Example Competency Test Problems

By: Dingbao Wang

Dr Wang is professor of engineering at UCF.
He has 15+ years of experience in teaching and research at UCF.
He holds degrees in Civil Engineering.
He specializes in water resources system modeling.

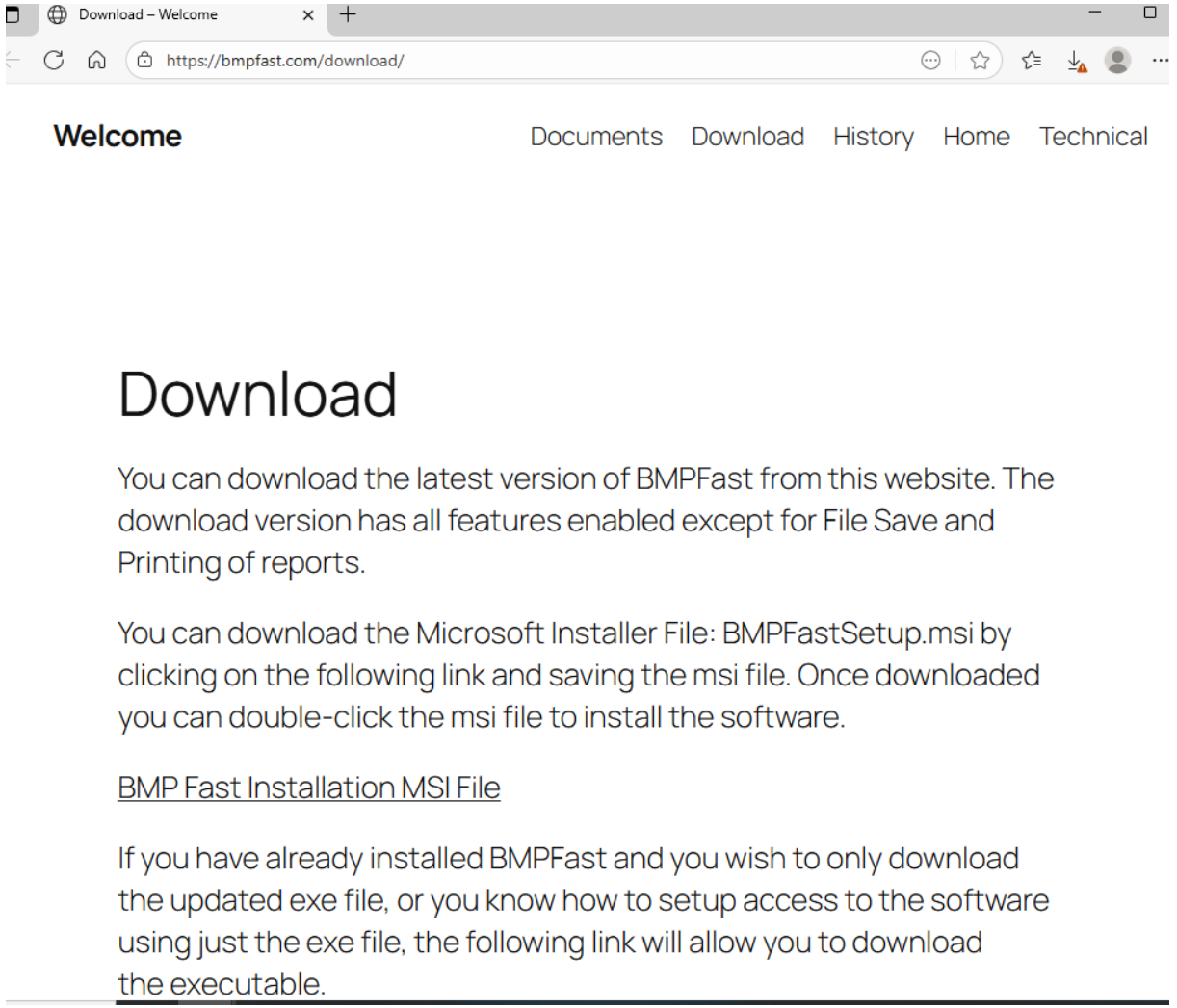
January 2026

Learning Objectives

- Interpretation of data used for BMPFast analysis.
- Show how to set up the analysis in BMPFast.
- Example of how to submit the BMPFast input/output for grading.
- Example questions asked.
- The testing, how many different questions, and retaking.
- Grade needed to earn a certificate of competency.

BMPFast Download

- https://bmpfast.com/download/
- Download of Microsoft Software Installer (MSI) file
- Download of executable file



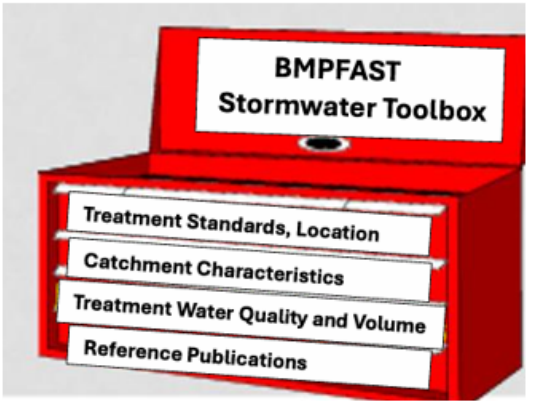
BMPFast 2025

Welcome to BMPFast 2025

Software by: Marty Wanielista, Ron Eaglin, Harvey Harper, and Dingbao Wang

Input for improvements to content was from professionals representing local and state government agencies as well as from the academic and consulting areas. This software is in agreement with State laws on the distribution of intellectual property as well as current practice related to applicant handbooks, research, and regulatory decisions made through 2025.

Disclaimer: The user is responsible for all input data and an understanding and navigation of the software.



Enter Valid User Email: Beta_Tester

Enter Validation Code: 250105

About BMPFast Validation

Continue with Validation

Continue without Validation

Login with a test account and code; access will be removed after beta testing.
Click **“Continue with Validation”**.
Validation code will be available after completing a competency evaluation (test).

Example Test Problem 1

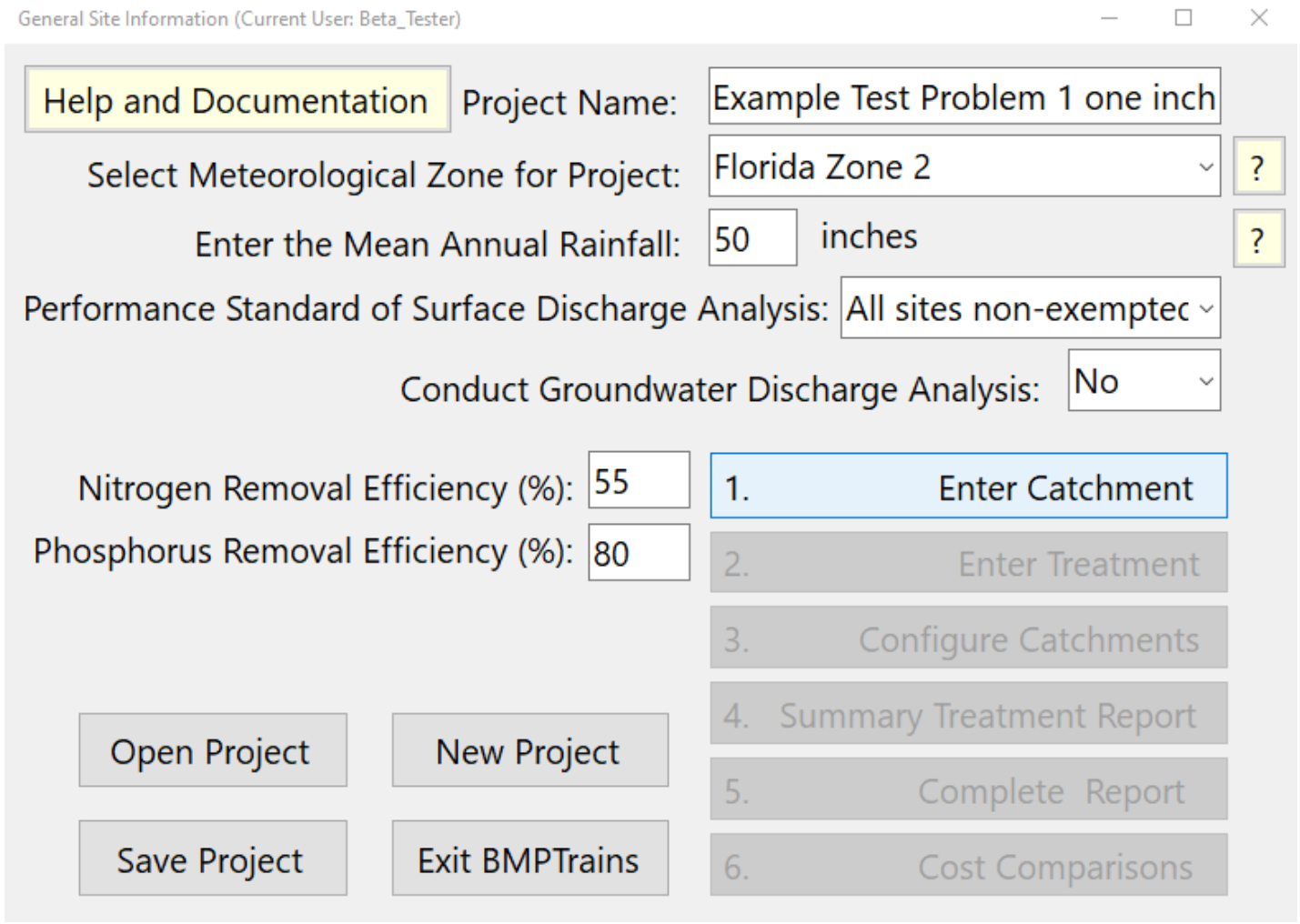
Retention basin: pre- vs. post-development loading

This example problem includes the step-by-step procedure to input information for retention basin average annual effectiveness. Retention basins also are identified as infiltration cells, retention ponds, and infiltration basins. They are used for regional and on-site treatment. The site is located in Marion County, near Ocala FL, with 2 acres and 50 inches of annual rainfall on Hydrologic Soil Group C. The pre-development land use condition is citrus with a non-DCIA Curve Number (CN) of 80 and 0% DCIA. The post-development land use condition is multi-family with a non-DCIA Curve Number (CN) of 80 and 28% DCIA.

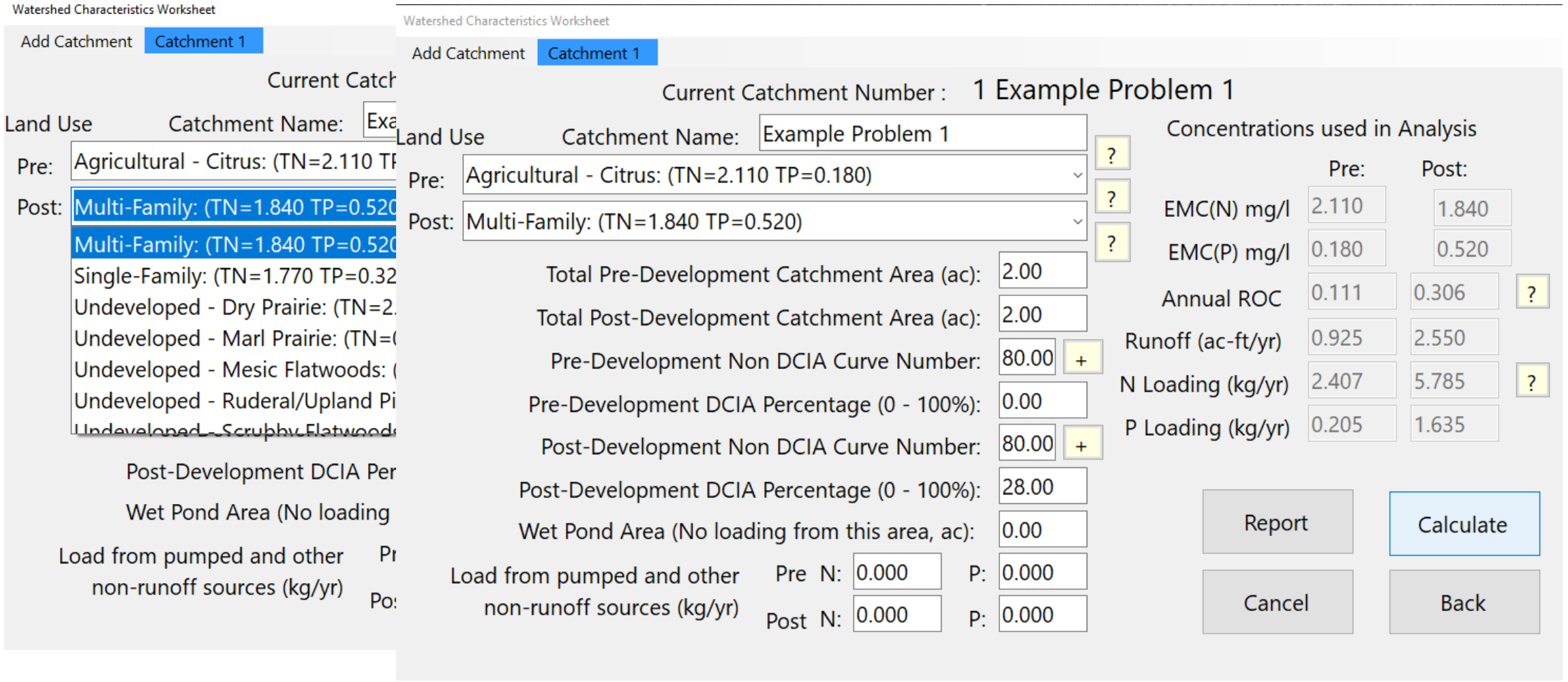
The onsite retention basin must provide treatment for discharge to a non exempted (non OFW or impaired water). The usual retention design depth for this area is a rainfall depth of 1 inch. Thus, the volume of the retention basin is 7,260 CF (i.e., 1-inch x 2 acres x (43,560 SF/acre) / (12 inches/foot)), which is equivalent to 0.167 acre-feet. The retention depth for the 1 inch of treatment is on the average 3 feet. Thus, the area at design depth of 1 inch over the watershed is 2420 SF (7260 CF/3ft) or 0.056 acres. There is an option to double the retention treatment depth up to 0.333 acre-feet. The retention area is part of the catchment area. The depth of retention (inches) is calculated from the volume of the retention basin and the catchment area. The catchment area may change if there is additional runoff to the retention basin from another catchment area as an example.

There is no additional treatment volume onsite that can result from a deeper basin because of water table depth. The BMPFast 2025 software is used to analysis one inch of treatment depth first. Calculating the treatment efficiency needed so that the post development average annual loading of nutrients equals the predevelopment nutrient loading. Comparing the result from the calculated treatment efficiency by the pre- vs. post-development to the percent reduction required in treatment performance standards for all sites non-exempt. The greater load reduction (the more protective) will be the requirement for the project. The analysis option selected is for all sites non-exempt. The net improvement analysis option selected is to calculate treatment efficiency by pre- vs. post-development. The question is to determine if the 1-inch size of retention meets the performance standard.

1. General Site Information Worksheet

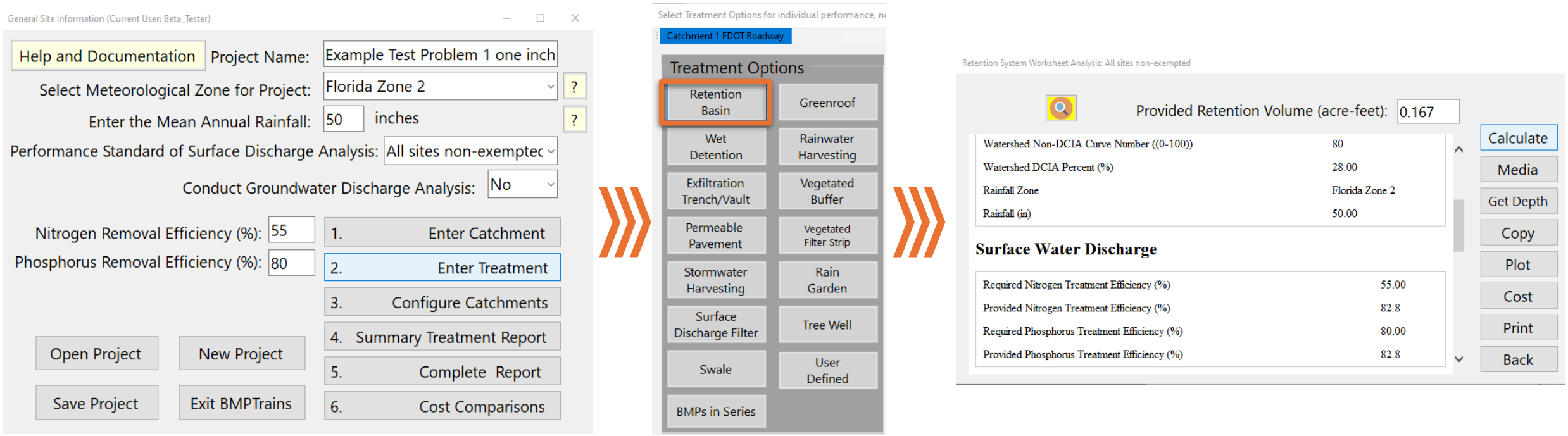


2. Watershed Characteristics Worksheet



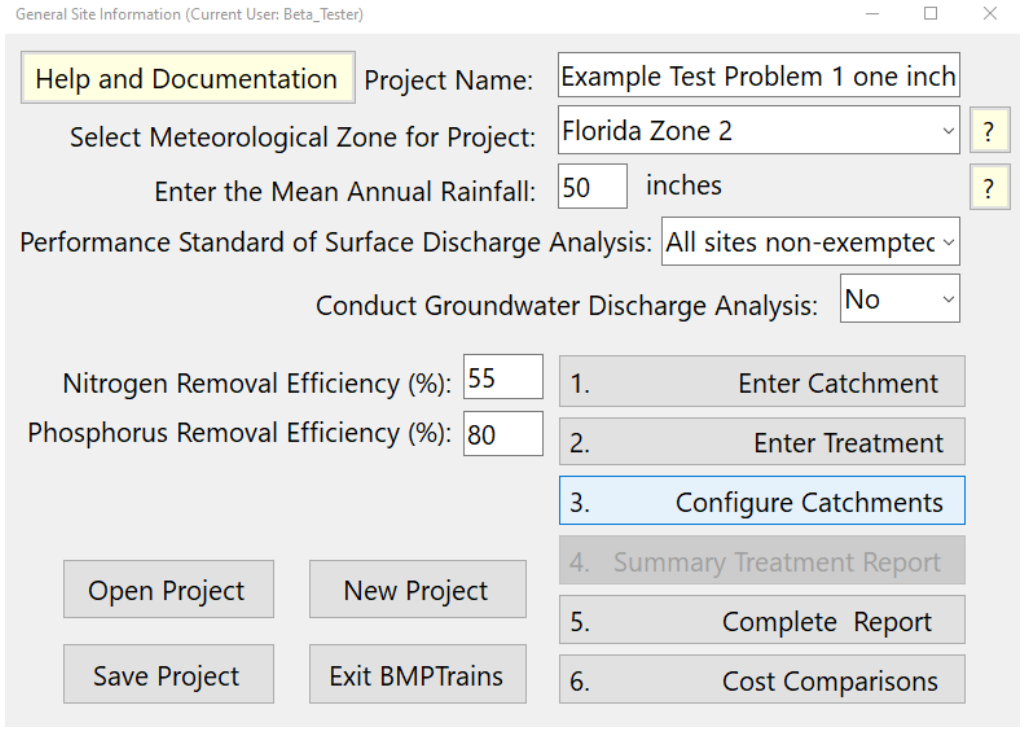
3. Treatment Options

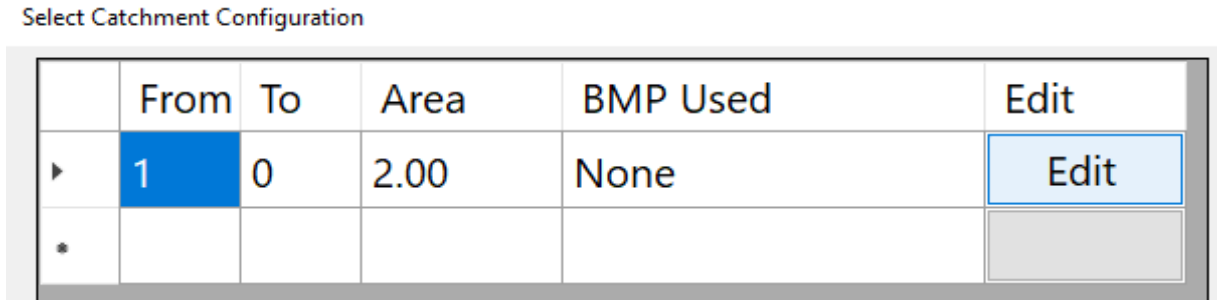
retention basin with design depth of 1 inch

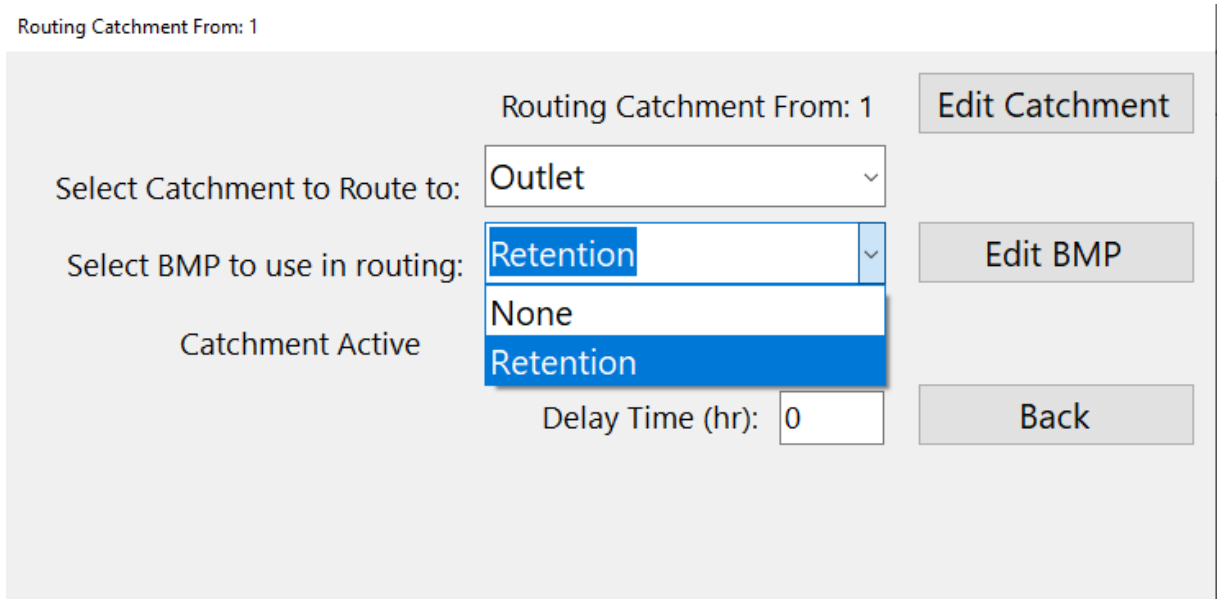


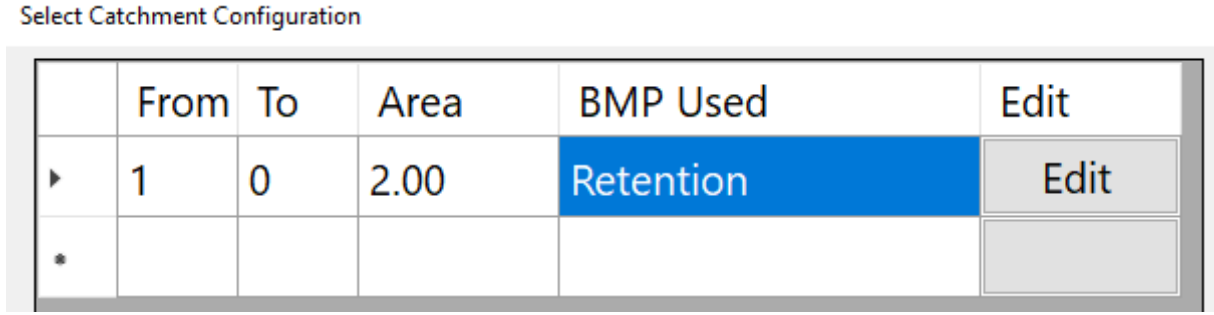
4. Configure Catchments

retention basin with design depth of 1 inch

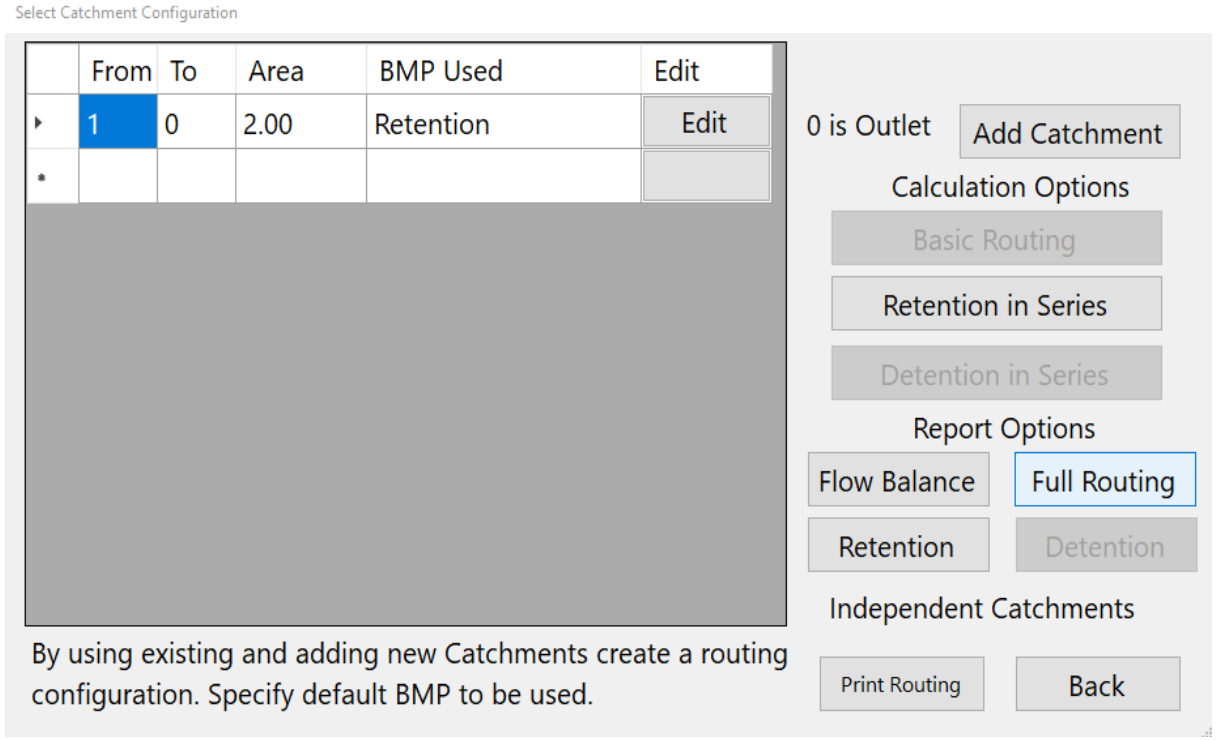


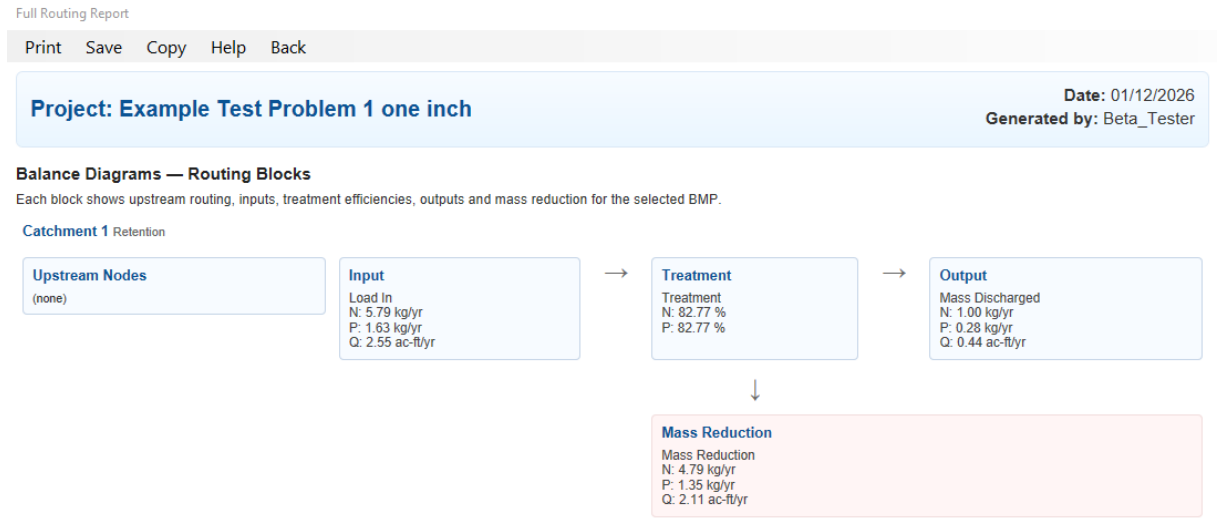






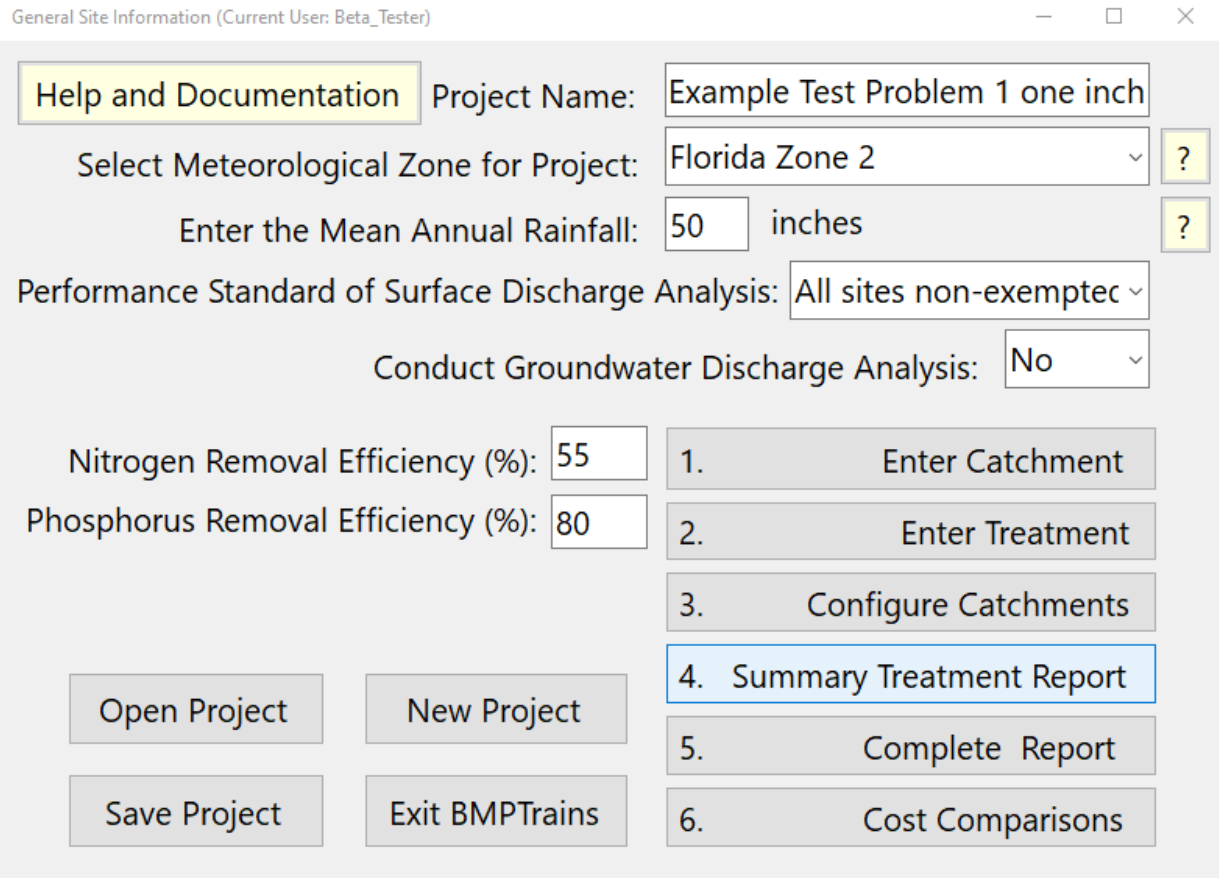
Full Routing Report





5. Summary Report

retention basin with design depth of 1 inch



Project: Example Test Problem 1 one inch

Summary Treatment Report

Catchments and Associated BMP Types

ID	Catchment Name
1	Example Problem 1

Volume of Runoff Summary

Scenario	Effect
Pre-Condition	
System Post-Condition (with BMPs)	
Post-Condition (no BMP)	

Effective Area is the watershed area used to normalize runoff (acres). Runoff volumes are shown in acre-feet per ye

Summary Loading Analysis

% Target Removals

Is system total nitrogen target removal met? **Yes** (Required: 55% Provided: 82.77%)
Is system total phosphorus target removal met? **Yes** (Required: 80% Provided: 82.77%)

Pre vs. Post Removals

Is % less than predevelopment system loading for TN met? **Yes** (Required: 58.4% Provided: 82.77%)
Is % less than predevelopment system loading for TP met? **No** (Required: 87.44% Provided: 82.77%)

Nitrogen Loading

Surface Water Discharge

Total N pre load	2.41 kg/yr	
Total N post load	5.79 kg/yr	
Percent N load reduction	83 %	
Provided N discharge load	1 kg/yr	2.2 lb/yr
Provided N load removed	4.79 kg/yr	10.56 lb/yr

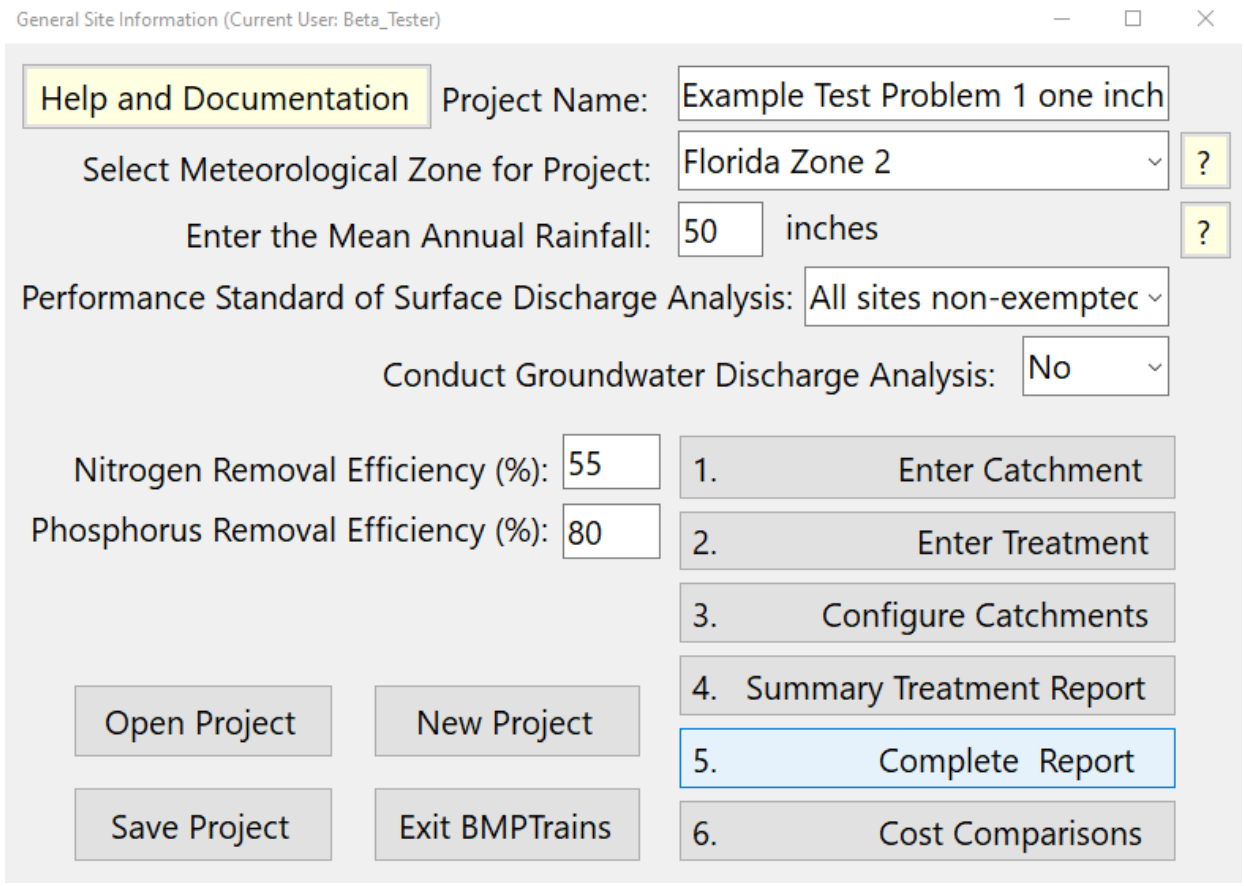
Phosphorus Loading

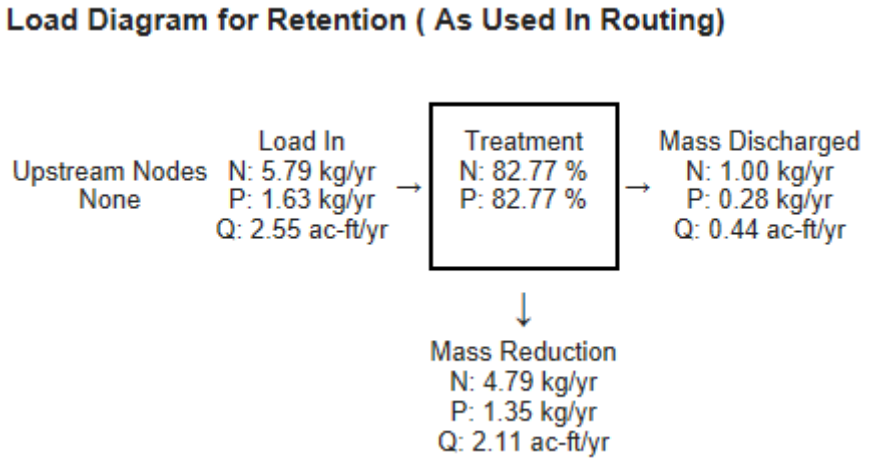
Surface Water Discharge

Total P pre load	.205 kg/yr	
Total P post load	1.635 kg/yr	
Percent P load reduction	83 %	
Provided P discharge load	.282 kg/yr	.62 lb/yr
Provided P load removed	1.353 kg/yr	2.984 lb/yr

6. Complete Report

retention basin with design depth of 1 inch





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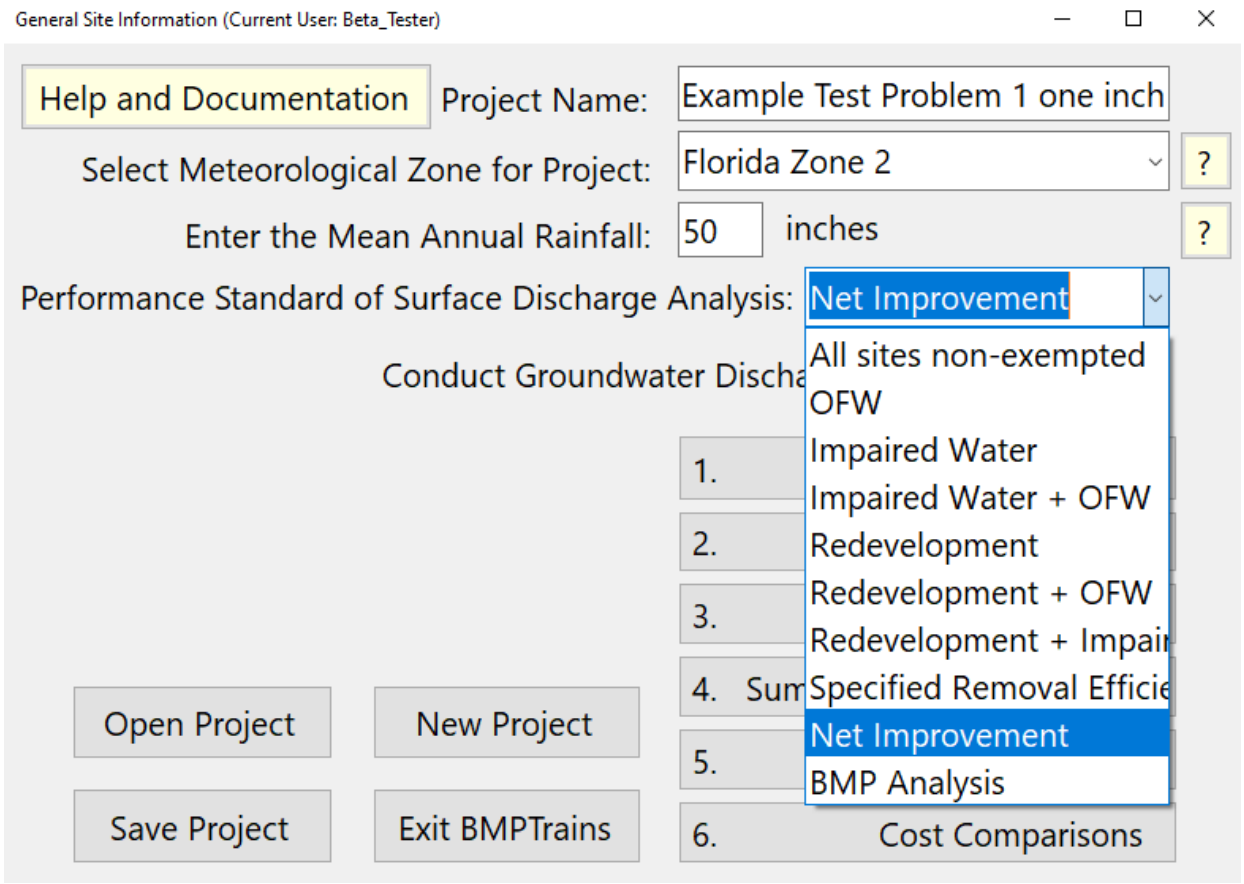
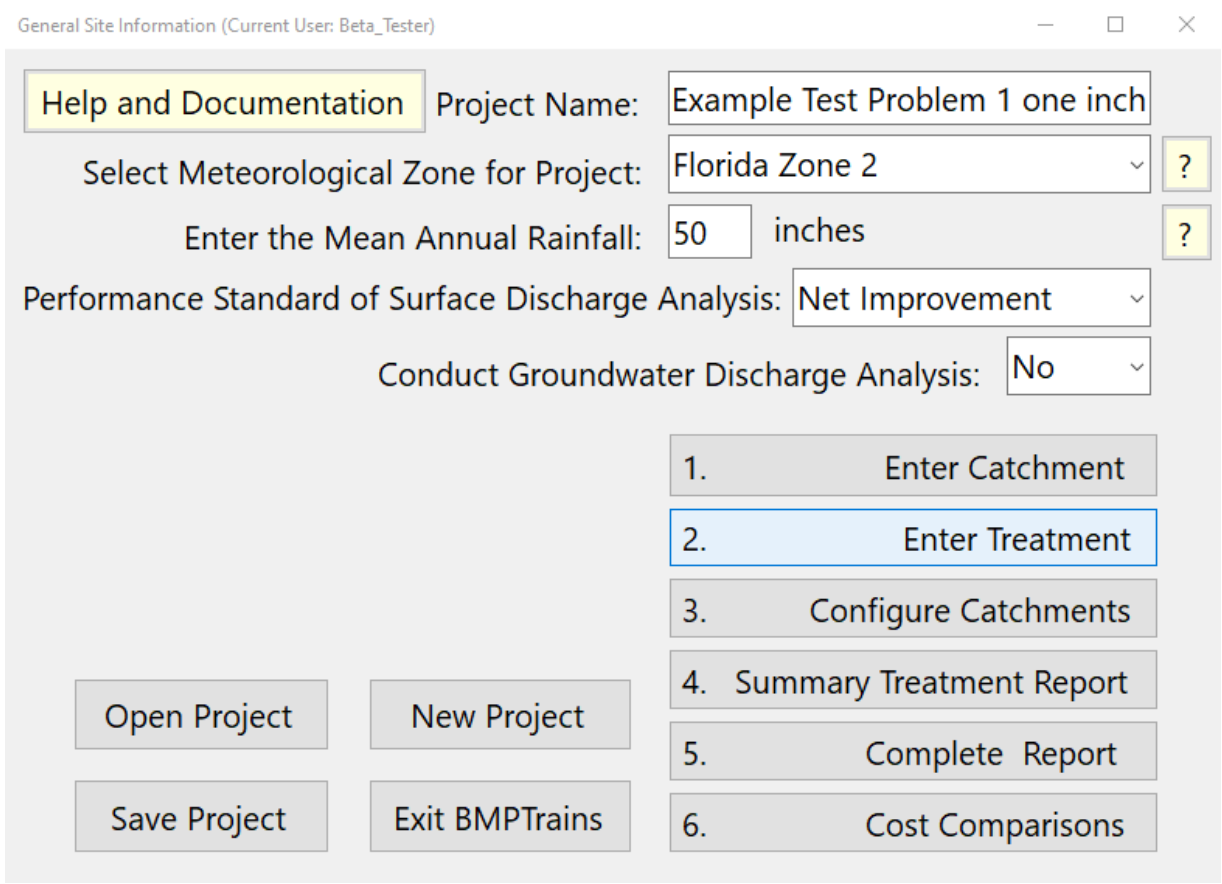
7. Analysis Result of the Net improvement

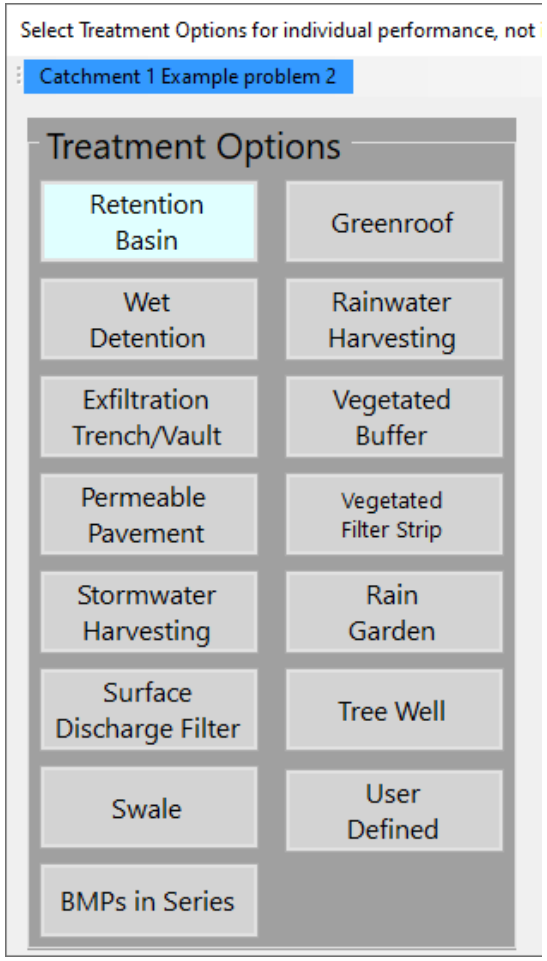
retention basin with design depth of 1 inch

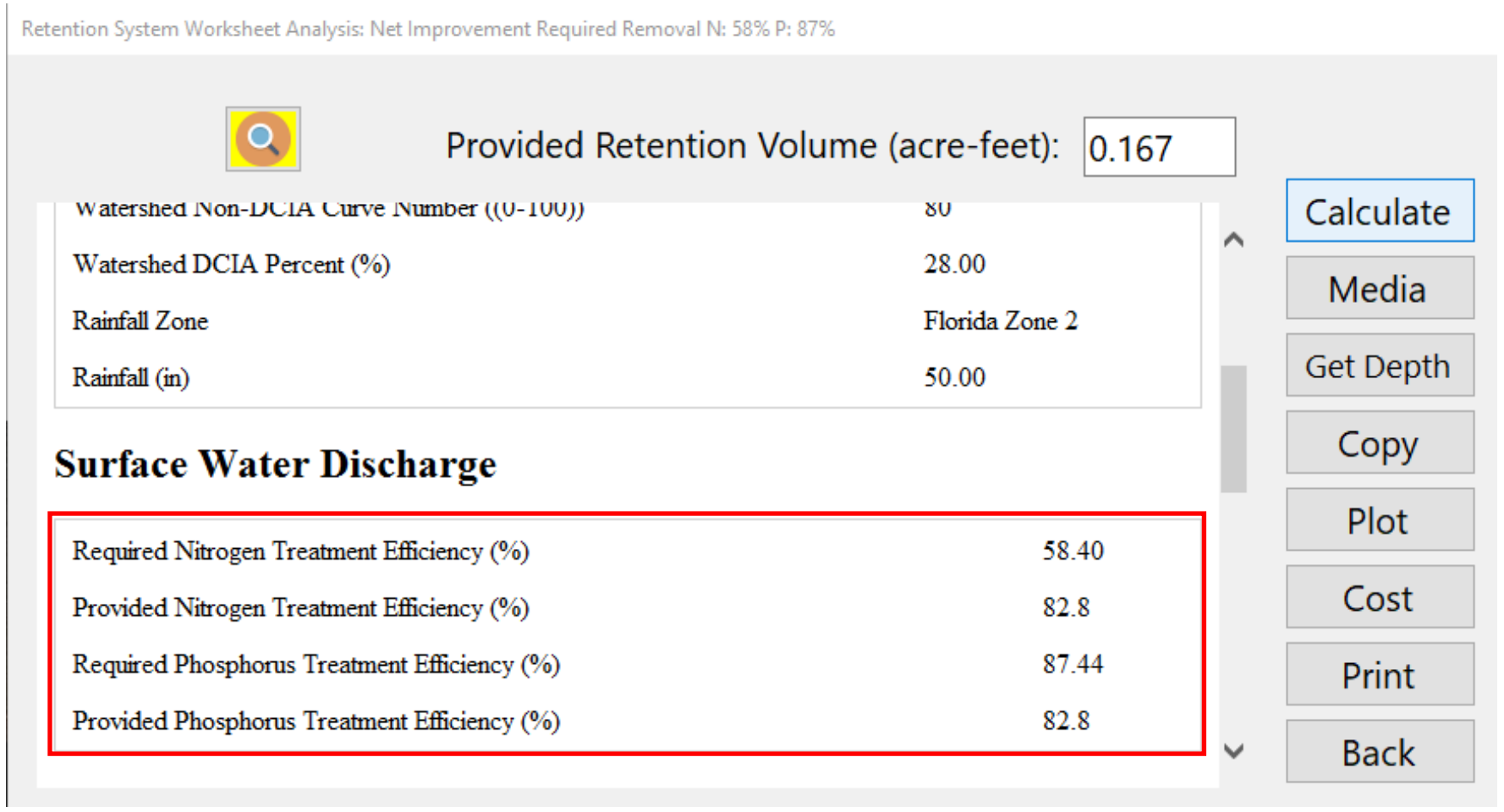




7. Analysis Result of the Net improvement

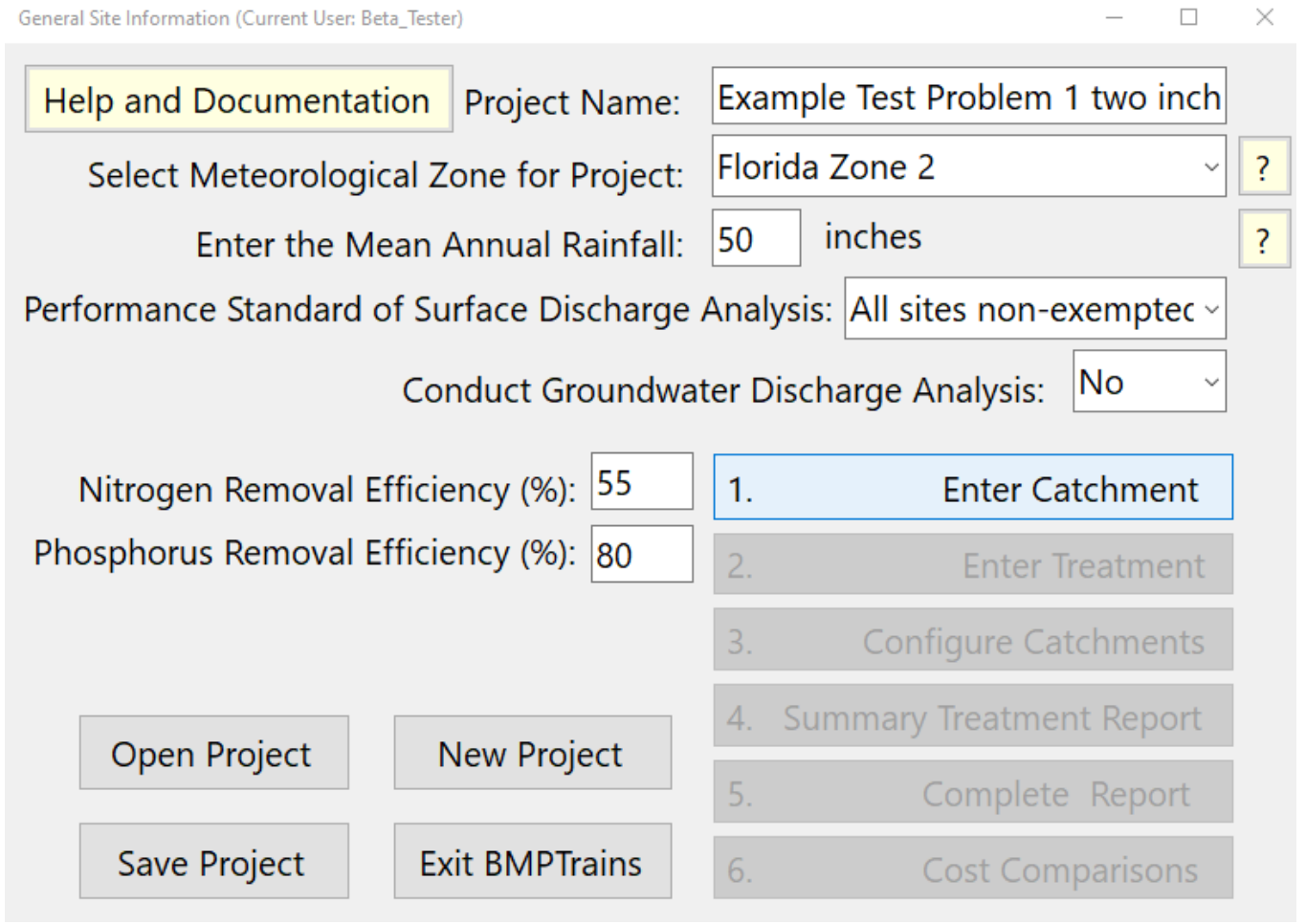
retention basin with design depth of 1 inch



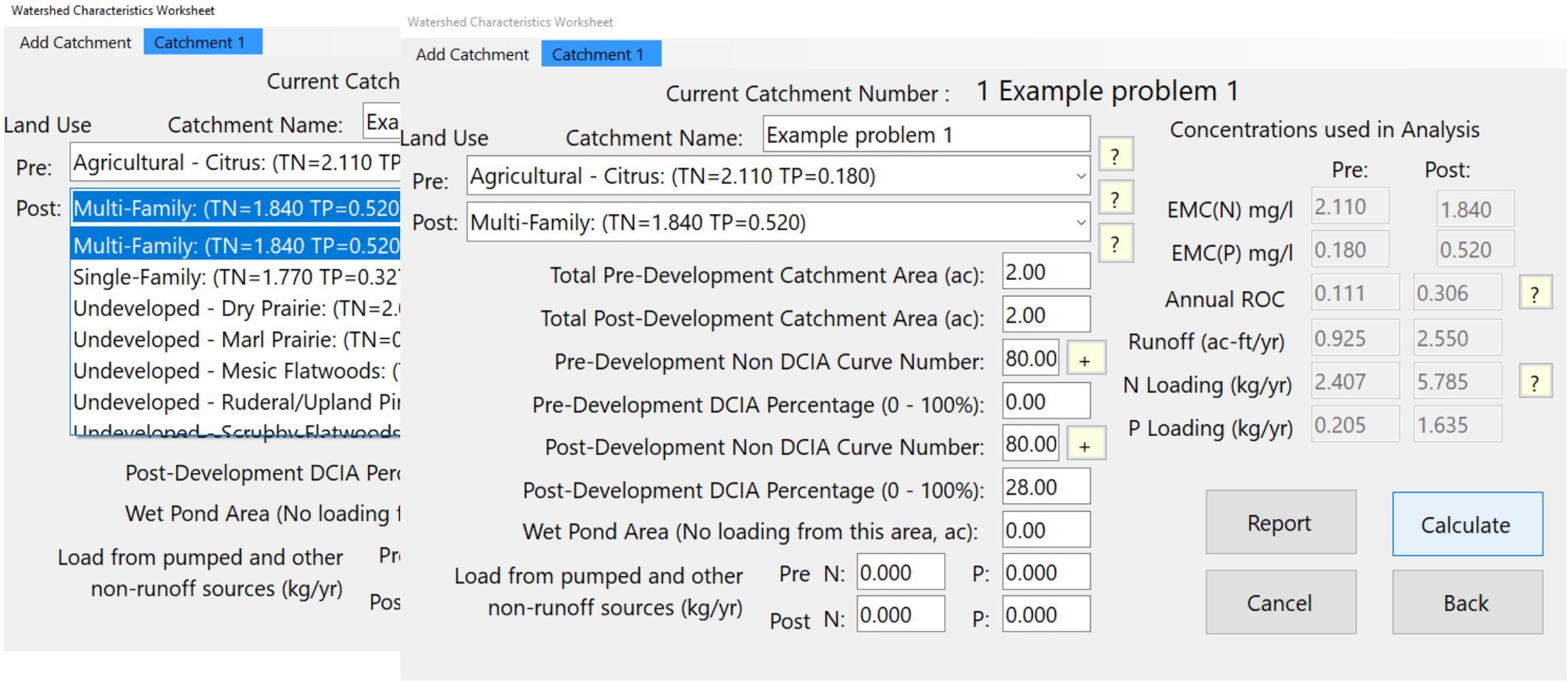


8. General Site Information Worksheet

The analysis indicates that a design depth of 1 inch, while sufficient to meet the All Sites performance standard, does not fulfill the requirement that post-development average annual nutrient loading be equal to or less than pre-development levels. Therefore, a design depth of 2 inches was selected for further evaluation to determine whether the performance standard can be achieved.

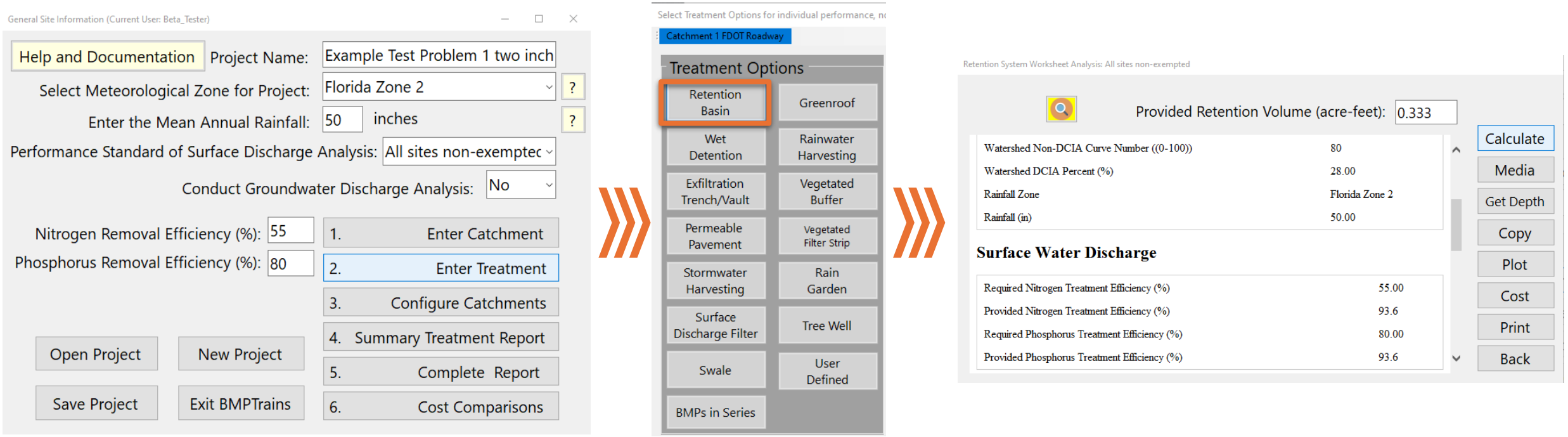


9. Watershed Characteristics Worksheet



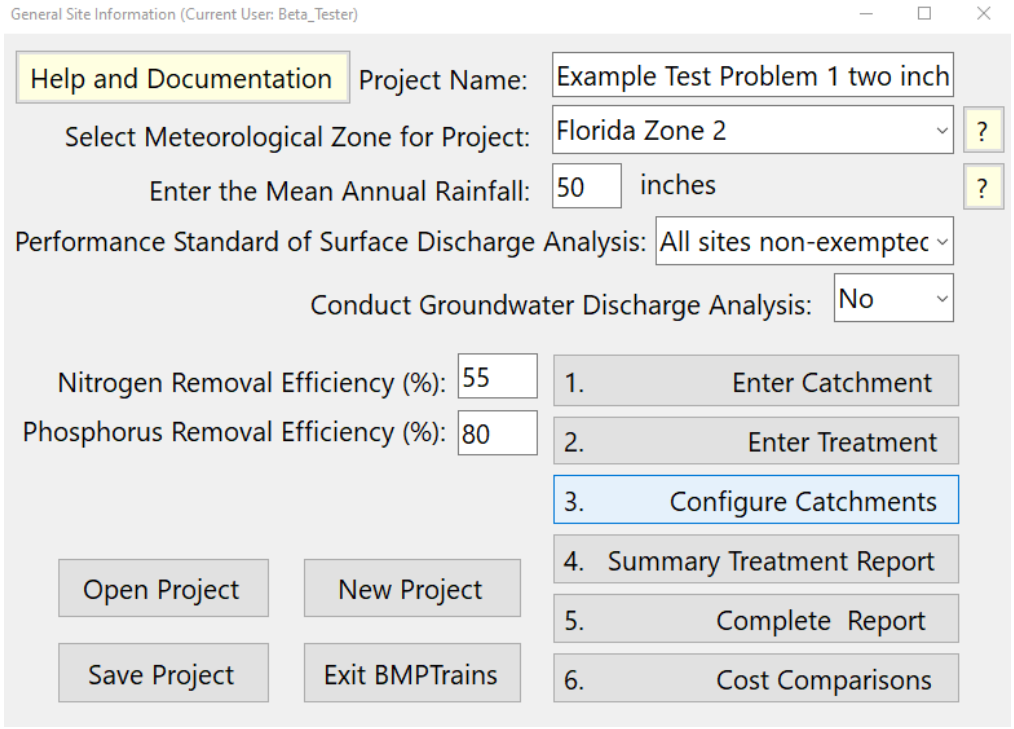
8. Treatment Options

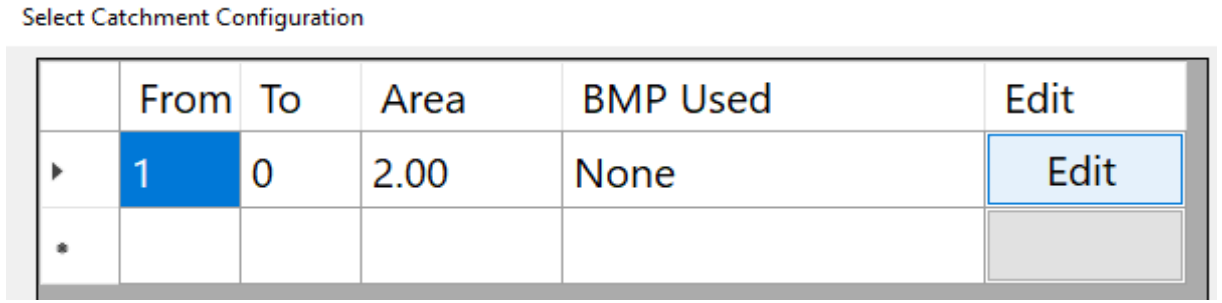
retention basin with design depth of 2 inches

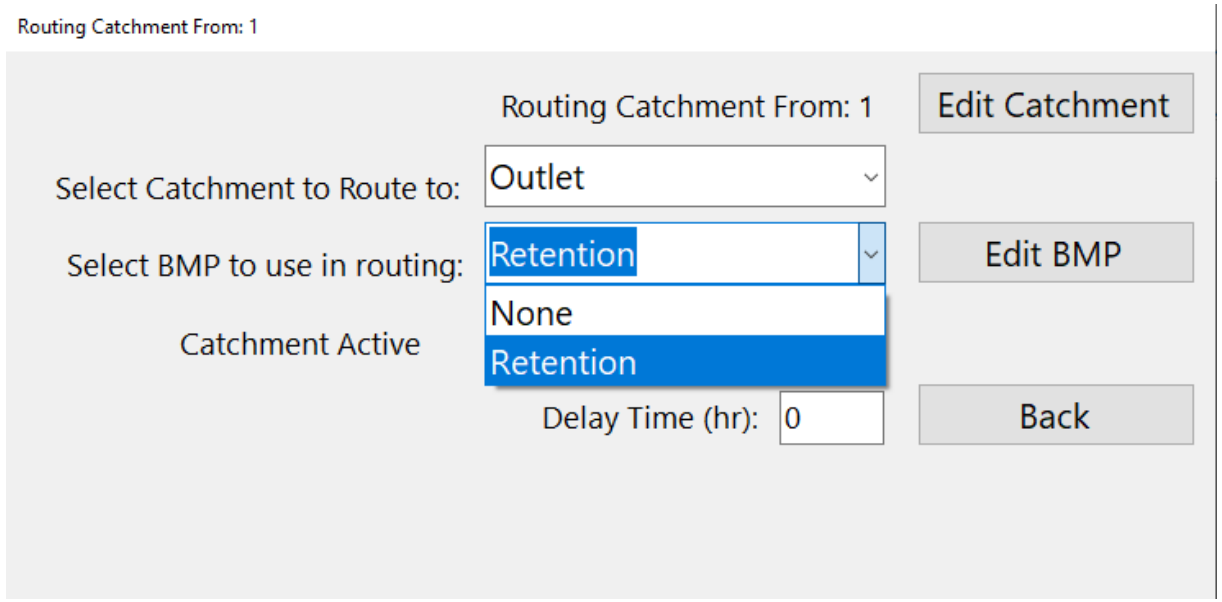


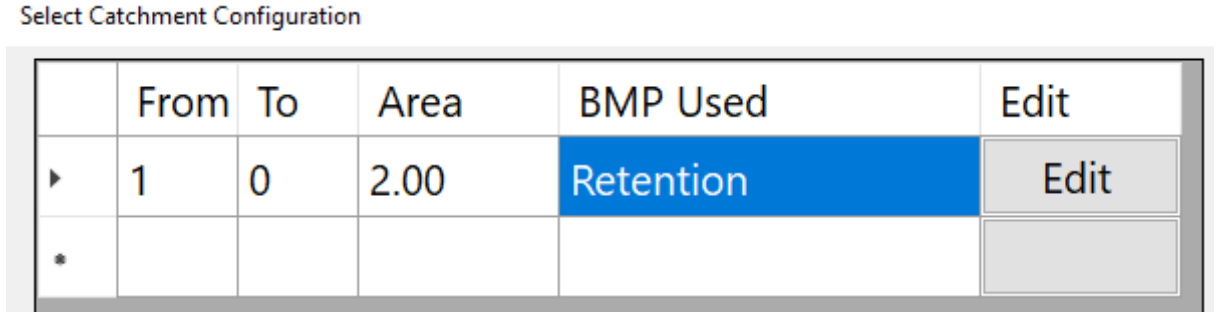
9. Configure Catchments

retention basin with design depth of 2 inches

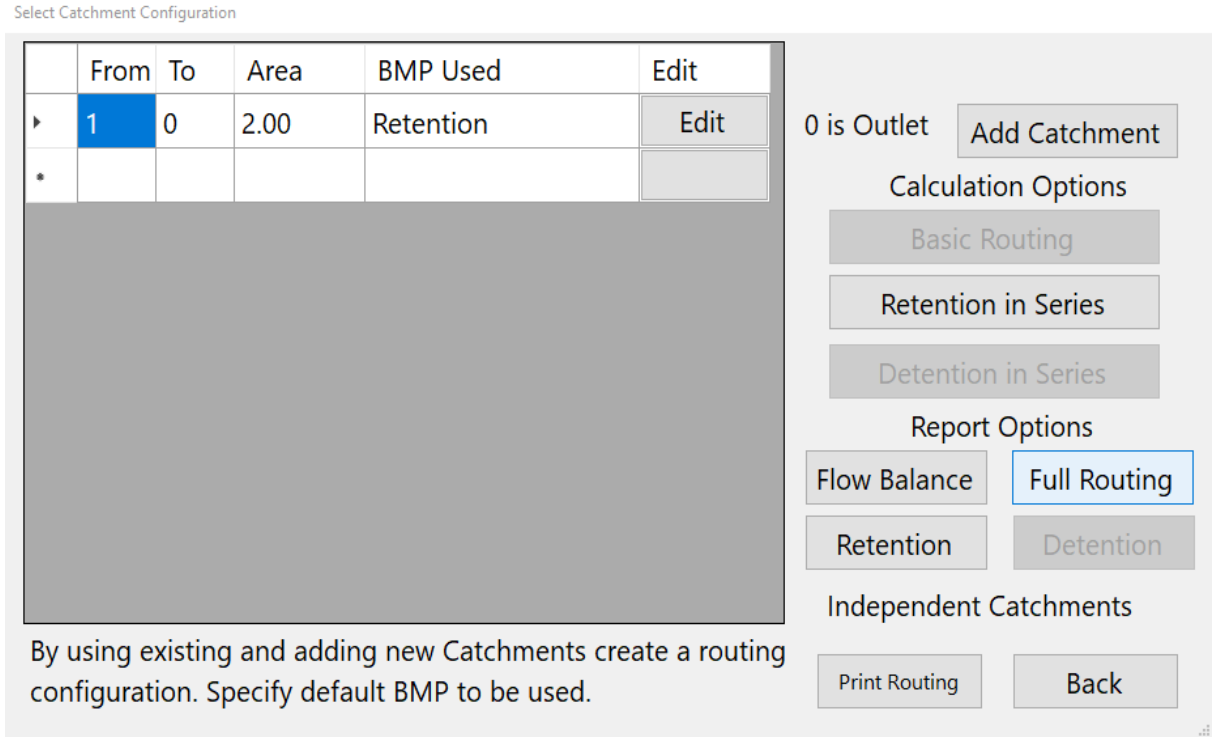


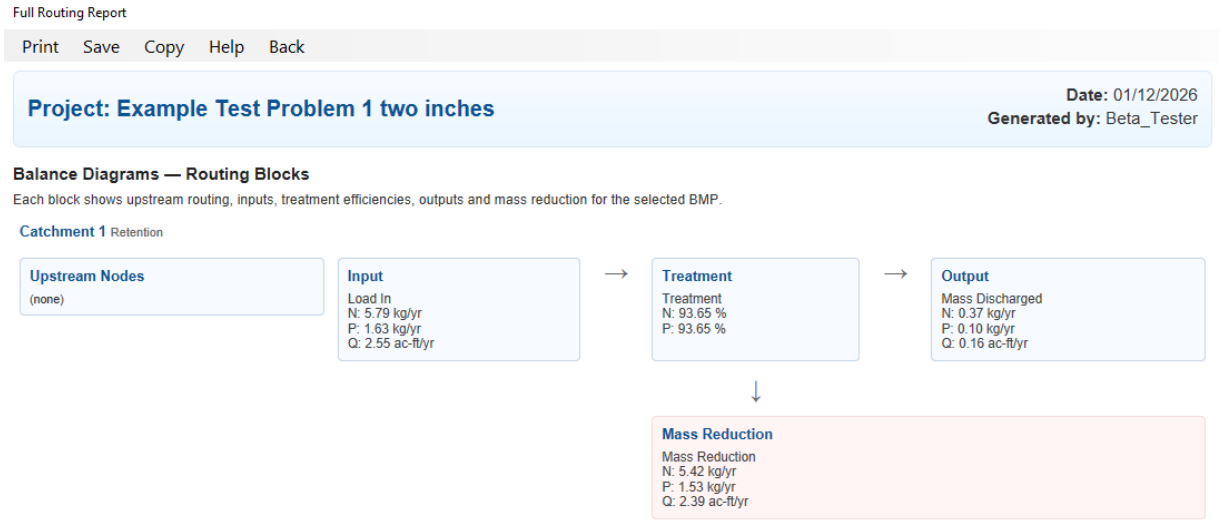






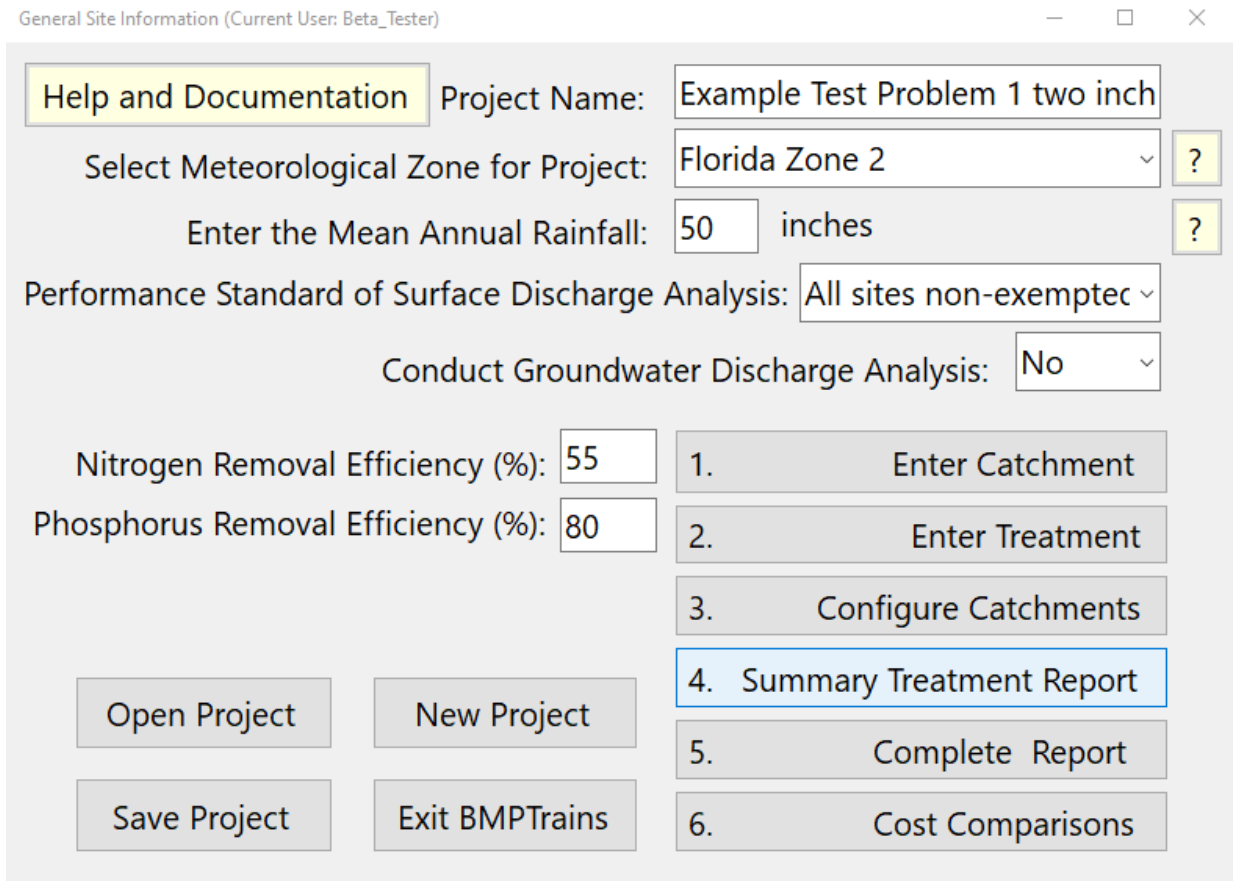
9. Full Routing Report
retention basin with design depth of 2 inches





10. Summary Report

retention basin with design depth of 2 inches



Project: Example Test Problem 1 two inches

Summary Treatment Report

Catchments and Associated BMP Types

ID	Catchment Name
1	Example problem 1

Volume of Runoff Summary

Scenario	Effect
Pre-Condition	
System Post-Condition (with BMPs)	
Post-Condition (no BMP)	

Effective Area is the watershed area used to normalize runoff (acres). Runoff volumes are shown in acre-feet per yea

Summary Loading Analysis

% Target Removals

Is system total nitrogen target removal met? **Yes** (Required: 55% Provided: 93.65%)
Is system total phosphorus target removal met? **Yes** (Required: 80% Provided: 93.65%)

Pre vs. Post Removals

Is % less than predevelopment system loading for TN met? **Yes** (Required: 58.4% Provided: 93.65%)
Is % less than predevelopment system loading for TP met? **Yes** (Required: 87.44% Provided: 93.65%)

Nitrogen Loading

Surface Water Discharge

Total N pre load	2.41 kg/yr	
Total N post load	5.79 kg/yr	
Percent N load reduction	94 %	
Provided N discharge load	.37 kg/yr	.81 lb/yr
Provided N load removed	5.42 kg/yr	11.95 lb/yr

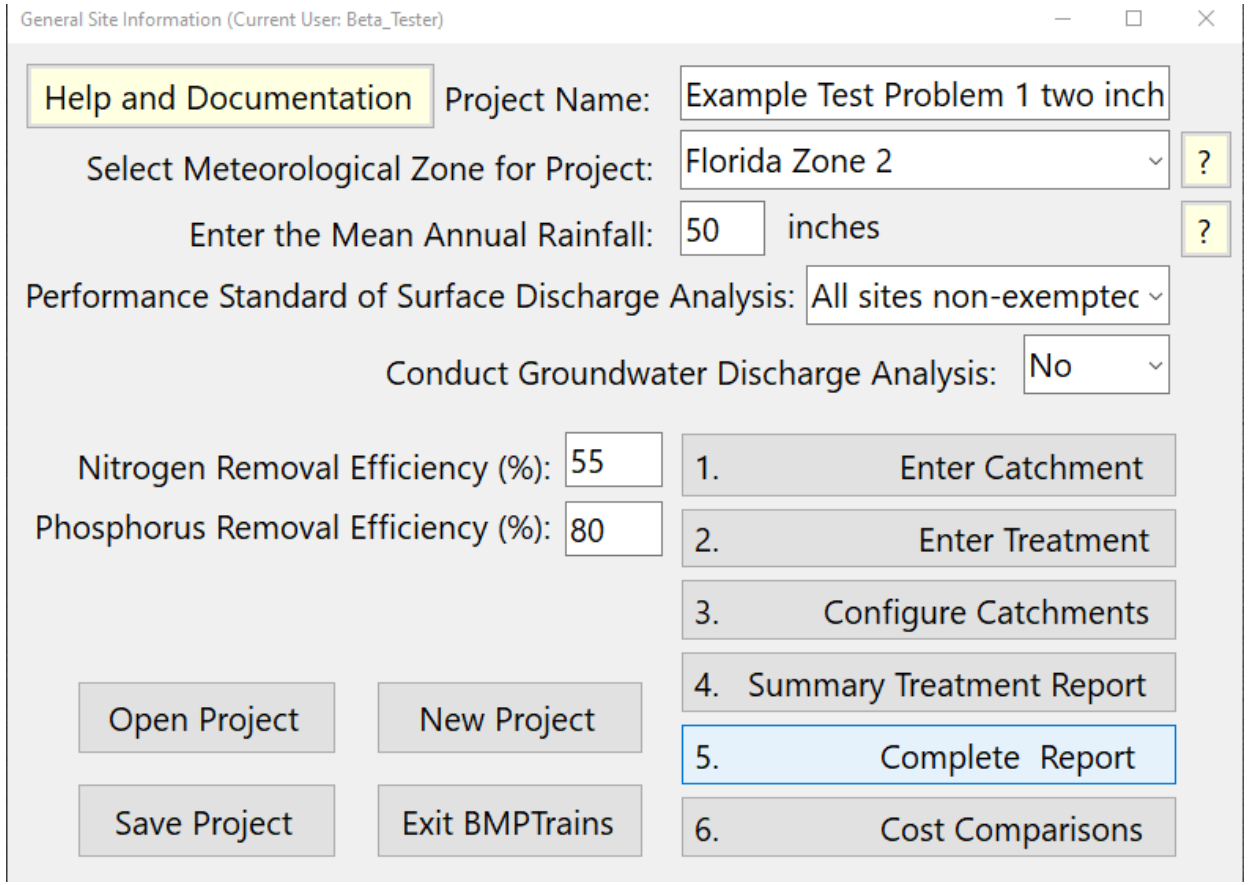
Phosphorus Loading

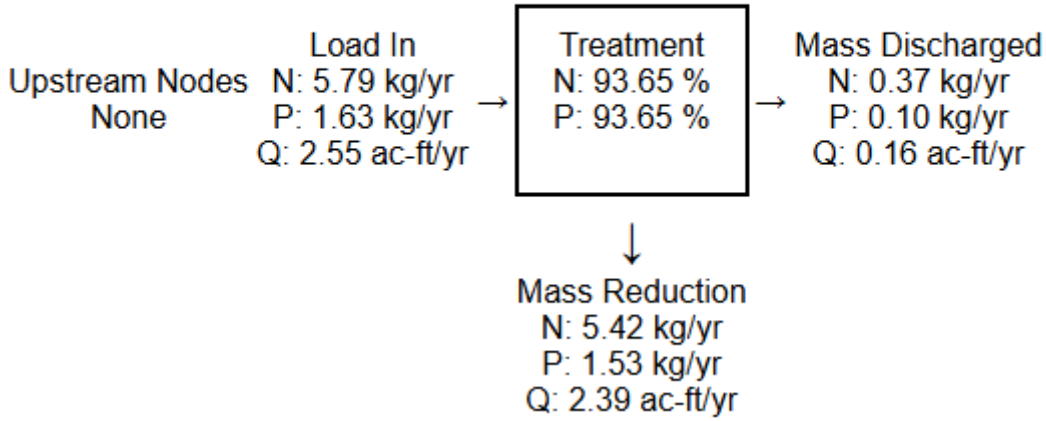
Surface Water Discharge

Total P pre load	.205 kg/yr	
Total P post load	1.635 kg/yr	
Percent P load reduction	94 %	
Provided P discharge load	.104 kg/yr	.23 lb/yr
Provided P load removed	1.531 kg/yr	3.376 lb/yr

11. Complete Report

retention basin with design depth of 2 inches





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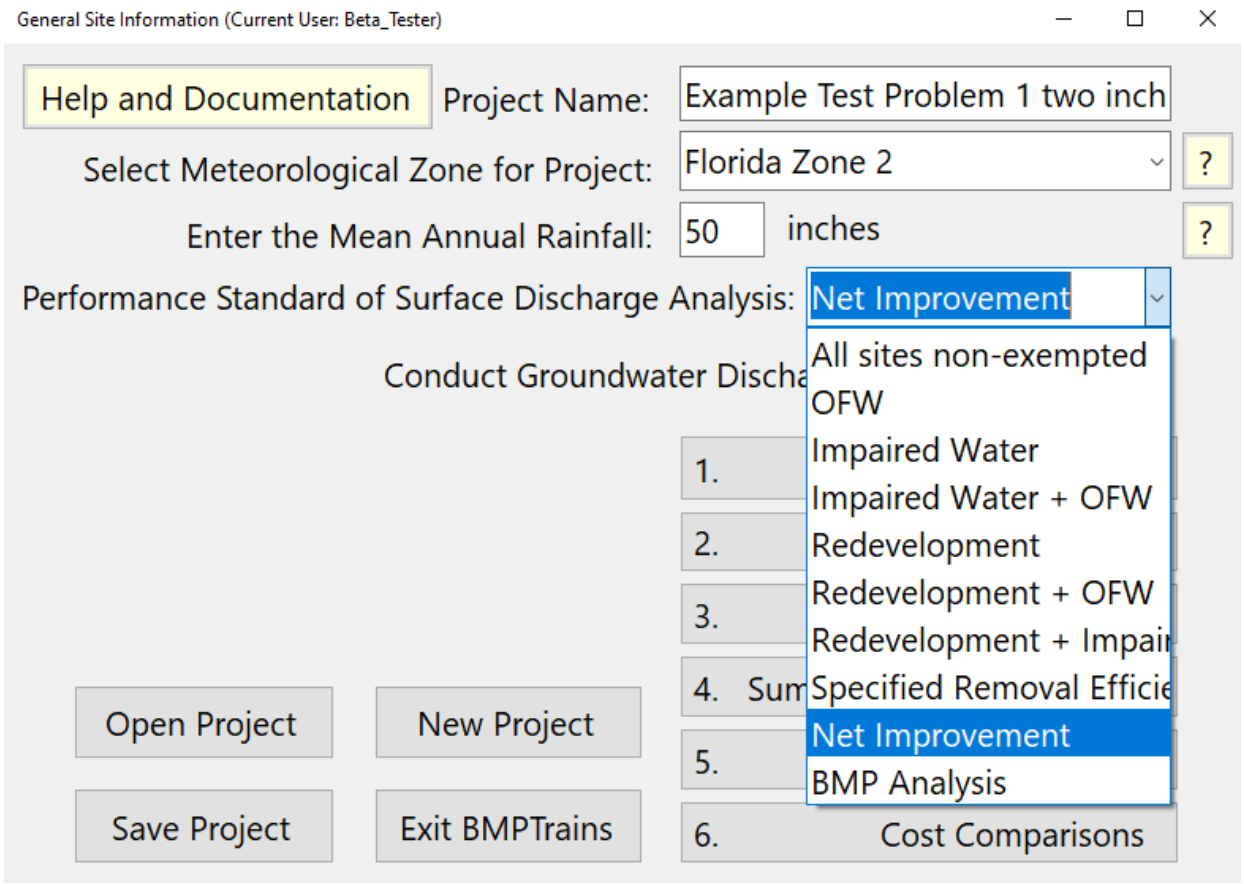
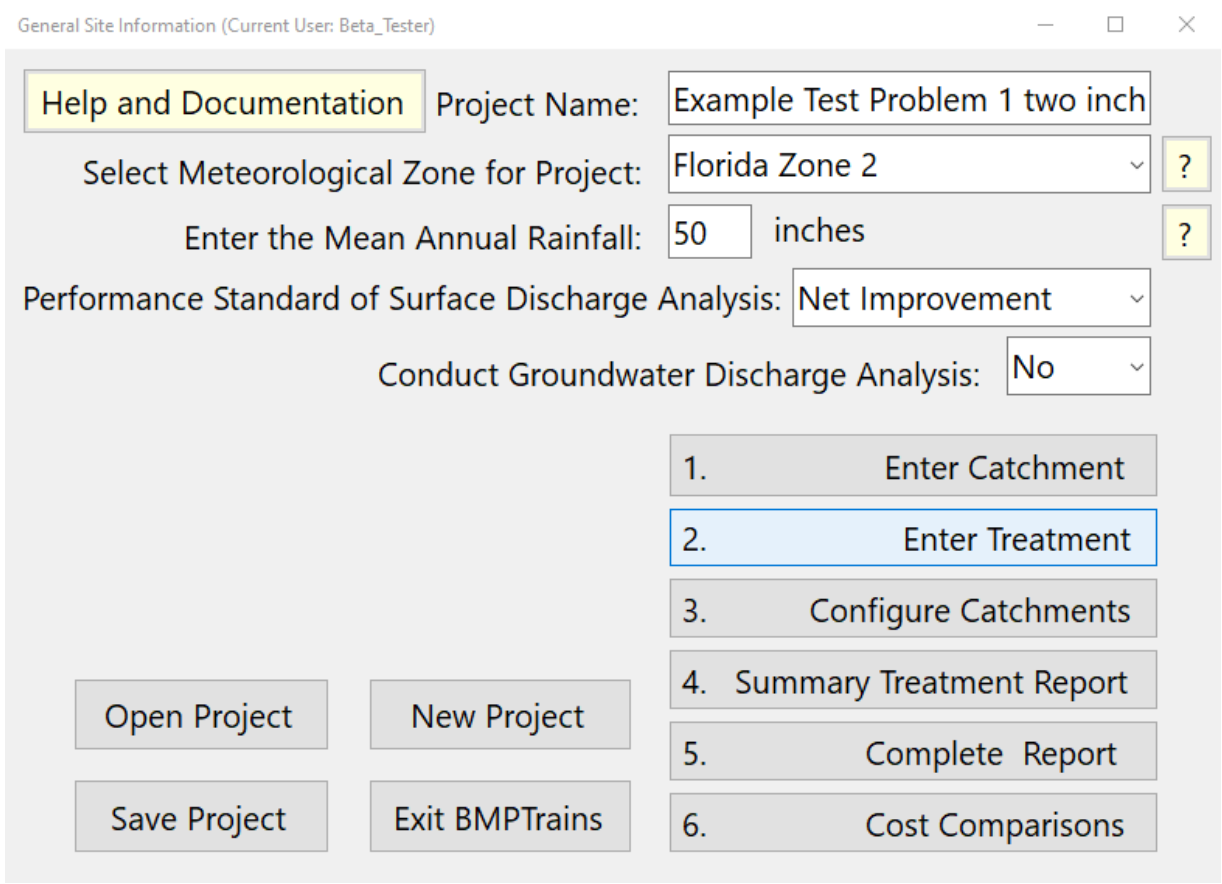
12. Analysis Report of the Net improvement

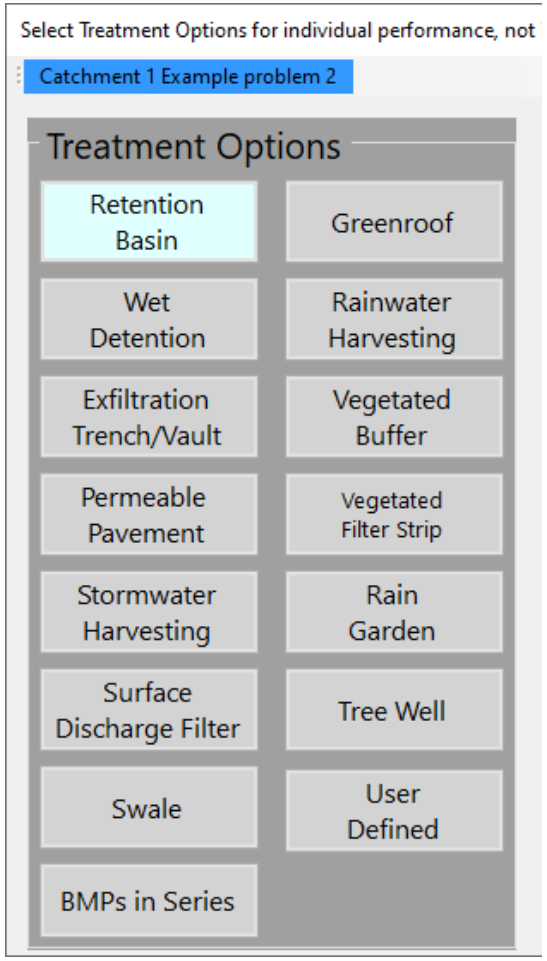
retention basin with design depth of 2 inches

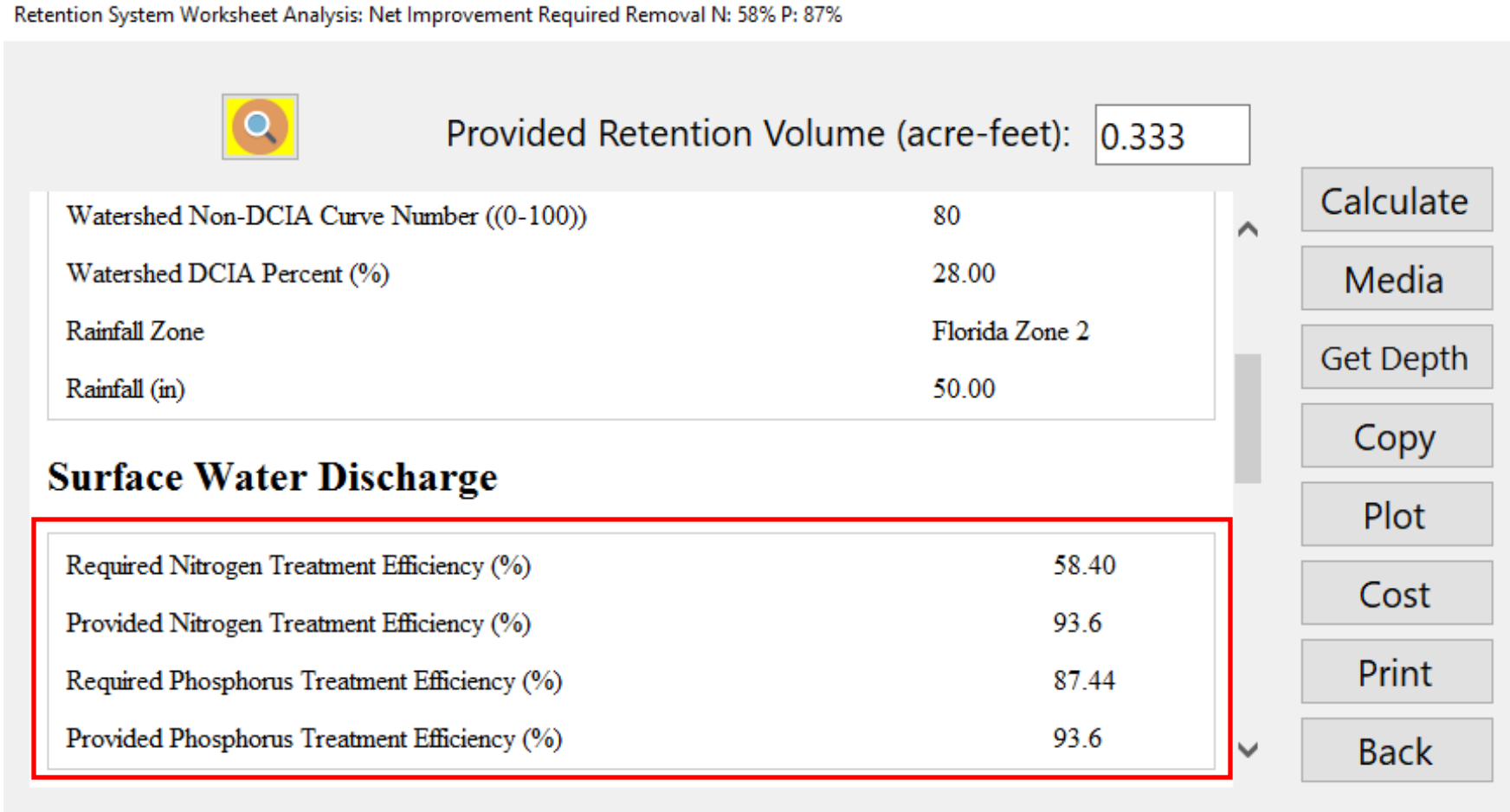




12. Analysis Report of the Net improvement

retention basin with design depth of 2 inches





Example questions for example test Problem 1

1.	What meteorological zone? (1, 2, or 3)	2
2.	For the target removal of all sites non-exempt, what is the target nitrogen removal? (55, 58, or 60)	55
3.	For net improvement, what is the target nitrogen removal? (55, 58, or 60)	58
4.	Is the multi-family EMC value of TN greater or less than the pre condition one? (less, more)	less
5.	What value of provided retention volume (acre-feet) should be entered? (0.167, 1 or 7260)	0.167
6.	For the 0.167 ac-ft design, what is the mass reduction of TN (kg/yr)? (4.79, 5.80 or 9.97)	4.79
7.	For the 0.167 ac-ft design, what is the mass reduction of TP (kg/yr)? (0.66, 0.69 or 1.35)	1.35
8.	For the 0.167 ac-ft design, What is the discharge to surface water (ac-ft/yr)? (0.44, 3.09 or 3.83)	0.44
9.	For the 0.333 ac-ft design, what is the TN treatment efficiency (%)? (22, 93.65, 99)	93.65
10.	If allowed by local regs, is permeable pavement an option to increase removal? (Yes, No)	Yes

Question 1 — 2.5 pts

Question 1 for Problem 1

What meteorological zone?

- ○ 1
- ○ 2
- ○ 3

Question 2 — 2.5 pts

Question 2 for Problem 1

For the target removal of all sites non-exempt, what is the target nitrogen removal?

- ○ 55
- ○ 58
- ○ 60

Wrong answer

Question 1

0 / 2.5 pts

Question 1 for Problem 1

What meteorological zone?

- ✗ 1
- ➔ 2
- 3

Correct answer

Question 2

2.5 / 2.5 pts

Question 2 for Problem 1

For the target removal of all sites non-exempt, what is the target nitrogen removal?

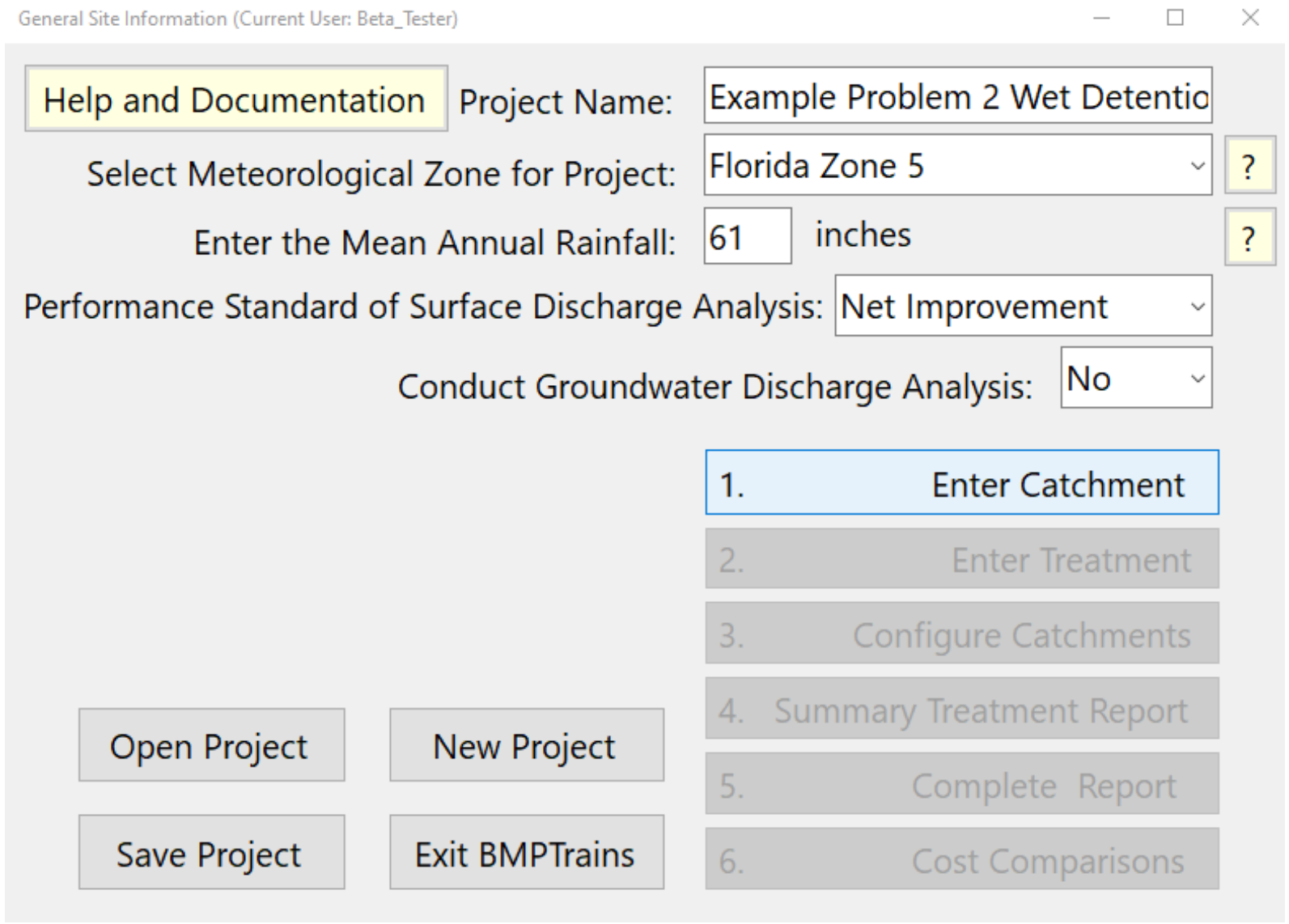
- ✓ 55
- 58
- 60

Example Test Problem 2

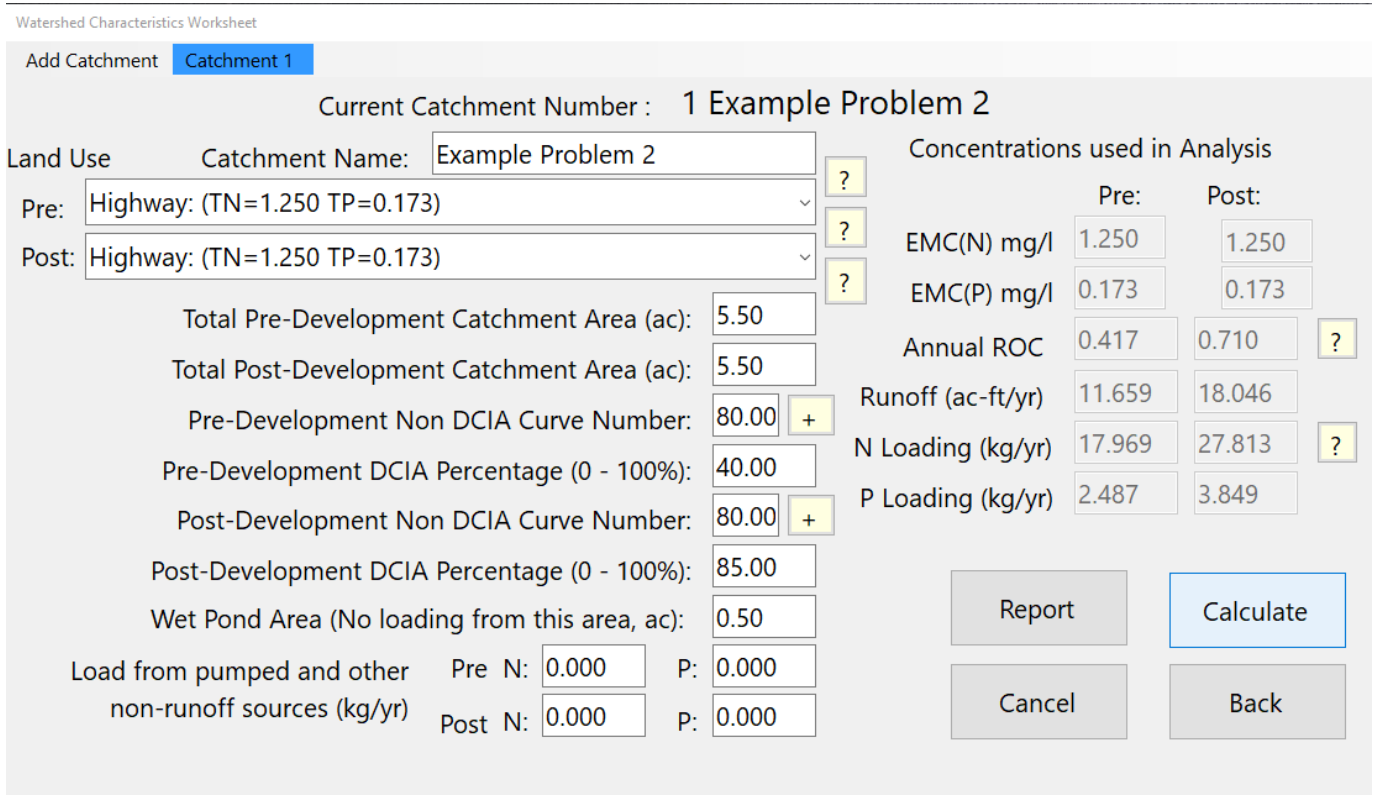
Wet detention: net improvement

A half-acre wet detention pond is serving a 5.5-acre highway expansion from one lane in each direction to two lanes in each direction. The existing portion of highway is not served by any treatment system. The existing and proposed portion of the highway will be treated in the post-development condition. The site is located in West Palm Beach with 61 inches of annual rainfall, FL on Hydrologic Soil Group D. The existing land use condition is a highway with a non-DCIA Curve Number of 80 and 40% DCIA. The post-development land use condition is a highway with a non-DCIA Curve Number of 80 and 85% DCIA (pavement of 4.675 acres and a wet pond area of 0.50 acres which is not part of the DCIA). The analysis will be a net improvement analysis using a wet detention pond which will utilize a littoral zone in the design. The permanent pool is 2.472 acre-feet. Note for net improvement alone, there is no target % removal. How much Nitrogen and Phosphorus removal can be expected from the wet detention ?

1. General Site Information Worksheet

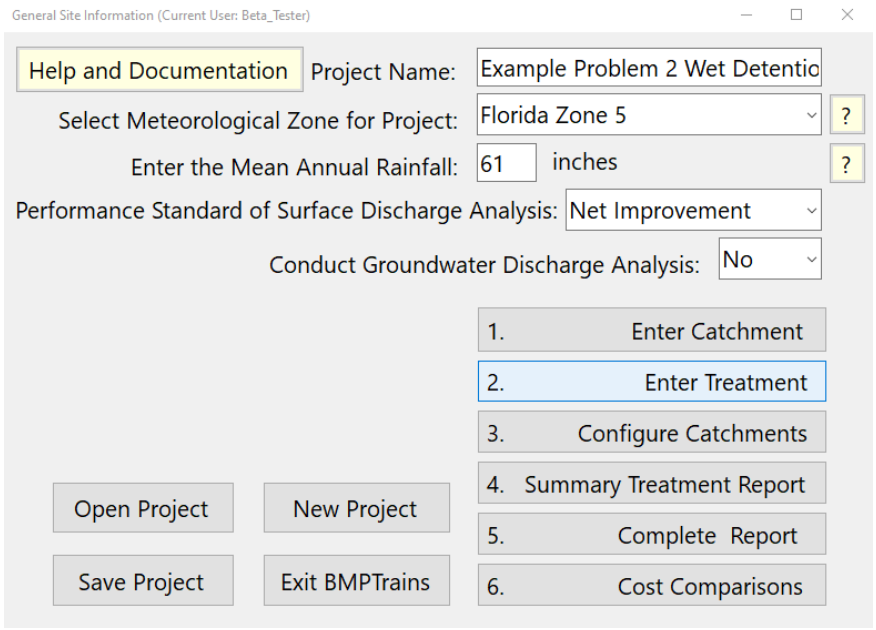


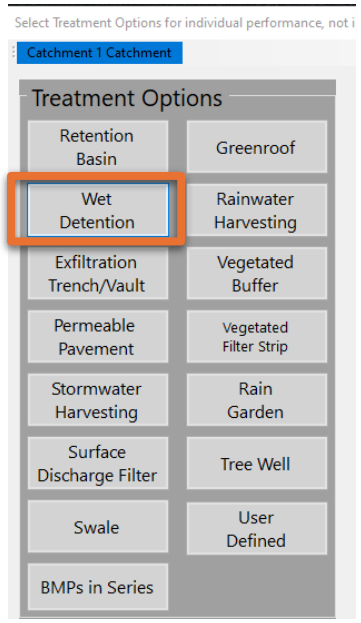
2. Watershed Characteristics Worksheet

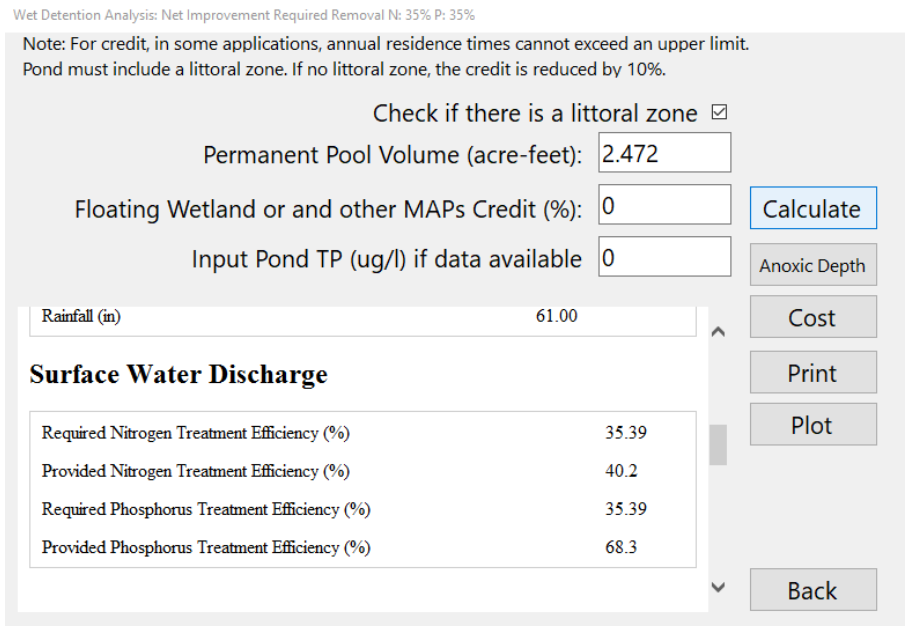


3. Treatment Options

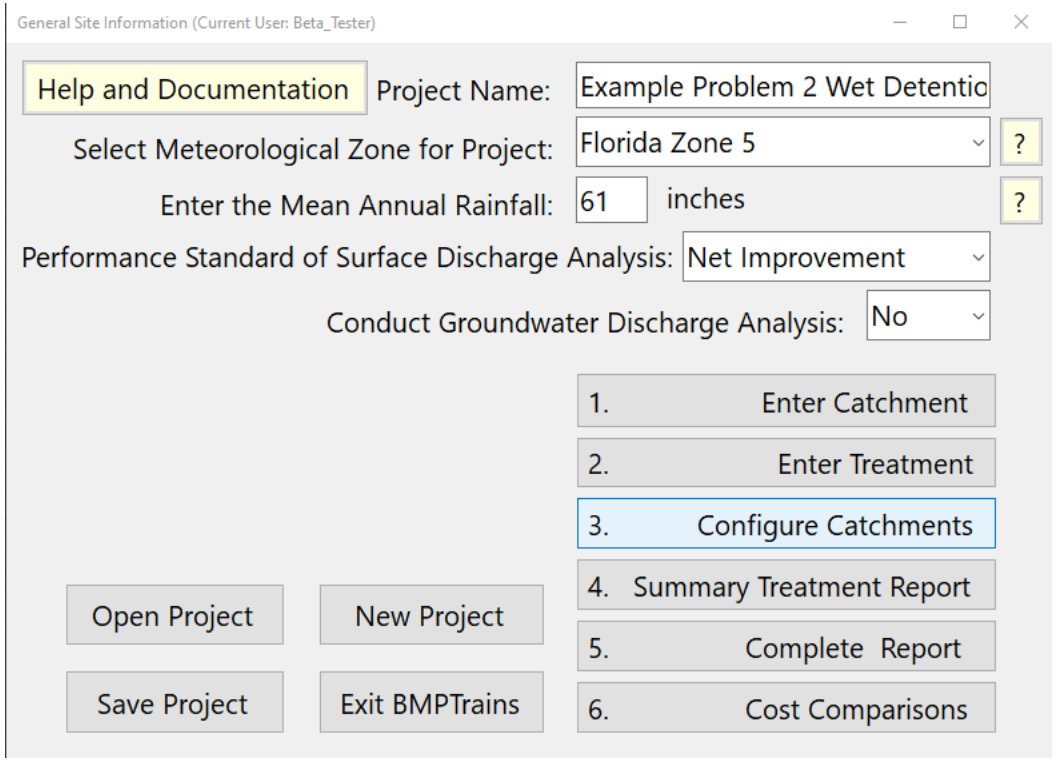
Wet Detention

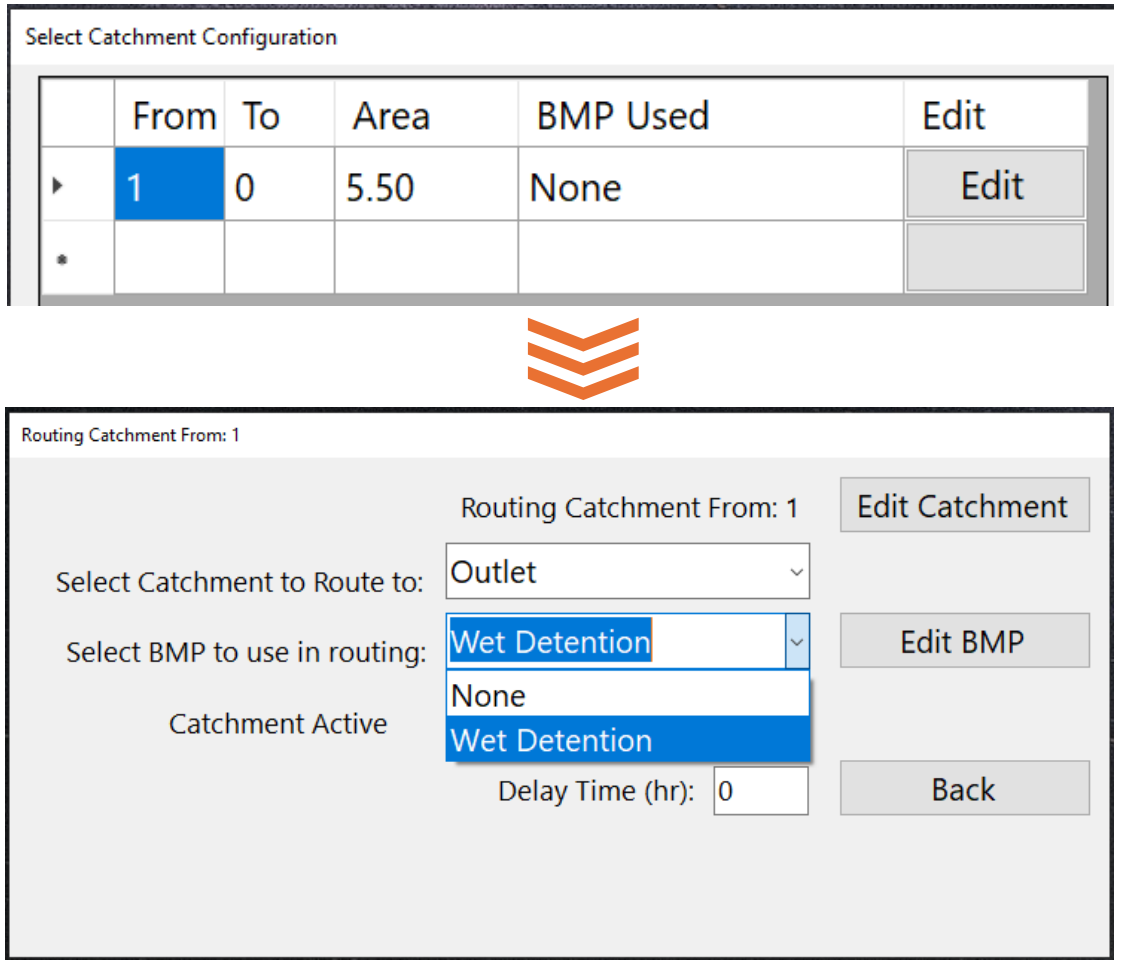






4. Configure Catchments





Select Catchment Configuration

	From	To	Area	BMP Used	Edit
▸	1	0	5.50	Wet Detention	Edit
*					

0 is Outlet

Add Catchment

Calculation Options

Basic Routing

Retention in Series

Detention in Series

Report Options

Flow Balance

Full Routing

Retention

Detention

Independent Catchments

Print Routing

Back

By using existing and adding new Catchments create a routing configuration. Specify default BMP to be used.

Full Routing Report

Print Save Copy Help Back

Project: Example Problem 2 Wet Detention

Date: 01/12/2026
Generated by: Beta_Tester

Balance Diagrams — Routing Blocks

Each block shows upstream routing, inputs, treatment efficiencies, outputs and mass reduction for the selected BMP.

Catchment 1 Wet Detention

Upstream Nodes
(none)

Input
Load In
N: 27.81 kg/yr
P: 3.85 kg/yr
Q: 18.05 ac-ft/yr

→

Treatment
Treatment
N: 40.23 %
P: 68.32 %

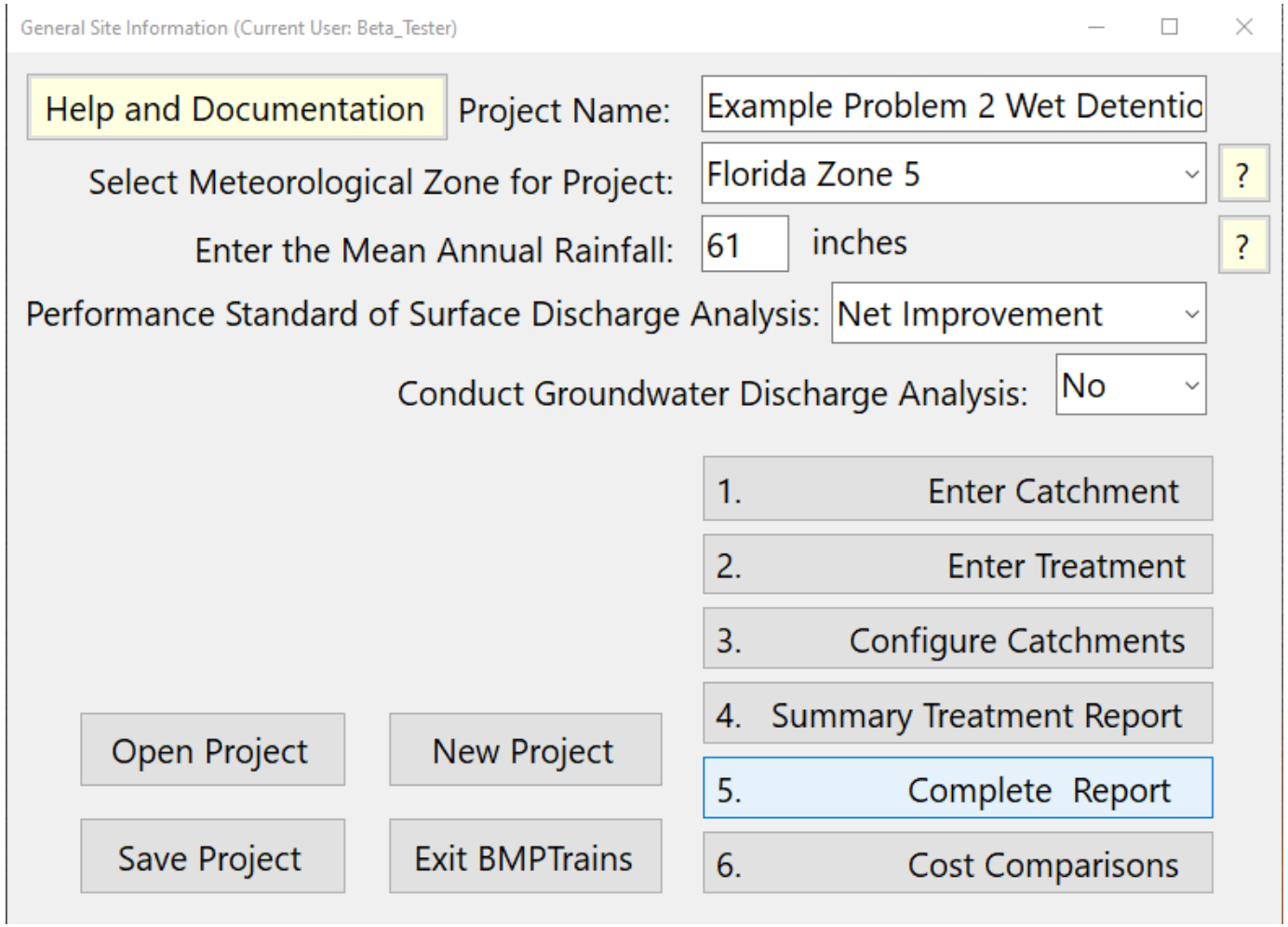
→

Output
Mass Discharged
N: 16.62 kg/yr
P: 1.22 kg/yr
Q: 18.05 ac-ft/yr

↓

Mass Reduction
Mass Reduction
N: 11.19 kg/yr
P: 2.63 kg/yr
Q: 0.00 ac-ft/yr

5. Summary Treatment Reports



No Target % Removals for Analysis Type: Net Improvement

Pre vs. Post Removals

Is % less than predevelopment system loading for TN met? **Yes** (Required: 35.39% Provided: 40.23%)
Is % less than predevelopment system loading for TP met? **Yes** (Required: 35.39% Provided: 68.32%)

Nitrogen Loading

Surface Water Discharge

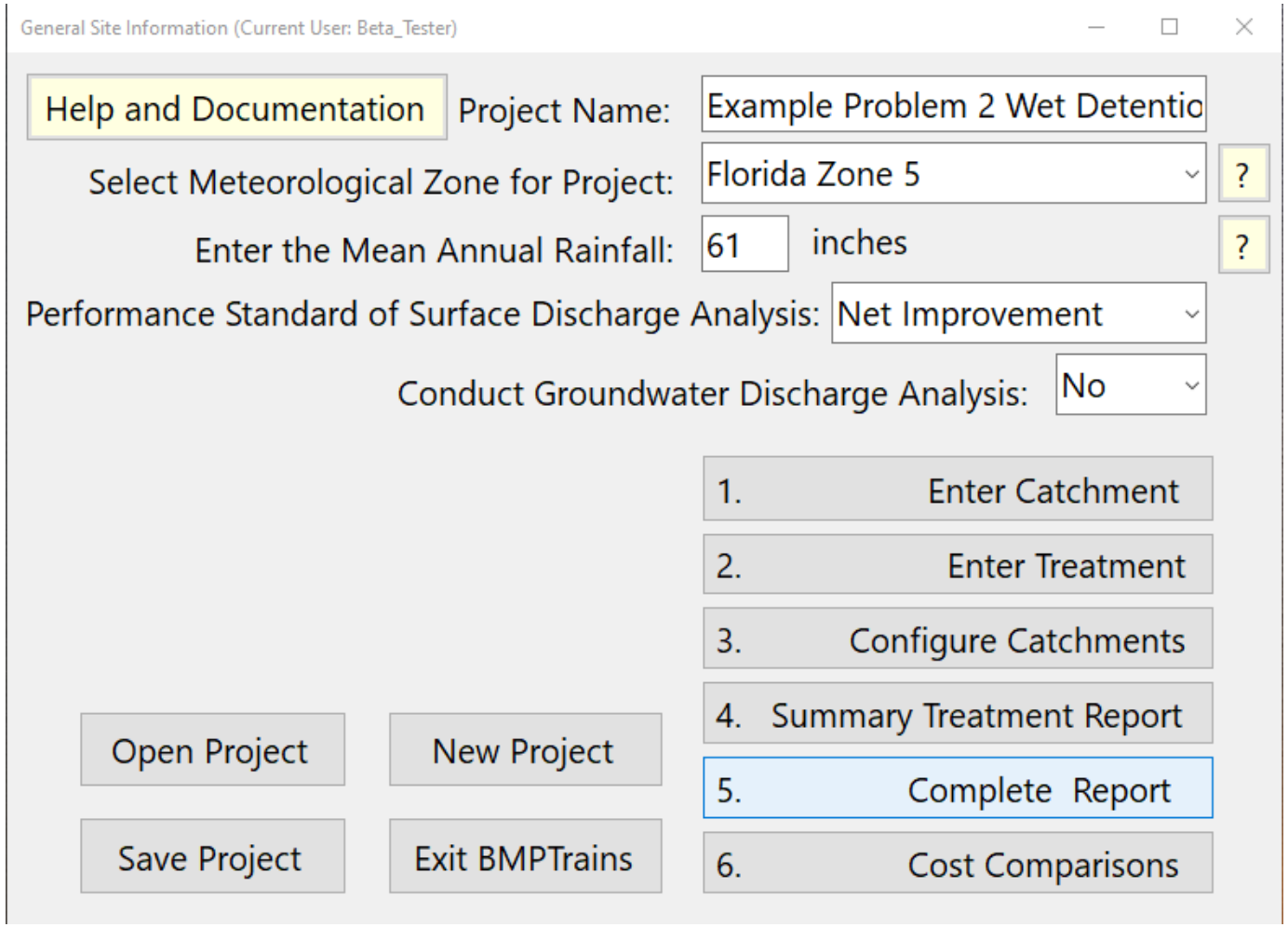
Total N pre load	17.97 kg/yr	
Total N post load	27.81 kg/yr	
Target N load reduction	%	
Target N discharge load	17.97 kg/yr	
Percent N load reduction	40.23 %	
Provided N discharge load	16.62 kg/yr	36.66 lb/yr
Provided N load removed	11.19 kg/yr	24.67 lb/yr

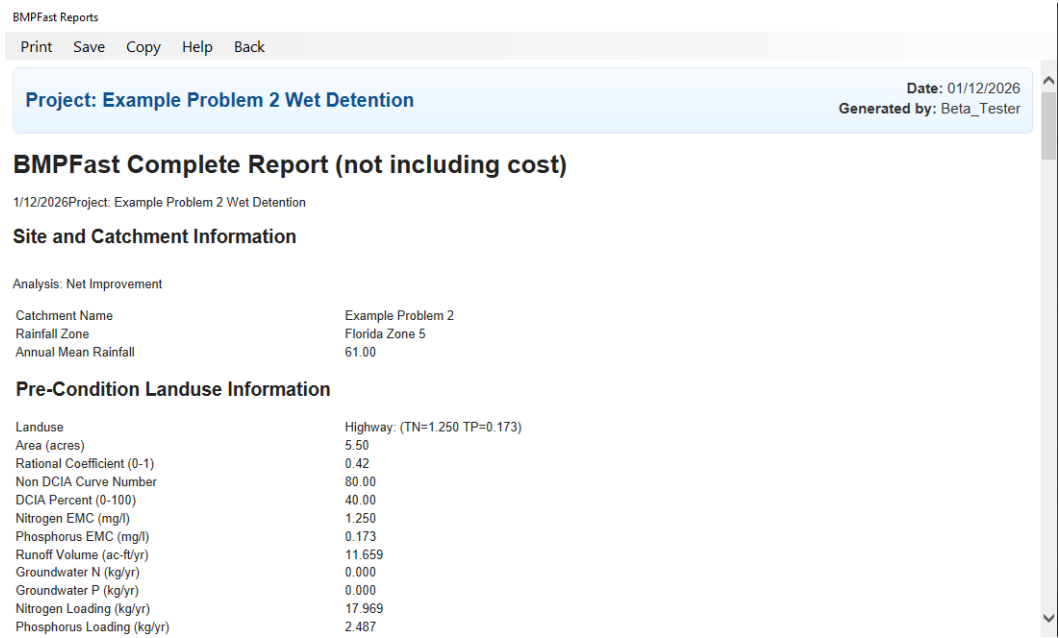
Phosphorus Loading

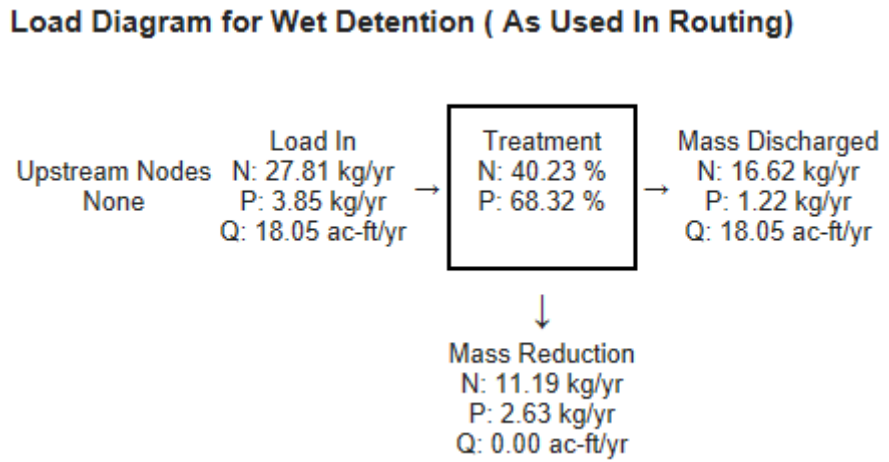
Surface Water Discharge

Total P pre load	2.487 kg/yr	
Total P post load	3.849 kg/yr	
Target P load reduction	%	
Target P discharge load	2.487 kg/yr	
Percent P load reduction	68 %	
Provided P discharge load	1.22 kg/yr	2.69 lb/yr
Provided P load removed	2.63 kg/yr	5.799 lb/yr

6. Complete Report







Example questions for example test Problem 2

1.	What meteorological zone? (1, 3, or 5)	5
2.	Which analysis type should be selected in the BMPFast for this scenario? (BMP Analysis, Impair Water or Net Improvement)	Net Improvement
3.	If no littoral zone, how many credits will be reduced in (%)? (5, 10 or 15)	10
4.	What value of wet pond area without loading should be entered (acre)? (0, 0.5 or 1)	0.5
5.	Is the TN target treatment efficiency (%) less than required for OFW (yes, no)	yes
6.	What is the mass reduction of TN (kg/yr)? (11.19, 16.62 or 27.81)	11.19
7.	What is the mass reduction of TP (kg/yr)? (1.22, 2.63 or 3.85)	2.63
8.	What is the discharge to surface water after wet detention(ac-ft/yr)? (0, 11.19 or 18.05)	18.05
9.	What is the TN treatment efficiency (%) of the wet detention? (35, 40.2 or 45.5)	40.2
10.	What is the TP treatment efficiency (%) of the wet detention? (35, 68.3 or 82)	68.3

The testing, how many different questions, and retaking

- There are 4 BMPFast problems per test.
- Each has 10 questions for a total of 40.
- The test must be completed in 24 hours.
- The test can be repeated once before having to repeat and pay for another training class.

Grade needed to earn a certificate of competency

- A grade of 75% (30 out of 40) correct is needed to earn the certificate.
- After passing the competency test, a validation code will be provided to access the professional BMPFast software

BMPFast

Example Competency Test Problems

By: Dingbao Wang

January 2026