REVISED FISCAL NOTE FOR PROPOSED PERMANENT RULES 15A NCAC 18E
Revised July 2018

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 28 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.

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

The 15A NCAC 18E proposed rules were posted for public comment during the fall of 2017. This revised fiscal note reflects changes made to the proposed rules based on the public comments received. The expected costs and benefits of the proposed rules are described in subsequent sections and quantified whenever possible. The impact of the quantified 15A NCAC 18E rule changes is estimated at a net cost of $2.3 million over the first five years, a reduction of over $17 million compared to the original proposal. The On-Site Water Protection Branch expects the unquantifiable benefits of the proposed rules, such as

longer treatment system life, reduced system malfunctions and thus reduced human and environmental health risk, to exceed these quantified costs. The revised 15A NCAC 18E rules and fiscal note will be posted again for public comment during the late spring/early summer of 2018, with a proposed effective date of October 1, 2018.

II. INTRODUCTION AND BACKGROUND

The On-Site Water Protection Branch (OSWP) of the Environmental Health Section, DPH, DHHS, oversees the sewage treatment and dispersal rules for on-site wastewater treatment systems. The program is a joint effort among the local health departments (LHDs) and OSWP. OSWP provides statewide regulatory and consultative services related to on-site wastewater treatment systems to LHDs and numerous other clients, including developers, builders, land owners, system installation contractors, system operators, professional engineers (PEs), licensed soil scientists (LSSs), professional geologists, environmental health consultants, and others.

On-site wastewater treatment and dispersal systems serve property owners in rural parts of the state and areas not served by a centralized (regional or municipal) wastewater treatment system. Approximately 50% of the homes in North Carolina rely on soil-based on-site wastewater treatment systems and that dependence within our state has remained relatively constant for more than 20 years. These systems are an effective, critical, and permanent component of our wastewater treatment infrastructure.

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. If treatment and dispersal is inadequate, a stomach virus from one person can be transmitted through the soil to a drinking water supply and potentially infect others. Excess nitrogen discharged to the surface waters can create algal blooms that can kill fish populations by depleting oxygen levels. The rules contain provisions that ensure on-site wastewater treatment systems are properly sited to avoid these public health and environmental concerns.

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 is eventually dispersed into the soil (where it receives final treatment) and then to the groundwater; the groundwater flows to a stream; the stream flows to a water treatment plant; the water treatment plant conveys drinking water to its customers; and the homeowner discharges wastewater down the drain.

Over time, fewer people have contracted illnesses due to inadequate on-site wastewater treatment system discharges. A significant reason for the sustained reduction of illness over the past 40 years is vigilant enforcement of these rules by the LHDs and OSWP. As a result, the importance of on-site wastewater treatment system rules has sometimes been forgotten or minimized. People instead tend to focus more on economic development and maximizing buildable lots and less on the potential public health and environmental effect of improper wastewater management.

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

[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

(diarrhea, vomiting, fever, or abdominal cramps) could be attributed to private drinking water well contamination.

The average treatment cost per emergency room visit in 2013 was $1,357. 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 effects attributable to microbial contamination.

The on-site wastewater treatment system rules were first adopted in 1977 and the last major update was in 1990. Since then, sporadic changes have been made to the current rules resulting in inconsistent terminology and a certain amount of conceptual contradiction. In the late 1990's, OSWP began an effort to update the full set of current rules. Over a period of 10 years, a committee of public and private sector stakeholders reviewed the current rules and proposed language, but the formal rulemaking process did not continue for multiple reasons.

In the intervening years, as technological innovations have surged, and terminology has become more standardized at the national level, OSWP has endeavored to capture critical procedures, concepts, and rule interpretations in guidance documents. However, these do not carry the weight of a rule and are subject to further interpretation by stakeholders. Legislators have enacted Session Laws (eight modifications during the past five years alone) which become effective upon passage and require rule revision. Instead of engaging in separate efforts to address industry advancements, clarify language, remove inconsistences, and incorporate Session Law changes (which is what has been done for the last 28 years), it is both logical and critical to update the entire rule package at one time.

The current rulemaking effort began with distribution of the draft rules from the *previous* effort to major stakeholder groups (LHDs, product manufacturers, operators, installers, tank manufacturers, LSSs, PEs, North Carolina Septic Tank Association, and other interested parties). Representatives of these groups attended formal meetings held in 2014 to provide updated input on the proposed rules. OSWP then distributed an updated (based on stakeholder comments) version of the proposed rules for review by the stakeholders a second time.

The 15A NCAC 18E proposed rules resolve several 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 28 years.

Rules that are over 28 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 of the rules. The 15A NCAC 18E proposed rules use simplified language, streamlined paragraph structures, and are internally consistent and provide a more intuitive logical understanding of the rules to the end users.

The 15A NCAC 18E proposed rules went out for public comment during the fall of 2017. OSWP received over 3,000 comments on the proposed 15A NCAC 18E rules and fiscal note during the public comment period from over 100 individuals, companies, and organizations. Approximately 70% of the comments related to four main issues: tanks, the on-site wastewater treatment system permitting process, product approvals, and drainfield systems. As OSWP reviewed and responded to comments, it was far more productive to identify and address the 'big picture' issues. Distilling comments down to their basics kept OSWP staff focused on the big picture and able to move the discussion toward how the issue fits into

the overall framework of the proposed rules. This process still enabled OSWP to respond specifically to each comment received.

OSWP also met with two stakeholder groups to discuss the big picture issues. The stakeholder groups were on the following: tanks and product approvals (including advanced pretreatment systems). After the meetings, OSWP followed up and asked stakeholders to provide additional information based on the big picture issue discussions.

As part of reviewing the comments and the big picture, OSWP looked at the proposed changes to try and determine what the industry was receiving in return for making these modifications. In some situations, such as the increased concrete strength for tanks, there was a large cost associated with the increased strength but no documented problems that indicated a need for this change. Upon re-evaluation, OSWP revised the proposed rule to closely mirror the current rule, addressing the comments received.

III. PURPOSE OF RULE CHANGE

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. To that end, the purpose of this rule revision is to:

- reorganize the rules into a more logical order to increase consistency and clarity;
- incorporate current rule interpretations and existing knowledge of advanced technologies;
- include previously excluded products and facilitate further innovation;
- update and standardize terminology using vetted sources; and
- incorporate Session Law mandates.

Reorganize the Rules in a Logical Format

A key concern noted by stakeholders is the complicated organization of the current rules. Thus, as part of the proposed rules, 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. This approach allows for a complete re-organization of the on-site wastewater treatment system rules in a logical order which will facilitate future rule revision significantly. This approach ensures that rules are internally consistent and provides end users with a more intuitive and logical structure.

Incorporate Rule Interpretations and Guidance

OSWP has been working on an update to the current rules for over 20 years. In the absence of successful rulemaking, and as the industry has become more complex, OSWP has been compelled to provide multiple rule interpretations in the form of guidance documents which have evolved into standard practices which must be codified to carry appropriate weight. Additionally, Session Laws over the past five years have mandated eight significant changes to the rules that have yet to be incorporated. Most importantly, facilitating innovation is critical in this rapidly changing industry. Instead of updating the rules separately to address industry advancement and Session Law changes, which is what has been done for the last 28 years, it is both logical and critical to update the entire rule package at this time.

Facilitate Technological Innovation

In the past 28 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 denied permits 28 years ago 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 in rule. Instead, these tanks are currently reviewed based on guidance documents developed by OSWP that identify the information required for these alternative material tanks. The proposed rules include all currently available tank construction materials (polyethylene, fiberglass, and precast reinforced concrete) but still allows for other materials to be proposed for manufacture of tanks. The proposed rules also clearly identify the criteria that must be met by all tanks, regardless of the material used in tank construction. The purpose here is to codify guidance as well as facilitate use of future innovations.

The same approach held true for pumping systems, media filters, drainfield trench technologies, drip irrigation technologies, appurtenances such as effluent filters, etc. The 15A NCAC 18E proposed rules will provide the broadest possible benefits from new emerging technologies to the end users of on-site wastewater treatment systems while continuing to protect public health and the environment.

Standardize Terminology
Standard terminology is fundamental to good rules, especially in our unique industry. Piece meal revisions adopted over the years included inconsistent terms and definitions. During the process, OSWP used terminology from nationally recognized resources to increase consistency at the state level but also encompass bigger picture issues.

Incorporate Session Law Mandates
Numerous Session Laws adopted over the past five years also necessitate rule revisions. The following Session Laws 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 PE 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 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 PE 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 have been 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.

To summarize, the purpose of this rule revision is to incorporate current rule interpretations and existing knowledge of advanced technologies, include previously excluded products, facilitate further innovation, update and standardize terminology, improve organization, consistency, and clarity as well as incorporate Session Law mandates.

IV. ECONOMIC IMPACT SUMMARY

Overall, the proposed rules facilitate the ability of the LHDs and OSWP to maintain and enhance protection of public health and the environment while providing property owners broader options and the private sector clear and well-defined benchmarks. The impact of the quantified 15A NCAC 18E rule changes is estimated at a net cost of $2.3 million over the first five years. However, several significant changes have unquantifiable benefits. The Division expects the unquantifiable benefits of the proposed rules to exceed these quantified costs.

Overall, the largest financial impact of the revised 15A NCAC 18E rules will still be on the private sector, the owner (facility owner) and product manufacturers. A certain percentage of the costs incurred by product manufacturers will be passed on to the owner, who, in turn, receives a higher quality system component. Certified subsurface operators will see an increase in the number of systems they may contract to inspect, increasing their bottom line but also protecting the property owner's investment through regular maintenance. Third party certification and verification companies will also see an increase in benefits from required testing, monitoring, and reporting.

The costs associated with plastic and fiberglass tank approvals, and effluent filters, risers, and pipe penetration approvals are included in the proposed rules and an associated fiscal impact is thus noted in the report. However, these policies are an established part of the approval process for proprietary products and manufacturers are already incurring these costs.

Some of the most significant changes in the proposed rules have an unquantified fiscal impact. These include the ability to develop lots that would previously have been denied permits based upon their design daily flow and the soil and site conditions on the property. Rule revisions include concessions on both design daily flow and siting criteria when advanced pretreatment is used. Further, manufacturers will

have clear targets that must be achieved to gain approval for use of their advanced pretreatment product in North Carolina.

The main overarching benefit from the proposed rules are the changes that continue to protect public health and the environment, based on current knowledge and experience with on-site wastewater treatment systems. The requirement to include advanced pretreatment components to treat high strength (stronger than domestic) wastewater is an unquantifiable cost to the owner. But the benefits to everyone, owner included, are also unquantifiable. Many 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, and more.

The impact of the quantified 15A NCAC 18E rule changes is estimated at a net cost of $2.3 million over the first five years, a reduction of over $17 million compared to the original proposal. The largest changes in cost were to the concrete tank manufacturers and the State government. Going back to the original concrete design criteria represented a significant cost decrease, or benefit, to the concrete tank manufacturers and ultimately, the facility owner. The significantly streamlined RWTS and Provisional and Innovative (P&I) approval renewal process reduced the costs to the State government and the product manufacturer. We can expect that some portion of the manufacturer's costs would have been passed on to the facility owner so, although the *quantifiable* costs to the facility owners have not changed, the significant reduction of the burden on manufacturers will also benefit the ultimate consumers of the products. These revisions resulted in an overall lower cost for the revised 18E rules. The revisions made to the 15A NCAC 18E rules based on the public comments do not increase the risk to public health and the environment. Many changes are a return to the current rule language which continues to protect public health and the environment. See the Alternatives section for more detail on the major revisions made in response to public comments.

Table 1 summarizes the costs and benefits of the proposed 15A NCAC 18E rules projected for the first five years, as revised based on the public comments. A summary of the net impact of the original rule proposal is also presented for comparison.

Table 1. Benefits and Costs Summary, Including Net Present Value

BENEFITS	YR 1	YR2	YR 3	YR 4	YR 5
State Gov't, OSWP					
*Risers, filters, and pipe penetrations new approvals fees	$80	$80	$80	$80	$80
Wastewater flow reduction from expanded facility list			Unquantified		
Local Gov't, LHDs					
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		
Increased design flow for Advanced Pretreatment system siting			Unquantified		
Wastewater flow reduction from expanded facility list			Unquantified		
Passed-on manufacturer benefits			Unquantified		
Reclaimed water option for beneficial use			Unquantified		
Manufacturer					
Piggyback control panel revenue	$871,380	$949,230	$1,017,456	$1,072,474	$1,108,728
Grease tank capacity increase revenue	$247,200	$254,616	$262,254	$270,122	$278,226
Simplified, more flexible approval process for new technologies			Unquantified		
Increased design flow for Advanced Pretreatment system siting			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	$0	$0	$0	$0	$0
*Risers, filters, and pipe penetrations approvals	$8,000	$8,000	$8,000	$8,000	$8,000
All Parties and General Public					
Reclaimed water option for beneficial use			Unquantified		
Fewer system malfunctions (Human health, environmental, and business benefits)			Unquantified		
Total Benefits	**$6,549,310**	**$6,689,711**	**$6,821,435**	**$6,940,201**	**$7,039,534**

COSTS	YR 1	YR2	YR 3	YR 4	YR 5
State Gov't, OSWP					
*Plastic and fiberglass tank approval time	$952	$979	$1,006	$1,033	$1,061
*Risers, filters, and pipe penetrations new approvals time	$102	$104	$107	$110	$113
Risers, filters, and pipe penetrations renewals time	$241	$257	$273	$289	$306
RWTS and P&I renewals time	$1,650	$1,762	$1,944	$2,203	$2,546
Local Gov't, LHDs					
Existing system inspection time	$20,836	$22,691	$24,224	$25,416	$26,232
Structural verification test - stronger enforcement	$0	$0	$0	$0	$0
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	$871,380	$949,230	$1,017,456	$1,072,474	$1,108,728
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		
Reclaimed water option for beneficial use			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	$0	$0	$0	$0	$0
Concrete tank design change	$0	$0	$0	$0	$0
*Risers, filters, and pipe penetrations approvals	$8,600	$8,600	$8,600	$8,600	$8,600
Risers, filters, and pipe penetrations renewals	$4,560	$4,720	$4,880	$5,040	$5,200
RWTS and P&I renewals	$10,800	$11,200	$12,000	$13,200	$14,800
Total Costs	**$7,105,516**	**$7,256,623**	**$7,399,202**	**$7,528,959**	**$7,639,396**

*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

Proposed Rules as Revised per Public Comments

NET QUANTIFIED IMPACT – Excludes unquantified costs and benefits	YR 1	YR2	YR 3	YR 4	YR 5
State Gov't	($3,410)	($3,601)	($3,863)	($4,202)	($4,630)
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	$32,620	$101,126	$159,830	$205,156	$231,554
Private Certifiers, Testers, and Inspectors	$5,372,750	$5,424,485	$5,477,945	$5,532,425	$5,587,100
General Public			Unquantified		
Net Impact	($556,206)	($566,912)	($577,766)	($588,758)	($599,862)
NPV, 2017$*	($2,363,465)				

*Calculated using a 7% discount rate

Original Rule Proposal

NET QUANTIFIED IMPACT - Excludes unquantified costs and benefits	YR 1	YR2	YR 3	YR 4	YR 5
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)				

V. ANALYSIS

To determine the fiscal impact of the proposed rules, information was collected from LHDs, OSWP staff, PEs, LSSs, and installers. LHDs were categorized into three groups based upon the number of authorized agents on staff (small LHDs: one or two; mid-size LHDs: three to four; large LHDs: five or more) that permit 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. LHDs from the three physiographic regions (mountains, piedmont, and coastal plain) were identified to capture fiscal impacts across the full range of soil conditions (and thus, system types) seen in the State. 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

The majority of proposed revisions constitute minor changes or technical corrections that ensure consistency across all the rules. These rules do not represent a change in intent, nor do they pose any additional fiscal impact on industry, State, or local governments. Although these rules are proposed as new rules, they will replace 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 Permit

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

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 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 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, Leak Testing, and Installation 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 .0805 – Tank Leak Testing and 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 Systems
15A NCAC 18E .0905 – Prefabricated Permeable Block Panel Systems
15A NCAC 18E .0906 – Sand Lined Trench 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

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 .1205 – Advanced Pretreatment Sand Lined Trench Systems
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 .1401 – Plans for Prefabricated Tanks
- 15A NCAC 18E .1402 – Tank Design and Construction
- 15A NCAC 18E .1406 – Modification, Suspension, and Revocation of Approvals

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

II. Rules clarified to reflect current practices

Over the past 28 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. The following rules have been updated to reflect the current knowledge base and accepted practices:
- 15A NCAC 18E .0901(a) – Conventional Wastewater Systems
- 15A NCAC 18E .1302(d) – Operation and Maintenance of Advanced Pretreatment Systems
- 15A NCAC 18E .1710 – 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 a limiting soil condition, and as much as 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 peer reviewed research on 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.

For conventional gravel dispersal fields, at least 24 inches of approvable soil below the ground surface is required based upon 12 inches of gravel in the trench and 12 inches of vertical separation to a limiting condition. Other trench products that measure less than 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. This would allow all trench products and dispersal systems to be treated equally. The on-site wastewater treatment system design will be dictated by the soil conditions and site features, not the current rule interpretation.

Because this rule change is merely a clarification of the current rules and how this specific requirement has been applied, there is no cost to OSWP or LHDs. This would affect homeowners positively as it would allow them a broader range of 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 preferred by consumers. Conversely, manufacturers may incur a cost if consumer preferences shift away from their product to a newly applicable product.

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

The current rules provide effluent compliance criteria for performance of advanced pretreatment systems. These criteria include evaluation of effluent sampling results from an advanced pretreatment system to determine whether the sample results meet effluent treatment standards. Evaluation of sampling results determines compliance for:

- initial product approval pursuant to G.S. 130A-343;
- continued product approval or advancement from Provisional to Innovative status; and
- individual site compliance.

The effluent compliance criteria in the current rules applies to a single *site* (such as a single-family home or a business) where advanced pretreatment is used as well as to the *product* approval (all advanced pretreatment systems installed under a given product P&I approval).

Use of advanced pretreatment allows OSWP and the LHDs to grant siting concessions (such as decreased horizontal or vertical setbacks or an increase in the soil loading rate) based upon dispersing a higher quality wastewater effluent to the drainfield. Any of these concessions results in increased potential risk to public health and the environment, so effluent from these systems is sampled on a regular basis to verify that the system meets the specified parameters.

For most single-family homes, effluent samples are collected once per year. Using the current criteria, if sample results for a single parameter are out of compliance, the site could be deemed out of compliance. Many simple things can cause an effluent sample to be out of compliance, such as a clump of solids in the effluent sample, excessive sample holding time, or improper sampling technique. When a sample result is out of compliance, the protocol includes provisions for resampling (at an additional cost to the owner) to demonstrate compliance.

OSWP engaged in an internal exercise to apply the current criteria to evaluate the performance of an advanced pretreatment system (product P&I approval). In doing so, OSWP demonstrated clearly that the interpretation of the criteria is not being consistently applied. Currently approved advanced pretreatment systems have difficulty meeting the requirements due in part to these differing interpretations of the current rules. The proposed rules reflect review of real world data from approved advanced pretreatment systems in North Carolina and will standardize criteria for compliance determination for both an individual site and a specific system P&I approval regardless of who conducts the evaluation. The modified compliance criteria still protect public health and the environment. OSWP may revoke a small number of existing products based on the proposed rules, however, this is expected to be an infrequent occurrence.

The compliance standards for advanced pretreatment systems have also been expanded to be used for new applications for P&I approval. This allows all advanced pretreatment systems to be evaluated based on the same criteria. Advanced pretreatment manufacturers will have a clearer target for showing that their

product complies with the rules. OSWP will also be better able to identify advanced pretreatment systems that are out of compliance through consistent evaluation of 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 (included with .1400 Rules in discussion)
15A NCAC 18E .1103 – Control Panels
15A NCAC 18E .1301 – Operation and Maintenance of Wastewater Systems
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 a new 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 new structure must meet the minimum horizontal setback requirements to the on-site wastewater treatment system and repair area. Many times, structures are built without confirmation that their proposed location meets these minimum horizontal setbacks, and construction may even occur directly over the system or repair area. These problems may not be revealed until the property is conveyed to a new owner or when the on-site wastewater system malfunctions. At that point, solutions may be limited. The existing system may be compromised beyond repair, or the repair area may have been compromised by construction and thus, no longer available. If no additional land is available, the property owner may have no options at all aside of permanent pump and haul.

To prevent these problems, the owner must apply to the LHD prior to the owner beginning construction to ensure that the on-site wastewater treatment system is not affected. The LHD can confirm that the location of the new structure meets setbacks to the on-site wastewater treatment system and provide written confirmation to county Building Inspections department prior to the release of the building permit. In the event that modifications to the on-site wastewater treatment system would allow the owner to proceed with proposed construction, the LHD can issue the appropriate permits.

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 many on-site wastewater treatment system malfunctions associated with structures placed or built on the on-site wastewater treatment system.

This rule helps clarify the minimum requirements and the process an owner and the LHD must follow in these situations. LHDs that already confirm new structure building permits may choose to modify their current procedures based on the proposed rule. The cost of these modifications are unquantifiable. Tables 2 and 3 show the projected costs to the private sector and the 5% of LHDs that will have to implement new processes for existing system inspections.

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

These proposals will also prevent delays in real estate transactions resulting from discovery of improperly located structures. If the existing on-site wastewater treatment system is under a structure, swimming pool, or deck, for example, the transaction 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 may terminate the transaction completely. The integrity of the wastewater system is central to the long-term value of the residence or structure itself.

With these rule revisions in place, appropriate setbacks will be maintained to protect the integrity of the on-site wastewater treatment system. Existing system inspections will have ongoing impacts. LHDs that do not have a program will incur costs to implement one and ongoing costs to maintain the program. The total number of existing system inspections performed by LHDs on an annual basis will vary, as it is based on the owner's decision to build additional structures on their lot. Table 4 summarizes the benefits associated with existing system inspections.

Table 2. Projected Cost Increases and Losses to LHDs for Existing System Inspections, Year One*

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**

*Values are presented in 2018 dollars.
**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.

Table 3. Private Sector Costs Associated with Existing System Inspections, Year One*

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**

*Values are presented in 2018 dollars.

Table 4. Summary of Benefits from Existing System Inspections

Private Sector Benefits (homeowner, consultants, operators, installers)
Ensures verification of location of existing on-site wastewater treatment system relative to proposed new construction Maintains appropriate setbacks to on-site wastewater treatment system to protect system integrity Reduces number of on-site wastewater treatment system malfunctions Precludes costs to repair malfunctioning on-site wastewater treatment systems Improves ability to sell house or business in the future Protects property owner's investment
Public Sector Benefits (LHD and OSWP)
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 controls. The piggyback control is an outdoor electrical outlet with a cover into which the pump is plugged. Piggyback controls have limited functionality aside of turning the pump on and off. It is estimated that over 30,000 on-site wastewater treatment systems use piggyback controls.

Problems associated with piggyback controls include: safety issues when used in a wet environment; cords exposed and subject to deterioration by sunlight or damage during yard maintenance; accessibility (sometimes piggybacks are installed at a very low elevation, at or near the ground surface); alarms not readily visible (device 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 receptacle to house all the wiring and the plug.

The 15A NCAC 18E rules propose to require control panels for all pump systems. Control panels provide many improvements over the piggyback controls. Control panels are NEMA 4X rated, meaning that the enclosure is resistant to water intrusion into the panel and subsequent corrosion. Control panels are larger than an outdoor electrical outlet, allowing for more room for operators to perform work within 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 and operate the pump directly from the panel.

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 assist in diagnosing problems 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 leaks that may allow 'extra' water (such as stormwater or groundwater) to infiltrate the system. 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 5 and 6 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 5. Projected Cost Increases for use of Control Panels for Pump Systems, Year One*

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)**

*Values are presented in 2018 dollars.
**Assuming a 3% increase in cost per year.

Table 6. Projected Benefits for use of Control Panels for Pump Systems, Year One*

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**

*Values are presented in 2018 dollars.
**Assuming a 3% increase in cost per year.

There is an initial cost for the control panel, but 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 using control panels will stay the same or increase with the number of systems. Table 7 shows the projected number of permits issued and the number with pump systems with control panels installed over a five-year period. Table 8 summarizes the benefits associated with using control panels for all pump systems.

Table 7. 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 8. Summary of Benefits from Control Panels

Private and Public Sector Benefits
Increased safety Ability to troubleshoot malfunctions when they do occur Ability to identify problems before they result in a system malfunction Ease of accessibility

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

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

The on-site wastewater treatment system classifications for operation and maintenance in the current rules have not kept pace with the different systems approved by OSWP. As the on-site wastewater treatment system increases in size or complexity, the system classification also increases along with the frequency of operator visits and LHD compliance inspections. As recent technologies have been approved,

guidance has been provided to the LHDs, operators, and manufacturers regarding the on-site wastewater treatment system classifications for operation and maintenance.

In the proposed rules, the list of on-site wastewater treatment system classifications is expanded to codify in rule the guidance OSWP has been distributing for years. The system classifications are now described more broadly so that newly-approved technologies will fit more readily into the proposed system classification table. The expanded list reflects the current status of on-site wastewater treatment system classifications for operation and maintenance. This makes it easier for LHDs, owners, operators, and consultants to determine the frequency of required operator inspection.

The LHDs are required under the current rules to inspect certain on-site wastewater treatment systems at specified frequencies. These systems include those with pumps (Type IIIb, IVa, and IVb), advanced pretreatment (Type V and VI), drip dispersal (Type V), or with 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 there is no malfunction.

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.

The proposed rules provide the LHDs with two options for compliance inspections required for certain Type III on-site wastewater treatment systems: LHD staff or allow the owner to contract with a private certified subsurface operator.

Owners of systems classified as Type IIIb (on-site wastewater treatment systems with a single pump) or IIIh (gravity groundwater lowering systems) are not required to contract with a private certified subsurface operator for operation and maintenance. However, they are required to have a five-year compliance inspection by the LHD.

As part of the proposed rules, at the LHD's discretion, the owner may engage a private certified subsurface operator to perform the five-year compliance inspection. By providing another option under which these inspections can be performed, there is a greater chance of finding malfunctioning on-site wastewater treatment systems and repairing them.

The LHDs will still be responsible for conducting compliance inspections on all 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, houses will be disconnected from 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 and unpredictable.

It is uncertain how many LHDs will opt to allow owners to hire a private certified subsurface operator to inspect Type IIIb and IIIh systems. LHDs that are not currently conducting compliance inspections will not lose any money since they are currently not collecting any fees for this service. If the LHD has a compliance inspection program in place but elects to offer owners the option to go to the private sector, any staff time savings from this option will be offset by lost inspection fee revenue. Tables 9 and 10 below show the net costs to LHDs and facility owners if 50% of the LHDs allow owners to hire a certified subsurface operator, as well as the net savings for private owners. This is an upper-bounds estimate.

By having owners use a private certified subsurface operator to inspect the system, LHDs that have not been conducting compliance inspections will gain information on the on-site wastewater treatment system and learn about malfunctions that may have occurred for years without any action taken.

For owners who currently do not pay any fees for a LHD compliance inspection, this will be a 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 certified subsurface operators.

Table 9. Projected Facility Owner Costs Based Upon Using a Certified Subsurface Operator for Type IIIb and IIIh Inspections, Year One*

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)**

*Values are presented in 2018 dollars.
**Inspections must occur every 5 years

Table 10. Projected Benefits to Private Certified Subsurface Operators, Year One*

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**

*Values are presented in 2018 dollars.
**Inspections must occur every 5 years

These will be ongoing impacts, dependent upon LHDs decision to allow owners to hire a certified subsurface operator as well as dependent upon the number of systems installed. Table 11 shows the projected number of Type IIIb and IIIh systems over a five-year period, assuming that Type IIIb and IIIh will account for 15% of all existing systems. Table 12 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 11. 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 12. 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 Precludes costs to repair malfunctioning on-site wastewater treatment 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 .1403 – Tank Material Requirements
Rule 15A NCAC 18E .1404 – Plans for Risers, Effluent Filters, and Pipe Penetrations

Tanks are a component 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 food service establishments or other facilities expected to have significant amounts of fats, oil, and grease in their waste stream. 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, or the design daily flow is greater than 3,000 gallons/day.

Grease Tank Capacity Requirement

Greases tanks are used to separate and remove the grease from wastewater generated by food service facilities. The disinfection methods used in commercial kitchen dishwashers (chemicals and high water temperature) keep the grease in suspension in the wastewater for a much longer period of time than typically occurs in a household kitchen. The wastewater needs sufficient time to cool so that the grease can congeal in the grease tank, so grease tanks generally need longer retention times than septic tanks. One way to increase retention time is to add additional tank compartments or tanks in series to the current grease tank size.

Removing the grease from the wastewater reduces the risk of early malfunction for systems serving food service facilities. Food service facilities are at a higher risk for early on-site 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. The grease 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.

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

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[3]. This is based on a second 1,000 gallon grease tank, which is what would be required at a minimum. The total grease tank capacity is based on the design flow which is project

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

specific. Tables 13 and 14 project the private sector costs associated with the increase in grease tank capacity.

Table 13. Summary of Costs from Grease Tank Capacity Changes, Year One*

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

*Values are presented in 2018 dollars.
**Assuming a 3% increase in cost per year.

Table 14. Summary of Benefits from Grease Tank Capacity Changes, Year One*

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

*Values are presented in 2018 dollars.
**Assuming a 3% increase in cost per year.

Tank Material Requirements

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 must demonstrate that the tank will provide equivalent treatment and performance to the concrete tanks.

Although 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 use occurs in the western part of North Carolina. There are many sites in the mountains that a concrete tank truck cannot reach, and a tank must be carried onto the site. Plastic tanks can be carried onto the site. Fiberglass tanks are occasionally seen on large (over 3,000 gallons/day) systems. Fiberglass tanks cannot compete cost wise in the single-family home market, and are more expensive than plastic and concrete tanks. For on-site wastewater treatment systems with a design flow over 3,000 gallons/day, 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.

Tank structural integrity testing is a way to spot check and confirm that the tanks installed meet the minimum rule requirements. OSWP strongly encourages the LHD to routinely spot check concrete tanks for strength. A Schmidt Rebound hammer or equivalent is used by OSWP and LHDs to check concrete strength. 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 most manufacturers are already 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 unless they are specifically approved.

The approximate cost for a manufacturer to obtain approval for a plastic or fiberglass tank under the proposed rules is $30,000. The third party cost to maintain this national 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 15, 16, 17, 18, and 19 identify the private sector costs associated with plastic or fiberglass tanks obtaining and maintaining approval.

Table 15. Manufacturer Cost due to Plastic or Fiberglass Tank Approvals, Year One*

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

*Values are presented in 2018 dollars.

Table 16. Manufacturer Ongoing Cost due to Approvals, Year Two 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 17. Private Sector Benefits due to Plastic or Fiberglass Tank Approvals, Year One*

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**

*Values are presented in 2018 dollars.

Table 18. Private Sector Benefits due to Approvals, Year Two 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 19. Public Sector Costs to Review Initial Plastic or Fiberglass Tank Approvals, Year One

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

*Values are presented in 2018 dollars.
**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.

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 PE 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.

Plans for Risers, Effluent Filters, and Pipe Penetrations

Risers, effluent filters, and pipe penetrations 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 tanks, effluent filter cleaning, 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 and cooking grease) in the tank and prevent the scum layer from moving on through the system to the drainfield. Cast-in-place pipe penetrations provide for some flexibility with the pipes that 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.

OSWP 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 OSWP. This guidance is now included in the proposed rules. By including this guidance in the proposed rules, the manufacturers can easily identify the information required when applying to OSWP for review and approval.

The average cost to a manufacturer to apply for and receive approval of an effluent filter, riser, or pipe penetration 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 OSWP. Tables 20, 21, and 22 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 include a provision that all effluent filter, riser, and pipe penetration approvals will expire every year. The manufacturer will be required to submit a renewal form to OSWP with updated contact information and a notarized statement that the products have not changed from the previous year. This allows OSWP to verify contact information, that the products still meet current material standards, and are performing as anticipated by the product manufacturer.

Tables 23 and 24 project the fiscal impact to effluent filter, riser, and pipe penetration manufacturers and OSWP for approval renewals every year. The projected costs are over a five-year period.

Table 25 summarizes the benefits associated with all of the proposed tank rule changes.

Table 20. Projected Private Sector Costs for Effluent Filters, Risers, and Pipe Penetration New Approvals, Year One*

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)**

*Values are presented in 2018 dollars.

Table 21. Projected Private Sector Costs for Effluent Filters, Risers, and Pipe Penetration New Approvals, Year One*

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**

*Values are presented in 2018 dollars.

Table 22. Projected OSWP Costs for Effluent Filters, Risers, and Pipe Penetration New Approvals, Year One*

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)**

*Values are presented in 2018 dollars.
**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 23. Projected OSWP Costs for Effluent Filters, Risers, and Pipe Penetration Approval Renewals, Year One*

OSWP Staff Projected Fiscal Impacts, Annualized	
Number of Effluent Filter, Riser, or Pipe Penetration Product Renewals per Year	7
Total Cost in Man Hours for Approval Renewal by Engineer (Number of Approval Renewals x 0.5 man hours x Hourly Compensation**)	($222)
Net Annualized Cost to OSWP	**($222)**

*Values are presented in 2018 dollars.
**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 Private Sector Costs for Effluent Filters, Risers, and Pipe Penetration Approval Renewals, Year One*

Manufacturer Projected Cost Increases, Annualized	
Number of Effluent Filter, Riser, or Pipe Penetration Product Renewals per Year	7
Average Private Sector Cost to Collect Information and Write Report ($200/renewal)	$1,400
Total Annualized Cost to Manufacturer	**($1,400)**

*Values are presented in 2018 dollars.

Table 25. Summary of Benefits from All 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 P&I system has received approval for their product, the manufacturer has that approval forever. OSWP has 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.

Under the proposed rules, the RWTS and P&I approvals will expire on December 31 every year. The manufacturer will need to submit a one-page renewal form to OSWP with updated contact information and a notarized statement that the products have not changed from the previous year. This allows OSWP to verify contact information and that the products continue to perform as anticipated by the product manufacturer.

Additionally, 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 LHDs submit this report to OSWP monthly. This information will assist OSWP with identifying the number of approved products being installed and product performance.

The costs for completion and review of the renewal form are projected in Tables 26 and 27. 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 P&I approvals issued was two per year. 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 28 summarizes the benefits associated with approval renewals for RWTS and P&I approvals.

Table 26. Projected OSWP Fiscal Impacts for Residential Wastewater Treatment System and Provisional and Innovative Approval Renewals, Year One*

OSWP Staff Projected Fiscal Impacts, Annualized

Number of P&I Approval Renewals to Review	43
Number of RWTS Approval Renewals to Review	9
Total Cost in Man Hours for Approval Renewal by Engineer (Number of Approval Renewals x .5 man hours x Hourly Compensation**)	($1,650)
Net Annualized Costs to OSWP	**($1,650)**

*Values are presented in 2018 dollars.
**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 27. Projected Private Sector Fiscal Impacts for Residential Wastewater Treatment System and Provisional and Innovative Approval Renewals, Year One*

Private Sector Projected Cost Increases	
Number of P&I Approval Renewals to Review	43
Number of RWTS Approval Renewals to Review	9
Average Private Sector Cost to Collect Information and Write Report ($200/report)	($10,400)
Total Cost to Private Sector (Number of Approval Renewals x Report Cost)	**($10,400)**

*Values are presented in 2018 dollars.

Table 28. 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 .0601 – Location of Wastewater Systems
15A NCAC 18E .0801(b) – Septic Tank Capacity Requirements
15A NCAC 18E .0908 – Drip Dispersal Systems (discussed with Rule .1204 and Section .1600)
15A NCAC 18E .1002 – Reclaimed Water 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
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 – Septic Tank 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, especially with the use of extreme low-flow fixtures, may result in wastewater strength that is greater than domestic strength, which is clarified in the proposed rules.

The expanded facility list in Rule .0401 will help LHDs calculate design daily flows in a shorter time frame. For facilities that are not currently listed, the LHD consults with OSWP to determine a design flow. Sometimes this can take a couple of days to research (to be consistent with what 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 in Rule .0402 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, OSWP, LHDs, 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 Section .0400 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 or hire a consultant to determine the impact on the environment for the facility expansion. This will be site specific and vary based on the type of soil, wastewater characteristics, and site characteristics (wells, 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 account 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". The proposed rules require that whenever a flow reduction is requested, the wastewater strength is also

evaluated. The evaluation could include advanced pretreatment or a determination of the impact of the increased wastewater strength on the environment.

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 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[4] and the number of existing assisted living and nursing homes exceeds 1,000.[5] Only a fraction of these existing facilities utilize on-site wastewater treatment systems and 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 an additional $26.50/gallon of wastewater treated 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. The on-site wastewater treatment systems with advanced pretreatment are more likely to have much longer life span. Since the wastewater strength will be lower, the drainfield will be more likely to have a standard on-site wastewater treatment system life span or even to possibly exceed it.

[4] 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

[5] 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

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 and the advanced pretreatment system is meeting domestic strength limits, more wastewater could be discharged to the system without needing to expand the drainfield at all.

Overall, the impact to 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 29 summarizes the associated benefits from the proposed changes to design daily flows and effluent characteristics.

Table 29. 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 .0601 – Location of Wastewater Systems

Under the current rules, an on-site wastewater system must be located a minimum of 100 feet from a private drinking water well on an individual site. That distance may be reduced to 50 feet, but no less than 50 feet, based on space limitations or to repair a failing on-site wastewater system. This reduction in a horizontal setback still protects the public health and the environment but recognizes that space limitations can occur on individual lots. There is one exception to the above allowance, and that is when the on-site wastewater system is installed in saprolite. Saprolite is decomposed weathered rock that is located above bedrock and beneath soil. Saprolite is generally found in the piedmont and mountain regions.

Several comments were received by OSWP suggesting allowing the reduction from 100 feet to 50 feet for on-site wastewater systems installed in saprolite. After reviewing the scientific research conducted by professors at North Carolina State University, OSWP has determined that water primarily moves vertically in saprolite. OSWP agreed that the horizontal setback should be reduced from 100 feet to 50 feet for saprolite systems, similar to what is done for other on-site wastewater systems.

It is impossible to determine the number of sites this will impact. These sites would have been denied due to a lack of available space for the on-site wastewater treatment system to meet all the current rules. This proposed rule change will allow sites that would have previously been denied or would require a more expensive system to have a conventional on-site wastewater system installed.

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

Sometimes, the plumbing from the facility exits 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 septic tank for the on-site wastewater treatment system. The grinder pump station is permitted by county Building Inspections departments and often the on-site wastewater treatment system is already installed and in use when the grinder pump station is discovered by the LHD.

Grinder pumps do exactly when their name implies. The pump grinds up the solids in the wastewater as part of the pumping process. Septic tanks are designed for a minimum wastewater retention time to allow a significant portion of the solids in the wastewater to settle out. The smaller-sized particles resulting from use of a grinder pump tend to stay in suspension within the septic tank. This can increase the amount of solids and organic matter that is discharged to the drainfield and can result in premature system failure.

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 PE 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 county Building Inspections departments, 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 a LHD discovers a grinder pump station when a problem occurs, the best corrective action in most cases will be to install a second septic tank in 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[6]. Table 30 summarizes the associated benefits from increasing septic tank capacity when a grinder pump is used.

Table 30. 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)

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

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

.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 a P&I approval under Rule 15A NCAC 18A .1969. In the proposed 18E rules, Rule .1969 is now Section .1700. The P&I 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 P&I approval helps expedite the permitting process in many ways. The P&I approvals also specify when a licensed professional, (such as a PE or LSS) is required.

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

The existing criteria from the P&I approval are being proposed for adoption in these rules. The fiscal impact of adding the drip dispersal system P&I approval information to the proposed rules is a neutral or positive change for drip dispersal system manufacturers. The information and standards the products must meet are 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. By adding this information to the proposed rules, OSWP is providing transparency to and streamlining the P&I approval process.

The approximate cost for a manufacturer to obtain P&I approval for a drip dispersal system under the proposed rules is unquantifiable. While the current criteria for P&I approval are in the proposed rules, the P&I 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 P&I approval was issued, a total of six drip dispersal P&I approvals have been issued. At the most, one new application might be received over the next five years for a new drip dispersal P&I approval. Table 31 summarizes the benefits associated with adding drip irrigation to the proposed rules.

Table 31. Summary of Benefits with Adding Drip Irrigation

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

Rule 15A NCAC 18E .1002 – Reclaimed Water Systems
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/Day and Less Than or Equal to 3,000 Gallons/Day

Advanced pretreatment systems are used on sites with moderate to severe soil and site limitations. The soil depth may be so limited that a conventional 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.

Reclaimed Water Systems

OSWP has added reclaimed water systems to the proposed rules. Reclaimed water systems are defined as treated wastewater effluent meeting established standards and using the effluent for beneficial reuse. Beneficial reuse means that the water is being used in a beneficial manner and to conserve the State's water resources by reduced the use of potable, surface, and groundwater resources. Some examples of beneficial reuse include toilet flushing and irrigation of lawns or flower beds.

Industry stakeholders advocated the addition of reclaimed water systems to the proposed rules. There is an increased cost associated with treating the wastewater to a higher effluent standard. Reclaimed water systems, though, allow the owner a cost savings with regards to the use of potable water. Golf courses use a significant amount of water to irrigate the greens. Many times, the water used for irrigation is potable water. Using a reclaimed water system, the owner can reduce the amount of potable water used for irrigation and use reclaimed water to irrigate the greens. Besides saving the owner potable water costs, the use of reclaimed water is conserving water resources.

Due to the cost associated with reclaimed water systems, including long term operation, maintenance, and management, it is unlikely these would be used for single family residences. These will more likely be used for larger systems where the added cost for reclaimed water is not a significant portion of the overall wastewater system cost.

OSWP and LHDs already have the infrastructure in place to deal with review, permitting, and inspection of reclaimed water systems (another type of advanced pretreatment system).

During the last drought, OSWP received many requests about using wastewater effluent for lawn irrigation and other beneficial purposes, to reduce the use of potable water. Although a drought is not currently in progress, OSWP and the on-site wastewater industry recognize that when another drought comes to North Carolina, this is going to be one way to conserve potable water that owners will be asking for. The option to permit these systems needs to be included now, while OSWP is updating the rules, so that everyone in the on-site wastewater industry is ready for the next drought.

The ability to conserve potable water, whether during a drought or not, is an unquantifiable fiscal impact that has a net overall positive impact on North Carolina and its water resources.

Advanced Pretreatment System Standards

Two changes were made to the effluent quality standards in the proposed rules, and both relate to the total nitrogen limit. The total nitrogen limit in the current rules is less than or equal to 20 mg/L or greater than 60% removal. The effluent standard was changed from 20 mg/L to 30 mg/L for on-site wastewater system with a design daily flow up to 3,000 gallons/day and the "60% removal" provision was removed from the proposed rules.

The increase in total nitrogen was made based on input from stakeholders, and data collected by OSWP also supports this change as well. Research has been done on the impact of on-site wastewater treatment systems on the environment in the past five to 10 years. The research has primarily evaluated nitrogen and phosphorus, and in most cases, the on-site wastewater treatment systems do not include advanced pretreatment to reduce the nitrogen. While there is an impact from on-site wastewater treatment systems, it is not as significant as generally assumed, and the soil treats the wastewater effluent as it travels through the subsurface. Based on this knowledge and knowing that advanced pretreatment systems reduce the amount of nitrogen discharged to the subsurface, OSWP does not believe that increasing the nitrogen limit will not impact public health and the environment.

Many advanced pretreatment systems generate effluent that meets the 30 mg/L standard today. The effluent standard change does help the homeowner. The homeowner will not be penalized because their on-site wastewater treatment system is not meeting the effluent standards.

Most 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 blends with incoming wastewater. Since the 'unreduced" concentrations have been diluted, it is difficult to determine the percent removal of total nitrogen. Removal of the 60% standard allows a more straightforward determination of whether or not the on-site wastewater treatment system is in compliance with the effluent standard.

Siting and Sizing Criteria for Systems with a Design Daily Flow Less Than or Equal to 1,500 Gallons/Day

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

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 – Wastewater Sampling Requirements for Advanced Pretreatment Systems, Including Reduced Sampling Requirements
.1710 –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 P&I 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, but approved using this process, 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 P&I 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

Two alternatives are listed below. Both of these alternatives were included in the proposed rules that posted for public comment last fall. The revised rules include changes to these alternatives based on comments received during the public comment period.

Alternative #1: Increased concrete tank strength and three cast-in-place inlet pipe penetrations

The proposed rules included an increase in concrete strength, from 3,500 psi to 4,000 psi, and a requirement for three cast-in-place inlet pipe penetrations. These design and material increases had a significant impact on the overall cost to an on-site wastewater system. While the costs per tank were only $165, the overall cost to the industry was significant. After reviewing comments and meeting with stakeholders, the potential improvements in overall tank design would not necessarily outweigh the costs to implement these design changes. 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 tanks to the next level. The revised rules do not include these requirements.

Alternative #2: Product re-approvals for compliance with the rules

The proposed rules included a provision for product approvals to expire every five years, with the manufacturer re-applying for approval. The manufacturer would provide documentation to support the re-approval of their product. After reviewing the comments and meeting with stakeholders, a compromise was suggested by one of the stakeholders. Washington State has an annual re-approval process for all their approved products. The re-approval process is just an application with current contact information and a notarized signature under a statement verifying that the product has not changed. This approach, or one very similar to it, was a reasonable compromise. Manufacturers would not have to collect and submit detailed information regarding their product performance and OSWP received current contact information and verification from the manufacturer that the product had not changed. The cost for the scaled down re-approval process would be significantly less to both the public and private sectors.

VII. UNCERTAINTY AND RISK ANALYSIS

The following items have the greatest uncertainty in this analysis: the number of new building permits, 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 must come up with new sources of revenue. Table 33 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 estimated net cost of the rules would increase by approximately $21,000 under the high-permit scenario, and the net cost would be approximately $22,000 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 daily. 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 which 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 32 below).

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 (within a range of 100-200) 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. Because the additional cost to the facility owner for installing a second grease tank is an equivalent benefit to the manufacturer, the number of grease tank installations has a neutral effect on the net impact of the rule from a statewide perspective.

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. Most 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.

In the Sensitivity Analyses, the overall Net Impact over five years has decreased since the overall cost to implement the rules has decreased compared to the original rule proposal. The difference from the model for Annual Type IIIb and IIIh inspections stayed the same, but the overall Net Impact decreased from the previous fiscal note. The difference from the model changed for the Annual number of new septic tanks

based primarily on the reduction in tank material cost. That reduced the overall impact on implementing the rules.

Table 32 shows the impact of the sensitivity analysis on the Net Present Value for 15A NCAC 18E.

Table 32. Sensitivity Analysis on Net Economic Impact (Net Present Value)

SENSITIVITY ANALYSES

Annual New Septic Tank Permits	**YR1**	**YR2**	**YR3**	**YR4**	**YR5**
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, 5 yrs**	**Difference from Model**
High Range	($2,384,358)	($20,893)
Modeled Range	($2,363,465)	$0
Low Range	($2,341,174)	$22,291

Annual Type IIIb and IIIh Inspections - LHD Completion Rate	**Net Impact, 5 yrs**	**Difference from Model**
10%	($330,966)	$2,032,499
30%	($1,347,216)	$1,016,250
50%	($2,363,465)	$0
70%	($3,379,715)	($1,016,250)
90%	($4,395,964)	($2,032,499)

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.[7] 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%

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

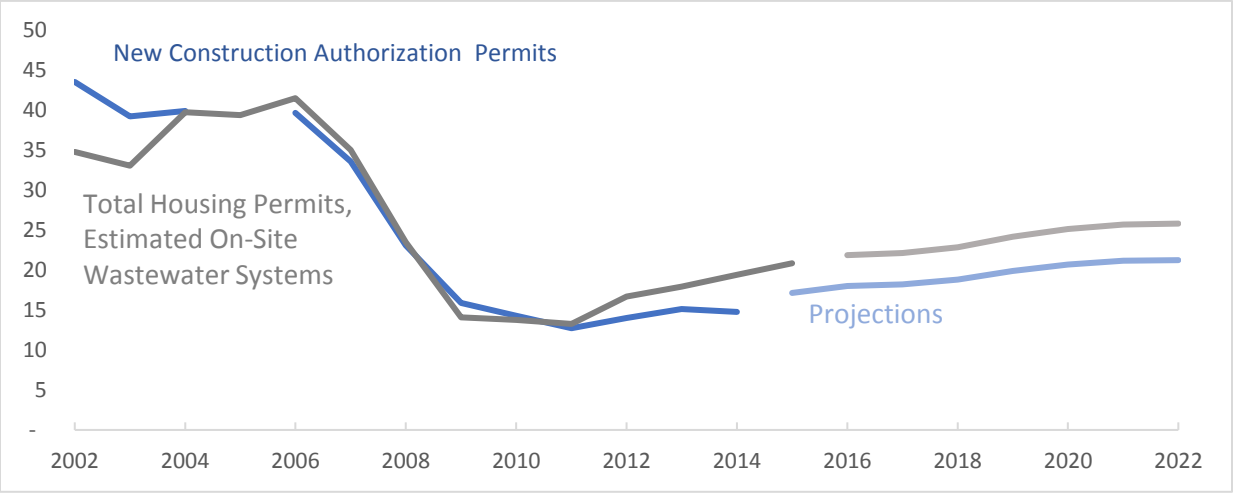
2018	18,801	3%
2019	19,903	6%
2020	20,679	4%
2021	21,152	2%
2022	21,237	.4%
2023	21,387	.7%

*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,[8] weighted by county population growth projections.[9] The total number of projected building permits was multiplied by the percent of households in each county using on-site wastewater treatment systems[10] 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



[8] IHS Connect (September 2016). *State Analysis: Forecast Data: Annual Data – North Carolina.* Accessed at https://www.ihs.com/index.html.
[9] NC Office of State Budget and Management (2016). *Annual County Population Totals 2017-2021*. Accessed at http://www.osbm.nc.gov/demog/county-projections.
[10] 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.