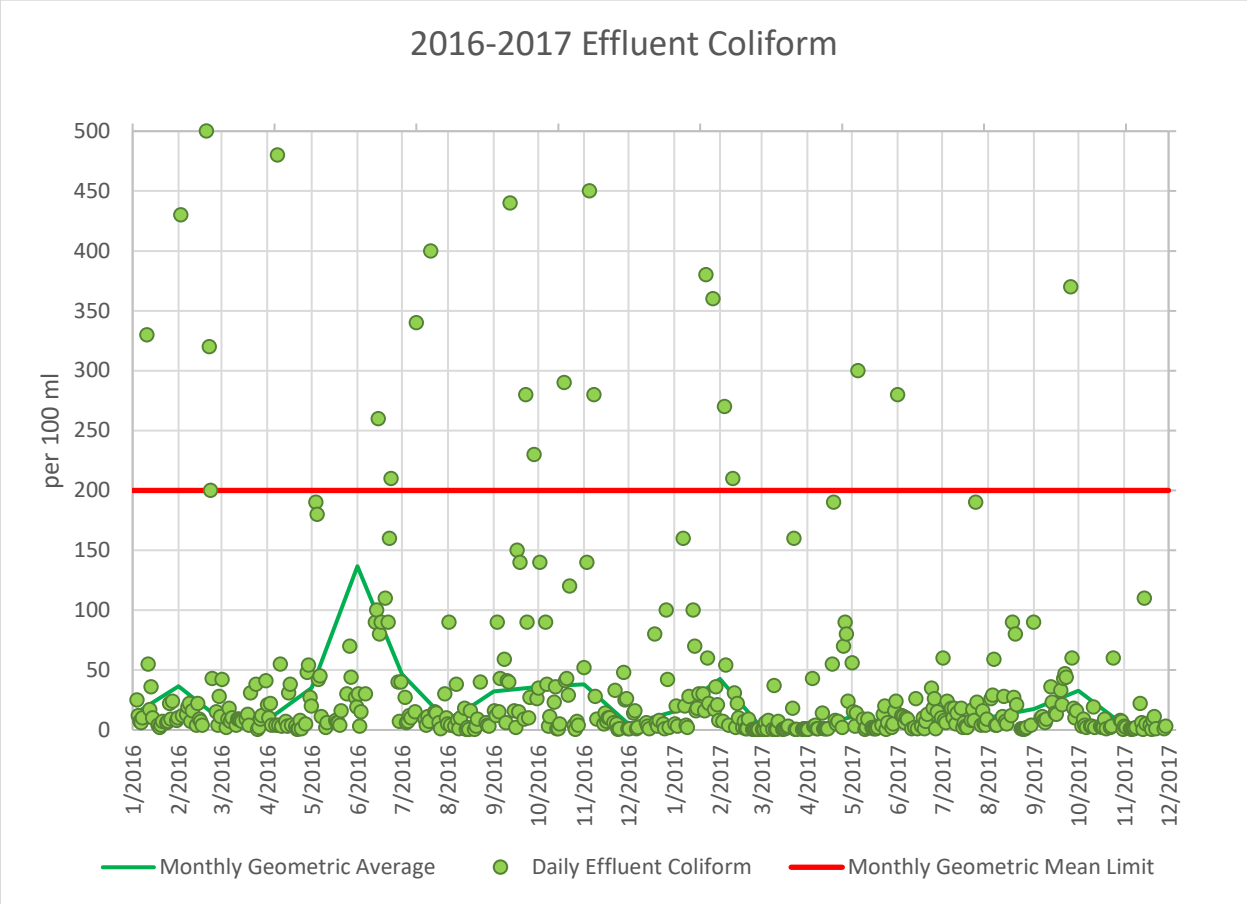


Figure 4. Effluent Coliform Counts

The single coliform violation, which occurred in one week of June 2016, was for a weekly geometric mean coliform count of 838/100 ml, over two times the weekly limit of 400/100 ml. The Town's investigations of its larger customers and industrial users led Town staff to conclude that the event was likely due to end of year cleaning at local schools, where unknown cleaning chemicals were discharged to the collection system.

3.2.3 Nitrogen

The WWTP's ammonia limit is seasonal, with much higher permitted effluent values in cooler months.

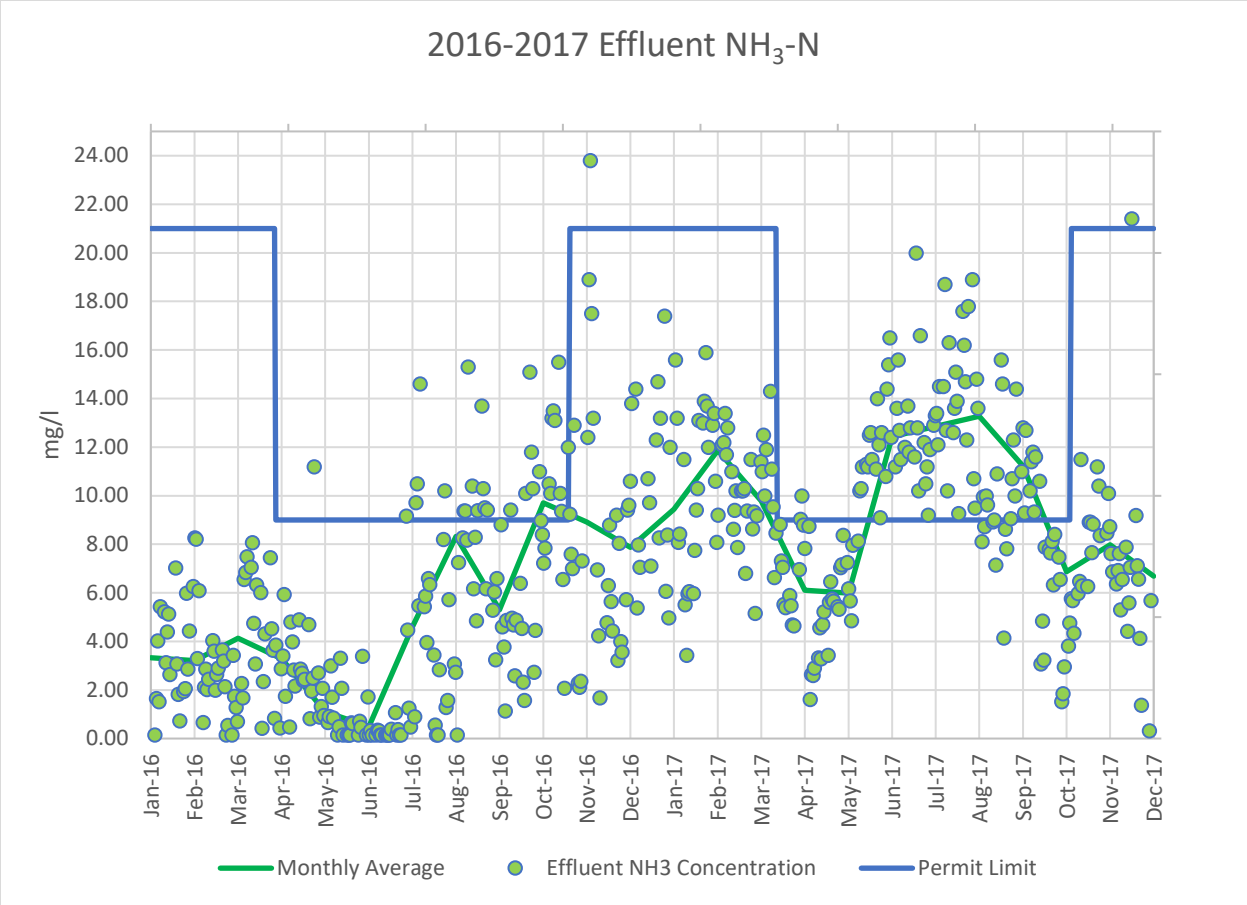


Figure 5. Effluent NH_3-N Concentrations

Individual daily effluent ammonia values exceeded the discharge limit on 23.9% of the days for which effluent values were measured, which roughly corresponds to the monthly permit violations shown, where the monthly average exceeded the permit limit 5 out of 24 months, or 21% of the time.

Effluent ammonia concentration varies greatly within individual months, ranging from a maximum of 28.2 mg/L in August 2016 to a minimum of 0.15 mg/L observed in several months, including August 2016.

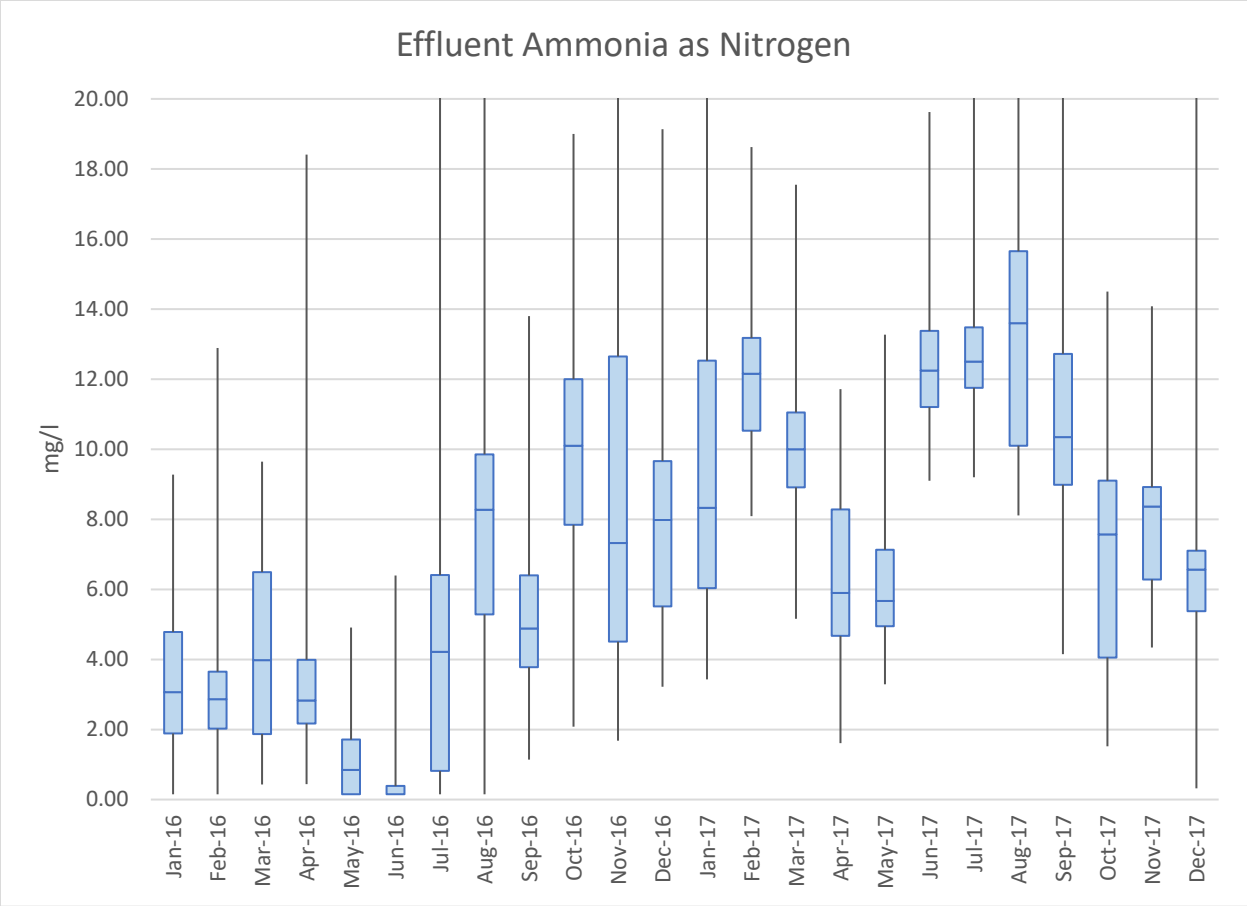


Figure 6. Effluent NH_3-N Variability

Influent ammonia is not measured daily. Only three readings are available from the past three years, collected on February 7, May 2, and August 1 of 2017. Influent and Effluent Total Kjeldahl Nitrogen (TKN), Nitrate + Nitrite, and Total Nitrogen (TN) were also measured on those dates, as well as on November 7, 2017.

The nitrogen balance of the system doesn't appear to be consistent for February 7, 2017. Total Kjeldahl Nitrogen is equal to ammonia plus organic nitrogen, but the reported February effluent TKN is less than ammonia nitrogen for effluent. Similarly, TN should be equal to TKN plus nitrate and nitrite nitrogen, but is also less than ammonia nitrogen for that day's effluent.

Since no influent ammonia nitrogen concentration was recorded for November, and the February data are inconsistent, there are only two days of influent and effluent nitrogen data available for 2017, and none for the previous year. No conclusions can be drawn from the analysis of such sparse data. More influent data should be collected before conclusions can be drawn. It has been suggested by Town staff that industrial users in the Town may be contributing high influent ammonia spikes to the plant.

Ammonia is removed from wastewater by nitrification, a biological process wherein bacteria convert ammonia to nitrate. This process is aerobic since it involves the addition of oxygen to ammonia nitrogen. Consequently it takes place in the aeration basins. Once nitrate has been produced by the nitrifying bacteria, denitrifying bacteria can strip the oxygen from the nitrates, leaving nitrogen gas, which floats to the top of the wastewater and diffuses into the atmosphere. This process is anaerobic, and is hindered by the presence of free oxygen or if the carbon source is inadequate. Denitrification takes place in the unaerated secondary clarifiers at this WWTP.

Since the nitrogenous waste in the WWTP's effluent is still in the form of ammonia, it can be concluded that nitrification is deficient. While there may also be denitrification deficiencies, this cannot be concluded from the few nitrogen measurements available.

Various influent characteristics may inhibit nitrification, including toxicity, temperature, alkalinity, pH, and carbon-based BOD. More influent and process control data are needed before specific recommendations can be made regarding the design of biological treatment improvements needed.

3.2.4 Total Suspended Solids

Individual daily effluent TSS values exceeded the 30 mg/l monthly average discharge limit on 8.2% of the days on which effluent values were measured, and exceeded the 45 mg/l weekly average discharge limit on 3.2% of days. The plant has had ten effluent TSS concentration violations in the last two years.

Effluent TSS concentration varies greatly over the period of record, ranging from a maximum of 424 mg/l in October 2017 to a minimum below the detection limit.

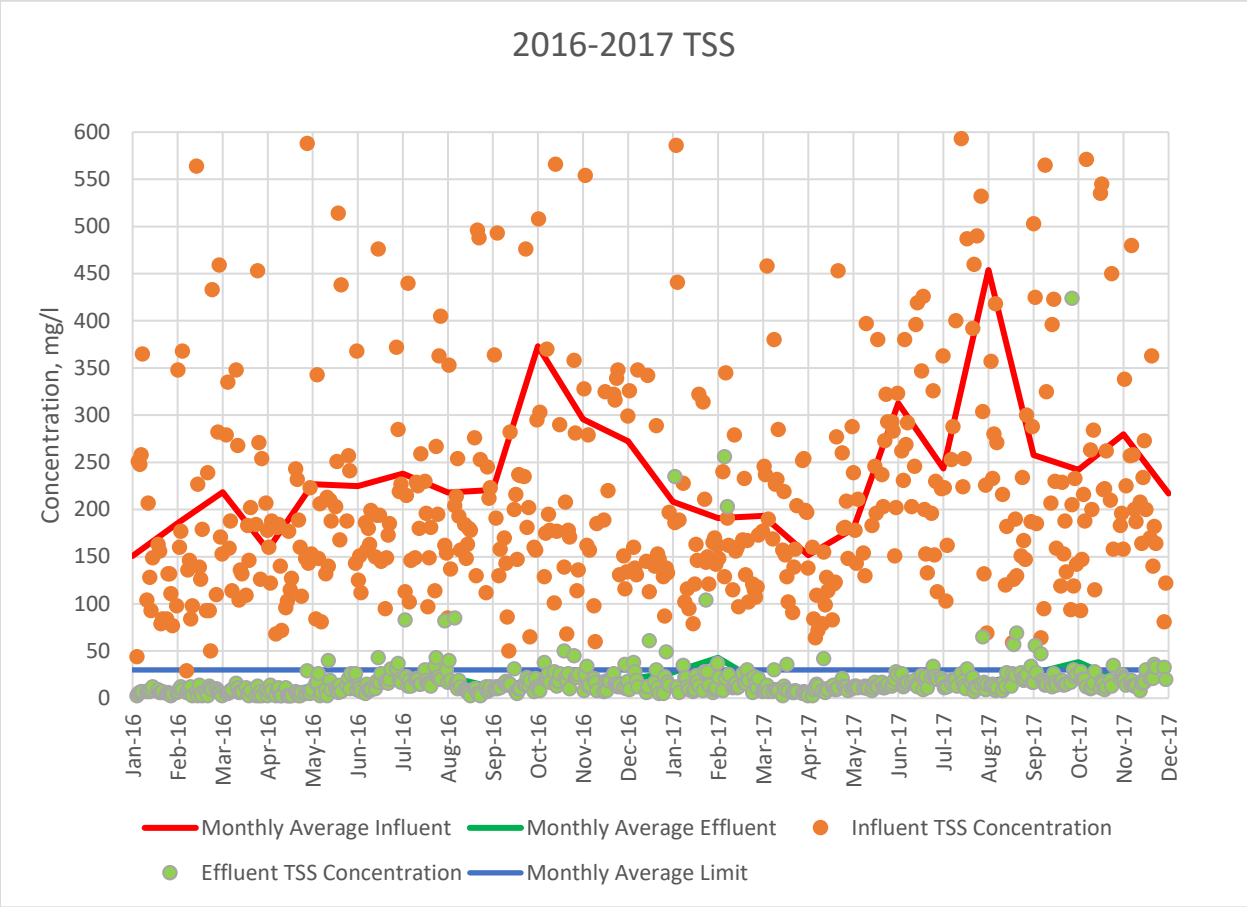


Figure 7. Total Suspended Solids Concentration

In addition to the TSS concentration limit, the WWTP's NPDES permit states that the monthly average effluent TSS concentration may not exceed 15% of the influent value, i.e., the treatment process must remove 85% of influent TSS. TSS removal at the plant averages almost 90%, with removal dropping below 85% on 15.7% of days during the period of analysis. There are no documented violations for TSS removal in the past two years.

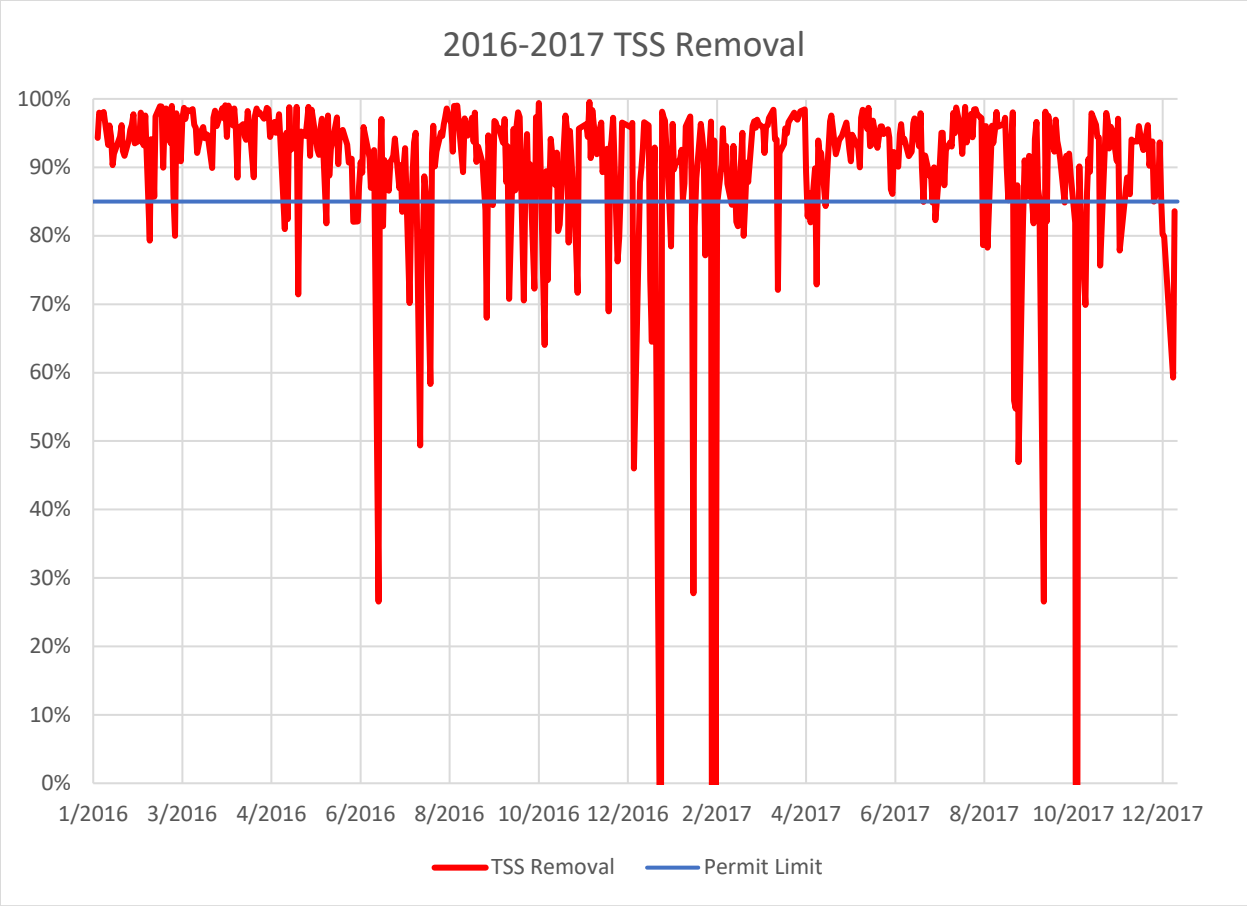


Figure 8. Total Suspended Solids Removal

Previous studies have identified effluent TSS concentrations as problem for the WWTP, and have attributed this problem to design deficiencies in the secondary clarifiers. The secondary clarifiers are only 8 feet deep when design guidelines from various sources suggest that minimum secondary clarifier depth should be 12 feet regardless of flow. The secondary clarifiers also have effluent weirs that are shorter than recommended to handle peak hourly flows. The 2007 McGill Associates report also noted that while effluent from the secondary clarifiers was not tested, the presence of settled sludge in the chlorine contact basin downstream of the secondary clarifiers provided another data point in favor of inadequate performance in the secondary clarifiers.

A further difficulty in the treatment process may be the lack of a dedicated anoxic zone for denitrification. Without such a space for the removal of oxygen from nitrates and the discharge of nitrogen to the atmosphere, denitrification will take place primarily in the secondary clarifiers, where nitrogen bubbles produced in the bottom of the clarifiers can float the sludge blanket to the top of the basin, allowing the sludge to be carried over the weirs. The plant's difficulties with managing filamentous bacteria can also contribute to TSS violations. Operators currently hold floating filamentous bacteria back from discharge by careful operation of the disinfection basins.

3.2.5 Biochemical Oxygen Demand

Individual daily effluent BOD values exceeded the 30 mg/l monthly average discharge limit on 5.4% of the days it was measured.

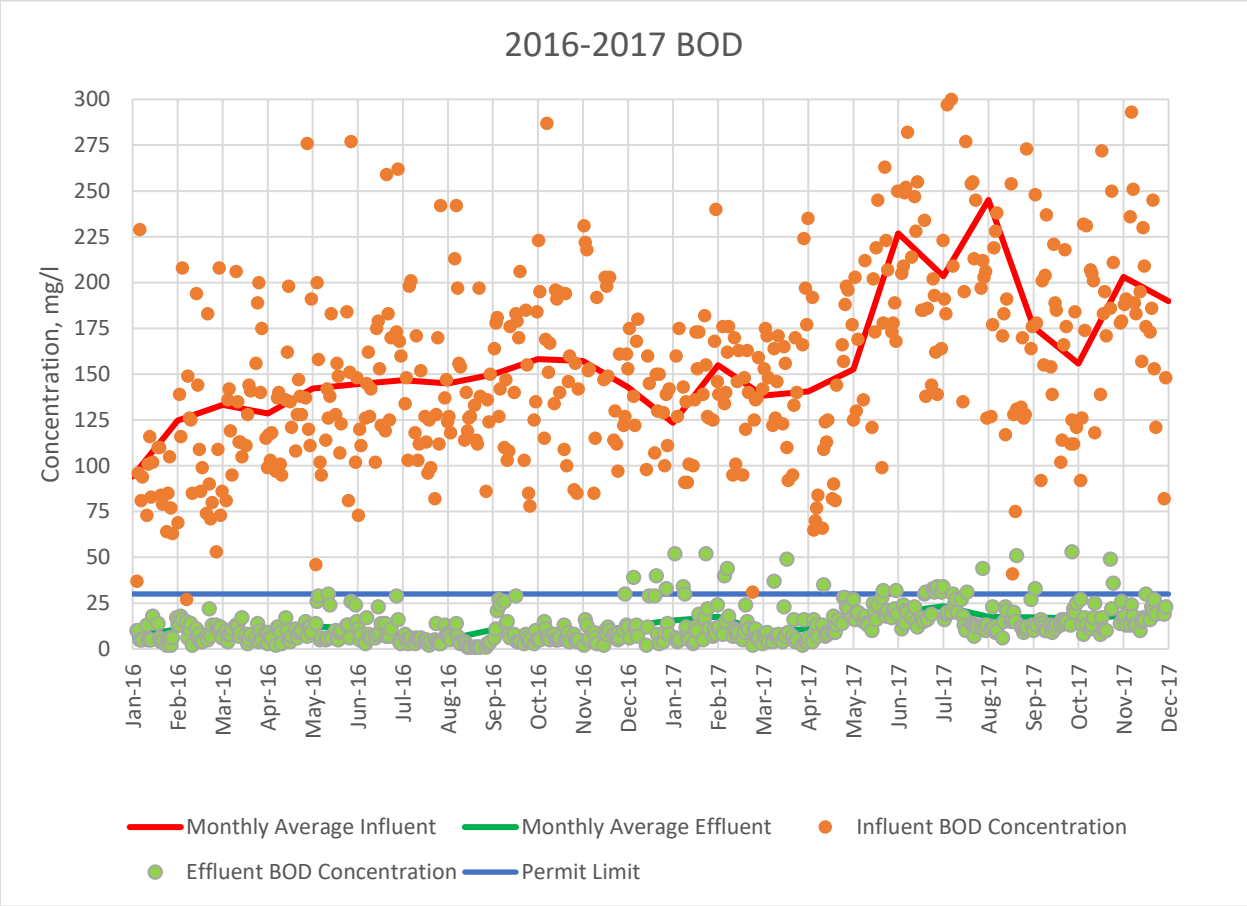


Figure 9. Biochemical Oxygen Demand Concentration

Daily BOD removal values were less than the 85% removal target on 15.7% of days. Insufficient BOD removal was discussed in the previous 2007 McGill Associates report as a subject of concern, and it was suggested that the difficulty may be due to low influent values, and may be ameliorated with a reduction in I/I, which would result in wastewater with higher BOD concentrations. During the assessment period from 2016-2017 this does not appear to have been the case. Influent BOD concentrations on days when the plant achieved at least 85% BOD removal averaged 164 mg/l, while concentrations on days the plant could not achieve 85% removal averaged 123 mg/l. Under both conditions it would be possible for the plant to meet its effluent concentration limit of 30 mg/l while still removing less than 85% of influent BOD.

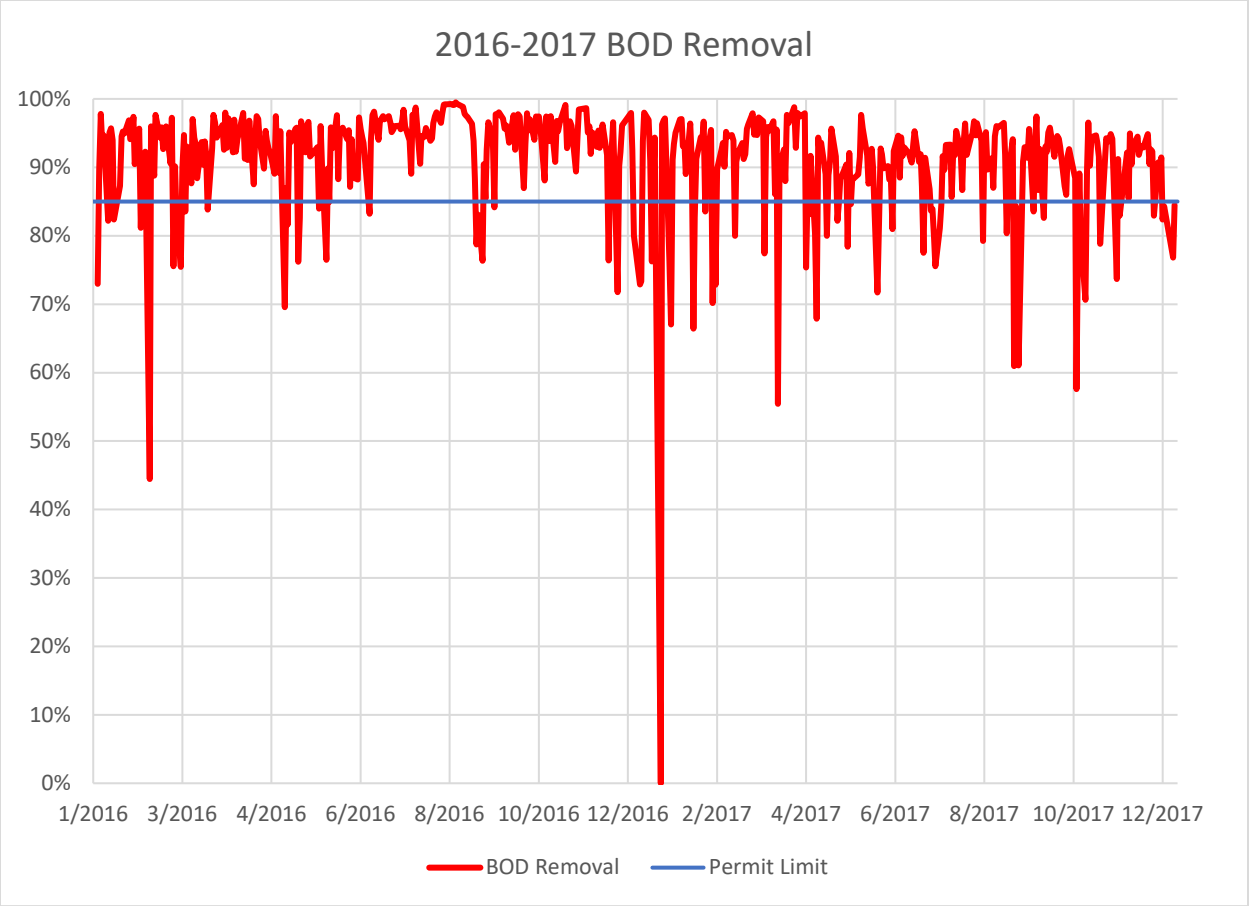


Figure 10. Biochemical Oxygen Demand Removal

Despite this occasional difficulty in meeting treatment goals, the plant did not exceed its permit limits during the two year period for which data were obtained.

3.3 Management of Compliance Issues

Relative to the current compliance situation, the Town will need to develop an approach that will be acceptable to the regulatory agency and allow for the plant to achieve consistent compliance. The management of this process with minimized regulatory impact is best served by the use of a Special Order by Consent (SOC). This requires the cooperation of the regulatory agency and the development of a plan that establishes a schedule to provide for a capital project to upgrade or replace the existing facility. This approach also requires the establishment of an appropriate funding process to achieve the plant upgrade process. Preliminary discussions with DWR staff indicates that they are open to discussing a compliance plan that would include the issuance of an SOC.

Generally, short-term steps to achieve consistent compliance are effective where basic WWTP conditions are such that only relatively minor capital projects are needed. While it is possible that some improvement in effluent quality may be achieved by short-term actions, long-term compliance is not achievable without a major upgrade of the WWTP The facility issues at the WWTP are such that stable, long-term compliance can only be achieved through a major capital project to upgrade this facility.

The development of a comprehensive facilities upgrade project requires a clear picture of funding and the development of a plan for design, permitting, and construction of the project. Once these steps can be developed and approved by the Town, it will be possible to establish a clear path forward that will satisfy the regulatory agency and provide Waynesville with a facility capable of effectively managing its wastewater well into the future. As a result, we believe it is appropriate that the Town move forward with developing a comprehensive capital project to address problems with the current WWTP and engage DWR on the development and adoption of an appropriate SOC.

If an SOC for a comprehensive plant upgrade is the path chosen, we anticipate it will be necessary to assure the regulatory agency that every step is being taken to secure the best performance of the existing facility pending the completion of the improvements project. This will include the following:

- A systematic and documented plan and actions to identify and correct, if possible, the source of recent increased loading to the plant.
- Establishment of an aggressive operational parameter monitoring program that will assist with establishing the current internal performance of each treatment step (full nitrogen series data, TSS series and BOD-5 at a minimum).
- Development of a detailed operational assessment of the existing facilities based on the data noted above to determine what, if any, actions are possible to improve effluent quality pending completion of the WWTP improvements.
- Establishment of an operational program that can be used throughout the timeline for completing the comprehensive capital project.

These actions will likely be a component of the SOC and DWR will require reports to document this effort. The Town will have to develop a schedule for the WWTP capital project that can be approved by DWR and will need to work with the agency to develop interim limits that allow compliance during the SOC period and that are acceptable to the agency.

Because the statutory provision for an SOC for publicly owned wastewater treatment systems allows for additional flow during the period of the SOC, the Town will need to evaluate its expected sewer service demand during the project period, so this amount of flow can be included in the SOC. This provision allows Waynesville to meet sewer extension and service demands while the SOC stays in place.

Steps to secure an SOC can be initiated before all of the details of the improvements project are developed, but it cannot be finalized without a schedule for completion of the project. Once an SOC has been drafted and is acceptable to DWR, a formal notice by the agency will be issued for public comment.

3.4 Industrial Users

According to the plant's most recent NPDES permit renewal application, the treatment works does not receive any discharges from either Categorical Industrial Users (CIUs) or non-categorical Significant Industrial Users (SIUs). There is consequently no pretreatment program and the Town's industries do not have any specific pretreatment standards to meet. All users are required to comply with the Town's Sewer Use Ordinance (SUO). Town staff have informed McGill Associates that a previous pretreatment program was discontinued. Even without a pretreatment program, the provisions of the SUO contain both general and specific prohibitions against contributing pollutants that may interfere with the treatment process to the treatment plant. The Town may also require an industrial user to monitor its flows by notification without reinstating a formal pretreatment program.

The Town of Waynesville has one industrial user discharging process wastewater flows to its collection system: Giles Chemical, a manufacturer of magnesium sulfate (Epsom Salt). Until 2017, Giles Chemical was permitted to recycle a portion of its process water, but current United States Food and Drug Administration standards for Good Manufacturing Practices no longer permit the reuse of process water. As a consequence of this change, process water must be discharged to the wastewater collection system. The manufacture of magnesium sulfate does not directly involve nitrogen or any nitrogen-containing compounds, so it is unlikely that ammonia violations at the plant can be directly attributed to high influent ammonia quantities stemming from industrial operations. However, the removal of ammonia is a biological process, and the possibility remains that influent wastewater being discharged to the treatment plant from its industrial user could adversely affect nitrifying bacteria populations in the plant, specifically if wastewater from the plant is removing alkalinity from the collection system. It is recommended

that further data regarding the nature of the wastewater discharged to the plant by this industrial user be collected, including alkalinity and dissolved solids content.

3.5 Future Flows and Speculative Limits

McGill Associates has corresponded with NCDEQ regarding potential changes to the WWTP's effluent limits, and has been informed that the current limits for ammonia nitrogen are consistent with the Division of Water Resources' ammonia toxicity policy, and are unlikely to change. BOD and TSS limits are also expected to stay the same over the next 10-15 years. New nutrient limits for nitrogen and/or phosphorus are not expected. However, we do recommend that in the development of the design of the WWTP improvements that the potential for additional treatment be considered in the layout of units and equipment.

4.0 TREATMENT PROCESS ALTERNATIVES

4.1 Current Process

The WWTP currently treats wastewater through a conventional activated sludge process, consisting of influent screening to remove coarse inorganic material, grit removal, primary clarification, biological treatment using a conventional activated sludge process (with a hydraulic detention time of less than 10 hours), secondary clarification, and disinfection using chlorine gas prior to discharge of the treated effluent. Biosolids produced b the treatment process receive primary treatment including thickening using gravity thickeners prior to anaerobic digestion for stabilization. Anaerobically digested biosolids are processed by an alkaline stabilization process where lime, cement kiln dust and heat are used to produce a product which meets 503 standards for Class A biosolids. This Class A product is distributed to local farmers as a soil amendment.

In the primary treatment train, wastewater enters the treatment plant through a two bar screens, one automatic and one manually raked, that remove large solids before entering a grit chamber where smaller solids are removed by inertia and extracted by an airlift pump. From the grit chamber, wastewater flows by gravity to a pair of primary clarifiers where heavier-than-water solids settle out by gravity.

In the secondary treatment train, wastewater from the primary clarifiers is pumped by three centrifugal pumps to the four-chambered aeration basin where aerobic bacteria consume BOD and nitrify ammonia. Only two of the aeration basins are currently used for this purpose, with the other two being used for aerobic digestion and to receive flow returned from one of the two chlorine contact basins. Wastewater from the aeration basins flows to two secondary clarifiers where solids and aerobic bacteria settle out by gravity. Since the clarifiers are not aerated, the opportunity for denitrification of the nitrate produced in the previous basin is present. From the secondary clarifiers, wastewater flows to two chlorine contact basins for disinfection by chlorine, followed by dechlorination with sulfur dioxide. In order to reduce the potential for discharge of floating filamentous bacteria scum on in the chlorine contact basins, the two basins are used alternately, with the contents of each pumped back into a chamber of the aeration basin once every two weeks. Treated effluent flows underneath a baffle on the end of each chlorine contact basin and is discharged into the Pigeon River by gravity.

4.2 Treatment Alternatives

4.2.1 Project Goal

The project goal is to identify the necessary improvements to bring the wastewater treatment plant into full and stable compliance with its NPDES discharge permit so that it can reliably meet its permit limits at flows up to its design capacity.

4.2.1.1 Disinfection

Since only one violation of the Town's discharge permit was related to disinfection processes, it appears reasonable to conclude that the Town's chlorination process and equipment are functioning adequately. At 6.0 MGD, the existing chlorination basin gives a contact time of 31.9 minutes, over twice the Ten States Standard of 15 minutes at peak flow. The plant could accommodate a peaking factor of 2.12 at design capacity and still meet chlorine contact time standards.

The 2017 UTEC report identified disinfection by chlorination as a candidate for modification, citing the public safety benefits of abandoning chemical disinfection in favor of ultraviolet disinfection. However, substitution of UV for chlorine cannot be recommended until the WWTP first makes modifications to better control its total suspended solids and the use of final filters is included. Filtration is not otherwise expected to be necessary to comply with the WWTP's effluent limits. High TSS can reduce the efficacy of UV disinfection because the suspended particles can shield microorganisms from the ultraviolet light. Instead, we recommend that the Town continue to use chemical disinfection, but in order to address safety concerns, switch from the current chlorination system to a sodium hypochlorite (bleach) based liquid feed system.

4.2.1.2 Nitrogen and Total Suspended Solids Removal

Due to the sparsity of process data regarding influent nitrogen and the efficacy of nitrogen removal in the aeration basins, it is difficult to make specific recommendations regarding nitrogen removal alternatives.

Suspended solids are removed by gravity settling at this plant in two rectangular secondary clarifiers. The 8' deep clarifiers, which were the subject of a 2007 McGill Associates report, are shallower than the 12' recommended by most design standards, and their effluent weirs are too short for peak flows. While they function adequately at average flows, higher flow rates can cause high proportions of suspended solids to be carried out of the basins due to the combination of shallow depth and high-velocity flow over the effluent weirs. There is no structure or equipment downstream of the secondary clarifiers that is capable of removing a significant amount of suspended solids prior to effluent discharge.

Any suspended solids removal alternative must rely upon at least one of three tactics: giving the solids more time to fall below a depth from which they will not be carried over the weirs, promoting enhanced flocculation and faster settling of the solids, or installing filtration equipment to catch solids either within the existing basins or after they are carried over the weirs.

The previous report by McGill Associates discussed several process modifications to address the shortcomings of the existing secondary clarifiers:

1. Modification of the secondary clarifiers, raising the walls by approximately four feet and replacing the sludge collection equipment.

2. Installation of tertiary filtration equipment downstream of the existing clarifiers.
3. Modification of the secondary clarifier influent piping to reduce flow velocity and the introduction of a polymer injection system to enable flocculation and faster settling of the suspended solids.
4. Conversion of the existing aeration basin to a membrane bioreactor, an alternative whose consideration was delayed due to high capital cost.

The 2017 UTEC report also identified the secondary clarifiers as the primary contributor to discharge limit violations and recommended a few other alternatives:

5. Replacement of the sludge removal system in the clarifiers with a hoseless cable vacuum system.
6. Replacement of the clarifiers with new, 90' diameter, 15' deep circular clarifiers.

None of the previous studies addressed ammonia removal, which has been noted as a recent problem. More data must be collected during the design process to determine what is currently inhibiting nitrification in the aeration basins. For the sake of this report, it is assumed that any plant replacement or upgrade will be designed for adequate ammonia removal.

4.2.1.3 Combined Heat and Power Improvements

The 2017 UTEC report included an assessment of the potential for the anaerobic digesters' gas production to generate power for the WWTP. At the WWTP's full 6.0 MGD design capacity, UTEC estimated that biogas production would be approximately 2,772 ft^3/hr. Currently, a portion of this biogas is used to provide heat to the anaerobic digesters themselves, but the majority of it is wasted to atmosphere.

The UTEC report stated that the WWTP could generate as much as 150 kW from its biogas production, compared to an average of 323.5 kW used at the plant from 2014-2016. The relatively small potential for power generation for biogas relative to the plant's demands mean that the WWTP cannot become a net energy producer. The energy available from this biogas could be used to operate a small generator or single piece of mechanical equipment, but is not sufficient to power the entire plant or an entire treatment train. Alternatively, it could be burned and used to generate heat directly for sludge treatment.

4.2.2 Common Elements of Treatment Alternatives

Generally speaking, many of the plant's current deficiencies must be addressed regardless of the specific treatment alternative chosen. The three rehabilitation or conversion alternatives discussed below encompass the following recommended improvements:

1. Replacement of the existing headworks with a new headworks to be housed in an adjacent structure, consisting of two self-moving bar screens, vortex grit removal, a grit classifier, and a grease receiving station. The Town should also consider the possibility of

constructing a grease receiving station at the headworks in order to more efficiently process the contents of grease traps and direct fats, oils, and grease directly to the anaerobic digester.

2. Rehabilitation of the primary clarifiers, consisting of concrete rehabilitation, additional railing and footboards for safety, replacement of influent gate valves, releveling of the existing weirs, and replacement of diaphragm pumps and piping.
3. Expansion and rehabilitation of the intermediate pump station, including the addition of a fourth pump, piping improvements, and roof repair.
4. Rehabilitation of the existing aeration basins, including concrete rehabilitation, and replacement of leaking air headers. Further modifications of the aeration basins will depend on the project alternative selected.
5. Modification of the blower building, including motor upgrades, the addition of a crane system capable of moving the blowers and their motors, and installation of new control panels capable of processing dissolved oxygen data from the aeration basin and operating the blowers using variable frequency drives.
6. Disinfection system improvements, including the installation of hypochlorite tanks, dosing pumps, piping improvements, and dechlorination equipment.
7. Construction of a non-potable effluent water reuse booster station.
8. Rehabilitation of the primary and secondary sludge thickener tanks including concrete rehabilitation and replacement of mechanical equipment.
9. Rehabilitation of the anaerobic digester, including roof and mixing equipment replacement, concrete rehabilitation, and piping improvements.
10. Rehabilitation of the belt filter press, including replacement of the polymer feed system belts, and conveyors, and repair of the control panel.
11. Rehabilitation of the lime pasteurization system, including replacement of the thermo-blender trough and heater, recycle feed hopper, and lime silo dust collection system, and modification of the baghouse to improve maintenance access.

Note that these alternatives depend on reuse of some existing concrete structures in addition to the construction of new structures. As discussed in Section 1.0 of this report and in the appendix, these existing structures appear to be suitable for rehabilitation and continued use based upon available information. The structural assessment contains two caveats. The first is that further evaluation of the drained structures is a component of concrete rehabilitation. In the course of that evaluation, evidence may be found that indicates that the concrete is not suitable for reuse. The second is that the useful life of concrete structures is finite, and while the ultimate lifespan of the structures of this facility is not known, these basins will eventually require complete replacement.

In order to address the WWTP's compliance issues, a phased approach is recommended:

1. Apply for the SOC. Begin collecting influent and process control data. Apply for funding for other compliance measures.
2. Construct new treatment trains while the existing WWTP is operating under the SOC.
3. Transfer operations to new treatment trains.

Since the only variation between the alternatives is in phase 2 of this process, we will spend the bulk of this section discussing four alternatives:

1. Rehabilitate and replace existing equipment as necessary and continue operating the plant using the existing suspended growth activated sludge process.
2. Replace the existing activated sludge process with a Sequencing Batch Reactor (SBR) process using either the existing aeration basins, if possible, or construct new basins to serve as reactors and using existing basins for post-equalization.
3. Construct new secondary clarifiers and retrofit the existing aeration basins to employ the Integrated Fixed-Film Activated Sludge process, a more efficient variation of the activated sludge process currently in place.
4. Construct a replacement wastewater treatment plant at a new location.

4.3 Alternative 1: Rehabilitate Existing Treatment Process

This alternative would consist of the rehabilitation of the existing basins and replacement of many of the components recommended for replacement by the previous reports. Since the secondary clarifiers cannot effectively be reused, new secondary clarifiers must be constructed on an adjacent parcel of land while keeping the existing secondary clarifiers in operation until they are complete. The plant would then be operated as a conventional activated sludge process wastewater treatment plant with primary clarification, aeration, secondary clarification, and disinfection.

This alternative may not provide adequate peaking capacity for the plant, so an aerated flow equalization basin would have to be constructed near the headworks of the plant. This flow equalization basin would permit peak flows to be diverted from a point upstream of the headworks to the basin and then pumped into the headworks once the peak has subsided.

The construction of this alternative would consist of the common elements listed in section 4.2.2 above with the addition of the the construction of two replacement secondary clarifiers and a flow equalization basin. This alternative provides the lowest operations and maintenance costs and the lowest operational complexity of the alternatives considered. It also carries a lower level of commitment than the other two rehabilitation or conversion alternatives since it requires the least specialized equipment. This alternative also does not preclude future conversion to another process such as IFAS or the addition of tertiary filtration if required.

4.4 Alternative 2: Sequencing Batch Reactors

Sequencing Batch Reactors (SBRs) operate as both aeration basins and secondary clarifiers by separating these functions over time into four stages. In the fill stage, influent wastewater enters the reactor until a predetermined volume is reached. In the react stage, the reactor is operated as an aeration basin to promote biological treatment. In the settle stage, aeration is stopped and the reactor functions as a secondary clarifier, with solids settling to the bottom. In the decant stage, clarified treated effluent is withdrawn from the top of the reactor by floating decanters and flows to a post-equalization basin. Multiple SBRs can be operated in a staggered fashion so that two reactors are not discharging flows to the post-equalization basin at one time.

As a rule of thumb the total volume of sequencing batch reactor basins needed to treat a given flow of wastewater to a given standard is equal to the total volume of the aeration basins and secondary clarifiers needed to treat that same wastewater by a conventional activated sludge process. The existing aeration basins are adequately sized to be operated as a set of four SBRs at a design capacity of 4.0 MGD, with each basin serving as a reactor. In order to retain the WWTP's current treatment capacity, a separate bank of three 79' square SBR basins and additional blower building must be constructed on the plant site, and additional modifications to the intermediate pump station will be required to split flows between the two sets of treatment trains. The existing secondary clarifiers can be repurposed as post-equalization basins.

This alternative may not provide adequate peaking capacity for the plant, so an aerated flow equalization basin would have to be constructed near the headworks of the plant. This flow equalization basin would permit peak flows to be diverted from a point upstream of the headworks to the basin and then pumped into the headworks once the peak has subsided.

The construction of this alternative would consist of the common elements listed in section 4.2.2 above in addition to the aeration basin and secondary clarifier modifications and construction of the flow equalization basin, additional SBR basins, and SBR blower building described in this section. This alternative is not recommended due to its operational complexity.

4.5 Alternative 3: Integrated Fixed-Film Activated Sludge Process

Integrated Fixed-Film Activated Sludge (IFAS) is a biological wastewater treatment technology originally developed in Canada in the mid-1990s as a means of upgrading wastewater treatment plants to treat greater wastewater flows within the same footprint. By adding engineered media with a high surface area to volume ratio to the aeration basin, a plant can create a more hospitable environment for nitrifying bacteria within the basin. It is possible to double the nitrification capacity of a given aerated volume using this system.

The modifications necessary to install an IFAS system in the existing aeration basins include, in addition to any rehabilitation on the aeration basins themselves, replacement of the existing coarse air diffusers with fine bubble diffusers, possible upgrades to the blowers to meet increased oxygen requirements, installation of either fixed or free floating media, and effluent screening on the aeration basins to retain free floating media. Depending on the specific equipment selected, it may be necessary to incorporate a band screen with 6mm or smaller maximum opening width into the headworks design. As in the rehabilitation alternative, replacement secondary clarifiers will be required for this alternative.

While influent wastewater characteristics are available for the headworks of the plant, only quarterly data on the primary clarifiers have been collected. We have based our opinion of the feasibility of this alternative on the aeration basin dimensions and an assumed 20% removal of BOD and 50% removal of TSS in the primary clarifiers.

This alternative may not provide adequate peaking capacity for the plant, so an aerated flow equalization basin would have to be constructed near the headworks of the plant. This flow equalization basin would permit peak flows to be diverted from a point upstream of the headworks to the basin and then pumped into the headworks once the peak has subsided.

The construction of this alternative would consist of the common elements listed in section 4.2.2 above with the addition of the aeration basin modifications and construction of the two replacement secondary clarifiers and new flow equalization basin described in this section. This alternative is more costly than the rehabilitation alternative, but may provide the wastewater treatment plant the clearest path to future expansion as well as the option of meeting any nutrient limits that may be imposed in the future.

4.6 Alternative 4: Construction of a New Wastewater Treatment Plant

Rather than retrofit the existing wastewater treatment plant with new technology or rehabilitate its current process, the option of building a new wastewater treatment plant nearby has also been considered. Potential locations include land adjacent to the existing WWTP on the south side of Richland Creek, land immediately across the creek from the existing WWTP, or a site on the Pigeon River near the outfall. In this alternative, it is likely that some portion of the existing WWTP would remain in service since its current location is still the destination of the existing wastewater collection system. Existing structures could be used as a pump station to relay flows from the existing WWTP site to the new site. Screening could also be performed at a headworks at the existing WWTP site, with other treatment processes taking place at the new site.

Construction costs for this alternative would be much higher than for the other alternatives. In addition to mechanical and electrical equipment costs being similar to the costs for the retrofit or rehabilitation alternatives, sitework, yard piping, and the construction of new basins and buildings would also be necessary, as well as any additional collection system piping that might be needed to convey flows to the new site.

There are also non-monetary disincentives to constructing a new WWTP that are not shared by the other alternatives. The selection of a new site would require environmental assessments and potentially an alternatives analysis comparing multiple potential sites. In addition to natural environmental obstacles, the concerns of local landowners and their setback requirements must be considered. If the owners of the land desired are not willing to sell the land to the Town, a politically contentious condemnation process may be necessary.

Independent of the land being selected and acquired, the Department of Environmental Quality and other natural resources agencies may require an environmental assessment of a new facility and discharge point. This review process has many potential regulatory impacts as well as resulting in a much longer approval process. If the outfall location changes significantly as a result of the project, the existing NPDES permit may need to be modified or a new NPDES permit may be necessary, which could subject the project to the delays associated with the development of the permit and the public notice and comment period.

This alternative would provide more operational flexibility and certainly any operator would welcome the opportunity to manage wastewater with a new facility. However, this flexibility comes at a high cost and would not provide any additional wastewater treatment capacity.

5.0 OPINIONS OF PROBABLE COST

5.1 Rehabilitate Existing Treatment Process

PRELIMINARY OPINION OF PROBABLE COST
WASTEWATER TREATMENT PLANT EVALUATION
TOWN OF WAYNESVILLE, NORTH CAROLINA
ALTERNATIVE 1: REHABILITATE EXISTING TREATMENT PROCESS
AUGUST 2018

ITEM	DESCRIPTION	QUAN.	UNIT	UNIT PRICE	TOTAL
1	Mobilization (3%)	1	LS	$316,100	$316,100
2	Flow Equalization Basin	1	LS	$2,050,700	$2,050,700
3	Headworks	1	LS	$1,192,600	$1,192,600
4	Primary Clarifiers	1	LS	$545,000	$545,000
5	Intermediate Pump Station	1	LS	$52,000	$52,000
6	Aeration Basin Rehabilitation	1	LS	$856,000	$856,000
7	Blower Building	1	LS	$146,000	$146,000
8	Secondary Clarifiers	1	LS	$1,846,500	$1,846,500
9	Disinfection System Improvements	1	LS	$160,000	$160,000
10	Outfall Improvements	1	LS	$250,000	$250,000
11	Primary Sludge Thickener Rehabilitation	1	LS	$125,000	$125,000
12	Secondary Sludge Thickener Rehabilitation	1	LS	$125,000	$125,000
13	Anaerobic Digester Rehabilitation	1	LS	$980,000	$980,000
14	Belt Filter Press Rehabilitation	1	LS	$65,000	$65,000
15	Lime Pasteurization System Rehabilitation	1	LS	$584,000	$584,000
16	Plant-Wide Improvements	1	LS	$1,560,000	$1,560,000
	CONSTRUCTION SUBTOTAL				**$10,853,900**
	Technical Services				$2,171,000
	Contingency (15%)				$1,628,000
	TOTAL PROJECT				**$14,652,900**

5.2 Sequencing Batch Reactors

PRELIMINARY OPINION OF PROBABLE COST
WASTEWATER TREATMENT PLANT EVALUATION
TOWN OF WAYNESVILLE, NORTH CAROLINA
ALTERNATIVE 2: SEQUENCING BATCH REACTORS
AUGUST 2018

ITEM	DESCRIPTION	QUAN.	UNIT	UNIT PRICE	TOTAL
1	Mobilization (3%)	1	LS	$364,900	$364,900
2	Flow Equalization Basin	1	LS	$2,050,700	$2,050,700
3	Headworks	1	LS	$1,192,600	$1,192,600
4	Primary Clarifiers	1	LS	$545,000	$545,000
5	Intermediate Pump Station	1	LS	$402,000	$402,000
6	Aeration Basin Rehabilitation	1	LS	$856,000	$856,000
7	SBRs in New Basins	1	LS	$5,294,800	$5,294,800
8	Blower Building	1	LS	$23,000	$23,000
9	Disinfection System Improvements	1	LS	$160,000	$160,000
10	Outfall Improvements	1	LS	$250,000	$250,000
11	Primary Sludge Thickener Rehabilitation	1	LS	$125,000	$125,000
12	Secondary Sludge Thickener Rehabilitation	1	LS	$125,000	$125,000
13	Anaerobic Digester Rehabilitation	1	LS	$980,000	$980,000
14	Belt Filter Press Rehabilitation	1	LS	$65,000	$65,000
15	Lime Pasteurization System Rehabilitation	1	LS	$584,000	$584,000
16	Plant-Wide Improvements	1	LS	$1,560,000	$1,560,000
	CONSTRUCTION SUBTOTAL				**$14,578,000**
	Technical Services				$2,916,000
	Contingency (15%)				$2,187,000
	TOTAL PROJECT				**$19,681,000**

5.3 Integrated Fixed-Film Activated Sludge Process

PRELIMINARY OPINION OF PROBABLE COST
WASTEWATER TREATMENT PLANT EVALUATION
TOWN OF WAYNESVILLE, NORTH CAROLINA
ALTERNATIVE 3: CONVERSION OF EXISTING AERATION BASINS TO IFAS
AUGUST 2018

ITEM	DESCRIPTION	QUAN.	UNIT	UNIT PRICE	TOTAL
1	Mobilization (3%)	1	LS	$374,800	$374,800
2	Flow Equalization Basin	1	LS	$2,051,000	$2,051,000
3	Headworks	1	LS	$1,192,600	$1,192,600
4	Primary Clarifiers	1	LS	$545,000	$545,000
5	Intermediate Pump Station	1	LS	$52,000	$52,000
6	Aeration Basin Rehabilitation	1	LS	$856,000	$856,000
7	IFAS Retrofit	1	LS	$4,130,000	$4,130,000
8	Blower Building	1	LS	$23,000	$23,000
9	Secondary Clarifiers	1	LS	$1,846,500	$1,846,500
10	Disinfection System Improvements	1	LS	$160,000	$160,000
11	Outfall Improvements	1	LS	$250,000	$250,000
12	Primary Sludge Thickener Rehabilitation	1	LS	$125,000	$125,000
13	Secondary Sludge Thickener Rehabilitation	1	LS	$125,000	$125,000
14	Anaerobic Digester Rehabilitation	1	LS	$980,000	$980,000
15	Belt Filter Press Rehabilitation	1	LS	$65,000	$65,000
16	Lime Pasteurization System Rehabilitation	1	LS	$584,000	$584,000
17	Plant-Wide Improvements	1	LS	$1,560,000	$1,560,000
	CONSTRUCTION SUBTOTAL				**$14,919,900**
	Technical Services				$2,984,000
	Contingency (15%)				$2,238,000
	TOTAL PROJECT				**$20,141,900**

5.4 Construction of a New Wastewater Treatment Plant

The 2017 UTEC report suggested that the construction of a new wastewater treatment plant on an adjacent property could be achieved for $18,432,000. McGill Associates does not concur with this opinion. The "New Plant" item featured in that cost opinion was only $15,000,000, or $2.50 per gpd of treatment capacity.

RSMeans Facilities Construction Costs (RSMeans), published by Gordian, serves as a reference for construction costs for commercial, industrial, municipal, and institutional facilities, including municipal wastewater treatment facilities. The 2014 RSMeans provided nationwide average construction costs, including overhead and profit, for WWTPs ranging in capacity from 1.0 to 5.0 MGD, as well as City Cost Index figures allowing these nationwide average construction costs to be localized to many municipalities. While Waynesville, North Carolina was not directly referenced in the book, City Cost Indices were provided for both Asheville and Murphy. The average of those two figures was 77.6, meaning construction costs for Waynesville were estimated to be approximately 77.6% those of the nationwide average.

Table 3. WWTP Construction Costs per GPD Treatment Capacity

	construction cost per gpd		
	2014	2014	2018*
Capacity (MGD)	Nationwide	Waynesville	
1.0	$12.10	$9.39	$10.00
1.5	$11.65	$9.04	$9.62
2.0	$11.00	$8.54	$9.09
3.0	$8.60	$6.67	$7.10
5.0	$6.70	$5.20	$5.54

*adjusted for inflation using www.usinflationcalculator.com

The trendline for these figures can be extended to 6.0 MGD to provide an approximate cost of construction for a 6.0 MGD wastewater treatment plant in Waynesville.

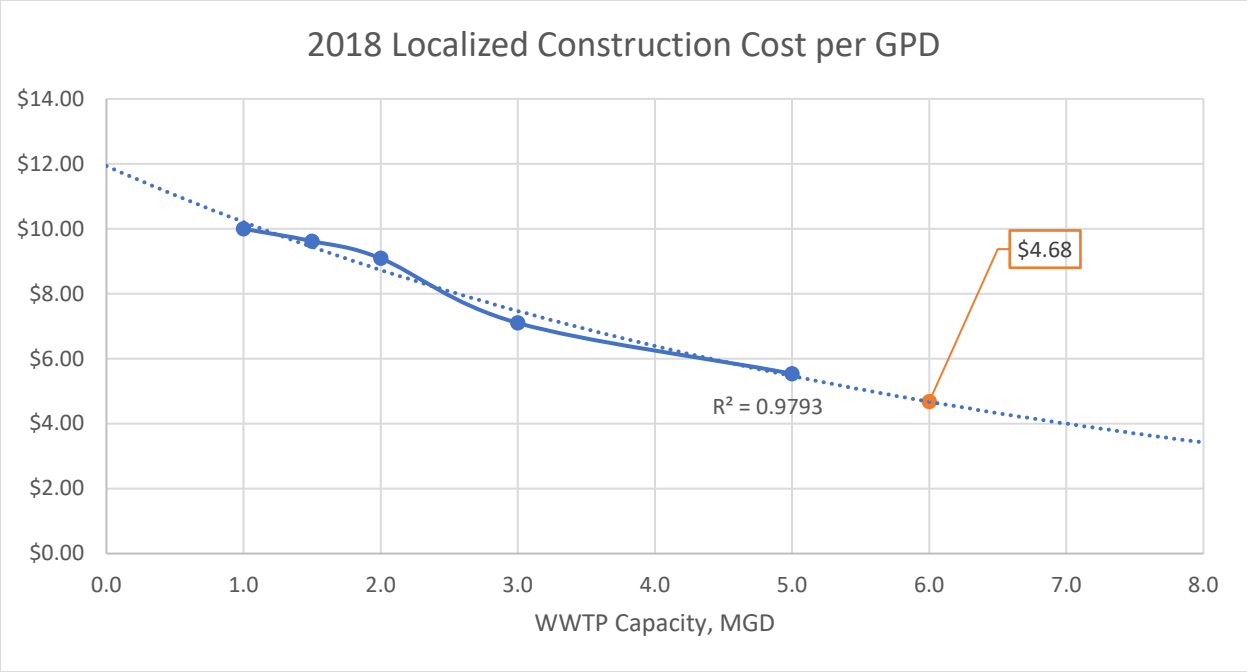


Figure 11. WWTP Construction Cost Trendline

From the above figure, the cost of constructing a 6.0 MGD wastewater treatment plant in Waynesville, North Carolina is estimated to be approximately $4.68 in 2018 dollars.

Other capital costs in addition to construction include land acquisition, technical services, and contingency. Nearby potential WWTP locations range in tax value from $173,200 to $607,800.

The total capital cost for a new wastewater treatment plant is estimated to be between $34,000,00 and $38,000,000.

PRELIMINARY OPINION OF PROBABLE COST
WASTEWATER TREATMENT PLANT EVALUATION
TOWN OF WAYNESVILLE, NORTH CAROLINA
ALTERNATIVE 4: NEW WASTEWATER TREATMENT PLANT
AUGUST 2018

ITEM	DESCRIPTION	QUAN.	UNIT	UNIT PRICE	TOTAL
1	1 GPD of Treatment Capacity	6,000,000	LS	$4.68	$28,080,000
	CONSTRUCTION SUBTOTAL				**$28,080,000**
	Land Acquisition				**$608,000**
	Technical Services				$3,370,000
	Contingency (10%)				$2,808,000
	TOTAL PROJECT				**$34,866,000**

6.0 CAPITAL FUNDING SOURCES

Grant and loan funding is available for wastewater treatment plant improvements.

6.1 United States Department of Agriculture

The United States Department of Agriculture – Rural Development Agency (USDA-RD) administers a Water & Waste Disposal loan & grant program that provides long-term, low interest loans to rural areas and towns with populations of 10,000 or fewer residents. Grants may also be provided if loan repayment would cause an unacceptable increase in user rates. USDA staff have stated that the Town of Waynesville would be eligible for an intermediate rate 40-year loan at 3.125%, and that if the Town is operating on an SOC, the project would automatically qualify for the "poverty rate" of 2.375%. Without an SOC it would still be possible to qualify for the poverty rate if the Town could document sufficient permit violations in the preliminary engineering report and prove that the project will improve health and sanitary conditions.

6.2 State Revolving Fund

The Clean Water State Revolving Fund (SRF) is administered by the NCDEQ Division of Water Infrastructure, and provides loans of up to $30 million for wastewater treatment and collection system projects, as well as projects that improve energy efficiency at treatment works. There are some funds available for principal forgiveness, and some 0% interest loans are available for green projects. The typical interest rate for SRF loans is one half the general obligation bond interest rate on the date loan applications are due. The rate is currently 1.97% for a 20 year loan.

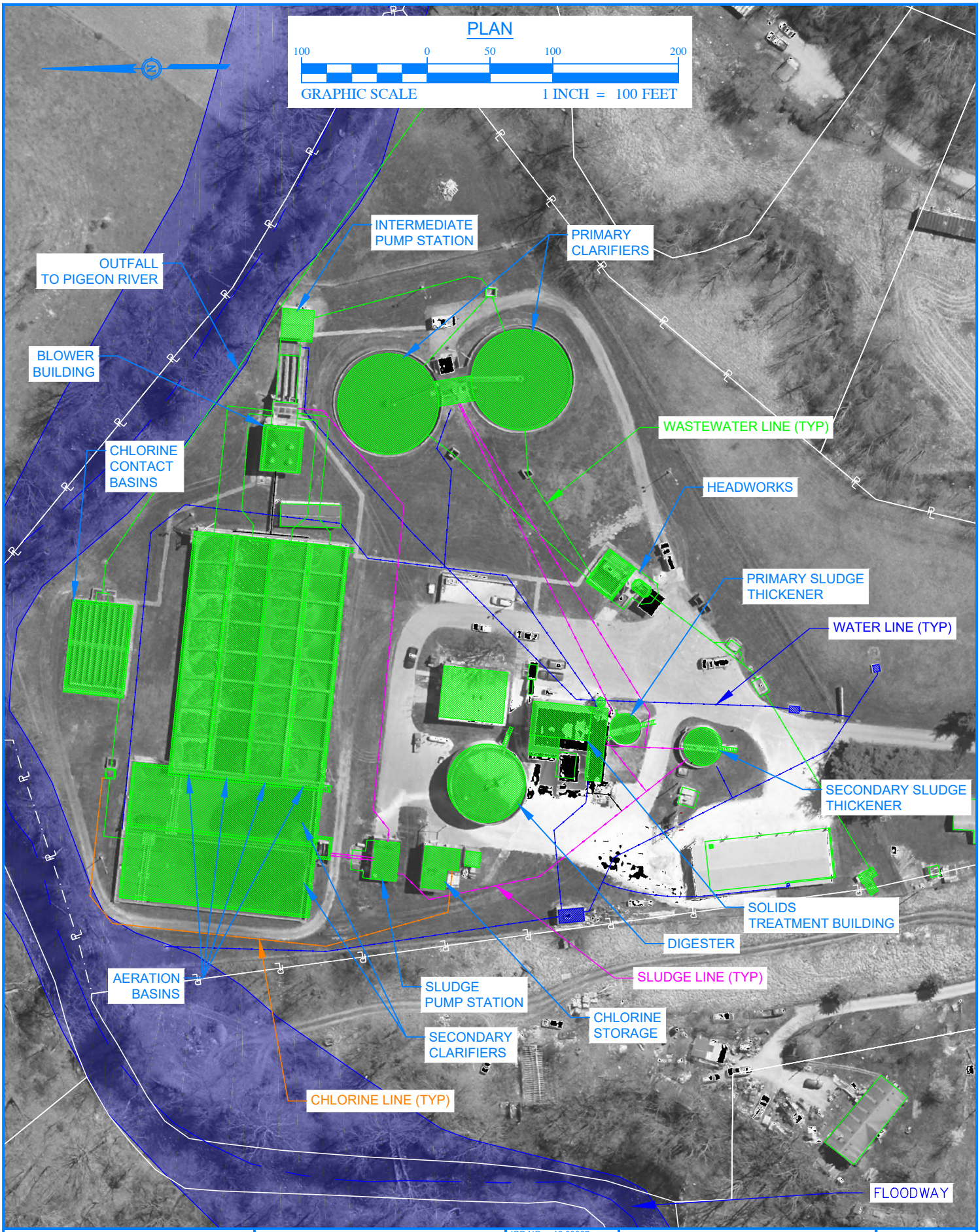
6.3 Revenue or General Obligation Bonds

The Town could raise funds by issuing either revenue bonds, which would be repaid through utility rates from the new facility, or general obligation bonds, which could be repaid through any available resource, including tax revenue.

6.4 Private Placement Bank Loan

Private Placement Bank loans are available to municipalities for infrastructure projects similar to the WWTP upgrade. However, these loans typically result in a higher interest rate, but with similar 20-year terms. The project is secured by assets of the town and the facility itself along with revenue generated by the utility users. The advantage of the private placement loan is reduced upfront cost as the need for some of the items like Preliminary Engineering Reports, Environmental Assessments, and other studies required by the various funding agencies is not required.

APPENDIX 1 FIGURES



McGill ASSOCIATES
ENGINEERING · PLANNING · FINANCE
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WASTEWATER TREATMENT PLANT EVALUATION

TOWN OF WAYNESVILLE

HAYWOOD COUNTY, NORTH CAROLINA

JOB NO.: 16.00367
DATE: SEPTEMBER 2018
DESIGNED BY: MJW
CADD BY: MJW
DESIGN REVIEW: ____
CONST. REVIEW: ____
FILE NAME: 16.00367 Report Figures.dwg

EXISTING WASTEWATER TREATMENT PLANT LAYOUT

FIGURE A-1

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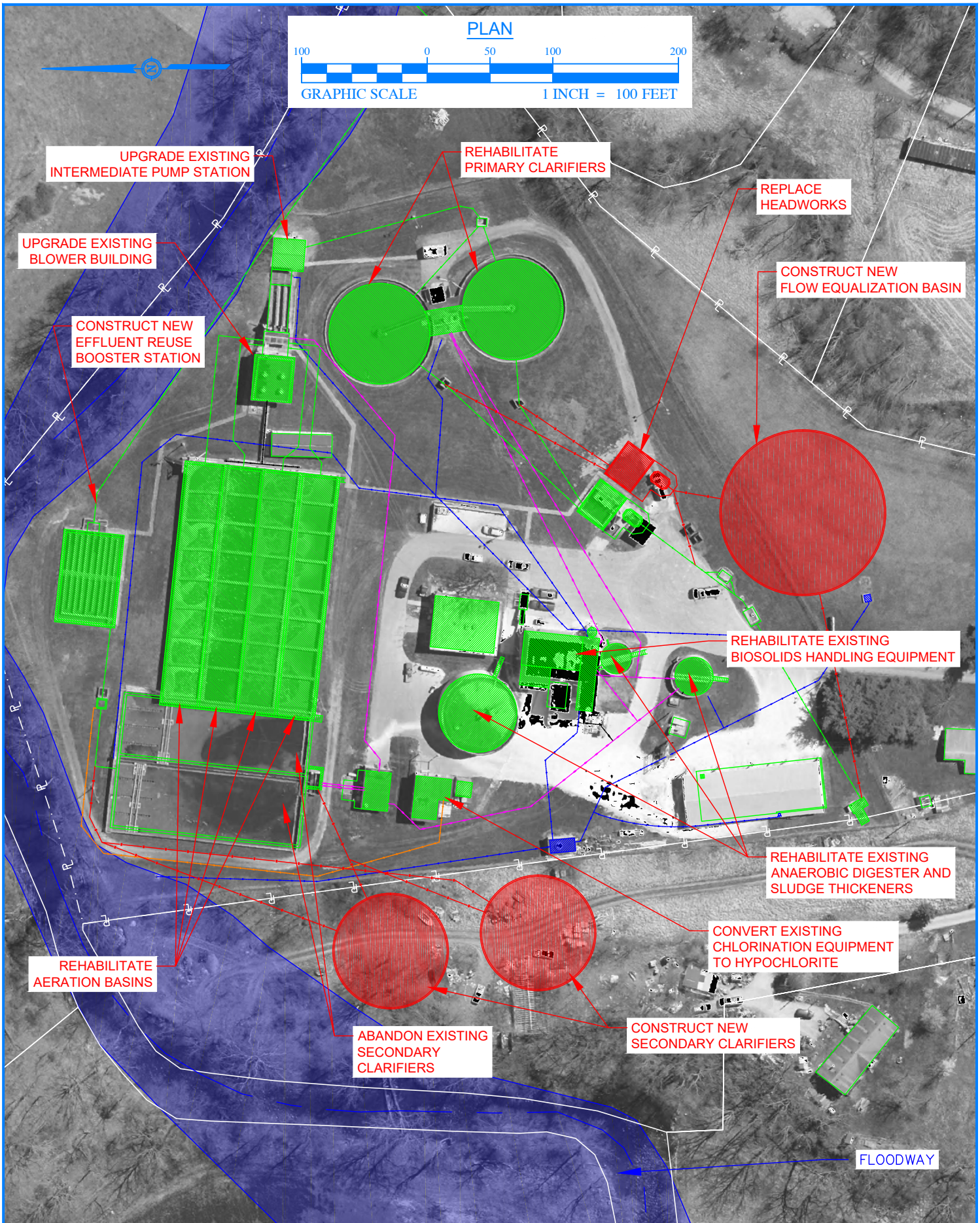

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WASTEWATER TREATMENT PLANT EVALUATION

TOWN OF WAYNESVILLE

HAYWOOD COUNTY, NORTH CAROLINA

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DESIGN REVIEW: ____
CONST. REVIEW: ____
FILE NAME: 16.00367 Report Figures.dwg

ALTERNATIVE 1: REHABILITATION OF EXISTING PROCESS

FIGURE A-2

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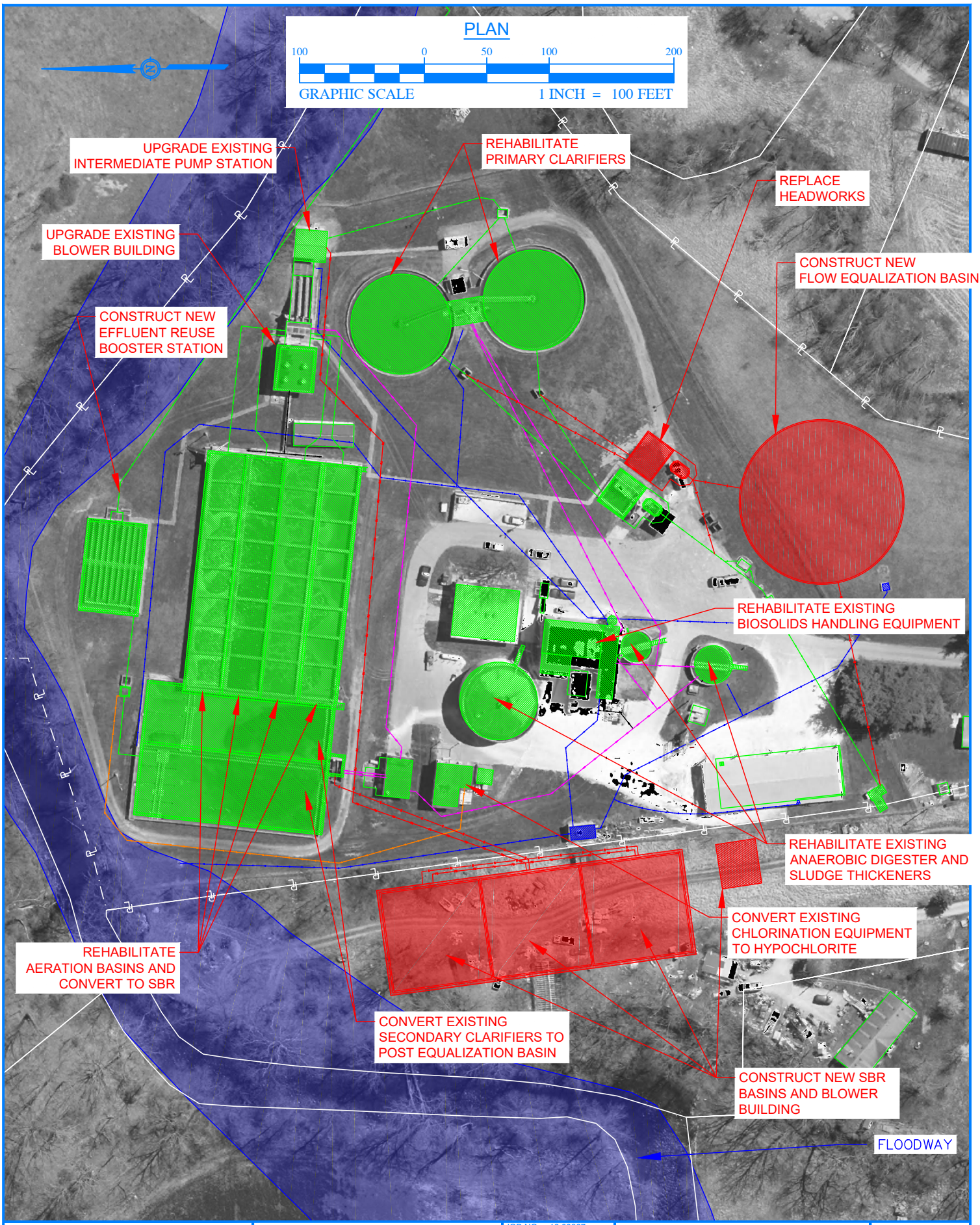

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WASTEWATER TREATMENT PLANT EVALUATION

TOWN OF WAYNESVILLE

HAYWOOD COUNTY, NORTH CAROLINA

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DESIGN REVIEW: ____
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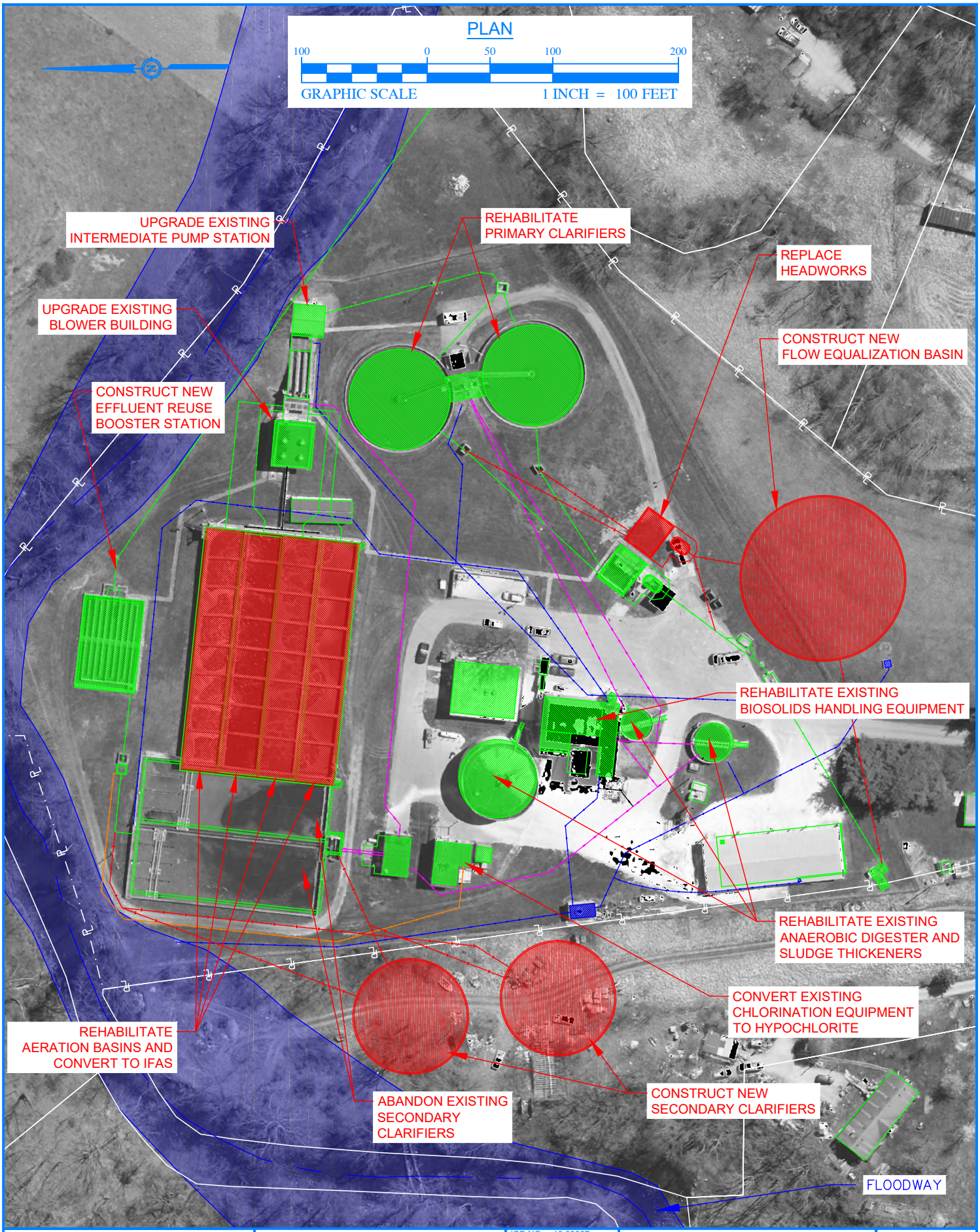
FILE NAME: 16.00367 Report Figures.dwg

ALTERNATIVE 2: SEQUENCING BATCH REACTORS

FIGURE A-3



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WASTEWATER TREATMENT PLANT EVALUATION

TOWN OF WAYNESVILLE

HAYWOOD COUNTY, NORTH CAROLINA

JOB NO.: 16.00367
DATE: SEPTEMBER 2018
DESIGNED BY: MJW
CADD BY: MJW
DESIGN REVIEW: ____
CONST. REVIEW: ____
FILE NAME: 16.00367 Report Figures.dwg

ALTERNATIVE 3:
INTEGRATED FIXED FILM ACTIVATED SLUDGE PROCESS

FIGURE
A-4

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APPENDIX 2 STRUCTURAL CONDITION ASSESSMENT

MEDLOCK & ASSOCIATES ENGINEERING, PA

Mr. Keith Webb, PE
McGill Associates
55 Broad Street
Asheville, NC 28801

August 31, 2018

Subject: Final Structural Condition Assessment
Waynesville Wastewater Treatment Plant
566 Walnut Trail Road, Waynesville, NC
Project Number: 573218

Dear Mr. Webb:

At the request of McGill Associates (McGill), Medlock & Associates Engineering, PA (MAE) has evaluated the condition of concrete structures at the Waynesville Wastewater Treatment Plant (WWTP) at 566 Walnut Trail Road. As part of the evaluation, MAE has undertaken to document the general condition of the concrete structures; note the nature and extent of any cracking, spalling, and any other deterioration; and develop repair recommendations intended to address structural deficiencies, mitigate sources of deterioration. We understand that MAE's work is to assist the town of Waynesville in completing its due diligence in assessing the cost of extending the useful life of the facility.

On July 19, Mr. Frank Ungert, PE, visited the WWTP to perform the site evaluation. MAE's evaluation of the structures is based on a limited visual assessment of visible or otherwise accessible concrete and other structural elements; no invasive observations or testing were completed for the preparation of this report. The site evaluation comprised a visual examination of concrete conditions coupled with non-destructive testing. Mr. Ungert also used a handheld radar scanning device[1] to document the location and depth of steel reinforcing bars. In addition to the visual assessment, MAE reviewed a partial set of original structural drawings. Two drawing sheets were provided by McGill, and others were reviewed on site.

Note that the evaluation of submerged or otherwise inaccessible structural elements is beyond the scope of MAE's investigation. Likewise, the condition and functionality of wastewater treatment equipment are beyond the scope of the investigation, except to the extent that corrosion, leakage, or other damage impacts the condition of the structure.

STRUCTURAL COMPONENTS & CONDITION ASSESSMENT

The WWTP was constructed in the late 1960s expanded in the mid-1970s. The facility comprises several concrete structures used in the wastewater treatment process. The concrete structures evaluated by MAE include two primary clarifiers, one secondary clarifier, one aeration basin, one digester tank, and two thickener basins (Figure 1). The following is a general description of the structural elements that for each concrete structure, a summary of general conditions, and a description of structural deficiencies that may require repair of remediation.

Primary Clarifiers

The two primary clarifiers are essentially identical; they are both open structures that are circular in plan, with an overall diameter of 87 feet (Figure 2). Each clarifier comprises an interior basin with an annular drainage trough at the basin perimeter. Drawings indicate that the basin has in inside diameter of 80 feet with 8-foot tall reinforced concrete walls 9 inches thick. Integral with the basin wall, the drainage trough that is 2 feet wide x 4 feet deep. The exterior wall of the trough was measured to be about 8 inches

[1] Bosch Wallscanner D-tect 150 Professional ultra-wide band (UWB) radar scanner/detector

Address: 53 Asheland Avenue, Suite 101 • Asheville, NC 28801 Phone: (828) 232-4448 • Fax: (828) 232-5224 Web: www.medlockengr.com

thick. The top of the exterior wall of the trough is located above the interior wall, allowing clear water to flow out of the basin and into the trough, where it is directed to an 18-inch outlet pipe (Figure 3). The bottom of the basin is a slab-on-grade that slopes towards the center of the basin; structural drawings indicate that the slab in approximately 8 inches thick.

The grade at the clarifiers slopes generally west to east. At its highest elevation, the grade is within 12 inches of the top of the exterior wall of the trough; at its lowest, the grade exposes the bottom surface of the trough. At steel guardrail is anchored to the top of the exterior wall of each clarifier. Each guardrail extends along the periphery of the clarifier only where the top of the wall is within approximately 4 feet of the adjacent grade.

Visual Assessment Summary – Primary Clarifiers

Where accessible or otherwise visible (*i.e.*, at the exterior of the structure), the concrete at each of the clarifiers is in generally good condition. The concrete is stained but is typically sound, with isolated areas of spalling, delamination, or other areas of deterioration. MAE observed vertical cracks spaced at regular intervals around the entire periphery of each clarifier. The cracks typically extend along the full height of the exterior trough wall, diminishing in size towards the base of the wall. The cracks are typically narrow, but at several locations, are up to 60 mils in width (approximately 1/16 inch). The cracks are spaced at approximately 6 feet on center at the south clarifier and 4 feet on center at the north clarifier. MAE noted metal form ties embedded in the wall at several cracks (Figure 4). The consistent spacing of the cracks and the presence of the form ties tend to indicate that the cracks are not likely due to over-stress of the trough wall. Rather, the cracks were likely due to concrete shrinkage shortly after construction.

At the south clarifier, the cracks are typically dry. At several locations at the north clarifier, however, there is efflorescence, dampness, or other indicators of leakage. In most cases, the degree of leakage appears to be minor (Figure 5). At one location at the north clarifier, the leaking crack is coupled with spalling and delaminating concrete at the base of the trough wall (Figure 6). At a second location between vertical cracks, MAE noted an area at the base of the trough wall, approximately 18 inches wide, that is severely delaminated and on the verge of spalling (Figure 7).

MAE scanned the surface of the trough wall to locate steel reinforcing bars. The vertical reinforcing bars were found to be spaced at an average of approximately 12 inches on center; horizontal bars were spaced at 6 inches on center. The structural drawings MAE reviewed did not include the reinforcing details for the clarifier. However, analysis indicates that the amount of reinforcing in the clarifier wall, assuming typically-sized bars, is sufficient for the loads imposed by expected hydraulic loads.

Aeration Basin

The aeration basin is an open structure that is rectangular in plan, with a footprint of approximately 190 feet x 128 feet, with the long axis oriented east-west (Figure 8). The structure comprises 10-inch thick reinforced concrete perimeter walls that are topped with a 28-inch wide x 12-inch deep flange. At the east elevation, the flange is used as a walkway with a steel guardrails anchored to the top face. Structural drawings indicate the wall is 15 feet, 6 inches above the interior slab-on-grade. The top of the perimeter wall varies between approximately 4 and 9 feet above adjacent grade.

The aeration basin is divided into four chambers that run the length of the structure. The chambers are separated by three full-height walls that are 10 inches thick. The north- and south-most interior walls are topped with 4-foot wide x 12-inch deep flanges that serve as walkways with steel guardrails anchored to the top face of each. The middle interior wall lacks a walkway. Structural drawings indicate that air headers are contained within chambers that run the length of the basin beneath the interior walkways. Horizontal braces spaced at 23 feet on center extend north-south between the interior walls. The 2-foot

wide x 12-inch deep concrete braces are integral with the walkways at the top of each wall, and provide lateral stability for the interior and perimeter walls.

A 3 foot, 6 inch wide x 6-foot deep drainage trough runs the length of the aeration basin (Figure 9). As with the primary clarifier, the top of the exterior wall of the trough is located above the interior wall at the west elevation, allowing clear water to flow out of the basin and into the trough. Steel guardrails are anchored to the top of the exterior trough wall and to the top flange of steel beams that extend across the width of the basin. Structural drawings indicate that originally, a steel grate walkway spanned between the steel beam and the exterior wall of the trough, and extending along the length of the trough.

At some point previous, the west wall of the aeration basin must have exhibited some degree of excessive lateral movement (Figure 10). Drawings indicate that a supplemental reinforced concrete wall was constructed against the inside face of the existing wall. Anchors that secure the existing wall to the new wall are visible above the water line of the adjacent secondary clarifier. The supplemental wall is entirely beneath the waterline in the aeration basin and as such, its condition is unknown to MAE.

Visual Assessment Summary – Aeration Basin

As with the primary clarifiers, the concrete observed at the aeration basin, where accessible or otherwise visible, is in generally good condition. The concrete is typically sound, with isolated areas of spalling, delamination, or other areas of deterioration (Figure 11). However, the extent and degree of deterioration is greater than that observed at the primary clarifiers. The aeration basin does not exhibit a regular pattern of deterioration, such as the cracks observed at the primary clarifier; rather, the deterioration observed is localized and not systemic. Like the clarifier, however, the deterioration does not tend to indicate over-stress of the structural components. It is more likely due to exposure to a corrosive environment coupled with shrinkage and expansion of the concrete over time.

Cracking is commonly observed throughout the structure. Typically, the cracks are relatively narrow and dry. However, efflorescence is typical, which indicates leaching of moisture through the concrete. MAE observed vertical and horizontal cracks at the face of walls and at the underside of the flanges at the top of the wall (Figure 12). No expansion joists were noted along the 190 foot length of the aeration basin. It is reasonable to conclude that shrinkage of the constrained concrete contributed to a portion of the cracks at the perimeter walls.

MAE also observed extensive cracking with significant efflorescence along the length of the drainage trough (Figure 13). These cracks tend to be narrow and run in a nearly continuous horizontal line near the bottom of the trough. They appear to coincide with a cold joint in the concrete between the base of the trough and the outside wall. As such, it is likely that these cracks are not due to over-stress, but rather indicate seepage of moisture through the cold joint.

At the east elevation, below one of the 24-inch inlet pipes, MAE observed an 18-inch long horizontal crack (Figure 14). This crack is wider than those typically observed at the north elevation. The damp surface and biological growth around the crack indicate active leakage.

At several locations, MAE observed narrow flexural cracks at the top of the concrete brace where it joins the walkway (Figure 15). These cracks are atypical in that they are likely due to over-stress of the structural member, rather than to concrete shrinkage and/or exposure to corrosive environment.

Cracks were also commonly observed radiating from guardrail post penetrations at walkways (Figure 16). These are cracks are likely due to freeze-thaw damage caused by water penetrating the annular space between the guardrail collar and the concrete. MAE observed concrete patches at several locations,

indicating prior repair to similar deterioration. The guardrails themselves appear relatively new, and are in good condition, with no evidence of corrosion or other damage.

Spalled, delaminated, and otherwise deteriorated concrete is more extensive at the aeration basin than at the primary clarifier. Considerable spalling was noted on the top surface of the walkways, with up to approximately ¼ inch of section loss (Figures 17, 18). The deterioration in this area is likely due to exposure to corrosive environment. Likewise, relatively minor spalled and delaminated concrete at the south end of the drainage trough is likely due environmental exposure and/or freeze-thaw effects.

In addition to the concrete deterioration noted above, MAE also noted deterioration at non-structural elements. The steel beam that supports the guardrail at the drain trough exhibits varying degrees of corrosion. The degree of corrosion is most severe along the bottom flange (where it is subjected to greatest exposure to corrosive liquids) and at the embedded plate connection at its south end (Figure 19). The embedded angle opposite the beam that is intended to support the steel grate walkway above the trough exhibits a similar degree of corrosion. The corrosion is typically minor, and does not substantially affect the structural capacity of the steel elements.

At several locations throughout the aeration basin structure, vegetative matter and other organic materials are growing (Figure 9). Left unabated, their continued growth could potentially damage the concrete elements as roots penetrate and crack the concrete.

MAE scanned the surface of the aeration basing near the northwest corner to locate steel reinforcing bars. Our field measurements indicate that the reinforcing was placed as specified in the structural drawings, at least for the accessible exterior walls that were scanned. The vertical reinforcing bars were found to be spaced at an average of approximately 12 inches on center; horizontal bars were spaced at 6 inches on center. The structural drawings indicate that the walls are reinforced with two mats each of vertical #8 bars spaced at 12 inches on center, and horizontal #4 bars at 12 inches on center. The differential in the horizontal bar spacing is likely due to the scanner detecting bars on the opposite face of the wall.

Our analysis indicates that the interior walls of the aeration basin have sufficient structural capacity to safely support the hydraulic load imposed by a water level imbalance of 16 feet resulting from the full drainage a single chamber. At that level of imbalance, the interior wall will be at approximately 95% of its structural capacity. The capacity of the walls would be diminished if the submerged concrete has deteriorated to the point that the reinforcing has been at least partially exposed. We suspect that this level of deterioration is not present, but recommend that the condition of the concrete be monitored during the drainage process. Moreover, it may necessary to install temporary horizontal bracing between the walls of the drained chamber.

Secondary Clarifier

The secondary clarifier is an open structure that is rectangular in plan, with a footprint of approximately 153 feet x 112 feet, with the long axis oriented north-south (Figure 20). It is immediately adjacent to the aeration basin; their east and west perimeter walls are coincident. The reinforced concrete perimeter walls are 12 inches thick, and drawings indicate that they form a basin 9 feet deep. The grade adjacent to the secondary clarifier varies. At the north and wests elevation, the top of the perimeter wall is approximately 4 feet above grade; at the east elevation, it is less than 12 inches above grade. A steel guardrail is anchored to the top of the

A raised concrete trough bisects the structure, running north-south (Figure 21). The trough comprises 8-inch concrete walls and base with two parallel, 2-foot 6-inch wide x 3-foot 6-inch deep chambers. We understand that the trough serves as the interior bearing line for two, linearly-traversing skimmer arms.

The other end of each skimmer arm bears at the east and west perimeter walls, with guide roller contacting the perimeter walls above the waterline. At the north and south ends of the structure, 12-concrete walls define additional channels and chambers for re-directed water and sludge (Figure 22).

Visual Assessment Summary – Secondary Clarifier

Where accessible or otherwise visible, the concrete at secondary clarifier is in generally good condition. The concrete is typically sound, with isolated areas of spalling, delamination, or other areas of deterioration. MAE observed vertical cracks spaced at regular intervals along the north and west elevations of the clarifier (Figure 23). The cracks are typically narrow and extend along the full height of the wall. The cracks are spaced at approximately 8 feet on center. The consistent spacing of the cracks tend to indicate that the cracks are not likely due to over-stress, but rather to concrete shrinkage. The cracks are typically dry. At several locations, however, efflorescence that indicates seepage.

The 12-inch wall that forms the separation chamber at the south end of the structure exhibit considerable spalling and delaminations at the guardrail anchorages (Figure 24). The deterioration is exacerbated by vegetative growth.

The concrete at the inside face of the perimeter walls has abraded over time due to the skimmer arms' guide rollers (Figure 25). The abrasion is minor, having exposed aggregate beneath the otherwise smooth surface of the concrete.

Due to the limited above-grade height of the concrete walls, the reinforcing at the secondary clarifier was not assessed.

Digester

The digester structure an enclosed structure that is circular in plan, with an overall diameter of 60 feet (Figure 26). Drawings indicate that the reinforced concrete exterior wall is 12 inches thick. The digester is enclosed by a sloped roof clad with steel panels. Drawings indicate that the roof is framed with radial steel trusses. The joint between the roof panels and the concrete wall is sealed with asphaltic material.

Visual Assessment Summary – Digester

Where accessible or otherwise visible, the concrete at the digester is in generally good condition. The concrete is typically sound, with isolated cracking. MAE observed vertical and horizontal cracks around the entire periphery of the structure. The cracks are typically narrow and dry. Efflorescence is commonly observed, which indicates seepage through the concrete. At several locations, there is also evidence of corrosion staining emanating from the cracks (Figure 27).

MAE scanned the surface of the digester wall to locate steel reinforcing bars. The vertical reinforcing bars were found to be spaced at an average of approximately 12 inches on center; horizontal bars were spaced at 5 inches on center. The structural drawings MAE reviewed did not include the reinforcing details for the clarifier. However, analysis indicates that the amount of reinforcing in the digester wall, assuming typically-sized bars, is sufficient for the loads imposed by expected hydraulic loads.

Sludge Thickeners

The two sludge thickeners are essentially identical, but with different dimensions; they are both open structures that are circular in plan (Figure 28). The original structure has a diameter of 22 feet, while the newer structure has a diameter of 28 feet. At the top of each wall, a 30-inch deep flange projects 18

inches beyond the surface of the wall. Steel-framed catwalks that spans the width of each structure are accessed by steel stairs. The dimensions of the reinforced concrete exterior wall is not known to MAE; structural drawings reviewed by MAE did not have wall sections or reinforcing details for the sludge thickeners.

Visual Assessment Summary – Sludge Thickeners

The condition of the thickeners is similar to that of the digester. Where accessible or otherwise visible, the concrete in generally good condition. The concrete is typically sound, with isolated cracking. MAE observed vertical and horizontal cracks around the periphery of the structure, and on the underside of the concrete flange. The cracks are typically narrow and dry. Minor efflorescence is commonly observed, which indicates seepage through the concrete.

At the north-most thickener, there is considerable leakage where the influent pipe penetrates the concrete wall (Figure 29). The concrete in this area exhibits minor surface deterioration in this area. Due to limited access, it is not clear to MAE whether the leakage is due to deteriorated concrete, sealant failure, or damage to the pipe itself.

The reinforcing at the sludge thickener structures was not assessed.

Repair Recommendations

Overview:

To the extent that structural elements are accessible, the seven concrete structures evaluated by MAE that comprise the WWTP facility are in generally good condition. They exhibit varying types and degrees of isolated deterioration. With few exceptions, the deterioration is not due to over-stress of the structural components, but rather due mainly to environmental conditions -- exposure to corrosive elements, freeze-thaw damage, and concrete expansion and contraction. The extent and degree of observed deterioration does not substantially affect the structures' capacity to safely support the hydrostatic loads they are were designed for. However, due to the limited scope of MAE's investigation, we cannot opine of the full extent of the facility's condition.

Due to the age of the structures and the corrosive nature of their contents, it is likely that the interior or submerged surfaces of the concrete are deteriorated to a greater extent than what has been noted in this report. The degree of deterioration is unknown, but it may be that after 40 years of exposure to a corrosive environment, the concrete may have deteriorated to an extent that affects its structural capacity. A comprehensive evaluation of the condition of the concrete structures would require draining each structure and performing a similar visual condition assessment. Prior to the visual assessment, the structures should be thoroughly power-washed or otherwise cleaned to expose the concrete. To supplement the visual assessment, it may be necessary to take a sampling of concrete cores and have them analyzed by a materials testing laboratory to determine the depth of deterioration. Repairs similar to those summarized below may be required at the interior of the concrete structures.

To maintain the structural capacity of the concrete structures, we have developed general repair procedures that are intended to extend the expected useful life of the facility. The repairs address the commonly-observed types of deterioration, including spalled and/or delaminated concrete and significant cracks. We anticipate that they could be applied not only to the deteriorated concrete documented in this report, but also to the type of deterioration expected to be found on the submerged surfaces of the structures. Wastewater facilities of this type and vintage are have been found to have a useful life of

approximately 50 years[2,3]. Despite approaching the end of its expected useful life, implementing these repairs will likely extend the useful life of the facility for another 10 years, thereby allowing time to plan for its replacement.

In addition to the structural repair procedures outlined below, MAE also recommends the following miscellaneous repairs and maintenance items:

- Removal vegetative matter from concrete structural elements
- Removal of corrosion from steel elements, particularly where embedded in concrete
- Implementation of maintenance plan that includes periodic inspection of structure

Repair Type 1 -- Spall/Delamination Repairs:

Where the concrete is spalled, delaminated, or otherwise deteriorated, we recommend installing the repair as follows.

- Hammer sound along concrete to determine extent of deterioration. Mark 3 inches beyond extent of deterioration to designate perimeter of repair area. To extent practical, mark perimeter so as to maximize length of continuous, straight lines with minimal number of corners.
- Sawcut ¾ inch into concrete at perimeter of repair area.
- Chip away concrete to sound substrate, minimum depth of 2 inches. Do not penetrate further than half of wall thickness. Remove ¾ inch radially around exposed reinforcing.
- Use wire brush to remove corrosion from reinforcing.
- Prepare substrate for application of repair mortar. Remove all deteriorated concrete, dirt, oil, grease, and all bond-inhibiting materials from surface. Provide exposed aggregate surface with the minimum surface profile recommended by the manufacturer. Saturate surface with clean water and provide saturated surface dry (SSD) surface with no standing water during application.
- Hand apply epoxy bonding agent and anti-corrosion coating to exposed and cleaned reinforcing. Take care to avoid coating concrete substrate.
- Install repair mortar per manufacturer's written instructions.

Repair Type 2 -- Crack Repairs:

Where the width of the cracks exceed the specified threshold (typically 20 mils) or where there is efflorescence or other evidence of leakage, we recommend installing the repair as follows:

- Grind off efflorescence along length of crack to reveal concrete substrate.
- Seal surface of crack with epoxy paste per manufacturer's written instructions.
- Drill 5/8-inch diameter holes alongside of crack at 45 degree angle. Space holes at approximately 12 inches. Flush drilled holes with water to remove debris and drill dust. Install injection ports.
- Inject port at lowest hole (for vertical cracks) or first flushed hole (for horizontal cracks). Inject epoxy repair grout per manufacturer's written instructions. Continue injecting until grout appears at adjacent hole. After completing injections at 4 holes, return to first hole and repeat process.
- Cut injection ports flush with concrete and grind off epoxy paste.

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[2] ASCE (2011), "Failure to Act: The Economic Impact of Current Investment Trends in Water and Wastewater Treatment Infrastructure", < https://www.asce.org/uploadedFiles/Issues_and_Advocacy/Our_Initiatives/Infrastructure/Content_Pieces/failure-to-act-water-wastewater-report.pdf > (July 30, 2018).

[3] Environmental Finance Center, New Mexico Tech (2006), "Asset Management: A Guide for Water and Wastewater Systems", < https://www.env.nm.gov/dwb/assistance/documents/AssetManagementGuide.pdf > (July 30, 2018).

Repair Type 3 – Combined Spall/Delamination/Crack Repairs:

Where cracks meet the threshold for repair are coincident with spalled or delaminated concrete, we recommend installing the repair as follows:

- Remove deteriorated concrete and prepare substrate and exposed reinforcing in a similar manner to steps described in repair type 1.
- Where full-depth crack or cold joint is encountered within repair area, prepare and repair crack in similar manner to steps described in repair type 2.
- Install repair mortar in a similar manner to steps described in repair type 1.

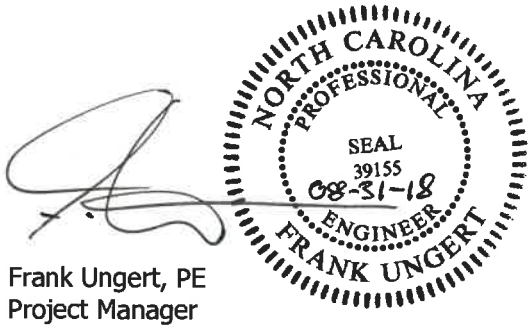
This report shall not supersede the State Code or local building codes as they apply. All construction shall proceed in accordance with requirements of the current edition of the North Carolina Commercial Building Code.

The scope of this report is limited to matters discussed herein and is based solely on visual observation. Site observations are limited to visibly observable areas; we offer no opinion regarding structural conditions behind finishes or inaccessible areas. No opinion is offered, and none should be inferred, regarding other aspects of this structure or the structure taken as a whole. MAE makes no claims pertaining to the subsurface conditions or their ability to support required loads. For further information regarding subsurface conditions we recommend contacting a geotechnical engineer. This report is based on presently known and available facts, data, and information. To the extent that additional or different facts, data, or information is developed or discovered after the issuance of this report, MAE reserves the right to amend, alter, or change the report as needed to reflect consideration of the additional or different facts, data, or information.

We are pleased to be of service. If you have any questions regarding this report or require further assistance, please call.

Sincerely,
Medlock & Associates Engineering, P.A.
(Cert.# C-3133)

Ben Wiese, PE
Project Engineer



Frank Ungert, PE
Project Manager

FIGURES

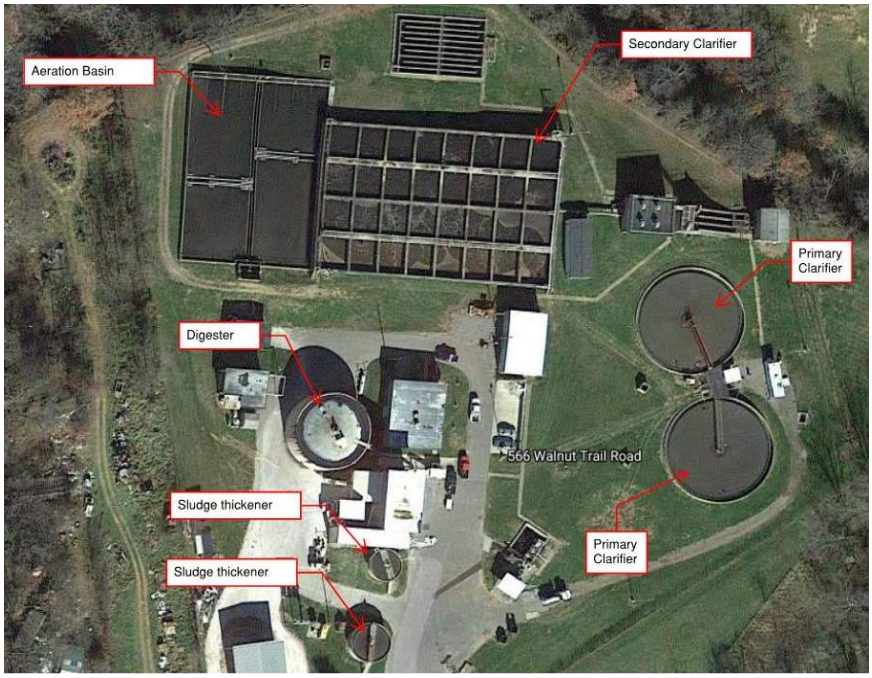


Figure 1. Waynesville wastewater treatment plant.

Figure 2. Concrete at primary clarifier is stained but in generally good condition.

Figure 3. Annular drainage trough at primary clarifier.

Figure 4. Typical crack at primary clarifier. Red arrow indicates metal form tie.

Figure 5. Crack at primary clarifier with minor leakage.

Figure 6. Spalled concrete coincident with leaking crack at primary clarifier.

Figure 7. Severely delaminated concrete at base of primary clarifier.

Figure 8. Aeration basin. Walkway (red arrow) tops interior wall that separates chambers. Horizontal braces (yellow arrow) provide lateral stability to walls.

Figure 9. Drainage trough at west end of aeration basin. Original steel grate used for walking surface has been removed. Note substantial vegetative growth.

Figure 10. Anchor rods (red arrows) installed as retrofit presumably intended to arrest excessive lateral movement of west perimeter wall of aeration basin.

Figure 11. Concrete at aeration basin is in generally good condition.

Figure 12. Typical cracks with efflorescence at north perimeter wall of aeration basin

Figure 13. Continuous horizontal crack and efflorescence (red arrow) indicate seepage through cold joist at drainage trough wall.

Figure 14. Crack with substantial leakage at east perimeter wall of aeration basin.

Figure 15. Minor flexural crack and delaminating concrete at horizontal brace.

Figure 16. Freeze-thaw cracking at guardrail post penetration.

Figure 17. Localized delaminations and spalling at aeration basin walkway.

Figure 18. Widespread spalling and raveling of concrete at aeration basin walkway.

Figure 19. Corrosion at steel beam at embedded plate connection.

Figure 20. Concrete at secondary clarifier is in generally good condition.

Figure 21. Central rough at secondary clarifier.

Figure 22. Sludge diversion channel at west end of secondary clarifier. Note vegetative growth.

Figure 23. Typical crack at secondary clarifier.

Figure 24. Spalling concrete at guardrail anchorage at secondary clarifier.

Figure 25. Abraded concrete along path of skimmer arm guide wheel.

Figure 26. Exterior concrete wall and steel-clad roof of digester.

Figure 27. Cracks with efflorescence and corrosion staining at digester.

Figure 28. Sludge thickener structures. Concrete is in generally good condition.

Figure 29. Leaking pipe at north-most sludge thickener.

TOWN OF WAYNESVILLE BOARD OF ALDERMEN
REQUEST FOR BOARD ACTION
Meeting Date: September 11, 2018

SUBJECT: Proposal to negotiate a "Special Order for consent" (SOC) with DENR to answer the "Notice of Violation" (NOV)

AGENDA INFORMATION:

Agenda Location:	Continued Business
Item Number:	**5B**
Department:	Administration/Public Services
Contact:	Rob Hites, Town Manager
Presenter:	Rob Hites, Town Manager

BRIEF SUMMARY: The Town has received a number of Notices of Violation (NOV) over the past year culminating with an inspection of the plant and an order by DENR to provide them with a plan of action to remedy the plant's deficiencies. The negotiation process to obtain a "Special Order for Consent" binds a local government to a process that would contractually bind it to a time table that would lead to improvement of the plant. The alternative to this process would likely be DENR imposing a moratorium on further hookups to the sewer system.

Forrest Westall is the retired chief of DENR's regulatory section. He will negotiate interim treatment limits, realistic schedule to plan, design, bid and construct a renovated plant and represent the Town at regional and Raleigh negotiating sessions. His proposed fee for this service is $20,000.

MOTION FOR CONSIDERATION: To approve the proposal for services as presented.

FUNDING SOURCE/IMPACT: Sewer Fund Professional Services

ATTACHMENTS:

- Proposal from McGill and Associates
- Notice of Violation from DENR

MANAGER'S COMMENTS AND RECOMMENDATIONS: Mr. Westall has the experience as both an engineer and retired DENR director of the regulatory branch to represent the Town as it moves through the SOC process. Now that we are under a thirty day window to respond to the NOV we need to formulate an answer to the NOV that would stave off a moratorium.

NORTH CAROLINA
Environmental Quality

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
LINDA CULPEPPER
Interim Director

Certified Mail #7017 2620 0000 9759 5718
Return Receipt Requested

September 4, 2018

Gavin A Brown
Town of Waynesville
PO Box 100
Waynesville, NC 28786

SUBJECT: **NOTICE OF VIOLATION**
Tracking Number: NOV-2018-PC-0360
Permit No. NC0025321
Waynesville WWTP
Haywood County

Dear Permittee:

The North Carolina Division of Water Resources conducted an inspection of the Waynesville WWTP on August 21, 2018. This inspection was conducted to verify that the facility is operating in compliance with the conditions and limitations specified in NPDES WW Permit No. NC0025321. A summary of the findings and comments noted during the inspection are provided in the enclosed copy of the inspection report.

The Compliance Evaluation inspection was conducted by Division of Water Resources staff from the Asheville Regional Office. The following violation(s) were noted during the inspection:

Inspection Area	Description of Violation
Permit	Identified interfering discharges have not been addressed by the town as required by **Part IV Special Conditions for Municipal Facilities.**
Operations & Maintenance	Treatment components are reaching the end of their life expectancy and are no longer fully operational. Facility no longer appears capable of adequately treating incoming wastewater. A finalized decision, regarding WWTP upgrades, has not been conveyed or presented to DWR. **Part II Standard Conditions Section C(2) The Permittee shall at all times properly operate and maintain all facilities and systems of treatment control which are installed or used by the Permittee to achieve compliance with the conditions of this permit.**

Please reference the enclosed inspection report for specific examples. Remedial actions should have already been taken to correct this problem and prevent further occurrences in the future. The Division of Water Resources may pursue enforcement action for this and any additional violations of State law.

To prevent further action, please respond in writing to this office **within 30 days** upon your receipt of this Notice of Violation regarding your plans or measures to be taken to address the indicated violations and other identified issues, if applicable.

If you should have any questions, please do not hesitate to contact Mikal Willmer with the Water Quality Regional Operations Section in the Asheville Regional Office at 828-296-4500.

Sincerely,

DocuSigned by:
7E617A38285848C...

G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

ATTACHMENTS: Inspection Report

EC: WQS-ARO Server
LF
David Foster- Director Public Works
Preston Gregg, PE- Town Engineer
Ronnie Norris, ORC

20180904_NC0025321_NOV2018PC0360

EPA

United States Environmental Protection Agency
Washington, D.C. 20460

Water Compliance Inspection Report

Form Approved.
OMB No. 2040-0057
Approval expires 8-31-98

Section A: National Data System Coding (i.e., PCS)

Transaction Code	NPDES	yr/mo/day	Inspection Type	Inspector	Fac Type
N	NC0025321	18/08/21	C	S	

Inspection Work Days	Facility Self-Monitoring Evaluation Rating	B1	QA	Reserved
			N	

Section B: Facility Data

Name and Location of Facility Inspected (For Industrial Users discharging to POTW, also include POTW name and NPDES permit Number)

Waynesville WWTP
300 Walnut Trl
Waynesville NC 28786

Entry Time/Date: 10:00AM 18/08/21
Exit Time/Date: 11:30AM 18/08/21
Permit Effective Date: 17/03/01
Permit Expiration Date: 21/01/31

Name(s) of Onsite Representative(s)/Titles(s)/Phone and Fax Number(s)

///
Mark Allen Jones/ORC/828-452-4685/
Ronnie D Norris/ORC/828-452-4685/

Other Facility Data

Name, Address of Responsible Official/Title/Phone and Fax Number

David Foster,PO Box 100 Waynesville NC 28786/Public Services Director/828-456-3706/8284562000

Contacted: No

Section C: Areas Evaluated During Inspection (Check only those areas evaluated)

- [x] Permit
- [x] Flow Measurement
- [x] Operations & Maintenance
- [x] Records/Reports
- [x] Self-Monitoring Program
- [x] Sludge Handling Disposal
- [x] Facility Site Review
- [x] Pretreatment
- [x] Effluent/Receiving Waters
- [x] Laboratory

Section D: Summary of Finding/Comments (Attach additional sheets of narrative and checklists as necessary)

(See attachment summary)

Name(s) and Signature(s) of Inspector(s)	Agency/Office/Phone and Fax Numbers	Date
Timothy H Helm Mikal Willmer	ARO WQ//828-296-4665/ Division of Water Quality//828-296-4686/	8/31/2018 8/30/2018

Signature of Management Q A Reviewer	Agency/Office/Phone and Fax Numbers	Date
DocuSigned by:		8/31/2018

EPA Form 3560-3 (Rev 9-94) Previous editions are obsolete.

Section D: Summary of Finding/Comments (Attach additional sheets of narrative and checklists as necessary)

Inspectors Mikal Willmer and Tim Heim, with the Asheville Regional Office, conducted a compliance evaluation inspection of the Waynesville WWTP on August 21, 2018. This inspection was conducted to determine whether the facility is being operated and maintained in compliance with NPDES Permit No. NC0025321. ORC Ronnie Norris and Backup ORC Mark Jones were present and assisted in the inspection.

Many of the treatment units are reaching the end of their useable life expectancy and potential external contributions to the collection system waste stream have made maintaining healthy biota and optimal operating conditions within the facility difficult. The facility continually struggles to meet permit limits for TSS and NH3. Below is a listing of items documented during the inspection:

Wastestream Influence: Matrix Interferences were noted during NH3 testing last year. Salts are precipitating out of solution at elevated pHs. Collection System sampling indicated significant changes in sulfates, conductivity, Total Solids, Hardness and Alkalinity levels above and below Giles Chemical's (Epson Salt Manufacturer) discharge into the collection system. Drastic changes to basin conditions can cause die off beneficial organisms within the facility and allow proliferation of non-target organisms.

Headworks: Staff report the headworks struggles to handle heavy flows into the facility. Additionally, the mechanical bar screen is not connected to the generator, therefore staff must manually open and close gates and monitor the manual bypass screen (continuous raking) during power outages. This is a safety hazard and requires more staff resources during outages.

Structural: Noted several areas where leaks are occurring around piping entering and exiting concrete basins. Facility staff stated a firm is scheduled to come repair known spalling concrete and leaks throughout the facility within the next week.

Basins: Several of the concrete catwalks have significant spalling. Metal railings are loose from walkways in several locations, creating a potential fall hazard. Diffusers are missing and facility staff cannot remove several of the diffusers without a crane. One basin is being used solely as an aerobic digester. Several of the basins have filamentous bacteria floating on the surface and DO levels are reported to be <1 mg/L in the basins.

RAS/WAS: Staff still have no means of controlling the return and wasting rate. This was noted in the previous inspection. This significantly limits the operators' ability to maintain an appropriate sludge blanket and sludge age within the facility.

Clarifiers: Significant floating solids within the clarifiers. Retention time does not appear adequate. Trac Vac system does not operate as intended. Staff report issues maintaining the system. Staff must walk on the trac system to clean lines, presenting another trip/fall hazard.

Chlorine Contact Chamber: Staff indicated the chamber is pumped down and cleaned weekly; however, solids are still present in significant amounts.

Solids Handling: Staff report solids storage is inadequate. The two thickeners and one anaerobic digester are undersized for the size of facility. One AB has been converted to an aerobic digester to help better manage solids. The thickeners are being rerouted to the headworks at times to accommodate the need for solids wasting and processing.

I&I: The treatment works sees 2 MG flow swings during heavy rain events, often peaking above design

flow for several days.

Inspectors do acknowledge the Town has budgeted more for maintenance of the facility this fiscal year and that the $200k allotted is being used to repair diffusers and repair failing concrete. ARO is also aware and acknowledges that McGill has completed an engineering assessment and presented to the Board; however, a finalized decision in regard to the future plans for the WWTP has not been conveyed to DWR.

In addition to planned plant upgrades, the Town will need to assess potential negative impacts on the facility from the Collection System. As stated above, I&I is introducing, at a minimum, a million gallons of flow to the system, which has the potential to hydraulically overload the facility.

Industrial discharges into the system also need to be assessed by the Town. Waynesville is no longer under a DWR approved pretreatment program; however, discharges into the collection system that may negatively impact the Town's ability to adequately treat incoming wastewater and maintain compliance should be addressed.

Operations & Maintenance

	Yes	No	NA	NE
Is the plant generally clean with acceptable housekeeping?	■	☐	☐	☐
Does the facility analyze process control parameters, for ex: MLSS, MCRT, Settleable Solids, pH, DO, Sludge Judge, and other that are applicable?	■	☐	☐	☐

Comment: Monitor DO, pH, solids and additional parameters as needed.

Permit

	Yes	No	NA	NE
(If the present permit expires in 6 months or less). Has the permittee submitted a new application?	☐	☐	■	☐
Is the facility as described in the permit?	■	☐	☐	☐
# Are there any special conditions for the permit?	■	☐	☐	☐
Is access to the plant site restricted to the general public?	■	☐	☐	☐
Is the inspector granted access to all areas for inspection?	■	☐	☐	☐

Comment: Standard Effluent Toxicity, MMP and Pollutants Scan.

Record Keeping

	Yes	No	NA	NE
Are records kept and maintained as required by the permit?	■	☐	☐	☐
Is all required information readily available, complete and current?	■	☐	☐	☐
Are all records maintained for 3 years (lab. reg. required 5 years)?	■	☐	☐	☐
Are analytical results consistent with data reported on DMRs?	■	☐	☐	☐
Is the chain-of-custody complete?	☐	☐	☐	■
Dates, times and location of sampling	☐			
Name of individual performing the sampling	☐			
Results of analysis and calibration	☐			
Dates of analysis	☐			
Name of person performing analyses	☐			
Transported COCs	☐			
Are DMRs complete: do they include all permit parameters?	■	☐	☐	☐
Has the facility submitted its annual compliance report to users and DWQ?	■	☐	☐	☐
(If the facility is = or > 5 MGD permitted flow) Do they operate 24/7 with a certified operator on each shift?	■	☐	☐	☐
Is the ORC visitation log available and current?	■	☐	☐	☐
Is the ORC certified at grade equal to or higher than the facility classification?	■	☐	☐	☐
Is the backup operator certified at one grade less or greater than the facility classification?	■	☐	☐	☐
Is a copy of the current NPDES permit available on site?	■	☐	☐	☐

Permit: NC0025321 **Owner - Facility:** Waynesville WWTP
Inspection Date: 08/21/2018 **Inspection Type:** Compliance Evaluation

Record Keeping

	Yes	No	NA	NE
Facility has copy of previous year's Annual Report on file for review?	■	☐	☐	☐

Comment: All files are maintained onsite in the main building.

Flow Measurement - Influent

	Yes	No	NA	NE
# Is flow meter used for reporting?	■	☐	☐	☐
Is flow meter calibrated annually?	■	☐	☐	☐
Is the flow meter operational?	■	☐	☐	☐
(If units are separated) Does the chart recorder match the flow meter?	☐	☐	■	☐

Comment: Facility records and reports influent flow readings for daily/monthly flow.

Influent Sampling

	Yes	No	NA	NE
# Is composite sampling flow proportional?	■	☐	☐	☐
Is sample collected above side streams?	■	☐	☐	☐
Is proper volume collected?	■	☐	☐	☐
Is the tubing clean?	■	☐	☐	☐
# Is proper temperature set for sample storage (kept at less than or equal to 6.0 degrees Celsius)?	■	☐	☐	☐
Is sampling performed according to the permit?	■	☐	☐	☐

Comment: Sample for influent BOD, TSS, NH3

Grit Removal

	Yes	No	NA	NE
Type of grit removal				
a.Manual	☐			
b.Mechanical	■			
Is the grit free of excessive organic matter?	■	☐	☐	☐
Is the grit free of excessive odor?	■	☐	☐	☐
# Is disposal of grit in compliance?	■	☐	☐	☐

Comment: airlift pumps remove grit from chamber.

Bar Screens

	Yes	No	NA	NE
Type of bar screen				
a.Manual	■			
b.Mechanical	■			
Are the bars adequately screening debris?	■	☐	☐	☐

Bar Screens

	Yes	No	NA	NE
Is the screen free of excessive debris?	■	□	□	□
Is disposal of screening in compliance?	■	□	□	□
Is the unit in good condition?	□	■	□	□

Comment: Mechanical bar screen is in need of repair or replacement. Some of the chain guards are in need of repair/replacement. Allows some pass through of debris. Mechanical screen is not connected to the generator. Facility staff have to continuously rake the manual bypass bar screen during power outages.

Primary Clarifier

	Yes	No	NA	NE
Is the clarifier free of black and odorous wastewater?	■	□	□	□
Is the site free of excessive buildup of solids in center well of circular clarifier?	■	□	□	□
Are weirs level?	■	□	□	□
Is the site free of weir blockage?	■	□	□	□
Is the site free of evidence of short-circuiting?	■	□	□	□
Is scum removal adequate?	■	□	□	□
Is the site free of excessive floating sludge?	■	□	□	□
Is the drive unit operational?	■	□	□	□
Is the sludge blanket level acceptable?	□	□	□	■
Is the sludge blanket level acceptable? (Approximately ¼ of the sidewall depth)	□	□	□	■

Comment: all sludge is wasted from primary clarifiers.

Aeration Basins

	Yes	No	NA	NE
Mode of operation	Ext. Air			
Type of aeration system	Diffused			
Is the basin free of dead spots?	□	■	□	□
Are surface aerators and mixers operational?	□	□	■	□
Are the diffusers operational?	□	■	□	□
Is the foam the proper color for the treatment process?	■	□	□	□
Does the foam cover less than 25% of the basin's surface?	■	□	□	□
Is the DO level acceptable?	□	■	□	□
Is the DO level acceptable?(1.0 to 3.0 mg/l)	□	■	□	□

Permit: NC0025321 **Owner - Facility:** Waynesville WWTP

Inspection Date: 08/21/2018 **Inspection Type:** Compliance Evaluation

Aeration Basins

	Yes	No	NA	NE

Comment: One of the basins is being used as an aerobic digester due to inadequate solids storage. Plant staff state they operate the facility on two of the basins; however, these are not operating optimally. There are dead spots within the basin and several diffusers are missing. Filamentous bacteria are prevalent in the basin and the DO level at the time of the inspection was 0.82 mg/L.

Secondary Clarifier

	Yes	No	NA	NE
Is the clarifier free of black and odorous wastewater?	■	□	□	□
Is the site free of excessive buildup of solids in center well of circular clarifier?	□	□	■	□
Are weirs level?	■	□	□	□
Is the site free of weir blockage?	■	□	□	□
Is the site free of evidence of short-circuiting?	□	■	□	□
Is scum removal adequate?	□	■	□	□
Is the site free of excessive floating sludge?	□	■	□	□
Is the drive unit operational?	■	□	□	□
Is the return rate acceptable (low turbulence)?	□	□	□	■
Is the overflow clear of excessive solids/pin floc?	□	■	□	□
Is the sludge blanket level acceptable? (Approximately ¼ of the sidewall depth)	□	□	□	■

Comment: Rectangular clarifiers with evidence of short-circuting and uneven flow distribution over weirs. Trac-VAC system does not operate optimally. Operators have to climb on to Trac systems to wash out lines. Floating sludge is visible throughout both clarifiers indicating issues with the sludge blanket and settling.

Pumps-RAS-WAS

	Yes	No	NA	NE
Are pumps in place?	■	□	□	□
Are pumps operational?	■	□	□	□
Are there adequate spare parts and supplies on site?	■	□	□	□

Comment: All pumps are in place and operable; however, facility staff have no way to regulate the RAS/WAS rate. This severely limits solids handling within the facility.

Anaerobic Digester

	Yes	No	NA	NE
Type of operation:	Floating cover			
Is the capacity adequate?	□	■	□	□
# Is gas stored on site?	□	■	□	□
Is the digester(s) free of tilting covers?	■	□	□	□
Is the gas burner operational?	■	□	□	□
Is the digester heated?	■	□	□	□

Anaerobic Digester

	Yes	No	NA	NE
Is the temperature maintained constantly?	■	☐	☐	☐
Is tankage available for properly waste sludge?	☐	■	☐	☐

Comment: According to plant staff the thickeners are undersized and the digester is about half the size needed.

Solids Handling Equipment

	Yes	No	NA	NE
Is the equipment operational?	■	☐	☐	☐
Is the chemical feed equipment operational?	■	☐	☐	☐
Is storage adequate?	☐	■	☐	☐
Is the site free of high level of solids in filtrate from filter presses or vacuum filters?	■	☐	☐	☐
Is the site free of sludge buildup on belts and/or rollers of filter press?	■	☐	☐	☐
Is the site free of excessive moisture in belt filter press sludge cake?	■	☐	☐	☐
The facility has an approved sludge management plan?	■	☐	☐	☐

Comment: Filter press and lime stabilization equipment is in need of repair/replacement in the near future. Class A Residuals storage may need to be increased if it is not being hauled regularly to customers or to the landfill. Currently any runoff drains to the head of the plant.

Disinfection-Gas

	Yes	No	NA	NE
Are cylinders secured adequately?	■	☐	☐	☐
Are cylinders protected from direct sunlight?	■	☐	☐	☐
Is there adequate reserve supply of disinfectant?	■	☐	☐	☐
Is the level of chlorine residual acceptable?	☐	☐	☐	■
Is the contact chamber free of growth, or sludge buildup?	☐	■	☐	☐
Is there chlorine residual prior to de-chlorination?	☐	☐	☐	■
Does the Stationary Source have more than 2500 lbs of Chlorine (CAS No. 7782-50-5)?	■	☐	☐	☐
If yes, then is there a Risk Management Plan on site?	■	☐	☐	☐

If yes, then what is the EPA twelve digit ID Number? (1000-____-____)

If yes, then when was the RMP last updated?

Comment: Chlorine contact chamber is being drained and cleaned once a week; however, there are still significant solids floating on the surface of the contact chamber. Facility projected upgrade would replace gas disinfection with liquid chlorine.

De-chlorination

	Yes	No	NA	NE
Type of system ?	Gas			
Is the feed ratio proportional to chlorine amount (1 to 1)?	■	☐	☐	☐

Permit: NC0025321 **Owner - Facility:** Waynesville WWTP
Inspection Date: 08/21/2018 **Inspection Type:** Compliance Evaluation

De-chlorination

	Yes	No	NA	NE
Is storage appropriate for cylinders?	■	☐	☐	☐
# Is de-chlorination substance stored away from chlorine containers?	■	☐	☐	☐

Comment:

Are the tablets the proper size and type?	☐	☐	■	☐
Are tablet de-chlorinators operational?	☐	☐	■	☐

Number of tubes in use?

Comment: Facility projected upgrade would replace gas dechlorination with liquid.

Laboratory

	Yes	No	NA	NE
Are field parameters performed by certified personnel or laboratory?	■	☐	☐	☐
Are all other parameters(excluding field parameters) performed by a certified lab?	■	☐	☐	☐
# Is the facility using a contract lab?	■	☐	☐	☐
# Is proper temperature set for sample storage (kept at less than or equal to 6.0 degrees Celsius)?	■	☐	☐	☐
Incubator (Fecal Coliform) set to 44.5 degrees Celsius+/- 0.2 degrees?	■	☐	☐	☐
Incubator (BOD) set to 20.0 degrees Celsius +/- 1.0 degrees?	■	☐	☐	☐

Comment: All data is kept within the laboratory separated by parameter.

Effluent Sampling

	Yes	No	NA	NE
Is composite sampling flow proportional?	■	☐	☐	☐
Is sample collected below all treatment units?	■	☐	☐	☐
Is proper volume collected?	■	☐	☐	☐
Is the tubing clean?	■	☐	☐	☐
# Is proper temperature set for sample storage (kept at less than or equal to 6.0 degrees Celsius)?	■	☐	☐	☐
Is the facility sampling performed as required by the permit (frequency, sampling type representative)?	■	☐	☐	☐

Comment:

Effluent Pipe

	Yes	No	NA	NE
Is right of way to the outfall properly maintained?	☐	☐	☐	■
Are the receiving water free of foam other than trace amounts and other debris?	☐	☐	☐	■
If effluent (diffuser pipes are required) are they operating properly?	☐	☐	☐	■

Comment: Did not visit effluent final discharge to Pigeon River.

Effluent Pipe

	Yes	No	NA	NE

Upstream / Downstream Sampling

	Yes	No	NA	NE
Is the facility sampling performed as required by the permit (frequency, sampling type, and sampling location)?	■	□	□	□

Comment:

Standby Power

	Yes	No	NA	NE
Is automatically activated standby power available?	■	□	□	□
Is the generator tested by interrupting primary power source?	■	□	□	□
Is the generator tested under load?	■	□	□	□
Was generator tested & operational during the inspection?	□	■	□	□
Do the generator(s) have adequate capacity to operate the entire wastewater site?	■	□	□	□
Is there an emergency agreement with a fuel vendor for extended run on back-up power?	■	□	□	□
Is the generator fuel level monitored?	■	□	□	□

Comment: Bar screen is not connected, manual bypass screen has to be used during power outages.

McGill ASSOCIATES

September 6, 2018

Mr. Rob Hites, Town Manager
Town of Waynesville
Post Office Box 100
Waynesville, North Carolina 28786

RE: Proposal for Engineering Services
Assistance: Special Order by Consent (SOC)
Town of Waynesville Wastewater Treatment Plant

Dear Mr. Hites:

McGill Associates is pleased to present this proposal for engineering services to the Town of Waynesville for assistance in developing for submittal to the North Carolina Division of Water Resources, Department of Environmental Quality (NC DWR and DEQ) a Special Order by Consent (SOC) application. These services would also include support of the negotiations with DEQ to secure issuance of an appropriate Special Order by Consent (SOC) for the Town's Wastewater Treatment Plant (WWTP) improvements project. We anticipate accomplishing the following tasks:

1. Conduct initial meeting with appropriate Town staff and elected official to review overall strategy to guide SOC discussions with DEQ.
2. Contact DWR Regional staff to provide status on the Town's process to identify the selected alternative for its WWTP and establish a general plan for proceeding with the SOC process.
3. Following decision on the selected alternative, meet with DWR Regional Office to coordinate and review the recommended WWTP Capital Improvements Plan (CIP) alternative with DWR Regional Office staff.
4. In coordination with the Town, incorporate input from the agency into the general WWTP improvements plan.
5. Develop preliminary information to facilitate discussions at the required SOC pre-application meeting (this would include review of the anticipated steps of the process to fund, design, construct and put into operation the WWTP improvements).
6. Arrange, support and participate in an SOC pre-application meeting with DWR Regional Office and the Town.
7. Develop an approach and timeline for completing the selected CIP alternative for the WWTP (this will represent the basis for an SOC schedule). This schedule will include the following items with appropriate dates:

    A. Actions needed to secure funding for the WWTP CIP (including the time needed to develop a Preliminary Engineering Report, developing a funding application and securing financing).

55 Broad Street
Asheville, North Carolina 28801
P.O. Box 2259
Asheville, North Carolina 28802
ph: 828.252.0575
f: 828.252.2518
www.mcgillengineers.com

B. Completion of Plans and Specifications.
C. Permitting of the construction plans.
D. Advertise for bids.
E. Begin construction.
F. Complete construction.
G. Place WWTP into operation.
H. Comply with final limitations.

8. Provide an evaluation to support development of the relaxed interim effluent limits (SOC limits) that will be requested for inclusion in the SOC and applicable until the WWTP CIP project can be completed.
9. Coordinate with DWR Regional Office the inclusion and settlement of all outstanding NOVs and civil penalties.
10. Assist with the development of projections of additional flow allocation needed by the Town over the timeframe of the SOC (to be included in the SOC as an authorization to add flow—allows for sewer extensions and connections over the SOC period).
11. Develop a final SOC application for submittal by the Town and discuss with DWR before it is submitted.
12. Continue to engage DWR to address any questions or additional information needed to move forward with the issuance of an SOC.
13. Monitor any public comments offered during the public notice of the proposed final SOC and review with the Town before providing input to DWR on any needed responses to public comments.
14. Review with Town staff the issued SOC and go over all reporting required in the order.

We propose to perform the tasks noted above for a maximum not to exceed fee of $20,000. Please note that I will be heavily involved in this assignment at my normal hourly rate of $190/hr. Addition needed support costs associated with this effort will be provided in accordance with the attached fee schedule. If you concur with the provisions of this proposal, please sign the acceptance below on page 3 and submit to us the executed original.

We appreciate the opportunity to submit this proposal to the Town of Waynesville. If you have any questions regarding this proposal, please do not hesitate to contact me.

Sincerely,
McGILL ASSOCIATES, P.A.

FORREST R. WESTALL, SR., PE
Principal

frw:ac

ACCEPTED BY TOWN OF WAYNESVILLE:

Signature	Date
Name (Type or Print)	Title

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BASIC FEE SCHEDULE

September 2017

PROFESSIONAL FEES	Hourly Rate
Firm Principal	$190.00
Program Services Manager I	$150.00
Program Services Manager II	$160.00
Senior Project Manager I	$160.00
Senior Project Manager II	$170.00
Senior Project Manager III	$175.00
Project Manager I	$140.00
Project Manager II	$150.00
Project Engineer I	$105.00
Project Engineer II	$115.00
Project Engineer III	$125.00
Engineering Associate I	$ 85.00
Engineering Associate II	$ 90.00
Engineering Technician I	$ 80.00
Engineering Technician II	$ 90.00
Engineering Technician III	$100.00
Environmental Specialist I	$ 80.00
Environmental Specialist II	$ 90.00
Electrical Engineer I	$105.00
Electrical Engineer II	$115.00
Electrical Engineer III	$125.00
Electrical Engineering Associate I	$ 85.00
Electrical Engineering Associate II	$ 90.00
Electrical Engineering Technician I	$ 80.00
Electrical Engineering Technician II	$ 90.00
Electrical Engineering Technician III	$100.00
Mechanical Engineer I	$105.00
Mechanical Engineer II	$115.00
Mechanical Engineer III	$125.00
Mechanical Engineering Associate I	$ 85.00
Mechanical Engineering Associate II	$ 90.00
Mechanical Engineering Technician I	$ 80.00
Mechanical Engineering Technician II	$ 90.00

Mechanical Engineering Technician III	$100.00
CADD Operator I	$ 75.00
CADD Operator II	$ 80.00
CADD Operator III	$ 85.00
Construction Services Manager I	$120.00
Construction Services Manager II	$135.00
Construction Administrator I	$ 90.00
Construction Administrator II	$100.00
Construction Administrator III	$110.00
Construction Field Representative I	$ 75.00
Construction Field Representative II	$ 80.00
Construction Field Representative III	$ 85.00
Construction Project Coordinator	$ 75.00
Planner I	$ 95.00
Planner II	$110.00
Planner III	$125.00
Planner IV	$135.00
Surveyor I	$ 80.00
Surveyor II	$ 90.00
Surveying Associate I	$ 70.00
Surveying Associate II	$ 75.00
Survey Technician I	$ 70.00
Survey Technician II	$ 75.00
Survey Field Technician I	$ 55.00
Survey Field Technician II	$ 60.00
Survey Field Technician III	$ 65.00
Administrative Assistant (I-II)	$ 70.00
Administrative Assistant III	$ 75.00
Accounting Assistant (I-II)	$ 80.00

1. EXPENSES

a. Mileage - $0.65/mile
b. Robotics/GPS Equipment - $25/hr.
c. Survey Drone - $100/hr.
d. Telephone, reproduction, postage, lodging, and other incidentals shall be a direct charge per receipt.

2. ASSOCIATED SERVICES -

a. Associated services required by the project such as soil analysis, materials testing, etc., shall be at cost plus ten (10) percent.