

RALEIGH STORMWATER

# Submitting Nutrient Calculations to the City of Raleigh

April 20, 2023



Raleigh



# Agenda

- Design Manuals
- Vested Rights
- Common Plan of Devt
- UDO 9.2.2.A.4
- Existing Development
- Treatment Req's
- SNAP Inputs
- Buy-down Calcs
- Submittal Req's
- Watershed Overlays

# City of Raleigh Plan Review Team

## Supervisor:

- Sally Hoyt, PE\*

## Senior Reviewers:

- Nathan Burdick, CFM
- Kendall Effler, PE, CFM\*
- Sean Eggleston\*
- Charlie Miller, PE

## Reviewers:

- Lauren Poole\*
- Brian McHouell, CFM\*
- Molly Zahorian, EIT

## Senior Specialist:

- Donnell Perry

\*Speaking Today

# Notes

- This presentation only addresses the Nutrient Rules. Runoff Control rules are not changing – nothing said today negates the need for SCMs for runoff controls.
- Our guidance on submitting the nutrient calculations is a work in progress. If it changes, we will post updated guidance to the website and notify everyone on this webinar + other City email lists.
- Written guidance will be posted.
- Webinar will be recorded and made available.

# What Design Manual(s) Apply

## City of Raleigh Stormwater Management Design Manual

The current manual will continue to be in effect until replaced by the updated stormwater manual (currently in progress).

**NOTE:** Chapter 3 will no longer be applicable due to changes in the Neuse rules.

## City of Raleigh Guidelines for Land Disturbing Activity (GLDA)

GLDA will remain in effect until its contents is replaced by the updated City of Raleigh Stormwater Manual.

# What Design Manual(s) Apply

## NCDEQ Stormwater Design Manual & SCM Credit Document (Current)

Use of the Minimum Design Criteria (MDCs) will be required by the updated Neuse Rules. For SCM credit values, reference table A-2 in the SCM Credit Document.

**NOTE:** After the effective date of TC-1-23, the City will no longer accept the Archived NCDEQ Manual.

## Guidance Document

A document will be provided following this webinar containing guidance for meeting the UDO requirements. This will be incorporated into the new City of Raleigh Stormwater Design Manual.

# Vested Rights

Projects that submitted stormwater solutions prior to TC-1-23 have vested rights in choosing to comply with:

Regulations effective at the time of submittal

OR

New TC-1-23 Regulations

# Common Plan of Development

## Definition from 15A NCAC 02H .1002(8)

*"Common Plan of Development" means a site where multiple separate and distinct development activities may be taking place at different times on different schedules but governed by a single development plan regardless of ownership of the parcels. Information that may be used to determine a 'common plan of development' include plats, blueprints, marketing plans, contracts, building permits, public notices or hearings, zoning requests, and infrastructure development plans."*



# Common Plan of Development

## YES

- Submitted as 1 Case

## NO

- Two residential lots sharing driveway

List will grow as additional information obtained.

# Common Plan of Development

## Examples:

- Two lots, each 0.4 acres, submitted for townhouses with a shared driveway on the property line.
- Parking lot on a separate parcel < 0.5 acres. Parking serves adjacent office building.
- Recombining multiple lots under 1 acre for new residential development of 3 acres.

# Changes to UDO 9.2.2.A/Grandfathered Lots

- Grandfathered lots greater than 1ac used for detached building for 1 or 2 unit living:
  - 5% BUA/impervious limit
  - Now subject to UDO 9.2.2.B-H
  - 9.2.2.A.4 zoning limits table no longer applies

Note: grandfathered lots 1ac or less used for an approved residential use or lots 0.5ac or less for any approved use will follow the zoning table and can be subdivided if not part of a Common Plan of Development.

# Questions?



# Treatment Requirements

- Calculate % BUA to determine if SCM required
- Determine how much water quality needs to be treated by a Primary SCM (WQv).
- Determine Site Area for SNAP

# Existing Development

Existing BUA that was in place before May 1, 2001 or was permitted before May 1, 2001:

- Doesn't count towards the %BUA
- Will not require treatment
- Excluded from site area in SNAP

# Existing Development

Existing BUA that was permitted on or after May 1, 2001 and before effective date of TC-1-23:

- Counts towards the %BUA
- Not required to be treated by new SCM
- Might have to do additional buy-down
- Might be in site area for SNAP – depends on method

# Existing Development

Existing BUA that was placed on or after May 1, 2001 without a permit will be treated as Newly Proposed BUA.



# Existing Development

Existing BUA that was permitted after the effective date of TC-1-23:

- Counts towards the %BUA
- Would previously been treated by SCM, so new SCM not required.
- Might have to do additional buy-down
- Included in site area for SNAP

# Calculate %BUA to Determine if SCM Needed

Greenfield Site:

$$\frac{\text{Parcel BUA}}{\text{Parcel Area}} = \% \text{BUA}$$

Redevelopment Site:

$$\frac{(\text{Parcel BUA} - \text{Exist. BUA placed/permitted prior to May 1, 2001})}{(\text{Parcel Area} - \text{Exist. BUA placed/permitted prior to May 1, 2001})} = \% \text{BUA}$$

## Calculate %BUA to Determine if SCM Needed

If % BUA > 24%, then

All new BUA must be treated with a Primary SCM.

If % BUA  $\leq$  24%, then

An SCM may be used, but is not required.

Buy-down only could be used.

# If SCM Required, Determine WQv

## GREENFIELD:

- Calculate the required WQv based on all parcel BUA.
- Treat that volume in Primary SCM(s)
- The actual DA to SCM(s) may exclude 5% of the site's BUA or 0.25 ac of site's BUA, whichever smaller, if that area cannot reach the SCM(s). This results in a slight oversizing of the SCM(s).

# If SCM Required, Determine WQv

## GREENFIELD EXAMPLE:

Adding 3 acres of BUA to 5 acre lot.

$$R_v = 0.05 + 0.9 * (3/5) = 0.59$$

$$WQ_v = 3630 * 1 \text{ in} * 0.59 * 5 \text{ ac} = 10,709 \text{ cf Required}$$

DA to SCM is 2.95 ac BUA and 1 ac pervious

$$R_v = 0.05 + 0.9 * (2.95/3.95) = 0.72$$

$$WQ_v = 3630 * 1 \text{ in} * 0.72 * 3.95 \text{ ac} = 10,324 \text{ cf provided at 100\% sizing}$$

Oversizing:  $10,709 - 10,324 = 385 \text{ cf}$  or 104% sizing for the DA in SNAP

Required WQv (10,709 cf) must be designed in SCM

# If SCM Required, Determine WQv

## REDEVELOPMENT:

- Calculate the required WQv based on all NEW parcel BUA.
- Treat in a Primary SCM
- Existing Parcel BUA or ROW BUA that is not currently treated by an SCM may be treated in lieu of new BUA.

# Determine Site Area for SNAP

## GREENFIELD SITE:

- Entire parcel(s) area
- New ROW
- Existing ROW where BUA is added

# Determine Site Area for SNAP

Categorize when BUA was added

Exclude from SNAP

It depends

Include in SNAP

Include in SNAP

		PROPOSED Site Area in SF				
Land Cover Category		Existing or Permitted before May 1, 2001	Permitted May 1, 2001 to May 1, 2023	Previously Permitted May 1, 2023 and Later	Newly Proposed Areas	Total
BUA on Parcel(s)	Roof BUA					
	Deck (50% of footprint)					
	Parking/Driveway/Sidewalk/Other BUA on Parcel					
	<i>Total BUA on Parcel(s)</i>					
Non-BUA on Parcel(s)	Protected Forest					
	Managed Pervious/Landscaping on Parcel					
	Land Taken Up by SCM					
	Open Water/Pool					
	<i>Total non-BUA on Parcel(s)</i>					
BUA in ROW	Roadway BUA in ROW					
	Sidewalk/Other BUA in ROW					
	<i>Total BUA in ROW</i>					
Non-BUA in ROW	Managed Pervious/Landscaping in ROW					
	<i>Total Site Area</i>					



# Determine Site Area for SNAP

For BUA between May 1, 2001 and TC-1-23:

Method A: Put all information in SNAP, recalculating the previous area with the new method.

Method B: Use current (old) calculation method for the existing BUA, which requires recalculation because the pervious area decreases. Use SNAP for the new BUA.

# Example to Compare Methods

SNAP Inputs	Pre-Project		Post-Project Area	
	Area (ac)	Area (sf)	Area (ac)	Area (sf)
Roof	8	348,480	11	479,160
Parking/Driveway/Sidewalk	8	348,480	8.5	370,260
Managed Pervious/Landscaping	9	392,040	4.65	202,554
Land Taken up by SCM		-	0.85	37,026
<b>Total</b>	<b>25</b>	<b>1,089,000</b>	<b>25</b>	<b>1,089,000</b>

Existing SCM = Wet Pond

Previous Buydown = 4747.2 lb = 158.24 lb/yr perpetual credits

New SCM = Bioretention

# Method A Example

## Entire Site into SNAP

SNAP Outputs		
	Loading Rate (lb/ac/yr)	Load (lb/yr)
Project Area Pre-Project	7.87	196.84
Project Area Post-Project before Treatment	9.57	239.28
Project Area Post-Project after Treatment	5.17	129.24
Buydown required	1.57	39.25
Previous Buydown		158.24
Additional Buydown		0

# Method B Example

Previous Site Calculations	Area (ac)	Loading Rate (lb/ac/yr)	Load (lb/yr)	30-year Load (lb)
Total Site Impervious Area excluding ROW	16	21.2	339.2	
Total Site PPUOS	0	0.6	0	
Total Site Managed Pervious Area excluding ROW	9	1.2	10.8	
Total Site Area excluding ROW	25	14.00	350	
Nutrients removed by SCM 1 (wet pond at 30%)			101.76	
Buy-down previously purchased			158.24	4747.2

Changes	
Total Land Cover Changed	4 ac
Does this change the land cover or drainage area to the SCM(s)?	no
If yes, provide new calculations for the SCM removal.	

# Method B Example - continued

Recalculation of Previously Permitted Area				
	Area (ac)	Loading Rate (lb/ac/yr)	Load (lb/yr)	30-year Load (lb)
Total Site Impervious Area excluding ROW	16	21.2	339.2	
Total Site PPUOS	0	0.6	0	
Total Site Managed Pervious Area excluding ROW	5	1.2	6	
Total Site Area excluding ROW	21	16.44	345.2	
Nutrients removed by SCM 1			101.76	
Buy-down previously purchased			158.24	4747.2
Remaining Load		4.06	85.2	
Additional Buydown Needed		0.46	9.6	

# Method B Example - continued

## Recalculate Load for Old Area








SNAP Inputs for New Site	Area (ac)	Area (sf)
Roof	3	130,680
Parking/Driveway/Sidewalk	0.5	21,780
Land Taken up by SCM	0.5	21,780
Total	4	174,240

SNAP Outputs for New Site	Loading Rate (lb/ac/yr)	Load (lb/yr)
Project Area Pre-Project	1.17	4.68
Project Area Post-Project before Treatment	10.91	43.63
Project Area Post-Project after Treatment	2.32	9.28
Buydown required for new area		0
Total Buy-down Required		9.6

# Land Cover Loading Rates Comparison to Current Method

	Current Neuse TN Calcs	SNAP 4.2	
	TN Export Coefficient (lb/ac/yr)	EMC (mg/L)	Equivalent TN Export Coefficient (lb/ac/yr)
Roof		1.18	<b>10.57</b>
Roadway		1.64	<b>14.69</b>
Parking/Driveway/Sidewalk		1.42	<b>12.72</b>
Impervious Area	<b>21.20</b>		
Protected Forest		0.97	<b>0.46</b>
Permanently preserved undisturbed open space (forest, meadow)	<b>0.60</b>		
Other Pervious/Landscaping	<b>1.20</b>	2.48	<b>1.17</b>
LAND TAKEN UP BY SCM		1.18	10.57

# SCM TN Removal Rates Comparison to Current Method

SCM Type	TN Removal per Archived DEQ Manual	TN Removal per 2018 SCM Credit Doc	SNAP v4.2 Removal Range		Change
			Low TN Removal*	High TN Removal**	
Bioretention w/IWS	40%	35-65%	48%	83%	
Wet Pond	40%	30%	8%	49%	
Dry Pond	10%	10%	<i>Increase 10%</i>	20%	
Wetland	40%	44%	34%	53%	
Sand Filter (Closed)	35%	35%	7%	30%	
LS-VFS	30%	30%	23%	56%	
Storm Filter	50%		29%	46%	

\*modeled in SNAP 4.2 (Roof, D Soils)

\*\*modeled in SNAP 4.2 (Roadway, B soils)



# Questions?



# SNAP 4.2.0 - Project Info

## Project Information

*Complete this sheet if required by your reviewing authority.  
Contact them for any questions. Grey boxes/text are optional.*

SNAP v4.2.0

### LOCATION

Project Name (optional):	Project Name & Case Number		Parcel ID (optional):		
Submission Date (optional):		date	<a href="#">Nutrient Management Watershed:</a>	Neuse	menu
Local Jurisdiction / Reviewing Agency:	Raleigh	menu	Subwatershed:	Neuse-Upper	menu
Project Latitude Coordinates (optional):		N	Phosphorus Delivery Zone:	Neuse - Upper 03020201	menu
Project Longitude Coordinates (optional):		W	Nitrogen Delivery Zone:	Neuse - Upper 03020201	menu

### PROJECT DETAILS

Development Land Use Type:		menu	Disturbed Area:		ft <sup>2</sup>
Part of Common Development Plan?		y/n	Project Activity:		menu
Designated Downtown Area?		y/n	<a href="#">Project Drains to SA Waters?</a>		y/n
Public Linear Road/Sidewalk Project?		y/n	Pre-Project Land Use:		menu
Project Owner Type:		menu	Project Description (optional):		

### STORMWATER DETAILS

<b>(Falls ONLY)</b> Onsite Reduction % Req.		%	<a href="#">Project Uses LID/Runoff Volume Match?</a>		y/n
Existing BUA/Development Onsite?		y/n	Local Gov't nutrient req's same as State?	yes	y/n
Local Gov't cutoff date for Existing BUA:	05/01/2001	date	Project Drains to Regional SCM?	no	y/n
Nitrogen Export Rate Target:	3.60	lb/ac/yr	Total Nitrogen Offset Credits Needed:		lb/yr
Phosphorus Export Rate Target:	1000.00	lb/ac/yr	Total Phosphorus Offset Credits Needed:		lb/yr

# SNAP 4.2.0 - Land Cover Characteristics

SNAP v4.2.0

## Project Area and Offsite Land Cover Characteristics

Precipitation Station:

Raleigh

*Copy & Paste VALUES ONLY for Best Results*

[click here to scroll down to error messages on this sheet](#)

PROJECT AREA LAND COVERS	TN EMC (mg/L)	TP EMC (mg/L)	Pre-Project Area (ft <sup>2</sup> )	Post-Project Area (ft <sup>2</sup> )	Change pre-to-post (ft <sup>2</sup> )
Roof	1.18	0.11			0
Roadway	1.64	0.34			0
Parking/Driveway/Sidewalk	1.42	0.18			0
Protected Forest	0.97	0.03			0
Managed Pervious/Landscaping	2.48	1.07			0
Offsite or Existing Roof	1.18	0.11			0
Offsite or Existing Roadway	1.64	0.34			0
Offsite or Existing Parking/Driveway/Sid	1.42	0.18			0
Offsite Protected Forest	0.97	0.03			0
Offsite Managed Pervious	2.48	1.07			0
CUSTOM LAND COVER 1					0
CUSTOM LAND COVER 2					0
CUSTOM LAND COVER 3					0
LAND TAKEN UP BY SCM	1.18	0.11			0
	total (Regulated & UnReg) Area		0.00	0.00	
	Project (Regulated) Area		0.00	0.00	

# SNAP 4.2.0 Land Covers

## "Roof"

Used for any impervious surface elevated above the surrounding ground and not used for vehicular traffic.

Slatted decks may be included in this category at 50% or 30% impervious according to the UDO definition of "impervious surface."

# SNAP 4.2.0 Land Covers

## "Roadway" & "Parking/Driveway/Sidewalk"

- "Roadway" is used for road surface impervious areas in the ROW, including on-street parking, bike lanes, etc.
  - Includes the on-site parking lanes on a "Multifamily Street"
- "Parking/Driveway/Sidewalk" is used for all ground-level impervious surface outside the ROW, and non-roadway impervious surfaces in the ROW.
  - Includes synthetic turf and proprietary/permeable surfaces that are not designed per the "Permeable Pavement" MDC.

# SNAP 4.2.0 Land Covers

## "Protected Forest" & "Managed Pervious"

- "Protected Forest" is used for areas designated as Permanently Protected Undisturbed Open Space (UDO 9.2.2.F.)
  - May include undisturbed areas of Riparian Buffer Zone 1.
- "Managed Pervious/Landscaping" is used for all other pervious areas.

# SNAP 4.2.0 Land Covers

## Custom Land Cover for pools and open water

- Pools and non-SCM open water may be input as a custom land cover:
  - 0% impervious
  - TN EMC = 1.18 mg/L
  - TP EMC = 0.11 mg/L

# SNAP 4.2.0 - SCM Characteristics

- Type of SCM – Should match the MDC title
- HSG at SCM location – If multiple, the less infiltrative should be selected
- SCM Description – Should align with how it is labeled in plans and report
- Design Storm Size – 1"/24hr
- Percent Full Size – Must be 100% if used for regulatory purposes
- Land taken up by SCM – should only be zero if underground



# Questions?



# Buydown Threshold

- Developments with less than or equal to 24% BUA *may meet* their nutrient target through buy-down only.
- Developments with more than 24% BUA *must treat* all BUA with a *Primary SCM* before buy-down to their nutrient target

**\*\*NOTE: Residential 6 lbs/ac/yr & Commercial 10 lbs/ac/yr thresholds no longer apply\*\***

# Buydown Calculations

***Previously***, the amount of buydown was calculated as the annual load (lb/yr) being bought down multiplied by 30 years resulting in a total amount of pounds being bought down.

***Now***, the amount of buydown will be calculated as the annual load (lb/yr) being bought down – nutrient banks will now be selling "perpetual" credits rather than by the pound.

# Submittal Requirements

The sealed and signed stormwater calculations report must contain the following items related to the nutrient calculations:

- Pre- and Post-Development Exhibit showing the land cover broken out by the SNAP categories.
- PDF's of the following SNAP Tool 4.2.0 worksheets:
  - Project Info
  - Land Cover Characteristics
  - SCM Characteristics
  - Nutrient Export Summary
  - Nutrient Offset
- City Nutrient Summary Sheet

The projects SNAP Tool 4.2.0 Excel file will be submitted with the City's Case number in the file name as required for DEQ documentation.

# Watershed Protection Overlay Districts

The Falls Watershed Protection Overlay District (FWPOD, UDO Sec. 9.5.2) and the Swift Creek Watershed Protection Overlay District (SWPOD, UDO Sec. 9.5.3) still apply and the regulations have not changed.

These Districts have more stringent nutrient targets that must be input into the SNAP v4.2.0 Tool.

# Watershed Overlays – Falls (FWPOD)

## UDO Section 9.5.2

SNAP v4.2.0

### LOCATION

Project Name (optional):	Project Name & Case Number		Parcel ID (optional):		
Submission Date (optional):		date	<a href="#">Nutrient Management Watershed:</a>	Falls_Lake	menu
Local Jurisdiction / Reviewing Agency:	Raleigh	menu	Subwatershed:	Lower_Falls	menu
Project Latitude Coordinates (optional):		N	Phosphorus Delivery Zone:	Falls - Lower	menu
Project Longitude Coordinates (optional):		W	Nitrogen Delivery Zone:	Falls - Lower	menu

### PROJECT DETAILS

Development Land Use Type:		menu	Disturbed Area:		ft <sup>2</sup>
Part of Common Development Plan?		y/n	Project Activity:		menu
Designated Downtown Area?		y/n	<a href="#">Project Drains to SA Waters?</a>		y/n
Public Linear Road/Sidewalk Project?		y/n	Pre-Project Land Use:		menu
Project Owner Type:		menu	Project Description (optional):		

### STORMWATER DETAILS

<b>(Falls ONLY)</b> Onsite Reduction % Req.		%	<a href="#">Project Uses LID/Runoff Volume Match?</a>		y/n
Existing BUA/Development Onsite?		y/n	Local Gov't nutrient req's same as State?	yes	y/n
Local Gov't cutoff date for Existing BUA:		date	Project Drains to Regional SCM?	no	y/n
Nitrogen Export Rate Target:	2.20	lb/ac/yr	Total Nitrogen Offset Credits Needed:		lb/yr
Phosphorus Export Rate Target:	0.33	lb/ac/yr	Total Phosphorus Offset Credits Needed:		lb/yr

# Watershed Overlays – Swift (SWPOD)

## UDO Section 9.5.3

SNAP v4.2.0

### LOCATION

Project Name (optional):	Project Name & Case Number		Parcel ID (optional):		
Submission Date (optional):		date	<a href="#">Nutrient Management Watershed:</a>	Neuse	menu
Local Jurisdiction / Reviewing Agency:	Raleigh	menu	Subwatershed:	Neuse-Upper	menu
Project Latitude Coordinates (optional):		N	Phosphorus Delivery Zone:	Neuse - Upper 03020201	menu
Project Longitude Coordinates (optional):		W	Nitrogen Delivery Zone:	Neuse - Upper 03020201	menu

### PROJECT DETAILS

Development Land Use Type:		menu	Disturbed Area:		ft <sup>2</sup>
Part of Common Development Plan?		y/n	Project Activity:		menu
Designated Downtown Area?		y/n	<a href="#">Project Drains to SA Waters?</a>		y/n
Public Linear Road/Sidewalk Project?		y/n	Pre-Project Land Use:		menu
Project Owner Type:		menu	Project Description (optional):		

### STORMWATER DETAILS

<b>(Falls ONLY)</b> Onsite Reduction % Req.		%	<a href="#">Project Uses LID/Runoff Volume Match?</a>		y/n
Existing BUA/Development Onsite?		y/n	Local Gov't nutrient req's same as State?	no	y/n
Local Gov't cutoff date for Existing BUA:		date	Project Drains to Regional SCM?	no	y/n
Nitrogen Export Rate Target:	2.20	lb/ac/yr	Total Nitrogen Offset Credits Needed:		lb/yr
Phosphorus Export Rate Target:	0.33	lb/ac/yr	Total Phosphorus Offset Credits Needed:		lb/yr

# Questions?





Materials will be posted to:

<https://raleighnc.gov/stormwater/stormwater/neuse-nutrient-rule-changes>

For individual questions e-mail:

[sally.hoyt@raleighnc.gov](mailto:sally.hoyt@raleighnc.gov)

