

Introductory Tutorial for the GI Implementation Forms

This Introductory Tutorial will guide the user through the Oregon State University Extension Service's **Green Infrastructure (GI)** Implementation Forms. The tutorial is meant to be read in order, but you may click on a link in the Table of Contents to be taken to that page.

For more information beyond this Introductory Tutorial, see the Continued Tutorials below.

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The **Continued Tutorials** found below contain further information:

[Continued Tutorial: New Development Site](#)

Manages Catchments #2-5 from this site. Contains examples of additional BMP worksheets and ways to overcome challenging soil conditions.

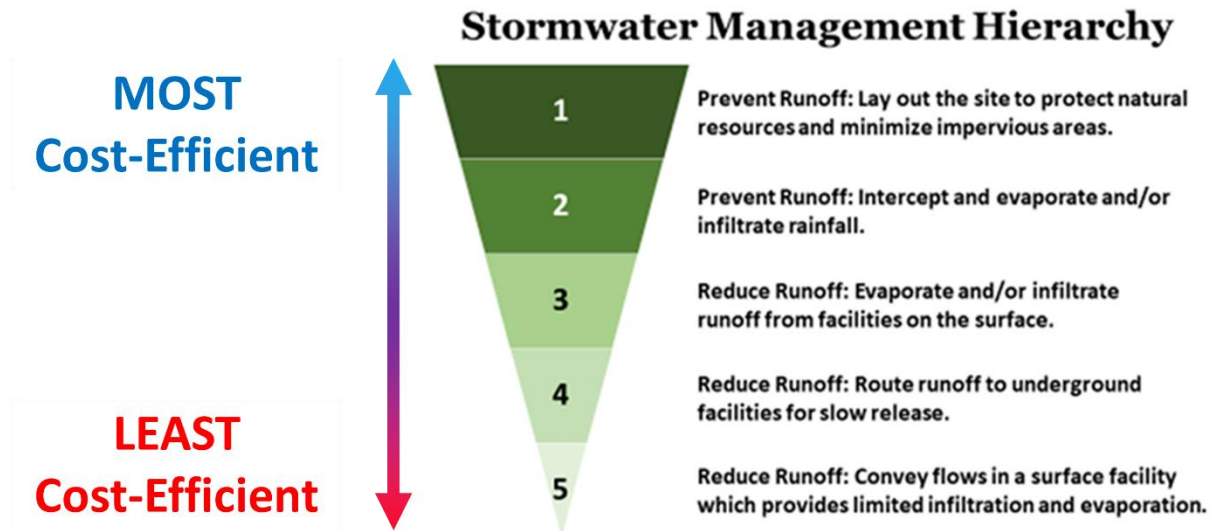
- Catchment 2: (Stormwater Planter)
- Catchment 3: (Vegetated Roofs, Downspout Disconnection)
- Catchment 4: (Lined Stormwater Planter, slow-draining soils)
- Catchment 5: (Vegetated Filter Strip, expansive clay soils)

[Continued Tutorial: Redevelopment Site](#)

Manages an example redevelopment of an office site in eastern Oregon. Contains examples of retrofit and pavement removal BMPs.

- Redevelopment Site: (Soakage Trench, Porous Pavement, Vegetated Roofs, Minimal Excavation)

Stormwater Management Hierarchy



The **Stormwater Management Hierarchy** ([link](#)) orders the BMPs in the GI Implementation Forms according to cost efficiency. Whenever site conditions allow, it is recommended to implement BMPs that prevent runoff and perform infiltration. You will see the Stormwater Management Hierarchy used to guide the selection of BMPs throughout this tutorial.

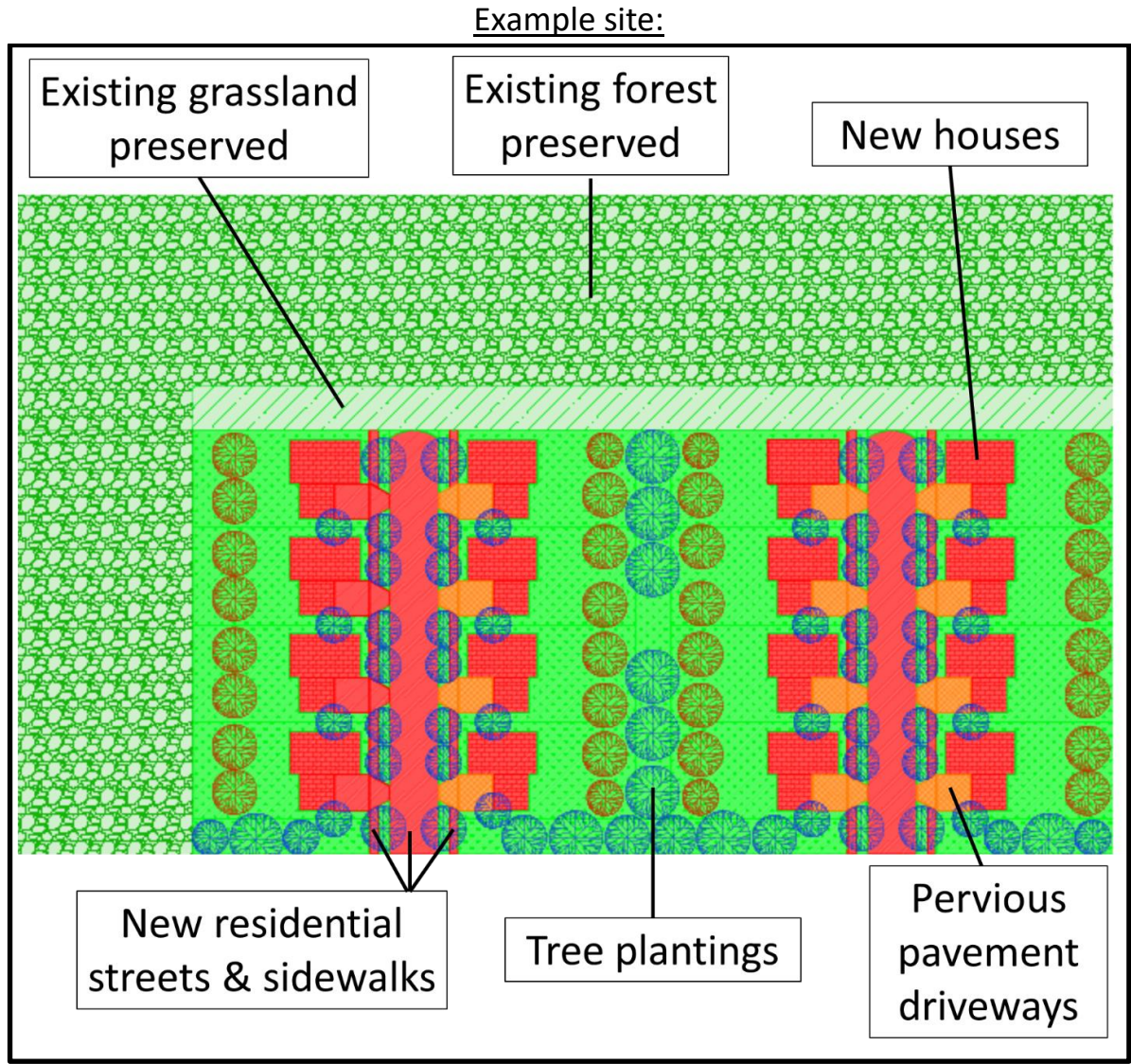
New Development Site

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In this example, we have a mock design for a new residential development.

There are 16 single-family houses being built in an old agricultural field in western Oregon. The surrounding forest and some of the grassland along the edge of the farm field will be preserved and may be used for recreation. Each house is 2 stories, includes an attached garage (required by code), and sits on a 1/8-acre lot (minimum allowed by code). The driveways are constructed with porous pavement where site conditions allowed. Trees will be planted along the edge of the streets, in the backyards, and in the common areas.

The developers wish to maintain a good reputation with the local municipality and so have agreed to manage stormwater onsite according to the GI Implementation Forms. This tutorial will walk through using the GI Implementation Forms to design this site.



Before Starting the GI Implementation Forms

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1. Check Rainfall Depth Requirements ([OSU Extension link](#)) ([NOAA Link](#))

Jurisdictions generally require stormwater designs to manage the rainfall depth of a specific **design storm** (i.e. 10-year 24-hour storm, 25-year 24-hour storm, etc.).

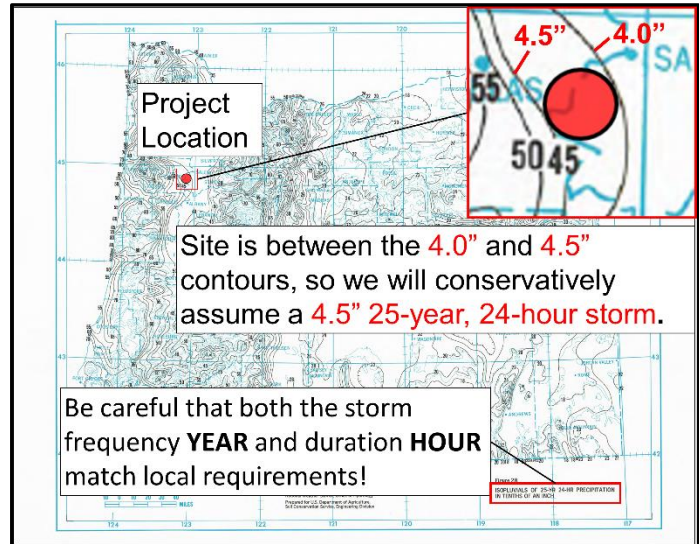
To find out the design storm requirements for your project, review the municipality's local stormwater code or check with the municipal staff. If not given by the municipality, the rainfall depth associated with different design storms can be found below:

Design Storm Depth Links:

- 25-Year (24-Hour) Storm Depths in Oregon: ([OSU Extension Link](#))
- 2 to 100-Year (24-Hour) Storm Depths in Oregon (see pages 30-35): [NOAA Link](#)

In this example project, the developers have agreed to manage the 25-year, 24-hour storm. A rainfall design storm depth of **4.5"** for the project location is found from the NOAA map.

We will use this rainfall depth later when we are filling out the BMP Worksheets.

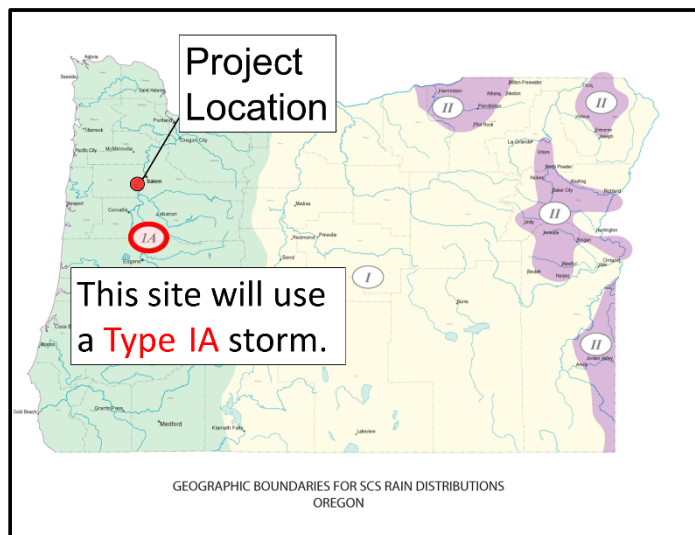


2. Check NRCS/SCS Storm Type ([link](#))

The NRCS/SCS **Storm Type** determines the design storm precipitation timing and intensity.

Storm Types I, IA, and II each have a different GI Implementation Form spreadsheet package. We must find the Storm Type for this project so that we know which spreadsheet package to use.

This site falls within the **Type 1A** storm region, so we will need to use the Type 1A GI Implementation Form package ([link](#)).

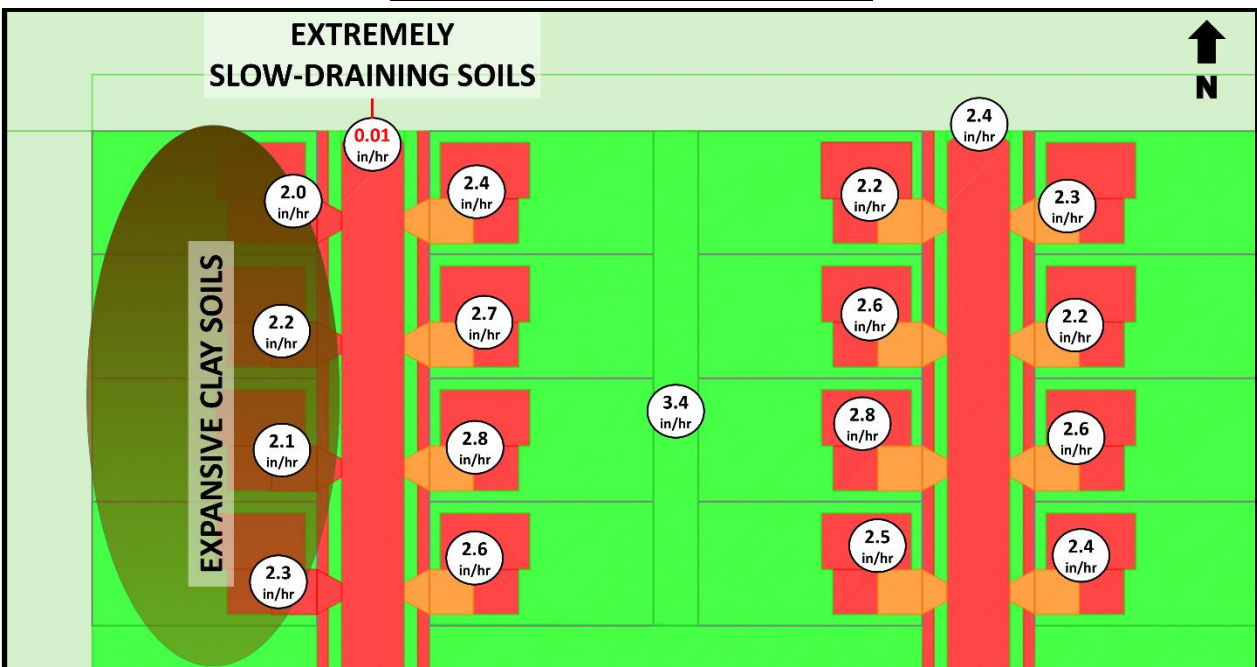


3. Perform Soil Infiltration Testing ([link](#))

The types of BMPs available and the sizes required depend on the **infiltration rate** of local soils.

Infiltration testing should be performed at or very near the proposed location and depth of each stormwater BMP. Infiltration testing methods provided by OSU Extension ([link](#)) can be used by either homeowners or professionals.

Example Site Infiltration Testing

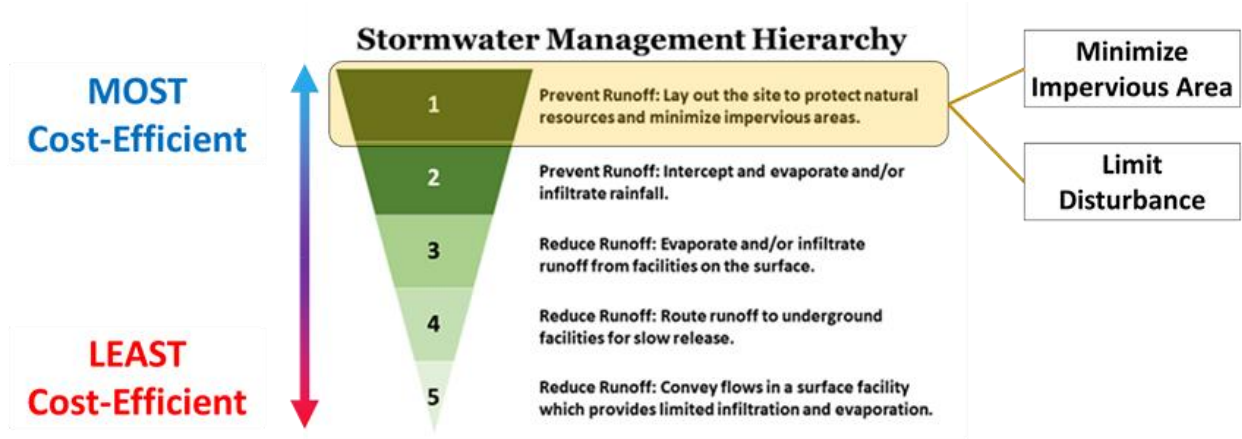


Local soils testing in this example site was performed for each proposed BMP location. Besides one isolated area of slow-draining soils in the northwest corner of the site, the infiltration rates tested varied from 2.0 to 3.4 inches/hour. There were also some noted expansive clay soils along the W edge of the site. This information will be used later when choosing and sizing the BMPs.

Site Layout

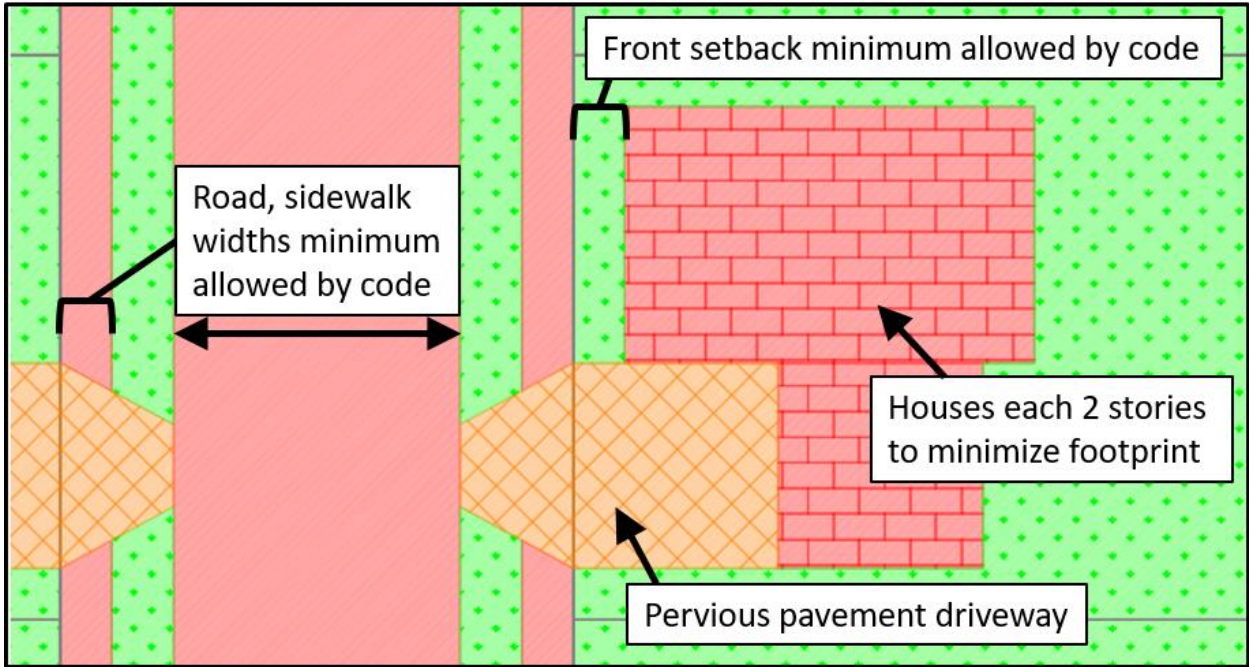
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We will now open up the **Type IA GI Implementation Form** ([link](#)) and begin filling it out.



First, fill out the **Site Layout** form to see what practices can be implemented to minimize impervious area and limit disturbance. These practices are among the most cost-efficient ways to manage stormwater (see the **Stormwater Management Hierarchy** below). Implementing as many of these practices as possible helps avoid costly treatment alternatives and may even earn a developer incentive bonus in certain municipalities.

In this example, the road, sidewalk, and front setback widths were all set to the minimum allowed by code. The driveways are made of porous pavement and the houses are each 2 stories to minimize footprint.



In the **Site Layout** form, we enter our practices to minimize impervious area and limit disturbance.

Site Form: Steps to an LID Site & Sizing Facilities

Complete Sections A-B in tabs, "Instructions & Site Layout", "Site Landscape Areas", and "Site Hardscape Areas" once for ENTIRE SITE

A. CREATE SITE LAYOUT & LID STRATEGY (ENTIRE SITE)

Minimize Impervious Area

These practices reduce the drainage area to be managed by Runoff BMPs and reduce stormwater management costs (and some of them also reduce overall project costs). If not incorporated, provide justification.

	Incorporated	Not Feasible	Not Applicable	Justification if not incorporated
1. Shared parking spaces BMP	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Code requires garage for each house
2. Minimize Pavement Widths BMP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Minimize Front Setbacks BMP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Share a Driveway BMP	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Driveway sizes minimized instead
5. Minimize Building Footprint(s) BMP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Minimize Roadway Cross Section(s) BMP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Minimize New Pavement BMP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Limit Disturbance

8. Construction Sequencing BMP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Conserve Fast(er) Draining Soils BMP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Site Landscape Areas

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In the **Site Landscape Areas** form, we will manage the runoff from the site's vegetated areas.

Tree Protection BMP: 93,500 ft²
Represents existing forested area preserved.

Cluster Development: 13,000 ft²
Represents existing non-forested vegetated area preserved.

Tree Planting BMP: 30,310 ft²
Only count new trees planted further than 10 ft. from impervious areas.
Enter tree counts in B1 to get managed area.
Evergreen Trees: (4 small, 4 medium, 10 large)
Deciduous Trees: (4 small, 28 medium)

In the **Site Landscape Areas** form, we enter BMPs until all landscape areas are managed and Step 16 becomes **True**.

B. PREVENT RUNOFF FROM LANDSCAPE AREAS (ENTIRE SITE)

10. Enter Landscape Drainage Area. Enter total drainage area of landscape surfaces for the entire site. **183,200** square feet

Limit Disturbance of Protected Landscape Areas

Apply these BMPs to landscape areas that will be protected in their natural, current, or restored state in the proposed development. These reduce the amount of impervious area to be managed by Runoff BMPs and reduce stormwater management costs (and some of them also reduce overall project costs).

Area Managed Equation	Area Managed
11. Cluster Development BMP. Enter natural landscape areas protected from all development impacts in light blue box and multiply by value shown to calculate area managed = 1.00 x 13,000 sf of BMP = 13,000 sf	
12. Tree Protection BMP. Enter area of tree canopy farther than 10 feet from an impervious area and properly protected from all development impacts in the light blue box and multiply by value shown to calculate area managed. = 1.5 x 93,500 sf of BMP = 140,250 sf	

Prevent Runoff from Developed Landscape Areas

Apply these BMPs to any proposed landscape areas where disturbance has taken place. These reduce the amount of runoff to be managed in Runoff BMPs below.

Area Managed Equation	Area Managed
13. Tree Planting BMP (Landscape). Enter the landscape area managed with trees. = Area set automatically to D41 in WS B1 Tree Planting (LS) = 30,310 sf	
14. Restored Soils BMP. Enter area of newly disturbed or existing landscape to be restored and planted with perennial flowers, shrubs, grasses, and grass-like in first box and multiply by value shown to calculate area managed. = 1.00 x 0 sf of BMP = 0 sf	
15. SECTION B AREA MANAGED SUBTOTAL: Calculate landscape areas managed with runoff prevention BMPs = Step 11 + Step 12 + Step 13 + Step 14 + Step 15 = 183,560 sf	
16. Is Step 15 equal to or greater than Step 10? If TRUE, then yes. If FALSE, then manage Landscape areas until TRUE. = TRUE	

To add Tree Plantings, open **Worksheet B1**. Areas managed in B1 will automatically appear here.

Click to open Worksheet B1 to find landscape area managed by Tree Plantings

Step 16 is **True**. Success!

The total landscape area of the site includes any existing or proposed lawns, meadows, forests, grasses, shrubs, etc. First, enter the original vegetation areas preserved during construction with protective fencing: **Tree Protection BMP** for forested areas or **Cluster Development BMP** for non-forested areas. Then, enter the new plantings on the developed area: **Restored Soils BMP** for shrubs, grasslands, or perennial flowers and **Tree Planting BMP** for trees. You will need to open **Worksheet B1** to calculate the area managed by tree plantings. **Note: only count new trees planted further than 10 ft. from hardscape surfaces.** Continue to add new plantings until Step 16 in the Site Landscaping Areas form shows "True".

In **Worksheet B1**, we enter **Evergreen** and **Deciduous Tree** Plantings to count towards the **Site Landscape Areas** managed.

WORKSHEET B1. TREE PLANTING (LANDSCAPE AREA) BMP WORKSHEET

[\[View BMP Factsheet\]](#)

[\[View BMP Suitability Matrix\]](#)

Use this form to determine:

- The maximum landscape area that may be managed with newly planted/proposed trees.
- The landscape area managed by trees that may be entered in Site Landscape Areas for both deciduous and evergreen trees.

a. Specify if the Tree Plantings will take place on the **Entire Site** or within specific **Catchment #'s**:

Entire Site
 Yes Enter Yes or No

Determine available proposed canopy of evergreen trees to manage landscape areas:

Evergreen (Landscape). Calculate the total mature canopy for multiple evergreen trees to manage landscape area runoff. (If desired, trees within 10 feet of hardscape areas may be used to prevent runoff from hardscape using Worksheet E1 instead.)

c. Small Canopy (for trees with small mature canopy area spreads including small trees and many trees with upright canopies with a canopy diameter measuring about 20 feet). Enter number of trees in the blue box and multiply by assumed canopy area.	= 315 square feet x	<input type="text" value="4"/>	# of small proposed trees	=	<input type="text" value="1260"/>	sf
d. Medium Canopy (for trees with medium mature canopy area spreads with a tree canopy diameter measuring about 25 feet). Enter number of trees in the blue box and multiply by assumed canopy area.	= 490 square feet x	<input type="text" value="4"/>	# of med proposed trees	=	<input type="text" value="1960"/>	sf
e. Large Canopy (for trees with large mature canopy area spreads with a tree canopy diameter measuring about 30 feet). Enter number of trees in the blue box and multiply by assumed canopy area.	= 700 square feet x	<input type="text" value="10"/>	# of large proposed trees	=	<input type="text" value="7000"/>	sf
f. Calculate available proposed evergreen canopy = Step c. + Step d. + Step e.				=	<input type="text" value="10220"/>	sf
g. Calculate landscape area that could be managed by proposed evergreen trees = Step f. x value shown.	= 1.50 x	<input type="text" value="10220"/>	square feet	=	<input type="text" value="15330"/>	sf

Determine available proposed canopy of deciduous trees to manage landscape areas:

Deciduous (Landscape). Calculate the total mature canopy for multiple deciduous trees to manage landscape area runoff. (If desired, trees within 10 feet of hardscape areas may be used to prevent runoff from hardscape using Worksheet E1 instead.)

h. Small Canopy (for trees with small mature canopy area spreads including small trees and many trees with upright canopies with a canopy diameter measuring about 20 feet). Enter number of trees in the blue box and multiply by assumed canopy area.	= 315 square feet x	<input type="text" value="4"/>	# of small proposed trees	=	<input type="text" value="1260"/>	sf
i. Medium Canopy (for trees with medium mature canopy area spreads with a tree canopy diameter measuring about 25 feet). Enter number of trees in the blue box and multiply by assumed canopy area.	= 490 square feet x	<input type="text" value="28"/>	# of med proposed trees	=	<input type="text" value="13720"/>	sf
j. Large Canopy (for trees with large mature canopy area spreads with a tree canopy diameter measuring about 30 feet). Enter number of trees in the blue box and multiply by assumed canopy area.	= 700 square feet x	<input type="text" value="0"/>	# of large proposed trees	=	<input type="text" value="0"/>	sf
k. Calculate available proposed deciduous canopy = Step h. + Step i. + Step j.				=	<input type="text" value="14980"/>	sf
l. Calculate landscape area that could be managed by proposed deciduous trees = Step k. x value shown.	= 1.00 x	<input type="text" value="14980"/>	square feet	=	<input type="text" value="14980"/>	sf
m. Calculate the total landscape area managed by proposed evergreen and deciduous trees = Step g. + Step l.				=	<input type="text" value="30310"/>	sf

Determine area managed to enter on UD Implementation Form

n. Enter the actual landscape area where trees will be planted = sf

o. The smaller of the values in Step m. and Step n. will be entered = sf

Area Managed from **Worksheet B1** here will automatically be added to the **Site Landscape Areas** form.

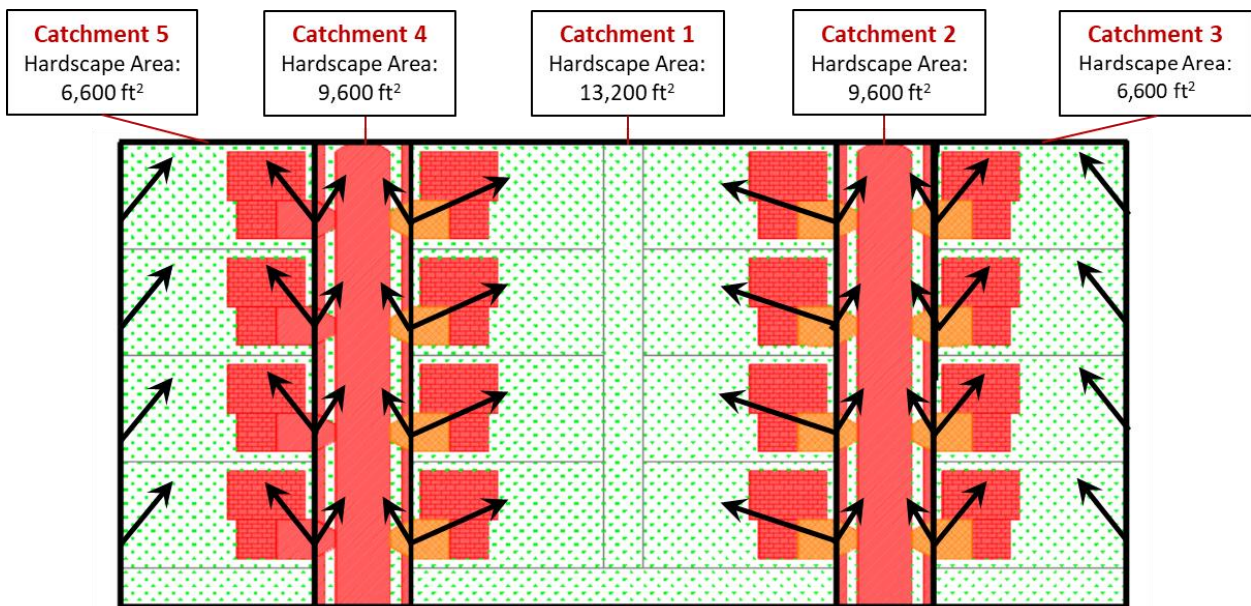
Used to determine "Area Managed" on Site Landscape Areas form

Site Hardscape Areas

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In the **Site Hardscape Areas** form, we will take an inventory of the new and existing hardscape areas in each catchment (also known as a “drainage area”).

In this example, we have 5 catchments with new hardscape areas, but no existing hardscape. Hardscape areas include roofs, gravel, roads, sidewalks, asphalt, porous pavement, and any other type of pavement. The boundaries of each catchment are determined by local topography and/or site design elevation grading ([link](#) for tutorial on determining catchment area boundaries).



In the **Site Hardscape Areas** form, we enter the total # of catchments and the hardscape areas for each catchment.

INVENTORY OF SITE HARDSCAPE AREAS

Enter # of Catchments (drainage areas) in site

1. Enter total # of catchments here to get the rows below to appear.

Enter total hardscape area for each catchment
(rows appear when # of Catchments is entered above)

• Hardscape areas include any pavement (including porous pavement)

2. Enter in hardscape areas.

For each catchment, click to open a new Catchment Form

	Existing Hardscape		New Hardscape		Total Hardscape	
Catchment 1	0	sf	13,200	sf	13,200	sf
Catchment 2	0	sf	9,600	sf	9,600	sf
Catchment 3	0	sf	6,600	sf	6,600	sf
Catchment 4	0	sf	9,600	sf	9,600	sf
Catchment 5	0	sf	6,600	sf	6,600	sf

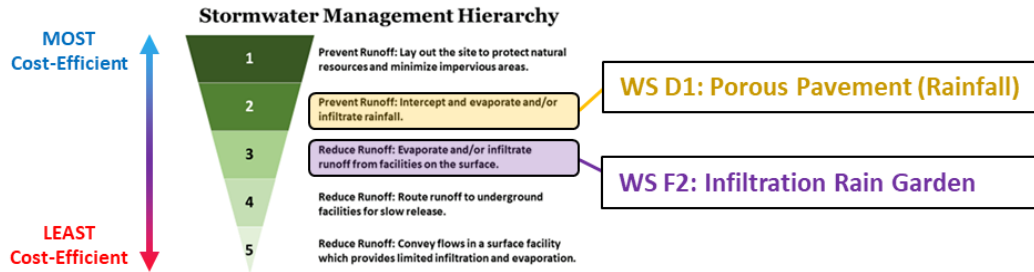
In the next step, we will click here to open up a **Catchment Form** for Catchment #1.

Catchment Form

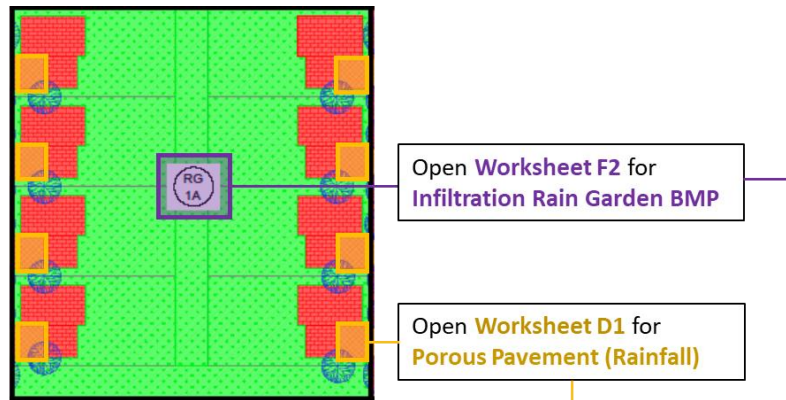
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To manage the hardscape areas for Catchment #1, open a new **Catchment Form** by clicking on the blue button in the Site Hardscape Areas. Note that the cells for Catchment ID and Remaining Hardscape Area are automatically populated.

The BMPs listed in the Catchment Form are ordered according to the **Stormwater Management Hierarchy**, so try to use the BMPs listed higher up whenever possible.



Catchment #1 consists of two rows of housing lots with a grassed common area abutting each backyard. All 8 driveways utilize Porous Pavement (Rainfall) and there will be an Infiltration Rain Garden in the common area.



CATCHMENT FORM: STEPS TO AN LID SITE & SIZING FACILITIES
SECTIONS D -- I (COMPLETE A SINGLE CATCHMENT FORM FOR EACH CATCHMENT)

Prioritizing BMP Selection: Priority should be taken to utilize BMP's from higher up in the hierarchy. **0 ft² remaining. Success!**

C. Calculate Total Remaining Hardscape Drainage Area to be Managed (CATCHMENT 1) 0 square feet remaining

21. Total # of Catchments (found from Site Hardscape Areas) A single Catchment Form needs to be completed for each Catchment.

22. Enter the Catchment addressed by this Catchment Form (eg. 1, 2, 3, 4)

23. Total Hardscape Area (found from Site Hardscape Areas) sf Apply BMPs below applicable to hardscape areas until no area is left unmanaged.

26. Porous Pavement (Rainfall) BMP. Enter area of porous pavement that manages ONLY the rainfall it receives to calculate hardscape area managed. Complete Worksheet D1 if entering an area. $1.00 \times 3,200 \text{ sf of BMP} = 3,200 \text{ sf}$ **If entering area here, click to complete Worksheet D1 for Porous Pavement (Rainfall) BMP**

33. Infiltration Rain Garden or LID Swale BMP. Enter the hardscape area managed with a rain garden or LID swale. *Area set automatically to Cell N15 in (C#1) - F2 RG or Swale* sf **If entering area here, click to complete Worksheet F2 for Inf. Rain Garden or LID Swale BMP**

In the Catchment Form, first enter the area managed by the **Porous Pavement (Rainfall) BMPs** on the driveways. Then, open **Worksheet D1** with the blue button to design the BMP. Since all the driveways require identical base rock depths, we may use a single Worksheet D1 for all driveways. If you need multiple forms, click on the blue button again to open an additional copy of the worksheet.

Using **Worksheet D1** to enter **Porous Pavement (Rainfall)**

WORKSHEET D1. POROUS PAVEMENT (RAINFALL) BMP WORKSHEET [\[View BMP Factsheet\]](#) [\[View BMP Suitability Matrix\]](#)

Porous Pavement (Rainfall) is designed to treat runoff only from the porous pavement area itself (to treat runoff from outside areas, see Worksheet F1). For multiple porous pavement (rainfall) BMPs, complete this worksheet for each different base rock depth recommended for structural stability in Step h.

- Use this form to:
1. Confirm site suitability for infiltration of rainfall using porous pavement.
 2. Determine the minimum depth of base rock needed to store the design storm and provide structural stability
- a. Enter a unique identifier for the BMP. (PP-1A, PP-1H, etc.)

Porous Pavement Designation:

Since our the **base rock depths** in **Step i.** are identical for the 8 driveways, we may use a single **Worksheet D1** to count for all driveways

- b.

In Catchment #:

Confirm suitability for infiltration of rainfall with porous pavement:

- c. Under 'Physical Setting' in the Porous Pavement fact sheet, are all conditions met to safely infiltrate the rainfall it receives? If Yes, continue to Step d. If No, then site is unsuitable for porous pavement to manage rainfall, so enter a 0 on Step 26 of the Catchment Form.
- d. See the BMP Suitability Matrix. Do any site conditions exist in the footprint of the porous pavement that are grayed out (i.e. not applicable)? If Yes, then site is unsuitable for porous pavement to manage rainfall, so enter a 0 for Area Managed by Porous Pavement (Rainfall) on Step 26 of the Catchment Form. If No, continue to Step e..
- e. Enter tested design infiltration rate, performed within the footprint of the porous pavement. If the infiltration rate is less than 0.3 inch/hour, a qualified licensed engineer should perform hydrologic modeling and provide specifications for construction.

Yes

No

2.2 in/hr

Report lowest tested soil infiltration rate of all Porous Pavement locations entered

Determine minimum base rock depth:

- f. Enter design storm event to manage. See [precipitation maps](#).
- g. Enter base rock depth required for structural stability (from pavement section developed by a qualified licensed professional who has investigated the site soils).
- h. Calculate base rock depth required to manage design storm = 0.7 x design storm [inches].
- i. Determine minimum base rock depth. Enter the larger of steps g. and h. and indicate this minimum base rock depth on construction plans and/or details.

Enter design storm. (see: [Check Rainfall Depth Requirements](#))

4.5 inches of rain

24 in

= 0.7 x 4.5 in(es) = 3.15 in

24 in

The **base rock depth** in **Step i.** will usually be equal to the structural requirement in **Step g.**

Next, open **Worksheet F2** using the blue button on the Catchment Form to enter information on the **Infiltration Rain Garden BMP**. First, we enter the 10,000 ft² hardscape drainage area (max 10,000 ft² for this BMP) from the 8 houses draining to the Rain Garden (*we do NOT enter the porous pavement areas since we have already managed those*). Then, we enter our 8 small evergreen tree plantings that are within 10 ft. of the houses. These tree canopies overhang the hardscape area to reduce the runoff sent to our BMP. As a result, our drainage area is reduced from 10,000 ft² to 8,740 ft² (maximum 20% area reduction allowed), allowing us to reduce the size of our BMP. Finally, we must adjust the rock trench and rain garden area. To manage this drainage area, the Rain Garden Area needs to be at least 550 ft².

Using Worksheet F2 to enter Infiltration Rain Garden BMP

WORKSHEET F2. INFILTRATION RAIN GARDEN OR LID SWALE BMP IN STEP 33 OF CATCHMENT FORM

a. Infiltration Rain Garden or LID Swale BMP Designation (e.g. RG-1, LS-B, etc.):

b. In Catchment #:

Confirm suitability for infiltration of runoff:

c. Under 'Physical Setting' in the Rain Garden factsheet, are all conditions met to safely infiltrate runoff? If Yes, continue to Step d. If No, then site is unsuitable for this BMP. Skip to Step 37 of the Catchment Form to investigate the possibility of using a conveyance BMP instead or redesign the site layout to accommodate infiltration. Enter Yes or No

d. Total Hardscape Drainage Area Draining to BMP: (Max 10,000 sf) = sf Used to determine the

e. Hardscape Area Reduction from Tree Plantings. Max 20% (2000 sq ft) = sf

f. Total Remaining Hardscape Area = sf Number used for the BMP worksheet (row 79), W

Determine footprint/size of rain garden or LID swale BMP:

g. Once you have calculated the hardscape area reduction from tree plantings, use the BMP calculator at the bottom of the worksheet to calculate to determine the area footprint of the BMP (it will be automatically entered here). Indicate this area on plans as well. square feet footprint of infiltration

h. Confirm vegetation health. Have appropriate plants been chosen for level of moisture they are likely to receive, regardless of excavation depth and ponding depth set by overflow strategy? Plants are critical to the success of these systems. If the answer is no, redesign the planting plan to improve plant establishment and long-term viability, then enter a yes. Enter Yes or No

Determine hardscape area reduction (max 20% reduction) from tree planting:

i. Limit Disturbance: Tree Protection BMP (Hardscape), Evergreen Tree Planting BMP, Vegetated Roof, and Contained Planters. Enter areas where these BMPs are placed over or overhang hardscape drainage areas in first box and multiply by value shown to find area generating runoff to manage. = 0.50

Determine available proposed canopy of evergreen trees to manage hardscape areas:

Evergreen (Hardscape). Calculate the total mature canopy for multiple evergreen trees to manage hardscape area runoff. (If desired, trees may be used to prevent runoff from landscape areas using Worksheet B1 instead.)

j. Small Canopy (for trees with small mature canopy area spreads including small trees and many trees with upright canopies with a canopy diameter measuring about 20 feet). Enter number of trees in the blue box and multiply by assumed canopy area. = 315 square feet x # of small proposed trees = 2,520 sf

k. Medium Canopy (for trees with medium mature canopy area spreads with a tree canopy diameter measuring about 25 feet). Enter number of trees in the blue box and multiply by assumed canopy area. = 490 square feet x # of med proposed trees = 0 sf

l. Large Canopy (for trees with large mature canopy area spreads with a tree canopy diameter measuring about 30 feet). Enter number of trees in the blue box and multiply by assumed canopy area. = 700 square feet x # of large proposed trees = 0 sf

m. Calculate available proposed evergreen canopy = Step j. + Step k. + Step l. = sf

n. Calculate hardscape area that could be managed by proposed evergreen trees = Step m. x value shown. = 0.50 x sf = sf

1. Manually enter hardscape drainage area to **Rain Garden** (roofs, roads, sidewalks, etc.). Ignore vegetated areas.

Our **Tree Plantings** have reduced our remaining hardscape drainage area by **1,260 sf** from **10,000** → **8,740!**

2. Entering **Tree Plantings** of 8 small evergreens to reduce remaining hardscape drainage area. (Trees must be within 10 ft. of hardscape areas draining to **Rain Garden**.)

RAIN GARDEN & LID SWALE SIZING CALCULATOR-POST DEVELOPED
Suitable for modeling a 24 Hour Storm, SBUH Type 1A Rainfall Distribution

Assumption: Time of concentration is conservatively 0.

USER INPUTS

Hourly Rainfall Depth (i.e., Design Storm) = in

Drainage area = sf

Drainage Area Runoff Coefficient =

Design Infiltration Rate of Soil = in/hr

Trench Below Rain Garden (optional) = in

Rock/Trench Void Porosity = %

Desired Maximum Ponding Depth = in

Rain Garden Area = sf

CALCULATED DESIGN CRITERIA

Maximum Ponding Depth in Rain Garden = in

Depth of Water Left in Rock Trench After 30 Hours = in

Depth of Water Left in Rain Garden After 30 Hours = in

Rain Garden Area is Adequately Sized? TRUE

OTHER CALCULATED VALUES

Peak Rainfall Intensity = in/hr

Peak flow infiltrated/kept on-site = cfs

Peak flow overflowing/leaving facility/site = cfs

CALCULATIONS:

Calculated. This is the depth of water predicted in the facility for the conditions entered in USER INPUTS.

Calculated. This should be 0 to be ready for the next storm.

Calculated. This should be 0 to be ready for the next storm.

Calculated from distribution.

This is the **Remaining Drainage Area** after taking the reductions from **Tree Plantings**.

4. Enter Runoff Coefficient. Generally = 0.9 since the calculator only considers hardscape drainage areas (roofs, roads, sidewalks, etc.).

6. Size the Rain Garden until **True**.

Peak flow from here can be used to check any site quantity/detention requirements.

3. Enter design storm. (see: Check Rainfall Depth Requirements)

5. Enter tested local soil infiltration rate (see: Perform Soil Infiltration testing)

Our hardscape area managed from Worksheet F2 will be automatically linked back to our Catchment Form. Now we see that our Catchment Form displays **0 square feet remaining** of hardscape area to manage, we are done with Catchment #1!

To continue designing Catchments #2-5 of this site, see [Continued Tutorial: New Development Site](#). To look at a Redevelopment site, see [Continued Tutorial: Redevelopment Site](#).