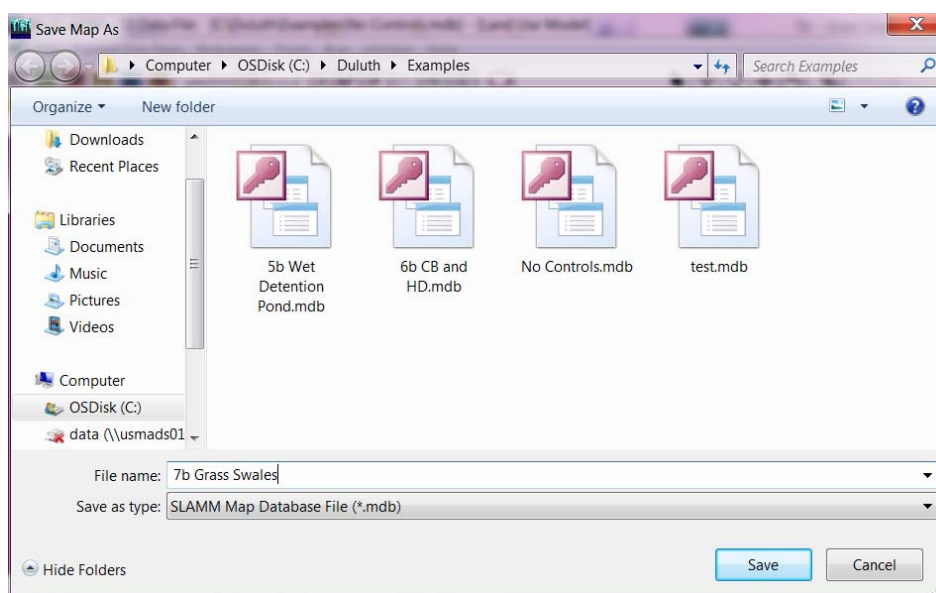


## Grass Swale Example

### Grass Swale Example

For this example, we will start with the model file we created for No Controls and add grass swales. All of the source areas in the Commercial 1 Land Use will be routed to the grass swales. A schematic of the project site and the grass swales can be found at the end of this document.

Open the No Controls model file and Save the File with a new name.



Change the Site Description in the Current File Data to reflect the grass swales.

Current File Data	
<b>SLAMM Data File Name:</b>	
C:\WinSLAMM\Training Courses\Madison 2012\Model Files\1b Grass Swales.mdb	
<b>Site Descript.:</b> Grass Swales, Commercial Development	
<b>Edit</b>	Seed: -42
<b>Edit</b>	Rain File: C:\Program Files\WinSLAMM v10\Rain Files\WisReg - Madison\WI 1981.RAN
<b>Edit</b>	Start Date: 01/01/81
<b>Edit</b>	End Date: 12/31/81
<input checked="" type="checkbox"/> Winter Season Range	
Start of Winter (mm/dd) 12/02 End of Winter (mm/dd) 03/12	
<b>Edit</b>	Pollutant Probability Distribution File: C:\Program Files\WinSLAMM v10\WI_GEO01.ppd
<b>Edit</b>	Runoff Coefficient File: C:\Program Files\WinSLAMM v10\WI_SL06 Dec06.rsv

## Grass Swale Example

Disconnect the map network and add the Grass Swale control measure. Reconnect the network.

The screenshot displays the WinSLAMM v10 software interface. The 'Land Use' table is visible on the left, and a map network diagram is shown on the right.

**Land Use Table:**

Source Area #	Source Area	Area (acres)	Source Area Parameters	First Control Practice	Second Control Practice
46	Large Landscaped Areas 1				
47	Large Landscaped Areas 3				
48	Large Landscaped Areas 4				
49	Large Landscaped Areas 5				
50	Large Landscaped Areas 6				
51	Small Landscaped Areas 1	0.830	Entered		
52	Small Landscaped Areas 2	0.500	Entered		
53	Small Landscaped Areas 3				
54	Small Landscaped Areas 4				
55	Small Landscaped Areas 5				
56	Small Landscaped Areas 6				
57	Undeveloped Areas 1				
58	Undeveloped Areas 2				
59	Undeveloped Areas 3				
60	Undeveloped Areas 4				
61	Undeveloped Areas 5				
62	Undeveloped Areas 6				
	<b>Other Areas</b>	0.000			
63	Playground 1				
64	Playground 2				
65	Playground 3				

**Land Use Table (continued):**

Land Use #	Land Use Type	Land Use Label	Land Use Area (acres)
1	Commercial	Commercial 1	7.290

**Control Practice Table:**

CP #	Control Practice Type	Control Practice Name or Location
1	Grass Swales	DS Grass Swales # 1

**Map Network Diagram:**

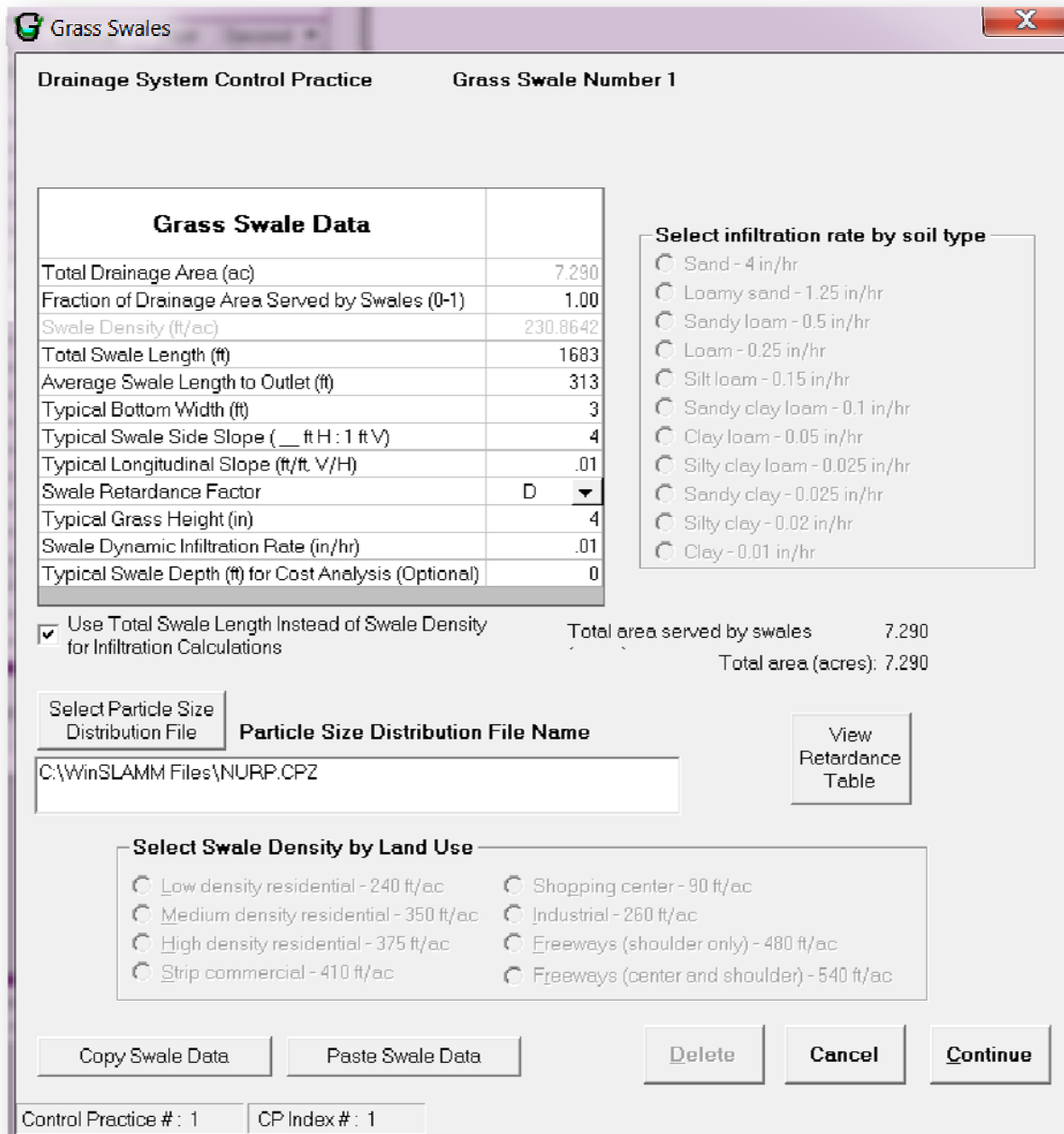
The diagram shows a network of land use areas and control practices. A red box labeled 'Commercial 1' is connected to a blue circle labeled 'Junction 2'. 'Junction 2' is connected to a green box labeled 'GS' (DS Grass Swales # 1). 'GS' is connected to a blue circle labeled 'Junction 1'. 'Junction 1' is connected to a green box labeled 'OUT' (Outfall).

**Current File Data Entered:** Total Area = 7.290 acres | No Upstream Source Areas | LU# = 1 | Index Number = 1 | Remaining Loops = 253 | Start Date: 01/01/81 | End Date: 12/31/81 | X = 2172

## Grass Swale Example

Double click on the Grass Swale label to open the form. Enter the data shown below.

*Note: when moving through the Grass Swale form, press the "Enter" key to move to the next cell, not the "Tab" key.*



The image shows a software window titled "Grass Swales" with a close button (X) in the top right corner. The window is divided into two main sections: "Drainage System Control Practice" and "Grass Swale Number 1".

**Grass Swale Data**

Total Drainage Area (ac)	7.290
Fraction of Drainage Area Served by Swales (0-1)	1.00
Swale Density (ft/ac)	230.8642
Total Swale Length (ft)	1683
Average Swale Length to Outlet (ft)	313
Typical Bottom Width (ft)	3
Typical Swale Side Slope (___ ft H : 1 ft V)	4
Typical Longitudinal Slope (ft/ft V/H)	.01
Swale Retardance Factor	D ▼
Typical Grass Height (in)	4
Swale Dynamic Infiltration Rate (in/hr)	.01
Typical Swale Depth (ft) for Cost Analysis (Optional)	0

**Select infiltration rate by soil type**

- ☐ Sand - 4 in/hr
- ☐ Loamy sand - 1.25 in/hr
- ☐ Sandy loam - 0.5 in/hr
- ☐ Loam - 0.25 in/hr
- ☐ Silt loam - 0.15 in/hr
- ☐ Sandy clay loam - 0.1 in/hr
- ☐ Clay loam - 0.05 in/hr
- ☐ Silty clay loam - 0.025 in/hr
- ☐ Sandy clay - 0.025 in/hr
- ☐ Silty clay - 0.02 in/hr
- ☐ Clay - 0.01 in/hr

☒ Use Total Swale Length Instead of Swale Density for Infiltration Calculations

Total area served by swales 7.290  
Total area (acres): 7.290

**Select Particle Size Distribution File**

Particle Size Distribution File Name  
C:\WinSLAMM Files\NURP.CPZ

**Select Swale Density by Land Use**

- ☐ Low density residential - 240 ft/ac
- ☐ Medium density residential - 350 ft/ac
- ☐ High density residential - 375 ft/ac
- ☐ Strip commercial - 410 ft/ac
- ☐ Shopping center - 90 ft/ac
- ☐ Industrial - 260 ft/ac
- ☐ Freeways (shoulder only) - 480 ft/ac
- ☐ Freeways (center and shoulder) - 540 ft/ac

Buttons: Copy Swale Data, Paste Swale Data, Delete, Cancel, Continue

Control Practice #: 1 CP Index #: 1

*Please Note: There must be no spaces prior to the filename and path shown in the Particle Size Distribution cell.*

## Grass Swale Example

Run the model.

### Results

Runoff Volume: 327,571 cu ft  
Runoff Volume Percent Reduction: 1.64 %  
Particulate Solids Concentration: 101.5 mg/L  
Particulate Solids Yield: 2,076 lbs  
Particulate Solids Percent Reduction: 16.16 %  
Rv (with controls): 0.39  
Approx. Urban Stream Classification: Poor  
Total Phosphorus: 6.24 lbs  
Total Phosphorus Percent Reduction: 12.3 %

Land Uses	Junctions	Control Practices	Outfall	Output Summary			
File Name: C:\2012 November Madison\Examples\1b Grass Swales.mdb							
<b>Outfall Output Summary</b>							
	Runoff Volume (cu. ft)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction	
Total of All Land Uses without Controls	333043		0.39	119.1	2476		
Outfall Total with Controls	327571	1.64 %	0.39	101.5	2076	16.16 %	
Current File Output: Annualized Total After Outfall Controls		328471	Years in Model Run:	1.00	2081		
Pollutant	Concentration - No Controls	Concentration - With Controls	Concentration Units	Pollutant Yield - No Controls	Pollutant Yield - With Controls	Pollutant Yield Units	Percent Yield Reduction
Total Phosphorus	0.3423	0.3052	mg/L	7.117	6.241	lbs	12.32 %
<div>Print Output Summary to Text File    Print Output Summary to .csv File    Total Area Modeled: 7.290</div>							
<b>Total Control Practice Costs</b>							
Capital Cost	N/A						
Land Cost	N/A						
Annual Maintenance Cost	N/A						
Present Value of All Costs	N/A						
Annualized Value of All	N/A						
<div>Perform Outfall Flow Duration Curve Calculations</div>							
<b>Receiving Water Impacts Due To Stormwater Runoff</b> (CWP Impervious Cover Model)							
				Calculated Rv	Approximate Urban Stream Classification		
Without Controls				0.39	Poor		
With Controls				0.39	Poor		

The pollution reduction reported at the outfall is the overall pollution reduction for the entire site.

To see the pollution reduction from just the grass swales, select the "Control Practices" tab.

## Grass Swale Example

Land Uses		Junctions		Control Practices		Outfall		Output Summary			
Runoff Volume		Part. Solids Yield (lbs)		Part. Solids Conc. (mg/L)		Summary Table					
Data File: C:\2012 November Ma											
Rain File: WisReg - Madison WI 1											
Date: 11-12-12 Time: 9:00:17 AM											
Site Description: Grass Swales											
Control Practice No.	Control Practice Type	Total Inflow Volume (cf)	Total Outflow Volume (cf)	Percent Volume Reduction	Total Influent Load (lbs)	Total Effluent Load (lbs)	Percent Load Reduction	Flow Weighted Influent Conc (mg/L)	Flow Weighted Effluent Conc (mg/L)	Percent Conc. Reduction	I N P (n)
1	Grass Swales	333043	327573	1.642	2476	2076	16.16	119.1	101.5	14.757	

The grass swales are reducing the runoff volume by 1.6% and the TSS load by 16%. Because there is only one control practice in the model and it is treating all of the source areas, the individual control practice output matches the output summary.



**Legend**

-  Grass Swales
-  Drainage Area

**WinSLAMM Model Example  
Project Area**

