GI Implementation Forms
Continued Tutorial: New Development Site

This Continued Tutorial is meant to follow the Introductory Tutorial for the Oregon State University Extension Service's **Green Infrastructure** (**GI**) Implementation Forms.

This tutorial continues the design of the New Development site from the Introductory Tutorial. This Continued Tutorial contains additional examples of BMPs and scenarios to overcome soil or site challenges. Click on the sections in the Table of Contents to be taken to the page discussing the BMP or scenario you are interested in.

Table of Contents:

The additional tutorials found below contain further information:

Introductory Tutorial

Contains general information on using the GI Implementation Forms as well as more background information on this new development site.

- General information on using the GI Implementation Forms
- Catchment 1: (Porous Pavement & Rain Garden)

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)

Site Review

(see Introductory Tutorial for more information)

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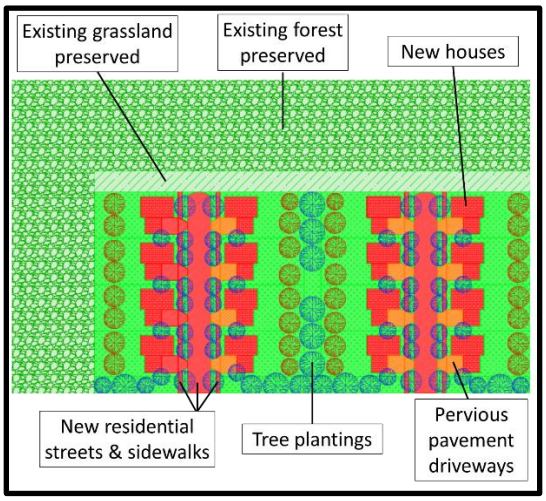
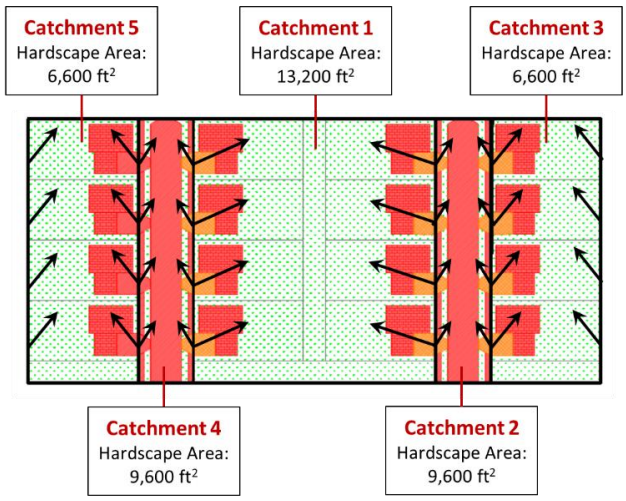
As discussed in the Introductory Tutorial, this site is a new housing development in western Oregon. There are 5 catchments in the site. This Continued Tutorial will design Catchments #2-5.





Prior to filling out the GI Implementation Forms, you will need the following information. These topics are covered in greater detail in the Introductory Tutorial.

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

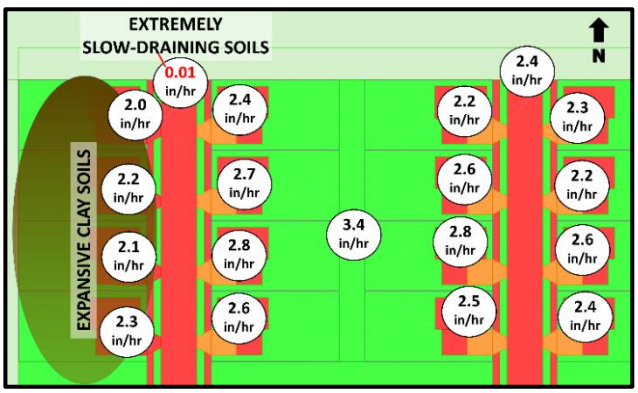
Jurisdictions generally require stormwater designs to manage rainfall depth of a given **design storm** (ie. 10-year 24-hour storm, etc.). This example site will use a 25-year, 24-hour design storm of **4.5”.**

2. Check NRCS/SCS Storm Type (link)

The NRCS/SCS **Storm Type** determines the design storm precipitation timing and intensity. Since this site lies in western Oregon, we will use the GI Implementation Form spreadsheet for **Storm Type IA**.

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 near the proposed location and depth of each BMP. Site infiltration testing found areas of slow-draining soils and expansive clay soils.



Catchment #2

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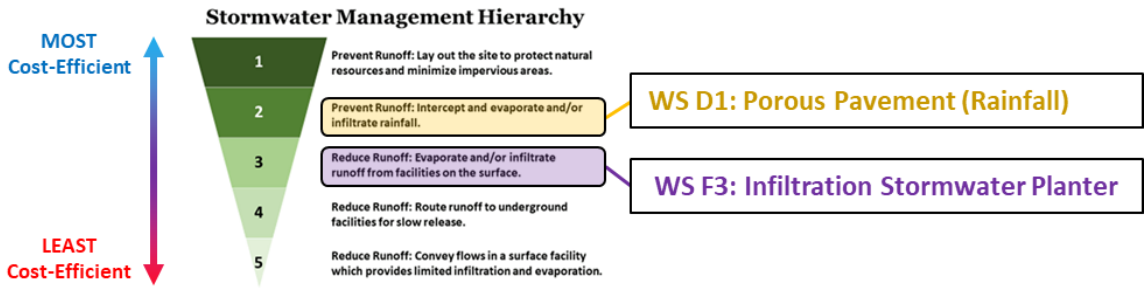
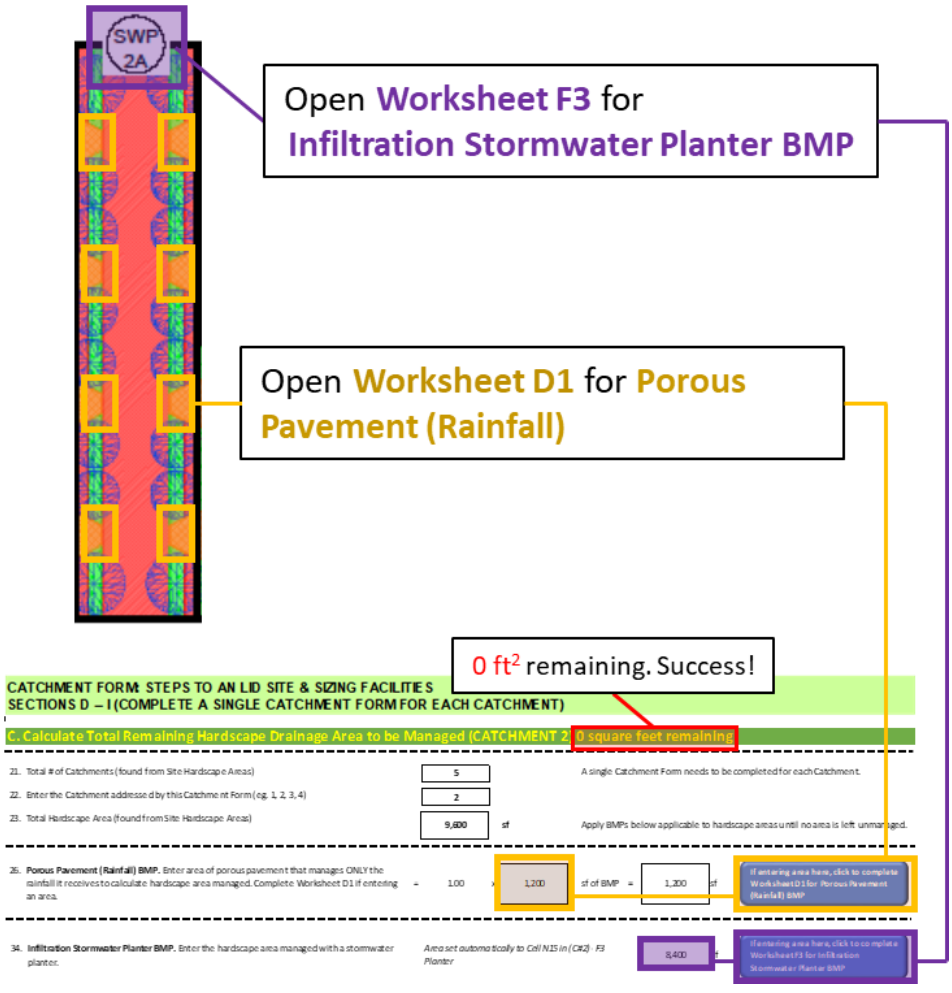
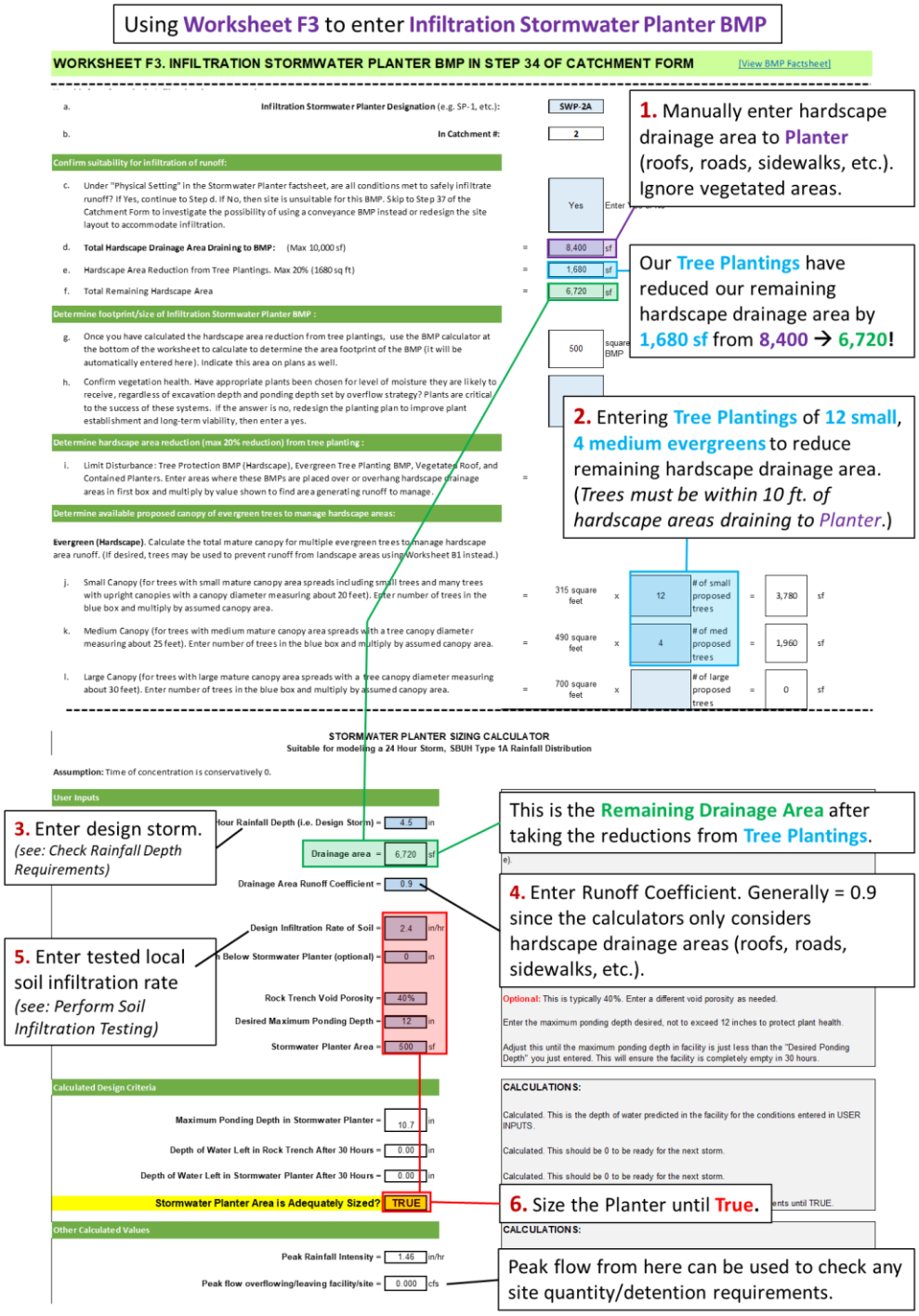
Catchment #2 consists of 8 Porous Pavement (Rainfall) driveways and an Infiltration Stormwater Planter receiving drainage from the street.



The **Worksheet D1** for **Porous Pavement (Rainfall) BMP** in Catchment #2 is the same as in Catchment #1 from the Introductory Tutorial, so we will skip this step here.



Next, open **Worksheet F3** to design the **Infiltration Stormwater Planter BMP** (process is similar to Worksheet F2 for Rain Garden BMP in the Introductory Tutorial). First, enter hardscape area from the street and sidewalks (*ignore porous pavement driveways-- they have already been accounted for*). Then, enter the plantings that are within 10 ft. of the street to reduce the drainage area from 8,400 ft^2 down to 6,720 ft^2 (max. 20% area reduction allowed). Finally, adjust the rock trench and stormwater planter dimensions to determine a final BMP size of 500 ft^2.



Catchment #3

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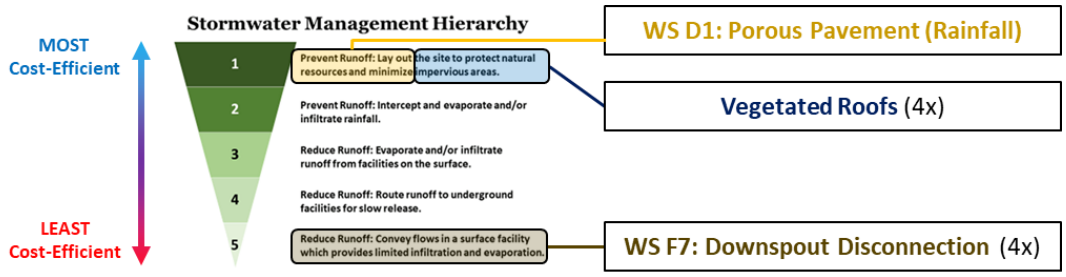
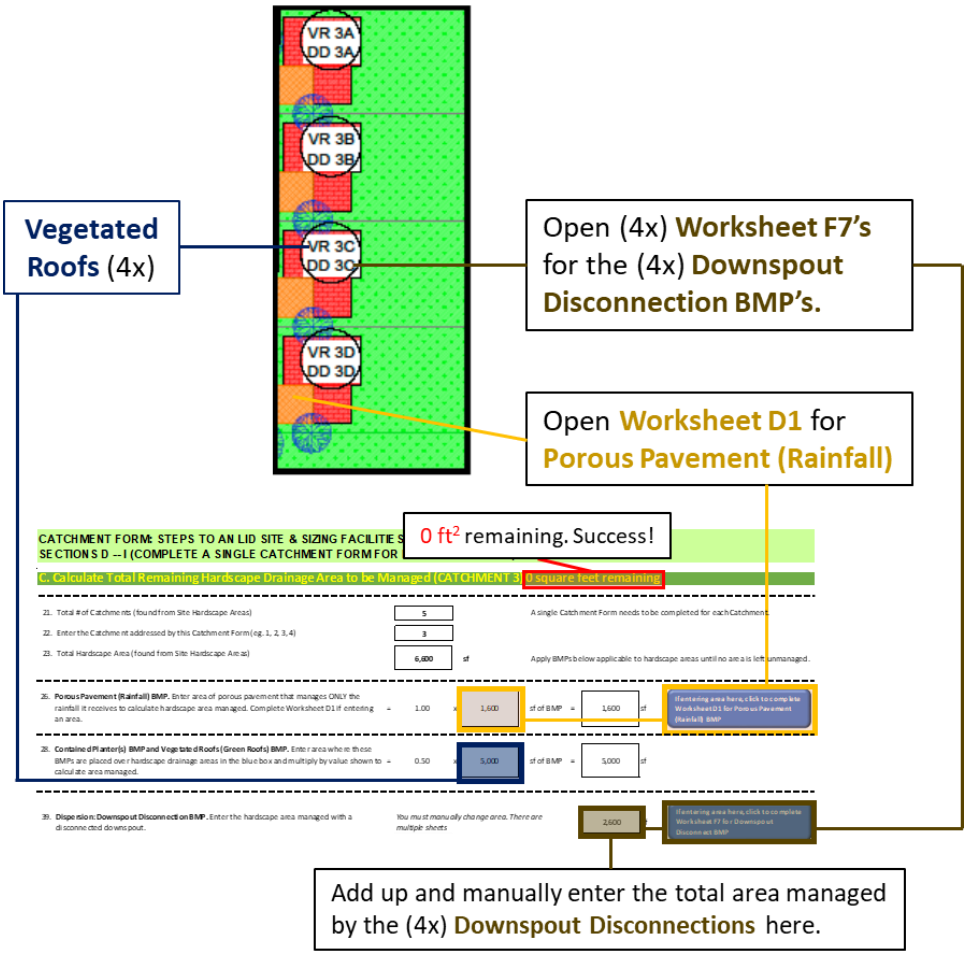
Catchment #3 consists of a single row of 4 housing lots. Unfortunately, the lots are built right up to a neighboring property, so there is no common area to place a BMP like in Catchment #1.



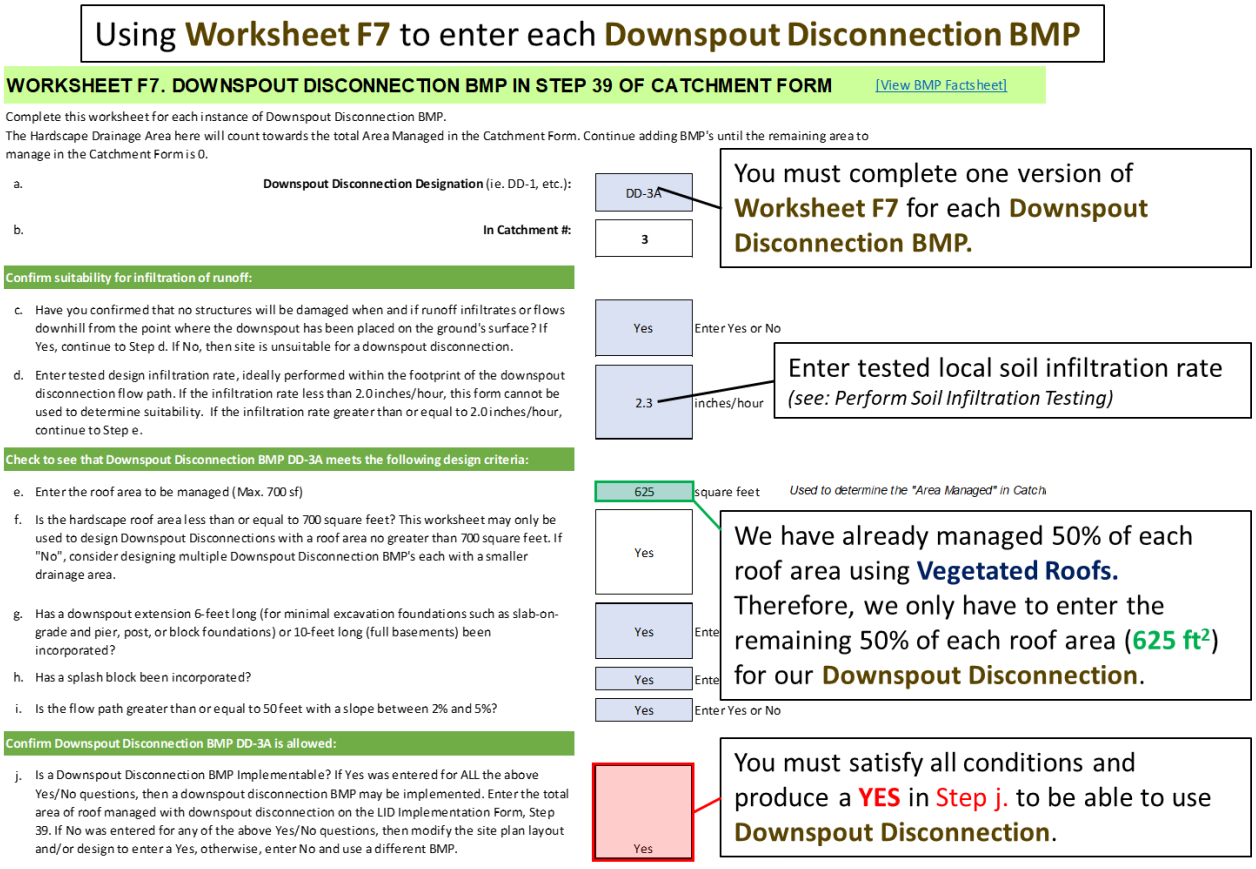
These houses are designed with Vegetated Roofs to partially manage the roof hardscape area. However, since there is no above-ground space for a BMP, we must move down the **Stormwater Management Hierarchy** and use Downspout Disconnections to fully manage our hardscape areas.



First, fill out Worksheet D1 for Porous Pavement (Rainfall) for each driveway like previous catchments (see Catchment #1 in the Introductory Tutorial for help).

Next, enter the hardscape area managed by **Vegetated Roof BMPs** directly into the Catchment Form. Note that although the Vegetated Roofs cover 5,000 ft^2, the Area Managed Equation only gives credit for 50% of this area (2,500 ft^2). We must add more BMPs to fully manage Catchment #3.

Then, open four separate versions of **Worksheet F7**; one for each **Downspout Disconnection BMP.** To open a duplicate form, click on the blue button in the Catchment Form again (you will be prompted to enter a unique name identifier). All the conditions in Worksheet F7 must be met for Downspout Disconnection to be possible in your location. In this case, although each roof area is 1,250 ft^2, 50% of this area is already managed by the Vegetated Roof, cutting our effective hardscape area to only 625 ft^2. Since we used multiple worksheets for this BMP, we must manually enter the total Area Managed of 2,500 ft^2 from all four Downspout Disconnection BMPs to the Catchment Form.



Catchment 4

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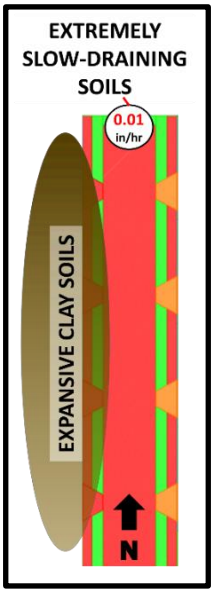
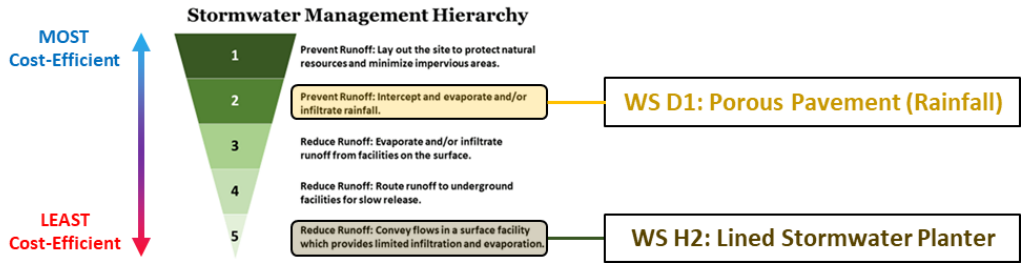
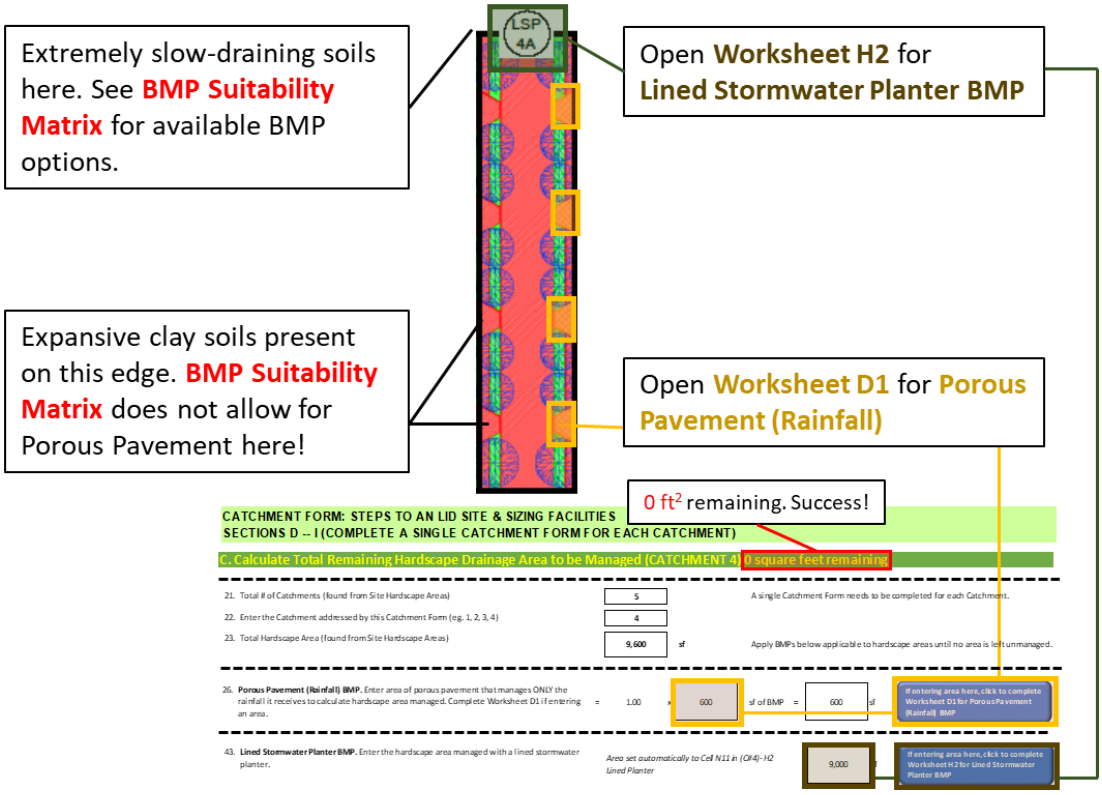
Catchment #4 contains street drainage area similar to Catchment #2. However, we have some challenging soil conditions here.



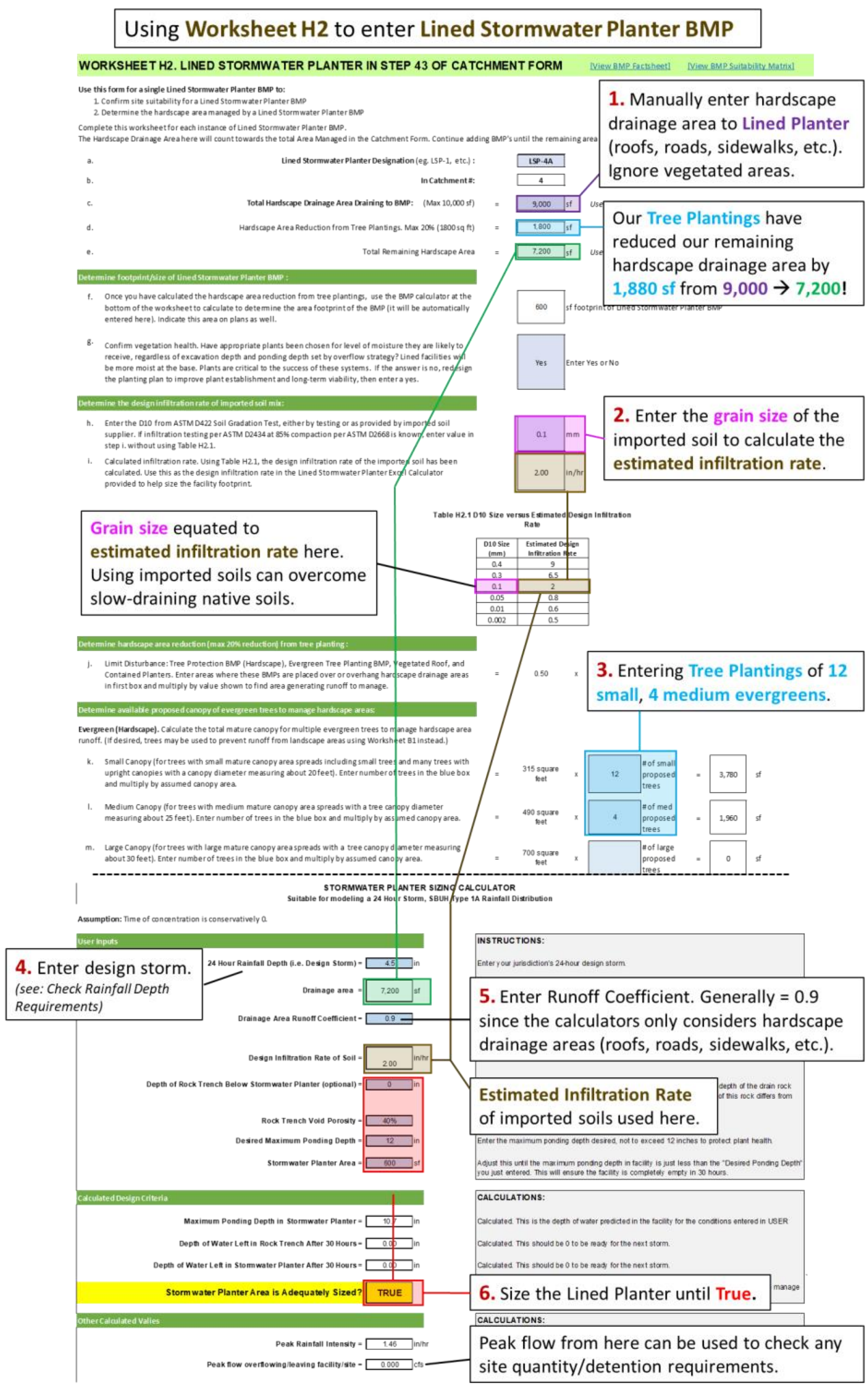


Infiltration testing revealed areas of Expansive Clay Soils and slow-draining soils. After consulting the **BMP Suitability Matrix**, the developers determined that they cannot use Porous Pavement for the driveways on the west side of the street due to the Expansive Clay Soils. Additionally, the developers were concerned because they already drew up plans to install a Green Infrastructure BMP in the area of slow-draining soils. Although towards the bottom of the **Stormwater Management Hierarchy**, the developers were able to design a Lined Stormwater Planter, using imported soils to overcome the native soil infiltration rate.



Like previous catchments, complete out Worksheet D1 for Porous Pavement (Rainfall) for the 4 driveways NOT within the Expansive Clay Soils BMP (see Introductory Tutorial for help).

The rest of the hardscape area is managed by the **Lined Stormwater Planter BMP** in **Worksheet H2**. In Worksheet H2, we enter the imported soil grain size, which equates to an estimated infiltration rate of 2.00 inches/hour. We calculate a Lined Stormwater Planter Footprint of 500 ft^2.



Catchment 5

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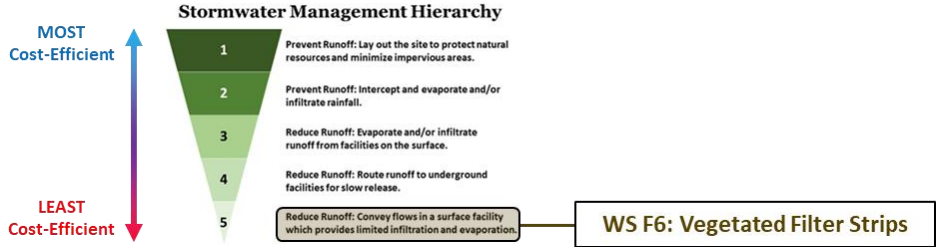
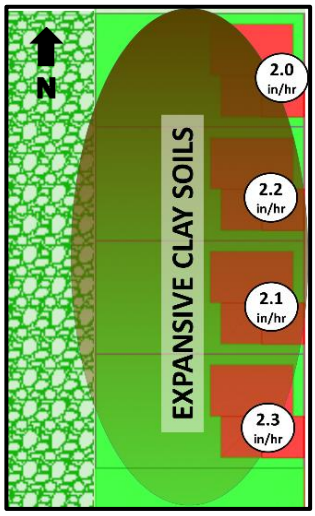
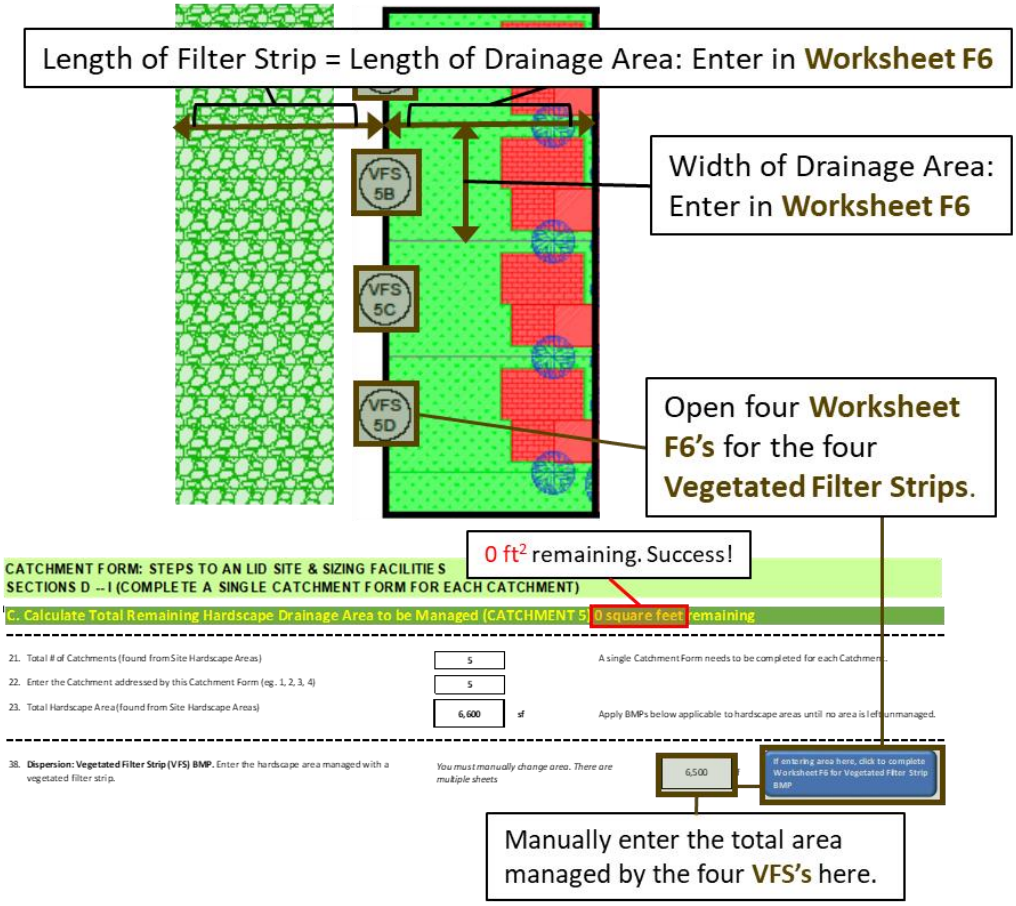
Catchment #5 contains the final row of houses. The site is challenging, with Expansive Clay Soils and little room for a BMP; the house lots back right up to a forest the developers are preserving.

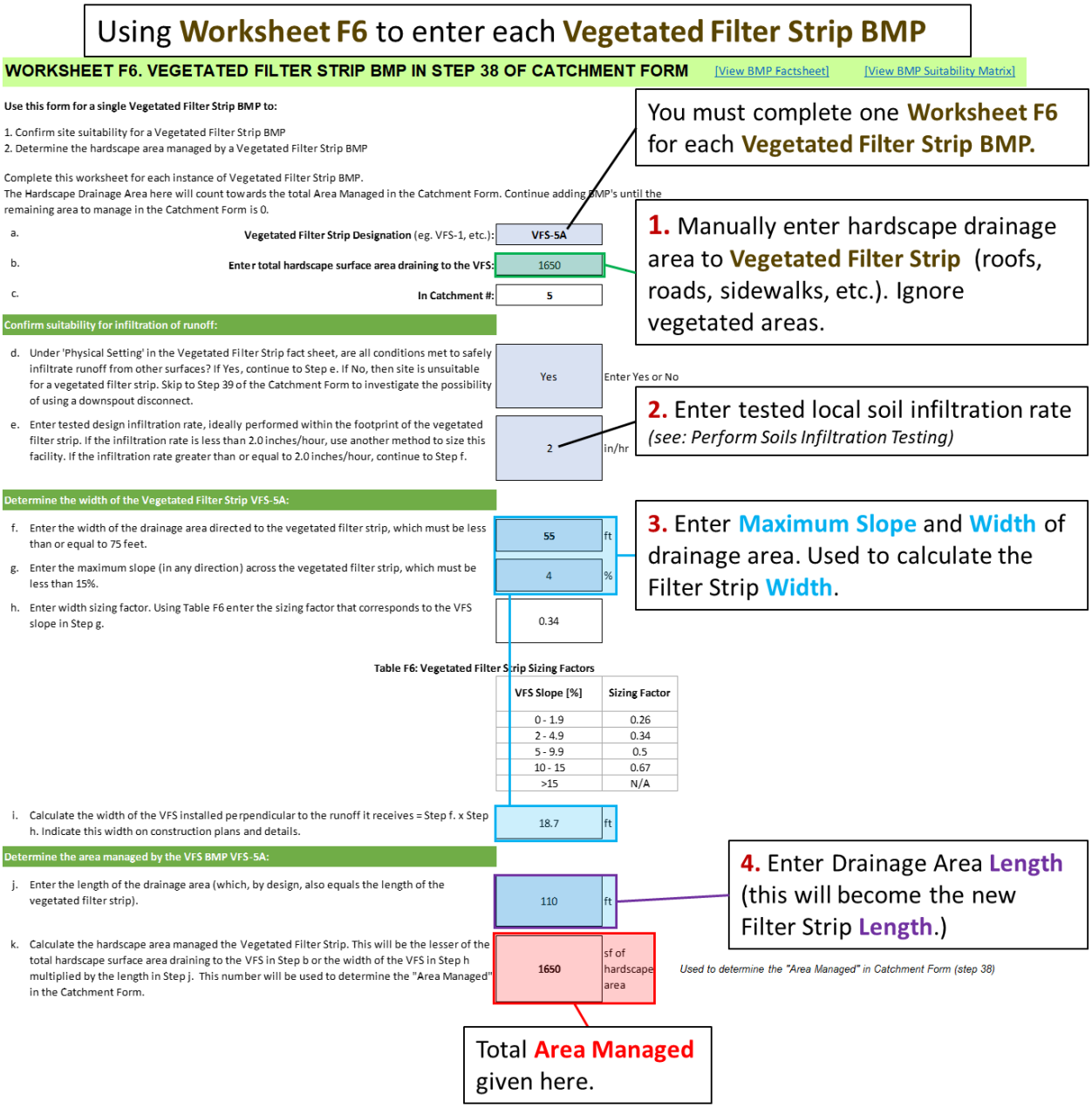




After consulting the **BMP Suitability Matrix**, the developers determined that a **Vegetated Filter Strip BMP** for each lot would be a good solution. Each Vegetated Filter Strip would sit along the western edge of the yard and use the adjacent forest as the filter strip area. Since we have Expansive Clay Soils, we cannot use Porous Pavement in Catchment #5.



We must fill out 4 iterations of **Worksheet F6**, one for each **Vegetated Filter Strip BMP**. The width (55') and length (110') of each filter strip drainage area match the dimensions of the lot. Our Filter Strips meet the conditions required in F6, so they are indeed feasible for this location.



We now have 0 square feet remaining on our Catchment Form. We have completely managed Catchment #5, and now, the entire site! Well done! You are now ready to tackle your own site!

See the Continued Tutorial: Redevelopment Site for an example of the GI Implementation Forms for an office redevelopment site using the Type II spreadsheet package in eastern Oregon.