UNRBA Nutrient Credit Development Project
PFC Meeting
March 2016

March 1, 2016

Summary of Status for Credit Development (Task 1)

Task 1 Status Update

- Meeting (February 19th) with DWR Planning and DEMLR Stormwater
  - Project coordination across groups
  - Agency processes and impacts to credits project
- Continued progress on priority measures
- Continued participation in Stormwater Control Measures Crediting Team

Credit Development Process

- Establish technical workgroup
  - Agency staff (DEQ Planning and Stormwater)
  - Subject matter experts (e.g., NCSU Stormwater)
- Compile published nutrient removal data and develop preliminary methods and analysis
- Work with technical workgroup to refine technical approach
- Draft the practice standard document
- Release for review by PFC, NSAB, WOC, SCM CT, etc.
- Work with DEQ to finalize based on input

Review Schedule

- DWR approval process requires review by the NSAB
- Distribute practice standards 2 to 3 weeks before PFC and NSAB meetings
- Present credits at PFC and NSAB meetings
- Comments from reviewers due 1 week after NSAB meeting
- Finalize draft and release for informal 30-day public comment
- DEQ finalize and issue final approval

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Practice	Technical Approach	Practice Standard (Credit Document)	Broader Review	Percent Complete
Level spreader filter strips d.v.	Finalized	Released for broad review Feb. 22nd	Comments due Mar 18th	95
Bioretention d.v.	Finalized	Released for broad review Feb. 22nd	Comments due Mar 18th	95
Infiltration devices	Finalized	To be released Mar 21st	Comments due April 8th	90
Soil improvement and PANM	Finalized	To be released Mar 21st	Comments due April 8th	90
Livestock exclusion	Nearly final	Planned release in April	Comments due in May	80
Land conservation	In development	Planned release in April	Comments due in May	60
Buffer restoration (urban and rural developed areas)	In development	Planned release in May	Comments due in June	50
Removal of illicit discharges	Awaiting local data	Planned release in May	Comments due in June	10

Task 2: Status of Work for Credit Calculation Tool

Task Force for Tool Development

- Further tool development is on hold until second half of 2016
  - More information on Rules Revisions and reporting requirements
  - Integrate credit development from Task 1 for non structural practices
  - Assess the need for supplemental features as we progress
- Agency continues to work through JFSAT issues
  - Most changes are associated with fixing bugs and calculations
  - Should not affect the read in functions of the UNRBA Credit Tool
- Agency beginning technical discussions on combining the JFSAT and StormEZ tools
  - We will continue to track these discussions and their potential impacts to the UNRBA Credit Tool

Bioretention Design Variants

Technical Workgroup

- **NCDEQ Division of Water Resources, Planning:**
  - Rich Gannon, John Huisman, Trish D'Arconte, and Amin Davis
- **NCDEQ Division of Energy, Mineral and Land Resources, Stormwater:**
  - Annette Lucas
- **NCSU-BAE Stormwater Engineering Group:**
 - Andrew Anderson, Erin Carey, and Bill Hunt

Minimum Design Criteria and Technical Guidance

- Pursuant to Minimum Design Criteria and related requirements of rules 15A NCAC 2H .1000 (http://portal.ncdenr.org/c/document_library/get_file?uuid=0212634d-9aa9-4301-a481-1d6c57930c44&groupId=38334), and

- Guided by Chapter 12 of the NC BMP Design Manual

- Crediting requires assumed factor of safety in HyPer Tool of 10 percent

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Design Variants for Bioretention Cells

- Soil media depth

- Inclusion of internal water storage (IWS)

- Average surface ponding depth

- Surface storage ratio (i.e., storage volume relative to design storm volume)

- Drainage coefficient (default is 2 ft/d)

Average Surface Ponding Depth

Depth to IWS (root zone)

IWS (media+gravel)

Subgrade soil
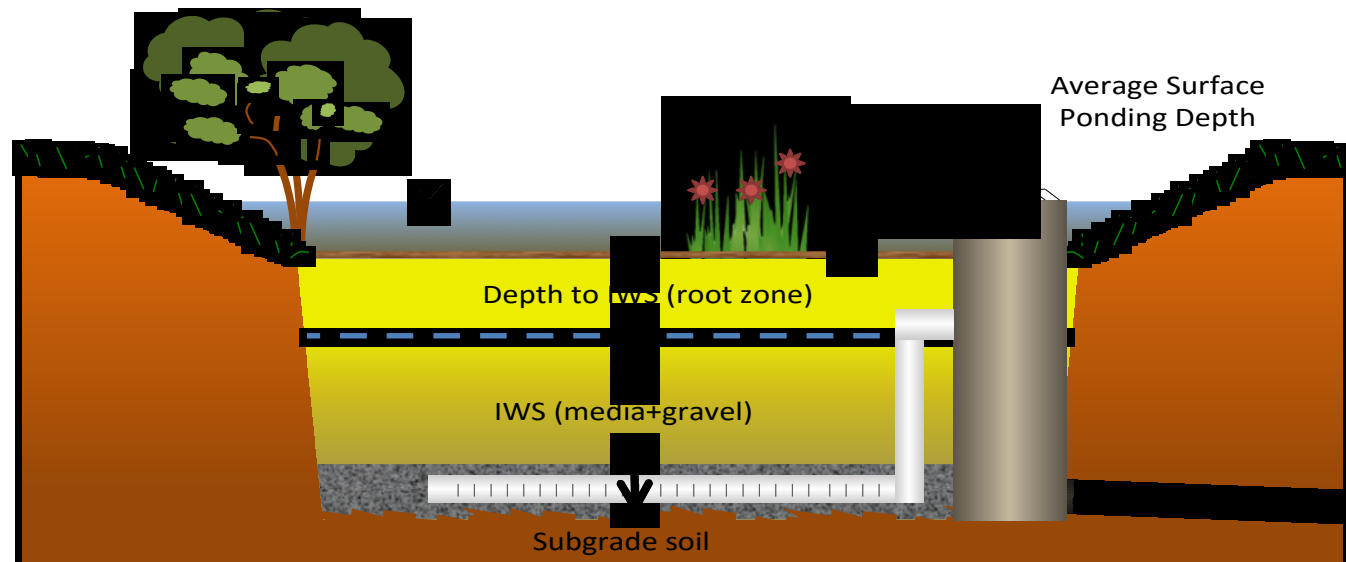
Crediting Method

- Input design variants into HyPer Tool

- Record hydrologic values from the HyPer Tool

- Enter site information into JFSAT

- Select one of the "Custom Bioretention" options in JFSAT: with or without IWS
  (select "Other Custom BMP" until JFSAT functions are restored)

  - Enter hydrologic values from HyPer Tool on the BMP Characteristics tab

  - Use default nutrient EMCs for bioretention with or without IWS

    - With IWS: 0.81 mg-N/L and 0.1 mg-P/L

    - Without IWS: 1.08 mg-N/L and 0.13 mg-P/L

- JFSAT outputs nutrient loads pre and post BMP implementation

HyPer Tool

- Developed by the NCSU-BAE Stormwater Group (http://www.bae.ncsu.edu/stormwater/downloads.htm)

- Model is based on output from over 400 DRAINMOD simulations

- Predicted water budgets for bioretention match field observations to within 10 percent

$y = 1.0066x - 0.3046$
$R^2 = 0.9979$

$y = 1.0365x - 0.7103$
$R^2 = 0.8188$
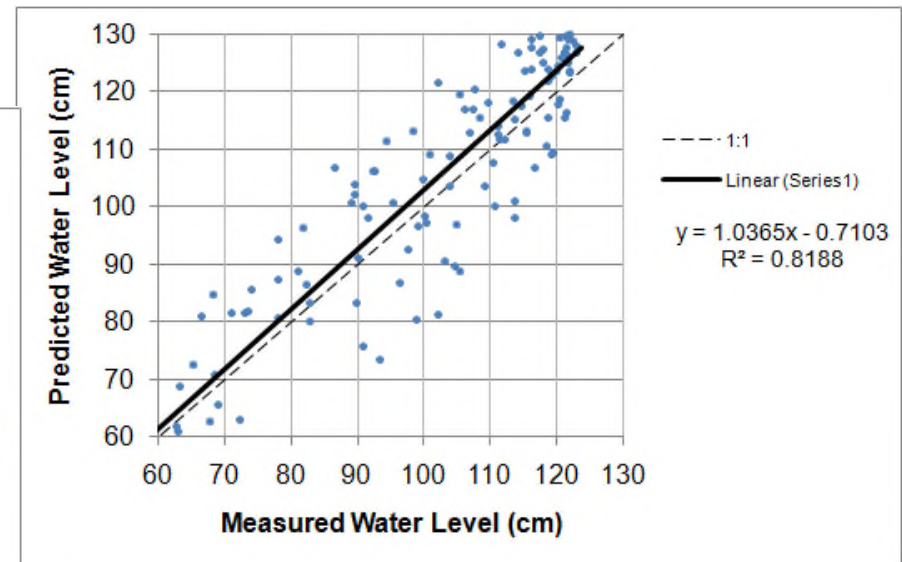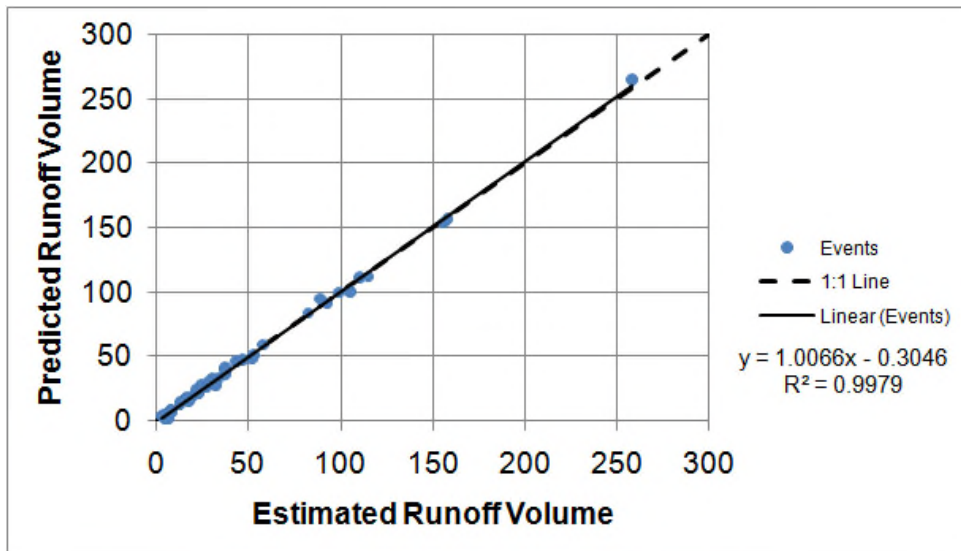
Input Design Variants in HyPer Tool

DESIGN INPUT PARAMETERS		
Units	**English**	
Hydrologic Soil Group	**B**	
Soil Media Depth	**3**	ft
Depth to IWS	**1**	ft
Average Surface Ponding	**9**	in
Surface Storage Ratio	**75%**	relative to WQ volume
Drainage Coefficient	**2**	ft/d
BRC Area : Drainage Area Ratio	**8.3%**	
Factor of Safety	**10%**	

Record Hydrologic Output from HyPer Tool

DESIGN OUTPUT PARAMETERS		
Maximum Subgrade Ksat	0.140	in/hr

HYDROLOGY	Total (in/yr)	Percent of Total
Runoff	544	
ET	35	7%
Overflow	52	9%
Exfiltration	290	53%
Drainage	168	31%

Overflow % → 9%

% Treated → 31%

Enter Data into JFSAT (Project Information)

Jordan/Falls Lake Stormwater Nutrient Load Accounting Tool

Version 3.0

Date:	February 23, 2016
Project Name:	bioretention example
Development Area (ft²):	23,000
Physiographic Region: Regional Map	Piedmont
Project Latitude Coordinates:	N
Project Longitude Coordinates:	W
Precipitation Location: Precip Map	Butner
Project Designer:	
Contact Phone Number/Email:	
Project Description:	

Buttons: Introduction, Watershed Characteristics, BMP Characteristics, Individual BMP Summary, Overall Summary, Print Project Info, Clear All Entries, Import An Existing Project, Help & Documentation

Enter Data into JFSAT (Watershed Characteristics)

WATERSHED LAND USES				
	TN EMC (mg/L)	TP EMC (mg/L)	Pre-Development (ft^2)	Post-Development (ft^2)
COMMERCIAL				
Parking lot	1.44	0.16	23,000	21,225
Roof	1.08	0.15		
Open/Landscaped	2.24	0.44		
Open water	--	--		
LAND TAKEN UP BY BMPs	1.08	0.15		1,775

LAND USE AREA CHECK	
Total Development Area Entered (ft^2):	23,000

Enter Data into JFSAT (BMP Characteristics)

	BMP #1	
Type of BMP:	**Custom Bioretention with IWS**	← Select
Select predominant hydrologic soil group (HSG) for the location of the BMP.	**B**	← Select
Description of Custom BMPs	BR w ISW, SMD3, DIWS1, ASP9, SSR75%, DC2, FOS10%	← Enter description
Under- or Over-sized Percentage:		
Hydrologic Values (Value must be entered by user for Water Harvesting or Custom BMPs) **Hydrologic Values**	Overflow %: | % Treated	
	9% | 31%	← Enter hydrologic values from HyPer Tool
Nutrient Effluent EMC Values (Value must be entered by user for custom BMPs)	TN EMC (mg/L): | TP EMC (mg/L):	
	0.81 | 0.1	← Defaults

JFSAT Outputs Nutrient Loads Pre and Post BMP (Overall Summary)

Development Summary

	Pre-Development Conditions	Post-Development Conditions	Post-Development w/ BMPs
Percent Impervious (%)	100.0%	100.0%	100.0%
Annual Runoff Volume (c.f.)	85,470	85,470	34,327
Total Nitrogen EMC (mg/L)	1.44	1.41	0.95
Total Nitrogen Loading (lb/yr)	7.69	7.54	2.02
Total Nitrogen Loading (lb/ac/yr)	14.56	14.27	3.83
Total Phosphorus EMC (mg/L)	0.16	0.16	0.11
Total Phosphorus Loading (lb/yr)	0.85	0.85	0.24
Total Phos. Loading (lb/ac/yr)	1.62	1.61	0.46

Nitrogen Credit = 7.69 lb/yr − 2.02 lb/yr = 5.67 lb/yr
Phosphorus Credit = 0.85 lb/yr − 0.24 lb/yr = 0.61 lb/yr

Questions on Bioretention Design Variants?

Level Spreader Filter Strip Design Variants

Technical Workgroup

- **NCDEQ Division of Water Resources, Planning:**
  - Rich Gannon, John Huisman, Trish D'Arconte, and Amin Davis
- **NCDEQ Division of Energy, Mineral and Land Resources, Stormwater:**
  - Annette Lucas and Bradley Bennett
- **NCSU-BAE Stormwater Engineering Group:**
  - Andrew Anderson, Erin Carey, and Bill Hunt

Minimum Design Criteria and Technical Guidance

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- Guided by Chapter 8 of the NC BMP Design Manual

- Minimum width of 10 ft

- Minimum ratio of length to design flow of 10 ft/cfs

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Design Variants for Level Spreader Filter Strip

- Width (W), (i.e., flow path)

- Ratio of the length in ft (L)
  to the design flow in cfs (Q)

  - Q = CIA

    - Q = design flow (cfs)

    - C is the runoff coefficient (unitless)

    - I = 0.75 in/hr (new MDC)

    - A = drainage area (ac)

    [See description of the Rational Method
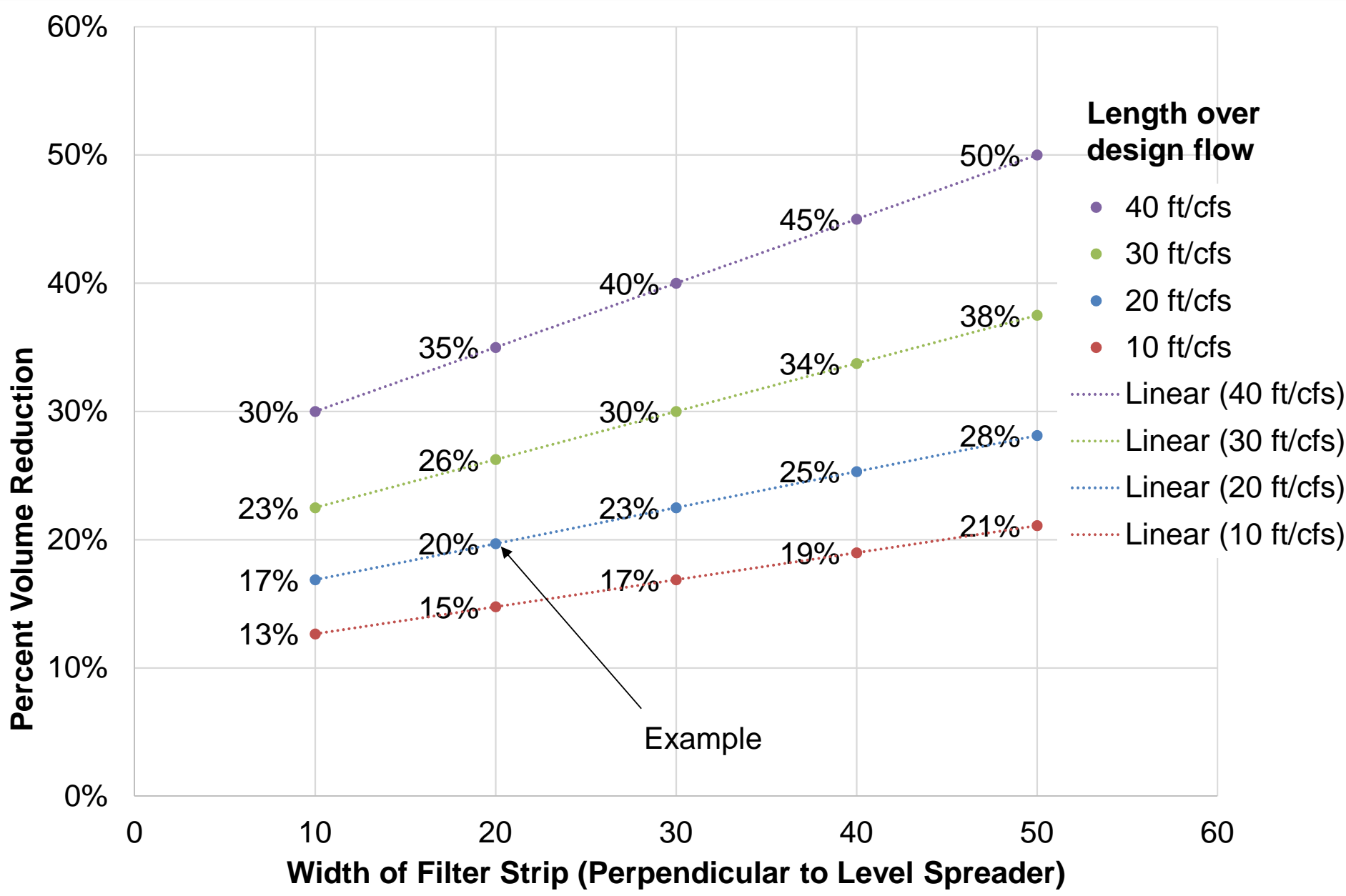   in Ch. 3 of the NC BMP Design Manual]
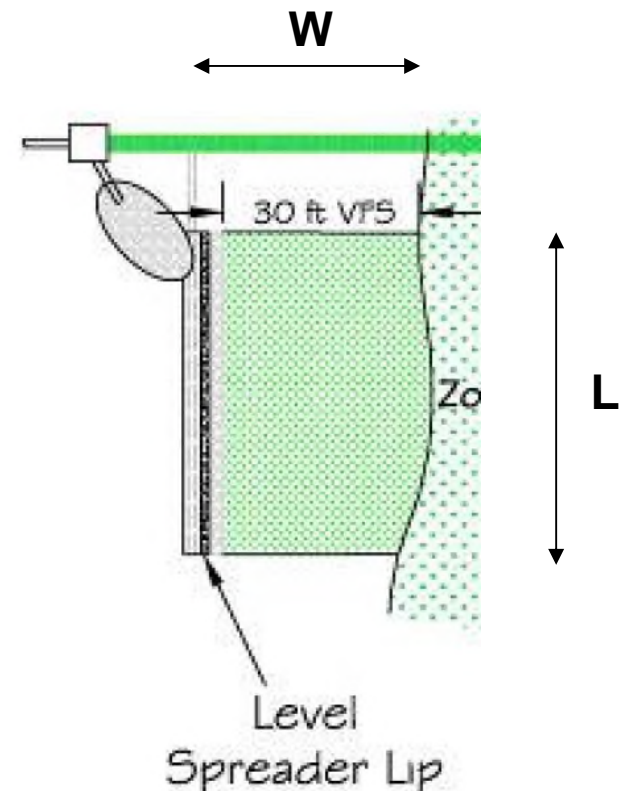
Modified from Winston and Hunt (2010)

Crediting Method

- Select the appropriate %Volume Reduction from the LSFS design variants figure

- Calculate: % Treated = 100% - %Volume Reduction

- Select "Other Custom BMP" option in JFSAT

  - Enter hydrologic values (% Treated and Overflow % = 0)

  - Use default nutrient EMCs for LSFS
    (1.09 mg-N/L and 0.16 mg-P/L)

- JFSAT outputs nutrient loads pre and post BMP

Enter Data into JFSAT (BMP Characteristics)

	BMP #1	
Type of BMP:	**Other Custom BMP**	← Select
Select predominant hydrologic soil group (HSG) for the location of the BMP.	**C**	← Select
Description of Custom BMPs	LSFS: W= 20 ft and L/Q = 20 ft/cfs	← Enter description
Under- or Over-sized Percentage:		
Hydrologic Values (Value must be entered by user for Water Harvesting or Custom BMPs) **Hydrologic Values**	**Overflow %:** | **% Treated**	← Enter hydrologic values
	0% | 80%	
Nutrient Effluent EMC Values (Value must be entered by user for custom BMPs)	**TN EMC (mg/L):** | **TP EMC (mg/L):**	
	1.09 | 0.16	← Enter defaults

JFSAT Outputs Nutrient Loads Pre and Post BMP

Development Summary

	Pre-Development Conditions	Post-Development Conditions	Post-Development w/ BMPs
Percent Impervious (%)	100.0%	100.0%	100.0%
Annual Runoff Volume (c.f.)	85,470	85,470	68,407
Total Nitrogen EMC (mg/L)	1.44	1.44	1.09
Total Nitrogen Loading (lb/yr)	7.69	7.67	4.65
Total Nitrogen Loading (lb/ac/yr)	14.56	14.52	8.80
Total Phosphorus EMC (mg/L)	0.16	0.16	0.16
Total Phosphorus Loading (lb/yr)	0.85	0.85	0.68
Total Phos. Loading (lb/ac/yr)	1.62	1.62	1.29

Nitrogen Credit = 7.69 lb/yr − 4.65 lb/yr = 3.04 lb/yr
Phosphorus Credit = 0.85 lb/yr − 0.68 lb/yr = 0.17 lb/yr

Questions on LSFS Design Variants?