*Draft* – Catalog of Nutrient Reduction Practices



Rainwater Harvesting Practice - Raleigh

Developed by the N.C. Division of Water Resources

Nonpoint Source Planning Branch

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Contents

[Chapter 1: Introduction 5](#_Toc57050317)

[1.1 Overview 5](#_Toc57050318)

[1.2 What is a “Nutrient Credit”? 5](#_Toc57050319)

[1.3 Types of Nutrient Credit 5](#_Toc57050320)

[1.3.1 Permanent Nutrient Offset Credit 6](#_Toc57050321)

[1.3.2 Term Nutrient Offset Credit 6](#_Toc57050322)

[1.4 Nutrient Practice Options 6](#_Toc57050323)

[1.5 Regulations Supported 7](#_Toc57050324)

[Chapter 2: Nutrient Reduction Practices & Resources 8](#_Toc57050325)

[2.1 Table of Approved Nutrient Practices 8](#_Toc57050326)

[2.2 Supporting Information for Stormwater Control Measures (SCMs) 10](#_Toc57050327)

[2.2.1 NCDEMLR Stormwater Design Manual / Minimum Design Criteria 10](#_Toc57050328)

[2.2.2 NCDEMLR SCM Credit Document 10](#_Toc57050329)

[2.2.3 Stormwater Nitrogen & Phosphorus Accounting Tool (SNAP) 10](#_Toc57050330)

[2.2.4 Other Development Site Activities - Procedural Practices 11](#_Toc57050331)

[2.2.5 Other Development Site Activities - Land Cover Modification Practices 11](#_Toc57050332)

[2.3 Supporting Information for DWR-Approved Nutrient Practices 11](#_Toc57050333)

[2.3.1 Factors To Consider When Selecting Practices 12](#_Toc57050334)

[Chapter 3: DWR-Approved Practices for Existing Development 13](#_Toc57050335)

[3.1 Remedying Illicit Discharges to Surface Waters or Stormwater Systems 13](#_Toc57050336)

[3.2 Storm Drain Cleaning 13](#_Toc57050337)

[3.3 Street Sweeping 13](#_Toc57050338)

[3.4 Soil Improvements 14](#_Toc57050339)

[3.5 Remedying Discharging Sand Filters 14](#_Toc57050340)

[3.6 Cattle Exclusion with Nutrient Management 14](#_Toc57050341)

[3.7 Riparian Reforestation on Agricultural Land 15](#_Toc57050342)

[Chapter 4: Practice Implementation Guidance 16](#_Toc57050343)

[4.1 Credit Stability and Revision of Credit Values 16](#_Toc57050344)

[4.2 Crediting Older Installations 17](#_Toc57050345)

[4.3 Nested Credit 17](#_Toc57050346)

[4.4 Delivery Factors and Transport Factors 18](#_Toc57050347)

[4.5 Credit Tracking and Reporting 18](#_Toc57050348)

[4.6 Use of Federal or State Grant Funds 18](#_Toc57050349)

[Appendix I:Template for Proposed Practice Design Specifications & Nutrient Accounting 19](#_Toc57050350)

[Appendix II: Practice Approval Process 22](#_Toc57050351)

[Appendix III: Nutrient Credit for Unique Practice Installations 27](#_Toc57050352)

[Appendix IV: Nutrient Offset Credit Trading Rule (NCAC 02B .0703) 28](#_Toc57050353)

# Chapter 1: Introduction

## 1.1 Overview

North Carolina’s nutrient management strategy (NMS) rules require nutrient loading reductions from various sectors. Each strategy establishes reduction goals, and those goals provide the foundation for watershed-specific nutrient reduction regulations governing these sectors. The ultimate purpose of these strategies is to restore targeted waterbodies, eliminating nutrient-driven impairments.

To support implementation under the rules, the Division of Water Resources, with significant support from other agencies and organizations, has developed this Catalog of Nutrient Reduction Practices. The purpose of this catalog is to provide a single, comprehensive listing of all currently approved nutrient practices and referencing to the applicable sources of design standards and nutrient reduction accounting.

The Catalog is intended to provide a single reference for regulated parties and nutrient market participants considering their options for nutrient reductions under North Carolina’s nutrient strategy rules. These options are referred to throughout this document as “nutrient reduction practices,” or simply “practices.” The Catalog also provides basic guidance and references to resources that can be used to assist with selecting the most suitable practice as well as a template and instructions for the approval of new practice types.

## 1.2 What is a “Nutrient Credit”?

While the specific term “nutrient credit” is not defined in North Carolina regulation, its use throughout this guidance reflects the common meaning of a DWR-recognized nutrient load reduction value assignment for a given practice; more specifically, the average annual total nitrogen or total phosphorus mass export reduction value estimated for a practice to a receiving waterbody or stormwater conveyance. Wherever the context in this document is credit produced for use in trading, the more specific phrase “nutrient offset credit” is used. Unlike nutrient credit generally, definitions and uses of nutrient offset credits are established in rule, specifically the *Nutrient Offset Credit Trading* Rule (15A NCAC 02B .0703) and Nutrient Strategy Definitions Rule (15A NCAC 02B .0701). For the purposes of both this Catalog and rule 2B .0703, nutrient reductions are calculated for an average annual basis, and it is understood there will be variability in actual nutrient reduction between years and between installations of the same type of practice. It is an abstract accounting of a real-life process. The nutrient reduction practice design specifications referenced in this Catalog are intended to produce on-the-ground reductions that vary as little as possible in effectiveness from their presumptive values while still being practicable to implement in heterogenous settings and conditions.

## 1.3 Types of Nutrient Credit

As suggested above, nutrient credits can be divided into **tradable (nutrient offset credits) and non-tradable** forms. As specified in **Table 1** below, some practices are suitable for producing either form, depending on the procedures followed around their implementation. As noted above, the requirements for establishing tradable credits are spelled out in the *Nutrient Offset Credit Trading* rule. Non-tradable credits are those used for directly meeting rule requirements by a regulated entity. Where they are discussed in this Catalog, non-tradable credits are referred to as such, or as “direct compliance credit”, or as “non-tradable nutrient reductions”. Non-tradable credit projects have one or more of qualifying conditions, design features, installation constraints, approval, reporting, credit release, operations, or maintenance specifics that make them unsuitable for trading.

Nutrient credits are also specified as **“permanent” or “term” (time-limited)** in nature, with associated requirements. For tradable credits, requirements associated with each duration are set out in the *Nutrient Offset* rule, as discussed below. For non-tradable credits, permanent or term credit duration varies by source rule requirements and by the nature of the individual practice as stipulated in practice specifications. New Development Stormwater is the only strategy rule requiring practices to provide permanent reductions. Other strategy rules provide latitude for permanent or term reductions. Certain practices by their nature are limited to producing term reductions, as identified in **Table 1**. A unique type of annually credited practice, provided for in *Appendix III, Nutrient Credit for Unique Practice Installations*, is innovative practices lacking sufficient research for presumptive credit, which may be monitored for annual, retrospective credit. The nature of this option limits its use to parties under the *Existing Development* rule.

### 1.3.1 Permanent Nutrient Offset Credit

A "Permanent Nutrient Offset Credit" is defined in rule 2B .0701 as:

*“a nutrient load reduction credit that does not automatically expire. Permanent nutrient offset credits account for permanent nutrient load reductions resulting from permanently installed and maintained nutrient reduction practices. Permanent nutrient offset credits may be used for compliance with new development stormwater rules and may also satisfy other nutrient load reduction requirements as described in .0703. Nutrient offset credits are expressed in pounds of total nitrogen or total phosphorus per year.”*

Permanent credit calculation methods have gone through an approval process to determine adequacy of scientific research to predict performance of comparable practices and situations. DWR has enough confidence in the calculation method to accept it as a prospective or predictive calculation of year-to-year nutrient reduction. The practice is designed to a standard where DWR expects long-term, essentially permanent, nutrient reduction provided at that estimated annual amount. Permanent nutrient offset credit projects must follow requirements set forth in .0703 and require inspection by DWR for suitability of the site prior to starting work.

### 1.3.2 Term Nutrient Offset Credit

A "Term Nutrient Offset Credit" is defined in rule 2B .0701 as:

*“a nutrient load reduction credit that accounts for annual nutrient load for a finite period of time. Temporary nutrient offset credits are expressed in pounds of total nitrogen or total phosphorus.”*

Term credit calculation methods have gone through a similar process of evaluation to permanent credits, and DWR accepts these methods for prospective, presumptive calculation of year-to-year nutrient reduction. However, unlike a permanent credit, these are considered “temporary” because of the time-limited design, management, or performance of the practice. Many term credits may be renewed through re-inspection, rehabilitation, or other refreshment of practice function. Term nutrient offset credit practices must follow requirements set forth in .0703 and require inspection by DWR for suitability of the site prior to starting work.

## 1.4 Nutrient Practice Options

Generally, nutrient strategy rules each identify an information source for the practices that may be used to satisfy their requirements, and either the rule or the referenced source describes procedures associated with implementing those practices and methods for quantifying presumptive nutrient reductions assigned to installations of a practice type. **Table 1** provides a summary listing of all currently approved practices available under the range of nutrient strategy rules, and respective sources for design specifications and nutrient crediting. This list can be expected to continue expanding with time. DWR intends to add practices as resources permit, and will update the Catalog periodically to reflect new additions. The process for approving practices for nutrient credit is outlined in *Appendix II*. The requirements associated with establishing a new practice are sufficiently involved and protracted that parties planning rule compliance in the near term are advised to work from the currently approved set. Parties subject to the *Existing Development Stormwater* rule have an additional potential option, for experimental practice installations, to monitor the practice for annual, retroactive credit. *Appendix III* outlines the process for approving the use of such innovative practices.

## 1.5 Regulations Supported

 This Catalog serves as a reference compendium of nutrient practices used across all of North Carolina’s nutrient strategy rules. **Table 1** provides a summary listing of all currently approved practices and, for each practice, identifies its applicability to each rule type in a strategy as well as its suitability for trading under the Offset rule.

# Chapter 2: Nutrient Reduction Practices & Resources

This chapter provides the current list of nutrient practices with state-approved design specifications and nutrient reduction credit methods. It identifies the rules under which each practice is applicable, and explains andprovides references to the design specifications and credit methods used for each practice. The chapter also provides planning-level information to help affected parties evaluate practice options.

## 2.1 Table of Approved Nutrient Practices

**Table 1** includes the list of all currently approved practices that can be implemented to achieve nutrient reductions toward compliance with the range of NC nutrient strategy rules. For each practice:

* a reference is provided to the applicable design specifications and nutrient credit method,
* the rules are identified under which it can be used for direct compliance;
* its suitability as a nutrient offset practice is identified; and
* its suitability as either a permanent or term practice, or either is indicated.

Subsections following the table explain the basis for each of the determinations provided for each type of practice. Links are also provided to relevant reference information.

**Table 1. State-Approved Nutrient-Reducing Practices**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  | **Applicable Direct Compliance Rules** |  |  |
| **Practice Name** | **Design Specifications** | **Credit Method** | **New Dev’t** | **Existing Dev’t** | **Waste-water** | **Agri-culture** | **Trading/ Offset** | **Duration P/T6**  |
| **Stormwater Control Measures (SCMs)** |
| Infiltration System | SDM / MDC1  | SNAP2  | X | X |  |  | X | P, T |
| Bioretention Cell | SDM / MDC1 | SNAP2 | X | X |  |  | X | P, T |
| Wet Pond & Floating Wetland Island | SDM / MDC1 | SNAP2 | X | X |  |  | X | P, T |
| Stormwater Wetland | SDM / MDC1 | SNAP2 | X | X |  |  | X | P, T |
| Permeable Pavement | SDM / MDC1 | SNAP2 | X | X |  |  | X | P, T |
| Sand Filter | SDM / MDC1 | SNAP2 | X | X |  |  | X | P, T |
| Rainwater Harvesting  | SDM / MDC1 | SNAP2 | X | X |  |  | X | P, T |
| Green Roof | SDM / MDC1 | SNAP2 | X | X |  |  | X | P, T |
| Disconnecting Impervious Surface | SDM / MDC1 | SNAP2 | X | X |  |  | X | P, T |
| Level Spreader-Filter Strip | SDM / MDC1 | SNAP2 | X | X |  |  | X | P, T |
| Pollutant Removal Swale | SDM / MDC1 | SNAP2 | X | X |  |  | X | P, T |
| Dry Pond | SDM / MDC1 | SNAP2 | X | X |  |  | X | P, T |
| **Proprietary Stormwater Control Measures** |
| Silva Cell Suspended Pavement with Bioretention | SDM / MDC1 | SNAP2 | X | X |  |  | X | P, T |
| Filterra | SDM / MDC1 | SNAP2 | X | X |  |  | X | P, T |
| **Other Development Site Activities** |
| Treatment of Redevelopment | n/a | SNAP2 | X | X |  |  | X | P, T |
| Overtreatment of New Development | n/a | SNAP2 | X | X |  |  | X | P, T |
| Impervious Surface Conversion | n/a | SNAP2 | X | X |  |  | X | P, T |
| Upfitting Existing SCMS | SDM / MDC1 | SNAP2 | X | X |  |  | X | P, T |
| **Developed Lands Activities** |
| Remedying Discharging Sand Filters  | DWR Practice3  | DWR Practice3 |  | X |  |  |  | T |
| Remedying Illicit Discharges  | DWR Practice3 | DWR Practice3 |  | X |  |  |  | T |
| Soil Improvement | DWR Practice3 | DWR Practice3 |  | X |  |  |  | T |
| Storm Drain Cleaning | DWR Practice3 | DWR Practice3 |  | X |  |  |  | T |
| Street Sweeping | DWR Practice3 | DWR Practice3 |  | X |  |  |  | T |
| **Wastewater Activities** |
| Creation of Surplus Allocation  | 15A 2B .0279 | 15A 2B .0279 |  | X | X |  | X | T |
| Surplus Allocation via Regionalization | 15A 2B .0279 | 15A 2B .0279 |  | X | X |  | X | T |
| **Rural Practices** |
| Cattle Exclusion | DWR Practice3 | DWR Practice3 |  |  |  |  | X | T |
| Riparian Reforestation on Ag Land | 15A 2B .0703 | DWR Practice3 |  |  |  |  | X | P, T |
| Water Control Structure | SWCC/NRCS5  | NLEW4 |  |  |  | X |  | T |
| Riparian Buffer: 20’; 30’; 50’; 100’ | SWCC/NRCS5 | NLEW4 |  |  |  | X |  | P, T7  |
| Scavenger Crop: Rye/Triticale; Oats/Barley; Wheat | SWCC/NRCS5 | NLEW4 |  |  |  | X |  | T |
| Livestock Exclusion: 10’; 20’; 30’; 50’; 100’ Setback | SWCC/NRCS5 | NLEW4 |  |  |  | X |  | T |
|  |  |  |  |  |  |  |  |  |

**Legend *(see corresponding subsections below for reference information)*:**

1 SDM/MDC – Stormwater Design Manual / Minimum Design Criteria

2 SNAP – Stormwater Nitrogen and Phosphorus Tool

3 DWR Practice – DWR-approved nutrient practice

4 NLEW – Nitrogen Loss Estimation Worksheet

5 SWCC/NRCS – Soil and Water Conservation Commission / USDA-NRCS applicable practice standards

6 P/T – Permanent Duration, Term Duration or Either

7 – Riparian buffer widths up to 50’, once established, are required by watershed Buffer Protection rules to be left permanently. Widths greater than 50’ may be replaced with other land cover once the terms of a cost-share contract are met.

## 2.2 Supporting Information for Stormwater Control Measures (SCMs)

Stormwater Control Measures involve engineered structural practices that convey and treat stormwater runoff on developed lands. These characteristics lend themselves to consistent design specifications and relatively easily instrumented and reproducible research study. As a result, North Carolina has established a robust set of SCMs with associated nutrient crediting that involves less uncertainty than credit estimation for other nonpoint source practices. These practices, covered by the first three groups in **Table 1** – (public domain) *SCMs, Proprietary SCMs,* and *Other Development Site Activities* – are all available for both *New Development* and *Existing Development* rule compliance, and while to date it has only been done on an experimental basis early in the nutrient offset program, they could also be used to generate offset credits. The following subsections provide references to fuller details on the design and nutrient accounting associated with the range of SCMs.

### 2.2.1 NCDEMLR Stormwater Design Manual / Minimum Design Criteria

The NCDEMLR Stormwater Design Manual provides the design specifications for SCMs to meet the Minimum Design Criteria (MDC) that are codified in the state stormwater rules (02H .1001 through 02H .1062), which went into effect on January 1, 2017.

* The Design Manual and rules can be downloaded from the NCDEMLR website at <https://deq.nc.gov/sw-bmp-manual>

### 2.2.2 NCDEMLR SCM Credit Document

The SCM Credit Document provides a table of all DEMLR-approved SCMs with their primary or secondary rating, hydrologic fates of influent, and nutrient effluent concentrations. A second table provides qualitative ratings on other SCM benefits for all of the approved SCMs. These tables are useful for facilitating comparisons between SCMs. It was developed through a joint effort between NCDEMLR, DWR, stormwater researchers, and the SCM Crediting Team stakeholders.

* The Document can be downloaded from the NCDEMLR website: <https://deq.nc.gov/sw-bmp-manual>

### 2.2.3 Stormwater Nitrogen & Phosphorus Accounting Tool (SNAP)

North Carolina’s Stormwater Nitrogen and Phosphorus Tool (SNAP Tool) is a Microsoft Excel-based spreadsheet that uses the Simple Method to estimate annual runoff volume and associated nutrient loading generated by a user-defined catchment area. The Tool also allows users to estimate reductions in runoff volume and nutrient load produced by different SCMs. The type and location of SCMs can be customized by users to optimize reduction of stormwater runoff from a site. The flow and pollutant load reduction provided by a given SCM is calculated using the effluent Event Mean Concentration (EMC) metric. Most of the SCMs that follow DEMLR’s Minimum Design Criteria (MDC), as well as custom SCMs, can be modeled with this tool.

* The latest version of the tool can be downloaded from the DWR website here: <https://deq.nc.gov/about/divisions/water-resources/planning/nonpoint-source-management/nutrient-offset-information#stormwater-nutrient-accounting-tools>

### 2.2.4 Other Development Site Activities - Procedural Practices

Treatment of redevelopment projects and the overtreatment of new development projects are two procedural practices that can be credited through the use of the SNAP Tool. The following are three scenarios describing how these procedural practices could be implemented by local governments to generate nutrient-reductions that count towards their *Existing Development* rule requirements:

* + Redevelopment projects that exceed land disturbance thresholds and increase built-upon area are required by state new development rules to reduce loads. In these cases, by implementing state requirements loads are being reduced from existing developed lands, and affected parties may credit those net reductions towards their *Existing Development* needs.
	+ A local government could by ordinance set more stringent loading rate targets for new development than those required by the state and retain the ‘extra’ reductions toward *Existing Development* needs. This would include obtaining treatment on development projects that fall below the state’s new development loading rate targets without treatment.
	+ A local government could adopt ordinances that require treatment on other new development that is not required to treat under the state’s new development rules. This would include development that does not exceed land disturbance thresholds or projects that would be vested under the state’s implementation timeframes.

### 2.2.5 Other Development Site Activities - Land Cover Modification Practices

Land modification practices such as removing impervious surfaces (referred to as impervious surface conversion in **Table 1** or reforesting developed land are also credited using the SNAP Tool and can generate significant nutrient reductions that would count towards meeting *Existing Development* requirements. The following are two examples of these land modification practices:

* + Removal of existing impervious cover or replacement of existing pavement with permeable pavement would decrease runoff and increase infiltration, decreasing nutrient loading. Local governments could seek such opportunities on lands they control or on private lands. To facilitate such projects, communities could revisit parking requirements in existing ordinances for the potential to reduce mandates, to allow for shared parking, or other approaches.
	+ Reforestation of managed open space on developed lands combined with protection through conservation easement or other protective instrument could decrease runoff and nutrient loading.

## 2.3 Supporting Information for DWR-Approved Nutrient Practices

The DWR Director has approved a set of practices developed primarily to expand the toolbox of load-reducing options for local governments implementing *Existing Development* stormwater rules. Each of these practices is outlined individually in ***Chapter 3***, and:

* Approved practice documents detailing design specifications and nutrient accounting methods can be downloaded at <https://deq.nc.gov/about/divisions/water-resources/planning/nonpoint-source-management/nutrient-offset-information> .

In **Table 1**, these practices are all those appearing under *Developed Lands Activities* and *Wastewater Activities*, and the first two under *Rural Activities*. These practices are typically developed by DWR staff in close consultation with the Nutrient Scientific Advisory Board, taken through public comment, revised and endorsed by the NSAB before receiving Director approval *(see Practice Approval Process, Appendix II)*. Staff and the NSAB have developed and periodically update a list of potentially creditable candidate practices, which they have prioritized based on member input on overall utility and potential cost-effectiveness. DWR staff uses this prioritized list to guide their efforts in developing additional practices for crediting. All manner of nonpoint and point source practices are considered under this process, and DWR expects to continue completing additional practices over time as resources permit and data support credit establishment *(see Appendices I-III)*.

The two *Wastewater Activities* in **Table 1**, ways of achieving surplus allocation, can provide dischargers greater comfort in their future ability to maintain compliance with permit limits. Alternatively, they can be used toward direct *Existing Development* rule compliance through either a joint or combined compliance approach or through trading as an offset.

The first two *Rural Practices* in **Table 1** can be used as offsets. The *Agricultural Riparian Buffer Reforestation* practice has been used virtually exclusively to date as the offset practice for New Development rule compliance in Neuse and Tar-Pamlico River Basins.

The remaining *Rural Practices* in **Table 1** are the BMPs given nitrogen reduction efficiency assignments in the *Nitrogen Loss Estimation Worksheet, NLEW*, the accounting tool used for compliance with watershed Agriculture rules. These BMPs differ from all other practices in **Table 1** in that the NLEW accounting method does not yield load reduction estimates to receiving waterbodies for these practices; instead, their percent removal efficiencies contribute to estimates of reduction in nitrogen loss from edge-of-management unit. For this reason, these agricultural practices cannot currently be used for trading purposes, since the Offset rule requires estimates of the former. Where sufficient research results exist to support such load reduction estimates for agricultural practices, they have the potential to be considered for offset credit development. The first two *Rural Practices* are examples of this outcome.

### 2.3.1 Factors to Consider When Selecting Practices

Several factors should be considered when choosing practices to implement toward *Existing Development* rule requirements. The following basic site compatibility and cost issues should be evaluated as part of a planning level opportunity assessment.

* Cost-effectiveness: dollars invested per pounds of nutrient reduced
* Physical: drainage area, space constraints, slope, utility conflicts
* Logistical: scale economy & maintainability.
* Temporal: future changes to drainage area
* Social: landowner willingness, public acceptance
* Regulatory: permitting hurdles

# Chapter 3: DWR-Approved Practices for Existing Development

While most of the practices in **Table 1** are available for use toward *Existing Development Stormwater* rule compliance, either through direct compliance or as offsets, this chapter compiles brief summaries on the subset that has been developed and approved by DWR with *Existing Development* compliance specifically in mind, as described in *Section 2.3* above.

## 3.1 Remedying Illicit Discharges to Surface Waters or Stormwater Systems

Remedying Illicit Discharges is the practice of preventing future non-stormwater discharges and associated pollutants from entering surface waters or stormwater systems and requires programs to prevent new sources of the same type. Credit is based on the reduction or elimination of nutrient loading relative to the strategy’s baseline period and is calculated using either monitored or default concentration, flow rate and duration, or flow volume.

**Design Specifications and Nutrient Accounting Document on DWR Website:**<https://files.nc.gov/ncdeq/Water%20Quality/Planning/NPU/Nutrient%20Offset%20Rule/Remedying%20Illicit%20Discharges%20Practice%20Signed%2004%2005%202017.pdf>

## 3.2 Storm Drain Cleaning

Storm Drain Cleaning is the practice of periodic removal of gross solids (organic debris, litter, or coarse sediments) and associated material from storm drain catch basins. The combined material is collected from unaltered catch basins or catch basins with a collection device installed. Credit is directly quantified, proportional to the amount of material collected by converting the weight of material collected to a representative weight of nitrogen and phosphorus removed from the system.

**Design Specifications and Nutrient Accounting Document on DWR Website:**<https://files.nc.gov/ncdeq/Water%20Quality/Planning/NPU/Nutrient/2019.10.14-Storm-Drain-Cleaning-Nutrient-Credit-FINAL.pdf>

## 3.3 Street Sweeping

Street Sweeping is the practice of periodically cleaning roadway surfaces that have curb and gutter and collecting the sweepings. These sweepings or gross solids may include organic debris, litter, and a range of sediment sizes. To determine the nutrient removal credit for the practice, the weight of combined material prevented from entering the stormwater system is converted to a representative weight of nitrogen and phosphorus, totaled annually, and compared to an estimate of amounts collected during a strategy’s baseline time period.

**Design Specifications and Nutrient Accounting Document on DWR Website:**<https://files.nc.gov/ncdeq/Water%20Quality/Planning/NPU/Nutrient/2019.10.14-Street-Sweeping-Nutrient-Credit-FINAL.pdf>

## 3.4 Soil Improvements

Soil Improvement is the practice of increasing the storage capacity of soil and promoting infiltration, storage, and evapotranspiration to achieve runoff volume and related nutrient reductions from existing, managed pervious areas associated with residential, commercial, industrial, institutional, and public open areas. The practice may include tillage or scarification with the addition of topsoil in addition to pervious area nutrient management to establish and maintain healthy vegetation. Soil storage capacity and nutrient credits vary depending on the depth of soil that is improved. A default option and a site-based monitoring option are included to provide flexibility to practitioners applying for nutrient credits.

**Design Specifications and Nutrient Accounting Document on DWR Website:**<https://files.nc.gov/ncdeq/Water%20Quality/Planning/NPU/Nutrient%20Offset%20Rule/Soil%20Improvements%20Practice%20Standard_Approved%20by%20DEQ%20with%20signature%2003%2010%202017.pdf>

## 3.5 Remedying Discharging Sand Filters

Remedying Discharging Sand Filters is the practice of replacing or upgrading discharging sand filter onsite wastewater systems serving single family residences with alternatives to reduce nutrient loading to surface waters. Discharging sand filter systems are typically found in areas where drainage issues make soils unsuitable for conventional onsite septic systems. As discharging systems, they are treated on an individual basis, not a programmatic basis and credit is given for each system improved. Credit varies depending on the type of system being replaced, the type of improvement or remedy, and the number of bedrooms served by the system.

**Design Specifications and Nutrient Accounting Document on DWR Website:**<https://files.nc.gov/ncdeq/Water%20Quality/Planning/NPU/Nutrient/2019.04.18.Remedying.Discharging.Sand.Filters.FINAL.with.Memo.pdf>

## 3.6 Cattle Exclusion with Nutrient Management

Cattle Exclusion is the practice of installing fencing along a stream as a physical barrier to animals entering open water and degrading stream banks. This practice prevents the trampling of stream banks and cattle-induced erosion, reduces direct deposition of animal waste in the stream, and allows for re-establishment of a buffer zone. The crediting method provides nutrient reduction credits for cattle exclusion with or without reductions in stocking rates and establishes to-stream load reduction credit for use in meeting nutrient rules with comparable load requirements.

**Design Specifications and Nutrient Accounting Document on DWR Website:**<https://files.nc.gov/ncdeq/Water%20Quality/Planning/NPU/Nutrient%20Offset%20Rule/Cattle%20Exclusion%20Practice%20Signed%2004-05-2017.pdf>

## 3.7 Riparian Reforestation on Agricultural Land

Riparian reforestation on agricultural land is the practice of restoring or enhancing vegetated ecosystems adjacent to surface water bodies, where trees, grasses, shrubs, and herbaceous plants function as a filter to remove pollutants from overland stormwater flow, runoff, and shallow groundwater flow prior to discharge to receiving waters. The scope of this practice is limited to the restoration and enhancement of riparian buffers on agricultural lands that qualify as suitable restoration or enhancement sites and meet specific design criteria. The nutrient reduction credit method used results in a single per-acre credit value applied to the restored or enhanced buffer footprint combining the removal of nutrients achieved by way of throughput treatment, deposition of nitrogen from overbank flooding and footprint of land conversion from agricultural use to forest.

**Nutrient Accounting Document on DWR Website:**<https://files.nc.gov/ncdeq/Water%20Quality/Planning/NPU/Nutrient%20Offset%20Rule/Ag-Buffer-Credit.pdf>

# Chapter 4: Practice Implementation Guidance

The following subjects have arisen primarily during implementation of *New Development Stormwater* rules and development of a model program for the Falls *Existing Development Stormwater* rule. Their applicability relates consistently to the *Existing Development* rule. That said, a majority of the content is universal in applicability across nutrient rules, or is proving to have at least some applicability beyond existing development. Thus, this content is provided here with an assumption of broad applicability. Discussion of rule-specific applications does not connote a limitation in applicability unless it is stated as such.

As a foundation for this discussion, the following threshold criteria for crediting are recognized for the Falls *Existing Development* rule. Under the rule, any practice installed subsequent to the Baseline time period is potentially eligible for nutrient credit. As with credit-seeking under the *Nutrient Offset* rule, practices implemented to comply with another rule of the same nutrient strategy are not eligible for *Existing Development* credit, nor are those done for compensatory mitigation purposes. One last threshold criterion is that a practice needs to qualify as one of the approved nutrient practice types.

## 4.1 Credit Stability and Revision of Credit Values

Predictability and reliability of practice credit value are important principles for regulated parties and are supported by DWR. The following concepts are offered to provide mutual understanding about credit expectations for various settings. These concepts apply to a given installation of a practice under a given nutrient strategy.

Across nutrient rules, individual practice installations that were awarded presumptive nutrient credit at the time of their installation, and are maintained according to practice requirements, retain that credit for the agreed life of the practice, provided catchment runoff assumptions used to size the practice are not violated, and even if other nutrient reduction projects are subsequently implemented in the catchment.

Where the lifespan of a Term practice expires, if the responsible party seeks to renew the use of that installation for another term, then both the practice design specifications and the credit assignment are subject to the applicable requirements in place at that time. For installations used as offsets, the elements of this principle are established in the *Nutrient Offset* rule, 15A NCAC 02B .0703.

This credit stability concept relates to presumptive credit and does not apply to practices that receive credit year-to-year based on monitoring, such as Street Sweeping, Storm Drain Cleanout and monitored experimental practices.

The nutrient reduction credit awarded for a type of practice may be reevaluated as additional research becomes available and sufficiently improves the state of knowledge on design or quantified performance of an approved type of practice. In such cases, the Division will conduct an open, consultative review process on contemplated revisions to the practice. Resulting practice design or credit revisions would not apply retroactively to any existing installations nor any pending ones where substantial planning had been done based on current specifications. Once approved, revised practice specifications would apply only to future installations. Thus, for example under the *Existing Development* rule, where DWR issues a revised practice document with crediting changes, a local government will not obtain either an increase or a decrease in the credit rate of an active installation of that practice, either retroactively or for the remainder of its agreed lifespan.

## 4.2 Crediting Older Installations

Under *Existing Development* rules, local governments may seek nutrient credit for projects that were installed under an older design standard that has subsequently been changed. Within the category of adequately maintained older practices, two primary scenarios are recognized: where an SCM was installed to meet a state or local regulation that preceded nutrient requirements, DWR will work with the local government to assign appropriate credit, guided by assessment of its design relative to current standards. Where designs are reasonably close to current specifications, DWR would prefer to award current crediting for simplicity.

In the second scenario, where the SCM was installed to comply with a nutrient stormwater rule, the local government may either use the credit assigned at the time of the development or, where the SCM is in reasonable compliance with current MDC, then the SNAP Tool may be used to calculate its credit under the *Existing Development* rule. This option does not violate the credit stability principle described above since the local government is a different party seeking initial credit for a practice installed under a different rule within a different nutrient strategy. Use of the newer tool would also be expected to provide a better estimate of actual performance. This option would be particularly useful if the original credit assignment is not available.

In the situation where an older practice installation deviates significantly from current standards, or where the installation has degraded and function is compromised, the local government may elect to modify or renovate the SCM to current standards for the current credit. If current design is not achievable, DWR will work with the local government to assign appropriate credit based on the design followed. It is possible that the original SCM design is determined to be uncreditable for nutrients and requires upfitting to receive credit.

## 4.3 Nested Credit

As alluded to in Section 4.1 above, when a new nutrient reduction project is nested in the catchment of an existing project, above or below, the existing project retains its credit value. Where new SCM projects are installed for new development (i.e. adding catchment BUA), it should be assumed that the new SCM is installed to treat only the new runoff and new nutrient load and does not alter the nutrient reduction function of any downstream SCMs.

Where new SCM retrofits are installed toward *Existing Development* rule compliance, two basic conceptual nesting scenarios are recognized. The first scenario would involve a new retrofit located below and receiving drainage from a currently treated catchment, and possibly also from additional drainage area. The second scenario would involve a new retrofit placed within the drainage catchment of an existing SCM, resulting in added “pre-treatment” for a sub-catchment. For both cases, the first step is to calculate the nutrient reduction provided by the two SCMs in series as if they were installed together. Then the nutrient reduction assigned to the older SCM is subtracted from the total reduction , and the difference is the credit awarded to the newer SCM(s). Credit assignment for the older SCM would follow the guidance described in Section 4.2 above.

Nutrient credit calculation for previously installed SCMs that are modified to improve their performance is handled similarly to newly nested SCMs. That is, nutrient reduction is first calculated for the upfitted or improved SCM as if it were being newly installed. Then the previously assigned credit is subtracted to determine what additional nutrient reduction is provided by the upfit or improvement. This applies both to SCMs being improved for Existing Development retrofit as well as to modification of existing SCMs to accommodate new BUA/development.

Where the nested practices are not SCMs, or only one is, the same basic policy logic described above would still apply. That is, reductions attributed to the pre-existing practice are not altered by the introduction of the new practice, and the crediting award for the new practice would be the difference in loading outcomes between the combined performance and the old practice credit.

## 4.4 Delivery Factors and Transport Factors

The terms delivery factor and transport factor both describe the fraction of a nutrient load that is attenuated instream between a given source or source area and the waterbody of concern. These values are developed through watershed modeling. They are used to support trading between different areas in a watershed to ensure that delivered loads are appropriately offset.

The use of these factors is watershed-specific, requiring establishment of both technical and regulatory foundations to be in place. Currently, each of the state’s four major nutrient strategies has a different status regarding use of delivery or transport factors. Additional discussion of this subject is provided in DWR’s draft Nutrient Trading Framework.

## 4.5 Credit Tracking and Reporting

Nutrient crediting requires regular reporting regarding the upkeep status and conditions of installed practices. The exact details of what is reported and when depends on the rule under which the credits were generated. Credits generated for offset trading purposes must meet reporting requirements set forth in their DWR approved nutrient banking instrument pursuant to the *Nutrient Offset* rule 15A NCAC 2B .0703 (e)(1) and pursuant to the maintenance requirements detailed in Subparagraph (g) of that rule. Nutrient reduction projects installed to meet Existing Development Rule requirements have reporting requirements described in the *Existing Development* Model Program.

## 4.6 Use of Federal or State Grant Funds

The ability of a regulated party to use grant funds to implement practices toward rule compliance is controlled first by each granting entity through its funding limitations. Where a grant allows use of its funds toward rule compliance, rules may limit such use. The only rule-based limitation currently in place in NC nutrient strategies is found in the *Nutrient Offset* rule, 15A NCAC 2B .0703 (f)(3), which bars the awarding of offset credits to any project funded in whole or in part by state or federal grant funds.

# Appendix I:Template for Proposed Practice Design Specifications & Nutrient Accounting

**Design Specifications & Nutrient Accounting for <Practice Name>**

I. Summary [Be succinct - best if entire summary is one page]

1. Description:

Short description of the practice, including variations or differences from other practices.

1. Utility:

Explain appropriate settings and the role of the practice.

1. Applicability

State whether this practice intended for meeting New and/or Existing Development Rules and any limitations on what entities may generate credits.

1. Credit Overview

Summary of how credits are calculated and of the range of unit load reductions to be expected.

II. Practice Design and Implementation

1. Qualifying Conditions and Limitations
2. Applicability

A fuller explanation of 1C (Applicability section of summary). State whether this practice intended for meeting New and/or Existing Development Rules and any limitations on what entities may generate credits

1. Preconditions

Describe any preconditions, particularly site preconditions, that must exist for this practice to be applicable

1. Constraints

Describe any situations or conditions where this practice is not allowable or creditable, or any other limitations on how this practice is implemented.

1. Design Guidance
2. Required Elements

List out the required design elements, and/or reference external design documents.

1. Recommended Elements

Optional section - put any design guidelines or references to design guidelines, and/or references to external documents, that are not required for implementation of this practice.

1. Installation/Implementation
2. Required Elements

List out required installation, construction, and implementation steps and elements, and/or reference external design documents.

1. Recommended Elements

Optional section - put any installation, construction, or implementation guidelines, and/or references to external documents, that are not required for implementation of this practice.

1. Operation and Maintenance
2. Required Elements

List out the steps to properly operate and maintain the practice, the required frequency, and any limitations on who does the work.

1. Recommended Elements

Optional section - put any operation and maintenance guidelines, and/or references to external documents, that are not required for implementation of this practice.

1. Credit Award and Renewal

Describe when the credit is awarded; include a credit award schedule here if appropriate. Describe any required monitoring, inspection, or verification of design or implementation. State the length of time this credit lasts before any renewal is required and the steps for credit renewal. If this practice has verification implemented through the NPDES program it is sufficient to state that, as compared to a retrofit situation where instructions should be more explicit.

III. Nutrient Credit Estimation

1. Credit Method Description

Describe the basis for this practice generating nutrient credits. Include any lookup tables or reference charts needed for credit calculation here.

1. Calculation Instructions

In this section give step-by-step instructions on calculating the credit, including instructions for the SNAP Tool or its descendant. If part of implementation includes collecting data, include the collection instructions here.

IV. Supporting Technical Information

1. Reductions Obtained

Describe the range of nutrient reductions that could be obtained based on the practice options and site conditions.

1. Example Calculation

Describe one or more implementation scenarios and provide attendant credit assumptions, calculations and results.

1. Credit Basis and Relative Confidence

Describe the scope of studies used to design this credit, the applicability of studies (such as geographic location), and the quality of studies. Based on this information, describe the confidence in this practice for reducing nutrients by the amounts estimated.

1. Cost Analysis

Optional section for planning-level cost analysis.

1. Risks and Benefits

Optional section for a summary of ecosystem and other benefits and potential risks and situations where this practice may not be appropriate or desirable.

1. References & Resources

Put the list of references here, including annotated references.

1. Credit Development Documentation

Optional section in which to place technical documentation and analysis of available studies as part of developing the credit method.

# Appendix II: Practice Approval Process

#### Introduction and purpose

The practices approval process is a policy intended to provide a thorough and fair vetting of potential nutrient reduction practices. Developed through extensive consultation with stakeholders in the Jordan and Falls Lake watersheds, the process ensures input from multiple stakeholders, provides ample opportunity for public comment, and seeks to provide clarity and efficiency for all engaged parties. A flowchart for this process is provided in figure 1, with further explanation provided throughout this section.

**Figure 1. Flowchart of DWR Approval Process for Nutrient Reducing Practices**



#### Timeline for New Practice Adoption

The process outlined here provides a guide for a necessarily flexible and iterative review process. To cite just a few examples, proposed practices may be subject to wide variation regarding the availability of supporting implementation and nutrient calculation information, the parties engaged in review, and applicability of other laws and rules to the practice’s implementation.

Generally, DWR is committed to fulfilling its role in the practice approval process in a professional and timely manner, and adoption of new practices remains a high priority for the division. However, the pace at which practice development occurs is subject to other factors and parties outside of DWR’s control. Practice proponents can help the process move expeditiously by developing high quality work and committing to timely reconciliation of comments as they are received.

From the initial consultation, proponents may expect the practice approval process to require a minimum of four months, assuming a well-documented technical basis for the credit, no significant legal or policy hurdles, and a group of experts committed to expediting review of the practice under development. More typically, the process may take six to eight months as the proponent, DWR, and external experts thoroughly vet iterative drafts of the proposals and then reconcile new comments received through the public review process.

#### Practice Approval Process

##### Initiating the process

Any party responsible for developing a nutrient reduction practice is designated as a practice proponent. While there are no qualifications required to begin the practice approval process, proponents may be third-party consultants, interest groups, Division of Water Resources staff, or staff experts from another North Carolina state agency.

Prospective proponents are encouraged to contact DWR’s Nonpoint Planning Branch as early as possible to discuss their ideas. If the practice appears promising, DWR will assign a staff liaison to the practice proponent for the duration of the project.

DWR shares jurisdiction over stormwater nutrient-reducing practices with a sister division, the Division of Energy, Mineral, and Land Resources. The rules and approval processes for these divisions are different but compatible. Where jurisdiction is shared, DWR and DEMLR will determine which division is best suited to work with proponent. When DEMLR is designated as the lead agency, DWR staff will retain a supporting role.

Once the proper processes have been identified and a liaison has been assigned, the proponent is encouraged to develop the specific practice standards according to the template provided in Chapter 2. Consistent communication between the proponent and DWR liaison is encouraged, particularly in the early conceptual stages.

##### Viability check

A viability check has been included in the practice approval process to conserve limited staff resources as well as to preserve the valuable time and goodwill of third parties, subject matter experts, other agency representatives and DWR leadership. Preliminary conceptual discussions and early proposal drafts are likely to illuminate the key issues to be resolved during consultation with subject matter experts and interested agency representatives. In some cases, these issues may be fatal to the credit sought.

DWR staff will only determine that a practice is “not viable” when insurmountable technical, logical, policy or legal concerns are identified in a conceptual proposal and attempts to resolve these issues with the proponent are unsuccessful. Proponents will be given ample opportunity to adapt their proposal to address these concerns. The proponent bears the burden of proof that a proposed practice is viable. However, this should generally be considered a light burden. Any credible approach to resolving key issues should be sufficient to engage additional subject matter experts and reevaluate these concerns in later stages.

Determination that a practice is “viable” by Division staff does not imply that approval of the practice will be recommended in later stages of the practice approval process. Conversely, a staff determination that a practice is “not viable” is subject to review by DWR’s director upon request.

##### Collaboration and practice standard development

Upon agreement that a practice is viable, the proponent and DWR staff will provide notice to identified stakeholders and committees that a new nutrient reduction practice is under development. The Nutrient Scientific Advisory Board will be notified and independent subject matter experts (SMEs) should be identified and invited to participate in the development of the practice. For agriculture-related practices, Watershed Oversight Committees and Basin Oversight Committees will also be notified. If DWR is identified as the lead agency for a stormwater practice, DEMLR will be informed that the practice has passed the viability check stage and will be invited to advise upon the practice.

After notifying these parties, the proponent will engage with subject matter experts and Division staff to form a Consultation and Review Team (CRT). The CRT should also include (at a minimum) independent subject matter experts, representatives from Basin/Watershed Oversight Committees for agricultural practices, and representatives from DEMLR for stormwater control practices. Utilizing feedback from the CRT, the proponent will draft and refine the practice standard according to the substantive guidance provided in chapter 2. This process is necessarily iterative and should result in the collaborative resolution of technical differences underpinning the practice standard.

At this stage, the proponent is the final arbiter of whether and how input from subject matter experts and the Division is incorporated into the practice standard. Upon completion of this process, the proponent will notify the Division of its intention to move forward to public comment.

##### Confidence Evaluation Factors

The following matrix helps evaluate confidence in the available science used to determine nutrient credits. It is intended to lend structure and consistency to a qualitative evaluation process and can help determine the need for incorporating conservatism into final credit assignments. In addition, it can guide further research. The matrix focuses mainly on the studies behind estimates, but also on the estimation methods themselves.

The matrix is a structured decision-making tool, designed to help compare different options by choosing one of the confidence levels for each of the eleven factors. Some factors may be more relevant to certain practices and studies. Lack of information or a low-confidence result for a factor does not connote disapproval.

**Table. Studies Confidence Matrix for Practice Credit Assignment**

|  |  |
| --- | --- |
| **Individual Study Factors** | **Confidence Level** |
| **High** | **Medium** | **Low** |
| **Applicability** |
| Setting | Study done within a regulated geography; or climate, physiography, soils, & biology match a regulatory setting well | Reasonable degree of study site match or similarity to a regulated geography across site attributes | Significant differences between more than one aspect of study setting and the regulated geography |
| Loading source, dynamics | ‘Natural’ vs. simulated, range of expected conditions captured | Some artificiality vs. expected conditions but reasonably similar | Entirely simulated design, partial to poor similarity to expected |
| Practice type | Well-described design that matches proposed nutrient design features | Some design differences from proposed nutrient conditions; learning-stage design; or details unclear but reasonably similar | Significant design differences studied from proposed here |
| Nutrient measurement | Reports TN, TP annual mass load changes to surface water  | Some assumptions required to determine TN, TP load changes or regarding delivery  | Limited N, P species, concentrations only; or delivery uncertainties  |
| **Data Scope and Depth** |
| Sampling frequency and project timespan | Robust characterization of events, > 1 annual cycle, varied meteorology &/or source management | Captures an annual cycle, reasonable intra-event representation and total *n*  | < 1 annual cycle; or low sample frequency and total *n*  |
| Sampling scheme | Fully captures of effects via pre/post, up/down, paired watershed | Adequate capture of practice effects; some data limitations | Partial capture of practice effects; incomplete picture |

|  |  |
| --- | --- |
| **Individual Study Factors** | **Confidence Level** |
| **High** | **Medium** | **Low** |
| **Data Quality** |
| Field methods / lab analysis | Approved state or federal methods used; or certified lab | Other well-documented protocol and methods | Unapproved methods; or inconclusive documentation |
| Data analysis | Methods sound, relevant; conclusions well-supported by statistics | Methods sound, conclusions plausible but not fully supported by data; moderate unexplained variability | Methods not the most relevant, inconclusive; insufficient evidence, substantial uncertainty |
| Peer review | Published in peer-reviewed journal | Published/reported with some level of professional or expert review | Minimal or no critical review |

|  |  |
| --- | --- |
| **Set of Studies Factors** | **Confidence Level** |
| **High** | **Medium** | **Low** |
| Number, diversity of studies | Good body of literature | Small number of studies, some diversity captured | One or two studies, significant gaps in range of conditions |
| Variability across studies | Variability well-understood, defensible | Some unexplained variability | Range of unexplained variability; poorly understood function |

##### Public comment

At the proponent’s request, DWR will coordinate the solicitation of NSAB and public comments on behalf of the proponent. The comment period should be open no less than 30 days, and notification should be provided through appropriate DWR mailing lists. DWR staff may also offer comments during this period if important issues appear unresolved at this stage of the approval process. After each comment period has passed, proponents are encouraged to work with the CRT to reconcile or otherwise address the substantive comments provided. While this process is intended to be informal, the failure of the proponent to adequately address substantive public comments will be taken into consideration by DWR staff as they determine whether to recommend approval of the proposed practice to the Director.

##### Director approval

Once the practice proponent reconciles all comments, they may submit the proposed practice to their DWR staff liaison for DWR Director approval. The proposed practice will be initially routed for approval through the DWR Planning Section Chief and comparable agency authority over any staff utilized for subject matter expertise. DWR staff will then submit the completed proposal to the DWR Director along with a staff opinion recommending the practice for approval or rejection. If rejection is recommended, a justification for that recommendation will be included as part of the staff opinion. If approval is recommended, the practice proposal itself will serve as the justification.

The Director will make the final agency determination regarding approval or rejection of the practice standard.

If a practice is rejected, DWR staff or other parties may assume the role of practice proponent and offer amendments to the original practice approach. The new proponent would begin the practice approval process anew.

##### Publication

Unless specifically noted in the practice itself, credit for the practice will become available immediately upon the signature of the DWR Division Director. The practice standard will also be temporarily posted to the Division’s website. Eventually, the practice standard will be incorporated as a new chapter in subsequent editions of this document. Other supporting materials will be kept on file with DWR according to its records retention schedule.

##### Appeal of approval decisions

A practice proponent may appeal the decision not to approve the practice standard. Informally, a proponent may seek review of the Director’s determination through the executive agency hierarchy. Such an appeal should be directed to the Secretary of the Department of Environmental Quality. Proponents may also seek appeal according the provisions of the N.C. Administrative Procedure Act.

##### Updating practices

Existing practice standards may be updated utilizing the same practice approval process.

# Appendix III: Nutrient Credit for Unique Practice Installations

**Introduction and purpose**

A party subject to an *Existing Development Stormwater* rule may consider installation of a practice type that has not been approved by the Division for annual, retroactive nutrient reduction credit based on direct monitoring of performance. Where a practice’s nutrient performance is insufficiently documented to successfully navigate the more rigorous practice approval process for presumptive crediting, a regulated party subject to an *Existing Development Stormwater* rule may seek to generate annual, retrospective reductions toward compliance from an individual installationof such an untested practice. This option requires direct monitoring of annual load reduction. Possible examples include larger-scale, capital-intensive, actively operated technologies that are largely untested at scale by parties unaffiliated with the manufacturer. Practices studied through this monitoring process may later be considered for general practice type approval as their capabilities become better understood through experimentation and monitoring.

**Monitoring requirements**

A party planning for partial *Existing Development* rule compliance from such an experimental practice installation will want to provide a monitoring framework to the Division in advance of practice installation. The framework should include identification of monitoring timeframes that could support establishment of presumptive annual, lifetime credit values for the practice. A five-year monitoring period may be a reasonable default timespan. The framework should also propose design standards for the practice and estimate credit values sought. Factors that could bear on the framework’s monitoring timespan may include the complexity of the practice, the nutrient processes involved, and the intensity of human operation required. A key factor in forming a decision to reduce, end or extend monitoring is the reliability of the installation’s performance in achieving predicted nutrient removals.

**Awarding credit**

During the trial period, the load reduction award would be annual and retroactive, based on DWR’s acceptance of monitoring results for the preceding year. To better assure the maximum degree of credit, any party considering the individual practice option is advised, prior to initiating a project, to engage DWR for input on, and review of, draft monitoring plans. A monitoring plan and quality assurance project plan is recommended in advance of the project to allow DWR to judge the sufficiency and quality of monitoring data.

**Limitations**

Because reductions can’t be assigned ahead of time, unique/experimental nutrient reduction practices may only be used for meeting *Existing Development* rule requirements, direct or joint compliance. Such reductions are not eligible for trading.

# Appendix IV: Nutrient Offset Credit Trading Rule (NCAC 02B .0703)

Cross-Strategy Rules

**.0701 Definitions**
<http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0701.pdf>

**.0703 Nutrient Offset Credit Trading**

<https://deq.nc.gov/about/divisions/water-resources/planning/nonpoint-source-management/nutrient-offset-information#about-nutrient-offsets-and-trading>

Falls Lake Rules

**.0277 New Development**
<http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0277.pdf>

**.0278 Existing Development**
<http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0278.pdf>

**.0279 Wastewater**
<http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0279.pdf>

**.0280 Agriculture**
<http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0280.pdf>

**.0281 State & Federal Stormwater**<http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0281.pdf>

Neuse Rules

**.0711 New Development**
<http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0711.pdf>

**.0712 Agriculture**
<http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0712.pdf>

**.0713 Wastewater**
<http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0713.pdf>

**.0714 Buffers**
<http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0714.pdf>

Tar-Pamlico Rules

**.0731 New Development**
<http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0731.pdf>

**.0732 Agriculture**
<http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0732.pdf>

**.0733 Wastewater**
<http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0733.pdf>

**.0734 Buffers**
<http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2002%20-%20environmental%20management/subchapter%20b/15a%20ncac%2002b%20.0734.pdf>