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## MEMORANDUM

TO: ENVIRONMENTAL REVIEW COMMISSION  
The Honorable Trudy Wade, Co-Chair  
The Honorable Jimmy Dixon, Co-Chair  
The Honorable Chuck McGrady, Co-Chair

FROM: Mollie Young, Director of Legislative Affairs

SUBJECT: Coastal Stormwater Study Report

DATE: April 1, 2016

Pursuant to Section 4.19 of Session Law 2015-286, the Department is required to evaluate the water quality of surface waters in the Coastal Counties and the impact of stormwater on this water quality, including determining the maximum allowable built-upon area for the low density state stormwater option as directly related to the length of grassed swale treatment length. The Department is required to report the results of its study, including recommendations, no later than April 1, 2016. The attached report satisfies these requirements.

If you have any questions or need additional information, please contact me by phone at (919) 707-8618 or via e-mail at [mollie.young@ncdenr.gov](mailto:mollie.young@ncdenr.gov).

cc: Tom Reeder, Assistant Secretary for Environment, DEQ  
Tracy Davis, Director of Energy, Mineral, and Land Resources, DEQ



# **Report on Stormwater Program**

## **To fulfill the requirements of Session Law 2015-286**

**Update on Stormwater Rule Review & Readoption**  
**Study of Coastal Water Quality and Options for Protection**  
**Summary of Current Stormwater Statutes, Rules and Guidance**



**April 1, 2016**

**Prepared by:**  
**North Carolina Division of Energy, Mineral, and Land Resources**  
**Stormwater Permitting Program**

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# Summary of Key Points

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## **#1: The MDC Team has done an Excellent Job updating the State’s Stormwater Program**

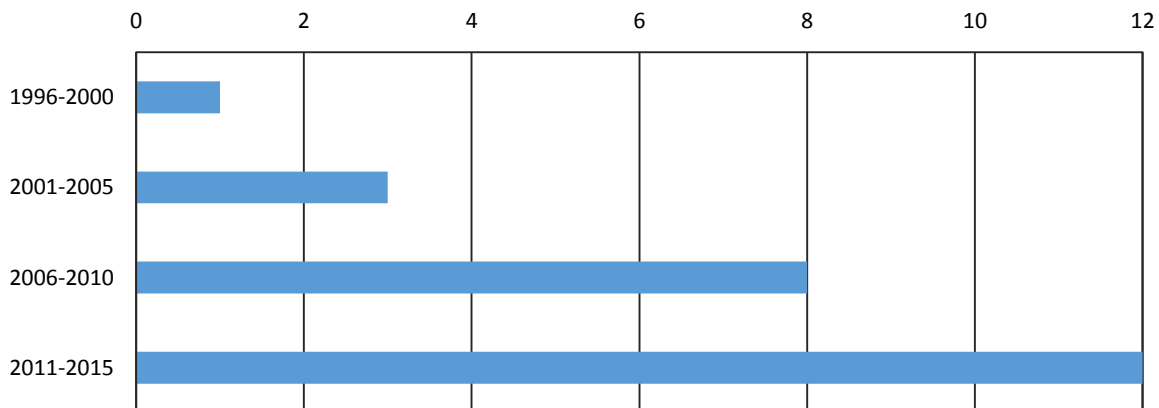
The General Assembly set forth a reasonable process in SL 2013-82 for the Department of Environmental Quality (DEQ) to update its stormwater program with the creation of the Minimum Design Criteria (MDC) Team. Although the one and one half year MDC development process resulted in numerous meetings and lengthy discussions, the MDC Team was able to create more cost-effective and technically sound stormwater management requirements than DEQ staff could have generated working alone or with only the university. DEQ plans to re-convene the MDC Team whenever stormwater program issues arise in the future and are pleased with the resulting package of stormwater rules that are currently moving through the rules review and readoption process. DEQ staff have presented the MDC and associated fast tracking permitting rules at numerous workshops and conferences since Spring 2015 and has received nearly unanimous support for these stormwater program updates.

## **#2: There is Flexibility in the Stormwater Rules for Alternative Designs**

Both the current and proposed stormwater rules offer flexibility for DEQ staff to consider and approve stormwater designs that vary from rule requirements when water quality is still protected. Applicants also have the ability to appeal staff decisions on permits to supervisors. DEQ staff regularly works with applicants to understand and explore the flexibility provided in the rules. No two projects are alike and nearly every site offers unique opportunities to treat stormwater in a manner that reduces cost.

The number of Session Laws (SL) related to stormwater has been significantly increasing during the past 20 years. Having part of the stormwater program in administrative code and part in SL can be difficult for the regulated community. When SLs are passed, they do not always fit cohesively together into the existing stormwater program. DEQ believes the State would be better served by providing flexibility for special projects and referring overriding issues to its MDC team of experts to determine how to best include these concerns in the administrative code.

**Figure 1: Number of Ratified Session Laws related to Stormwater**



### ***#3: Vegetated Swales are not the Best Option for Protecting Coastal Water Quality***

Vegetated swales act as direct conveyances to coastal waters not only for stormwater, but for all of the pollutants contained in that stormwater. The fecal coliform standard for shellfish waters is a geometric mean of **14** CFU/100 ml<sup>1</sup>. NCSU researchers found fecal coliform counts in stormwater vary from **230 to 9,500** CFU/100 ml (Hathaway and Hunt, 2008). Therefore, any direct discharge of stormwater to coastal waters can compromise their quality. Rather than encouraging vegetated swales, the proposed coastal stormwater and MDC rules have numerous new provisions that promote infiltration of stormwater. This is not only the best way, but probably the only way, to protect coastal resources.

Some of the ways that the proposed stormwater rules encourage infiltration include:

- Encouraging low density projects to disconnect as much of their built-upon areas as possible to allow stormwater to soak into the ground. This has the added benefit of reducing the amount of space taken up by vegetated swales.
- Allowing more flexibility in the design of infiltration systems. Designers can now account for the infiltration of stormwater during the storm event, which can reduce the footprint of the infiltration system. In addition, infiltration systems no longer have to be designed off-line, which eliminates the expense of designing, building and maintaining a flow separation device. In fact, designers may now use the infiltration system (on a voluntary basis) to help with flood control if this is required by a local government, eliminating the need for a second flood control structure.
- Providing a credit for disconnecting impervious surfaces upslope of stormwater control measures, since this will result in some infiltration of stormwater (and thus that stormwater will not be delivered to the stormwater control measure).

### ***#4: SA Waters (shell fishing waters) should retain a 12% Threshold for High Density, but the MDC Team Has Proposed Other Relief<sup>2</sup>***

Because untreated stormwater has been shown to exceed the fecal coliform standard for shellfishing by **16 to 50 times**, DEQ believes that it is crucial to retain the low density limit for SA waters at the current level of 12 percent. However, the MDC Team has proposed reducing the size of stormwater control measures from the 1-year, 24-hour storm (about 3.8 inches, depending on the location) to the 95<sup>th</sup> percentile storm (about 2.5 inches, depending on the location). The new MDC also reduce the cost of SCMs.

Please note **there is not a limit on built-upon area in SA waters**, just a threshold for when a project requires an Stormwater Control Measure (SCM). Developers have the prerogative to choose the percentage of built-upon area they would like on their projects in an SA watershed as long as they provide SCMs on projects that exceed 12 percent built-upon area.

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<sup>1</sup> CFU means colony forming unit, a unit used to estimate the number of bacteria in a sample. Counting with colony-forming units requires filtering the sample, placing it on a culture (food source) and counting the number of colonies that form. The colony has to grow significantly in order to be seen in the culture. The geometric mean is a mathematical method for “evening out” the very high and very low readings.)

<sup>2</sup> SA waters must be suitable for commercial shellfishing and all other tidal saltwater uses

# Chapter 1: Update on Stormwater Rules Review & Re-Adoption

Response to: **4.20.(a) Section 3 of S.L. 2013-82** reads as rewritten: "SECTION 3. The Environmental Management Commission shall adopt rules implementing Section 2 of this act no later than ~~July 1, 2016.~~ November 1, 2016."

The Minimum Design Criteria (MDC) Team has worked diligently to draft new stormwater rules to meet S.L. 2013-82 and G.S. §150B-21.3A within the timeframe set by the NC General Assembly. Specifically, the MDC Team met 18 times for 5½ hours at each meeting (from March 2014 until August 2015). MDC Team members include professional engineers, the Home Builders Association, the construction industry, a soil scientist, a landscape architect, several local government engineers, two professors, two environmental advocates, NCDOT and NCDEQ. A complete list of members appears in Appendix A.



The MDC Team met its deadlines to establish MDC<sup>3</sup> for stormwater control measures (SCMs) and a Fast-Track Stormwater Permitting Process. In addition, the MDC Team assisted DEQ stormwater staff in a complete overhaul of all of the state stormwater rules. See the main rule changes below.

### State Stormwater Rule Changes:

- Better organization
- Updated design standards
- Removal of requirements that are not necessary to protect water quality
- More flexibility for designers with more trust placed in licensed professionals

<sup>3</sup> The MDC Team agreed on this definition: Minimum Design Criteria (MDC) are design standards that must be met to ensure that an SCM functions in perpetuity to protect water quality standards and achieves the pollutant removal rates associated with the system. The MDC apply to SCMs regardless of the geographic location of the system, the stormwater program requirements to which it is subject or whether the SCM is being reviewed under the fast-track or regular review process.

DEQ staff has furthered the work of the MDC Team by:

- Creating a website to share the rules with the regulated community.
- Presenting the rules package at over a dozen workshops.
- Preparing a regulatory impact analysis that conservatively estimates the annual savings from these rules at \$17 million.
- Presenting the rules to the Environmental Management Commission, who has approved them to go forward to public notice and hearing.

**The public comment period for the rules began on February 15, 2016 and will end on April 18, 2016.**

**Public Hearings will be held on the following dates:**

- March 7, 2016 at 6:00 pm, New Bern-Craven County Public Library, 400 Johnson St., New Bern
- March 21, 2016 at 6:00 pm, Charles Mack Citizens Center, 215 N. Main St., Mooresville
- March 23, 2016 at 6:00 pm, Ground Floor Hearing Room, Archdale Building, 512 N. Salisbury St., Raleigh

DEQ plans to bring the final draft of the rules before the Environmental Management Commission at its July 2016 meeting for approval. The proposed stormwater rules and regulatory impact analysis can be viewed on DEQ's [Stormwater Rule Readoption website](#).

## Chapter 2:

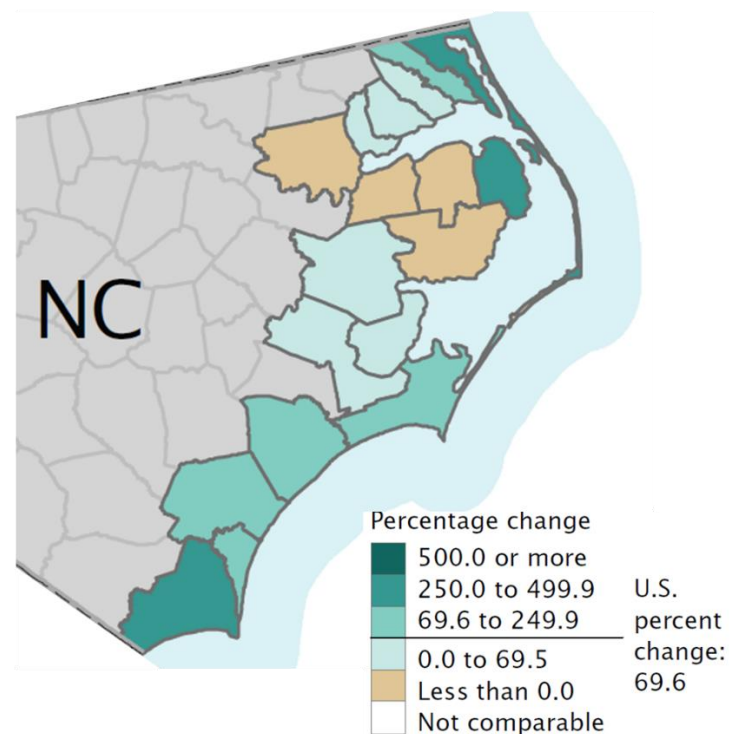
### Study on Coastal Water Quality and Potential Adjustments to Built-Up Area Limits

**SECTION 4.19.** *The Department of Environmental Quality shall evaluate the water quality of surface waters in the Coastal Counties and the impact of stormwater on this water quality. The Department shall study and determine the maximum allowable built-upon area for the low density state stormwater option as directly related to the length of grassed swale treatment length; therefore providing data for a property to achieve increased built-upon area above current limits by providing a longer length of grassed swale through which the stormwater must pass. If it is determined that increases in the percentage of built-upon area can be allowed in this way without detriment to the water quality, the Department shall submit recommendations to the General Assembly for the levels of increases in built-upon area that can be supported with corresponding increases in the length of grassed swale through which the stormwater shall pass. No later than April 1, 2016, the Department shall report the results of its study, including recommendations, to the Environmental Review Commission.*

The population growth in many of North Carolina's Coastal Counties has been significant over the past few decades. In the face of this growth, our shellfish, finfish and beaches have been fairly stable on a state-wide basis. However, there are significant localized water quality problems, particularly in our most populated areas, that impact our economy and our enjoyment of our natural resources.

As this report will show, development can degrade downstream water quality and there is a strong correlation between increased population and increased shellfish and beach closures. The goal of the state stormwater program is to maintain current water quality. It is probably not possible to develop currently undeveloped land and improve water quality. However, as we learn more about the science of stormwater treatment, we are discovering better ways to protect water quality in the face of development while also reducing the expense associated with stormwater control measures (SCMs).

**Figure 1: Change in Coastline Population by County: 1960-2008 (US Census Bureau 2010)**





## 2-A. Coastal Water Quality Overview

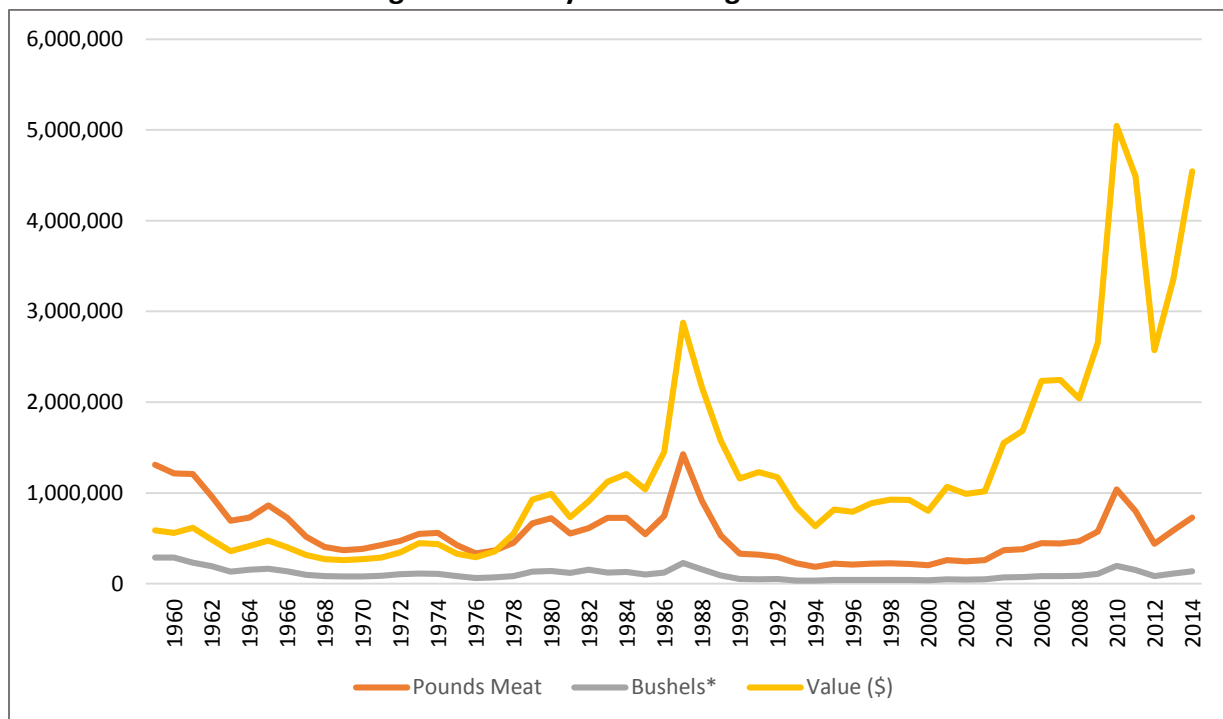
The U.S. Travel Association’s Travel Economic Impact Model estimates that coastal North Carolina had **\$3.0 billion** in travel-related sales in 2013 (NC Dept. of Commerce 2014). Healthy waters and shorelines are necessary to sustain and grow the coastal tourism and recreation industry. Compared to most states, coastal water quality in North Carolina is relatively high, ranking fourth in the nation according to the 2012 National Resource Defense Council’s Testing the Waters report (NRDC, 2012). This overview highlights our shellfish, fisheries and beach resources and includes two stormwater success stories.

### *Our Fisheries and Shellfish*

Recent data from the NC Division of Marine Fisheries (NCDMF) shows that fisheries and shellfish are crucial industries in our state. SL 2015-241 directs NCDMF to develop a plan to delineate oyster sanctuaries, enhance oyster habitat, and provide outreach and education that encourages shellfish aquaculture. Figure 2 below shows the increasing landings and value from commercial oyster harvest and thus an increase in the contribution of oyster harvest to our state’s economy.

Oysters are particularly indicative of the water quality in NC since they are raised in our state and are filter feeders and thus rely on high quality waters in order to be marketable. In fact, the DEQ officially classifies all shellfishing waters as either “High Quality Waters” or “Outstanding Resource Waters.”

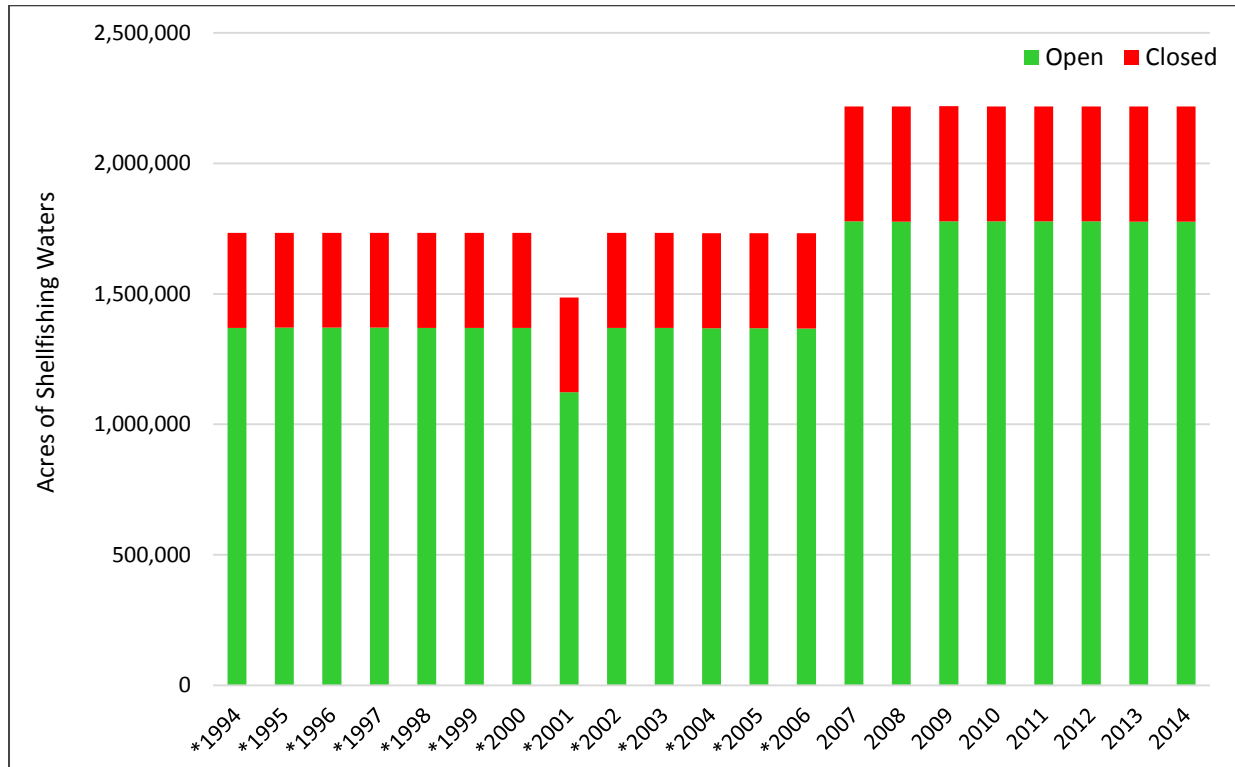
**Figure 2: NC Oyster Landings 1959-2014**



NCDMF’s Shellfish Sanitation Program monitors and classifies shellfish growing waters for safe shellfish harvest. This program samples approximately 1,000 stations coast wide at least six times each year. All

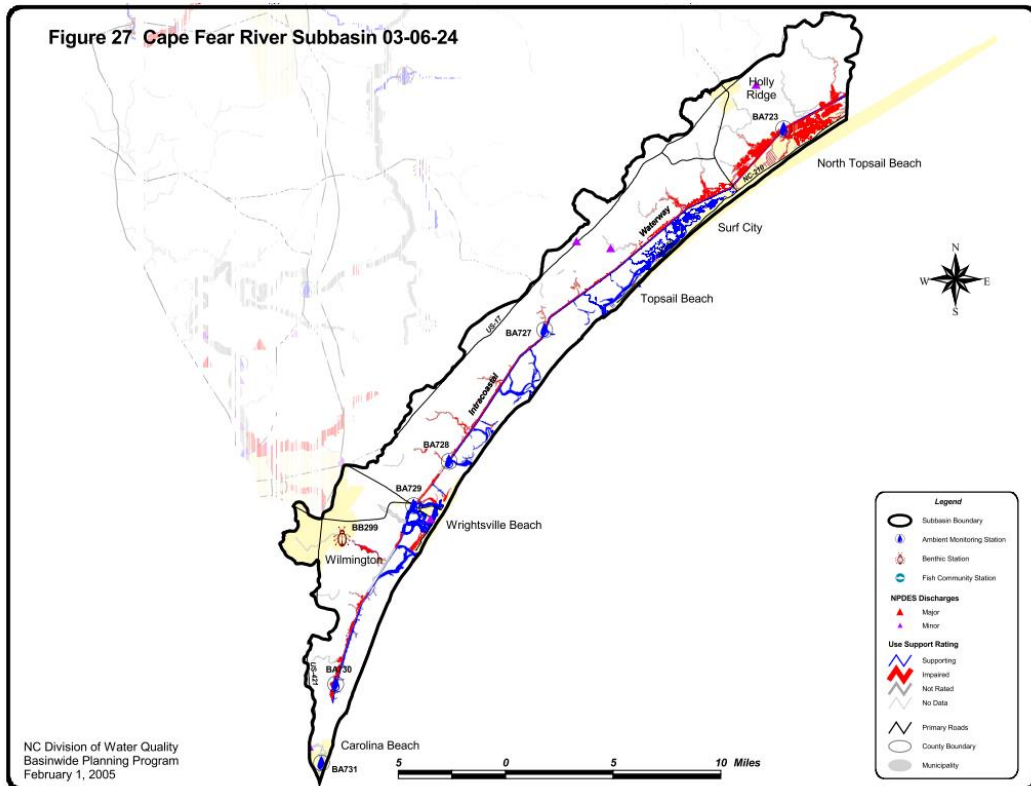
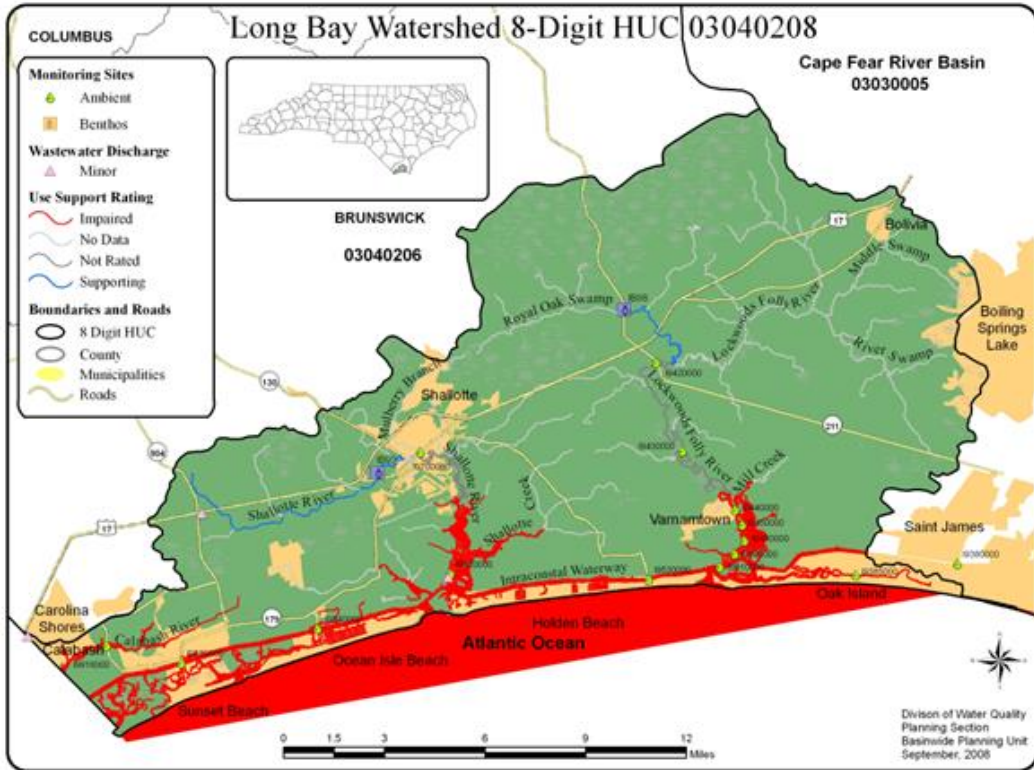
samples are cultured and analyzed by the program’s laboratories. Fecal coliform bacteria are used as an indicator of pathogens. Shellfish waters are classified as approved only if they do not exceed a geometric mean of 14 CFU/100 ml and a 90th percentile of 43 CFU/100ml. As shown in Figure 3, the relative percentage of open versus closed shellfish waters has remained fairly stable over the past 20 years. Please note that prior to 2007, acreage figures were hand tallied using a planimeter on NOAA charts whereas current figures have been calculated using GIS. This is the reason for the change in total acreage observed between 2007 and 2008.

**Figure 3: Status of Shellfish Waters, 1994-2014**



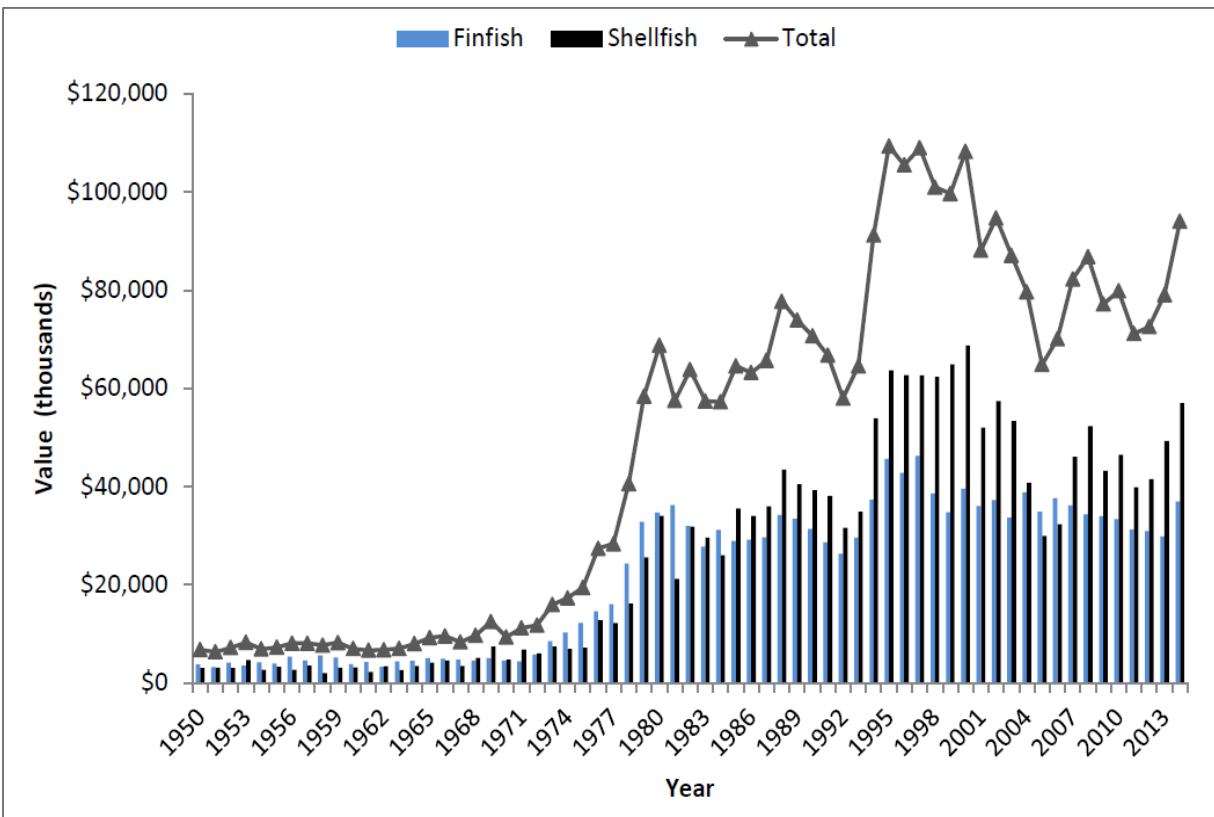
With approximately 2.2 million acres of shellfish waters, incremental closures are difficult to see. Localized closures do occur in productive areas; for example, although only approximately 20% of our state’s shellfish waters were closed in 2014 data, Brunswick County was 65% closed. Many of the closures that are occurring are in the productive shellfishing areas in the rivers. See Figure 4 showing the use support maps for the two most densely developed watersheds in the Lumber and Cape Fear River basins. The red areas on these maps indicate shellfishing waters that are closed due to fecal coliform violations.

Figure 4: Use Support Maps, Lumber and Cape Fear Basins (NCDWR 2008 & 2005)



NCDMF also keeps data on recreational and commercial fishing and uses economic models to estimate the resulting economic outputs to our state. Figure 5 shows the ex-vessel value (money paid to fishermen) of commercial finfish and shellfish harvest since 1950. As a comparison of the relative contribution of recreational versus commercial fishing to the state economy, NCDMF data shows that the recreational fishing industry in our state produces more than five times more economic output than the commercial fishing industry. However, the full economic impact of commercial fishing is difficult to estimate because of retail and restaurant markup, product that is shipped out of state and thus lost to the state economy, and the difficulty of placing a value on consumer desire for fresh seafood. Note that the values in Figures 5 and 6 are in thousands of dollars.

**Figure 5: Ex-vessel value of commercial finfish and shellfish harvest, 1950-2013  
(value in thousands of dollars) (NCDMF)**



**Figure 6: Estimated Economic Outputs from NC’s Fishing Industry (NCDMF)**

Year	Recreational		Commercial		Total	
	Jobs <sup>1</sup>	Economic Output (thousands of dollars) <sup>2</sup>	Jobs <sup>1</sup>	Economic Output (thousands of dollars) <sup>3</sup>	Jobs <sup>1</sup>	Economic Output (thousands of dollars) <sup>4</sup>
2014	16,050	\$1,732,000	7,656	\$369,000	23,706	\$2,102,000
2013	16,356	\$1,741,000	6,745	\$305,000	23,101	\$2,047,000
2012	18,304	\$1,870,000	6,435	\$283,000	24,739	\$2,153,000
2011	16,398	\$1,912,000	6,373	\$276,000	22,771	\$2,188,000
2010	14,948	\$1,711,000	7,094	\$307,000	22,042	\$2,018,000
2009	13,699	\$1,543,000	7,022	\$298,000	20,721	\$1,841,000
2008	18,029	\$2,016,000	7,597	\$339,000	25,626	\$2,355,000
2007	18,248	\$1,798,000	7,508	\$321,000	25,756	\$2,119,000

**Notes:**

- <sup>1</sup> Represents both full-time and part-time jobs
- <sup>2</sup> Output impacts represent the total economic output of industry production and business sales.
- <sup>3</sup> The economic impact estimates presented represent those of commercial seafood harvesters, dealers, wholesalers, and retailers.
- <sup>4</sup> The total of recreational and commercial economic output

## **Our Beaches**

North Carolina has miles of beaches with excellent water quality. In fact, our swimming beaches have been under advisory for an average of less than 1 percent of the swimming season for each year.

Since 1997, the NC Recreational Water Quality Program has been monitoring the quality of our state’s coastal recreational waters and notifying the public when bacteriological standards for safe bodily contact are exceeded. The program tests 204 swimming sites either once or twice a week (depending on the level of use) during the swimming season, which runs from April 1 to October 31. The sites are tested for enterococcus bacteria, an indicator organism found in the intestines of warm-blooded animals. While this bacteria does not cause illness itself, its presence is correlated with that of organisms that can cause illness. To comply with the swimming water quality levels set by the EPA and the state, water test results have to fall below a set average as well as a single-sample level. The average is the geometric mean of five weekly samples taken within a 30-day period. The geometric mean cannot exceed 35 enterococci per 100 milliliters of water. In addition, swimming advisories may be posted if a single sample exceeds the level set for it based on usage or if a beach has a stormwater discharge point.

Despite this good news, it has been well documented that stormwater carries pollutants that can be detrimental to the aquatic environment and to human health. The main human health concerns pertain to fecal bacteria that are washed into stormwater systems following storms. Fecal bacteria originating from the intestines of warm-blooded animals (birds, mammals both domesticated and wild, and

humans) pose health risks. Beaches with stormwater outfalls are posted with warnings about the risks of bacteria, which often go unheeded.

**Figure 7: Photographs from Kure Beach, NC (NCSU)**



### **Success Story 1: Hewletts Creek**

As mentioned in the beginning of this chapter, providing stormwater management on new development projects allows NC to hold the line on coastal water quality. Adding Stormwater Control Measures (SCMs) to new development projects on a VOLUNTARY basis can restore water quality that has been lost due to development that took place prior to the inception of the coastal stormwater rule.

A notable success story is the Wade Park constructed wetland, an engineered wetland built to address the impairment of Hewletts Creek. Hewletts Creek is 303(d) listed as impaired and is closed to shellfishing due to high levels of fecal coliform bacteria. This \$4 million dollar wetland project was developed by the City of Wilmington through local partnerships and grant monies from the North Carolina Clean Water Management Trust Fund. The wetland, which was constructed on 17 acres of property acquired by the partners, receives stormwater runoff from 590 acres of residential development. This accounts for approximately 10% of the Hewletts Creek watershed.

Post-project monitoring by UNC-Wilmington showed that the Wade Park engineered wetland was highly effective in reducing pollutant loads of fecal coliform bacteria to Hewletts Creek (Mallin et al, 2010). The wetland reduced the volume of stormwater runoff reaching the creek by 50-75%. The average load reduction for fecal coliform bacteria was 99% with an overall concentration reduction of more than 90%.

Noting the success of pollutant reduction through SCMs with the Wade Park wetlands project, the City of Wilmington is pursuing additional installations through the *Bradley and Hewletts Creek Watershed*

*Restoration Plan* (City of Wilmington 2011). Additional larger-scale projects are currently in development, including a 319-funded partnership with NC State University that include the installation of five volume reduction projects in the Hewletts Creek watershed. A parking lot bioretention cell and a constructed wetland at a local elementary school are two projects currently in the design phase and nearly ready for construction.

**Figure 8: Photograph of the Wade Park Construction Wetland (City of Wilmington)**



### ***Success Story 2: Dune Infiltration System, Kure Beach***



The Kure Beach Dune Infiltration System is an innovative stormwater best management practice (BMP) aimed at reducing discharge from existing stormwater beach outfalls. The dune infiltration system at Kure Beach is designed to divert most of the stormwater to beneath the sand dunes, filtering out the bacteria before it reaches the ocean. Since 2006, three systems have been installed along Atlantic Ave at the intersections of K, L and M Avenues. The systems are designed to capture small to medium-sized rainfall events.

Flow from the existing outfalls is diverted in a concrete vault into two banks of subsurface, open-bottomed chambers located beneath the sand dunes. The stormwater flows into the chambers and spreads out laterally beneath the dunes. It then mixes and moves with the groundwater, and is filtered as it moves down-slope, towards the ocean. During extremely intense rainfall events, stormwater can overflow the system and discharge to the ocean; however, this rarely occurs.

Since the systems were installed, all stormwater flow associated with Site L’s watershed has been captured and treated by the dune infiltration system. Stormwater flows at Site M have been reduced by 96%. Overall, stormwater discharge volume to the beach at these two sites have been reduced by 97% because of the new infiltration systems. The indicator bacterium, Enterococcus, has been reduced by 98% between the influent stormwater and the groundwater at the dune/beach interface line. Removal of the bacteria is thought to be due to adsorption and entrapment around sand particles, followed by natural die-off, desiccation, and predation by other microbes. These are substantial reductions in stormwater volume and bacteria concentrations. At the conclusion of this study, it is hopeful that the dune infiltration system will be recommended for use at other sites in an effort to improve coastal stormwater quality and protect human health and the environment.

**Figure 9: Kure Beach’s Dune Infiltration System, 2007-2010 (NCSU)**

Site	Stormwater Inflow Volume (CF)	Stormwater Overflow Volume (CF)	Total Stormwater Capture (CF)	Capture Rate
L	99,100	0	99,100	100%
M	261,000	9,930	9,930	96.2%
<b>Total</b>	<b>361,000</b>	<b>9,930</b>	<b>351,000</b>	<b>97.3%</b>

## 2-B. Built-Up Area and Vegetated Swales

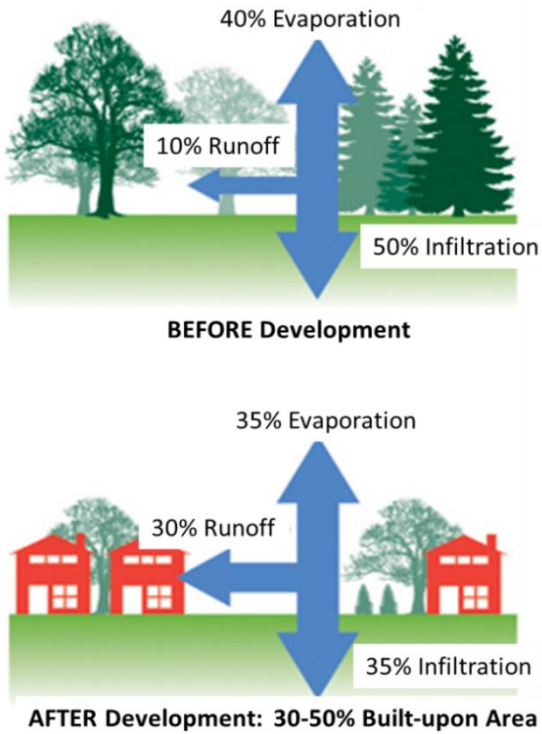
### *The Effects of Built-Up Area*

**Figure 10: Effects of Built-Up Area (EPA)**



Covering natural sandy soils with built-upon area like roofs, driveways, roads and parking areas results in a much greater volume of rain being carried to nearby waters at a much faster rate and with a much higher concentration of pollutants. (Fortunately, there is a simple solution to this problem: create opportunities for the water to soak back into the ground in a manner similar to the pre-development condition).





For over 20 years, researchers have been documenting a strong correlation between the water quality and the percentage of the drainage area that contains built-upon surfaces when stormwater management measures are not implemented. Above 10-12 percent impervious cover, the following changes have been shown to occur:

- Sensitive fish species die.
- Water quality is degraded.
- Stream banks become less stable and erode, sometimes resulting in property loss.

Determining the percentage of built-upon area on a development site is a cornerstone of the state stormwater program. “Low density” developments (i.e., sites containing a low percentage of built-upon area) are encouraged to disconnect as much built-upon area as possible and convey the remainder in vegetated conveyances like grass-lined ditches. “High density” developments (i.e., sites exceeding the low density threshold) are required to include SCMs to protect receiving waters.

The thresholds for high density developments vary based on the sensitivity and value of the water resource being protected:

- **12%** for Shellfishing (SA), High Quality and Outstanding Resource Waters.
- **24%** for the rest of the Coastal Counties and the NPDES (large and medium-sized) communities.

The research on the correlation between built-upon area and water quality indicate that raising the thresholds for built-upon area in SA water is likely to result in further degradation of these resources.

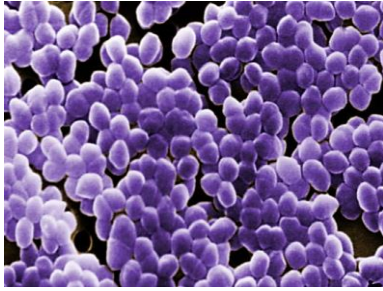
## Bacteria Basics

**Figure 11: Indicator Bacteria**



Two types of bacteria are used to assess our coastal waters: fecal coliform and *Enterococci*. Both are found in the intestines of warm-blooded animals like birds, pets, wildlife and humans. Both are largely benign themselves but serve as good indicators of more dangerous bacteria and viruses:

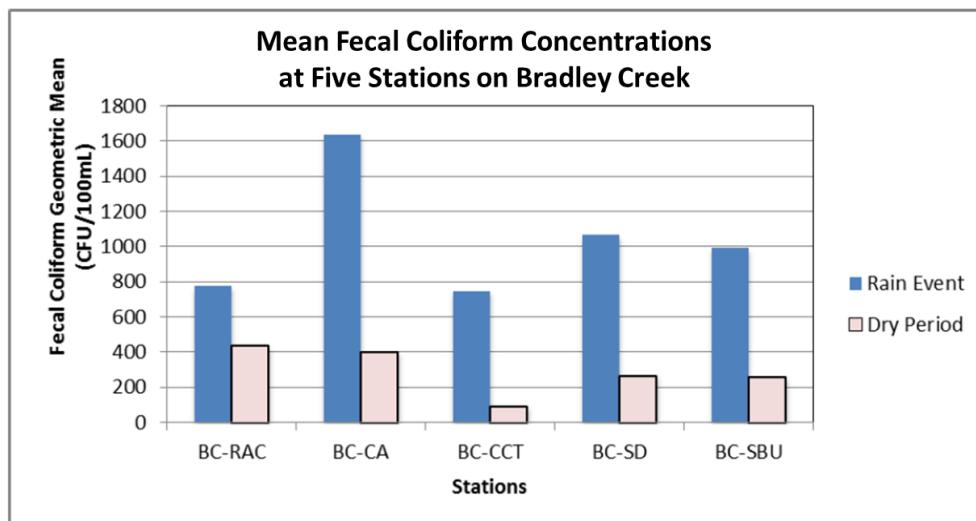
- **Fecal coliform** is used to assess shellfish waters. Since shellfish pump water through their gills almost constantly, they easily take up any bacteria, viruses and other pollutants that are present in the water. If shellfish that contain high concentrations of bacteria or viruses are consumed raw or undercooked, they could cause severe illness. Shellfish waters are approved if they do not exceed a geometric mean of 14 CFU/100 ml and a 90th percentile of 43 CFU/100ml.



- **Enterococci** are the federal standard for safe water quality at public saltwater beaches. The most common illnesses associated with swimming in contaminated water are gastrointestinal diseases and infections of the ear, nose, throat and skin. The geometric mean cannot exceed 35 *enterococci*/100 ml. Also, swimming advisories may be posted if a single sample exceeds the level set for it based on usage.

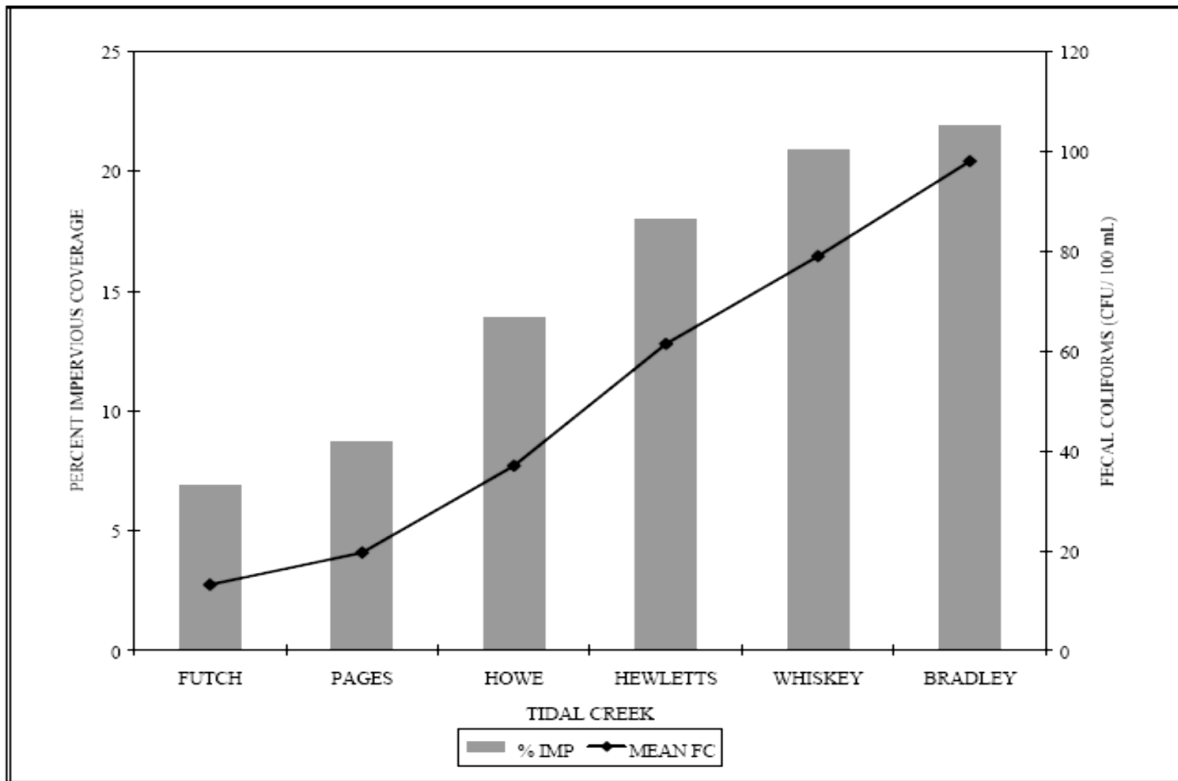
Dr. Michael Mallin at UNC-Wilmington recently undertook a study in the Bradley Creek watershed to determine whether the bacteria exceedances originate from wastewater or stormwater. Bradley Creek is the largest watershed in the New Hanover county area. A number of sewage leaks and spills have occurred in its drainage area and it consistently exceeds the standard for fecal coliform. The results, reported in Figure 12, show that fecal coliform concentrations are much higher during wet weather than dry weather. This strongly suggests that the source of the bacteria is stormwater. If the bacteria were primarily from wastewater, then the dry weather concentrations would be higher.

**Figure 12: Results of Dr. Mallin’s Study in Bradley Creek (2014)**



In a previous study, Dr. Mallin (2010) had already established a strong correlation between the percentage built-upon area in the drainage areas of each of the New Hanover County tidal creeks and the mean fecal coliform concentration. Note that in Figure 13, Futch and Pages are close to the fecal coliform standard of 14 FCU/100 ml (seven and nine percent built-upon, respectively) but that all of the tidal creeks that exceed the current SA waters standard of 12 percent built-upon area also exceed the fecal coliform standard. A significant portion of the drainage area of these tidal creeks was developed prior to the inception of the coastal stormwater rule.

**Figure 13: Built-upon Area V. Fecal Coliform Concentration in New Hanover County Tidal Creeks (Mallin, 2010)**



It is not the built-upon areas themselves that generate these bacteria. However, built-upon areas catch and carry fecal coliform from wildlife, birds and pets that remained on the ground before development directly to our coastal waters. Fortunately, the solution is simple: allow the stormwater to infiltrate into the sandy soils as it did before the land was developed.

Figure 14: Map of New Hanover County Tidal Creeks



## Are Longer Swales the Answer?

Figure 15: Neighborhood with grassed swales



Swales are not a good choice for removing bacteria or other pollutants from stormwater. In fact, the proposed stormwater rules developed by the MDC Team encourage designers to minimize the use of swales even on developments that are considered low density under the current thresholds. The low density development in Figure 15 could have been more attractive, safer and less expensive to build if the swales were eliminated and the stormwater were allowed to infiltrate into the adjacent sandy soils. In addition, it is not usually practical to increase the length of a swale beyond the distance from the built-upon area to the receiving water.

Dr. Mallin has found that the concentration of bacteria in stormwater nearly always exceeds federal standards for shellfish as well as federal recreational standards (2014). The Center for Watershed Protection has found that **grassed swales increase these already high concentrations of fecal coliform by 25 percent** (2007). Fortunately, there are a number of SCMs that do infiltrate stormwater. The new MDC reduce the expense of SCMs that infiltrate by significantly cutting back on the size of the storm that must be treated and by allowing the designer to consider that infiltration is occurring during the storm and thus not have to size the SCM to hold the entire storm event at one time.

The following SCMs are excellent for bacteria removal because they remove ALL of the fecal coliform from stormwater since they infiltrate it into the ground where rapidly dies off:

- **Infiltration systems** include basins and aggregate-filled trenches that are designed to soak stormwater into the ground. Infiltration systems can also be built underground, typically under parking areas.
- **Permeable pavement** is paving material that allows the rain water to flow through and infiltrate into the soils below. Examples of permeable pavement include, but are not limited to, porous concrete, permeable interlocking concrete pavers, concrete grid pavers, and porous asphalt.
- **Disconnected impervious surface** is the practice of allowing stormwater from roofs and pavement to run off onto an adequately-sized vegetated area to facilitate infiltration. It is a low-tech, low-cost way to manage stormwater, although it may not be possible on a very densely developed site.

**Figure 16: Excellent Options for Bacteria Removal & Water Quality in General:  
Infiltration Systems, Permeable Pavement and Disconnected Impervious Surfaces (NCSU)**



There are some areas on the coast that have high water tables for part of all of the year that make it difficult or impossible to infiltrate stormwater. In these areas, wet pond or stormwater wetlands are far more effective for bacteria removal from high density developments than swales. These devices retain a pool of stormwater, which stays in the device for at least 48 hours, during which time the bacteria are exposed to sunlight and die off. Wet ponds and stormwater wetlands typically remove 70 to 80 percent of the fecal coliform in stormwater prior to discharge (Center for Watershed Protection 2007). Note that this level of removal may not be adequate to clean stormwater to the federal fecal coliform standard.

**Figure 17: Good Options for Bacteria Removal:  
Wet Ponds and Stormwater Wetlands (NCSU)**



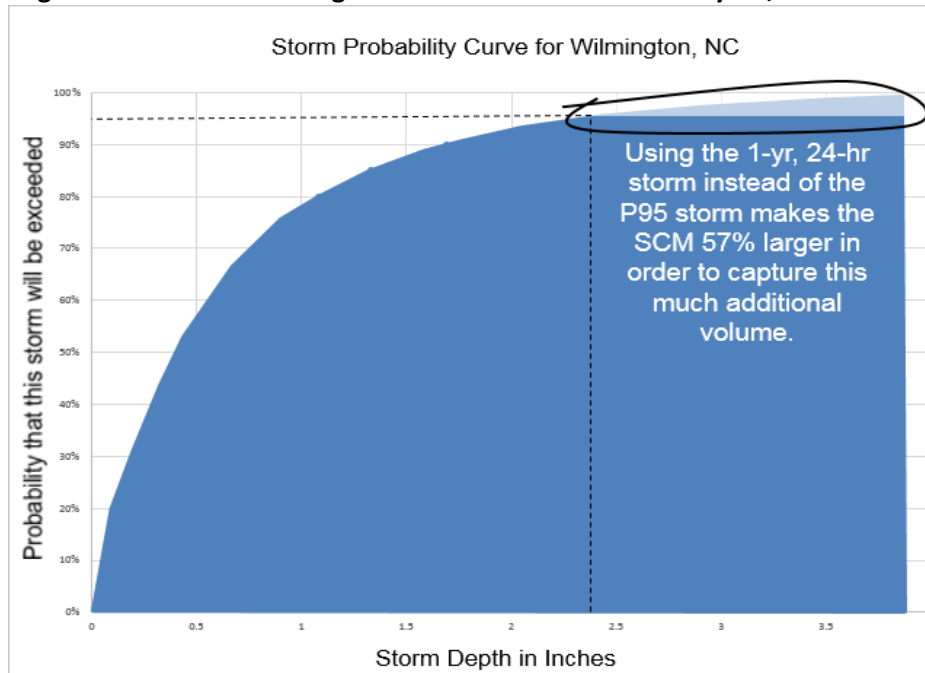
## **2-C. Options to Reduce Costs without Sacrificing Water Quality**

The panel of experts on the MDC Team has spent 90 hours discussing how to reduce the costs of stormwater management without sacrificing water quality. The results of their work as it affects the coastal stormwater program are summarized below.

## 1. Improvements to the Coastal Stormwater Rule itself:

- a. The required storm depth for SA waters from the 1-year, 24-hour storm depth (approximately 3.8 inches, depending on the location) to the 95<sup>th</sup> percentile storm depth (about 2.5 inches, depending on the location). The MDC Team agreed that there was a diminishing return associated with designing an SCM to be this large, as shown in Figure 18. Note that this rule also slightly increases the size of the required storm depth for other coastal waters from the 1.5-inch storm to the 90<sup>th</sup> percentile storm (about 1.8 inches, depending on the location).
- b. There are clear and cost-effective options for treating and discharging stormwater in SA waters compared with the previous “no discharge” requirements. Designers have the option of achieving runoff volume match, treating stormwater with non-discharging SCMs such as infiltration systems, or using discharging SCMs that are equipped with sand filtration capabilities. This option avoids the requirement in current rule 2H .1005 to put SCMs in series in SA waters.

**Figure 18: The Diminishing Return Associated with the 1-year, 24-hour Storm**



## 2. Design updates for infiltration systems:

- a. There is now a more customized design whereby Infiltration systems shall be designed to completely dewater the treatment volume to the bottom of the infiltration device within 72 hours. A site-specific soil investigation shall be performed to establish the hydraulic properties and characteristics of the area in which the infiltration device will be sited. 02H .1008(d) limits the use of infiltration systems to areas where soil infiltration rates are 0.52 inch/hour or greater, which allows the use of infiltration systems where they are currently prohibited.

- b. It is no longer required that infiltration systems be located off-line, removing the need to design, construct and maintain a separate flow splitting device.
  - c. Peak attenuation volume may be contained within the footprint of an infiltration system, which may remove the need for a separate device to meet peak flow control required by local governments.
  - d. There is no longer a limit on the size of the drainage area that may be treated in an infiltration system.
  - e. There is a new allowance to remove In-situ soils and replace them with infiltration media or infiltration media may be placed on top of in-situ soils if the applicant can demonstrate that the modified soil profile allows for drainage of the treatment volume within 72 hours. This is an option that does not exist in the current rule.
  - f. There is a new requirement for infiltration devices located under the ground surface to be equipped with a minimum of one inspection port. Underground infiltration systems are not specifically allowed in the current rule.
  - g. A level spreader-filter strip is no longer required at the outlet of infiltration systems, a savings of design, construction, maintenance and land costs.
3. **A level spreader-filter strip is no longer required at the outlet of wet ponds.** This saves space as well as design, construction and maintenance costs.
4. **Developers are credited for disconnecting impervious surfaces.** This results in a reduction of the volume of stormwater reaching the SCM, and therefore the SCM is allowed to be smaller and still meet the requirement of the rule.
5. **Low density projects are encouraged to disconnect built-upon area.** This will improve water quality by encouraging infiltration of stormwater (the goal of low density development). At the same time, this will reduce the cost of designing, constructing and maintaining vegetated swales on development sites.



## Chapter 3:

### Review of Stormwater Statutes, Rules and Guidance Documents

**SECTION 4.20.(d)** *The Environmental Review Commission, with the assistance of the Department of Environment and Natural Resources, shall review the current status of State statutes, session laws, rules, and guidance documents related to the management of stormwater in the State. The Commission shall specifically examine whether State statutes, session laws, rules, and guidance documents related to the management of stormwater in the State should be recodified or reorganized in order to clarify State law for the management of stormwater. The Commission shall submit legislative recommendations, if any, to the 2016 Regular Session of the 2015 General Assembly.*

#### 3-A. Current Stormwater Statutes

Session Law and Description ( <i>red = repealed</i> )	Notes
<b>SL 1989-447 <i>Statewide Stormwater Standards</i></b> [Whole] Established NC GS 143-214.7 - Stormwater Management	Statute was changed.
<b>SL 1995-507 <i>1995 Expansion/Capital Budget</i></b> [27.8(q)] Removed hearing requirement from 214.7 added ref to 150B	Statute was changed.
<b>SL 1997-458 <i>Clean Water Responsibility Act</i></b> [7.1] Established delegation process in 214.7. Established Stormwater Annual Report. DWQ and DOT to work to issue DOT NPDES permit by Oct 1, 1997.	This SL is being included under the report minimization initiative currently ongoing.
<b>SL 2004-124 <i>2004 Appropriations Act</i></b> [6.29, 30.20] Added d1 to 214.7 to limit use of parking for nurse stock unless stormwater controls in place. Also added to 215.6A for enforcement of d1. Later repealed. Funding for DOT Stormwater Projects - Ocean Outfalls	These sections have been repealed.
<b>SL 2004-163 <i>Phase II Stormwater Management</i></b> [Whole] Set requirements for implementation of MS4 program for phase II areas. Implementation, Designation, Petitioning, etc. Not codified, part of notes to 214.7.	This SL has sunset per SL 2006-246.
<b>SL 2005-386 <i>Amend Environmental Laws 2005</i></b> [1.10] Made correction to one reference in SL 2004-163	This SL has sunset per SL 2006-246.

Session Law and Description ( <i>red = repealed</i> )	Notes
<p><b>SL 2006-246 Stormwater Management 2006 [Whole]</b>  Disapproved EMC rules and set updated requirements for implementing MS4 program. Sunset SL 2004-163 on July 1, 2006. Included definitions, implementation schedule, tipped in areas, designation, petitioning, post construction, exemptions, waivers, general permit, etc. Added section to 214.7 on maintenance of stormwater practices (16b). Amended city/county authorities for stormwater control including authority to require for state and federal projects.</p>	<p>Sections 2-13 expired when the EMC adopted permanent rules.</p>
<p><b>SL 2007-323 2007 Appropriations Act [6.22, 30.3]</b>  Set up limits on BUA for vehicle parking, required BMPs to be implemented through local building review in 214.7(d2), a provision that was repealed later. Modified WQ permit fees.</p>	<p>The fee structure remains in effect.</p>
<p><b>SL 2008-198 Amend Env. Laws/Env. Tech Corrections 2008 [5, 6, 8]</b>  Added provision to SL 2008-211 (Coastal Rules) to: limit EMC's ability to change coastal rules through Oct, 2011, add requirements for recording of stormwater practices in deeds. Created vehicle surface area requirements in GS 113A.70 and .71</p>	<p>DEQ is implementing this SL except for the vehicle surface area requirements, which were repealed.</p>
<p><b>SL 2008-211 Improve Coastal Stormwater Management [Whole]</b>  Disapproved and superseded 2H.1005 rules. Set requirements for coastal stormwater, set exclusions, rescinded coastal MS4 designations, set up how EMC may adopt rules, etc. Requirements not codified. No mention of requirements expiring when EMC rules adopted like Phase II.</p>	<p>Highlighted because DEQ is recommending this to sunset after the passage of the readopted stormwater rules, explanation below.</p>
<p><b>SL 2009-322 Stormwater Control for Compost [Whole]</b>  Required the department to set up stormwater and wastewater permitting process for compost, establish an advisory group, set up interim permitting approach and report on results.</p>	<p>DEQ has fulfilled the requirements of this SL.</p>
<p><b>SL 2009-406 Extend Certain Development Approvals [Whole]</b>  Established a three-year extension for development approvals (state and local). Did not apply to federal programs (NPDES).</p>	<p>DEQ has fulfilled the requirements of this SL.</p>
<p><b>SL 2010-177 Permit Extension [Whole]</b>  Added one more year to SL 2009-406.</p>	<p>DEQ has fulfilled the requirements of this SL.</p>
<p><b>SL 2011-256 Asscs.-Stormwater Resp./SD &amp; Sept'g. Rules [1]</b>  Amended 214.7 to add c2 for permit transfer.</p>	<p>DEQ has fulfilled the requirements of this SL. Added Statute language</p>

Session Law and Description ( <i>red = repealed</i> )	Notes
<p><b>SL 2011-394 Amend Environmental Law 2011</b> [6] Amended 214.7 to add b1 to promote reuse</p>	<p>Added Statute language. DEQ has fulfilled the requirements of this SL.</p>
<p><b>SL 2012-200 Amend Environmental Law 2012</b> [1, 5, 6, 7] Amended 214.7 reporting to include information on stormwater capture and reuse.  Amended 214.7A to prohibit requirement of NPDES wastewater permit for Type I compost facilities.  Amended 214.7 to add c3 and c4 to prohibit requirement of stormwater ponds near public airports.  Amended 214.5 (Water Supply Watershed statute) to require local governments to allow density averaging across two noncontiguous lots. Also extends the time to implement Jordan stormwater rules.</p>	<p>DEQ has included these changes to the Water Supply Watershed program in the draft rules being developed as part of the rules review and readoption process. Added Provisions to Statue language.</p>
<p><b>SL 2013-82 Environmental Permitting Reform</b> [Whole] Required the EMC to develop MDC. Amended 214.7 by adding 214.7B that requires development of Fast Track Permitting</p>	<p>DEQ is in the process of fulfilling the requirements of this SL through ongoing rulemaking.</p>
<p><b>SL 2013-121 Transfer Environmental Permits</b> [1] Amended multiple permit program (state stormwater, non-discharge, erosion and sediment) areas to include transfer language. Added 214.7 c5 to allow transfer to new owner or HOA without request from the old owner if project in compliance, no substantial changes to the permit, etc.</p>	<p>DEQ is implementing these provisions. Added provisions to Statute language.</p>
<p><b>SL 2013-413 Regulatory Reform Act of 2013</b> [51] Requires all state agencies to review and update all of rules based on the level of public interest. Amended 214.7 to add b2 that set a definition of built-upon area that excluded gravel as BUA.</p>	<p>DEQ &amp; the EMC are thoroughly reviewing and updating the stormwater rules. Provision modified by SL 2014-120 and 2015-149. DEQ is implementing the built-upon area provision as modified by 2015-149.</p>
<p><b>SL 2014-1 Allow Use of DOT Stormwater BMPs</b> [Whole] Modified Section 9 of SL 2006-246 to allow linear transportation projects to use the DOT BMP tool box.</p>	<p>DEQ has included provisions that comply with this SL as part of the proposed stormwater rules. DEQ is recommending that this Session Law sunset after the readoption of the stormwater rules, explained below.</p>

Session Law and Description ( <i>red = repealed</i> )	Notes
<p><b>SL 2014-90 <i>Building Reutilization for Economic Dev Act</i></b> [2, 3] Amended 214.7 to add a1 Definitions (development and redevelopment) and add b3 that prohibits requiring stormwater control for existing development. Changed SL 2006-246 to conform to these definitions.</p>	<p>DEQ has included provisions for redevelopment that comply with this SL as part of the proposed stormwater rules.</p>
<p><b>SL 2014-120 <i>Regulatory Reform Act of 2014</i></b> [25, 29, 45, 46] 25 requires the EMC to allow grandfathering of an adjacent project to meet the same provisions of a previously approved project that is being expanded if plat approved prior to 7/1/2012. Requires EMC to put in rule and sunsets when in rule. 29 sets up standard review associated with PE's work on environmental permits, included pilot study on number of programs, including stormwater on review components that are "engineering." 45 changed 214.7 b2 so that gravel again considered to be built-upon area. Prohibits EMC and DEQ from defining gravel unless authorized. 46 prohibits requirements to modify stormwater permits to require stormwater control for cluster mailboxes. Expires earliest of either 12/31/2015 or when federal/local requirements in place.</p>	<p>DEQ is recommending the highlighted provision to sunset after the passage of the readopted stormwater rules, explanation below. All provisions of this SL are currently being implemented and/or reflected in the proposed stormwater rules.</p>
<p><b>SL 2015-149 <i>Stormwater/Built-Upon Area Clarification</i></b> [Whole] Again amends definition of BUA in 214.7 b2. Allows 57 stone and trails to be considered pervious with some other provisions.</p>	<p>Added language to statute. DEQ is implementing this provision.</p>
<p><b>SL 2015-246 <i>Local Government Regulatory Reform 2015</i></b> [2a and 2b, 13] 2a and 2b change local gov. authorities to prohibit enforcement of ordinances for state rules that are voluntary or rules that have been delayed by general assembly (Jordan Rules).</p>	<p>DEQ has worked with local governments on implementation of this provision.</p>
<p><b>SL 2015-286 <i>Regulatory Reform Act 2015</i></b> [4.19, 4.20, 4.21] 4.19 requires study for coastal stormwater to determine the level of built-upon area for low density, length of swales, etc. to protect water quality. 4.20 extends time for the EMC to adopt the fast track stormwater rules, amends 214.7 b2 to add language on allowable hydraulic methods, allow built-upon area in vegetated buffer if stormwater collected, treated and discharged through buffer and includes language about the applicability of SA water requirements. Also changes delegation language in d1 to take out "exceed" and requires local ordinances to come in to the EMC for review. 4.21 requires study to exempt linear utility projects from environmental regulation.</p>	<p>DEQ is recommending the highlighted provision to sunset after the passage of the readopted stormwater rules, explanation below. All provisions of this SL are currently being implemented and/or reflected in the proposed stormwater rules.</p>

## **DEQ Recommendations on Stormwater Statutes**

DEQ recommends that the following provisions of existing Session Laws sunset upon the enactment of the proposed stormwater rules developed under the rules review and re-adoption requirements.

### **#1 Sunset SL 2006-246 *Stormwater Management 2006* [Whole]**

**What it says:** SL 2006-246 Sections 2-13 already expired when the EMC adopted permanent rules for the MS4 stormwater program into administrative code. Section 1 disapproved stormwater rules that have since been modified in accordance with this SL. Sections 14 established the requirements for the EMC to develop a general permit and to put the MS4 stormwater program into administrative code, both of which the EMC has done. Sections 16 and 17 modify statute (done). The last section, 18, is administrative language about the SL (no longer relevant).

**Why we'd like to it to sunset:** Most of the language in SL is now included in either administrative code or statute or is no longer relevant. Thus, having conflicting language still in SL has been confusing to the regulated community.

### **#2 Sunset SL 2008-211 *Improve Coastal Stormwater Management* [Whole]**

**What it says:** This SL disapproved and superseded the 15A NCAC 2H.1005 Coastal Stormwater rule that was in effect at the time. The SL set requirements for treating stormwater in the 20 Coastal Counties and increased the design storm for shellfishing waters from 1.5 inches to the 1-year, 24-hour storm (usually about 3.7 inches, depending upon the specific location of the development). The SL also set up a procedure for the EMC to adopt an updated Coastal Stormwater rule; however, there was no mention of the SL requirements expiring when the EMC adopted the updated stormwater rule.

**Why we'd like to it to sunset:** The EMC adopted rules consistent with the SL in July 2013. In addition, the MDC Team discussed the current 15A NCAC 2H .1005 rule at length. The team believes that the proposed coastal rule provides equal or better protection than SL 2008-211 in a much more cost-effective manner for the development community. The specific changes and savings brought about by the proposed coastal rule are discussed in Chapter 2-C of this report.

### **#3 Sunset SL 2014-1 *Allow Use of DOT Stormwater BMPs* [Whole]**

**What it says:** This SL modifies Section 9 of SL 2006-246 (but note that Section 9 of SL 2006-246 has already sunset) to allow linear transportation projects to use the DOT BMP tool box.

**Why we'd like to it to sunset:** The DEQ has included provisions that comply with this SL as part of the proposed stormwater rules.

#### #4 Sunset one provision of SL 2014-120 *Regulatory Reform Act of 2014* [Section 25]

**What it says:** Section 25 requires the EMC to allow grandfathering of an adjacent project to meet the same provisions of a previously approved project that is being expanded if the plat was approved prior to 7/1/2012. The SL further requires the EMC to put this statute in rule, with the SL being sunset when the rule is effective.

**Why we'd like it to sunset:** The provisions of this section are difficult to implement and understand and it is not clear that this provision is equitable to all developers. DEQ believes that the proposed changes to the coastal stormwater rules will reduce the desire to be grandfathered under this SL.

#### # 5 Sunset one provision of SL 2015-286 *Regulatory Reform Act 2015* [A portion of 4.20(b)]

**What it says:** A portion of Section 4.20 says: "(2) Development may occur within the area that would otherwise be required to be placed within a vegetative buffer required by the Commission pursuant to G.S. 143-214.1 and G.S. 143-214.7 to protect classified shellfish waters, outstanding resource waters, and high-quality waters provided the stormwater runoff from the development is collected and treated from the entire impervious area and discharged so that it passes through the vegetative buffer and is managed so that it otherwise complies with all applicable State and federal stormwater management requirements."

**Why we'd like it to sunset:** The MDC Team discussed many ways to reduce the burden of stormwater regulations on the development community. This portion of SL 2015-286 is not consistent with the proposed rule package. The vegetated setbacks in the proposed stormwater rules are crucial to protecting use support. Placing built-upon area less than 30 feet from a stream often results in flooding issues for that property. In addition, it is not usually practical to convey stormwater uphill from a vegetated setback to a stormwater control measure and then discharge the stormwater back downhill through the buffer.

### 3-B. Current and Proposed Stormwater Rules

As discussed in Chapter 1 of this report, the panel of experts that made up the MDC Team spent a great deal of time, thought and effort into creating proposed stormwater rules that are organized, clear and save money for developers whenever this can be done without sacrificing water quality. DEQ found that working with a team of experts was an excellent method for updating the state stormwater program and we intend to use this process going forward when updates are necessary.

One of the ways in which the rules were improved is through the reorganization of the 15A NCAC 2H .1000 section. See the current versus proposed organization below:

- **Purpose and Definitions:** Updated to match new SL.
- **Specific Stormwater Programs:** Coastal stormwater program significantly updated to improve cost-effectiveness, other programs better organized. Requirements for low and high density covered in proposed updates to .1003 for greater consistency across all programs.
- **Permit administration:** Two rules added for the fast-track permitting process, other permitting requirements better organized.

- **Purple:** Technical Standards: Greatly modernized based on current research and practice. Made more cost-effective whenever possible without sacrificing water quality.

**Current Organization:**

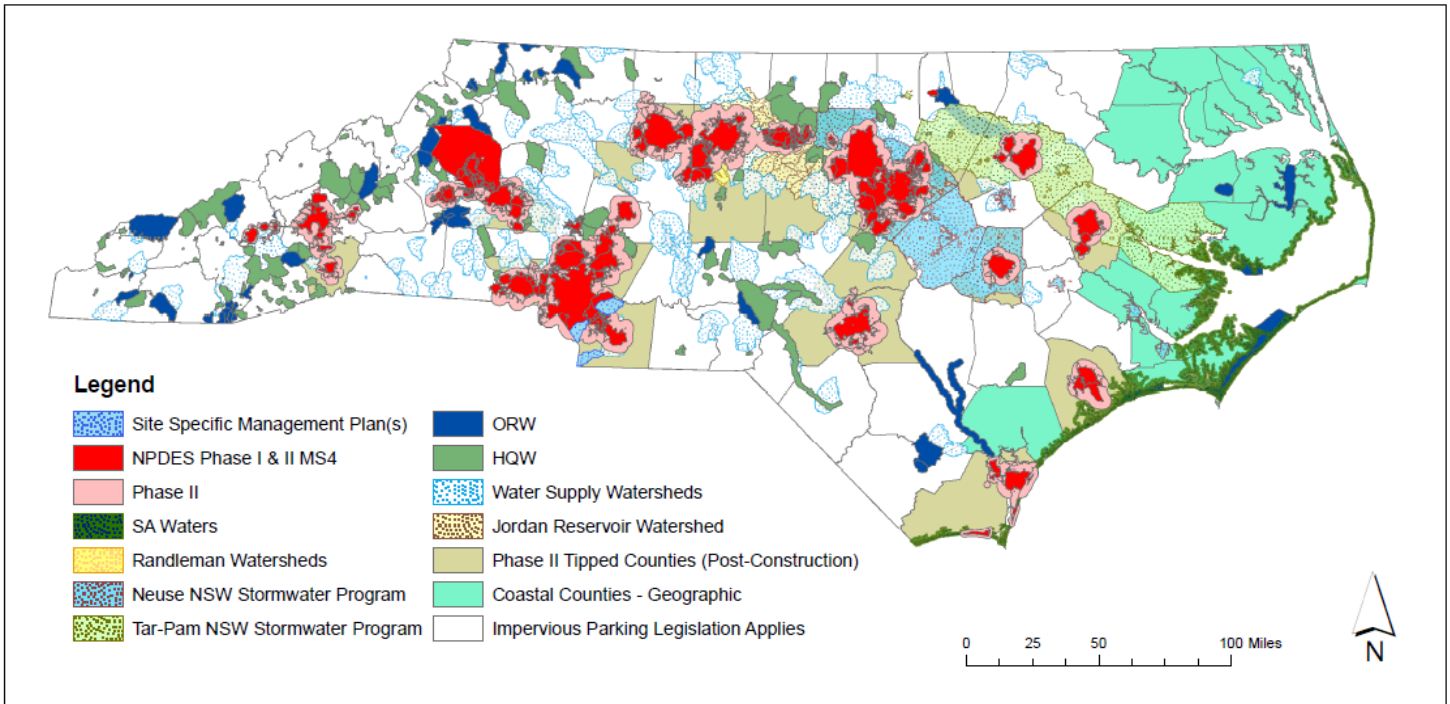
.1001	Stormwater Management Policy
.1002	Definitions
.1003	Stormwater Management: Coverage: Application: Fees
.1005	Stormwater Requirements: Coastal Counties
.1006	Stormwater Requirements: High Quality Waters
.1007	Stormwater Requirements: Outstanding Resource Waters
.1008	Design of Stormwater Management Measures
.1009	Staff Review and Permit Preparation
.1010	Final Action on Permit Applications to the Division
.1011	Modification and Revocation of Permits
.1012	Delegation of Authority
.1013	General Permits
.1014	Stormwater Management for Urbanizing Areas
.1015	Urbanizing Areas Definitions
.1016	Development in Urbanizing Areas
.1017	Post-Construction Practices
.1020	Universal Stormwater Management Program

**Proposed Organization:**

.1001	Post-Construction Stormwater Management
.1002	Definitions
.1003	MDC for All Subject Projects
.1016	Development in Urbanizing Areas: Applicability
.1017	NPDES and Urbanizing Areas: Post-Construction
.1018	Urbanizing Areas: Delegation
.1019	Coastal Counties
.1020	Universal Stormwater Management Program
.1021	Non-Coastal County HQW and ORW
.1040	Permit Administration
.1041	General Permits
.1042	Standard Permitting Process
.1043	Fast Track Permitting Process: Authorization to Construct
.1044	Fast Track Permitting Process: Final Permit
.1045	Permit Transfers and Renewals
.1050	MDC for all Stormwater Control Measures
.1051-.1062	MDC for Individual SCMs

See Appendix C for a more detailed explanation about the origin of the language for each specific proposed rule. The entire package of proposed stormwater rules is on public notice right now and is anticipated to be adopted by the EMC at its July 2016 meeting. The text of every rule may be found on the stormwater rule readoption web site: <http://deq.nc.gov/about/divisions/energy-mineral-land-resources/energy-mineral-land-permits/stormwater-program/rules-readoption>

**Figure 19: Current North Carolina Stormwater Programs**



### ***Timeline of Coastal Stormwater Rule Development and Amendments***

- Before 1983** | The state applied most of its resources to the regulation of point sources of pollution such as industrial and municipal wastewater discharges.
- 1983-1984** | Numerous state-issued permits issued were appealed by coastal fisherman and citizen groups. The litigation brought out that there were no state requirements to address stormwater runoff that was causing violation of federally-mandated fecal coliform standards for shellfish areas.
- 1985** | The state issued a report by Dr. George Everett that concluded: “if [coastal stormwater] runoff is collected and discharged into estuarine waters, standards for shellfish waters will be violated” and that stormwater practices “are necessary if these waters are to remain open for shellfishing.”
- 1987** | The EMC adopted a coastal stormwater rule based on comments from both development and environmental interests.
- 1995** | The EMC modified coastal stormwater rule to establish a more structured permitting process.



- 2005** The state reviewed the effectiveness of the coastal stormwater rule and presented the results to the EMC. The state observed an increase in closed shellfishing waters in tidal creeks in New Hanover County.
- 2008** The EMC took steps to update the coastal stormwater rules to prevent further impairment of North Carolina’s unique coastal resources and the recreation and tourism industries. A series of Public Hearings was held in 2008 and the rules were finalized through legislative action (SL 2008-211) later that year.
- 2012** The EMC adopted the SL 2008-211 provision in the rules.
- 2015** Session Law 2015-286 directs DEQ to study and report on the quality of coastal waters and opportunities to reduce the economic costs associated with the coastal stormwater program.

### **3-C. Current and Proposed Stormwater Guidance Documents**

DEQ staff is currently working on updating its current Stormwater BMP Manual to reflect all the changes in the MDC that will occur upon passage of the proposed stormwater rules. DEQ is planning to re-title the document “DEQ Stormwater Guidance Manual” to make it clear to the public that it offers technical guidance and is not a rule. The MDC that will be in the rules will be cut and pasted into this document and then technical guidance about how to meet the MDC will be provided. Some federal grant monies are being directed to a private consultant to provide updated diagrams of stormwater designs that are compliant with the proposed MDC. DEQ staff plans to initiate work on the updated guidance document as soon as possible upon enactment of the proposed stormwater rules.

# Appendix A:

## References

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Center for Watershed Protection. September 2007. *National Pollutant Removal Performance Database Version 3*. Ellicott City, MD.

City of Wilmington with Contributing Partners NC Coastal Federation, Withers & Ravenel Engineers, Town of Wrightsville Beach, UNCW Center for Marine Science. 2012. *Bradley and Hewletts Creek Watershed Restoration Plan*.

Hathaway, Jon and W.F. Hunt. October 2008. Removal of Pathogens in Stormwater. Urban Waterways, Issue AGW-588-16W. College of Agriculture and Life Science. North Carolina Cooperative Extension Service. Raleigh, NC.

Mallin, M.A., V.L. Johnson and S.H. Ensign. 2009. Comparative impacts of stormwater runoff on water quality of an urban, a suburban, and a rural stream. *Environmental Monitoring and Assessment* 159:475-491.

Mallin, M.A., McAuliffe, J.A., Shirazi, Y. and McIver, M.R. 2010. Pollutant Removal Efficacy of a Constructed Wetland: The Clean Water Management Trust Fund 2004B-707 Wilmington Bethel Road Wetlands Project. UNCW CMS Report 10-03.

Mallin, M. A., McIver, M.R., Robuck, A.R., and Barker, J.D. Environmental Quality of Wilmington and New Hanover County Watersheds. 2014. *CMS Report 15-01*. Center for Marine Science. University of North Carolina Wilmington. [www.uncw.edu/cms/aelab/](http://www.uncw.edu/cms/aelab/).

NC Department of Commerce. 2014. Travel Economic Impact Model. Raleigh, NC. <https://www.nccommerce.com/tourism/research/economic-impact/teim>.

NC Division of Marine Fisheries, License and Statistics Section, 2015 License-Statistics Annual Report. Morehead City, NC [http://portal.ncdenr.org/c/document\\_library/get\\_file?uuid=65446830-6e6f-41c1-bc77-4a5b33fc4ce4&groupId=38337](http://portal.ncdenr.org/c/document_library/get_file?uuid=65446830-6e6f-41c1-bc77-4a5b33fc4ce4&groupId=38337)

NC Division of Water Resources. 2005. Cape Fear Basinwide Water Quality Plan.

NC Division of Water Resources. 2008. Lumber Basinwide Water Quality Plan.

U.S. Census Bureau. May 2010. Coastline Population Trends in the United States: 1960 to 2008, Population Estimates and Projections. Washington, DC. <https://www.census.gov/prod/2010pubs/p25-1139.pdf>.

## Appendix B: Members of the MDC Team

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Name	Group	Company / Representing
Marc Houle, PE	Engineering/design	Yarbrough Williams & Houle Inc.
Cameron Moore	Engineering/design	Business Alliance for a Sound Economy
Ronald Horvath, PE	Engineering/design	Horvath Associates
Tim Clinkscales, PE	Engineering/design	Paramounte Engineering
Hunter Freeman, PE	Engineering/design	Withers & Ravenel
Mike Gallant, PE	Engineering/design	Michael C. Gallant, PE
Tom Murray, PE	Engineering/design	W.K. Dickson & Co., Inc. & PENC
JD Solomon, PE	Engineering/design	CH2M Hill
Rob Weintraub	Home Builder's Assoc.	Home Builders Association
Jonathan Bivens, PE	Construction	S. T. Wooten Corporation
Derek Pielech, PE	Local government	City of Wilmington
Virginia Spillman, PE	Local government	City of Greensboro
Robert Patterson, PE	Local government	Town of Morrisville
Mike McIntyre, PE	Local government	Charlotte-Mecklenburg Storm Water Services
Todd Miller	Environmental Group	N.C. Coastal Federation
Peter Raab	Environmental Group	American Rivers
Joe Faulkner	Landscape Architect	NcNeely Associates
Dr. Bill Hunt, PE	Academia	NCSU – Dept. of Biological and Agricultural Engineering,
Dr. Eban Bean, PE	Academia	East Carolina University Department of Engineering
Brian Lipscomb, PE	Dept. of Transportation	NCDOT Hydraulics Unit
Joseph Hinton, PE, PLSS	Soil Scientist	ECS Carolinas, LL
Boyd DeVane	DEQ	DWR Wetlands and Buffers
Toby Vinson, PE	DEQ	Chief, DEMLR Land Quality Section
Bradley Bennett	DEQ	DEMLR Stormwater Program
Annette Lucas, PE	DEQ	DEMLR Stormwater Program

## Appendix C: Summary of Stormwater Rules Review & Readoption

Rule Name	Proposed Action	Notes/Source of Rule Language
.0126 Stormwater Discharges	Readopt w/o Substantive Changes	<ul style="list-style-type: none"> <li>Minimal changes</li> </ul>
.0150 Definitions: NPDES MS4 Stormwater	Readopt w/ Substantive Changes	<ul style="list-style-type: none"> <li>Minimal changes</li> </ul>
.0151 NPDES MS4 Stormwater: Designation and Petition Process	Readopt w/ Substantive Changes	<ul style="list-style-type: none"> <li>Minimal changes</li> </ul>
.0152 Development in Urbanizing Areas	Readopt as a Repeal	<ul style="list-style-type: none"> <li>Proposed for repeal because is duplicative of 2H .1016</li> </ul>
.0153 NPDES MS4 Stormwater: Program Implementation	Readopt w/ Substantive Changes	<ul style="list-style-type: none"> <li>Minimal changes</li> <li>Adds .0153(f) to incorporate requirement from S.L. 2014-1 allowing DOT BMP Toolbox for linear transportation projects</li> </ul>
.0154 Post-Construction Practices	Readopt as a Repeal	<ul style="list-style-type: none"> <li>Proposed for repeal because is duplicative of 2H .1017</li> </ul>
.1001 Post-Construction Stormwater Management: Purpose and Scope	Readopt w/ Substantive Changes	<ul style="list-style-type: none"> <li>Reorganized</li> <li>Adds items on stormwater program applicability and vested rights</li> </ul>
.1002 Definitions	Readopt w/ Substantive Changes	<ul style="list-style-type: none"> <li>Streamlines definitions that duplicate statute</li> <li>Strikes unnecessary definitions</li> <li>Adds definitions, including new terms “Minimum Design Criteria” (or “MDC”) and “Stormwater Control Measure” (or “SCM”)</li> </ul>
.1003 Requirements that Apply to All Subject Projects	Readopt w/ Substantive Changes	<ul style="list-style-type: none"> <li>Based on MDC Team deliberations</li> <li>Codifies method for calculating project density</li> <li>Makes requirements for low and high density projects, vegetated setbacks, etc. consistent across programs</li> </ul>
.1005 Stormwater Requirements: Coastal Counties	Readopt as a Repeal	<ul style="list-style-type: none"> <li>Req’ts of 2H .1005 updated and moved to 2H .1019</li> </ul>
.1006 Stormwater Requirements: HQW	Readopt as a Repeal	<ul style="list-style-type: none"> <li>Req’ts of 2H .1006 updated and moved to 2H .1021</li> </ul>
.1007 Stormwater Requirements: ORW	Readopt as a Repeal	<ul style="list-style-type: none"> <li>Req’ts of 2H .1007 updated and moved to 2H .1021</li> </ul>

<b>Rule Name</b>	<b>Proposed Action</b>	<b>Notes/Source of Rule Language</b>
.1008 Design of Stormwater Management Measures	Readopt as a Repeal	<ul style="list-style-type: none"> <li>Req'ts of 2H .1008 updated and moved to following proposed rules: 2H .1001; .1003; .1031; 1040; .1042; .1050; .1051; .1053; .1059</li> </ul>
.1009 Staff Review and Permit Preparation	Readopt as a Repeal	<ul style="list-style-type: none"> <li>Req'ts of 2H .1009 updated and moved to 2H .1042(3)</li> </ul>
.1010 Final Action on Permit Applications	Readopt as a Repeal	<ul style="list-style-type: none"> <li>Req'ts of 2H .1010 updated and moved to 2H .1042(3)</li> <li>Also reference 2H .1040</li> </ul>
.1011 Modification and Revocation of Permits	Readopt as a Repeal	<ul style="list-style-type: none"> <li>Req'ts of 2H .1011 updated and moved to 2H .1040(6)</li> </ul>
.1012 Delegation of Authority	Readopt as a Repeal	<ul style="list-style-type: none"> <li>Req'ts of 2H .1012 updated and moved to 2H .1040(3)</li> </ul>
.1013 General Permits	Readopt as a Repeal	<ul style="list-style-type: none"> <li>Req'ts of 2H .1013 updated and moved to 2H .1041</li> </ul>
.1014 Stormwater Management for Urbanizing Areas	Readopt as a Repeal	<ul style="list-style-type: none"> <li>Proposed for repeal because is covered in 2H .0100s and 2H .1016 -.1018</li> </ul>
.1015 Development in Urbanizing Areas	Readopt as a Repeal	<ul style="list-style-type: none"> <li>Proposed for repeal because is duplicative of 2H .0150</li> </ul>
.1016 Development in Urbanizing Areas: Applicability and Delineation	Readopt w/ Substantive Changes	<ul style="list-style-type: none"> <li>Strikes .1016(c) (designation of regulated entities) b/c is covered in 2H .0151</li> <li>.1016(a)(4) moved to .1016(a)(1)(E)</li> <li>Moves .1016(d) (delegation), to its own new rule 2H .1018</li> </ul>
.1017 NPDES and Urbanizing Areas: Post-Construction Stormwater Management	Readopt w/ Substantive Changes	<ul style="list-style-type: none"> <li>.1017(2) Allows newer rules (Jordan, Falls, Coastal, Goose Creek, USMP) to satisfy stormwater requirements</li> <li>2H .1017(5) adds voluntary option to allow SCMs designed to achieve runoff volume match instead of runoff treatment.</li> </ul>
.1018 Urbanizing Areas: Delegation of Stormwater Management Program	Adopt	<ul style="list-style-type: none"> <li>New rule; language from 2H .1016(d)</li> </ul>
.1019 Coastal Counties	Adopt	<ul style="list-style-type: none"> <li>Includes req'ts previously located in 2H .1005</li> <li>Based on MDC Team deliberations</li> <li>Improves organization of coastal programs</li> <li>Updates technical standards for avoiding discharges of stormwater in SA waters</li> <li>Reduces the design storm in SA waters but slightly increases the design storm in regular coastal waters</li> </ul>
.1020 Universal Stormwater Management Program	Readopt w/ Substantive Changes	<ul style="list-style-type: none"> <li>.1020(f) adds voluntary option to allow SCMs designed to achieve runoff volume match as an alternative to runoff treatment</li> </ul>

Rule Name	Proposed Action	Notes/Source of Rule Language
.1021 Non-Coastal County HQW and ORW	Adopt	<ul style="list-style-type: none"> <li>▪ Req'ts previously located in 2H .1006 and .1007</li> <li>▪ Combines Non-Coastal County HQW and ORW programs because the existing requirements were very similar</li> <li>▪ .1021(7) adds a requirement for 30-foot vegetated setback for high density development</li> <li>▪ .1021(5) adds option to allow for single-family residential projects to qualify as low density if meet average lot size criteria over the entire project rather than minimum lot size for each lot</li> </ul>
.1031 New Stormwater Technologies Program	Adopt	<ul style="list-style-type: none"> <li>▪ Codifies and updates the requirement for the new stormwater technologies program (formerly the "PEP")</li> </ul>
.1040 Permit Administration	Adopt	<ul style="list-style-type: none"> <li>▪ Req'ts previously located in 2H .1008; .1010-.1012</li> <li>▪ Updates and organizes the process for stormwater permit administration and signatures on permit applications</li> </ul>
.1041 General Permits	Adopt	<ul style="list-style-type: none"> <li>▪ Req'ts previously located in 2H .1013</li> <li>▪ Minimal changes</li> </ul>
.1042 Standard Permitting Process	Adopt	<ul style="list-style-type: none"> <li>▪ Req'ts previously located in 2H .1008-.1010</li> <li>▪ Updates and organizes standard permitting process</li> </ul>
.1043 Fast Track Permitting Process: Authorization to Construct	Adopt	<ul style="list-style-type: none"> <li>▪ New permitting process</li> <li>▪ Based on MDC Team deliberations</li> <li>▪ Creates Step #1 of the fast-track permitting process</li> </ul>
.1044 Fast Track Permitting Process: Final Permit	Adopt	<ul style="list-style-type: none"> <li>▪ New permitting process</li> <li>▪ Based on MDC Team deliberations</li> <li>▪ Creates Step #2 of the fast-track permitting process</li> </ul>
.1045 Requirements for Permit Transfers and Renewals	Adopt	<ul style="list-style-type: none"> <li>▪ Req'ts previously located in 2H .1003, .1010</li> <li>▪ Codifies policies for permit transfers and renewals</li> <li>▪ .1045(3)(f) allows a licensed professional to certify that the SCM has been inspected, and that it was found to be built and maintained in accordance with the approved plans</li> </ul>
.1050 MDC for all Stormwater Control Measures	Adopt	<ul style="list-style-type: none"> <li>▪ Includes req'ts previously located in 2H .1008</li> <li>▪ Organizes MDCs that apply to all SCMs in one rule</li> <li>▪ Based on MDC Team deliberations; a number of design elements that the MDC team agreed are necessary to ensure that SCMs meet the current 85% TSS removal requirements, such as having a bypass device for larger flow events and protecting inlet and outlet structures against erosion, are proposed to be codified in 2H .1050</li> </ul>
.1051 MDC for Infiltration Systems	Adopt	<ul style="list-style-type: none"> <li>▪ Includes req'ts previously located in 2H .1008</li> <li>▪ Based on MDC Team deliberations</li> <li>▪ Updates and organizes design standards for this type of SCM</li> </ul>
.1052 MDC for Bioretention Cells	Adopt	<ul style="list-style-type: none"> <li>▪ Based on MDC Team deliberations</li> <li>▪ Updates and organizes design standards for this type of SCM</li> </ul>

<b>Rule Name</b>	<b>Proposed Action</b>	<b>Notes/Source of Rule Language</b>
.1053 MDC for Wet Ponds	Adopt	<ul style="list-style-type: none"> <li>▪ Req'ts previously located in 2H .1008</li> <li>▪ Based on MDC Team deliberations</li> <li>▪ Updates and organizes design standards for this type of SCM</li> </ul>
.1054 MDC for Stormwater Wetlands	Adopt	<ul style="list-style-type: none"> <li>▪ Based on MDC Team deliberations</li> <li>▪ Updates and organizes design standards for this type of SCM</li> </ul>
.1055 MDC for Permeable Pavement	Adopt	<ul style="list-style-type: none"> <li>▪ Based on MDC Team deliberations</li> <li>▪ Updates and organizes design standards for this type of SCM</li> </ul>
.1056 MDC for Sand Filters	Adopt	<ul style="list-style-type: none"> <li>▪ Based on MDC Team deliberations</li> <li>▪ Updates and organizes design standards for this type of SCM</li> </ul>
.1057 MDC for Rainwater Harvesting	Adopt	<ul style="list-style-type: none"> <li>▪ Based on MDC Team deliberations</li> <li>▪ Updates and organizes design standards for this type of SCM</li> </ul>
.1058 MDC for Green Roofs	Adopt	<ul style="list-style-type: none"> <li>▪ Based on MDC Team deliberations</li> <li>▪ Updates and organizes design standards for this type of SCM</li> </ul>
.1059 MDC for Level Spreader-Filter Strips	Adopt	<ul style="list-style-type: none"> <li>▪ Based on MDC Team deliberations</li> <li>▪ Updates and organizes design standards for this type of SCM</li> </ul>
.1060 MDC for Disconnected Impervious Surfaces	Adopt	<ul style="list-style-type: none"> <li>▪ Based on MDC Team deliberations</li> <li>▪ Updates and organizes design standards for this type of SCM</li> </ul>
.1061 MDC for Treatment Swales	Adopt	<ul style="list-style-type: none"> <li>▪ Based on MDC Team deliberations</li> <li>▪ Updates and organizes design standards for this type of SCM</li> </ul>
.1062 MDC for Dry Ponds	Adopt	<ul style="list-style-type: none"> <li>▪ Based on MDC Team deliberations</li> <li>▪ Updates and organizes design standards for this type of SCM</li> </ul>

# Appendix D:

## Proposed 15A NCAC 2H .1019

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15A NCAC 02H .1019 is proposed for adoption as follows:

### 15A NCAC 02H .1019 COASTAL COUNTIES

The purpose of this Rule is to protect the surface water from the impact of stormwater runoff from new development on the quality of various classifications of surface waters in the 20 Coastal Counties.

- (1) IMPLEMENTING AUTHORITY. This Rule shall be implemented by:
  - (a) local governments and other entities within the 20 Coastal Counties that are required to implement a Post-Construction program as a condition of their NPDES permits;
  - (b) local governments and state agencies that are delegated to implement a stormwater program pursuant to G.S. 143-214.7(c) and (d); and
  - (b) the Division in all other areas where this Rule applies.
- (2) APPLICABILITY OF THIS RULE. This Rule shall apply to the following types of developments within the Coastal Counties:
  - (a) all developments that require a Sediment and Erosion Control Plan pursuant to G.S. 113A-57;
  - (b) all developments that require a Coastal Area Management Act (CAMA) Major Development Permit pursuant to G.S. 113A-118; and
  - (c) developments that do not require either a Sediment and Erosion Control Plan or a CAMA Major Development Permit but meet one of the following criteria:
    - (i) nonresidential developments that propose to cumulatively add 10,000 square feet or more of built-upon area after the effective date of this Rule; or
    - (ii) residential developments that are within ½ mile of and draining to SA waters and propose to cover 12 percent or more of the undeveloped portion of the property with built-upon area.
- (3) EFFECTIVE DATES. The effective dates are as follows.
  - (a) for prior Rule .1000 of this Section, January 1, 1988;
  - (b) for prior Rule .1005 of this Section, September 1, 1995; and
  - (c) for S.L. 2008-211, October 1, 2008.
- (4) MDC FOR ALL PROJECTS. In addition to the requirements of this Rule, development projects shall also comply with the MDC as set forth in Rule .1003 of this Section.
- (5) DETERMINATION OF WHICH COASTAL STORMWATER PROGRAM APPLIES.
  - (a) SA WATERS. The SA Waters requirements shall apply to development activities located



within one-half mile of and draining to waters classified as SA per 15A NCAC 02B .0301.

- (i) The SA boundary shall be measured from either the landward limit of the top of bank or the normal high water level. In cases where a water is listed on the Schedule of Classifications, but the applicant provides documentation from the Division of Water Resources or the U.S. Army Corps of Engineers that the water is not present on the ground, the applicant shall not be subject to the SA requirements of this Rule.
- (ii) SA waters that have a supplemental classification of ORW shall be subject to additional special stormwater provisions per Items (6), (7) and (8) of this Rule.
- (iii) Projects that are partly located within an SA waters boundary shall follow the SA waters requirements in Item (6) of this Rule for that portion of the project that is inside the SA waters boundary and shall follow the Other Coastal Waters requirements of Item (6) of this Rule for the portion of the project that is outside the boundary.
- (iv) An SCM with any portion of its drainage area located within the SA waters boundary shall be designed to meet SA waters requirements.
- (b) FRESHWATER ORW. Freshwater ORW requirements shall apply to development activities that drain to waters classified as B-ORW and C-ORW per 15A NCAC 02B .0301.
  - (i) Projects that are partly located within a freshwater ORW boundary shall follow the freshwater ORW requirements in Item (6) of this Rule for that portion of the project that is inside the freshwater ORW boundary and shall follow the Other Coastal Waters requirements of Item (6) of this Rule for the portion of the project that is outside the boundary.
  - (ii) An SCM with any portion of its drainage area located within the freshwater ORW boundary shall be designed to meet freshwater ORW requirements.
- (c) OTHER COASTAL WATERS. If a receiving stream does not meet the applicability requirements for Sub-Items (5)(a) or (b) of this Rule, then it shall governed by other coastal water requirements set forth in this Rule.
- (6) STORMWATER REQUIREMENTS. Depending on the applicable program pursuant to Item (5) of this Rule, the following stormwater requirements shall apply:
  - (a) SUMMARY OF COASTAL PROGRAM REQUIREMENTS. The requirements associated with the Coastal Stormwater Program shall be in accordance with the following table.

<u>Program that Applies</u>	<u>Maximum BUA for Low Density</u>	<u>Required Storm Depth for High Density Projects</u>	<u>Additional Special Provisions</u>
<u>SA-HQW</u>	<u>12%</u>	<u>95<sup>th</sup> percentile storm event</u>	<u>SCMs for High Density SA Projects per Item (7) of this Rule</u>
<u>SA-ORW</u>	<u>12%</u>	<u>95<sup>th</sup> percentile storm event</u>	<u>SCMs for High Density SA Projects per Item (7) of this Rule; and Density Requirements for SA-ORW Projects per Item (8) of this Rule</u>
<u>B-ORW or C-ORW</u>	<u>12%</u>	<u>90<sup>th</sup> percentile storm event</u>	<u>None</u>
<u>Other coastal water</u>	<u>24%</u>	<u>90<sup>th</sup> percentile storm event</u>	<u>None</u>

- (b) BUILT-UPON AREA THRESHOLDS. A project shall be considered a low density project if it contains no more than the specified percentage of built-upon area and meets the low density criteria set forth in Rule.1003(2) of this Section; otherwise, a project shall be considered high density and shall meet the criteria set forth in Rule .1003(3) of this Section.
- (c) REQUIRED STORM DEPTH. For high density projects subject to SA waters requirements, the required storm depth shall be the 95<sup>th</sup> percentile storm event. For high density projects subject to Freshwater ORW and other Coastal Waters requirements, the required storm depth shall be the 90<sup>th</sup> percentile storm event.
- (d) VEGETATED SETBACKS. For all projects within the Coastal Counties, vegetated setbacks from perennial waterbodies, perennial streams, and intermittent streams shall be at least 50 feet in width for new development and at least 30 feet in width for redevelopment and shall comply with Rule .1003(4) of this Section.

- (7) SCMS FOR SA HIGH DENSITY PROJECTS REQUIREMENTS. High density projects subject to SA waters requirements shall use one of the following approaches for treating and discharging stormwater:
- (a) RUNOFF VOLUME MATCH. The project shall meet runoff volume match requirements for the 95th percentile storm event as set forth in Rule .1003 (3)(a)(ii) of this Section. Runoff volume in excess of the 95th percentile storm event shall be released at a non-erosive velocity at the edge of the vegetated setback.
  - (b) RUNOFF TREATMENT WITH NON-DISCHARGING SCMs. SCM(s) shall treat the stormwater from the entire project without discharging during the 95th percentile storm event as set forth in Rule .1003 (3)(a)(i) of this Section. The runoff volume in excess of the 95th percentile storm event shall be released at a non-erosive velocity at the edge of the vegetated setback or to an existing stormwater drainage system.
  - (c) RUNOFF TREATMENT WITH DISCHARGING SCMs. SCM(s) shall treat the stormwater from the entire project during the 95th percentile storm event as set forth in Rule .1003 (3)(a)(i) of this Section and meet the following requirements:
    - (i) a licensed professional shall provide documentation that it is not feasible to meet the MDC for infiltrations systems as set forth in Rule .1051 of this Section;
    - (ii) the stormwater shall be filtered through a minimum of 18 inches of sand prior to discharge;
    - (iii) the discharge from the SCM during the 95th percentile storm event shall be directed to either a level spreader-filter strip designed as set forth in Rule .1059 of this Section, a swale that fans out at natural grade, or a natural wetland that does not contain a conveyance to SA waters; and
    - (iv) the runoff volume in excess of the 95th percentile storm event shall be released at a non-erosive velocity at the edge of the vegetated setback or to an existing stormwater drainage system.
- (8) DENSITY REQUIREMENTS FOR SA-ORW PROJECTS. The following shall apply:
- (a) For the entire project, the percentage built-upon area shall not exceed 25 percent.
  - (b) For the portion of a project that is within 575 feet of SA-ORW waters, the percentage built-upon area shall not exceed 25 percent for high density projects and shall not exceed 12 percent for low density projects.

*History Note: Authority G.S. 143-214.1; 143-214.5; 143-215.3(a)(1);  
Partial content of this Rule was previously codified in 2H .1005.*

# Appendix E:

## SL 2008-211

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### GENERAL ASSEMBLY OF NORTH CAROLINA SESSION 2007

#### SESSION LAW 2008-211 SENATE BILL 1967

AN ACT TO PROVIDE FOR IMPROVEMENTS IN THE MANAGEMENT OF STORMWATER IN THE COASTAL COUNTIES IN ORDER TO PROTECT WATER QUALITY.

The General Assembly of North Carolina enacts:

**SECTION 1.(a)** Disapprove Rule. – Pursuant to G.S. 150B-21.3(b1), 15A NCAC 02H .1005 (Stormwater Requirements: Coastal Counties), as adopted by the Environmental Management Commission on 10 January 2008 and approved by the Rules Review Commission on 20 March 2008, is disapproved.

**SECTION 1.(b)** Supersede Rule. – 15A NCAC 02H .1005 (Stormwater Requirements: Coastal Counties), effective 1 September 1995, is superseded by this act. References in the North Carolina Administrative Code to 15A NCAC 02H .1005 shall be deemed to refer to the equivalent provisions of this act.

**SECTION 2.(a)** Definitions. – The following definitions apply to this act and its implementation:

- (1) The definitions set out in 15A NCAC 02H .1002 (Definitions).
- (2) The definitions set out in G.S. 143-212 and G.S. 143-213.
- (3) "Built upon area" has the same meaning as in Session Law 2006-246 and means that portion of a project that is covered by impervious or partially impervious surface including, but not limited to, buildings; pavement and gravel areas such as roads, parking lots, and paths; and recreation facilities such as tennis courts. "Built upon area" does not include a wooden slatted deck, the water area of a swimming pool, or pervious or partially pervious paving material to the extent that the paving material absorbs water or allows water to infiltrate through the paving material.
- (4) "Permeable pavement" means paving material that absorbs water or allows water to infiltrate through the paving material. Permeable pavement materials include porous concrete, permeable interlocking concrete pavers, concrete grid pavers, porous asphalt, and any other material with similar characteristics. Compacted gravel shall not be considered permeable pavement.
- (5) "Residential development activities" has the same meaning as in 15A NCAC 02B .0202(54).
- (6) "Vegetative buffer" has the same meaning as in 15A NCAC 02H .1002(22) and means an area of natural or established vegetation directly adjacent to surface waters through which stormwater runoff flows in a diffuse manner to protect surface waters from degradation due to development activities.
- (7) "Vegetative conveyance" means a permanent, designed waterway lined with vegetation that is used to convey stormwater runoff at a non-erosive velocity within or away from a developed area.

**SECTION 2.(b)** Requirements for Certain Nonresidential and Residential Development in the Coastal Counties. – All nonresidential development activities that occur within the Coastal Counties that will add more than 10,000 square feet of built

upon area or that require a Sedimentation and Erosion Control Plan, pursuant to G.S. 113A-57 or a Coastal Area Management Act (CAMA) Major Development Permit, pursuant to G.S. 113A-118 and all residential development activities within the Coastal Counties that require a Sedimentation and Erosion Control Plan, pursuant to G.S. 113A-57 or a Coastal Area Management Act (CAMA) Major Development Permit, pursuant to G.S. 113A-118 shall manage stormwater runoff as provided in this subsection. A development activity or project requires a Sedimentation and Erosion Control Plan if the activity or project disturbs one acre or more of land, including an activity or project that disturbs less than one acre of land that is part of a larger common plan of development. Whether an activity or project that disturbs less than one acre of land is part of a larger common plan of development shall be determined in a manner consistent with the memorandum referenced as "Guidance Interpreting Phase 2 Stormwater Requirements" from the Director of the Division of Water Quality of the Department of Environment and Natural Resources to Interested Parties dated 24 July 2006.

- (1) Development Near Outstanding Resource Waters (ORW). – Development activities within the Coastal Counties and located within 575 feet of the mean high waterline of areas designated by the Commission as Outstanding Resource Waters (ORW) shall meet the requirements of 15A NCAC 02H .1007 (Stormwater Requirements: Outstanding Resource Waters) and shall be permitted as follows:
  - a. Low-Density Option. – Development shall be permitted pursuant to 15A NCAC 02H .1003(d)(1) if the development meets all of the following requirements:
    1. The development has a built upon area of twelve percent (12%) or less. A development project with an overall density at or below the low-density threshold, but containing areas with a density greater than the overall project density, shall be considered low-density as long as the project meets or exceeds the requirements for low-density development and locates the higher density development in upland areas and away from surface waters and drainageways to the maximum extent practicable.
    2. Stormwater runoff from the development is transported primarily by vegetated conveyances. As used in this sub-sub-subdivision, "conveyance system" shall not include a stormwater collection system. Stormwater runoff from built upon areas that is directed to flow through any wetlands shall flow into and through these wetlands at a non-erosive velocity.
    3. The development contains a 50-foot-wide vegetative buffer for new development activities and a 30-foot-wide vegetative buffer for redevelopment activities. The width of a buffer is measured horizontally from the normal pool elevation of impounded structures, from the bank of each side of streams or rivers, and from the mean high waterline of tidal waters, perpendicular to the shoreline. The vegetative buffer may be cleared or graded, but must be planted with and maintained in grass or any other vegetative or plant material. The Division of Water Quality may, on a case-by-case basis, grant a minor variance from the vegetative buffer requirements of this section pursuant to the procedures set out in 15A NCAC 02B .0233(9)(b). Vegetative buffers and filters required

by this section and any other buffers or filters required by State water quality or coastal management rules or local government requirements may be met concurrently and may contain, in whole or in part, coastal, isolated, or 404 jurisdictional wetlands that are located landward of the normal waterline.

- b. High-Density Option. – Development shall be permitted pursuant to 15A NCAC 02H .1003(d)(2) if the development meets all of the following requirements:
1. The development has a built upon area of greater than twelve percent (12%).
  2. The development has no direct outlet channels or pipes to Class SA waters unless permitted in accordance with 15A NCAC 02H .0126. Stormwater runoff from built upon areas that is directed to flow through any wetlands shall flow into and through these wetlands at a non-erosive velocity.
  3. The development utilizes control systems that are any combination of infiltration systems, bioretention systems, constructed stormwater wetlands, sand filters, rain barrels, cisterns, rain gardens or alternative low impact development stormwater management systems designed in accordance with 15A NCAC 02H .1008 to control and treat the runoff from all surfaces generated by one and one-half inches of rainfall, or the difference in the stormwater runoff from all surfaces from the predevelopment and postdevelopment conditions for a one-year, 24-hour storm, whichever is greater. Wet detention ponds may be used as a stormwater control system to meet the requirements of this sub-sub-subdivision, provided that the stormwater control system fully complies with the requirements of this sub-subdivision. If a wet detention pond is used within one-half mile of Class SA waters, installation of a stormwater best management practice in series with the wet detention pond shall be required to treat the discharge from the wet detention pond. Secondary stormwater best management practices that are used in series with another stormwater best management practice do not require any minimum separation from the seasonal high water table. Alternatives as described in 15A NCAC 02H .1008(h) may also be approved if they meet the requirements of this sub-subdivision.
  4. Stormwater runoff from the development that is in excess of the design volume must flow overland through a vegetative filter designed in accordance with 15A NCAC 02H .1008 with a minimum length of 50 feet measured from mean high water of Class SA waters.
  5. The development contains a 50-foot-wide vegetative buffer for new development activities and a 30-foot-wide vegetative buffer for redevelopment activities. The width of a buffer is measured horizontally from the normal pool elevation of impounded structures, from the bank of each side of streams or rivers, and from the mean high waterline of tidal waters, perpendicular to the shoreline.

The vegetative buffer may be cleared or graded, but must be planted with, and maintained in, grass or any other vegetative or plant material. Furthermore, stormwater control best management practices (BMPs), or stormwater control structures, with the exception of wet detention ponds, may be located within this vegetative buffer. The Division of Water Quality may, on a case by case basis, grant a minor variance from the vegetative buffer requirements of this section pursuant to the procedures set out in 15A NCAC 02B .0233(9)(b). Vegetative buffers and filters required by this section and any other buffers or filters required by State water quality or coastal management rules or local government requirements may be met concurrently and may contain, in whole or in part, coastal, isolated, or 404 jurisdictional wetlands that are located landward of the normal waterline.

- c. **Stormwater Discharges Prohibited.** – All development activities, including both low- and high-density projects, shall prohibit new points of stormwater discharge to Class SA waters or an increase in the volume of stormwater flow through conveyances or increase in capacity of conveyances of existing stormwater conveyance systems that drain to Class SA waters. Any modification or redesign of a stormwater conveyance system within the contributing drainage basin must not increase the net amount or rate of stormwater discharge through existing outfalls to Class SA waters. The following shall not be considered a direct point of stormwater discharge:
    - 1. Infiltration of the stormwater runoff from the design storm as described in sub-sub-subdivision 3. of sub-subdivision b. of subdivision (1) of this subsection.
    - 2. Diffuse flow of stormwater at a non-erosive velocity to a vegetated buffer or other natural area, that is capable of providing effective infiltration of the runoff from the design storm as described in sub-sub-subdivision 3. of sub-subdivision b. of subdivision (1) of this subsection. Notwithstanding the other requirements of this section, the infiltration mandated in this sub-sub-subdivision does not require a minimum separation from the seasonal high-water table.
    - 3. The discharge from a wet detention pond that is treated by a secondary stormwater best management practice, provided that both the wet detention pond and the secondary stormwater best management practice meet the requirements of this sub-subdivision.
  - d. **Limitation on the Density of Development.** – Development shall be limited to a built upon area of twenty-five percent (25%) or less.
- (2) **Development Near Class SA Waters.** – Development activities within one-half mile of and draining to those waters classified by the Commission as Class SA waters or within one-half mile of waters classified by the Commission as Class SA waters and draining to unnamed freshwater tributaries to Class SA waters shall meet the requirements of sub-subdivisions a., b., and c. of subdivision (1) of this subsection. The extent of Class SA waters is limited to those waters

that are determined to be at least an intermittent stream based on a site stream determination made in accordance with the procedures that are delineated in the Division of Water Quality's "Identification Methods for the Origin of Intermittent and Perennial Streams" prepared pursuant to Session Law 2001-404.

(3) Other Coastal Development. – Development activities within the Coastal Counties except those areas described in subdivisions (1) and (2) of this subsection shall meet all of the following requirements:

a. Low-Density Option: Development shall be permitted pursuant to 15A NCAC 02H .1003(d)(1) if the development meets all of the following requirements:

1. The development has a built upon area of twenty-four percent (24%) or less. A development project with an overall density at or below the low-density threshold, but containing areas with a density greater than the overall project density, shall be considered low density as long as the project meets or exceeds the requirements for low-density development and locates the higher density in upland areas and away from surface waters and drainageways to the maximum extent practicable.

2. Stormwater runoff from the development is transported primarily by vegetated conveyances. As used in this sub-sub-subdivision, "conveyance system" shall not include a stormwater collection system. Stormwater runoff from built upon areas that is directed to flow through any wetlands shall flow into and through these wetlands at a non-erosive velocity.

3. The development contains a 50-foot-wide vegetative buffer for new development activities and a 30-foot-wide vegetative buffer for redevelopment activities. The width of a buffer is measured horizontally from the normal pool elevation of impounded structures, from the bank of each side of streams or rivers, and from the mean high waterline of tidal waters, perpendicular to the shoreline. The vegetative buffer may be cleared or graded, but must be planted with, and maintained in, grass or any other vegetative or plant material. The Division of Water Quality may, on a case-by-case basis, grant a minor variance from the vegetative buffer requirements of this section pursuant to the procedures set out in 15A NCAC 02B .0233(9)(b). Vegetative buffers and filters required by this section and any other buffers or filters required by State water quality or coastal management rules or local government requirements may be met concurrently and may contain, in whole or in part, coastal, isolated, or 404 jurisdictional wetlands that are located landward of the normal waterline.

b. High-Density Option: Higher density developments shall be permitted pursuant to 15A NCAC 02H .1003(d)(2) if the development meets all of the following requirements:

1. The development has a built upon area of greater than twenty-four percent (24%).

2. The development uses control systems that are any combination of infiltration systems, wet detention ponds, bioretention systems, constructed stormwater wetlands,



sand filters, rain barrels, cisterns, rain gardens or alternative stormwater management systems designed in accordance with 15A NCAC 02H .1008.

3. Control systems must be designed to store, control, and treat the stormwater runoff from all surfaces generated by one and one-half inch of rainfall.
  4. Stormwater runoff from built upon areas that is directed to flow through any wetlands shall flow into and through these wetlands at a non-erosive velocity.
  5. A 50-foot-wide vegetative buffer for new development activities and a 30-foot-wide vegetative buffer for redevelopment activities. The width of a buffer is measured horizontally from the normal pool elevation of impounded structures, from the bank of each side of streams or rivers, and from the mean high waterline of tidal waters, perpendicular to the shoreline. The vegetative buffer may be cleared or graded, but must be planted with, and maintained in, grass or any other vegetative or plant material. Furthermore, stormwater control best management practices (BMPs), or stormwater control structures, with the exception of wet detention ponds, may be located within this vegetative buffer. The Division of Water Quality may, on a case by case basis, grant a minor variance from the vegetative buffer requirements of this section pursuant to the procedures set out in 15A NCAC 02B .0233(9)(b). Vegetative buffers and filters required by this section and any other buffers or filters required by State water quality or coastal management rules or local government requirements may be met concurrently and may contain, in whole or in part, coastal, isolated, or 404 jurisdictional wetlands that are located landward of the normal waterline.
- (4) Requirements for Structural Stormwater Controls. – Structural stormwater controls required under this section shall meet all of the following requirements:
- a. Remove an eighty-five percent (85%) average annual amount of Total Suspended Solids.
  - b. For detention ponds, draw down the treatment volume no faster than 48 hours, but no slower than 120 hours.
  - c. Discharge the storage volume at a rate equal to or less than the predevelopment discharge rate for the one-year, 24-hour storm.
  - d. Meet the General Engineering Design Criteria set forth in 15A NCAC 02H .1008(c).
  - e. For structural stormwater controls that are required under this section and that require separation from the seasonal high-water table, a minimum separation of two feet is required. Where a separation of two feet from the seasonal highwater table is not practicable, the Division of Water Quality may grant relief from the separation requirement pursuant to the Alternative Design Criteria set out in 15A NCAC 02H .1008(h). No minimum separation from the seasonal highwater table is required for a secondary stormwater best management practice that is used in a series with another stormwater best management practice.

- (5) **Certain Wetlands Excluded From Density Calculation.** – For the purposes of this section, areas defined as Coastal Wetlands under 15A NCAC 07H .0205, as measured landward from the normal high waterline, shall not be included in the overall project area to calculate impervious surface density. Wetlands that are not regulated as coastal wetlands pursuant to 15A NCAC 07H .0205 and that are located landward of the normal high waterline may be included in the overall project area to calculate impervious surface density.

**SECTION 2.(c)** **Requirements for Limited Residential Development in Coastal Counties.** – For residential development activities within the 20 Coastal Counties that are located within one-half mile and draining to Class SA waters, that have a built upon area greater than twelve percent (12%), that do not require a stormwater management permit under subsection (b) of this section, and that will add more than 10,000 square feet of built upon area, a one-time, nonrenewable stormwater management permit shall be obtained. The permit shall require recorded deed restrictions or protective covenants to ensure that the plans and specifications approved in the permit are maintained. Under this permit, stormwater runoff shall be managed using any one or combination of the following practices:

- (1) Install rain cisterns or rain barrels designed to collect all rooftop runoff from the first one and one-half inches of rain. Rain barrels and cisterns shall be installed in such a manner as to facilitate the reuse of the collected rain water on site and shall be installed in such a manner that any overflow from these devices is directed to a vegetated area in a diffuse flow. Construct all uncovered driveways, uncovered parking areas, uncovered walkways, and uncovered patios out of permeable pavement or other pervious materials.
- (2) Direct rooftop runoff from the first one and one-half inches of rain to an appropriately sized and designed rain garden. Construct all uncovered driveways, uncovered parking areas, uncovered walkways, and uncovered patios out of permeable pavement or other pervious materials.
- (3) Install any other stormwater best management practice that meets the requirements of 15A NCAC 02H .1008 to control and treat the stormwater runoff from all built upon areas of the site from the first one and one-half inches of rain.

**SECTION 2.(d)** **Exclusions.** – The requirements of this section shall not apply to any of the following:

- (1) Activities of the North Carolina Department of Transportation that are regulated in accordance with the provisions of the Department's National Pollutant Discharge Elimination System (NPDES) Stormwater Permit.
- (2) Development activities that are conducted pursuant to and consistent with one of the following authorizations, or any timely renewal thereof, shall be regulated by those provisions and requirements of 15A NCAC 02H .1005 that were effective at the time of the original issuance of the following authorizations:
  - a. State Stormwater Permit issued under the provisions of 15A NCAC 02H .1005.
  - b. Stormwater Certification issued pursuant to 15A NCAC 02H .1000 prior to 1 December 1995.
  - c. A Coastal Area Management Act Major Permit.
  - d. 401 Certification that contains an approved Stormwater Management Plan.
  - e. A building permit pursuant to G.S. 153A-357 or G.S. 160A-417.

- f. A site-specific development plan as defined by G.S. 153A-344.1(b)(5) and G.S. 160A-385.1(b)(5).
  - g. A phased development plan approved pursuant to G.S. 153A-344.1 or G.S. 160A-385.1 that shows:
    - 1. For the initial or first phase of development, the type and intensity of use for a specific parcel or parcels, including at a minimum, the boundaries of the project and a subdivision plan that has been approved pursuant to G.S. 153A-330 through G.S. 153A-335 or G.S. 160A-371 through G.S. 160A-376.
    - 2. For any subsequent phase of development, sufficient detail so that implementation of the requirements of this section to that phase of development would require a material change in that phase of the plan.
  - h. A vested right to the development pursuant to common law.
- (3) Redevelopment activities that result in no net increase in built upon area and provide stormwater control equal to the previous development.
  - (4) Development activities for which a complete Stormwater Permit Application has been accepted by the Division of Water Quality prior to the effective date of this act, shall be regulated by the provisions and requirements of 15A NCAC 02H .1005 that were effective at the time that this application was accepted as complete by the Division of Water Quality. For purposes of this subsection, a Stormwater Permit Application is deemed accepted as complete by the Division of Water Quality when the application is assigned a permit number in the Division's Basinwide Information Management System.
  - (5) Development activities for which only a minor modification of a State Stormwater Permit is required shall be regulated by the provisions and requirements of 15A NCAC 02H .1005 that were effective at the time of the original issuance of the State Stormwater Permit. For purposes of this subsection, a minor modification of a State Stormwater Permit is defined as a modification that does not increase the net area of built upon area within the project site or does not increase the overall size of the stormwater controls that have been previously approved for that development activity.
  - (6) Municipalities designated as a National Pollutant Discharge Elimination System (NPDES) Phase 2 municipality located within the 20 Coastal Counties until such time as the NPDES Phase 2 Stormwater Permit expires and is subject to renewal. Upon renewal of the NPDES Phase 2 Stormwater Permits for municipalities located within the 20 Coastal Counties, the Department shall review the permits to determine whether the permits should be amended to include the provisions of this section.

**SECTION 2.(e)** Exemptions From Vegetative Buffer Requirements. – The following activities are exempt from the vegetative buffer requirements of this section:

- (1) Development in urban waterfronts that meets the requirements of 15A NCAC 07H .0209(g),
- (2) Development in a new urban waterfront area that meets the requirements of Session Law 2004-117,
- (3) Those activities listed in 15A NCAC 07H .0209(d)(10)(A) through 15A NCAC 07H .0209(d)(10)(H),
- (4) Development of upland marinas that have received or are required to secure a Coastal Area Management Act Major Permit.

**SECTION 2.(f)** Compliance with Other Rules. – In addition to the requirements specified in this section, activities regulated under this section must also comply with any requirements of any other applicable law or rule.

**SECTION 3.** Rescission of Phase 2 Designations. – All designations of local governments within the 20 Coastal Counties as Phase 2 municipalities by the Environmental Management Commission under Section 5 of Session Law 2006-246 that occurred after 16 August 2006 are rescinded. The provisions of this section do not preclude any future designations of these areas as Phase 2 municipalities by the Environmental Management Commission under Section 5 of Session Law 2006-246.

**SECTION 4.** Additional Rule Making. – The Commission may adopt rules to replace the rules that are disapproved or superseded as provided in Section 1 of this act. If the Commission adopts rules pursuant to this section, notwithstanding G.S. 150B-19(4), the rules shall be substantively identical to the provisions of Section 2 of this act. The Commission may reorganize or renumber any of the rules to which this section applies at its discretion. Rules adopted pursuant to this section are not subject to G.S. 150B-21.9 through G.S. 150B-21.14. Rules adopted pursuant to this section shall become effective as provided in G.S. 150B-21.3(b1) as though 10 or more written objections had been received as provided by G.S. 150B-21.3(b2).

**SECTION 5.** Construction of Act. –

- (1) Except as specifically provided in Section 4 of this act, nothing in this act shall be construed to limit, expand, or otherwise alter the authority of the Environmental Management Commission or any unit of local government.
- (2) This act shall not be construed to affect any delegation of any power or duty by the Commission to the Department or subunit of the Department.
- (3) As used in subsection (b) of Section 2 of this act, the phrase "common plan of development" shall be interpreted and implemented in a manner consistent with the memorandum referenced as "Guidance Interpreting Phase 2 Stormwater Requirements" from the Director of the Division of Water Quality of the Department of Environment and Natural Resources to Interested Parties dated 24 July 2006, and for these purposes the memorandum shall be considered a part of this act and as such shall be printed as a part of the Session Laws.

**SECTION 6.** Application of Memorandum to Prior Session Law. – Subdivision (5) of Section 18 of S.L. 2006-246 reads as rewritten:

- "(5) As used in Section 9 of this act, the phrase 'common plan of development or sale' shall be interpreted and implemented in a manner consistent with the memorandum referenced as 'Guidance Interpreting Phase II Stormwater Requirements' from the Director of the Division of Water Quality of the Department of Environment and Natural Resources to Interested Parties dated 24 July 2006, and for these purposes the memorandum shall be considered a part of this act and as such shall be printed as a part of the Session Laws."

**SECTION 7.** Provisions of Act Not Codified; Set Out As Note. – Notwithstanding G.S. 164-10, the Revisor of Statutes shall not codify any of the provisions of this act. The Revisor of Statutes shall set out the text of this act as a note to G.S. 143-214.7 and may make notes concerning this act to other sections of the General Statutes as the Revisor of Statutes deems appropriate.

**SECTION 8.** Effective Date. – Subsection (b) of Section 1 of this act and Sections 2 and 3 of this act become effective 1 October 2008. All other sections of this act are effective when this act becomes law.

In the General Assembly read three times and ratified this the 15<sup>th</sup> day of July, 2008.

s/ Beverly E. Perdue  
President of the Senate

s/ Joe Hackney  
Speaker of the House of Representatives

s/ Michael F. Easley  
Governor

Approved 10:01 a.m. this 9<sup>th</sup> day of August, 2008