FISCAL NOTE FOR PROPOSED PERMANENT RULES 15A NCAC 18E

WASTEWATER TREATMENT AND DISPOSAL SYSTEMS

Rule Amendments:	15A NCAC 18E
Name of Commission:	Commission for Public Health
Agency Contact:	Nancy E. Deal, On-Site Water Protection Branch Environmental Health Section, DPH/DHHS 1642 Mail Service Center Raleigh, NC 27699-1642 919-707-5875 nancy.deal@dhhs.nc.gov
Impact Summary:	State Government: Yes Local Government: Yes Private Impact: Yes Substantial Impact: Yes
Authority:	G.S. 130A-333, G.S. 130A-335
Necessity:	The rules governing on-site wastewater treatment systems have not been updated as a complete package since 1990. The proposed rule changes reflect current knowledge and experience with on-site wastewater treatment systems as well as address technical corrections and legislative changes.

I. SUMMARY

The on-site wastewater treatment system rules (15A NCAC 18A .1900) have not been updated as a complete package since 1990. In the intervening 27 years, the industry has seen many technological advances, terminology has been standardized, and practical knowledge has been enhanced. The proposed rules incorporate current rule interpretations, existing knowledge of advanced technologies, include previously excluded products, updated and simplified terminology, and reflect significant improvement in consistency and clarity.

The majority of changes in the proposed rules are a re-organization of the current code and clarification of current language as part of an effort to simplify and streamline the current rules. Interpretations that have been in place for many years have been clarified and the rules now better match the many options available in technology, system design, data collection, and operation, maintenance, and management of on-site wastewater treatment systems.

II. INTRODUCTION AND BACKGROUND

The On-Site Water Protection Branch (OSWP) of the Environmental Health Section, DPH, DHHS, oversees the sewage treatment and disposal rules for on-site wastewater treatment systems. The program is a joint effort among the local health departments (LHDs) and the OSWP. The OSWP provides statewide regulatory and consultative services related to on-site wastewater treatment to LHDs and

numerous other clients, including builders, developers, land owners, system installers, system operators, engineers, soil scientists, geologists, environmental health consultants, and others.

On-site wastewater treatment systems serve homeowners in rural parts of the state and areas that are not served by a centralized wastewater treatment system. Approximately 50% of the homes in North Carolina are served by on-site wastewater treatment systems. That dependence within our state upon on-site wastewater treatment systems has remained relatively constant for over 20 years. These systems are a critical and permanent component of our wastewater treatment infrastructure.

The last time the full set of current rules were updated was in 1990. Since then, many changes have been made to the current rules, but in a piece meal fashion. This has resulted in inconsistent terminology and some contradictions across the rules.

In the late 1990's, OSWP started the process to update the current rules as a group. A committee of public and private sector stakeholders reviewed the current rules and proposed language over a period of 10 years. However, a number of issues delayed advancement of this set of proposed rules. Formal meetings held in 2014 with major stakeholder groups (LHDs, product manufacturers, operators, installers, tank manufacturers, soil scientists, engineers, North Carolina Septic Tank Association, and other interested parties) provided updated input on the proposed rules. The OSWP then distributed an updated version of the proposed rules, based on stakeholder comments, for review by the stakeholders a second time.

A key concern stakeholders raised dealt with confusion caused by the complicated structure of the current rule organization. Thus, as part of the proposed rules, the OSWP, in consultation with the Division, is proposing to repeal the current rules, 15A NCAC 18A .1900 *et seq.*, and adopt a new Subchapter, 15A NCAC 18E, for the on-site wastewater treatment system rules. Adopting a new Subchapter allows for a complete re-organization of the on-site wastewater treatment system rules. This approach addresses the piece meal changes that have been made to the rules in the past.

The 15A NCAC 18E proposed rules resolve a number of issues. These include a deterioration of internal clarity and consistency among individual rules in 15A NCAC 18A .1900 *et seq*. as well as inconsistency due to accumulated piece meal rule revisions over 27 years.

Current rules that are over 27 years old are updated in 15A NCAC 18E to reflect current knowledge and experience with on-site wastewater treatment systems. Inconsistencies and contradictions are corrected. Re-organization facilitates future rule updates and revisions within the specific relevant Sections, not just tacked on at the end. The 15A NCAC 18E proposed rule uses simplified language and streamlined paragraph structures. They are internally consistent and provide a more intuitive logical understanding of the rules to the end users.

III. PURPOSE OF RULE CHANGE

The primary goal of on-site wastewater treatment systems is the protection of public health and the environment. Wastewater contains bacteria, pathogens, and other contaminants that can have a significant impact on people and their surroundings. A stomach virus from one person can be transmitted through the soil to a drinking water supply and infect other people. Nitrogen discharged to the surface waters can create algal blooms that can kill fish populations by depleting oxygen levels.

Over time, as fewer people have become sick due to on-site wastewater treatment system discharges, the importance of on-site wastewater treatment system rules has been forgotten. People instead focus on

development, being able to build on every lot. The reason for the sustained lack of illness is due to the vigilant enforcement of these rules by the LHDs and OSWP.

Ultimately, water follows a specific cycle: the homeowner discharges wastewater down the drain into an on-site wastewater treatment system; the effluent from the treatment system disperses in to the soil and then to the groundwater; the groundwater flows to a stream; the streams flows to a water treatment plant; the water treatment plant conveys drinking water to its customers; and the homeowner discharges wastewater down the drain.

A study published by Nicholas DeFelice[1], et al, in Environmental Health Perspectives estimated the partial per-incident cost of human illness from microbial contamination of drinking water, which can result from wastewater treatment system malfunctions. The study looked at 122 North Carolina emergency departments and found that from 2007-2013, 29,400 visits for acute gastrointestinal illnesses (diarrhea, vomiting, fever, or abdominal cramps) could be attributed to private drinking water well contamination.

The average treatment cost per visit was $1,357 in 2013, based on the number of emergency department visits and the total costs associated with those visits. While it is not possible to determine what proportion of the waterborne illness incidents were caused by wastewater treatment system malfunctions, this study provides a per-incident cost of the illness. This is an underestimate because it does not capture gastrointestinal illnesses treated in other care settings, or secondary effects such as lost work days. It also does not capture any environmental impact of microbial contamination.

The long-term goal of the 15A NCAC 18E proposed rules is to continue to protect public health and the environment, while trying to give all homeowners the option to develop their piece of land. Not all lots are buildable, but the proposed rules continue to try and strike a balance between development and protection of human health and North Carolina's resources.

The on-site wastewater treatment system rules were first adopted in 1977 and the last major update was in 1990. The OSWP has been working on an update to the current rules for over 20 years. Additionally, several Session Laws over the past four years have made significant changes to the laws and require changes to the rules. Instead of updating the rules separately to address industry advancements and Session Law changes, which is what has been done for the last 27 years, it is both logical and critical to update the entire rule package at one time.

In the past 27 years, numerous technological changes have occurred with on-site wastewater treatment systems. Based on current knowledge and experience, many individual home sites and larger tracts of land that would have been turned down 27 years ago as unbuildable are now approved on a regular basis in North Carolina. The rules have not kept pace with the technology needed to facilitate these advances.

Precast reinforced concrete tanks are specifically listed in the current rules but tanks made of other materials, such as polyethylene and fiberglass are now commonly available but not addressed. Instead, these tanks are reviewed based on guidance documents developed by OSWP over the years to identify the information required for these alternative material tanks. The proposed rules include all currently available tank construction materials, such as polyethylene, fiberglass, and precast reinforced concrete, but still allows for other materials to be proposed for manufacture of tanks. The proposed rules also

[1] DeFelice, N. B., Johnston, J. E., MacDonald Gibson, J. (2016, May 20) "Reducing Emergency Department Visits for Acute Gastrointestinal Illnesses in North Carolina by Extending Community Water Service". http://www.ehponline.org

clearly identify the criteria that must be met by all tanks, regardless of the material used in tank construction.

Tanks are not the only technology that needed updating in the proposed draft. The same approach held true for pumping systems, appurtenances such as effluent filters, media filters, drainfield trench technologies, drip irrigation technologies, etc. The 15A NCAC 18E proposed rules will provide the broadest possible benefits from new emergent technologies to the end users of on-site wastewater treatment systems and still continue to protect public health and the environment.

A number of rule interpretations have been made over the years as the on-site wastewater industry has advanced and the rule-making process has become more complex. These interpretations are included in the proposed rules.

Terminology has been addressed throughout the proposed rules. As the current rules were modified piece meal, the terminology would change based on the current thinking. During the process, the OSWP looked at national resources to use terminology that would encompass bigger picture issues but also be consistent with the national scope.

Numerous Session Laws adopted over the past four years also necessitate rule revisions. The following specific Session Laws also require changes to the current rules.

S.L. 2013-413, Section 34 and S.L. 2014-120, Section 53
S.L. 2013-413, Section 34, allows a professional engineer to reduce the design daily flow rates in the current rules based on the use of low-flow fixtures and technologies. If the PE proposes a reduced design daily flow rate that is below 3,000 gallons/day, the S.L. eliminates the requirement for the on-site wastewater treatment system design to be reviewed and approved by the OSWP. S.L. 2014-120, Section 53, modified and expanded S.L. 2013-413, Section 34, by broadening the scope of the facilities for which the professional engineer can propose a reduced design daily flow.

S.L. 2014-120, Section 40
S.L. 2014-120, Section 40, made the following changes to the General Statutes: added the term "ground absorption system" with a definition to G.S. 130A-334 and modified the definitions of "plats" and "wastewater systems"; changed the validity of a construction authorization to match the improvement permit validity identified in G.S. 130A-336; and made changes to the requirements for preconstruction conferences on permits greater than five years old in G.S. 130A-335(f1).

S.L. 2014-120, Section 47
S.L. 2014-120, Section 47, removed the requirement for a survey of a manufactured product that has an accepted approval issued under the current rules if the product has been modified. This survey would be required after the modified product has been in use under the accepted approval for five years.

S.L. 2015-147, Section 1
S.L. 2015-147, Section 1, required the addition of innovative and other alternative systems to be used as options for repair areas when a permit for an on-site wastewater treatment system is used. This S.L. is a clarification of the existing interpretation of the current rules.

S.L. 2015-147, Section 2
S.L. 2015-147, Section 2, removed the requirement for a Public Management Entity to operate a sand lined trench on-site wastewater treatment system when a drainage system is used to lower the water table on the site.

S.L. 2015-147, Section 3
S.L. 2015-147, Section 3, removed the 1,000 gallon/day limitation for on-site wastewater treatment systems installed in saprolite (a type of soil).

S.L. 2015-286, Section 4.14(g)
S.L. 2015-286, Section 4.14(g), amended G.S. 130A-336 so that a change in ownership for a piece of property does not affect a construction authorization for an on-site wastewater treatment system that has already been issued.

S.L. 2015-286, Section 4.15(a)
S.L. 2015-286, Section 4.15(a) amended definitions, terminology, and requirements for on-site wastewater treatment systems classified as Innovative and Experimental in G.S. 130A-343.

IV. ECONOMIC IMPACT SUMMARY

Overall, the largest financial impact of the proposed 15A NCAC 18E rules will be the private sector, the owner (facility owner) and product manufacturers. A certain percentage of the costs incurred by the manufacturers will be passed on to the owner, such as the increased precast concrete tank cost or the cost to install a second grease tank. Third party certification and verification companies will see the biggest increase in benefits from the required testing.

The costs associated with plastic and fiberglass tank approvals, and effluent filters, risers, and pipe penetration approvals are now included in the rules and show a fiscal impact. However, these policies are already in place and part of the process the manufacturers go through to receive an approval. While the fiscal impact is now quantified, the manufacturers are already incurring these costs and should not see any additional cost from this rule.

Some of the most important changes in the proposed rules have an unquantified fiscal cost. These include being able to develop lots that may not have been able to be developed before (due to an increase in the design daily flow for advanced pretreatment systems and siting criteria) and for a manufacturer to have a better clarified target to gain approval in for their product in North Carolina.

The main overall benefit from the proposed rules are the changes to further protect public health and the environment. The addition of advanced pretreatment for wastewater with a strength greater than domestic wastewater is an unquantifiable cost to the owner. But the benefits to everyone, owner included, are also unquantifiable. A number of positive changes that are unquantifiable have also been made for the benefit of owners and the manufacturers: clearer targets for submittals, expanded lists of wastewater flows, improved quality of tanks in the ground, and more.

Overall, the proposed rules improve the ability of the LHDs and OSWP to protect public health and the environment yet still provide the private sector with options that clearer and better defined.

Benefits and Costs Summary, Including Net Present Value

BENEFITS	2018	2019	2020	2021	2022
State Gov't, OSWP					
*Risers, filters, and pipe penetrations approvals fees	$80	$80	$80	$80	$80
Risers, filters, and pipe penetrations renewals fees	$456	$472	$488	$504	$520
RWTS and P&I Renewals Fees	$11,700	$11,700	$11,700	$11,700	$11,700
Wastewater flow reduction from expanded facility list			Unquantified		
State Gov't, OSWP					
Existing system inspection fees	$57,900	$61,300	$63,700	$65,100	$65,400
Wastewater flow reduction from expanded facility list			Unquantified		
Facility Owner					
Longer system life, avoidance of repair costs			Unquantified		
Earlier identification of malfunctions			Unquantified		
Increase the design flow of Advanced Pretreatment systems			Unquantified		
Wastewater flow reduction from expanded facility list			Unquantified		
Passed-on Manufacturer Benefits			Unquantified		
Manufacturer					
Piggyback control panel revenue	$871,433	$950,168	$1,016,846	$1,071,317	$1,107,901
Grease Tank Capacity Increase revenue	$247,200	$254,616	$262,254	$270,122	$278,226
Simplified, more flexible approval process for new technologies			Unquantified		
Increase the design flow of Advanced Pretreatment systems			Unquantified		
Drip dispersal system approval criteria			Unquantified		
Wastewater strength requirement for advanced pretreatment			Unquantified		
Private Certifiers, Testers, and Inspectors					
Type IIIb and Type IIIh Inspections	$4,818,750	$4,862,385	$4,907,745	$4,954,125	$5,000,700
*Plastic and Fiberglass Tank Approvals	$546,000	$554,100	$562,200	$570,300	$578,400
Structural Verification Test	$36,600	$36,600	$36,600	$36,600	$36,600
*Risers, filters, and pipe penetrations approvals	$8,000	$8,000	$8,000	$8,000	$8,000
All Parties and General Public					
Fewer system malfunctions (human health, environmental, and business benefits)			Unquantified		
Total Benefits	**$6,598,066**	**$6,738,483**	**$6,870,223**	**$6,989,005**	**$7,088,354**

*These line items reflect the benefits and costs of existing policy that is being codified in rule. These requirements are part of current practice. The affected parties will not incur any new costs or benefits.

COSTS	2018	2019	2020	2021	2022
State Gov't, OSWP					
*Plastic and Fiberglass Tank Approval Time	$952	$979	$1,006	$1,033	$1,061
*Risers, filters, and pipe penetrations approvals time	$102	$104	$107	$110	$113
Risers, filters, and pipe penetrations renewals time	$579	$616	$654	$694	$736
RWTS and P&I Renewals Time	$18,823	$19,362	$19,891	$20,421	$20,980
Local Gov't, LHDs					
Existing system inspection time	$20,836	$22,691	$24,224	$25,416	$26,232
Structural verification test - stronger enforcement			Unquantified		
Facility Owner					
Existing system inspections fees	$57,900	$61,300	$63,700	$65,100	$65,400
Type IIIb and Type IIIh Inspections Fees	$4,818,750	$4,862,385	$4,907,745	$4,954,125	$5,000,700
Piggyback control panels	$871,433	$950,168	$1,016,846	$1,071,317	$1,107,901
Grease Tank Capacity Increase	$247,200	$254,616	$262,254	$270,122	$278,226
Additional tank required with grinder pumps			Unquantified		
Wastewater strength requirement for advanced pretreatment			Unquantified		
Passed-on Manufacturing Costs			Unquantified		
Manufacturer					
*Plastic and Fiberglass Tank Approvals	$1,062,000	$1,078,200	$1,094,400	$1,110,600	$1,126,800
Structural Verification Test	$36,600	$36,600	$36,600	$36,600	$36,600
Concrete Tank Design Change	$3,587,913	$3,910,591	$4,183,997	$4,407,510	$4,557,907
*Risers, filters, and pipe penetrations approvals	$8,600	$8,600	$8,600	$8,600	$8,600
Risers, filters, and pipe penetrations renewals	$3,420	$3,540	$3,660	$3,780	$3,900
RWTS and P&I Renewals	$85,200	$85,200	$85,200	$85,200	$85,200
Total Costs	**$10,832,056**	**$11,307,384**	**$11,720,922**	**$12,067,275**	**$12,316,781**

*These line items reflect the benefits and costs of existing policy that is being codified in rule. These requirements are part of current practice. The affected parties will not incur any new costs or benefits.

NET QUANTIFIED IMPACT – Excludes unquantified costs and benefits Includes benefits and costs of existing policy being codified in rule	2018	2019	2020	2021	2022
State Gov't	($8,219)	($8,810)	($9,390)	($9,974)	($10,590)
Local Gov't	$37,064	$38,609	$39,476	$39,684	$39,168
Facility Owner	($5,995,230)	($6,127,531)	($6,251,155)	($6,361,821)	($6,453,054)
Manufacturer	($3,676,955)	($3,932,254)	($4,144,175)	($4,315,184)	($4,427,651)
Private Certifiers, Testers, and Inspectors	$5,409,350	$5,461,085	$5,514,545	$5,569,025	$5,623,700
General Public			Unquantified		
Net Impact	($4,233,990)	($4,568,901)	($4,850,699)	($5,078,270)	($5,228,427)
NPV, 2017$	($19,509,254)				

**NPV calculated as of July 2017 using a 7% discount rate.

V. ANALYSIS

To determine the fiscal impact of the proposed rules, information was collected from LHDs, OSWP staff, PEs, LSSs, and installers. LHDs were divided into three groups: small, mid-size, and large by the size of their on-site wastewater treatment permitting staff. Small LHDs have one or two staff that permits on-site wastewater treatment systems. Mid-size LHDs have three to four staff, and large LHDs have five or more staff that permits on-site wastewater treatment systems. The size of the LHD impacts the services offered, on-site wastewater treatment system permits issued, and the fees charged. The smaller LHDs are generally in rural counties, and the larger LHDs are in more urban counties. Information was collected across the range of LHD sizes and physiographic regions (mountains, piedmont, and coastal plain) to provide a more complete picture of the proposed rule fiscal impact. The permit projections are included in Appendix A.

The analysis of the proposed rules is broken down into four categories:

I. Rules with minor changes or technical corrections;
II. Rules clarified to reflect current practices;
III. Rules with a quantifiable fiscal impact; and
IV. Rules with an unquantifiable fiscal impact.

I. Rules with minor changes or technical corrections

Several rules have been updated with minor changes or technical corrections to ensure consistency across all the rules. These rules do not represent a significant change in intent or pose any additional/fiscal impact on industry, State, and local governments. Although these rules are proposed as new rules, they are replacing rules that will be repealed. These rules include:

Section .0100 - General
- 15A NCAC 18E .0101 – Scope
- 15A NCAC 18E .0102 – Applicability
- 15A NCAC 18E .0103 – Incorporation by Reference
- 15A NCAC 18E .0104 – Abbreviations
- 15A NCAC 18E .0105 – Definitions

Section .0200 – Permits
- 15A NCAC 18E .0201 – General
- 15A NCAC 18E .0202 – Application
- 15A NCAC 18E .0203 – Improvement Permit
- 15A NCAC 18E .0204 – Construction Authorization
- 15A NCAC 18E .0205 – Operation Permit
- 15A NCAC 18E .0207 – Engineer Option Permits

Section .0300 – Responsibilities
- 15A NCAC 18E .0301 – Owners
- 15A NCAC 18E .0302 – Local Health Department and State
- 15A NCAC 18E .0303 – Licensed Professionals
- 15A NCAC 18E .0304 – Submittal Requirements for Plans, Specifications, and Reports Prepared by Licensed Professionals for Systems Over 3,000 GPD
- 15A NCAC 18E .0305 – Submittal Requirements for Plans, Specifications, and Reports Prepared by Licensed Professionals for Systems Less Than or Equal to 3,000 GPD

Section .0500 – Soil and Site Evaluation

15A NCAC 18E .0501 – Site Evaluation
15A NCAC 18E .0502 – Topography and Landscape Position
15A NCAC 18E .0503 – Soil Characteristics (Morphology)
15A NCAC 18E .0504 – Soil Wetness Conditions
15A NCAC 18E .0505 – Soil Depth to Rock, Saprolite, or Parent Material
15A NCAC 18E .0506 – Saprolite
15A NCAC 18E .0507 – Restrictive Horizons
15A NCAC 18E .0508 – Available Space
15A NCAC 18E .0509 – Site Suitability and Site Classification
15A NCAC 18E .0510 – Special Site Evaluations

Section .0600 – Location of Wastewater Systems
15A NCAC 18E .0601 – Location of Wastewater Systems
15A NCAC 18E .0602 – Applicability of Setbacks

Section .0700 – Collection Sewers, Raw Sewage Lift Stations, and Pipe Materials
15A NCAC 18E .0701 – Collection Sewers
15A NCAC 18E .0702 – Raw Sewage Lift Stations
15A NCAC 18E .0703 – Pipe Materials

Section .0800 – Tank Capacity and Leak Testing Requirements
15A NCAC 18E .0801 – Septic Tank Capacity Requirements
15A NCAC 18E .0802 – Pump Tank Capacity Requirements
15A NCAC 18E .0804 – Siphon Tank Capacity Requirements
15A NCAC 18E .0806 – Tank Installation Requirements

Section .0900 – Subsurface Disposal
15A NCAC 18E .0901 – General Design and Installation Criteria for Subsurface Dispersal Systems
15A NCAC 18E .0902 – Conventional Wastewater Systems
15A NCAC 18E .0903 – Bed Systems
15A NCAC 18E .0904 – Large Diameter Pipe
15A NCAC 18E .0905 – Prefabricated Permeable Block Panel Systems
15A NCAC 18E .0907 – Low Pressure Pipe Systems
15A NCAC 18E .0909 – Fill Systems
15A NCAC 18E .0910 – Artificial Drainage Systems
15A NCAC 18E .0911 – Privies

Section .1000 – Non-Ground Absorption Systems
15A NCAC 18E .1001 – Alternative Toilets
15A NCAC 18E .1002 – Wastewater Recycle/Reuse

Section .1100 – System Dosing and Controls
15A NCAC 18E .1101 – General Dosing System Requirements
15A NCAC 18E .1102 – Pump Dosing
15A NCAC 18E .1104 – Siphon Dosing
15A NCAC 18E .1105 – Timed Dosing
15A NCAC 18E .1106 – Pressure Dosed Gravity Distribution Devices

Section .1200 – Advanced Pretreatment Systems Standards, Siting, and Sizing Criteria
15A NCAC 18E .1206 –Advanced Pretreatment Bed Systems

Section .1300 – Operation and Maintenance
- 15A NCAC 18E .1302 – Operation and Maintenance of Advanced Pretreatment Systems
- 15A NCAC 18E .1303 – Owner Responsibilities for Wastewater System Operation and Maintenance
- 15A NCAC 18E .1304 – Management Entity Responsibilities for Wastewater System Operation and Maintenance
- 15A NCAC 18E .1305 – Local Health Department Responsibilities for Wastewater System Operation and Maintenance
- 15A NCAC 18E .1306 – System Malfunction and Repair
- 15A NCAC 18E .1307 – Wastewater System Abandonment

Section .1400 – Approval of Tanks and Appurtenances
- 15A NCAC 18E .1406 – Modification, Suspension, and Revocation of Approvals

Section .1500 – Approval and Use of RWTS
- 15A NCAC 18E .1501 – General
- 15A NCAC 18E .1502 – Application
- 15A NCAC 18E .1503 – Design and Construction Standards
- 15A NCAC 18E .1504 – Effluent Sampling Requirements for Residential Wastewater Treatment Systems

II. Rules clarified to reflect current practices

The following rules have been updated to reflect current practices. Over the past 27 years, rule interpretations have evolved into the standard of practice. However, due to many different issues, the current rules were never updated to reflect these standard practices. As part of the overall rule revision, one of the goals was to incorporate these current practices in the proposed rules listed below:
- 15A NCAC 18E .0901(a) – Conventional Wastewater Systems
- 15A NCAC 18E .1207 – Site and System Compliance Criteria for Advanced Pretreatment Systems
- 15A NCAC 18E .1302(d) – Operation and Maintenance of Advanced Pretreatment Systems
- 15A NCAC 18E .1710 – System Compliance Criteria for Advanced Pretreatment Systems

Rule 15A NCAC 18E .0901(a) – Conventional Wastewater Systems

The on-site wastewater treatment system rules require 12 inches of separation between the trench bottom and the soil or site limiting condition, and 18 inches of separation between the trench bottom and any soil wetness condition in sandy soils (Group I soils). This vertical separation distance is based on past research that has been done to determine the minimum soil depth required to protect public health and the environment. The total soil depth required on a site to issue an on-site wastewater treatment system permit has been interpreted differently over time, and flipped back and forth a few times.

For conventional gravel dispersal fields, at least 24 inches of approvable soil is required. The 24 inches consists of the following: 12 inches of vertical separation and 12 inches of gravel in the trench. Other trench products, which may not be 12 inches in height, have still been required to have 24 inches of approvable soil on the site. Some past interpretations of the current rules have determined that if a trench height for a proprietary product is 10 inches, only 22 inches of approvable soil is required on the site (12 inches of vertical separation and 10 inches proprietary product height).

The proposed rule change would specify that a 12-inch separation is required for all trench products, except where an 18 inch separation is needed in Group I soils to a soil wetness condition. This would allow all trench products and dispersal systems to be treated equally. The site would dictate the product that could be used in the on-site wastewater treatment system, not the current rule interpretation.

This rule change reflects a clarification of the current rules and how this specific requirement has been applied. There is no cost to OSWP or LHDs. This would impact homeowners positively as it would allow them more options from which to choose when selecting a trench product/dispersal system. Product manufacturers would also see a positive impact from this rule clarification if their product is applicable to more sites and more preferred by consumers. Conversely, some product manufacturers may incur a cost if consumer preferences shift away from their product to a newly applicable product.

Rule 15A NCAC 18E .1207 – Site and System Compliance Criteria for Advanced Pretreatment Systems
Rule 15A NCAC 18E .1302(d) – Operation and Maintenance of Advanced Pretreatment Systems
Rule 15A NCAC 18E .1710 – System Compliance Criteria for Advanced Pretreatment Systems

The current rules provide effluent compliance criteria for advanced pretreatment systems. These criteria evaluate the samples from an advanced pretreatment system and determine if the system is meeting the effluent treatment standards. The effluent compliance criteria in the current rules evaluate the samples for just a single site, like a single family home, and all the advanced pretreatment systems installed under the approval issued for the system.

The wastewater effluent from an advanced pretreatment system is sampled on a regular basis to verify that the system is meeting the specified parameters. The samples are required because drainfields following advanced pretreatment systems have modified siting criteria, decreased horizontal or vertical setbacks or an increase in the soil loading rate. These modified siting criteria are based on wastewater effluent that is a higher quality being discharged to the on-site wastewater treatment system.

Most single family home on-site wastewater treatment systems only have one effluent sample pulled per year. If just one of these samples is out of compliance, the site could be out of compliance when evaluated under the current criteria. Many simple things can cause an effluent sample to be out of compliance: a clump of solids in the effluent sample, sample not gotten to the laboratory in the correct amount of time, sample taken improperly, etc. When a sample comes back out of compliance, the sample can be taken again at an additional cost to the owner.

When OSWP has used the current criteria to evaluate the performance of an advanced pretreatment system, the application and interpretation of the rule is confusing. What the rule states, and what the intent was when the rule was written, are two different things. And, two different people reading the current rule can come away with at least two different ideas of what the rule means. By modifying the compliance criteria, the goal was to make it easier for both the public and private sectors to determine if an individual site or a specific system is in compliance with the criteria listed in the rules. The effluent standards remain unchanged.

These compliance criteria have also been difficult for the currently approved advanced pretreatment systems to meet due to differing interpretations of the current rule. The proposed rules clarify and better quantify the compliance criteria for both individual sites and approved systems based on real world data from approved advanced pretreatment systems in North Carolina. The modified compliance criteria still protect public health and the environment, but also more clearly state the compliance criteria. OSWP may revoke a small number of existing products based on the proposed rules, but this is expected to be an infrequent occurrence.

The compliance standards for advanced pretreatment systems has also been expanded to be used for new applications. This allows all advanced pretreatment systems to be evaluated based on the same criteria. These compliance standards will also be used when advanced pretreatment manufacturers renew their approvals, as proposed in the proposed rules.

The proposed changes in the compliance standards will allow all advanced pretreatment system effluent samples to be reviewed consistently, both for new applications and existing system. Advanced pretreatment manufacturers will have a clearer target for showing that their product is in compliance with the rules. OSWP will also be better able to identify advanced pretreatment systems that are out of compliance and consistently evaluate data.

III. Rules with a quantifiable fiscal impact

The following rules have a quantifiable fiscal impact:

15A NCAC 18E .0206 – Existing System Approvals for Reconnections and Property Additions
15A NCAC 18E .0803 – Grease Tank Capacity Requirements
15A NCAC 18E .0805 – Tank Structural Integrity and Leak Testing Requirements
15A NCAC 18E .1103 – Control Panels
15A NCAC 18E .1301 – Operation and Maintenance of Wastewater Systems
15A NCAC 18E .1401 – Plans for Prefabricated Tanks
15A NCAC 18E .1402 – Tank Design and Construction
15A NCAC 18E .1403 – Tank Material Requirements
15A NCAC 18E .1404 – Plans for Risers, Effluent Filters, and Pipe Penetrations
15A NCAC 18E .1405 – Risers, Effluent Filters, and Pipe Penetration Approval Renewal
15A NCAC 18E .1505 – Residential Wastewater Treatment System Approval Renewal
15A NCAC 18E .1711 – Provisional and Innovative Approval Renewal

Rule 15A NCAC 18E .0206 – Existing System Approvals for Reconnections and Property Additions

When any additional structure, such as a deck, shed, swimming pool, etc., is built on a piece of property with an existing house and on-site wastewater treatment system, that structure must meet the minimum horizontal setback requirements identified in the rules for on-site wastewater treatment systems and repair areas. Many times, these structures are built without confirmation that they meet these minimum horizontal setbacks and the structures are built in or on the on-site wastewater treatment system. An owner can apply for and receive a building permit from building inspections without anything from the LHD identifying that the proposed structure will not be installed in the on-site wastewater treatment system.

So, when the house is sold or the on-site wastewater treatment system fails, the LHD finds out about the existing structure. At that point, options for what can be done to solve the problem are limited. The repair area may be compromised, no additional land may be available to repair the system, or the existing system is compromised beyond repair.

To prevent these problems, the LHD needs to confirm that the location of the new structure does not impact the on-site wastewater treatment system or repair area. Prior to the owner receiving a building permit, they need to apply to the LHD and confirm that the proposed building location will not impact the on-site wastewater treatment system. This written confirmation is provided to Building Inspections prior to the release of the building permit for the new structure.

The majority (approximately 95%) of LHDs already provide this service to their customers.[2] This service evolved over time, without guidance from OSWP, because the LHDs were seeing so many failures with existing on-site wastewater treatment systems that were due to additional structures being built on the property. The LHDs started reaching out to Building Departments to require the owners to get approval from the LHD before they would issue the building permit to prevent future failures.

This rule helps to clarify the minimum requirements of what is needed and the process an owner and the LHD must follow. LHDs that already confirm new structure building permits may choose to modify what they are currently doing based on the proposed rule. These modifications are unquantified. Tables 1 and 2 show the projected costs to the private sector and the 5% of LHDs that will have to implement new processes for existing system inspections.

This will also prevent homeowners from having problems in the future when they sell their house. The on-site wastewater treatment system will not be impacted by additional structures built on the property. If the existing on-site wastewater treatment system is under a structure, swimming pool, deck, etc, the sale of the house could be delayed while the buyers and sellers negotiate how the on-site wastewater treatment system issues will be addressed. A problem with the on-site wastewater treatment system could even cause the sale of the house to fall through. Table 3 summarizes the benefits associated with existing system inspections.

Table 1. Projected Cost Increases and Losses to LHDs for Existing System Inspections, Fiscal Year 2018

Local Health Department Projected Cost Increases	
Average Number of Existing System Inspections	579
Average Application Fees Collected	$100
Total Benefits in Fees Collected	$57,900
Total Cost in Man Hours for Existing System Inspections (Number of Existing System Inspections x 1.0 man hours x Hourly Compensation*)	($20,839)
Net Savings	**$37,061**

*Calculated based on 2016 government salary information for REHS from NCOSHR and projected growth in NC state and local government wages from IHS Markit, and cost of employee benefits by industry from the US Bureau of Labor Statistics. The mid-range hourly wage rate, including benefits is expected to be $35.99 in 2018.

These are ongoing impacts. There will be the initial implementation cost for the LHDs that do not have a program. After that initial implementation cost, the LHDs will maintain the program. The total number of existing system inspections performed by LHDs on an annual basis to going to vary, as it is based on the owner's decision to build additional structures on their lot.

Table 2. Private Sector Costs Associated with Existing System Inspections, Fiscal Year 2018

Private Sector Projected Cost Increases	
Average Number of Existing System Inspections	579
Average Application Fee Paid to LHD	$100
Total Cost to Private Sector (Number of Existing Systems Inspected x Application Fee)	$57,900
Net Savings (Cost)	**$57,900**

[2] Estimate based on consultation with LHD accreditation evaluator.

Table 3. Summary of Benefits from Existing System Inspections

Private Sector Benefits (homeowner, consultants, operators, installers)
Identify location of existing on-site wastewater treatment system
Avoidance of wastewater system repair costs due to malfunctioning on-site wastewater treatment system
Improves ability to sell house in the future
Fewer wastewater system malfunctions
Public Sector Benefits (LHD and On-Site Water Protection Branch)
Fewer wastewater system malfunctions
Additional service to provide to their clients

Rule 15A NCAC 18E .1103 – Control Panels

The current rules allow for the use of piggyback control panels. The piggyback control panel is an outdoor electrical outlet with a cover into which the pump is plugged. Piggyback control panels have limited functionality aside of turning the pump on and off.

Some problems associated with piggyback control panels are as follows: safety issues when using the piggyback around water; protecting the cords from weed whackers, sunlight, etc.; accessibility (sometimes piggybacks are installed very low, on top of the ground surface); alarms are not always visible on the piggyback control panel (located in a crawl space under the house, in the garage, or an outdoor closet, etc.); corrosion issues; and limited space inside the piggyback control panel receptacle to house all the wiring and the plug.

The 15A NCAC 18E rules will require control panels for all pump systems. Control panels provide a number of improvements over the piggyback control panel. Control panels are NEMA 4X rated. The rating means that the enclosure is protected against water coming into the panel and subsequent corrosion. Control panels are larger than an outdoor electrical outlet, allowing for more room to work in the enclosure. The visible and audible alarm components are a physical part of the control panel. The operator or LHD can check control panel function when conducting an inspection.

Control panels also provide more precise control and monitoring of the amount of effluent dosed to the dispersal field. The control panel will have elapsed time meters to document the *amount* of time the pump runs and cycle counters to document the *number* of times a pump turns on. If the on-site wastewater treatment system malfunctions, the elapsed time meters and cycle counters can potentially help diagnose the problem because they document pump operation. This information allows calculation of the volume of effluent pumped to the dispersal field. The pump controls can document excessive water use by the owner. Alternately, the information may help identify a leak allowing 'extra' water in the form of stormwater or groundwater to be sent to the field. Either of these conditions can result in malfunction due to hydraulic overload.

The addition of elapsed time meters and cycle counters will allow the operator and LHD to easily trouble shoot malfunctioning systems and provide a history of system operation that is currently non-existent. This will help all parties (operator, LHD, and owner) to maximize the system operation and identify problems before they become malfunctions.

Tables 4 and 5 identify the projected cost increases for the use of control panels in pump systems. The average number of pump systems installed for 2018 was calculated based on the responses from the LHD on the number of pump systems installed in their county over the course of a year and reviewing

information from the county monthly activity reports. The western counties see a greater number of pump systems than the central and eastern counties. Approximately 15% of the on-site wastewater treatment systems installed require a pump tank.

Table 4. Projected Cost Increases for use of Control Panels for Pump Systems, Fiscal Year 2018

Facility Owner Projected Cost Increases	
Average Number of Pump Systems Installed	2,820
Average Cost Increase to Install a Control Panel in 2018*	$309
Total Cost	**($871,380)**

*Assuming a 3% increase in cost per year.

Table 5. Projected Benefits for use of Control Panels for Pump Systems, Fiscal Year 2018

Manufacturer Projected Revenue Increases	
Average Number of Pump Systems Installed	2,820
Average Cost Increase to Install a Control Panel in 2018*	$309
Total Benefits	**$871,380**

*Assuming a 3% increase in cost per year.

There will be an initial cost for the control panel. After that, there is no additional cost associated with the control panel. As the number of systems installed continues to increase, the number of pump systems with control panels installed will stay the same or increase with the number of systems. Table 6 shows the projected number of permits issued and the number with pump systems with control panels installed over a five year period. Table 7 summarizes the benefits associated with using control panels for all pump systems.

Table 6. Projected Number of Permits Issued and Pump Systems with Control Panels

Year	Projected Number of Permits Issued	Projected Number of Pump Systems with Control Panels
2019	19,903	2,986
2020	20,679	3,102
2021	21,152	3,173
2022	21,234	3,185
2023	21,387	3,208

Table 7. Summary of Benefits from Control Panels

Private and Public Sector Benefits
Increased safety
Ability to troubleshoot malfunctions
Ease of accessibility

Rule 15A NCAC 18E .1301 – Operation and Maintenance of Wastewater Systems

There are two issues addressed with the proposed changes: the expansion of on-site wastewater treatment system classification types, and LHD inspections of Type IIIb system.

The on-site wastewater treatment system classification types for operation and maintenance in the current rules have not kept up with the different systems approved by the OSWP. As the on-site wastewater treatment system increases in size or complexity, the frequency of the operator visits and the LHD

compliance inspections increases. As new technologies have been approved, guidance has been provided to the LHDs, operators, and manufacturers regarding the on-site wastewater treatment system classification type for operation and maintenance.

The LHDs are required under the current rules to inspect certain on-site wastewater treatment systems at specified frequencies. These systems include pumps (Type IIIb, IVa, and IVb), advanced pretreatment (Type V and VI), drip dispersal (Type V), or have a design daily flow greater than 3,000 gallons/day (Type V). The LHDs compliance inspections verify that the system is operating in compliance with its operation permit and that no malfunction is occurring.

Not all LHDs conduct compliance inspections. Budget and staff limitations require the LHDs to focus on new on-site wastewater treatment system permits, repair permits, and other limited priorities.

In the proposed rules, the list of on-site wastewater treatment system classification types is expanded for operation and maintenance to codify in rule the guidance the OSWP has been distributing for years. The system classification types have been phrased using broader terms to categorize larger groups so that new technologies approved will fit into the system classification type table easier. The expanded list reflects the current status of on-site wastewater treatment system classification types for operation and maintenance. This makes it easier for LHDs, operators, and consultants to determine the operator inspection frequency.

In the proposed rules, the LHDs are provided with two options for compliance inspections required for certain Type III on-site wastewater treatment systems. Owners of systems classified as Type IIIb (on-site wastewater treatment systems with a single pump) or IIIh (gravity groundwater lowering systems) can, at the LHD's discretion, have a certified subsurface operator perform the five year compliance inspection. The operator for Type III systems is the owner. A private certified operator is not required. However, the owner cannot self-inspect the system. If the LHD does not conduct the compliance inspection, a certified subsurface operator must inspect the on-site wastewater treatment system. The only inspection the Type IIIb and IIIh systems will ever have is the LHD compliance inspection. By providing another option, there is a greater chance of finding malfunctioning on-site wastewater treatment systems and repairing these malfunctions.

The LHDs will still have to conduct compliance inspections on Type IV, V, and VI systems.

Over time, the number of systems to be inspected will increase as more systems are installed. There will be times where, as city sewer expands and is installed, that houses will come off of on-site wastewater treatment systems and the number of systems to inspect will decrease, but this will not be a yearly occurrence. This will be very irregular.

It is uncertain how many LHDs will opt to allow owners to hire a certified subsurface operator to inspect Type IIIb and IIIh systems. Any staff time savings from this option will be offset by lost inspection fee revenue. Tables 8, 9, and 10 below show the net costs to LHDs and facility owners if 50% of the LHDs allow owners hire a certified subsurface operator, as well as the net savings for private owners. This is an upper-bounds estimate.

LHDs that are not currently conducting compliance inspections will not be losing any money, as they are currently not collecting any fees for this service. By having owners use a certified subsurface operator to inspect the system, they will be gaining information on the system and identifying malfunctions that may have previously gone on for years without any action taken.

For owners who currently do not pay any fees for a LHD compliance inspection, this will be a brand new cost. Owners who already pay for a LHD compliance inspection, could pay more if the LHD chooses to end their compliance inspection program and require certified subsurface operators to inspect the Type IIIb and IIIh systems. OSWP assumes that LHDs are currently optimizing their time according to task priority. Therefore, OSWP assumes that LHDs that currently perform these inspections will continue to do so (since they generate revenue, on net), and those LHDs that currently do not have sufficient staff time to conduct the inspections will authorize private inspectors.

Table 8. Projected Facility Owner Costs Based Using a Private Operation for Type IIIb and IIIh Inspections, Fiscal Year 2018

Facility Owner Projected Additional Costs for Private Inspection, Annualized*	
Average Number of Type IIIb and IIIh Systems Inspected per Year (321,250/5)	64,250
Proportion of Total Inspections Completed by Private Inspectors	50%
Average Fee for Certified Subsurface Operator to Inspect a Type IIIb or IIIh System	$150
Total Costs to Facility Owner	**($4,818,750)**

*Inspections must occur every 5 years

Table 9. Projected Benefits to Certified Subsurface Operators, Fiscal Year 2018

Certified Subsurface Operator Revenue Benefits, Annualized*	
Average Number of Type IIIb and IIIh Systems Inspected Per Year (321,250/5)	64,250
Proportion of Total Inspections Completed by Private Inspectors	50%
Average Fee by Certified Subsurface Operator to Inspect a Type IIIb or IIIh System	$150
Total Benefits to Certified Operator	**$4,818,750**

*Inspections must occur every 5 years

These will be ongoing impacts, dependent upon LHDs decision to allow owners to hire a certified subsurface operator, and dependent upon the number of systems installed. Table 10 shows the projected number of Type IIIb and IIIh systems installed over a five year period, assuming that Type IIIb and IIIh will account for 15% of all existing systems. Table 11 summarizes the benefits associated with the expansion of wastewater system classification types and a private sector option for Type IIIb and IIIh system inspections.

Table 10. Projected Number of Permits Type IIIb and IIIh System Inspections

Year	Type IIIb and IIIh Systems
2019	324,159
2020	327,183
2021	330,275
2022	333,380
2023	336,507

Table 11. Summary of Benefits from Expansion of Wastewater System Classification Types and Type IIIb and IIIh Inspections

Private Sector Benefits (homeowner, consultants, operators, installers)
Additional service to provide to their clients Avoidance of on-site wastewater treatment system repair costs due to malfunctioning system
Public Sector Benefits (LHD and On-Site Water Protection Branch)
Fewer on-site wastewater treatment system malfunctions

Rule 15A NCAC 18E .0803 – Grease Tank Capacity Requirements
Rule 15A NCAC 18E .0805 – Tank Structural Integrity and Leak Testing Requirements
Rule 15A NCAC 18E .1401 – Plans for Prefabricated Tanks
Rule 15A NCAC 18E .1402 – Tank Design and Construction
Rule 15A NCAC 18E .1403 – Tank Material Requirements
Rule 15A NCAC 18E .1404 – Plans for Risers, Effluent Filters, and Pipe Penetrations

Tanks are part of every on-site wastewater treatment system installed in North Carolina. All on-site wastewater treatment systems use a septic tank. Grease tanks are used with on-site wastewater treatment systems that are designed for a food service facility. Pump tanks are used when the effluent from the septic tank cannot flow by gravity to the drainfield, the total drainfield line length exceeds 750 linear feet, and the design daily flow is greater than 3,000 gallons/day.

The current rules specifically identify the design and construction for concrete tanks. Plans for other tanks are approved on an individual basis and evaluated based on the information provided. The information provided needs to show that the tank will provide equivalent effectiveness to the concrete tanks.

The majority of tanks installed in North Carolina are concrete tanks. Plastic and fiberglass tanks are also used across North Carolina in on-site wastewater treatment systems. Plastic tanks are used most often after concrete tanks and the highest place of use is in the western part of North Carolina. There are many sites in the mountains that a concrete tank truck cannot get to and a tank has to be carried onto the site. Plastic tanks can be carried onto the site. Fiberglass tanks are occasionally seen on large (over 3,000 gpd) systems. Fiberglass tanks cannot compete cost wise in the single family home market. Fiberglass tanks are more expensive than plastic and concrete tanks. For on-site wastewater treatment systems with a design flow over 3,000 gpd, the tank cost is already going to be greater due to the larger tanks. The additional cost for fiberglass tanks will not be as great in these systems.

The criteria for plastic and fiberglass tanks has been in guidance for years. The proposed rules include the minimum material requirements and any design requirements that differ from concrete tanks. The most significant design difference between plastic and fiberglass tanks and concrete tanks is the wall thickness. Plastic and fiberglass tanks will have a much thinner wall than concrete. This is a material difference.

The approximate cost for a manufacturer to obtain approval for a plastic or fiberglass tank under the proposed rules is $30,000. The cost to maintain the certification on average is $5,400 per year. The initial approval cost is a one time cost. The cost to maintain the certification is an on-going cost. Over the past five years, a total of 14 new plastic tanks have been approved. On average, three new plastic or fiberglass tank approvals will be issued per year. Tables 12, 13, 14, 15, and 16 identify the private sector costs associated with plastic or fiberglass tanks obtaining and maintaining approval.

Table 12. Manufacturer Cost due to Plastic or Fiberglass Tank Approvals, Fiscal Year 2018

Manufacturer Projected Cost Increases	
Average Number of New Tanks Submitted for Approval	3
Initial approval cost	$30,000
Total Costs	**($90,000)**

Table 13. Manufacturer Ongoing Cost due to Approvals, Fiscal Year 2019 and Beyond

Manufacturer Projected Cost Increases	
Average Number of New Tanks Submitted for Approval	3
Ongoing annual certification costs	$5,400
Total Costs	**($16,200)**

Table 14. Private Sector Benefits due to Plastic or Fiberglass Tank Approvals, Fiscal Year 2018

Revenue Benefits to Third-party Testers and Certifiers	
Average Number of New Tanks Submitted for Approval	3
Initial approval fees	$20,000
Total Benefits to Testers and Certifiers	**$60,000**

Table 15. Private Sector Benefits due to Approvals, Fiscal Year 2019 and Beyond

Revenue Benefits to Third-party Testers and Certifiers	
Average Number of New Tanks Submitted for Approval	3
Ongoing annual certification fees	$2,700
Total Benefits to Testers and Certifiers	**$8,100**

Table 16. Public Sector Costs to Review Initial Plastic or Fiberglass Tank Approvals, Fiscal Year 2018

OSWP Review Costs	
Average Number of New Tanks Submitted for OSWP Approval	3
Total Cost in Man Hours for Approval Renewal by Engineer (Number of Approval Renewals x 5 man hours x Hourly Compensation*)	**$952**

*Calculated based on 2016 government salary information for Engineers from NCOSHR and projected growth in NC state and local government wages from IHS Markit, and cost of employee benefits by industry from the US Bureau of Labor Statistics. The mid-range hourly wage rate, including benefits is expected to be $63.45 in 2018.

There have also been some issues with larger concrete tanks that were not designed as traffic rated tanks. They were approved as part of a project specific submittal. These tanks have started to crack just a few years after installation.

The current rules also specify that additional reinforcement is required for tanks that are placed deeper than three feet below the finished grade. How much additional reinforcement is not specified and interpretation of this rule has varied in the past.

The proposed rules require all tanks buried deeper than three feet below finished grade to be designed by a professional engineer for the proposed tank burial depth. The State shall review and approval the additional reinforcement tank designs.

This cost associated with tanks buried deeper than three feet will be unquantifiable. There is no mechanism in place to track the number of tanks that are buried deeper than three feet. The tank design

will vary based on the burial depth and current tank design. The PE could propose additional reinforcement, increase in the thickness of the tank lid, increased concrete strength, etc., to modify the tank design for the proposed burial depth. The tank design will be site and project specific.

The proposed rules include a structural verification test. This structural verification test shows that the tank is able to withstand the loads acting on the tank (soil depth weight, water table force, people walking over tank, etc). The structural verification test applies to all new approved tanks. Over the past five years, the most tank approvals issued in one year was 24. That same number can be projected out over the next five years to provide a determination of the on-going costs associated with the proposed rule. Tables 17 and 18 projects the cost to the private sector for the tank structural verification tests.

Table 17. Private Sector Cost due to Structural Verification Test, Fiscal Year 2018

Private Sector Projected Cost Increases	
Average Number of New Tanks Submitted for Approval	24
Weighted Average Cost of Structural Verification Test ($600 for precast concrete tanks and $8,000 for plastic and fiberglass tanks)	$1,525*
Total Cost to Private Sector (Number of New Tank Approvals x Average Cost)	**($36,600)**

*This number was obtained in the following method: 21 tanks were estimated as precast concrete and three tanks were estimated as plastic or fiberglass. These numbers were based on tank approvals issued over the past five years.

Table 18. Private Sector Benefits due to Approvals, Fiscal Year 2018

Benefits to Third-party Testers and Certifiers	
Average Number of New Tanks Submitted for Approval	24
Initial approval fee	$1,525
Total Benefits to Testers and Certifiers	**$36,600**

*This number was obtained in the following method: 21 tanks were estimated as precast concrete and three tanks were estimated as plastic or fiberglass. These numbers were based on tank approvals issued over the past five years.

Concrete tank design has been modified in the proposed rules in two ways: increased concrete strength from 3,500 psi to 4,000 psi and the addition of three inlet pipe penetrations. The increased concrete strength will provide a stronger, better tank. The inlet pipe penetrations will provide for a better seal, less likely to leak for the tanks. The average cost increase for a concrete tank to increase the tank strength from 3,500 psi to 4,000 psi is $40/1,000 gallon tank. The addition of three inlet pipe penetrations per tank is $40/pipe penetration. The average cost increase for a 1,000 gallon tank is $160.[3] Table 19 shows the private sector costs associated with proposed concrete tank design changes.

Table 19. Private Sector Cost due to Concrete Tank Design Changes, Fiscal Year 2018

Private Sector Projected Cost Increases	
Average Number of New Septic Tanks Installed	18,801
Average Number of New Pump Tanks Installed	2,820
Average Number of New Grease Tanks Installed	150
Total Number of New Tanks Installed	**21,771**
Average Cost Increase Based on Concrete Tank Design Changes in 2018*	$165
Cost to Private Sector (Number of New Tank Installed x Average Cost)	**($3,592,215)**

*Assuming a 3% annual growth in cost.

[3] Based on information from a North Carolina Precast Concrete Tank Manufacturer

The number of tanks installed per year will follow with the number of permits issued per year. Table 20 shows the projected number of tanks installed over a five year period.

Table 20. Projected Number of Septic Tanks and Pump Tanks Installed*

Year	Tanks Installed
2019	22,888
2020	23,781
2021	24,325
2022	24,423
2023	24,595

*This analysis assumes that 150 grease tanks will be installed per year (range of 100-200).

Tank structural integrity testing is a way to spot check and confirm that the tanks installed meet the minimum rule requirements. OSWP Branch strongly encourages the LHD to routinely spot check concrete tanks for strength. A Schmidt Rebound hammer is used by the Branch and LHDs to check concrete strength. The proposed rules have been modified to re-emphasize that the LHDs should be checking at least 10% of the septic tanks installed in their counties. This requirement will add minimal additional time to existing site visits. Plastic and fiberglass tanks do not have a piece of testing equipment that is relatively inexpensive and easy for LHD staff to use to check material strength. The plastic and fiberglass tank manufacturers will need to be enrolled in a third-party quality assurance and quality control program, which include unannounced annual audits and materials testing. OSWP expects that the majority of manufacturers are already IAPMO/ANSI Z1000, or B66 certified (meeting the requirements of the proposed rule) because such certification is required to be able to sell products in other states. The proposed rules will prevent any post-approval design modifications. The results of the annual audits and material testing will need to be submitted to the Branch on a yearly basis.

Risers, effluent filters, and pipe penetration are all used with tanks. Risers provide access to the tanks for routine operation and maintenance. This includes visual inspection of the tank and its contents, pumping out the tanks, cleaning the effluent filter, maintenance of the pump and control system, etc. Effluent filters are located at the outlet end of septic tanks and grease tanks. They keep the scum layer (stuff that floats on top of the wastewater, such as toilet paper) in the tank and prevent the scum layer from moving on through the system. Cast-in-place pipe penetrations provide for some flexibility with the pipes that enter and exit the tanks. The tanks and pipes can settle over time since they are set on disturbed earth. By using a flexible pipe penetration, minor settling will not cause breaks in the tank, pipe, or connection.

The OSWP Branch has approved risers, effluent filters, and pipe penetrations for use with all State approved tanks for over 15 years. The criteria for these products has always been in guidance documents provided by the OSWP Branch. This guidance is now included in the proposed rules. By including this guidance in the proposed rules, the manufacturers the information required when submitting an application to OSWP for review and approval.

On average, the cost for a manufacturer of an effluent filter, riser, or pipe penetration to apply for and receive approval is $10,750. This cost includes the product certification cost verifying that the product meets the minimum requirements. Over the past five years, a total of four new risers and effluent filters (combined) have applied for and received approval from the OSWP. Tables 21, 22, and 23 project the fiscal impact to effluent filter, riser, and pipe penetration manufacturers and OSWP for new approvals. On average, one new application is projected to be submitted per year.

The proposed rules also include a provision for all the effluent filter, riser, and pipe penetration approvals to become renewable every five years. This allows the OSWP to verify that the products still meet current material standards and are performing as anticipated by the product manufacturer.

Tables 24 and 25 project the fiscal impact to effluent filter, riser, and pipe penetration manufacturers and OSWP for approval renewals. The projected costs are over a five year period.

Table 21. Projected Private Sector Costs for Effluent Filters, Risers, and Pipe Penetration Approval, Fiscal Year 2018

Manufacturer Projected Cost Increases, Annualized	
Avg Number of Effluent Filter, Riser, or Pipe Penetration Applications	0.8
Average Private Sector cost to Collect Information and Write Report ($650/application)	$520
Third Party Product Verification Fee ($10,000/application)	$8,000
Total Application Fees Paid (Number of Approval Renewals x $100 Application Fee)	$80
Total Annualized Cost	**($8,600)**

Table 22. Projected Private Sector Costs for Effluent Filters, Risers, and Pipe Penetration Approval, Fiscal Year 2018

Private Certifiers, Testers, and Inspectors Benefits, Annualized	
Avg Number of Effluent Filter, Riser, or Pipe Penetration Applications	0.8
Third Party Product Verification Fee ($10,000/application)	$8,000
Total Benefit to Private Certifiers, Testers, and Inspectors	**$8,000**

Table 23. Projected OSWP Costs for Effluent Filters, Risers, and Pipe Penetration Approvals, Fiscal Year 2018

OSWP Staff Projected Fiscal Impacts, Annualized	
Avg Number of Effluent Filter, Riser, or Pipe Penetrations Applications to Review	0.8
Total Application Fees Collected (Number of Approval Renewals x $100 Application Fee)	$80
Total Cost in Man Hours for Approval Renewal by Engineer (Number of Approval Renewals x 2 man hours x Hourly Compensation*)	($102)
Net Annualized Cost to OSWP	**($22)**

*Calculated based on 2016 government salary information for Engineers from NCOSHR and projected growth in NC state and local government wages from IHS Markit, and cost of employee benefits by industry from the US Bureau of Labor Statistics. The mid-range hourly wage rate, including benefits is expected to be $63.45 in 2018.

Table 24. Projected OSWP Costs for Effluent Filters, Risers, and Pipe Penetration Approval Renewals, Fiscal Year 2018

OSWP Staff Projected Fiscal Impacts, Annualized	
Avg Number of Effluent Filter, Riser, or Pipe Penetration Product Renewals per Year (20% per year)	4.56
Total Application Fees Collected (Number of Approval Renewals x $100 Application Fee)	$456
Total Cost in Man Hours for Approval Renewal by Engineer (Number of Approval Renewals x 2 man hours x Hourly Compensation*)	($579)
Net Annualized Cost to OSWP	**($123)**

*Calculated based on 2016 government salary information for Engineers from NCOSHR and projected growth in NC state and local government wages from IHS Markit, and cost of employee benefits by industry from the US Bureau of Labor Statistics. The mid-range hourly wage rate, including benefits is expected to be $63.45 in 2018.

Table 25. Projected Private Sector Costs for Effluent Filters, Risers, and Pipe Penetration Approval Renewals, Fiscal Year 2018

Manufacturer Projected Cost Increases, Annualized	
Avg Number of Effluent Filter, Riser, or Pipe Penetration Product Renewals per Year (20% per year)	4.56
Average Private Sector Cost to Collect Information and Write Report ($650/renewal)	$2,964
Total Application Fees Submitted (Number of Approval Renewals x $100 Application Fee)	$456
Total Annualized Cost to Manufacturer	**($3,420)**

Greases tanks are used to separate and remove the grease from the wastewater coming out of a food service facility. The methods used for disinfection in commercial kitchens (chemicals and high water temperature) keep the grease in suspension in the wastewater. To remove the grease, the wastewater needs sufficient time to cool so that the grease can come out of suspension and congeal in the grease tank. Grease tanks generally need longer retention times than septic tanks to remove the grease. One way to increase retention time is to add more compartments or tanks to the current grease tank size.

Removing the grease from the wastewater helps reduce the risk of early malfunction for systems serving food service facilities. Food service facilities are at a higher risk for early onsite wastewater treatment system malfunction. If the grease is not removed in the grease tank, septic tank, or pump tank, it will travel to the drainfield and come out of suspension at the soil interface. This will clog the soil and cause premature malfunction of the drainfield. Grease accumulation in grease tanks, septic tanks, and pump tanks can be removed. Once grease has congealed in the soil, it is almost impossible for the drainfield to recover. A repair is required in the form of a replacement drainfield.

Also required is capacity change in the grease tank configuration. Currently, a single grease tank is installed as part of the on-site wastewater treatment system for food service facilities. The proposed rules change that single grease tank to two grease tanks in series for on-site wastewater systems that have a required grease tank capacity over 1,500 gallons.

On average, 100 to 200 grease tanks a year would be installed with on-site wastewater treatment systems. An average cost to install a second grease tank, including the cost of the tank and the installation charges, would be around $1,600[4]. This is based on a second 1,000 gallon grease tank, which is what would be

[4] Based on information from a North Carolina Certified On-site Wastewater Contractor

required at a minimum. The total grease tank capacity is based on the design flow which is project specific. Tables 26 and 27 project the private sector costs associated with the increase in grease tank capacity.

Table 26. Summary of Costs from Grease Tank Capacity Changes, Fiscal Year 2018

Facility Owner Costs	
Number of additional grease tanks installed	150
Cost per tank and installation in 2018*	$1,648
Public Sector Costs	**($247,200)**

*Assuming a 3% increase in cost per year.

Table 27. Summary of Benefits from Grease Tank Capacity Changes, Fiscal Year 2018

Tank Manufacturer Benefits	
Number of additional grease tanks sold	150
Cost per tank and installation in 2018*	$1,648
Revenue Benefits to Manufacturers	**$247,200**

*Assuming a 3% increase in cost per year.

Table 28 summarizes the benefits associated with the proposed tank rule changes.

Table 28. Summary of Benefits from Tank Rule Improvements

Private Sector Benefits (homeowner, consultants, operators, installers)
Potential reduction in on-site wastewater treatment system repair costs due to grease Quicker review of alternative tank material designs
Public Sector Benefits (LHD and On-Site Water Protection Branch)
Potential reductions in system malfunctions due to grease

Rule 15A NCAC 18E .1505 – Residential Wastewater Treatment System Approval Renewal
Rule 15A NCAC 18E .1711 – Provisional and Innovative Approval Renewal

Currently, once a manufacturer of a residential wastewater treatment system (RWTS) or Provisional and Innovative (P&I) system has received approval for their product, the manufacturer has that approval forever. The OSWP have only revoked two approvals in more than 20 years. One manufacturer had let their required certification lapse; the other manufacturer was determined by OSWP to have failed to disclose a problem with their product that was later discovered in North Carolina installations. A number of these products are used on sites for which a conventional on-site wastewater treatment system cannot be installed. The site has limitations that require a more advanced on-site wastewater treatment system for the lot to be developed.

Problems have also been identified with advanced pretreatment products. Some advanced pretreatment products are not able to meet the treatment standards that they were originally approved for. The original testing supported the application, but further use in the field has identified problematic systems.

OSWP staff have limited time and resources to follow up with every RWTS and P&I system installed in North Carolina to ensure that the products are meeting their specified requirements. This can make it difficult to collect enough information to revoke a manufacturer's approval.

Under the proposed rules, the RWTS and P&I approvals will expire every five years. The manufacturers will have to apply for re-approval and show that their product is continuing to meet the criteria for which it was originally approved. The re-approval schedule will be spread out over five years so that OSWP staff will not have all re-approvals to review at the same time, creating a backlog.

The LHDs fill out a monthly activity report. This report includes information on the type of system, including RWTS and P&I products, installed. The LHDts submit this report to OSWP monthly. This information will assist the manufacturers with writing reports that will be used to support their re-application. The monthly activity reports will provide manufacturers with the number of systems their products have been installed in and the number of repairs permits issued associated with their products.

Advanced pretreatment system manufacturers are already responsible for the long term operation and maintenance of the proprietary systems, including ensuring that effluent samples are pulled in accordance with the rules and their specific approval. The results of the effluent sampling are provided to the LHD as part of the operator's required reports.

The OSWP Engineers will see an increase in their workload with the review of the approval renewal applications. The RWTS and P&I approval manufacturers will see an increase in their cost. The manufacturer will have to collect information on their product performance and write a report supporting their application for re-approval. The manufacturers will also have to pay the OSWP an application fee.

The costs projected in Table 29 and 30 are annualized over a five year period. Currently, there are 21 Advanced Pretreatment Provisional and Innovative systems that will be subject to 5-year renewals, 9 Residential Wastewater Treatment Systems, 19 Dispersal Field Products, and 5 "other" products. The costs and number of approvals should stay relatively consistent with time. Once a manufacturer has received approval, they will not want to lose the approval and re-start the product approval process from the beginning. Over the last five years, the average number of new product approvals issued was two. This does not include modifications to existing approvals. So, over a five year period, the total number of product approvals could increase by ten (average of two a year). Table 31 summarizes the benefits associated with approval renewals for residential wastewater treatment systems and provisional and innovative approvals.

Table 29. Projected OSWP Fiscal Impacts for Residential Wastewater Treatment System and Provisional and Innovative Approval Renewals, Fiscal Year 2018

OSWP Staff Projected Fiscal Impacts, Annualized	
Avg Number of Approval Renewals to Review – Advanced Pretreatment Provisional and Innovative (20%/yr)	4.2
Avg Number of Approval Renewals to Review – Residential Wastewater Treatment Systems (20%/yr)	1.8
Avg Number of Approval Renewals to Review – Dispersal Field Products (20%/yr)	3.8
Avg Number of Approval Renewals to Review – Other than Listed Above (20%/yr)	1
Total Application Fees Collected (Number of Residential Wastewater Treatment System Re-Approvals x $1,500 Application Fee + Number of Provisional and Innovative Approval Re-Approvals x $1,000 Application Fee)	$11,700
Total Cost in Man Hours for Approval Renewal by Engineer – Advanced Pretreatment Provisional and Innovative (Number of Approval Renewals x 30 man hours x Hourly Compensation*)	($7,995)
Total Cost in Man Hours for Approval Renewal by Engineer – Dispersal Field Product (Number of Approval Renewals x 8 man hours x Hourly Compensation*)	($1,929)
Total Cost in Man Hours for Approval Renewal by Engineer – Other than Listed Above (Number of Approval Renewals x 15 man hours x Hourly Compensation*)	($952)
Total Cost in Man Hours for Approval Renewal by Soil Scientist – Advanced Pretreatment Provisional and Innovative (Number of Approval Renewals x 15 man hours x Hourly Compensation**)	($2,909)
Total Cost in Man Hours for Approval Renewal by Soil Scientist – Dispersal Field Product (Number of Approval Renewals x 15 man hours x Hourly Compensation**)	($2,632)
Total Cost in Man Hours for Approval Renewal by Soil Scientist – Other than Listed Above (Number of Approval Renewals x 15 man hours x Hourly Compensation**)	($693)
Total Cost in Man Hours for Approval Renewal by Engineer – Residential Wastewater Treatment Systems (Number of Approval Renewals x 15 man hours x Hourly Compensation*)	($1,713)
Total Approval Labor Costs	**($18,823)**
Net Annualized Costs to OSWP	**($7,123)**

*Calculated based on 2016 government salary information for Engineers from NCOSHR and projected growth in NC state and local government wages from IHS Markit, and cost of employee benefits by industry from the US Bureau of Labor Statistics. The mid-range hourly wage rate, including benefits is expected to be $63.45 in 2018.

**Calculated based on 2016 government salary information for Soil Scientist from NCOSHR and projected growth in NC state and local government wages from IHS Markit, and cost of employee benefits by industry from the US Bureau of Labor Statistics. The mid-range hourly wage rate, including benefits is expected to be $46.18 in 2018.

Table 30. Projected Private Sector Fiscal Impacts for Residential Wastewater Treatment System and Provisional and Innovative Approval Renewals, Fiscal Year 2018

Private Sector Projected Cost Increases	
Avg Number of Approval Renewals to Review – Advanced Pretreatment Provisional and Innovative (20%/yr)	4.2
Avg Number of Approval Renewals to Review – Residential Wastewater Treatment Systems (20%/yr)	1.8
Avg Number of Approval Renewals to Review – Dispersal Field Products (20%/yr)	3.8
Avg Number of Approval Renewals to Review – Other than Listed Above (20%/yr)	1
Average Private Sector Cost to Collect Information and Write Report ($7,500/report)	($81,000)
Total Application Fees Submitted (Number of Residential Wastewater Treatment System Re-Approvals x $1,500 Application Fee + Number of Provisional and Innovative Approval Re-Approvals x $1,000 Application Fee)	($11,700)
Total Cost to Private Sector (Number of Approval Renewals x Report Cost)	**($92,700)**

Table 31. Summary of Benefits from Product Approval Renewals

Private Sector Benefits (homeowner, consultants, operators, installers)
Updated list of approved products and current contact information Updated product approval that reflects current knowledge
Public Sector Benefits (LHD and On-Site Water Protection Branch)
Updating list of approved products and current contact information Method to verify that products going in the ground are the same as the products originally approved, including performance

IV. Rules with an unquantifiable fiscal impact

The rules identified in this part have an unquantifiable fiscal impact. There is not enough information to determine how many of these system types are utilized on an annual basis or to quantify the value added to calculate a fiscal impact. These rules are as follows:

Section .0400 – Design Daily Flow and Effluent Characteristics
15A NCAC 18E .0801(b) – Septic Tank Capacity Requirements
15A NCAC 18E .0909 – Drip Dispersal Systems
15A NCAC 18E .0906 – Sand Lined Trench Systems
15A NCAC 18E .1201 – Advanced Pretreatment System Standards
15A NCAC 18E .1202 – Siting and Sizing Criteria for Systems with a Design Daily Flow Less Than or Equal to 1,500 Gallons/Day
15A NCAC 18E .1203 – Siting and Sizing Criteria for Systems with a Design Daily Flow Greater Than 1,500 Gallons/Day and Less Than or Equal to 3,000 Gallons/Day
15A NCAC 18E .1204 – Advanced Pretreatment Drip Dispersal Systems
15A NCAC 18E .1205 –Advanced Pretreatment Sand Lined Trench Systems
Section .1600 – Approval and Use of Pre-Engineered Package Drip Dispersal Systems
Section .1700 – Approval and Permitting of Wastewater Systems, Technologies, Components, or Devices

Section .0400 – Design Daily Flow and Effluent Characteristics

Rule 15A NCAC 18E .0401 – Design Daily Flow
Rule 15A NCAC 18E .0402 – Effluent Characteristics
Rule 15A NCAC 18E .0403 – Adjustments to Design Daily Flow

Section .0400, Design Daily Flow and Wastewater Characteristics, has been updated to reflect an expanded list of facilities, a clarification of domestic strength wastewater, and additional options to facilitate facility flow reductions, including addressing the issue of wastewater strength.

The list of facilities in the current rules has not been updated in over 20 years. Actual wastewater flows are generally less than the daily flows currently listed. Many facilities request, and receive, flow reductions based on actual water use or the use of low-flow fixtures. The reduction in daily flows will result in smaller on-site wastewater treatment systems installed. The smaller on-site wastewater treatment system will cost the facility owner less to install, operate, and maintain. However, lower flows may result in wastewater strength that is greater than domestic strength, which is clarified in the proposed rules.

The expanded facility list will help LHDs calculate design daily flows in a shorter time frame. For facilities that are not currently listed, the LHD consults with the OSWP to determine a design flow. Sometimes this can take a couple of days to research (to be consistent with what the OSWP has recommended to other LHDs) and provide the LHD with a final answer. The expanded list will ultimately result in permits being issued in a shorter time frame.

The clarification of domestic strength wastewater allows the on-site wastewater industry to define up front which facilities generate higher strength wastewater and account for that in the design from the beginning, instead of after the on-site wastewater treatment system is failing. The current rules have different values for what is or is not domestic strength wastewater in different rules. By clearly identifying the wastewater strength with the design flow, the OSWP, LHD, and consultants will be able to educate owners regarding the impacts of the wastewater quality on public health and the environment. This may impact some owners with specific plans for their property. The facilities identified as higher than domestic strength wastewater in Rule .0402 have all been previously identified as such by the on-site wastewater industry, but not all owners are aware of the wastewater strength of these facilities. Some owners or developers may have increased design and construction costs due to the need for advanced pretreatment or additional design work to show that the wastewater quality will not harm public health and the environment. This will impact both new and existing facilities. The existing facilities will be impacted when an owner is expanding their facility and needs to expand their on-site wastewater treatment system. The proposed rules will require that the wastewater be evaluated. This could require the owner to add advanced pretreatment to the on-site wastewater treatment system to add advanced pretreatment or hire a consultant to determine the impact on the environment for the facility expansion. This will be very site specific and vary based on the type of soil, wastewater characteristics, and site characteristics (lakes, ponds, shallow water table, bedrock, etc).

Rule .0403, Adjustments to Design Daily Flow, accounts for both hydraulic and organic changes to the design daily flow. The current rules only accounted for adjusting the design daily flow based on the amount of water used. The increased wastewater strength was not directly addressed, just referenced as "further adjustments shall be made when the wastewater characteristics exceed those of domestic wastewater". Now, both hydraulic and organic peaking factors must be applied when an adjusted design daily flow (flow reduction) is proposed. The organic peaking factor takes into account the increased organic loading rate on the soil, and adjusts the reduced design daily flow accordingly.

This rule also identifies how to address flow reductions for systems designed to treat wastewater that has nitrogen concentrations higher than domestic strength. Many schools and RV parks have septic tank effluent concentrations that are very high in nitrogen. Nitrogen is one of the known wastewater constituents that can have a significant impact on public health and the environment. "Blue baby syndrome," or methemoglobinemia, has been attributed in some cases to nitrate contaminated drinking water that is given to infants. The nitrate reduces the oxygen carrying capacity of the infant's blood. High levels of nitrogen in surface water can cause eutrophication, where the alga in the water blooms in excess (due to the increased nitrogen in the water) and reduces the water's oxygen levels. This decrease in oxygen levels impacts fish and other aquatic life.

By addressing the potential increase in effluent nitrogen levels, the impact on public health and the environment can be minimized.

The private sector will see the biggest impact financially from Section .0400. While the increased facility list, clarified domestic strength wastewater criteria, and expansion of design daily flow reduction options will help the reduce the permitting time requirement and allow for smaller systems, the requirement to take into account wastewater strength will require additional design calculations or advanced pretreatment systems for some sites. Many sites currently being permitted for higher than domestic strength wastewater facilities already have advanced pretreatment in the on-site wastewater treatment system. This is due to the industry's knowledge of the problems with the high strength wastewater or other soil and site limitations.

The types of facilities that could be impacted will include the following: restaurants, summer camps, food stands, other food service establishments, meat markets, fish markets, schools, RV parks, rest areas and visitor centers, convenience stores with food service and public restrooms, service stations with public restrooms, rest homes, assisted living homes, nursing homes, day camps, and temporary labor camps. Other facilities could be included in this list in the future if it is determined, with experience, that the wastewater strength exceeds domestic wastewater strength.

While the complete universe of potentially affected existing and new facilities is unknown, the number of existing schools and restaurants in the state exceeds 3,000[5] and the number of existing assisted living and nursing homes exceeds 1,000.[6] Only a fraction of these existing facilities will be affected by the rules in any given year, dependent upon when an owner is expanding their facility and needs to expand their on-site wastewater treatment system and the wastewater characteristics. The addition of advanced pretreatment would cost the owner approximately $26.50/gallon of wastewater treated more when compared to a conventional on-site wastewater treatment system without advanced pretreatment.

The private sector could also see some benefits from advanced pretreatment being used with high strength wastewater on-site wastewater treatment systems. These on-site wastewater treatment systems are more likely to have a longer life span with advanced pretreatment. Since the wastewater strength will be lower, the drainfield will be more likely to have a standard on-site wastewater treatment system life span.

The advanced pretreatment system may also allow the owner to expand the facility without having to expand or modify the on-site wastewater treatment system. If the water use is lower than the design flow

[5] School data provided by NCDPI and Private School Review, accessed at http://www.dpi.state.nc.us/docs/fbs/resources/data/factsfigures/2015-16figures.pdf ; https://www.privateschoolreview.com/north-carolina

[6] This figure includes adult care homes (assisted living) and nursing homes licensed by the NC Division of Health Services Regulation. Data accessed at https://www2.ncdhhs.gov/dhsr/reports.htm

and the advanced pretreatment system is meeting domestic strength limits, more wastewater could be discharged to the system.

Overall, the impact to the OSWP and LHDs will be offset by rule changes. The time savings from the expanded facility list will be offset by the sites that will have additional design calculations or advanced pretreatment system designs to review. Table 32 summarizes the associated benefits from the proposed changes to design daily flows and effluent characteristics.

Table 32. Summary of Benefits from Changes to Design Daily Flow and Effluent Characteristics Rules

Private Sector Benefits (homeowner, consultants, operators, installers)
Faster permit issuance (due to quicker calculations of design daily flow)
Potential longer life of on-site wastewater treatment systems based on consider of wastewater strength
Potential future facility expansion without significant on-site wastewater treatment system modifications
Public Sector Benefits (LHD and On-Site Water Protection Branch)
Quicker calculations of design daily flow
Clearer definition of domestic wastewater strength and high strength wastewater

Rule 15A NCAC .0801(b) – Septic Tank Capacity Requirements

Sometimes, the plumbing from the facility will exit the building lower than originally planned and the wastewater from the facility cannot flow by gravity to the on-site wastewater treatment system. This occurs most frequently when a homeowner decides to add a bathroom to the basement, and the plumbing is already designed to flow by gravity from the first floor. So, a grinder pump station is installed to bring the wastewater from the basement up to the gravity sewage pipe already installed to flow into the on-site wastewater treatment system.

The grinder pump station is permitted by Building Inspections and discharges to the gravity sewer pipe flowing to the septic tank. Grinder pumps do exactly what their name implies. The pump grinds up the solids in the wastewater as part of the pumping process. These ground up solids will stay in suspension in the wastewater longer as small particles then they would as the larger particles. This can increase the amount of solids and organic matter that is discharged to the on-site wastewater treatment system.

Septic tanks are designed for a minimum wastewater retention time. The wastewater retention time removes a significant portion of the solids in the wastewater. Smaller solids are removed by the effluent filters at the outlet end of the septic tank. However, if the solid sizes are small enough, they will pass through both the septic tank and effluent filter.

Generally, the on-site wastewater treatment system is already installed and in use when the grinder pump station is discovered by the LHD.

The proposed rules require that the septic tank capacity be doubled whenever a grinder pump station is used to move wastewater from the facility to the on-site wastewater treatment system. By doubling the retention time in the septic tank, a higher percentage of these small solids can be removed from the wastewater before it discharges to the drainfield.

The homeowner could try to lower the existing septic tank, but that could be a complicated option. If the burial depth of the septic tank is greater than three feet, the septic tank would need to be designed by an engineer with additional reinforcement. The original septic tank potentially could not be used. And if the

on-site wastewater treatment system is already in use, this complicates the re-location of the existing septic tank even further. The homeowner could decide to add a second septic tank in a series, forego the renovation, or risk being noncompliant.

It is impossible to determine the number of grinder pump stations that are installed prior to an on-site wastewater treatment system. The LHD will not have a record of the grinder pump station since it is permitted by Building Inspections, not the LHD. If the system has already been installed, the LHD may never be made aware of the grinder pump station until a problem occurs with the on-site wastewater treatment system. If an LHD discovers a grinder pump when a problem occurs, the best corrective action in most cases will be to install a second septic tank in a series. An average cost to install a second septic tank, including the cost of the tank and the installation charges, would be around $1,600[7]. Table 33 summarizes the associated benefits from increasing septic tank capacity when a grinder pump is used.

Table 33. Summary of Benefits from Increases to Septic Tank Capacity Requirements when a Grinder Pump is Used Prior to the Septic Tank

Private Sector Benefits (homeowner, consultants, operators, installers)
Potential longer life of on-site wastewater treatment systems (due to the reduction of effluent solids that will pass through the septic tank and effluent filter)
Public Sector Benefits (LHD and On-Site Water Protection Branch)
Potential longer life of on-site treatment wastewater systems Clearer definition of what is required when a grinder pump is used prior to an on-site wastewater treatment system

Rule 15A NCAC 18E .0906 – Sand Lined Trench Systems
Rule 15A NCAC 18E .1205 – Advanced Pretreatment Sand Lined Trench Systems

The current rule for sand lined trench systems is based on research and is conservative in design. Sand lined trench systems were added to the current rules in 2007. Based on experience since 2007, both the public and private sectors felt some changes could be made to these rules that would allow additional lots to be permitted with sand lined trenches. The sand lined trench systems permitted would be smaller based on the proposed rules.

A sand lined trench system is used when the upper layers of soil on a site are not suitable for on-site wastewater treatment system permitting, but there is a suitable layer of soil that is beneath the unsuitable upper soil layers. This occurs in the coastal counties and some piedmont counties. The coastal counties have upper layer soils that water moves through very, very slowly. By digging the trench bottom down into the suitable soil layer, the unsuitable soil is bypassed and not used for the on-site wastewater treatment system. The wastewater moves down through the on-site wastewater treatment system trench filled with sand to the suitable soil layer.

The current rules base the soil loading rate on the unsuitable soil layers above the suitable soil layer. This means that the soil loading rate is very low and the systems are very large. The proposed rules base the soil loading rate on the suitable soil layer. This will allow for a smaller system. It will also allow additional lots to be permitted with sand lined trench systems.

Additionally, the current sand lined trench rule requires side ditches or surface swales in a U shape around the drainfield to promote surface drainage. These ditches and swales are required to be 25 feet from the

[7] Based on information from a North Carolina Certified On-site Wastewater Contractor

outside edge of the drainfield trenches. The proposed rules require that positive surface drainage, including crowning of the dispersal field, be used to facilitate surface drainage. This will require less land area and setbacks than the current rules.

When the sand lined trench rule was adopted in 2007, it eliminated the installation of some deep systems in the Piedmont counties. In the Piedmont counties, the upper soil layer is generally unsuitable soil that water cannot move through. Below that layer, on some sites, is a suitable soil layer that can be approved by the LHD. Since the current rule bases the soil loading rate on the unsuitable soil layer, the Piedmont counties were not able to install sand lined trench systems any more. The proposed rules will allow a limited number of sites to be permitted that were previously turned down since the adoption of the sand lined trench rule.

Overall, the number of permits issued for sand lined trench systems in a year is less than 1% of the total number of permits issued. Most LHDs do not anticipate a significant increase, or any increase, in the number of sand lined trench permits issued. Other factors, such as the requirement for an operator, impact the owner's decision as to whether or not they want to use this system. Manufacturers of propriety products could see reduced revenues due to the smaller system size. Due to the many factors that determine whether this type of system will be used on a coastal site, in addition to price, it is not possible to predict the net change (increase or decrease) in the use of these products. However, the intent of the rule is to be more permissive, to reduce the burden on the regulated community based on the most current science. Table 34 summarizes the benefits associated with changes to the sand lined trench rules.

Table 34. Summary of Benefits from Changes to Sand Lined Trench Rules

Private Sector Benefits (homeowner, consultants, operators, installers)
Reduced on-site wastewater treatment system size Potential increase in the number of lots this system could be installed on Allows the option for use with Piedmont counties
Public Sector Benefits (LHD and On-Site Water Protection Branch)
Allows the option for use with Piedmont counties

.0908 – Drip Dispersal Systems
.1204 – Advanced Pretreatment Drip Dispersal Systems

Section .1600 – Approval and Use of Pre-Engineered Package Drip Dispersal Systems
.1601 – General
.1602 – Design and Construction Standards
.1603 – Drip Dispersal System Testing

Drip dispersal systems have been in use in North Carolina for on-site wastewater treatment systems since 1993. The siting, design, and installation criteria have been revised and updated over the years to reflect current thinking with the technology. For many years, OSWP's goal has been to include drip dispersal systems in the rules. Drip dispersal systems are currently issued an approval under Rule 15A NCAC 18A .1969. In the proposed 18E rules, Rule .1969 is now Section .1700. The approvals contain the manufacturer specific drip dispersal system information: soil and site evaluation criteria and the minimum siting criteria, system design and installation, and operation and maintenance. The approval helps expedite the permitting process in many ways. The approvals also specify when licensed professionals, such as an engineer or licensed soil scientist, is required.

The LHD can issue a permit based on the information in the drip dispersal approval. Some LHDs may request OSWP assistance, but many can review a drip dispersal system proposal using the approval.

The existing criteria from the Approval are being proposed for adoption in these rules with one change. The proposed rules add specific design criteria for one component of the drip dispersal system. This information must be provided to OSWP for review prior to a drip dispersal system approval being issued.

The fiscal impact of adding the drip dispersal system approval information to the proposed rules is a neutral or positive change for manufacturers. The information and standards the products must meet is now identified in rule, which allows the manufacturers to know the criteria that must be met prior to making an application for a drip dispersal system. This information has been required to be provided by all manufacturers currently approved for drip dispersal systems, prior to the approval being issued. By adding this information to the proposed rules, OSWP is providing transparency to and streamlining the approval process.

The approximate cost for a manufacturer to obtain approval for a drip dispersal system under the proposed rules is unquantifiable. While the current criteria for approval are in the proposed rules, the approval process, and showing that a product or component meets that criteria, is impossible to predict based on the potential product variations in the industry.

Since 1993, when the first drip dispersal approval was issued, a total of six drip dispersal approvals have been issued. At the most, one new application might be received over the next five years for a new drip dispersal approval. Table 35 summarizes the benefits associated with adding drip irrigation to the proposed rules.

Table 35. Summary of Benefits with Adding Drip Irrigation

Private and Public Sector Benefits
Streamlined application and approval process
Clarification of information required for approval
Reduced time from application submittal to approval

Rule 15A NCAC 18E .1201 – Advanced Pretreatment System Standards
Rule 15A NCAC 18E .1202 – Siting and Sizing Criteria for Systems with a Design Daily Flow Less Than or Equal to 1,500 Gallons/Day
Rule 15A NCAC 18E .1203 – Siting and Sizing Criteria for Systems with a Design Daily Flow Greater than 1,500 gallons per day and less than or equal to 3,000 gallons per day

Advanced pretreatment systems are used on sites with moderate to severe soil and site limitations. The soil depth may be limited and a conventional or shallow on-site wastewater treatment system cannot be installed. A house and on-site wastewater treatment system may not be able to be installed on a site and meet all the horizontal setbacks required.

The use of advanced pretreatment allows for the reduction in some siting and sizing criteria for on-site wastewater treatment systems or an increase in the soil loading rate. The effluent is treated to a much higher quality, so the reduction in siting and sizing criteria or increase in soil loading rate does not increase the risk to public health. Advanced pretreatment systems are required to contract with a certified subsurface operator to visit the system at least twice a year. The operation permit for an advanced

pretreatment system expires every five years. These requirements help the LHDs to ensure protection of public health and the environment.

Only one change was made to the effluent quality standards in the proposed rules. The total nitrogen limit in the current rules is less than or equal to 20 mg/L or greater than 60% removal. The "60% removal" provision was removed from the proposed rules. The majority of advanced pretreatment systems approved for use with on-site wastewater treatment systems in North Carolina recirculate some portion of the effluent back to the septic tank at the beginning of the wastewater system. This is a critical configuration to facilitate nitrogen removal. When the effluent is recirculated back to the septic tank, it is very difficult to determine the percent removal of total nitrogen. The percent removal must be based on the septic tank effluent quality prior to any treated effluent being added. Since the treated effluent can dilute the septic tank effluent, and provide false indicators of 60% removal of total nitrogen, the removal of the 60% standard just makes for a cleaner determination of whether or not the on-site wastewater treatment system is in compliance with the effluent standard.

The design flow limitation for using advanced pretreatment and the reduction in siting and sizing criteria or an increase in the soil loading rate is currently 1,000 gallons/day for advanced pretreatment systems meeting treatment standards TS-I and TS-II and 1,500 gallons/day for advanced pretreatment systems designed to meet treatment standard NSF-40. The proposed rules will increase that design flow to 1,500 gallons/day. The flow was increased to provide a consistent number across all treatment standards.

This design flow increase could impact at least 100 sites per year. The 100 sites per year is based on the average number of sites that the coastal LHDs determined would be impacted by this rule change. Coastal counties generally have more advanced pretreatment systems in their counties than the rest of the counties in North Carolina. The lots in the coastal counties are typically smaller and the advantages provided by advanced pretreatment allow lots to be developed in accordance with the owner's plans.

Sites that may not meet the siting and sizing requirements in the current rules with a design flow over 1,000 gallons/day would be limited in their options. The owner may need to scale back the plans for what they would like to do or not even develop the site at all. By increasing the design flow limit that can be used with advanced pretreatment and siting and sizing reductions or an increase in the soil loading rate, these sites can now be developed. The benefit to the owner is incalculable but likely significant, as this rule change allows them to develop a site that could have been previously denied for their proposed plans.

Additionally, by increasing the design flow for all treatment standards for all siting and sizing reductions or increase in soil loading rates, it is easier for the LHDs and private consultants to provide land owners with an evaluation of the options available for the property. The risk to public health and the environment will not be increased by this change. Advanced pretreatment technology is approved in North Carolina to treat wastewater to NSF-40, TS-I, and TS-II standards. If the advanced pretreatment technology is proposed for a site with limitations, a special site evaluation has to be performed to show that the on-site wastewater treatment system will not adversely impact surface or groundwaters.

Section .1700 – Approval and Permitting of Wastewater Systems, Technologies, Components, or Devices
.1701 – General
.1702 – Application
.1703 – Department and Commission Application Review
.1704 – Approval Criteria for Provisional Systems
.1705 – Approval Criteria for Innovative Systems
.1706 – Approval Criteria for Accepted Systems
.1707 – Design and Installation Criteria for Provisional, Innovative, and Accepted Approvals

.1708 – Modification, Suspension, and Revocation of Approvals
.1709 – Effluent Sampling Requirements for Advanced Pretreatment Systems
.1710 – System Compliance Criteria for Advanced Pretreatment Systems
*.1711 – Provisional and Innovative Approval Renewal**
.1712 – Authorized Designers, Installers, and Management Entities
.1713 – Local Health Department Responsibilities
*Rules have a fiscal impact that is addressed elsewhere in the report.

Wastewater systems, technologies, components, or devices not specifically listed in the rules can be approved under a separate rule that specifies the minimum requirements needed for approval. This allows new technologies to be approved in North Carolina without requiring any changes to the rules. Manufacturers can also easily modify, adapt, or change their product without having to go through the formal rule making process.

The types of systems not specifically listed in the rules can include alternative drainfield products, advanced pretreatment systems, and other wastewater system components.

There are four different levels of approvals identified in the current rules: experimental, controlled demonstration, innovative, and accepted. Wastewater systems with experimental approvals have the least amount of data provided. Controlled demonstration approvals are for products that have some data or have been approved by a national testing facility. Wastewater systems approved as innovative have a large amount of data that has been collected about them or have previously received an experimental or controlled demonstration approval and met all the criteria in the approval. The accepted wastewater system approval is only for products that have had innovative approval in North Carolina for at least five years and a minimum number of systems installed. Accepted approvals must be reviewed and approved by the Commission for Public Health.

Session Law 2015-286 made numerous changes to G.S. 130A-343, which deals with the approval levels and criteria of these systems not specifically listed in the rules. The Session Law also required that the rules be updated to reflect the changes made to G.S. 130-343. The changes simplified the approval level options and expanded the options for a manufacturer to obtain approval, while maintaining a comparable level of rigor in the certification process. When making the changes required by Session Law 2015-286, OSWP staff also made additional changes to clarify the current rule.

The changes Session Law 2015-286 made to G.S. 130A-343 are as follows:

- Changed the definition of accepted systems to apply only to trench products and exclude advanced pretreatment systems.
- Changed the term controlled demonstration to provisional.
- Deleted experimental wastewater system approvals.
- Provided an alternative method for reducing effluent sampling criteria for advanced pretreatment wastewater systems.
- Provided time frames for OSWP review and approval of products.
- Provided alternative criteria for issuing a product a provisional approval.

In addition to updating the rule to reflect the Session Law changes, the current rule does not clearly lay out the requirements for approval, information required to be provided by the applicant or manufacturer, or the criteria the information must meet. The proposed rules reorganize the current rule into a format that makes it easier for a manufacturer to identify the application information needed and the criteria that information must meet.

VI. ALTERNATIVES

Alternative #1: Require leak testing of all tanks installed in on-site wastewater treatment systems. In the current rules, tanks are only required to be leak tested when the water table is within five feet of the ground surface and a mid-seam pump tank is used, with advanced pretreatment systems, and engineered design systems. OSWP staff looked at requiring every tank installed in an on-site wastewater treatment system to be leak tested, either with a hydrostatic test or a vacuum test.

The cost to implement this would increase the cost of the simplest system (septic tank to gravity drainfield) by around $1,000 per system (about 20%). As on-site wastewater treatment systems increased in size or complexity, and the cost of the system increased, the percent total of the system cost would decrease for tank leak testing. However, the majority of systems installed in North Carolina are single family residence systems that do not require advanced pretreatment.

This does not include the added cost to the LHDs. LHD staff would need to go back out to the site to verify the leak test results. This would result in at least one additional trip to the site at a minimum. For the small LHDs, this could end up being a significant burden on their limited staff resources.

In summary, the costs for leak testing all tanks impact both public and private sectors significantly. The quality of tanks installed in North Carolina has improved over the past 20 to 30 years and this is not a viable and cost effective option for moving the tanks to the next level. Other options are available, that are less expensive, to improve tank quality.

Alternative #2: Continue to allow piggyback control panels

Piggyback control panels are allowed under the current rules. Owners would not see an increase in the cost for pump system with the continued use of piggyback control panels. However, the problems associated with piggyback control panels would also continue: safety, corrosion, accessibility, etc. The increase in cost is worth the advantages gained by increased safety and control over system operation.

Alternative #3: Requiring grease tanks to obtain a separate tank approval

In the current rules, grease tank designs are almost identical to septic tank designs. The majority of grease tanks installed are modified septic tanks. OSWP staff looked at requiring grease tanks to have a separate grease tank approval issued by the State.

The cost to implement this would be around $3,500 per tank form and each tank has two forms, a top half form and a bottom half form. The total cost per tank would be $7,000. There are very few problems with the current process. (The main problem being tanks that have never been state approved being installed as a grease tank.) Based on the lack of problems with the current process, and the high cost to tank manufacturers for requiring grease tanks to have an approval number, it did not make fiscal sense to include this in the proposed rules.

VII. UNCERTAINTY AND RISK ANALYSIS

The following items have the greatest uncertainty in this analysis: the number of new building permits, the cost of materials, number of grease tanks installed, number of on-site wastewater treatment systems requiring advanced pretreatment due to high strength wastewater, and the impacts to the LHDs from Type IIIb and Type IIIh inspection requirements.

The number of new building permits drives everything. If the number of permits increases, the LHDs and private sector both stay busy keeping up with permitting, installing, and maintaining on-site wastewater treatment systems. If the economy drops, and the number of new building permits drops, everyone sees less work and has to come up with new sources of revenue. Table 36 below shows the net cost of the rule under two alternate scenarios: higher than expected septic tank installations (permits) over the next five years, and lower than expected septic tank installations. The net cost of the rules would be approximately $3.8 million higher than anticipated under the high-permit scenario, and approximately $3.6 million lower than anticipated under the low-permit scenario. See Appendix A for a discussion of how OSWP derived the permit estimates.

If the economy improves and home construction increases, the LHDs will see an increase in the number of applications received. This, in addition to the requirement for existing system inspections, will increase the LHD work load. Not all LHDs are back to the staffing levels they were at before the recession, and it takes time to hire, train, and have new staff ready to issue permits. Also, if some of the LHDs choose to offer the private inspection option for Type IIIb and IIIh systems, they could lose a revenue stream that will further impact the LHD. How much this will impact the LHDs will depend upon whether or not the LHD is currently conducting compliance inspections for Type IIIb and IIIh. LHDs can choose to continue their current program, implement a program if they do not have a program, or require the owners to hire a certified subsurface operator to inspect the system.

The LHDs have many priorities that they must attend to on a daily basis. Compliance inspections may fall further down on the priority list based on the current staffing needs and priorities. It is unknown how many LHDs will choose to offer the private option to owners as that will be a very county specific decision based on their specific needs. OSWP assumes that LHDs are currently optimizing their time according to task priority. Therefore, OSWP assumes that LHDs that currently perform these inspections will continue to do so (since the inspections generate revenue for LHDs, on net), and those LHDs that currently do not have sufficient staff time to conduct the inspections will authorize private inspectors. OSWP's best estimate of the proportion of compliance inspections currently performed by LHDs is 50%. The net cost of the rule over the next five years, including all affected parties, would be lower than estimated if LHDs choose to decrease the proportion of inspections they perform. On the other hand, if LHDs decide to perform more than 50% of the inspections, the net cost of the proposed rules would be higher than estimated (see Table 36 below).

The cost of materials (plastic, concrete, steel, etc.) will impact the projected costs to tanks and appurtenances (effluent filters, risers, and pipe penetrations). If the cost of the materials increases, that could drive the cost of these products up, ultimately costing the homeowner more for the on-site wastewater treatment system. If the material costs stay approximately the same, there should not be any additional cost increases. Construction cost inflation is assumed to be 3% per year, based on the annual growth in the index over the past 10 years.[8] Table 36 below shows how a lower growth rate of 2.5% and a higher growth rate of 3.5% would affect the net cost of the rules.

The number of grease tanks installed will vary greatly per year. It is based on the number of restaurants, food stands, schools, nursing homes, dining halls, and other food service facilities that are built. The numbers of these facilities increase and decrease over the years, in no particular pattern, so it is difficult to project a number of new installations per year. If the economy continues to increase and commercial businesses also increase, the number of grease tanks installed could increase as people decide to open restaurants or food stands. OSWP assumes that 150 grease tanks a year would be installed with on-site wastewater treatment systems, on average, based on numbers from the Food Protection Facilities Branch and the requirement to increase grease tank capacity by installing two grease tanks. Table 36 below

[8] Source: http://enr.construction.com/economics

shows how the net cost of the rules would change based on a range of 100-200 grease tank installations per year. This assumption has a relatively small net effect.

The number of systems that will be required to have advanced pretreatment because the wastewater strength is higher than domestic is almost impossible to predict. It is very dependent on facility type and proposed wastewater flow. The cost per system will also vary greatly because it will be very project specific. For some facilities, like restaurants or food stands, the primary contaminants of concern, grease and organic load, will be relatively straight forward to remove. High levels of nitrogen can be more complex to reduce and systems designed to reduce nitrogen can require more operational flexibility so that the system can be operated to meet the required limits.

The on-site wastewater treatment system cost is very site specific. The majority of the on-site wastewater treatment systems installed in North Carolina are still conventional wastewater treatment systems, without a pump. However, for limited sites there are options if a homeowner wants to build. The proposed on-site wastewater treatment system, such as advanced pretreatment and drip dispersal drainfield, is more expensive than the conventional system, but still allows the homeowner the option to build on their land.

Table 36 shows the impact of the sensitivity analysis on the Net Present Value for 15A NCAC 18E.

Table 36. Sensitivity Analysis on Net Economic Impact (Net Present Value)

Annual New Septic Tank Permits	2018	2019	2020	2021	2022
High Range	22,851	24,190	25,133	25,709	25,812
Modeled Range	18,801	19,903	20,679	21,152	21,237
Low Range	15,351	15,505	15,660	15,816	15,974

Annual New Septic Tank Permits	Net Impact, 2018-2022	Difference from Model
High Range	($15,673,404)	$3,835,850
Modeled Range	($19,509,254)	$0
Low Range	($23,104,911)	($3,595,657)

Annual Type IIIb and IIIh Inspections - LHD Completion Rate	Net Impact, 2018-2022	Difference from Model
10%	($17,476,755)	$2,032,499
30%	($18,493,005)	$1,016,250
50%	($19,509,254)	$0
70%	($20,525,504)	($1,016,250)
90%	($21,541,753)	($2,032,499)

Annual Construction Cost Inflation	Net Impact, 2018-2022	Difference from Model
2.5%	($19,227,770)	$281,484
3.0%	($19,509,254)	$0
3.5%	($19,790,738)	($281,484)

Annual Grease Tank Installations	Net Impact, 2018-2022	Difference from Model
100	($19,473,516)	$35,738
150	($19,509,254)	$0
200	($19,544,992)	($35,738)

APPENDIX A: Projected New Construction Authorization Permits

The analysis below indicates that the number of permits issued per year will increase between 2018 and 2023. Permits are expected to grow slowly over the next five years (see Table 1 below).

1. Wastewater Treatment System Permit Projections

Table 1 shows the approximate number of new construction authorization permits issued per year by the LHDs from 2002 to 2014.[9] The OSWP collects information from LHDs regarding the number and type of on-site wastewater treatment systems permitted. Not all LHDs respond and provide information to the OSWP. The approximate number of permits issued each year was calculated in the following manner: the number of new construction authorization permits issued and the number of LHDs responding were determined from the OSWP County On-Site Activity Reports. Each year was evaluated for the LHDs that did not respond. To provide an estimate of the number of permits issued for the missing values, the median was calculated based on the information for that LHD in the rest of County On-Site Activity Reports. The yearly total was calculated including the median number of permits for the missing LHD records. The OSWP has information up through 2014. Information for 2015 and 2016 on the number of permits issued has not yet been compiled.

Table 1. Approximate Number of On-site Wastewater Treatment System New Construction Authorization Permits Issued

Year	Approximate Number of New Construction Authorization Permits Issued	Change in Number of Construction Authorization Permits Issued
Historical Data		
2002	43,529	
2003	39,200	-10%
2004	39,901	2%
2005	*	*
2006	39,653	**
2007	33,590	-15%
2008	23,090	-31%
2009	15,897	-31%
2010	14,293	-10%
2011	12,726	-11%
2012	14,018	10%
2013	15,140	8%
2014	14,752	-3%
Estimates		
2015	17,139	16%
2016	17,989	5%
Projections		
2017	18,193	1.1%

[9] NC On-Site Water Protection Branch (2002-2014). "County Monthly Activity Reports." Accessed at http://ehs.ncpublichealth.com/oswp/resources.htm.

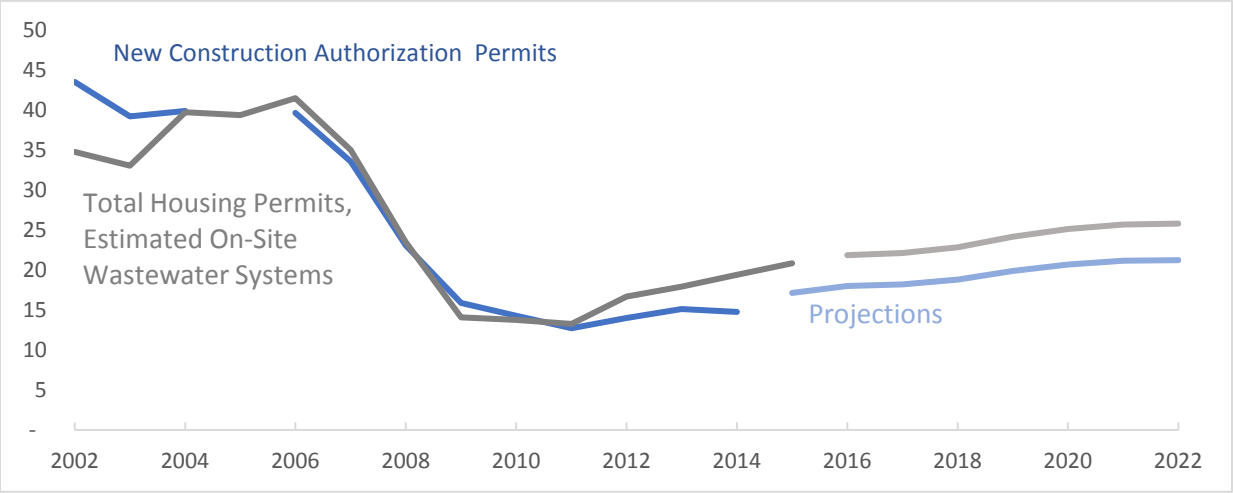
2018	18,801	3%
2019	19,903	6%
2020	20,679	4%
2021	21,152	2%
2022	21,237	.4%
2023	21,387	.7%

*Data collected were a statistical anomaly and not included in this analysis.
**Percent change could not be calculated.

The number of permits issued began to level off in 2013 and 2014. The worst effects of the recession appear to be over as the percent change in permits issued is in single digits as compared to double digits in the previous years. Based on the OSWP's estimates, 2015 showed a significant increase in the number of permits issued, and then levels off from 2016 through 2023. However, the number of permits issued depends on the current status of the housing market and the economy, so it can vary from year to year.

The projected number of permit issued from 2017 to 2023 was based on statewide building permit projections,[10] weighted by county population growth projections.[11] The total number of projected building permits was multiplied by the percent of households in each county using on-site wastewater treatment systems[12] to estimate the number of new on-site wastewater treatment systems permits for 2017 through 2023. Figure 1 shows the relationship between the number of new construction authorization permits issued and the total number of housing permits with on-site wastewater treatment systems. The majority of on-site wastewater treatment system permits issued each year are for single family homes.

Figure 1. New Construction Authorization Permit Projections in the Thousands by Year



[10] IHS Connect (September 2016). *State Analysis: Forecast Data: Annual Data – North Carolina.* Accessed at https://www.ihs.com/index.html.
[11] NC Office of State Budget and Management (2016). *Annual County Population Totals 2017-2021*. Accessed at http://www.osbm.nc.gov/demog/county-projections.
[12] U.S. Census Bureau (1990). *1990 Census of Population and Housing – Sewage Disposal*. Accessed at https://www.census.gov/mp/www/cat/decennial_census_1990/1990_census_of_population_and_housing_summary_tape_file_3a.html

Table 2 shows the projected number of new construction authorization permits issued from 2017 to 2023.

Table 2. Projected Number of Permits Issued

Year	Total Number of Permits Issued*
2017	18,193
2018	18,801
2019	19,903
2020	20,679
2021	21,152
2022	21,234
2023	21,387

*For a description of how these figures were estimated, see Table 1.

Based on OSWP County On-Site Activity Reports, approximately .5% of all permits issued utilizes advanced pretreatment or drip irrigation. Advanced pretreatment and drip irrigation are more likely to be used on sites with limitations that prohibit the installation of a conventional on-site wastewater treatment system.