BMP Accounting and Tracking Tool (BATT)

User's Guide

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1. Introduction

The BATT (BMP Accounting and Tracking Tool), developed by Tetra Tech for USEPA Region 1 is a spreadsheet-based tool that provides accounting, tracking and reporting for nutrient load reduction. The BATT uses Microsoft-Excel platforms and is intended to standardize accounting and tracking of a variety of BMP types and their associated nutrient load reductions.

The tool provides three primary functions:

- Accounting and Tracking of BMP Implementation- to document nutrient controls implemented and their associated estimated nutrient load reductions for tracking progress of watershed-based implementation programs, and for demonstrating compliance with MS4 permit and/or TMDL nutrient reduction requirements; this portion of the tool includes stormwater and NPS control accounting;
- Accounting and Tracking Changes in Land Use - to document the changes in development and impervious cover within a permitted area or watershed in order to more accurately track net changes in nutrient loading within an area, recognizing that development or redevelopment may significantly change nutrient loading from a given land area, regardless of nutrient controls being implemented; and
- Reporting - to generate reports of accomplished implementation activities and associated nutrient load reductions to document progress of watershed implementation programs and to assist users in satisfying permit reporting requirements and demonstrating compliance with associated MS4 permit and/or TMDL nutrient reduction requirements.

2. Getting Started

2.1 Software Requirement

The minimum software requirements for BATT are as follows:

- Microsoft Excel 2013
- Microsoft Word 2013
- Security settings should be changed to 'enable macros'
- Activate 'MS Word 15.0 Object Library'

Enable Macros

Microsoft Excel 2013
Click the File Button and go to *Options.* On the left-hand menu select *Trust Center* and click the button for *Trust Center Settings*. On the left-hand menu select *Macro Settings*. Select the *Enable All Macros* option.

Activate MS Word 15.0 Object Library

Microsoft Excel 2013
Activate the Visual Basic Editor window (*Alt F11*). Select the current project in the Project Explorer window, and choose *Tools | References*. In the References dialog box, choose the *MS Word 15.0 Object Library* in the Available References list box. Scroll down in the Available References list box to locate this object library and click the check box next to this object library. Click *OK* to close the Reference dialog box.

2.2 Introduction to BMP Accounting and Tracking Tool

The BATT is launched from the 'Launch BATT' button on the *Introduction* Screen that appears when the model spreadsheet is first opened. Upon initializing BATT, all opened Microsoft excel files will become locked, however, Microsoft Word will remain unlocked. In order to access data while BATT is open, move data to a word document. Figure 1 shows the *Home* form that appears once BATT has launched. The *Home* form offers the option to either add/edit project, import/export project, or view/export project summary report. The add/edit project function provides the option to create a new project or edit a previously saved project, see section 3. The import/export project function provides the option to browse for a comma separated values (CSV) file and then either import or export a project at the State-town level, see section 4. The view/export project function lists the unique identification of each BMP project and summarizes phosphorus, nitrogen, and sediment total load reduction, see section 5.

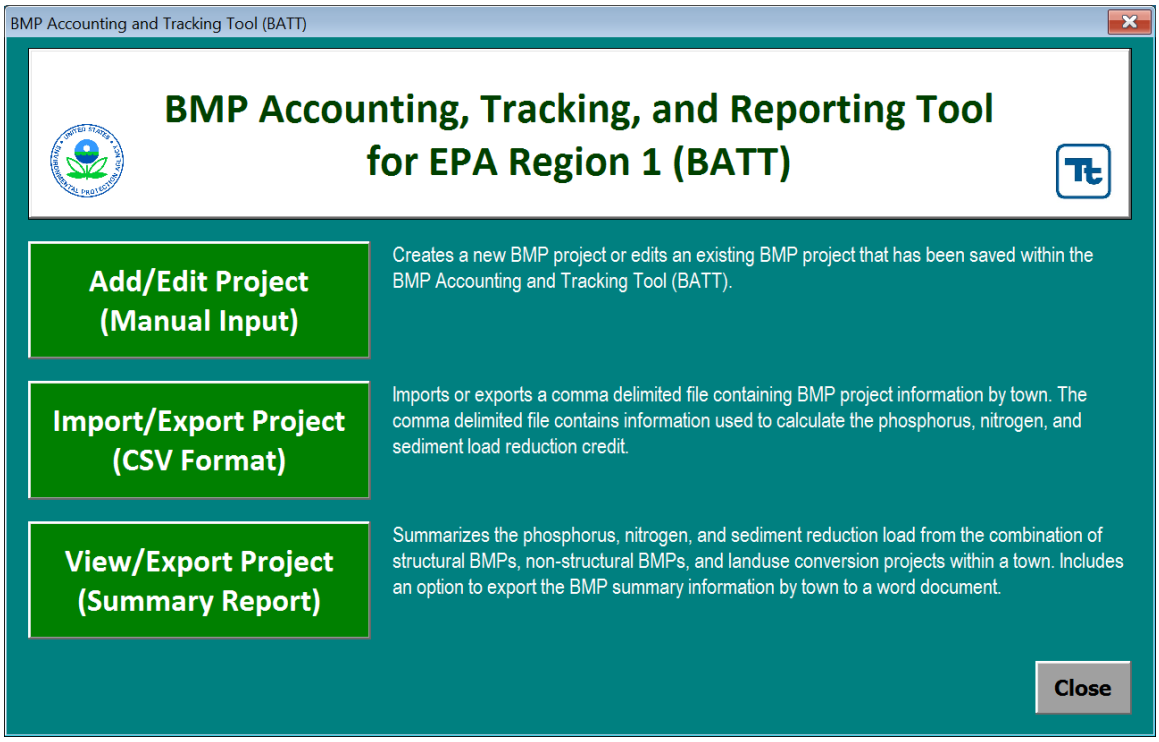


Figure 1. BATT Home form

3. Add/Edit Project (Manual Input)

The add/edit project function provides the option to create a new project or edit a previously saved project. A project is defined as an individual structural BMP, non-structural BMP, or land use conversion project, see Figure 2.

This section outlines the process of editing or removing existing projects, and adding a new project. The user is require to select a state and town before proceeding with to editing or deleting an existing project or creating a new project. The *Town* option box is populated based on the selected State. The *Add Town* button allows the user to add a town if their town is not provided in the Select a *Town* option box. The *Edit* option launches a project form containing the BMP project and land use information. The *Delete* option removes the selected project from the project database. *The Update Existing Project List* updated the structural, non-structural, and land use conversion project list after a project is edited, deleted or added. The structural, non-structural, and land use conversion new project option launches a project form depending on the project type.

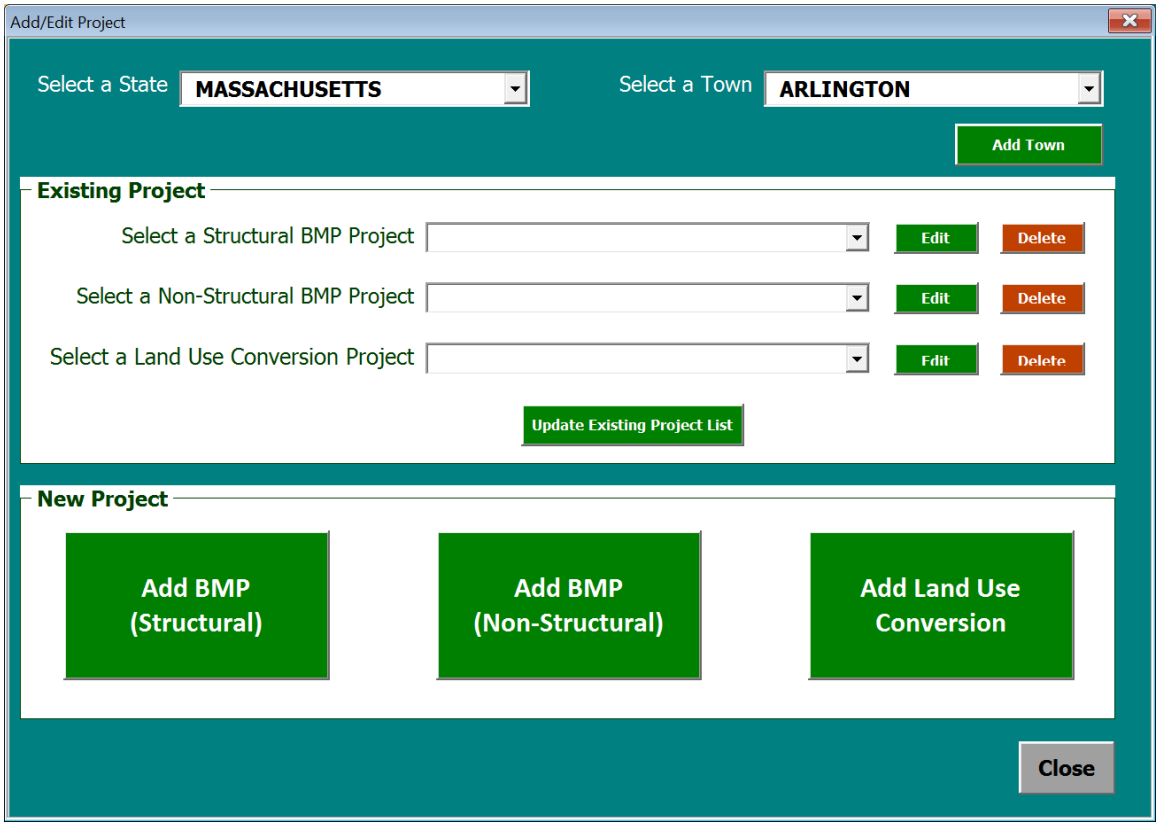


Figure 2. Add/Edit Project form

3.1 New Project

The user must select *Add BMP (Structural)*, *Add BMP (Non-Structural)*, or *Add Land Use Conversion* to start a structural BMP, non-structural BMP, or land use conversion project. After a new project is launched, the user is prompted to provide land use information. The selection of land use type is limited to the number of land use type available in the Opti-Tool and in the new MS4 permit, see Table 1. The letter at the end of the land use type denotes if the land use is impervious (I) or pervious (P). The selection of hydrologic soil group (HSG) is shown in Table 2.

Table 1. Land Use types in BATT

Land Use List
AGRICULTURE (I)
AGRICULTURE (P)
COMMERCIAL (I)
COMMERCIAL (P)
FOREST (I)
FOREST (P)
HIGH DENSITY RESIDENTIAL (I)
HIGH DENSITY RESIDENTIAL (P)
HIGHWAY (I)
HIGHWAY (P)
INDUSTRIAL (I)
INDUSTRIAL (P)
LOW DENSITY RESIDENTIAL (I)
LOW DENSITY RESIDENTIAL (P)
MEDIUM DENSITY RESIDENTIAL (I)
MEDIUM DENSITY RESIDENTIAL (P)
OPEN LAND (I)
OPEN LAND (P)

Note: (P) = pervious; (I) = impervious

Table 2. Hydrologic Soil Group (HSG) options in BATT

HSG List
A
B
C
C/D
D

3.1.1 Add BMP (Structural)

The *Add Structural BMP* form appears after the *Add BMP (Structural)* button is selected, see Figure 3. The *Land Use Information* tab is activated first. Within the *Land Use Information* tab, the user must select if the project is a new development or a retrofit BMP and provide the subcatchment and receiving water information.

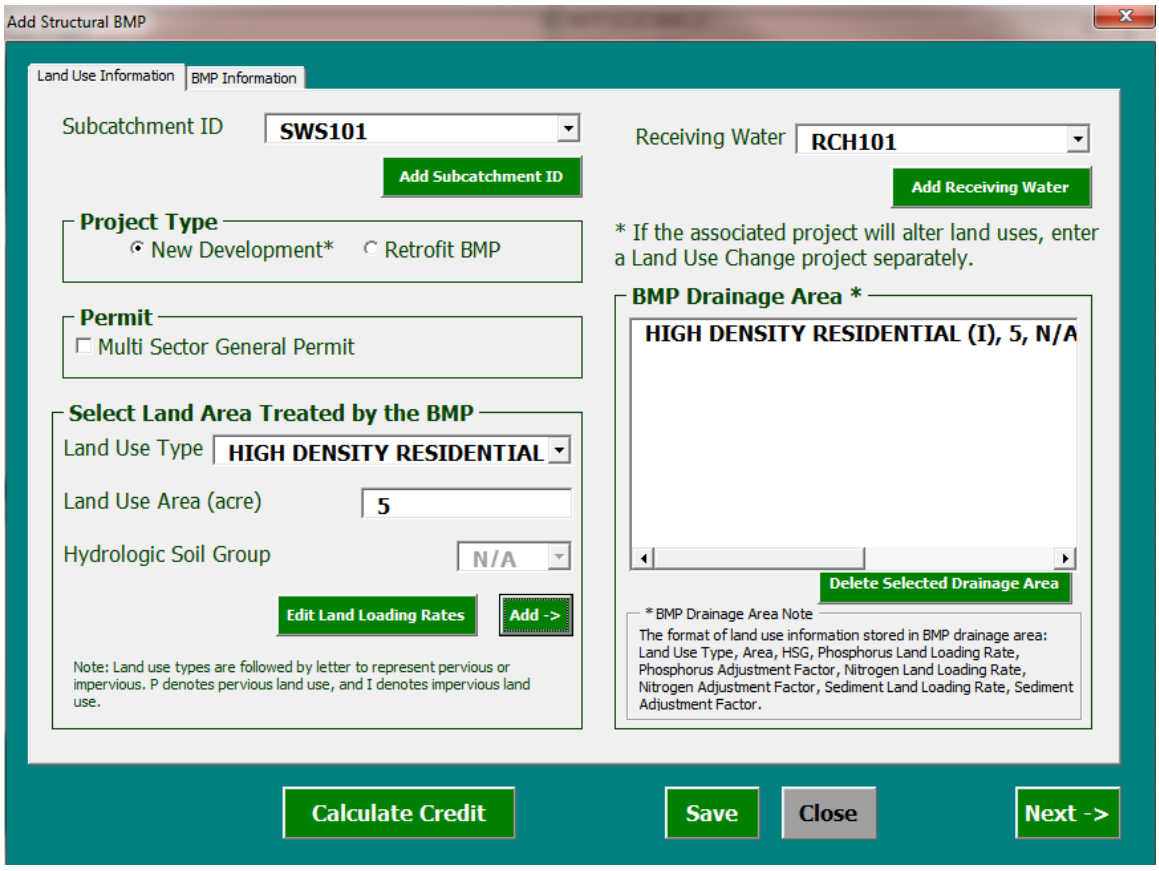


Figure 3. Add Structural BMP – Land Use Information

The *Subcatchment ID* lists subcatchment options. The *Add Subcatchment ID* button allows the user to add a subcatchment to the *Subcatchment* list, see Figure 4.

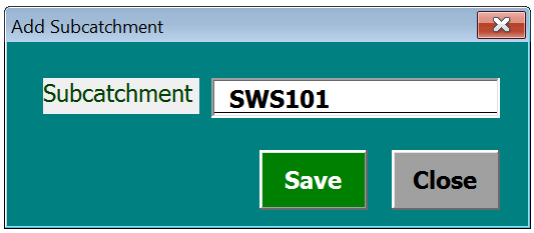


Figure 4. Add Subcatchment form

The *Receiving Water* lists receiving water options. The *Add Receiving Water* button allows the user to add a receiving water to the *Receiving Water* list, see Figure 5. If a subcatchment ID or receiving water is saved via the *Add Subcatchment* form or *Add Receiving Water* form, then the added option will become available in either the *Subcatchment ID or Receiving Water* option boxes.

Figure 5. Add Receiving Water form

In order to add land use information, the user must select the land use type and the hydrologic soil group, and provide the land use area. If the land use type is impervious, then the *Hydrologic Soil Group* options will become disabled and a N/A value will appear.

After the land use type, land use area, and the hydrologic soul group are provided the user has two options, edit land loading rates or add the land use information into the *BMP Drainage Area* box. The *Edit Land Loading Rates* form provides the land loading rates, and the user has the option to change the adjustment factor and save the changes, see Figure 6. The *Add* button assumes an adjustment factor of 1, unless the user edited the adjustment factor in *the Edit land Loading Rates* form, and then moves the land use information into the *BMP Drainage Area* box. The *BMP Drainage Area Note* explains the format of the land use information in the *BMP Drainage Area* box.

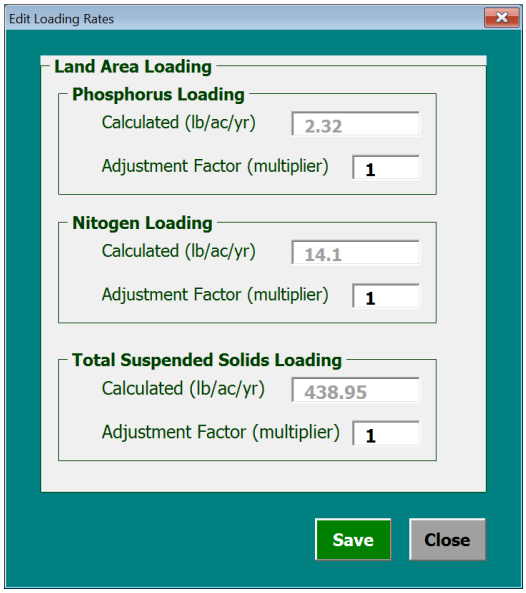


Figure 6. Edit Loading Rates (example – High Density Residential (I) land use type)

After the land use information has been entered, the user can move onto the next step to input BMP information. The *Next* button prompts the user to the *BMP Information* tab, see Figure 7.

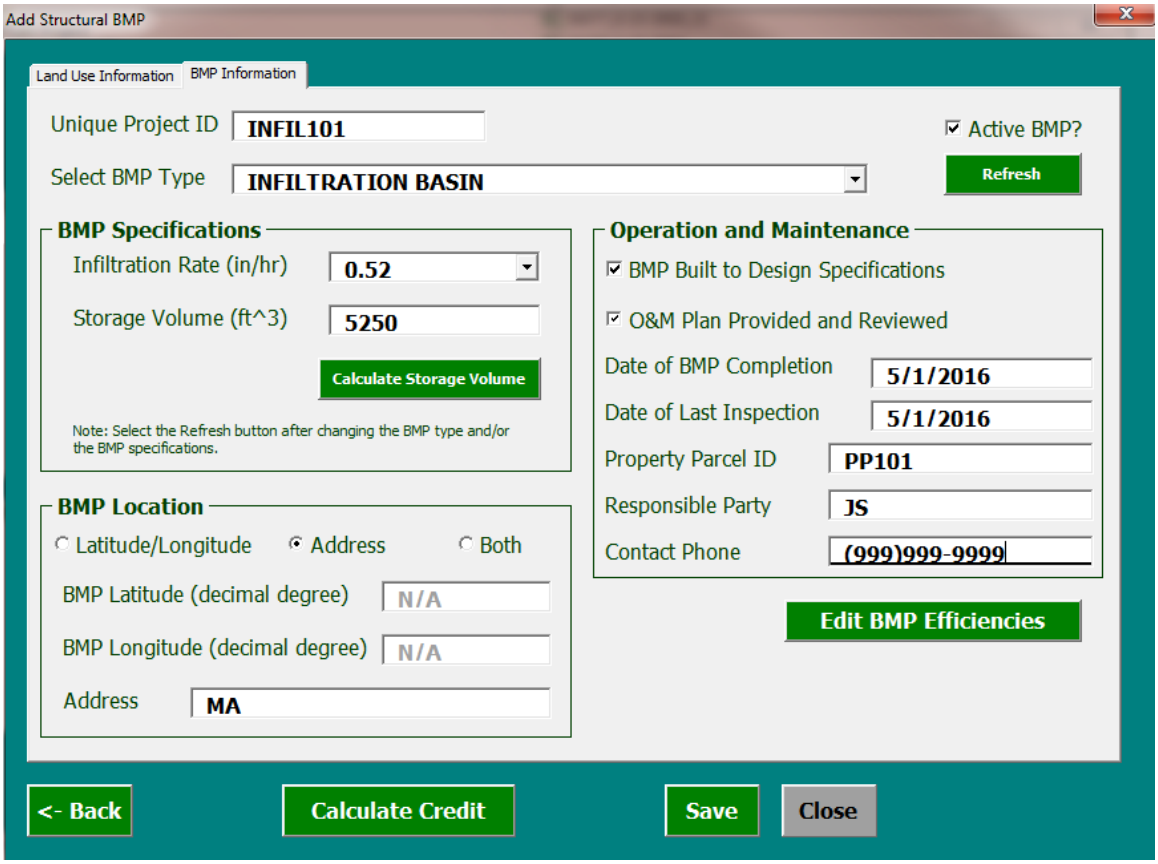


Figure 7. Add Structural BMP – BMP Information

Within the *BMP Information* tab, the user must provide a unique Project ID, BMP type, and associated BMP specifications before the tool can calculate credit, edit BMP efficiencies, or refresh BMP efficiencies and credit. The selection of available structural BMPs are provided in Table 3. The user must provide necessary BMP specifications according to the selected BMP type. Storage volume is required for all BMP types and the infiltration rate is only required for infiltration systems (infiltration trench and infiltration basin), see Table 4. If the user is unsure about the storage volume but knows the dimensions, the *Calculate Storage Volume* button populates a form with BMP dimensions based on the BMP type, see Figure 8. The *Calculate Storage Volume* calculates the storage volume based on the provided dimensions. Additional guidance on how storage volume should be calculated for the purpose of determining reduction amounts is shown in Appendix A.

Table 3. Structural BMP types in BATT

Structural BMPs List
BIORETENTION
ENHANCED BIORETENTION
EXTENDED DRY DETENTION POND
GRASS SWALE (CONVEYANCE)
GRAVEL WETLAND
INFILTRATION BASIN
INFILTRATION TRENCH
POROUS PAVEMENT
WET POND/CREATED WETLAND

Note - Enhanced Bioretention behaves as Biofiltration with Internal Storage Reservoir and Bioretention behaves as Biofiltration

Table 4. Infiltration Rates for infiltration BMP types in BATT

Infiltration Rate (in/hr)
0.17
0.27
0.52
1.02
2.41
8.27

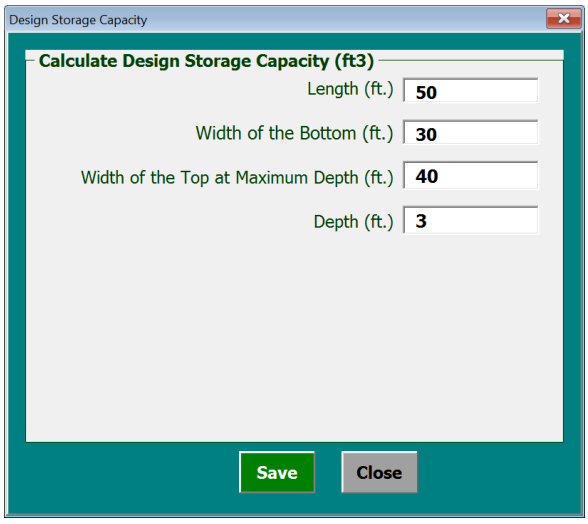


Figure 8. Calculate Storage Capacity (example – Infiltration Basin)

After the land use information, BMP Type, and BMP specification are provided the user has the option to edit BMP efficiencies, refresh BMP efficiencies, and/or calculate credit. The *Edit BMP Efficiencies* calculates the selected BMP efficiency for phosphorus, nitrogen, and total suspended solids, see Figure 9. The *Edit Default Efficiency (EPA*

Approved) option box provides the option to edit the calculated efficiencies, with EPA approval. Once the *Edit Default Efficiency (EPA Approved)* button is checked, the user can edit the calculated BMP efficiencies percentage. The *Default BMP Efficiency* button re-calculates the default BMP efficiencies and populates the form with default BMP efficiencies.

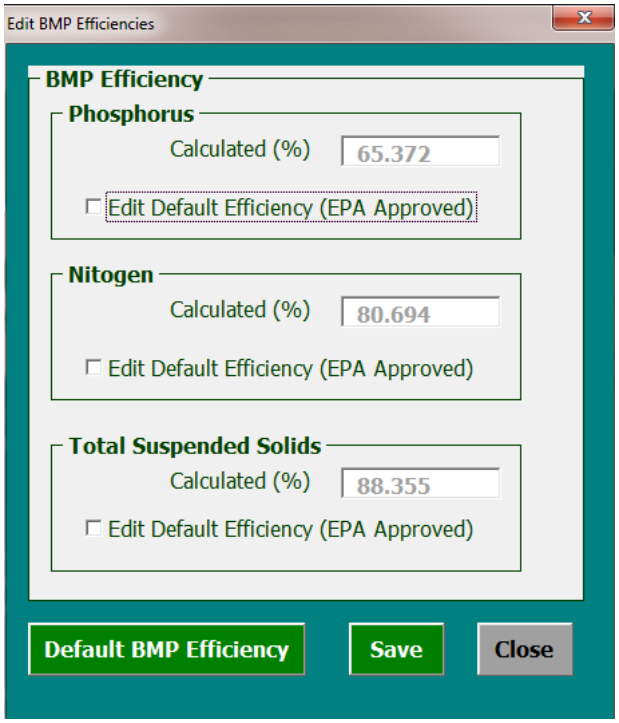


Figure 9. Edit BMP Efficiencies (example – Infiltration Basin)

After all land use information and the BMP information has been provide the user can refresh the BMP efficiencies, save the project or calculate credit. The *Refresh* button re-calculate the default BMP efficiencies, if the user changed the BMP type or BMP specifications. The *Calculate Credit* button calculates the change in load from the implemented BMP, see Figure 10.

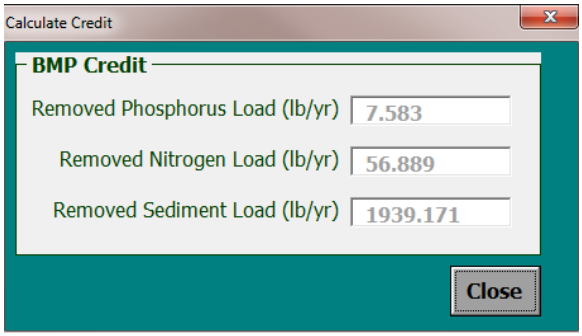
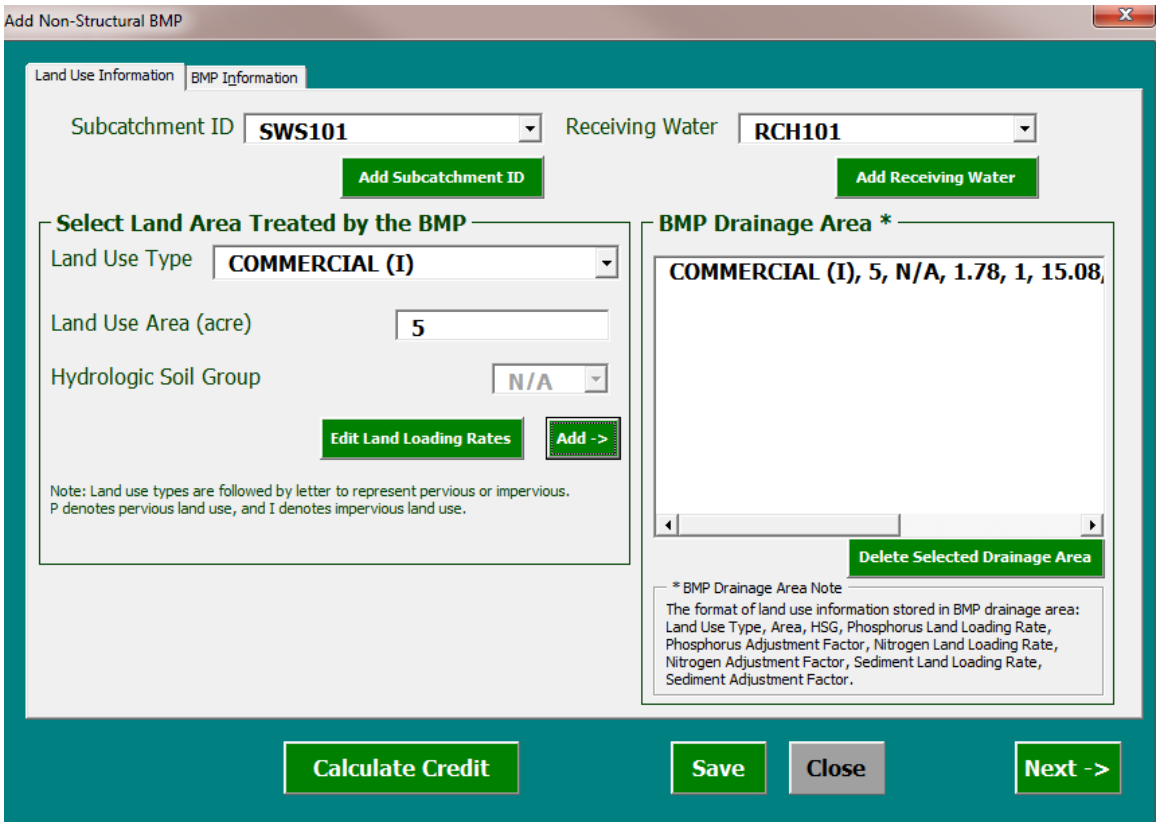


Figure 10. Calculate Credit (example – Structural BMP project)

3.1.2 Add BMP (Non-Structural)

The *Add Non-Structural BMP* form appears after the *Add BMP (Non-Structural)* button is selected, see Figure 11. The *Land Use Information* tab is activated first. Within the *Land Use Information* tab, the user must provide subcatchment ID, receiving water, and land use information.



The *Subcatchment ID* lists subcatchment options. The *Add Subcatchment ID* button allows the user to add a subcatchment to the Subcatchment ID list, see Figure 4. The *Receiving Water* lists receiving water options. The *Add Receiving Water* button allows the user to add a receiving water to the *Receiving Water* list, see Figure 5. If a subcatchment ID or receiving water is saved via the *Add Subcatchment* form or *Add Receiving Water* form, then the added option will become available in either the *Subcatchment ID or Receiving Water* option boxes.

In order to add land use information, the user must select the land use type and the hydrologic soil group, and provide the land use area. If the land use type is impervious, then the *Hydrologic Soil Group* options will become disabled and a N/A value will appear.

After the land use type, land use area, and the hydrologic soul group are provided the user has two options, edit land loading rates or add the land use information into the *BMP Drainage Area* box. The *Edit Land Loading Rates* form provides the land loading rates, and the user has the option to change the adjustment factor and save the changes, see Figure 12. The *Add* button assumes an adjustment factor of 1, unless the user edited the adjustment factor in *the Edit land Loading Rates* form, and then moves the land use information into the *BMP Drainage Area* box. The *BMP Drainage Area Note* explains the format of the land use information in the *BMP Drainage Area* box.

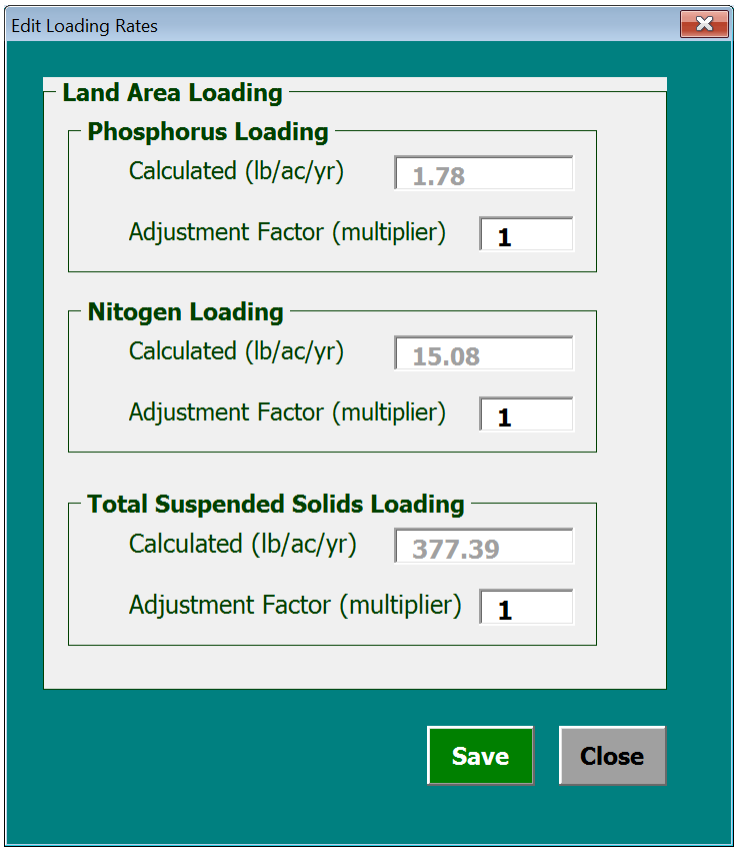


Figure 12. Edit Loading Rates (example – Commercial (I) land use type)

After the land use information has been entered, the user can move onto the next step, BMP information. The *Next* button prompts the user to the *BMP Information* tab, see Figure 13.

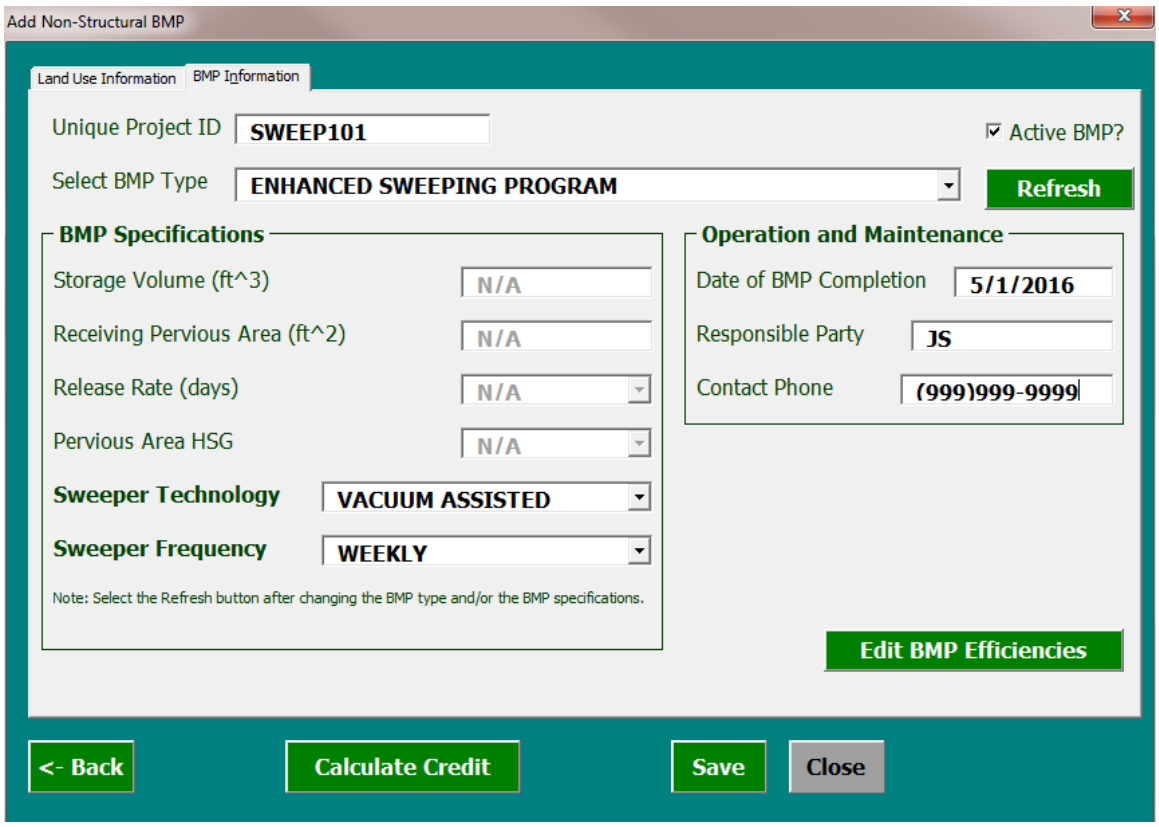


Figure 13. Add Non-Structural BMP – BMP Information

Within the *BMP Information* tab, the user must provide a unique BMP ID, BMP type, and associated BMP specifications before the tool can calculate credit, refresh BMP efficiencies, or edit BMP efficiencies. The selection of non-structural BMPs are provided in Table 5.

Table 5. Non-Structural BMP types in BATT

Non-Structural BMPs List
CATCH BASIN CLEANING
ENHANCED SWEEPING PROGRAM
IMPERVIOUS AREA DISCONNECTION
IMPERVIOUS AREA DISCONNECTION THROUGH STORAGE
NO APPLICATION OF FERTILIZERS CONTAINING PHOSPHORUS
ORGANIC WASTE/LEAF LITTER COLLECTION PROGRAM

The required BMP specifications become bold and enabled depending on the selected BMP. Table 6 shows the Release Rate options for *Impervious Area Disconnection Through Storage*. Sweeper Technology and Sweeper Frequency options for *Enhanced Sweeping Program* are listed in Table 7 and Table 8, accordingly.

Table 6. Release Rate for Impervious Area Disconnection Through Storage BMP

Release Rate (day) Choices
1
2
3

Table 7. Sweeper Technology for *Enhanced Sweeping Program*

Sweeper Technology Choices
HIGH-EFFICIENCY REGENERATIVE AIR-VACUUM
MECHANICAL BROOM
VACUUM ASSISTED

Table 8. Sweeper Frequency for *Enhanced Sweeping Program*

Sweeper Frequency Choices
MONTHLY
TWICE/YEAR (SPRING AND FALL)
WEEKLY

After the land use information, BMP Type, and BMP specification are provided the user has the option to calculate credit, refresh BMP efficiencies, and/or edit BMP efficiencies. The *Refresh* button re-calculate the default BMP efficiencies after the user changes the BMP type or the BMP specifications. The *Edit BMP Efficiencies* calculates the selected BMP efficiency for phosphorus, nitrogen, and total suspended solids, see Figure 14. The *Edit Default Efficiency (EPA Approved)* option box provides the option to edit the calculated efficiencies, with EPA approval. Once the *Edit Default Efficiency (EPA Approved)* button is checked, the user can edit the calculated BMP efficiencies percentage. The *Default BMP Efficiency* button re-calculates the default BMP efficiencies and populates the form with default BMP efficiencies.

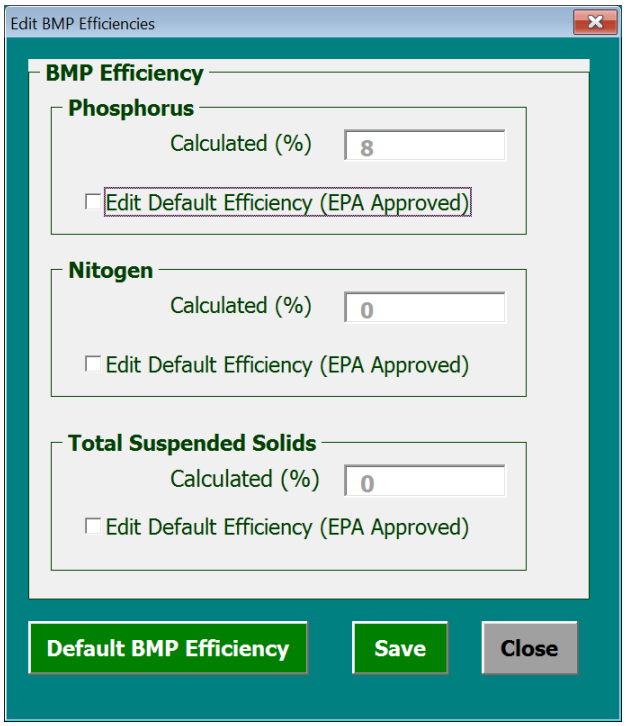


Figure 14. Edit BMP Efficiencies (example – Enhanced Sweeping Program, Vacuum Assisted and Weekly)

After all land use information and the BMP information has been provide the user can save the project or calculate credit. The *Calculate Credit* button calculates the change in load from the implemented BMP, see Figure 15.

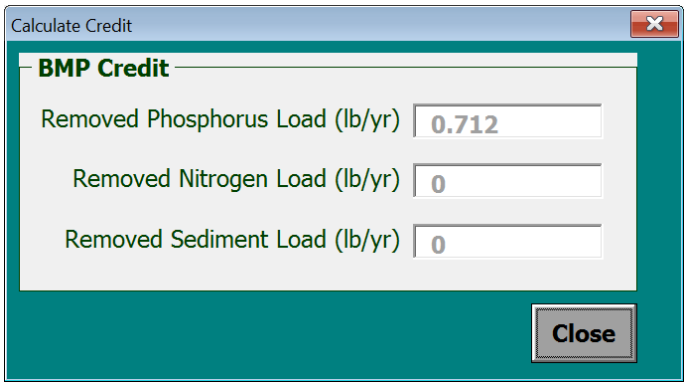


Figure 15. Calculate Credit (example – Non-Structural BMP project)

3.1.3 Add Land Use Conversion

The *Land Use Conversion* form appears after the *Add Land Use Conversion* button is selected, see Figure 16. The *Land Use Before* tab is activated first. Within *the Land Use*

Before tab, the user must select provide the unique BMP ID, property parcel ID, subcatchment ID, receiving water, and the land use information.

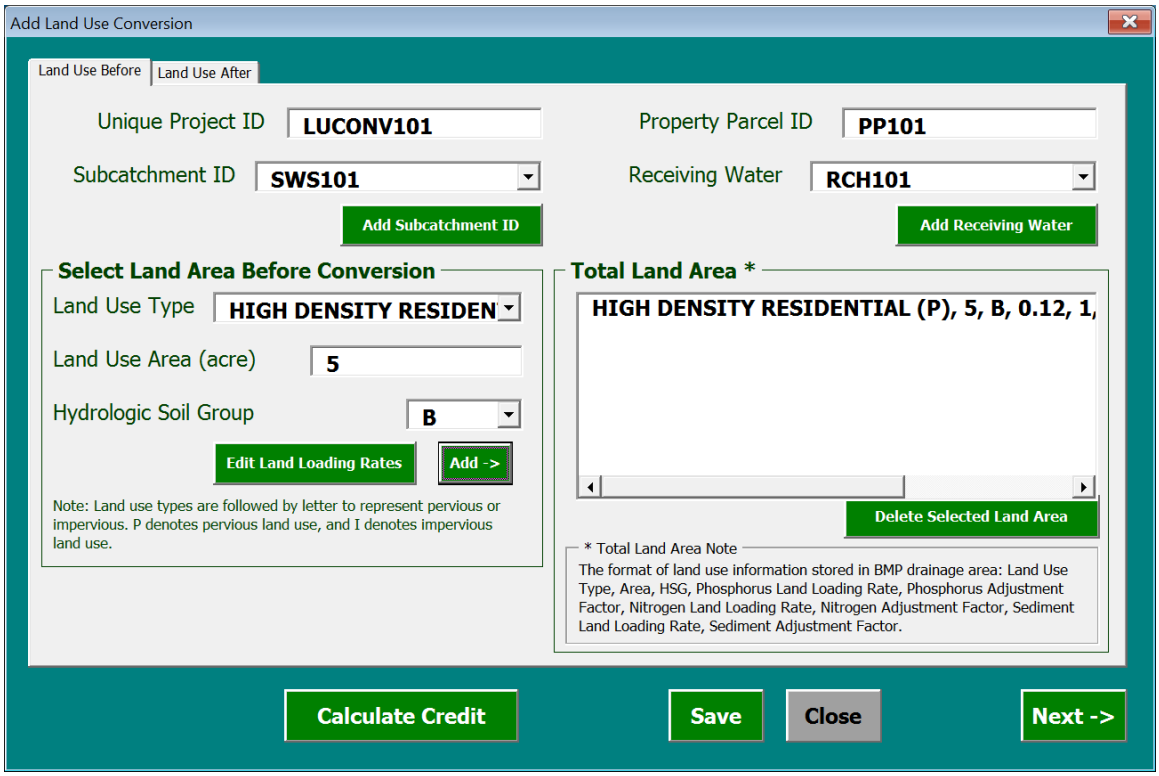


Figure 16. Add Land Use Conversion – Land Use Before

The *Subcatchment ID* lists subcatchment options. The *Add Subcatchment ID* button allows the user to add a subcatchment to the Subcatchment ID list, see Figure 4. The *Receiving Water* lists receiving water options. The *Add Receiving Water* button allows the user to add a receiving water to the *Receiving Water* list, see Figure 5. If a subcatchment ID or receiving water is saved via the *Add Subcatchment* form or *Add Receiving Water* form, then the added option will become available in either the *Subcatchment ID or Receiving Water* option boxes.

In order to add land use information, the user must select the land use type and the hydrologic soil group, and provide the land use area. If the land use type is impervious, then the *Hydrologic Soil Group* options will become disabled and a N/A value will appear.

After the land use type, land use area, and the hydrologic soul group are provided the user has two options, edit land loading rates or add the land use information into the *Total Land Area* box. The *Edit Land Loading Rates* form provides the land loading rates, and the user has the option to change the adjustment factor and save the changes, see Figure 17. The *Add* button assumes an adjustment factor of 1, unless the user edited the

adjustment factor in *the Edit land Loading Rates* form, and then moves the land use information into the *Total Land Area* box. The *Total Land Area Note* explains the format of the land use information in the *Total Land Area* box.

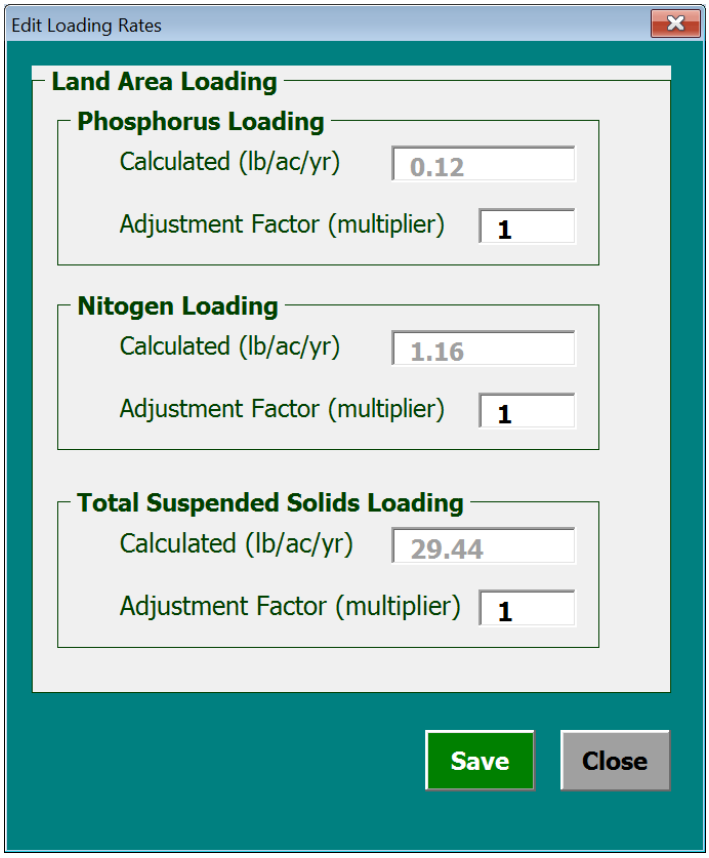


Figure 17. Edit Loading Rates (example – High Density Residential (P) land use type)

After the land use information has been entered, the user can move onto the next step, Land Use After. The *Next* button prompts the user to the *Land Use After* tab, see Figure 18.

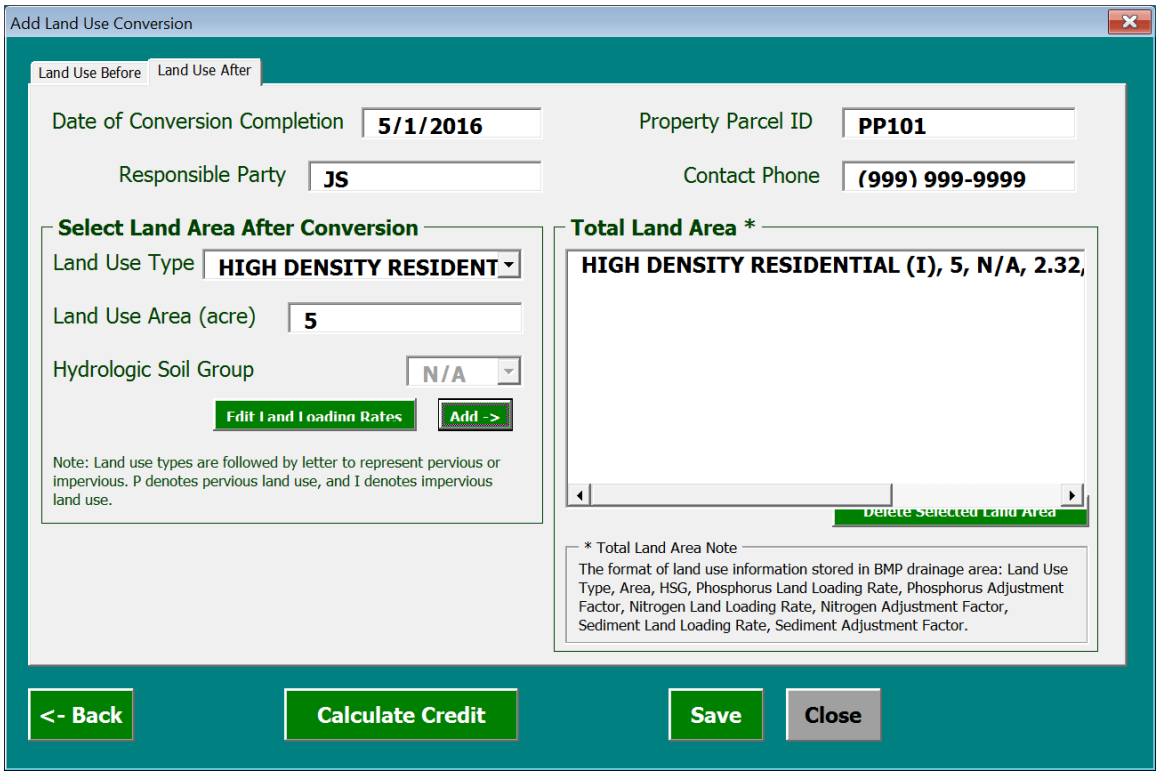


Figure 18. Add Land Use Conversion – Land Use After

Within *the Land Use After* tab, the user must select provide the date of conversion completion, property parcel ID, contact phone, and the land use information. To add land use information, the user must select the land use type and the hydrologic soil group, and provide the land use area. If the land use type is impervious, then *the Hydrologic Soil Group* options will become disabled and a N/A value will appear.

After the land use type, land use area, and the hydrologic soul group are provided the user has two options, edit land loading rates or add the land use information into the *Total Land Area* box. The *Edit Land Loading Rates* form provides the land loading rates, and the user has the option to change the adjustment factor and save the changes. The *Add* button assumes an adjustment factor of 1, unless the user edited the adjustment factor in *the Edit land Loading Rates* form, and then moves the land use information into the *Total Land Area* box. The *Total Land Area Note* explains the format of the land use information in the *Total Land Area* box.

After all land use before conversion, and land use information after conversion has been provide the user can save the project or calculate credit. The *Calculate Credit* button calculates the change in loading from the land use conversion project, see Figure 19. A negative load signifies an increase in loading and a positive load signifies a reduction in loading.

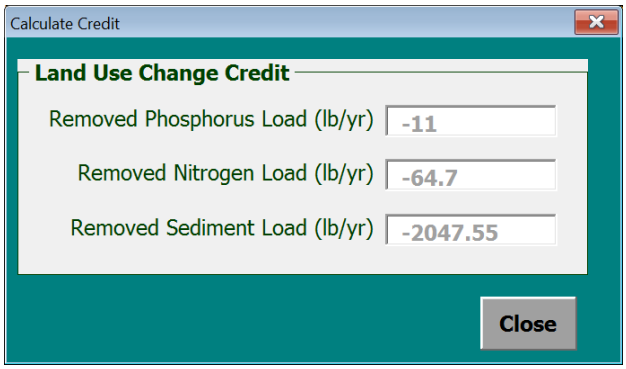


Figure 19. Calculate Credit (example – Land Use Change project)

3.2 Edit/Delete Existing Project

The user must select a Structural BMP project, a Non-Structural BMP project, or a Land Use Conversion project from the list to edit a Structural BMP project, a Non-Structural BMP project, or a Land Use Conversion project. After selecting the project user has a choice to edit the BMP information or delete the selected project. If the user does not see a saved project in the list, click on *Update Existing Project List* button, see Figure 20.

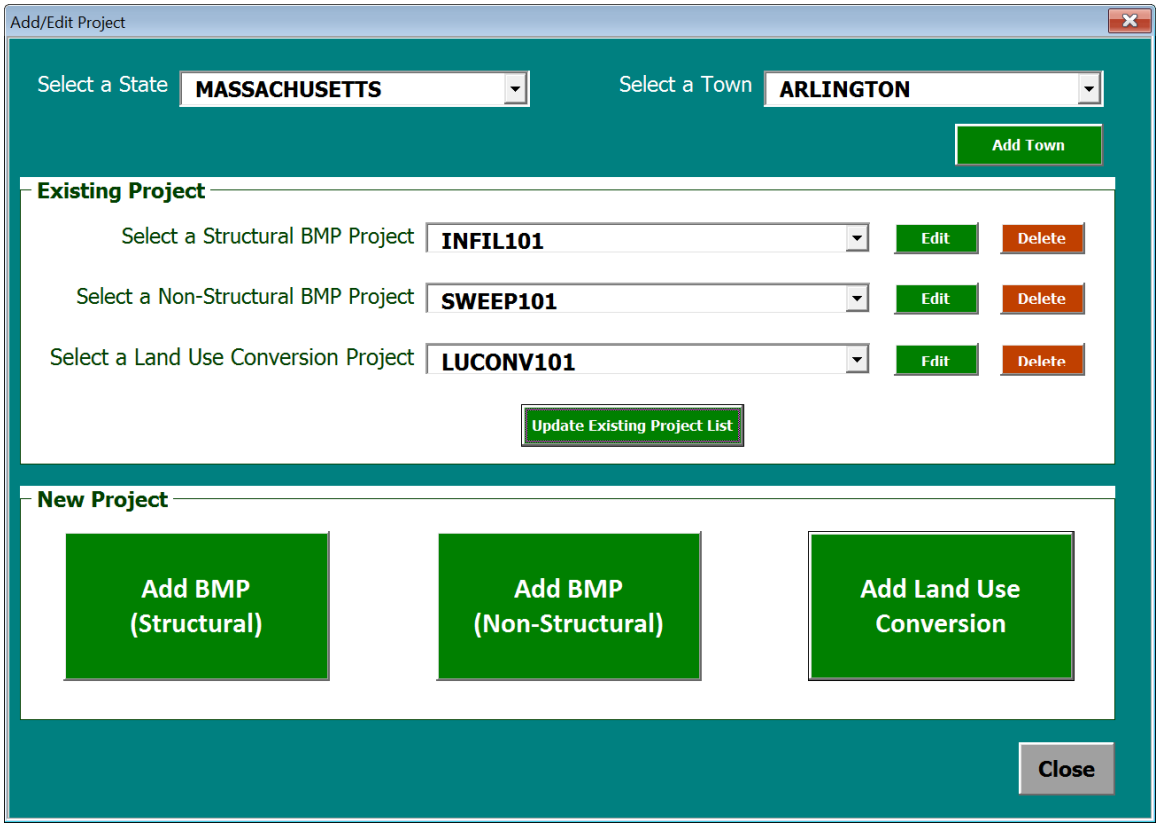


Figure 20. Edit/Delete Existing Project

4. Import/Export Project (CSV Format)

The import/export project function provides the option to browse for a comma separated values (CSV) file and then either import or export a project at the state and town level, see Figure 21.

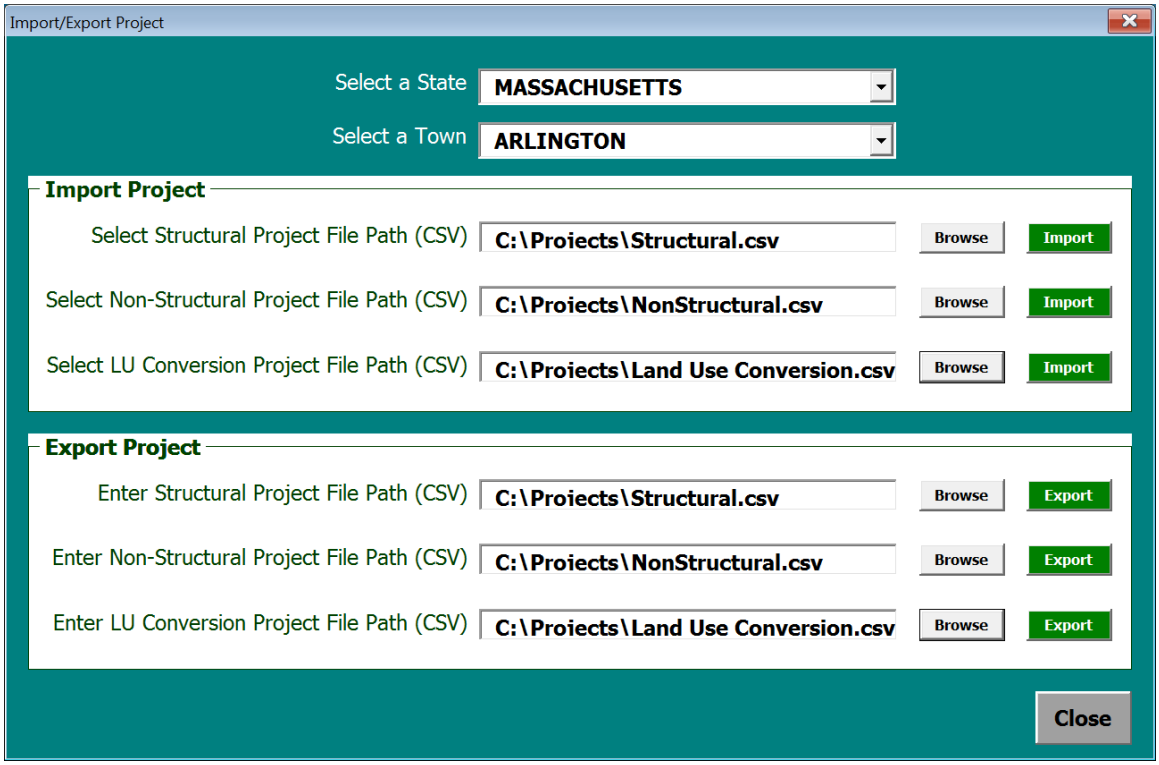


Figure 21. Import/Export Project form

Table 9, Table 10, and Table 11 list the field name and required input data for all three project types. Some of the fields are not user input but are BATT output results that can be stored back to the external database via using the export project option, see Table 9, Table 10, and Table 11 for details. The total number and order of fields are fixed and BATT requires all the fields to be populated in the CSV file. Even if a field is not relevant to the project type it must not be skipped but rather use a flag value, N/A for text field and -999 for a number field. If *Calculated BMP Efficiency* is -999 or *Edit Default Efficiency* is N/A, then upon import the tool will calculate the default BMP efficiencies based on BMP specifications and land uses. If the Storage Volume (ft^3)/ Filter Depth (in.) is -999, then BATT assumes a value of 0. If the *Receiving Pervious Area* is -999, then the tool assumes an area of 0. In the case the BMP storage volume or BMP treated land use area is zero, there will be no load credit for such BMPs.

The number of fields after the *Number of Land Uses* field should be repeated based on the value of *Number of Land Uses*. If *Land Use Area* is -999, then BATT will assume an

area of 0. If *Adjustment Factor* is -999, then BATT will assume an adjustment factor of 1. Upon importing, BATT calculates the land loading rates. The import project feature imports structural, non-structural, or land use conversion projects into the project database within BATT. Once a project exists in the project database, a project can be edited through the add/edit project feature or the nutrient load reduction can be summarized through the view/export project function.

Table 9. Structural BMP Project Information

Field Name	Value
State*,**	Massachusetts
Town*,**	Arlington
Unique Project ID**	INFIL101
Selected BMP Type*,**	Infiltration Basin
Active BMP (Yes/No)*,**	Yes
Project Type (New Development/Retrofit)*,**	New Development
Multi Sector General Permit (Yes/No)*,**	No
Phosphorus: Calculated BMP Efficiency (%)***	65.372
Phosphorus: Edit Default Efficiency (Yes/No)*,**	No
Nitrogen: Calculated BMP Efficiency (%) ***	80.694
Nitrogen: Edit Default Efficiency (Yes/No)*,**	No
Total Suspended Solids: Calculated BMP Efficiency (%)***	88.355
Total Suspended Solids: Edit Default Efficiency (Yes/No)*,**	No
Phosphorus Load Reduction (lb/yr)***	7.583
Nitrogen Load Reduction (lb/yr)***	56.889
Total Suspended Solids Load Reduction (lb/yr)***	1939.17
Date of BMP Completion**	5/1/2016
Date of Last Inspection**	5/1/2016
Subcatchment ID**	SWS101
Receiving Water**	RCH101
Infiltration Rate (in/hr)*,**	0.52
Storage Volume (ft^3) / Filter Depth (in.)**	5250
BMP latitude (degree)**	N/A
BMP Longitude (degree)**	N/A
Address**	MA
BMP Built to Design Specification (Yes/No)*,**	Yes
O&M Plan Provided and Reviewed (Yes/No)*,**	Yes
Property Parcel ID**	PP101
Responsible Party**	JS

Field Name	Value
Contact Phone**	(999)999-9999
Number of Land Uses**	1
Land Use Type1*,**	High Density Residential (I)
Land Use Area (ac) 1**	5
Hydrologic Soil Group1*,**	N/A
TP Calculated Land Area Loading (lb/ac/yr)1***	2.32
TP Adjustment Factor1**,***	1
TN Calculated Land Area Loading (lb/ac/yr)1***	14.1
TN Adjustment Factor1**,***	1
TSS Phosphorus Calculated Land Area Loading (lb/ac/yr)1***	438.95
TSS Adjustment Factor1**,***	1

**The value should match with the options available in BATT.*
***BATT required input (import CSV file).*
****BATT calculated output (export CSV file).*

Table 10. Non-Structural BMP Project Information

Field Name	Value
State*,**	Massachusetts
Town*,**	Arlington
Unique Project ID**	SWEEP101
BMP Type*,**	Enhanced Sweeping Program
Active (Yes/No)*,**	Yes
TP Efficiency***	8
Edit Default TP Efficiency (Yes/No)*,**	No
TN Efficiency***	0
Edit Default TN Efficiency (Yes/No) *,**	No
TSS Efficiency***	0
Edit Default TSS Efficiency (Yes/No) *,**	No
Phosphorus Reduction Load***	0.712
Nitrogen Reduction Load***	0
Total Suspended Sediment Reduction Load***	0
Date of BMP Completion**	5/1/2016
Subcatchment**	SWS101
Receiving Water ID**	RCH101
Storage Volume**	N/A
Receiving Pervious Area**	N/A

Field Name	Value
Release Rates*,**	N/A
Pervious Area HSG*,**	N/A
Sweeper Technology*,**	Vacuum Assisted
Sweeper Frequency*,**	Weekly
Responsible Party**	JS
Contact Phone Number**	(999)999-9999
Number of Land Uses**	1
Land Use Type 1*,**	COMMERCIAL (I)
Land Use Area (ac) 1**	5
Hydrologic Soil Group 1*,**	N/A
TP Calculated Land Area Loading (lb/ac/yr) 1***	1.78
TP Adjustment Factor 1**,***	1
TN Calculated Land Area Loading (lb/ac/yr) 1***	15.08
TN Adjustment Factor 1**,***	1
TSS Phosphorus Calculated Land Area Loading (lb/ac/yr) 1***	377.39
TSS Adjustment Factor 1**,***	1

**The value should match with the options available in BATT.*
***BATT required input (import CSV file).*
****BATT calculated output (export CSV file).*

Table 11. Land Use Conversion Project Information

Field Name	Value
State*,**	Massachusetts
Town*,**	Arlington
Unique Project ID**	LUCONV101
Phosphorus Load Reduction (lb/yr)***	-11
Nitrogen Load Reduction (lb/yr)***	-64.7
Total Suspended Solids Load Reduction (lb/yr)***	-2047.55
Date of Conversion Completed**	5/1/2016
Subcatchment ID**	SWS101
Receiving Water ID**	RCH101
Property Parcel ID**	PP101
Responsible Party**	JS
Contact Phone**	(999) 999-9999
Number of Land Uses Before**	1
Number of Land Uses After**	1

Field Name	Value
Land Use Type 1*,**	HIGH Density Residential (P)
Land Use Area (ac) 1**	5
Hydrologic Soil Group 1*,**	B
TP Calculated Land Area Loading (lb/ac/yr) 1***	0.12
TN Adjustment Factor 1**,***	1
TN Calculated Land Area Loading (lb/ac/yr) 1***	1.16
TN Adjustment Factor 1**,***	1
TSS Phosphorus Calculated Land Area Loading (lb/ac/yr) 1***	29.44
TSS Adjustment Factor 1**,***	1
Land Use Type 1*,**	High Density Residential (I)
Land Use Area (ac) 1**	5
Hydrologic Soil Group 1*,**	N/A
TP Calculated Land Area Loading (lb/ac/yr) 1***	2.32
TN Adjustment Factor 1**,***	1
TN Calculated Land Area Loading (lb/ac/yr) 1***	14.1
TN Adjustment Factor 1**,***	1
TSS Phosphorus Calculated Land Area Loading (lb/ac/yr) 1***	438.95
TSS Adjustment Factor 1**,***	1

**The value should match with the options available in BATT.*
***BATT required input (import CSV file).*
****BATT calculated output (export CSV file).*

5. View/Export Project (Summary Report)

The view/export project report function lists the unique identification of BMP and land use conversion projects, summarizes phosphorus, nitrogen, and sediment total load reduction, and provides the option to export the project summary to a word document, see Appendix B for the report template. The project report includes the State and Town level project summary credit and individual project summary, see Figure 22.

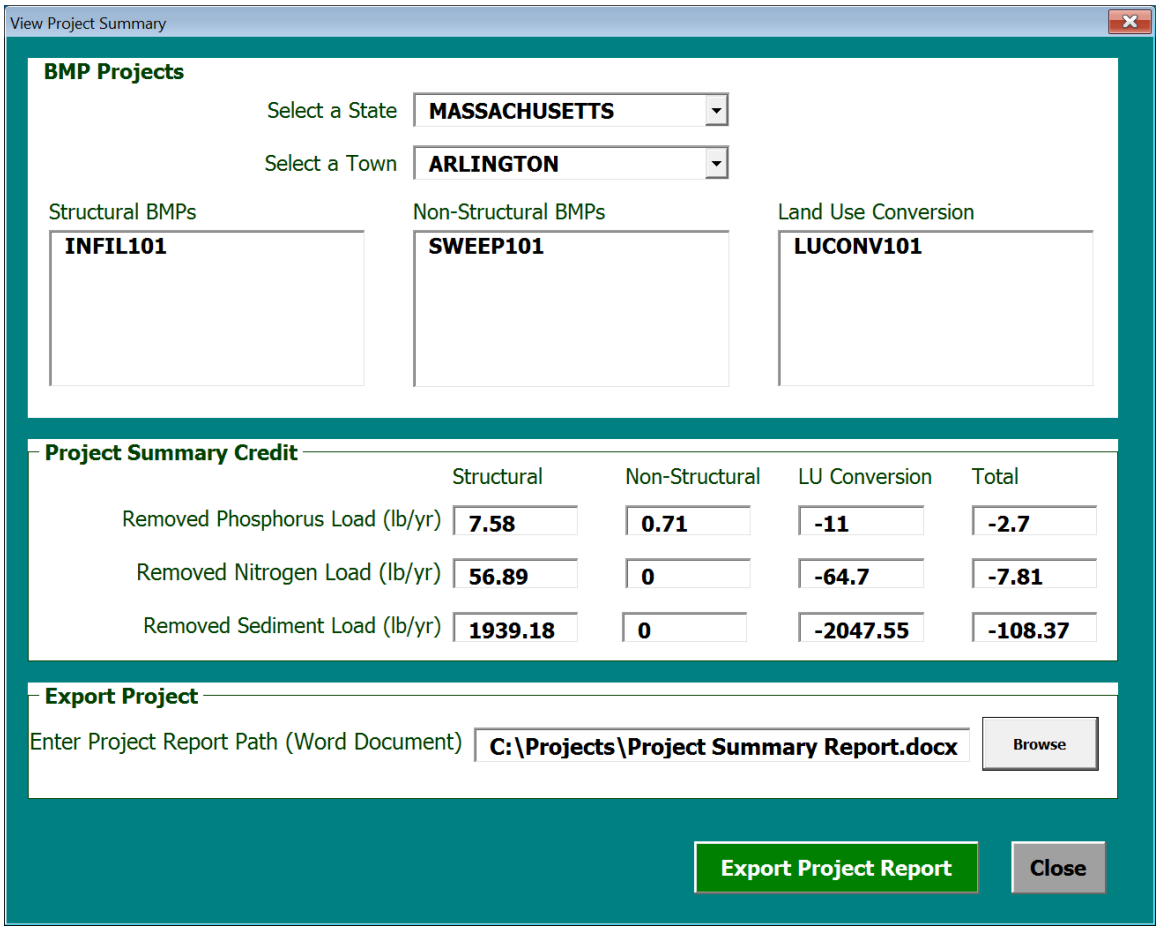


Figure 22. BATT View Project Summary form

6. Appendix A: Design Storage Volume Calculations

Table A1. Method for determining stormwater control design volume (DSV) (i.e., capacity) using Long-term cumulative performance curves

Stormwater Control Type	Description	Applicable Structural Stormwater Control Performance Curve	Method for calculating Design Storage Capacity to Estimate Long-term Cumulative Reduction Performances and Estimate Costs
Infiltration Trench	Provides temporary storage of runoff using the **void spaces** within the soil/sand/gravel mixture that is used to backfill the trench for subsequent infiltration into the surrounding sub-soils.	Infiltration **Trench** (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = void space volumes of stone and sand layers DSV = $(A_{trench} \times D_{stone} \times n_{stone}) + (A_{trench} \times D_{sand} \times n_{sand})$
Subsurface Infiltration	Provides temporary storage of runoff using the **combination of storage structures** (e.g., galleys, chambers, pipes, etc.) **and void spaces** within the washed stone that is used to backfill the system for subsequent infiltration into the surrounding sub-soils.	Infiltration **Trench** (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = Water storage volume of storage units and void space volumes of backfill materials. Example for subsurface galleys backfilled with washed stone: DSV = $(L \times W \times D)_{galley} + (A_{backfill} \times D_{stone} \times n_{stone})$
Surface Infiltraion	Provides temporary storage of runoff through **surface ponding** (e.g., basin or swale) for subsequent infiltration into the underlying soils.	Infiltration **Basin** (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = Water volume of storage structure before bypass. Example for linear trapazoidal vegetated swale DSV = $(L \times ((W_{bottom}+W_{top@Dmax})/2) \times D)$
Rain Garden/Bio-retention (no underdrains)	Provides temporary storage of runoff through **surface ponding and possibly void** spaces within the soil/sand/washed stone mixture that is used to filter runoff prior to infiltration into underlying soils.	Infiltration **Basin** (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = Ponding water storage volume and void space volumes of soil filter media. Example for raingarden : DSV = $(A_{pond} \times D_{pond}) + (A_{soil} \times D_{soil} \times n_{soil\ mix})$
Tree Filter (no underdrain)	Provides temporary storage of runoff through surface ponding and void spaces within the soil/sand/washed stone mixture that is used to filter runoff prior to infiltration into underlying soils.	Infiltration **Trench** (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = Ponding water storage volume and void space volumes of soil filter media. DSV = $(A_{bed} \times D_{ponding}) + (A_{bed} \times D_{soil} \times n_{soil\ mix})$
Bio-Filtration (w/underdrain)	Provides temporary storage of runoff for filtering through an engineered soil media. The storage capacity includes void spaces in the filter media and temporary ponding at the surface. After runoff has	Bioretention	DSV = Ponding water storage volume and void space volume of soil filter media. DSV = $(A_{bed} \times D_{ponding}) + (A_{bed} \times D_{soil} \times n_{soil})$

Stormwater Control Type	Description	Applicable Structural Stormwater Control Performance Curve	Method for calculating Design Storage Capacity to Estimate Long-term Cumulative Reduction Performances and Estimate Costs
	passed through the filter media it is collected by an under-drain pipe for discharge. Manufactured or packaged bio-filter systems such as tree box filters may be suitable for using the bio-filtration performance results.		
Gravel Wetland	Based on design by the UNH Stormwater Center (UNHSC). Provides temporary **surface ponding storage of runoff** in a vegetated **wetland cell** that is eventually routed to an underlying saturated gravel **internal storage reservoir (ISR)** for **nitrogen treatment**. Outflow is controlled by an elevated orifice that has its invert elevation equal at the top of the ISR layer and provides a retention time of at least 24 hours.	Gravel Wetland	DSV = pretreatment volume + ponding volume + void space volume of gravel ISR. DSV = ($A_{pretreatment}$ x $D_{preTreatment}$)+ ($A_{wetland}$ x $D_{ponding}$)+ (A_{ISR} x D_{gravel} x n_{gravel}) Pretreatment
Enhanced Bioretention	Based on design by the UNH Stormwater Center (UNHSC). Provides temporary surface ponding storage of runoff above a vegetated soil filter media cell that is filters runoff as it is routed to an underlying saturated washed stone internal storage reservoir (ISR) for nitrogen treatment. Outflow is controlled by an elevated orifice that has its invert elevation equal at the top of the ISR layer and provides a retention time of at least 24 hours.	**Enhanced** Bioretention	DSV = Ponding volume + void space volume of filter media + void space volume of gravel ISR. DSV = ($A_{filter\ bed}$ x $D_{ponding}$)+ ($A_{filter\ bed}$ x D_{filter} x n_{soil}) + (A_{ISR} x D_{stone} x n_{stone})
Porous Pavement with subsurface infiltration	Provides filtering of runoff through a filter course and temporary storage of runoff within the void spaces of a subsurface gravel reservoir prior to infiltration into subsoils.	Infiltration **Trench** (6 infiltration rates: 0.17, 0.27, 0.52, 1.02, 2.41 and 8.27 inches per hour)	DSV = void space volumes of gravel layer DSV = ($A_{pavement}$ x D_{stone} x n_{stone})
Porous pavement w/ impermeable underliner w/underdrain	Provides filtering of runoff through a filter course and temporary storage of runoff within the void spaces prior to discharge by way of an underdrain.	Porous Pavement	Depth of Filter Course = D_{FC}

Stormwater Control Type	Description	Applicable Structural Stormwater Control Performance Curve	Method for calculating Design Storage Capacity to Estimate Long-term Cumulative Reduction Performances and Estimate Costs
Sand Filter w/underdrain	Provides filtering of runoff through a sand filter course and temporary storage of runoff through surface ponding and within void spaces of the sand and washed stone layers prior to discharge by way of an underdrain.	Sand Filter	DSV = pretreatment volume + ponding volume + void space volume of sand and washed stone layers. $DSV = (A_{pretreatment} \times D_{preTreatment}) + (A_{bed} \times D_{ponding}) + (A_{bed} \times D_{sand} \times n_{sand}) + (A_{bed} \times D_{stone} \times n_{stone})$
Wet Pond	Provides treatment of runoff through routing through permanent pool.	Wet Pond	DSV= Permanent pool volume prior to high flow bypass $DSV=A_{pond} \times D_{pond}$ (does not include pretreatment volume)
Extended Dry Detention Basin	Provides temporary detention storage for the design storage volume t drain in 24 hours through multiple out let controls.	Dry Pond	DSV= Ponding volume prior to high flow bypass $DSV=A_{pond} \times D_{pond}$ (does not include pretreatment volume)
Grass Conveyance Swale	Conveys runoff through an open channel vegetated with grass. Primary removal mechanism is infiltration as runoff flows are conveyed.	Grass Swale	DSV = Volume of swale at full design flow $DSV=L_{swale} \times A_{x\text{-sect. swale}}$

7. Appendix B: Project Summary Report

Table B1. Project Summary Credit for ARLINGTON

	Removed Phosphorus Load (lb/yr)	Removed Nitrogen Load (lb/yr)	Removed Sediment Load (lb/yr)
Structural	7.58	56.89	1939.18
Non-Structural	0.71	0	0
Land Use Conversion	-11	-64.7	-2047.55
Total	-2.7	-7.81	-108.37

Table B2. Structural Project Summary for ARLINGTON

Project ID	BMP Type	BMP Storage Capacity (ft^3)/ Filter Depth (in.)	Phosphorus BMP Efficiency (%)	Nitrogen BMP Efficiency (%)	Sediment BMP Efficiency (%)	Removed Phosphorus Load (lb/yr)	Removed Nitrogen Load (lb/yr)	Removed Sediment Load (lb/yr)	Impervious Area Treated (acres)	Runoff Depth (in.)
INFIL101	INFILTRATION BASIN	5250	65.37	80.69	88.36	7.58	56.89	1939.18	5	0.29

Table B3. Non-Structural Project Summary for ARLINGTON

Project ID	BMP Type	BMP Storage Capacity	Phosphorus BMP Efficiency (%)	Nitrogen BMP Efficiency (%)	Sediment BMP Efficiency (%)	Removed Phosphorus Load (lb/yr)	Removed Nitrogen Load (lb/yr)	Removed Sediment Load (lb/yr)	Impervious Area Treated (acre)	Runoff Depth (in.)
SWEEP101	ENHANCED SWEEPING PROGRAM	N/A	8	0	0	0.71	0	0	5	N/A

Table B4. Land Use Conversion Project Summary for ARLINGTON

Project ID	Removed Phosphorus Load (lb/yr)	Removed Nitrogen Load (lb/yr)	Removed Sediment Load (lb/yr)	Impervious Area Treated (acre)
LUCHANGE101	-11	-64.7	-2047.55	5