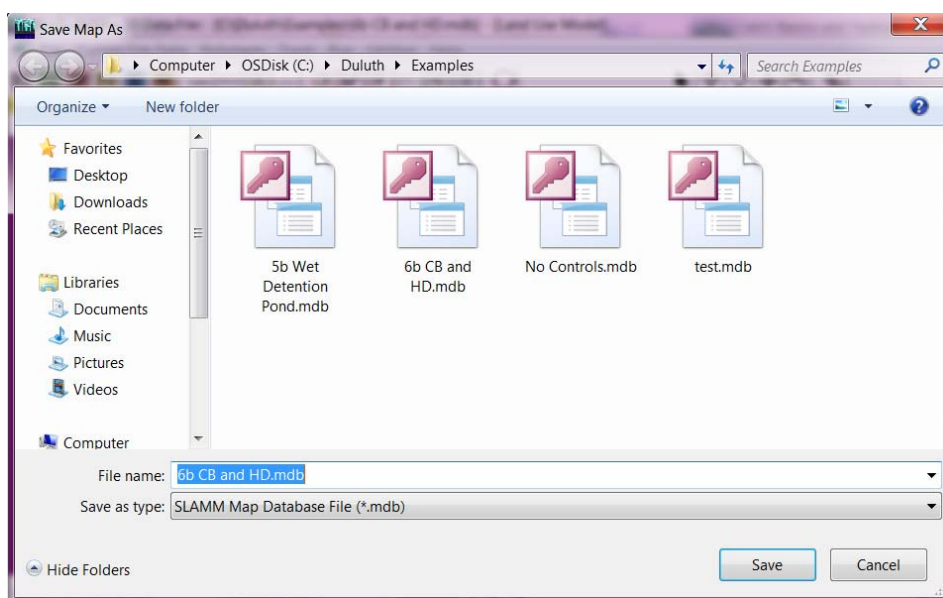


Catch Basins and Hydrodynamic Devices Example

Catch Basins and Hydrodynamic Devices Example

For this example, we will start with the model file we created for No Controls and add Catch Basins to treat runoff from a portion of the parking lot and a Hydrodynamic Device to treat the remainder of the runoff from the parking lot. A figure showing the locations of the Catch Basins and Hydrodynamic Device 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 Catch Basins and Hydrodynamic Device.

Current File Data	
SLAMM Data File Name:	
<input type="text" value="C:\WinSLAMM\Training Courses\Madison 2012\Model Files\1g 1h CB and HD.mdb"/>	
Site Descript.: <input type="text" value="Catch Basins and Hydrodynamic Devices, Commercial Development"/>	
Edit	Seed: <input type="text" value="-42"/>
Edit	Rain File: <input type="text" value="C:\Program Files\WinSLAMM v10\Rain Files\WisReg - Madison\WI 1981.RAN"/>
Edit	Start Date: <input type="text" value="01/01/81"/>
Edit	End Date: <input type="text" value="12/31/81"/>
<input checked="" type="checkbox"/> Winter Season Range	
Start of Winter (mm/dd) <input type="text" value="12/02"/> End of Winter (mm/dd) <input type="text" value="03/12"/>	
Pollutant Distribution File: <input type="text" value="C:\Program Files\WinSLAMM v10\Rain Files\WisReg - Madison\WI 1981.RAN"/>	

Catch Basins and Hydrodynamic Devices Example

Both the Catch Basins and the Hydrodynamic Device will be modeled as Source Area Control Measures. They will each treat a different part of the Parking Lot source area, therefore, the Parking Lot source area needs to be split into the appropriate areas. The Catch Basins will treat 0.90 acres and the Hydrodynamic Device will treat 1.95 acres.

The screenshot displays the WinSLAMM v 10 software interface. The left pane shows the 'Land Use' data for 'Commercial 1'. The 'Source Area' table lists various land use types, with 'Parking' areas highlighted in red. The 'Land Use' table shows 'Commercial 1' with a total area of 7.290 acres. The right pane shows a network diagram with a 'Commercial 1' node connected to 'Junction 1', which is then connected to an 'Outfall' node.

Source Area #	Source Area	Area (acres)	Source Area Parameters	First Control Practice	Second Control Practice
Roofs					
1	Roofs 1	0.680	Entered	-	-
2	Roofs 2	0.600			
3	Roofs 3				
4	Roofs 4				
5	Roofs 5				
6	Roofs 6				
7	Roofs 7				
8	Roofs 8				
9	Roofs 9				
10	Roofs 10				
11	Roofs 11				
12	Roofs 12				
Parking					
13	Paved Parking 1	1.950	Entered	-	-
14	Paved Parking 2	0.900	Entered	-	-
15	Paved Parking 3				
16	Paved Parking 4				
17	Paved Parking 5				
18	Paved Parking 6				
19	Unpaved Parking 1				

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

CP # Control Practice Type Control Practice Name or Location

Current File Data Entered | Total Area = 7.290 acres | No Upstream Source Areas | LU# = 1 | Index Number = 1 | Remaining Icons = 2/3 | Start Date: 11/10/10 | End Date: 12/10/10 | X = 21000

Catch Basins and Hydrodynamic Devices Example

Select the Catch Basin control measure from the Source Area Control Measure pull-down menu next to the appropriate Parking Lot source area. This will open the Catch Basin form.

The screenshot shows the WinSLAMM v10 software interface. The 'Land Use' table is visible on the left, and a 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
Roofs					
1	Roofs 1	0.680	Entered		
2	Roofs 2				
3	Roofs 3				
4	Roofs 4				
5	Roofs 5				
6	Roofs 6				
7	Roofs 7				
8	Roofs 8				
9	Roofs 9				
10	Roofs 10				
11	Roofs 11				
12	Roofs 12				
Parking					
13	Paved Parking 1	1.650	Entered		
14	Paved Parking 2	0.900	Entered	WP	
15	Paved Parking 3			HD	
16	Paved Parking 4			OD	
17	Paved Parking 5			BF	
18	Paved Parking 6			CI	
19	Unpaved Parking 1			PP	
Land Use Summary					
Land Use #	Land Use Type	Land Use Label			Land Use Area (acres)
1	Commercial	Commercial 1			7.290

The network diagram on the right shows a flow from 'Commercial 1' (represented by a red square icon) through 'Junction 1' (represented by a circle icon) to an 'Outfall' (represented by a green square icon labeled 'OUT').

The status bar at the bottom indicates: Current File Data Entered, Total Area = 7.290 acres, No Upstream Source Areas, LU# = 1, Index Number = 1, Remaining Icons = 253, Start Date: 01/01/81, End Date: 12/31/81, X = 12.

Catch Basins and Hydrodynamic Devices Example

Enter the data shown below.

There are 3 - 2' x 3' catch basins with a 2 foot sump below the invert of the outlet storm sewer. The catch basins sumps are in the inlets to the storm sewer. We are assuming each catch basin treats its own area – therefore the catch basins are in “parallel”, not in series. If the catch basins were in series, the map would need to be set up differently.

Note: when moving through the Catch Basin form, press the “Enter” key to move to the next cell, not the “Tab” key.

Catchbasin Control Device

First Source Area Control Practice
Land Use: Commercial 1
Source Area: Paved Parking 2

1. Fraction of drainage area served by catchbasins (0 - 1):	1.000	7. Typical outlet pipe slope (ft/ft):	0.020
<input type="radio"/> 2a. Catchbasin density (cb/ac):		8. Typical catchbasin sump surface area (sf):	6.0
<input checked="" type="radio"/> 2b. Number of Catchbasins:	3	9. Catchbasin Depth from Sump Bottom to street level (ft):	6.0
3. Average sump depth below catchbasin outlet invert (ft):	2.00	10. Inflow Hydrograph Peak to Average Flow Ratio	3.8
4. Depth of sediment in catchbasin sump at beginning of study period (ft):	0.00	11. Leakage rate through sump bottom (in/hr)	0.00
5. Typical outlet pipe diameter (ft):	1.00	12. <input type="button" value="Select"/> Critical Particle Size file name:	
6. Typical outlet pipe Manning's n:	0.013	C:\WinSLAMM Files\NURP.CPZ	

Typical Catchbasin Densities

<input type="radio"/> Low density residential (0.25 inlets/acre)	<input type="radio"/> Shopping center (1.2 inlets/acre)
<input type="radio"/> Medium density residential (0.5 inlets/acre)	<input type="radio"/> Industry (0.8 inlets/acre)
<input type="radio"/> High density residential (1 inlet/acre)	<input type="radio"/> Freeways (1 inlet/acre)
<input type="radio"/> Strip commercial (1.2 inlets/acre)	

Catchbasin Cleaning Dates

Catchbasin Cleaning No.	Catchbasin Cleaning Date (mm/dd/yy)
1	
2	
3	
4	
5	

Select

☒ **Catchbasin Cleaning Frequency**

<input type="radio"/> Monthly
<input type="radio"/> Three Times per Year
<input type="radio"/> Semi-Annually
<input checked="" type="radio"/> Annually
<input type="radio"/> Every Two Years
<input type="radio"/> Every Three Years
<input type="radio"/> Every Four Years
<input type="radio"/> Every Five Years

Control Practice #: 1 Land Use #: 1 Source Area #: 14

Check that the file name and path for the particle size distribution are correct.

Next, enter the Hydrodynamic Device that treats the remainder of the Parking Lot runoff. Click on the Commercial 1 Land Use label. Next to the appropriate Parking Lot Source Area, use the pull-down menu to select the Hydrodynamic Device.



Catch Basins and Hydrodynamic Devices Example

Enter the data shown below. We are modeling one 5-diameter hydrodynamic device with a 5-foot deep sump. The device can overflow 2 feet above the top of the sump.

Hydrodynamic Device

First Source Area Control Practice

Hydrodynamic Device Number 1

Land Use: Commercial 1

Source Area: Paved Parking 1

Hydrodynamic Control Device General Information - Enter for Both Single Chamber and Proprietary Devices

Total Source Area (ac)	1.950
Area Served by Device (ac)	1.95
Number of Devices	1
Device Density (units/ac)	0.513

Select Critical Particle Size file name.

C:\WinSLAMM Files\NURP.CP2

☐ Model Hydrodynamic Device with Lamella Plates or Settling Tubes

Fraction of device area with plates or tubes	
Average tube diameter or distance between plates (ft)	
Number of plates or tubes a vertical line will intersect	

For Device Cleaning, Select Either

Device Cleaning Dates

Device Cleaning No.	Device Cleaning Date (mm/dd/yy)
1	
2	
3	
4	
5	

☒ Device Cleaning Frequency

☐ Monthly
 ☐ Three Times per Year
 ☐ Semi-Annually
 ☒ Annually
 ☐ Every Two Years
 ☐ Every Three Years
 ☐ Every Four Years
 ☐ Every Five Years
 ☐ Never

Single Chamber Device Characteristics

1 - Average Sump Depth below Device Outlet Invert (ft)	5.00
Depth of Sediment in Device at Beginning of Study Period (ft)	0.00
2 - Typical Outlet Pipe Diameter (ft)	1.00
Typical Outlet Pipe Manning's n	0.013
3 - Typical Outlet Pipe Slope (ft/ft)	0.0200
Typical Device Sump Surface Area (sf)	19.3
4 - Device Depth from Sump Bottom to Street Level (ft)	10.00
Inflow Hydrograph Peak to Average Flow Ratio	3.8
5 - Minimum Allowable Scour Depth Below Outlet Invert (ft)	1.0
Maximum Flow to In-Line Sump (cfs)	N/A - Click to Activate
6 - Diameter of Orifice that Controls Flow to In-Line Sump (ft)	1.00
7 - Inflow Orifice Invert Elevation (ft)	6.00
8 - Length (ft) of Overflow Structure Acting as a Sharp-Crested Weir	4.00
9 - Elevation of Overflow Structure to Bypass In-Line Sump (ft above sump base)	7.00

Or Use Proprietary Hydrodynamic Control Device Information

Manufacturer - Model

1 - Average Sump Depth below Device Outlet Invert (ft)	
Depth of Sediment in Device at Beginning of Study Period (ft)	
2 - Typical Outlet Pipe Diameter (ft)	
Typical Outlet Pipe Manning's n	
3 - Typical Outlet Pipe Slope (ft/ft)	
Inflow Hydrograph Peak to Average Flow Ratio	
5 - Minimum Allowable Scour Depth Below Outlet Invert (ft)	
Device Sump Surface Area (sf)	

Delete Control

Cancel

Continue

Control Practice #: 2

Land Use #: 1

Source Area #: 13

Catch Basins and Hydrodynamic Devices Example

Run the model.

Results

Runoff Volume: 333,045 cu ft
Runoff Volume Percent Reduction: 0 %
Particulate Solids Concentration: 106.5 mg/L
Particulate Solids Yield: 2,214 lbs
Particulate Solids Percent Reduction: 10.6 %
Rv (with controls): 0.39
Approx. Urban Stream Classification: Poor
Total Phosphorus: 6.7 lbs
Total Phosphorus Percent Reduction: 5.2 %

Land Uses	Junctions	Control Practices	Outfall	Output Summary			
File Name: C:\2012 November Madison\Examples\1g_1h Catchbasins and Hydrodynamic Devices.mdb							
Outfall Output Summary							
	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	333045	0.00 %	0.39	106.5	2214	10.58 %	
Current File Output: Annualized Total After Outfall Controls		333960	Years in Model Run:	1.00	2220		
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	0.3244	mg/L	7.117	6.745	lbs	5.22 %
<div>Print Output Summary to Text File Print Output Summary to .csv File Total Area Modeled: 7.290</div> <div>Total Control Practice Costs 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> <div>Receiving Water Impacts Due To Stormwater Runoff (CWP Impervious Cover Model) Without Controls: Calculated Rv 0.39, Approximate Urban Stream Classification Poor With Controls: Calculated Rv 0.39, Approximate Urban Stream Classification Poor</div> <div>Perform Outfall Flow Duration Curve Calculations</div>							

The pollution reduction reported at the outfall (on the Output Summary Tab) is the overall pollution reduction for the entire site.

Review the Control Practices tabs to see the pollution reduction each control measure achieves.

Catch Basins and Hydrodynamic Devices 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 Mayd Hydrodynamic Devices.mdb										
Rain File: WisReg - Madison WI 1										
Date: 11-12-12 Time: 9:24:26 AM										
Site Description: Catchbasins and										
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
1	Catchbasin Cleaning	68315	68315	0	554.4	457.7	17.44	130.0	107.3	17.446
2	Hydrodynamic Device	148016	148016	0	1201	1037	13.66	130.0	112.2	13.701

The catch basins are reducing the pollution load from their Parking Lot sources by 17.4%. The Hydrodynamic Device is reducing the pollution load from its Parking Lot source area by 13.7%.

Legend



Catch Basin



Hydrodynamic Device



Catch Basin Drainage Areas



Drainage Area

**WinSLAMM Model Example
Project Area**

