

Frequently Asked Questions

Purchase, Download, and Installation

Need Password (July 2006)

Q. I just downloaded the zip file for a program update from the website and I need a password to extract the files. Where do I get the password from?

A. If you purchased a new or renewal license within the past year, you should have received an email regarding the program update with the password. If you purchased a new or renewal license more than a year ago, you will need to purchase a new or renewal license. If you did not receive the password, but believe you should have, please contact us.

Preview Software before Purchase (March 2007)

Q. Before buying this software I would appreciate seeing an example the input and output. Can you provide examples of the WinSLAMM input / output for my review?

A.

- The website contains information and examples for WinSLAMM.
- Training opportunities are available. Refer to the Training Page on the website.
- Dr. Pitt's research website also contains many examples of model use, such as: WinSLAMM and LID Pitt MD 2004.pdf

decision analysis Pitt and Voorhees James 2006.pdf

License Renewal Policy (December 2008)

Q. How do I know if I am eligible for a free version upgrade?

A. Review the License Renewal Policy posted on the website. Contact us if you do not have the date of purchase.

Renewal License (January 2009)

Q. If I am operating on version 8.4 do I need a renewal or whole new license to be on the current version?

A. The renewal refers to the time that has lapsed since the last purchase, not the physical program. If the last purchase was between 1 and 3 years ago, then the fee is \$150 plus the applicable handling and taxes listed on the order form to renew the license. If the last purchase was more than 3 years ago, then the fee is \$300 plus the applicable handling and taxes.

When you purchase a new or update license, you will then receive a CD with the entire software package (program, supporting files, documentation, etc).

Then, for the next year after the date of purchase, you will receive an email with instructions for downloading upgrades that occur to the model for no cost.

International Customers (December 2006)

Q. I am looking to purchase licenses of WinSLAMM and WinDETPOND. I am located outside of the USA. Is this an issue?

A. At times it can be difficult to send software outside of the USA. There are two options:

1. Send them via a shipping company such as Federal Express or the UPS. This option requires an additional 25% payment due to the additional effort and cost for international shipping.
2. Put all the files into a password protected zip file on our website. You download them, and once they are downloaded, we remove them from the website. With this option, the additional 25% for international orders is not required.

Send the completed order form and check for the appropriate fees, along with the preferred option for receipt of the software package.

Extension of Free Upgrade Period (March 2007)

Q. I am requesting a password for a free update of the latest version of WinSLAMM.

I purchased the program about 13 months ago and would appreciate a one time exception to the 1-year policy because it is so close.

A. We appreciate efforts to keep business costs as low as possible. However, we have worked very hard on the program over the years that it has been available, and believe we should be compensated for that. Our pricing is also very low - in part so that small engineering shops can afford to use it - and given the number of units that we sell, does not come close to covering the time we have spent on the program. We therefore do not provide exceptions to the 1-year policy.

Invoices (April 2007)

Q. Will PV and Associates, LLC provide invoices? We would like to purchase a copy of WinSLAMM but in order for our accounting department to issue a check I need an invoice, would you be able to email one to me?

A. Yes, PV and Associates will provide invoices. Please fill out the order form, mail (or e-mail) it to us with the request for an invoice, and we will send you an invoice. Once you receive the invoice, please mail the check with a copy of the order form and we will mail you the software package.

Credit Cards (April 2007)

Q. Does PV and Associates, LLC accept credit cards?

A. No, PV and Associates does not accept credit cards at this time. We researched providing that option for payment. We felt the cost to provide that option is more than we want to spend to obtain the option.

Purchase Orders (April 2007)

Q. Does PV and Associates, LLC accept purchase orders?

A. PV and Associates, LLC accepts purchase orders on a very limited basis. If your situation requires a purchase order, please contact us.

Refund Policy (January 2007)

Q. What is PV and Associates, LLC refund policy?

A. PV and Associates, LLC will grant a refund of the cost of the software within 30 days of the date of purchase if a purchaser of the software believes the software does not perform as documented. We have always responded to (and welcomed) suitably documented error reports and have made every effort to correct legitimate problems. However, we do expect the user to use the available help and documentation tools for the program, as we cannot provide unlimited technical support or consulting. In all cases, our liability is limited to the cost of the software license.

Documentation and Help File Location (November 2007)

Q. I recently received WinSLAMM CD and installed the program. I cannot locate the PDF files mentioned in the letter. Besides the help screen, is there a tutorial, or at some written documentation that could lead me through a computational process?

A. There are many forms of documentation available for the program.

- On the CD there is a folder called "WinSLAMM\Documentation" that has the .pdfs of the documentation.
- The Help File for the program is the most up to date documentation for the model. To access that, just press 'F1' from anywhere in the program.
- User's Guides can be downloaded from the website for the most current version of the program.
- There are also many example .dat files that are installed with the program into the c:\program files\winslamm folders.
- For training courses, refer to the website.

WinSLAMM Source Code (July 2007)

Q. I am working on some modifications to the EPA Storm Water Management Model (SWMM). As part of this effort, I am very interested in reviewing the source code for SLAMM/WinSLAMM as well as SSIP. Is it possible to obtain these and, if so, how can I go about such.

A. We don't typically distribute the source code for the model, as we have spent many years and many hours developing it, with minimal outside funding. We do have

extensive documentation for the model available directly from our web site - www.winslamm.com.

Installing an Updated Version of the Program (September 2007)

I am installing the updated version of the program. I have the following questions:

Q1. Should I leave all other files in the c:\Program Files\WinSLAMM directory and subdirectories in place and move ONLY the winslamm.exe and winslamm.hlp files?

Q2. Should I overwrite only winslamm.exe and winslamm.hlp with the newly extracted files of the same name - again leaving all the original supporting files in the directory c:\Program Files\WinSLAMM untouched?

Q3. Does it matter what version of WinSLAMM I am upgrading from?

A1. Yes, make a copy of only the files you are replacing and put them in a separate folder labeled by the version number you are replacing. The files contained in the zip file are the executable (winslamm.exe), the Help File (winslamm.hlp), and the log file (winslammlog.txt). PVA does not limit the number of versions allowed on a User's computer.

A2. Extract the zip file into your C:\program files\winslamm directory and it will only overwrite the three files listed above.

A3. It does not matter what version is being updated. Check the USGS Wisconsin website for updated parameter files.

'File Not Found' or 'Path Not Found' Error (April 2008)

Q. I installed WinSLAMM on a new computer. When I try to run the files, I get errors that it cannot find the parameter files.

A. Most likely the existing WinSLAMM data files have the paths to the parameter files pointing to a different location than they are currently stored. Verify the path listed in the WinSLAMM data file against the parameter file locations. If they differ, modify the WinSLAMM data file or change the file location. The default location for the parameter files is C:\Program Files\WinSLAMM directory.

MSFLXGRD.OCX Error (December 2006)

Q. I am trying to open WinSLAMM, and it says that I am missing the file MSFLXGRD.OCX. I currently have the file MSHFLXGD.OCX. I am not able to open the program, and this is the message it says:

"Run-time error '339': Component 'MSFLXGRD.OCX' or one of its dependencies not correctly registered: a file is missing or invalid."

Should I erase all of the WinSLAMM files and setup all of the files again?

A. Most likely WinSLAMM was not properly installed or the .ocx file has become corrupted. Uninstall the program and then reinstall it. Contact us if this does not correct the problem.

Number of Computers Program can be Installed on (February 2007)

Q. How many computers can a single license be installed on?

A. The number of licenses an entity owns is not tied to the number of computers it is loaded on, but the number of users. The program can be loaded on as many computers as needed in a single office location. However, each office location should own the number of licenses for the number of users using the program simultaneously. Additionally, licenses are not transferable between office locations.

Updating WinSLAMM Data Files

Automatic File Version Update (April 2008)

Q. When I open some of the standard land use files it tells me the file was created using WinSLAMM version 9.0 and asks me if I want to go to the File Update window to upgrade the file to the current version or cancel the file open operation. I am not sure what to select. After this, the .dat file update information comes up and there are two tabs: Version 9.1 to version 9.2 and Version 9.0 to Version 9.1. Can you help me upgrade these files and if I should re-name them or not?

A. Depending upon how many you have, it could be tedious to rename each one. Instead, create two folders in your project directory. Name the first "SLU Files v9_0" and the second "SLU Files v9_2". Put a copy of the files in each. This way you will always have an original copy – the "SLU Files v9_0" files - should you accidentally make a mistake. Then make sure you always open your file from the new version directory - the "SLU Files v9_2" folder.

While you are in the Update tab, check the box next to "Do Not Show Rename File Option". That will suppress the message that pops up asking you to rename the file. As long as you're always taking the files from the new version directory, you won't have to worry about renaming it.

Enter in the information for all tabs. Each tab adds the needed variables to upgrade them to the most current version you are running. The Batch Processor has the ability to update a large group of files at once.

Updating File Version in a Group using the Batch Editor (December 2008)

To update all the files as a group, go to Run/Run Batch Editor . . . , and select the 'Run a Set of .dat Files' button. Select the directory where you have the files you want to process, and then add all listed files to the run list. Select the '.DAT File Batch Changes' button, select the 'Process File List with Changes' radio button in the lower left hand corner, and then select the "Process Files" button.

Parameter Files

Reference Files versus Project Specific Files (January 2007)

Q. What files are created during a WinSLAMM model run and what files are used as reference files only?

A. The only files that will be created and changed per-project are the WinSLAMM Data Files (*.dat) and whatever other detailed output files you select. The other files, i.e.: Pollutant Probability Distribution File, Street Delivery File, etc.; are “reference only” files that will not change on a per-project basis. They may be re-calibrated and thus change as new versions of the model are released, but they will not change during a model run.

Supporting (or Parameter) File Location (January 2007)

Q. Is there a setting from within WinSLAMM that I can indicate/point to where the “default” data file will be located so the end user doesn’t have to browse for it each time?

A. No.

Creating a Rainfall File (December 2008)

Q. How do you create a rainfall file that can be used in WinSLAMM?

A. Rainfall files are a text file in the following format:

First row: Total number of events

Second row and beyond: Rain Event Data

The Rain Event Data is as follows:

“Start Date”, “Start time (in military format)”, “End Date”, “End time (also in military format)”, “Total Rain Depth (in inches)”

The following is an example of a rainfall file:

```
5
"05/01/88", "00:00", "05/01/88", "13:00", "2.5"
"06/01/88", "02:00", "06/01/88", "02:00", "3.0"
"07/01/88", "05:30", "07/01/88", "20:00", "3.5"
"08/01/88", "01:00", "08/01/88", "16:00", "4.0"
"09/01/88", "17:45", "09/01/88", "23:45", "4.5"
```

Enter the rainfall data in the above format. Save the file with a “.ran” extension. A rainfall file can also be created automatically from EarthInfo CD-ROMS using the Rainfall File Utility Editor in WinSLAMM.

Rainfall Data Source (April 2009)

Q. What is the source for the rainfall data files in WinSLAMM? Does the data come from NOAA or a mix of sources?

A. We use the NOAA data as published on the EarthInfo CD ROMs for almost all of the rain files distributed with the program. We usually can get several decades of rainfall info for many sites in a state with no apparent missing records. WinSLAMM has utilities that assist in importing and reformatting this data, and in analyzing the rains to obtain typical patterns. For research sites, where we have our own rainfall records from tipping bucket gages, we import that data. For some of the international sites (South Africa and New Zealand, for example), the rain data are from the local climatic agencies.

Winter Season Date Range (August 2009)

Q. For clarification purposes, is it a correct alternative to checking off the box for Winter Date Range and entering the dates to just set the start and stop dates to the winter range?

A. The two alternatives are not equivalent. The winter date exclusion option activates an increased load in the street cleaning subroutine at the end of the winter season, while the option you've attached does not. Our understanding is that the WDNR requires that a user in Wisconsin use the winter date range, so the second alternative does not meet the WDNR requirement. The winter season option should actually improve the performance of a street cleaner because there is, at the end of the winter season, a greater street dirt loading on the street, which the cleaner can then remove. If the loading on the street is lower, which would occur if the winter season option were not selected, then the removal rates are less.

Winter Season Date Range Continued (June 2007)

Q. We are experiencing a problem when we apply the winter range. For some reason when we apply the recommended winter range (12/02 to 03/12), we see a reduction in total phosphorous as compared to the same WinSLAMM model with no winter season range applied. This reduction, as expected, was from 663.9 to 637.4 lbs. But, when we reduce the winter season range from 12/02 to 02/12 we are experiencing an increase in total phosphorous from the no winter range WinSLAMM model from 663.9 to 693.0 lbs. Is this because the Wisconsin data that we used in our model is only calibrated to the specified winter season range of 12/02 to 03/12?

A. When you check the winter season option, you are by default increasing the initial street load at the start of every spring higher than if the winter season box is not checked. This was done by the DNR to attempt to match the existing data more closely. Without the checked box, the initial loading is much lower. It is low enough, in fact, to not provide enough mass to compensate for the additional events in the model run, which is why you were seeing the results you found from the three model runs.

To see more detail in the model runs, go to Tools/Default Model Options and select the "Washoff or Street Cleaning Detail File", which provides the details that go into the calculations for each event for street dirt accumulation, washoff and cleaning.

Choosing the Appropriate Street Delivery File (November 2007)

Q. I am reviewing a stormwater model for a proposed development, and I am trying to determine which WinSLAMM file for Street Delivery Parameter file would be most appropriate for the development – the Residential and Other Urban file or the

Commercial, Institutional, and Industrial file. Do you have any guidelines on when to use each file, particularly when the development has mixed uses? The development I am reviewing is a mixture of condominiums, indoor water parks, and outdoor recreation spaces including some woodlands.

A. For a study area with several land uses, each street delivery file should be added for each land use. Do not press the "Change all street delivery files to match the current file". Go through and tab each street delivery file that corresponds to the land use files you have and then use the edit button to make sure the path is clear.

Parameter Files (February 2007)

Q. Where do you get the pollutant probability distribution, runoff coefficient, particulate solids concentration, and the particulate residue delivery files? How are they developed?

A. These are all supplied with the model, but are user accessible. They were developed after calibration and verification mostly in WI and in AL, and found to work well in other areas. Dr. Pitt prepared a couple of summary chapters for Bill James that summarizes our source area data, for example. The papers are:

- Street dirt accum and washoff Pitt et al James 2004
- Pollutant sources part 1 Pitt et al James 2004
- Pollutant sources part 2 Pitt et al James 2004
- Pollutnat sources appendix Pitt et al James 2004

Pollutants

SSC vs TSS in WinSLAMM (November 2007)

Q. In the new study, I will getting field measurements of total rainfall, total runoff, and total particulate loading for up to three storms for one of the 5 areas to calibrate the model for that area and then use for the other 4 area models. All the WinSLAMM literature I've reviewed talk about "particulates". However, I'm not sure in sampling terms what this means. Is it the equivalent of total suspended solids? As you can see, I need to give my samplers guidance on what parameters to test for and I realize I have a disconnect here. Is it appropriate then in discussing WinSLAMM results to equate particulates in WinSLAMM with SSC from the lab?

A. We have always used SSC lab methods and not pipette TSS methods. We strongly recommend using a USGS/Decaport cone splitter to processes the samples, and not shaking/pouring or pipetting. Sampling of particulate-laden stormwater should be in areas of very well-mixed flows. One way is to sample where the water cascades into a small container where the sampler inlet is. If using a typical inlet near the bottom of a pipe, you may have stratification of particulates. Bed load sampling is also recommended, if possible. In general, "particulate solids" in WinSLAMM does equate to SSC in the lab.

WinSLAMM Output – TSS (September 2007)

Q. I want to verify that we are reading the output of SLAMM correctly.

When we run a file:

The Particulate Solids Yield (lbs) is 1,722 lbs.

The Filterable Solids Yield is 7,629 lbs.

The Total Solids Yield is 9,351 lbs.

Which number represents the dissolved portion of the TSS?

A. Assuming you are using the WI_GEO01.ppd pollutant probability distribution file developed by the WDNR, the filterable number is also known as the dissolved number (or TDS - Total Dissolved Solids). This represents anything that passes through a 0.45 micron filter.

In general, the Particulate Solids Yield represents Total Suspended Solids (TSS). However, check with the local regulatory agency to determine the type of Solids that should be used to comply with regulatory requirements.

Fecal Coliform or E. Coli (February 2007)

Q. Does the software include fecal coliform or E. coli. as pollutants that can be modeled?

A. Some of our included pollutant files contain fecal coliform data. If you have the source area data, you can create your own (for E. coli., for example). See the following summary paper and thesis for some of our recent research on urban bacteria:

- Bacteria levels wet weather vs dry weather Suman and Pitt WEFTEC 2004
- Student Thesis/Shergill Bacteria sources thesis

Modeling Pollutants not Available in WinSLAMM

Q. We are currently working on a rain harvesting project in Northern Jersey. We have been using your WinSLAMM program to analyze various pollutant loadings. We would like to know if it would be possible to add a few other pollutants to the program. We would like to analyze oil & grease & petroleum hydrocarbons. Our clients are very interested in having these pollutants added to the analysis.

I would really appreciate if you could let me know if you are aware of any other models that could aid in this analysis and work well with our results from the WinSLAMM analysis.

A. (Response from Dr. Pitt) The constituents in the pol file are dependent on the available data. If you have regional PAH data from source areas, then it will be possible for you to create a pol file using that data. You would also need to verify the results at the outfall also. Much of my source area PAH data for the Birmingham area is included in an EPA research report posted at:

- MCTT EPA Report. See page 39 on.

As far as I know, there are no other source area PAH data available covering most urban surfaces. We are currently conducting research on PAH concentrations as a function of particle size for the Tuscaloosa, AL, area, and we have some preliminary data now.

I also do not know of any data sources for oil and grease or petro hydrocarbons for urban source areas, but outfall data is available. My National Stormwater Quality Database I prepared for the EPA includes Phase 1 MS4 data from throughout the country.

There are only 165 petro hydrocarbon data points available (3.7 mg/L average value) nationwide. One approach would be to search the database for the most relevant data for your area, and use the average concentration with your predicted runoff volume data to obtain the mass discharges. We are about ready to post version 3.1 of the database, but I don't know if we have any additional petro hydrocarbon data available.

I am not aware of any other program that can predict these constituents, as the data is lacking.

It would be possible to create a pol file using our Bham data for PAHs, and check the predicted results with the limited outfall data, and make some adjustments. We have done similar activities for other folks. If you are interested in having us do this, let us know. The reliability of the results may not be high due to the lack of site specific data, but this would be an indication. However, if you look at our early 1999 report, you will see that rain characteristics likely were more important than source areas for the PAHs (and presumably for the petro hydrocarbons also), in the absence of gross contamination from industrial areas, so using the average outfall concentration and the predicted runoff volume (that considers your rain harvesting controls) may be a reasonable (and more cost-effective) approach.

Representing Project Areas

Choosing a Soil Type (November 2006)

Q. Is there guidance in the WinSLAMM documentation to help users determine which soil type they should check when completing the source area information?

A. When we set up the soil classifications clayey, silty and sandy, we assumed that they would correspond to the SCS classification A, B, C, and D soils, with:

- A - Sandy
- B - Silty
- C and D - Clayey.

Also note the recent soil survey paper Dr. Pitt wrote that will be posted on the PVA website (WinSLAMM User's Guides | PV & Associates) to determine the disturbed urban soil characteristics.

A. (WDNR). I agree with John's break-out and it mirrors what I have always done. Obviously, the problem is that there are 4 hydrologic classes and only three soils in SLAMM however appendix A of TR-55 provides the following break-out which matches well with what John provided:

- A - sand, loamy sand, or sandy loam
- B - silt loam or loam
- C - sandy clay loam
- D - clay loam, silty clay, clay, etc.

Standard Land Use File Version from USGS Wisconsin Website (December 2008)

Q. Are the SLU .dat files for WinSLAMM Version 9.3.2? The most current ones from the USGS web site are dated 3/3/2007.

A. The SLU files for download currently (as of January 14, 2009) from the USGS Wisconsin website are in version 9.2. The program will automatically update the files to the most recent version when they are loading into WinSLAMM.

Creating a WinSLAMM Data File that represents a Large Basin (April 2008)

Q. I am modeling several detention basins. I have 'no control' models (using the batch editor) for each detention basin's drainage area. I would like to combine all the .dat files that make up a drainage area for a detention basin and place a detention basin at the system outfall.

To my understanding, my problem is that the batch editor doesn't appear to handle detention basin controls, and SLAMM documentation states you cannot combine the same land uses with the "Combine .DAT Files" editor and I have many of the same land uses per detention basin drainage area (i.e. Residential = LDR, MDR, Multifamily, etc.)

Could you please give me some advice on how to approach modeling a detention basin drainage area with multiple land use areas with the same land use type?

A. For your situation, you will most likely need to do manual combining and entering of the data.

You have two options at this time.

Option 1 is to determine if you can ignore any of the land uses in your basin. For example, is the majority of the residential land use MDR with only a little bit of LDR and HDR? If so, you may be able to ignore the LDR and HDR and just call all your residential MDR. You will need to use your judgment to determine if this is an appropriate assumption. If you can do this for each land use, commercial, residential, industrial, etc, then you can use the "combine files" function to create one .dat file for your basin.

Option 2 is entering the data manually into the model. If you cannot use Options 1, then you need to create a spreadsheet of the source areas for each land use, add them up, and then manually enter them into a *.dat file that specifically represents your basin.

Agricultural Land and WinSLAMM (April 2007)

Q. We have a large area of agricultural land draining to our site. How do you model agricultural land using WinSLAMM?

A. Since WinSLAMM is an urban water quality model, it should not be used to model Agricultural land or very large tracts of undeveloped/open space.

Directly Connected Areas vs Partially Connected Areas (November 2007)

Q. What are the definitions of directly connected and partially connected?

A. In general, a directly connected impervious area is an area that goes right to the storm sewer collection system without passing over any pervious surfaces. Examples of this would be a rooftop where the gutter outlets onto the driveway or is piped right into a manhole connected to the storm sewer system. Another example would be a parking lot that drains to an inlet that is connected right to the storm sewer system.

A partially connected source area is an area where the runoff flows over vegetation prior to entering a storm sewer system. Examples of this would be a rooftop where the gutter outlets onto the lawn or a sidewalk where the drainage is designed to runoff into the adjacent grass. For impervious area to be considered partially connected, however, the runoff from it must flow over a specified distance that allows the runoff to infiltrate.

Typically 20 to 30 feet is a minimum distance used, however, you will need to check with your regulatory agency for their requirements of the distance.

Modeling Airports (December 2007)

Q. I am currently trying to model the stormwater runoff for a regional airport. Is there a separate overall category that airports would fit into (i.e. industrial) or a combination (industrial, commercial, freeways)? Do you have any suggestions on how to categorize some of the sub-areas (taxiway, runway, tarmac)? I realize SLAMM is based on more urban settings. But with the airport being many acres of open space and large quantities of pavement (though not as heavily traveled as a roadway), I'm looking for the most logical and appropriate way to model it. Are there any SLU files that are available for airports (on the air side)? Are there any studies that have looked at the loading on airports?

A. There are currently not any WDNR approved SLU files for airports. The City of Madison does have a .dat file it created for its airport that comes with the WinSLAMM program. Otherwise, users generally make their own based on the source areas of the actual airport.

When choosing the land use for your airport, you will want to think of which type of land use you feel most accurately represents it - i.e. commercial, institutional, industrial. Generally the residential or other urban land use will not represent an airport. You can also check with the appropriate regulatory agency to get their concurrence on the land use you choose.

As in all cases, the model would have to be calibrated and verified for a specific area. I have used WinSLAMM for the Minn-St Paul airport to help design ponds in available

areas on the airport. I was focusing mainly on hydrology and hydraulics and that worked well using the industrial or commercial files. That example is in the very large detention pond report (about 400 pgs) with the docs. In the early days of the model (1970s), I also used the model for other large airports in the SF bay area. We had local monitoring data (I monitored Oakland airport and the San Jose airport, but don't know where the data is now, and would probably not be relevant to your location anyways; I know that JFK in NY was also monitored as part of early 208 projects; we have not obtained any airport data for the NSQD though) and if I recall correctly, the main difference for the runways and other aircraft paved surfaces is that the runoff lacked the lead that was high for surrounding areas (apparently Pb was not in aviation fuel). The main surfaces could reasonably be modeled using the roads and parking areas and large flat roofs (see the airport example in the detention pond docs). Again, local monitoring would be preferable to calibrate the model, especially for runoff quality. Being an airport, they at least may have site rainfall data! The summary discussion in the detention pond docs probably also discussed FAA regs on standing water too (if not, make sure you get those; another issue is the deicing use).

Streets/Alleys

Street Source Area Calculations (April 2008)

Q. We have two model runs. The first is before adding additional pavement and the second is after. The additional pavement reduced the large landscaped area in the second one. The lbs of TSS went down. This does not seem reasonable.

We may be interpreting the "curb-miles" incorrectly. The street length does not change from pre to post. We are adding an additional lane and DOT is adding two additional lanes. The street width changes and reduces the large landscaped area (16.2 to 14.5 acres). If we add more pavement, why is the load decreasing?

A. WinSLAMM uses two different routines to calculate the load for landscaped areas versus the load from streets.

The load from landscaped area is calculated based on the area of the landscape and the soil type. In many areas, runoff from landscaped areas have a much larger TSS concentration than runoff from paved areas.

The load from the street is calculated based on its length in curb-miles and the street texture.

If the only source area you had in a dat file was landscaped area and you reduced the area of landscape between pre and post, you would be reducing the load.

For streets, if the only source area you had in a dat file was street and you increase the area of the street, but do not change the length of the curb-miles between pre and post you will not increase the load, regardless of if the area increases. The increased area will result in a larger runoff volume for a street, but not a larger TSS load.

Intuitively it does not make sense, because you would think that a wider street would create more load, but based on the research, it does not. Street dirt accumulates along the curb; the central lanes are relatively clean due to vehicle turbulence that blows that

stuff to the edge, where it bangs up against an edge (either parked cars or the curb). Most of our street dirt research reports included across-the-street testing and confirmed this. See the San Jose 79 report on Dr. Pitt's web site for more information. It creates more runoff volume because there is more impervious area, but not more TSS load.

Therefore, for you project site, based on the way it is modeled, you will see a reduction in TSS load. Your runoff volume should increase however.

Entering Street Width (June 2008)

Q. I have a question about the Street Area input parameters to SLAMM, specifically the total street length (curb-miles) and the estimated street width. Let's say there is a watershed that has only roadside ditches (no curb) and only half of the roadway (from the centerline to the edge of pavement) flows to the device being modeled. The total width of the roadway is 22', which makes half of the roadway 11'. Do I enter in the total street width (22') or half of the street width (11')?

A. The street length and estimated width is independent on the type of roadside drainage system, so you enter those values in all cases, with one exception.

The exception is if you have a divided road. For your example, assuming you are only modeling the drainage area to the device, you enter the data for only half of the road.

If one side of the street is drained with a swale and other side is drained by a curb and gutter, then you would enter the total swale length (considering that it is only on one side of the road) and the curb and gutter for the other half. Basically, you want the drainage system to be divided 50/50 by swales and curb and gutter. It doesn't matter to the model if the half of the streets drained by swales are separate streets (the normal assumption) or only one side of the street.

How do you Model an Alley in WinSLAMM? (August 2007)

Q. Are the alleys counted as impervious area like driveways or are they included in the streets area? For example, I compared a Medium Density Residential Standard Land Use file with and without alleys. The one without alleys has a smaller street area and a large driveway area. The one with alleys has a larger street area and no alleys. So, it appears as if alleys are considered streets in SLAMM.

A. If the alleys have gutters, then they could be modeled as streets. In the provided Standard Land Use Files, the alleys are added into the Street Source Areas.

If the alleys just have pavement up to buildings or to grass (no curb and gutter) and have convex shapes so water flows down the center, they would be modeled as Other Directly Connected Impervious Area.

Volume/Flow

Modeling Traditional Design Storms in WinSLAMM (November 2007)

Q. I have a question about using WinSLAMM for generating pond discharge volumes and rates. It is my understanding that WinSLAMM should not be used for calculating

these values for the purpose of comparison between pre-development and post-development rates for design storms (2-yr, 10-yr, and 100-yr).

A. WinSLAMM is a continuous simulation model, and we typically do not look at design storms. However, you can "trick" the model using design storm rainfall depths and durations, although the hydrographs are not the typical SCS hydrographs. Also, regarding pre-development conditions, the standard parameter files are not set up to account for very large undeveloped or agricultural conditions.

If you review the runoff coefficient file, which selects the runoff coefficient (R_v) that is used to calculate the runoff volume, you will note that it uses rainfall depth and source area. Therefore, this is acceptable for determining runoff volumes. However, the calculations for the control practice you are using may use the time or intensity in the calculations.

An interesting note about design storms and WinSLAMM is that a researcher compared WinSLAMM with other models - TR-55, SWMM, and the rational method, etc - using monitored storm data that included larger storms. WinSLAMM actually did as good as or better than the other models in predicting the runoff volumes from the storms.

Use caution when trying to do a pre- to post-development comparison using WinSLAMM. It would take a lot of work to calibrate the model for that. Generally it is more appropriate to do the design storm pre- and post-development comparison using hydraulic software.

Maximum Flow Limitation and Traditional Design Storms (September 2006)

Q. Is there a limit as to how much flow can be handled in the WinSLAMM program? For example, can a 100 year event be used on a small area such as 3 Acres?

A. There is no physical limit on the flow that the model can handle. As an example, we sometimes run a series of design storms, including the maximum probable event (48 inches in Alabama) for much larger catchments than 3 acres.

However, you have to be careful how you are using the modeled results. We have calibrated runoff volume with WinSLAMM for mostly small to moderate storms, and probably have some 5 or 10 "year" events included in the data set. However, flow rate calibrations are only available for rains of up to 1 or 2 year events. WinSLAMM was never intended to be a drainage design program, but can be used in conjunction with other programs. As an example, I have used SWMM5 and HydroCad with WinSLAMM. We will model a drainage area having stormwater controls and see how they will affect the design parameters that can be used in the design models (such as the CN, which is very sensitive to rain depth, development controls, and infiltration).

Complex Triangular Hydrograph (February 2007)

Q. How does the model develop instantaneous flow rates to be able to size BMPs? I did not see inputs for hydraulic watershed information and read that "triangular hydrographs, parameterized by a statistical approach, are used to simulate flow." Can you please explain this?

A. The complex triangular hydrograph is similar to the double triangular hydrograph used by NRCS, etc. We form it based on runoff quantity (calculated using my small storm hydrology for accurate predictions for water quality events), runoff duration (a function of rain duration), and the peak to average flow rate ratio (close to 3.8, can be modified by user). Dr. Pitt's website has several papers describing the small storm hydrology issues and why it is preferred. See: Pitt Dissertation for further discussions, and a summary paper at: Small storm hydrology Pitt james98. These do not discuss the current complex triangular hydrograph, but do discuss the other flow parameters.

In-Stream Calculations (February 2007)

Q. Do you see this model as being able to provide information necessary to develop an implementation plan for a fecal coliform total maximum daily load?

A. You will have to link the model to a receiving water model to calculate in-stream conditions. We have several output options specifically designed to link with other models, with hopefully minimal data file manipulation.

Initial Abstraction (March 2006)

Q. How does the model handle initial abstractions, particularly depression storage?

A. Initial abstractions on pavement are a function of pavement texture and slope, and confirmed by plotting actual rain vs. runoff amounts (the plots are used to determine initial abstractions on pervious areas also).

Calibration

Information for Calibrating WinSLAMM (February 2007)

Q. What information is needed to calibrate WinSLAMM?

A. Local rain information is the most important needs. We supply many rain files with the program; others can be developed from EarthInfo CDs, for example. Descriptions of local development characteristics are also important. This can be obtained from aerial photographs and ground surveys. We have data for many typical land use areas. See:

- WEFTEC05 impervious surfaces Bochs and Pitt for a summary paper describing this process and some of our data.

Locally available monitoring data for well-described areas is needed to calibrate and verify any and all stormwater quality models. The supplied files can be modified based on local data. The National Stormwater Quality Database at: NSQD EPA contains much MS4 data from throughout the country (this database is currently being expanded). You can probably obtain local data, if it is not in the database, for some end of pipe calibration purposes.

WinSLAMM Calibration Process (September 2007)

Q. What considerations should be taken into account when calibrating WinSLAMM?

A. There are a number of considerations that we try to take into account when performing a calibration. They include -

- Using only source area and outfall data to develop the parameter files since the model is not a receiving water model. This allows us to take advantage of one of the main strengths of the model - the source area approach.
- We start with the smallest, most uniform data that we have available, to start the parameter file modifications, and then change the more complicated source area parameters using the more complicated data sets and the new single source area parameters we just developed.
- It's important to exclude ag lands, wetlands, woodlands and other undeveloped areas from the calibration process as well as the model analysis.
- Also note Dr. Pitt's recent paper posted on the WinSLAMM web site (http://www.winslamm.com/winslamm_guides.html) and included on the program distribution disk on calibration.

WinSLAMM Calibration Considerations (February 2007)

Q. How do you calibrate WinSLAMM?

A. Calibration of WinSLAMM is similar to calibration of any other stormwater quality model. The most important need is having the necessary data. The rain files for running the program after calibration are usually created from EarthInfo CDs (Golden CO); try to make as long of a file as possible, using several rain gage stations near the area of interest that have long records of data and almost complete coverage. WinSLAMM can help you identify a typical shorter period for more rapid analyses, but Dr. Pitt tries to use the 20 to 50 year record for my final analyses (the program is quite fast, so a run doesn't take that much time; if you have several pollutants and ponds, then it may take 10 minutes or so for a typical land use). The docs describe the PSD files and if you do not have local data, you will need to select one of the existing files (the NURP distribution seems most reasonable).

The calibration of a stormwater quality model requires a good data set: rain and runoff quantities, plus pollutant concentrations (SS plus other pollutants of interest). Preferably, you would have at least a dozen events monitored covering a wide range of rain depths and for several land uses representing those of interest. It's easiest if no stormwater controls exist in the calibration set, at least initially.

1. Start with the runoff file using the rain and runoff data. Create a rain file starting about a month before the first rain and ending about a month after the last rain (in many cases, the monitored events may not be contiguous, although that would be easiest). You can fill in missing rains (approx) from the EarthInfo disk, if you don't have local measurements available.
2. Describe the watershed as accurately as possible and create the dat files. Start with the simplest land use (mostly directly connected impervious areas) and the standard runoff file and run the program.
3. Only look at the runoff results for events you have monitored, ignoring the others.
4. Plot the observed vs. modeled runoff values. Hopefully, they have followed the 45 degree diagonal line with little scatter. You will likely show a bias in the line though.

5. Run your dat file with the source rain file, looking where the runoff is originating for different classes of rains. Your plot may have a good fit for the smaller rains, but be too low for the larger rains, for example. The source rain file will identify where the water is coming from, and which coefficients may need adjusting.
6. Make the necessary adjustments, keeping the parameters within reason. When you are happy with that dat file, move onto the next more complex site (having directly connected impervious areas that you just adjusted, in addition to landscaped areas).
7. Repeat the analyses, hopefully only needing to adjust the pervious areas.
8. Finally, use a site that has paved areas draining to pervious areas and confirm the factors that adjust for disconnected impervious areas.
9. When you are satisfied with the runoff file (and only then), work with SS in a similar manner. The street delivery file allows adjustments for the limited energy of some rains. You should probably use the available files, as they were based on many source area observations. The delivery file accounts for deposition of particulates in the drainage system, as source area values are always larger than outfall values for smaller rains.
10. When satisfied with the SS calibration, work with the pollutant file for the constituents of interest for which you have the data.
11. Again, there is nothing unique about WinSLAMM requiring calibration; all stormwater quality models require calibration. Without adequate data, you will have to use the parameter files that have been created and tested elsewhere (the Wisconsin files most likely).

Calibrating WinSLAMM .PSC and .PPD Parameter Files (November 2007)

Q. I've been working with the .psc and .ppd files to compare stormwater pollution concentrations to NE regional studies. One USGS study in the Charles has total concentrations of pollutants in mg/L, so I've been converting the particulate concentrations (mg/kg) in the WI_GEO01 files to mg/L using the corresponding particulate solids file for easier comparison.

One question that has come up is that there is no representation of Paved Lane and Shoulder TSS (AT 13) in any .psc file for any land use other than Freeway. What particulate solids concentration does the program use to calculate TSS loading from roadways in those other land uses? Or does it use the AT 13 number for Freeway in Commercial, Residential, etc?

A. The ppd files have two parts: one for particulate bound pollutants, usually expressed as mg pollutant/kg SS and the other for dissolved pollutants, usually expressed as mg/L. Some pollutants (such as nitrates) are only present as dissolved pollutants, so they do not have a particulate counterpart. During Dr. Pitt's research, he analyzes the total forms and filterable forms, whenever possible, along with TSS (using cone splitters and not pipette subsampling). The dissolved forms are straight forward, and we use those values directly (along with the corresponding COV values to account for variability). For the particulate forms, it is a bit more complicated, as you have outlined. Take the total form, subtract the dissolved portion, and divide by the TSS (all for the same sample). With appropriate unit conversions, you will obtain the particulate-bound concentration expressed as mg/kg. You can do this backwards, as you are doing, as long as you use the correct and corresponding values. You will need to add the filterable concentration to the particulate concentration to obtain the total concentration that you are measuring.

Stormwater Control Practices

Control Practice Geographic Location (February 2007)

Q. How does the model account for where the BMP is geographically placed within the source area?

A. Stormwater controls can be associated with development characteristics (such as disconnecting impervious areas), source area controls (such as rain gardens, parking lot bioretention/biofiltration devices, upland wet detention ponds), drainage system and public works controls (street cleaning, catchbasin cleaning, hydrodynamic devices, grass swales), and end of pipe controls (wet ponds, large infiltration areas), etc. They are associated with specific source areas within each land use (several different roof categories, for example), for several source areas combined, etc.

Dry Detention Ponds (June 2008)

Q. How do you model dry ponds in WinSLAMM? After speaking with a few people at the WDNR, they were saying with the version 9.3 you can model them as wet ponds with a very small wet pool (like an inch) and get some credit for them. I have tried doing this and only came up with a 0.5% TSS reduction. Which I guess is some credit, but I would think it should be around 10%-15% (Similar to what I receive modeling swales)

A. The model currently calculates a reduced level of performance associated with dry ponds compared to wet ponds, due to scour. The dry pond literature is very confusing and conflicting; the wet pond literature is much more consistent. It takes a great deal of data to understand what is going on in a device having limited removals. Many of the available docs are limited in the number of samples obtained and the results vary greatly. In research that included much data, the long-term performance of dry ponds can approach zero. Also, there is a large variation in how dry ponds are defined.

The basic theory behind grass swales is different than the theory behind detention ponds in SLAMM. For grass swales, the runoff is being routed through a long area and thus the particles have more of an opportunity to be filtered out by the grass. Wet detention ponds are based on the settling of the particles in water. Therefore, the larger the surface area of the permanent pool, the more particles can settle out. The main difference between dry ponds and grass filters is the concentrated flows and flow depths present. Our plan is to eventually enhance the calculations for dry ponds based on recent grass filter research and on current scour research. During very low flows with a level spreader, high levels of particulate trapping will likely occur, as the water gets to be about 4 or 5 times the vegetation height, little trapping will occur. Scour will also occur in areas of concentrated flow, and if the water depth is shallow. When the water depth is about 3 ft, scour is minimized.

Another option for you to try is modeling the dry pond as an infiltration basin. The only reduction will be from the amount of runoff that is infiltrated into the native soil.

Modeling Complex Outlet Structures in WinSLAMM (September 2007)

Q. How do you model a multi-stage outlet structure? I have a structure that first allows flow into a small orifice that flows to the outlet culvert. When the water level is high enough it overflows into a 2-foot diameter vertical standpipe. However, that 2-foot diameter flows to a smaller outlet culvert (the same one the first small orifice drains to). If all three are entered, does the program assume direct outflow from each one?

A. First, a quick review: The model is analyzing the water quality storm events, not the larger design storm events. The largest event in any of the rainfall files provided for Wisconsin is a 2-year storm, the rest are smaller. So, when you're modeling your ponds for water quality, it's very helpful to think of how you want your outlet structure to perform for the 2-year storm event or below. To see how your pond will function in the larger storm events, once you have your water quality outlet designed, you will want to analyze in a water quantity software package.

With that being said, the next thing to think about is what will be your limiting factor for your water quality storms (less than the 2-year event)? Is it the final pipe the orifice and vertical standpipe drain to, or is it the orifice itself. Generally it is the orifice that designed for the water quality storms (I'm not sure how you've designed yours, so I'm just guessing here).

Use the "Water Balance Summary of All Detention Ponds" detailed output to see how your pond is performing for each event. It will show you how high the water gets in your pond and which outlet structures it goes through. The file has "PWB" in the file name - it will be a .csv file.

Run your model and review the detailed output. Check to see if any of the events reach your vertical standpipe. If they do not, then you know your orifice is the limiting factor and you do not need to worry about the final pipe the orifice and vertical standpipe drain to. If your output tells you a lot of the water goes through your vertical standpipe, then your final outlet pipe may be the limiting factor. So, in that case, remove the orifice and the vertical standpipe and just enter the final pipe.

For your outlet structure, do not enter all three at once because the model will use all three structures at once to estimate the outflow of the pond. This will overestimate the capacity of the outlet structure and thus result in a smaller TSS reduction. This does not sound like the correct way to model your outlet structure (without seeing a copy of the plans).

Another option is to use another program to calculate a stage-discharge curve for the entire outlet structure and then enter that information in as an 'Other Outflow' outlet.

Catch Basin Calculations (January 2008)

Q. Due to scour, some material is lost from the sump during larger runoff events and I believe that regular cleanouts should result in greater material capture. I'm not sure how much more credit would be gained but currently SLAMM doesn't give any benefit for regular cleanout (except to restore sediment storage area if it gets filled). Have you given any thought to factoring in credit for regular cleanout or mandating cleanout more often than to just restore sediment storage area?

A. We currently account for scour by assuming that the devices cannot fill up to anything more than one foot below the device. If the devices reach this level, then they can store no more sediment. This has, so far at least, proven to be a reasonable assumption based upon the scour modeling and monitoring that Dr. Pitt has been doing. If we assume that we are modeling inlets, where the water flows down from above, and not manholes with sumps, where water flows can enter in from the sides, it seems that it takes an extra-ordinary flow to affect the sediment below a foot or so.

In the model, cleanout benefits occur when the catchbasin density decreases, as this will fill them up faster.

Modeling a Constructed Wetland

Q. How would you model a constructed wetland using WinSLAMM?

A. In WinSLAMM, you can model a wetland as a wet detention pond for physical settling behavior predictions. The performance will likely be much less than a typical wet pond due to the shallow water, and expected scour. Sedimentation of particulate-bound P would be predicted, but not reductions in soluble forms. You could also use a specialized wetland model or a water chemistry model to predict soluble P reductions and then adjust the WinSLAMM outputs.

Model All or Part of a Project Area (August 2009)

Q. We've got a 4 acre site draining to a wet detention pond. Half is existing built-out conditions, half is new construction. The new construction requires 80% TSS removal. We have our wet pond modeled as an Outfall->Wet Detention.

My question is, can we only input the new construction source areas when calculating the TSS removal, or must all 4 acres be included in the model? I'm guessing that running the model with only half of the actual flow through the pond will not give us an accurate design.

A. Correct, all of the drainage area needs to be modeled when evaluating pond performance. Pond performance is highly dependent on the amount of water flowing to the pond and to the pond "size." Only having half of the water enter the pond would result in a significant over-prediction of performance. Another approach is to determine how much TSS comes from each side of the development and use the ratio of the TSS amount from the new area to the total TSS amount from both areas to adjust the 80% target. If 25% of the total TSS came from the existing area and 75% came from the new area, the the pond performance target would be about 7% of 80%, or about 60% TSS reduction. Obviously, you would need to have the approval of the reviewers for any approach you take.

Stormwater Control Practices – Street/Alley Cleaning

Street Cleaning Calculations – Frequency (February 2008)

Q. I have a general street sweeping question. I am working with a municipality to look at the cost effectiveness of implementing some BMP's to get to their 40% removal goal. We did the SLAMM modeling for them and I was running their

models playing with the street sweeping control device. I found that there was a convex portion of a graph comparing removal vs street sweeping frequency. I included a table below to illustrate.

Residential Street Sweeping	No Controls	With Controls	Difference
Percent Reduction	TSS (lbs)	TSS (lbs)	Removal
Once a Year (Current)	4376668	3554000	18.80%
Twice a Year	4376668	3552000	18.84%
Every 12 Weeks	4376668	3577000	18.27%
Every 8 Weeks	4376668	3570000	18.43%
Every 4 Weeks	4376668	3555000	18.77%
Every 2 Weeks	4376668	3518000	19.62%
Every Week	4376668	3481000	20.46%
Twice a Week	4376668	3442000	21.36%
Three Times a Week	4376668	3418000	21.90%
Four Times a Week	4376668	3408000	22.13%
Five Times a Week	4376668	3401000	22.29%
Everyday	4376668	3392000	22.50%

Why does the removal temporarily decrease with frequency?

A. The street cleaning routine works by cleaning the streets on the specified frequency you give it. If it rains on the day it's supposed to sweep, the program skips that cleaning (because public works departments don't generally sweep when it rains). Otherwise, it just continues to clean on the days that fall on the specified frequency.

What is happening is that the program is skipping a cleaning due to rain, and thus the sediment removal is reduced. You can compare the "Washoff or Street Cleaning Detail File" for each frequency to see when the model is cleaning. To initialize this file, you check the box in the "Detailed Output Options" form.

Longer periods of simulation reduce these small affects associated with rain occurring on days of street cleaning. The five year period recommended by WI DNR normally reduces these effects to small values. However, if smaller inconsistencies are desired, then expand the study period.

Street Cleaning Standard Land Use Files with Alleys (August 2007)

Q. If you have street sweeping on a SLU file with alleys, do the alleys get swept?

A. Because alleys are added to the street source area in Standard Land Use files, the alleys will be swept if street cleaning is applied to the street source areas. The user needs to check that this is appropriate (refer to Street Cleaning and Alleys FAQ).

Street Cleaning and Alleys (August 2007)

Q. Can you model street cleaning an alley?

A. Street cleaning data only shows effective reductions for street cleaning surfaces with a curb. The street cleaners need to brush against a vertical edge. Therefore, if the alley does not have a curb, street cleaning in the alleys should not be modeled.

Street Cleaning Removals – Spring Load (June 2008)

Q. When looking at street sweeping removal efficiencies compared to sweeping frequency, there seems to be a reasonable correlation. Sweeping every 12 weeks gave a 1.63% removal, and 7 times a week gave a 26% removal, with reasonable rates in between. However, the Once per year (spring) and twice per year (spring/fall) seem to have unusually high rates (11-12%) compared to the other frequencies. Are these two frequencies calculated a different way?

I understand that if a scheduled sweeping event coincides with a rainfall event in the rain file, the sweeping event is cancelled. In the Green Bay rain file, there are rainfall events on both 4/1 and 10/31, so theoretically the spring/fall scenario would be cancelled, but it still has an 11% removal efficiency. Switching to the 5-year rain file helped out some of the lower-frequency sweepings, but did not change the results of the spring or spring/fall scenarios.

Is there a logical explanation as to why the spring and spring/fall scenarios don't seem to follow the typical trend?

A. Research data shows there is a large winter load. This winter load is a result of the normal dirt and also the winter sanding practices. This dirt is not washed off because it doesn't rain in the winter (typically). So, the curve starts out really high in the beginning of spring, falls quickly due to rain events and then does a saw tooth pattern through the summer and fall until it snows again. When you street clean, the street cleaner is taking out some of the dirt along the curve at various times during the year. So, when you sweep twice a year, the model takes some dirt from the high part of the curve in the spring and then some from the end of the curve in the fall. When you sweep every 8 or 12 weeks, a majority of the high part of the curve has already been washed off due to rain events, thus the sweeper cleans a less high part of the curve and cannot achieve as much reduction. You can see exactly when the sweeper cleans in the detailed output files that are accessed through the "Tools > Default Model Options" screen.

Street Cleaning Removals – Not Using the Winter Season Option

Q. It doesn't seem that my street cleaning control is doing anything in that the "washoff or street cleaning" file (attached w/ .dat) doesn't show any difference between initial and after event loads for street cleaning. It does however, for washoff.

A. The reason why it doesn't show any difference is because the before event load is always lower than the MinStDirtRemovalLoad, which is the lowest street dirt load that the street cleaner you have configured can clean to. If you were to run the model with the winter season option, that increases the initial load significantly, which should be, at least initially, higher than the minimum street dirt removal level.

Modeling Parking Lot Sweeping (January 2009)

Q. I was wondering if I'm able to use the street cleaning option for paved parking areas and driveways? Our client regularly runs a street sweeper through their parking lot, but I'm unable to input anything for street cleaning for paved parking and driveways w/in the program. I get a message that says "Street Cleaning is not available for this source area". Do you know a way around this? Should I just model the parking lot as a street?

A. There is little data regarding the performance of street cleaning in parking lots, so sweeping parking lots it is not included in the model at this time.

Stormwater Control Practices in Series

Modeling Control Practices in Series – Sedimentation only Practices (October 2007)

Q. Can I model practices in series using WinSLAMM?

A. Stormwater control practices that only remove sediment and do not remove volume cannot be modeled in series in WinSLAMM at this time. Practices that only remove sediment include Street Cleaning, Catch Basins, Hydrodynamic Devices, and Wet Detention Ponds. These practices cannot be modeled in series because the resulting particle size distribution from the first practice is not modified and then routed to the next practice. The resulting sediment reduction from a practice is accounted for by a percent reduction. One current exception is the use of a pond before a biofiltration device in WinSLAMM, and the two ponds in series option in DETPOND.

Modeling Control Practices in Series – Street Cleaning and Catch Basins (June 2008)

Q. I'm trying to get a better understanding of why street cleaning and catchbasin controls cannot be modeled together. The help file says:

"The particulates removed by street sweeping and the particulates removed by catchbasin are typically composed of similar large particle sizes. To prevent an inaccurate increase in the reduction in sediment removal because of this, the model will not route the remaining sediment from those streets that are swept to the catchbasin if both practices are modeled together."

Could someone please elaborate? Why would a fraction of the larger particulate not be removed from street sweeping, then the remainder routed to the catchbasin where a fraction of the remaining larger particulate may settle out?

Many of the candidate sites I'm studying for LID retrofits have these two controls on-the-ground. Is there a workaround to recreate these existing conditions?

A. Currently, the help file is accurate and describes the problem of double-counting the same material that may be credited by the two controls. WinSLAMM currently reduces the load via street cleaning by a straight percent reduction based on current research data, it does not modify the particle size distribution. The routing version of WinSLAMM that is currently being developed will specifically route particle size distributions and will be able to address this issue specifically. Our outfall monitoring data shows no significant benefit of using these two controls simultaneously.

Modeling Control Practices in Series – Rain Gardens and Catch Basins

Q: I am modeling 5 rain gardens and 1 catch basin for a residential urban area. The rain gardens and catch basin are parallel entities but I want the overflow from the rain gardens to go to the catch basin. Can I do that in WinSLAMM?

A: Yes, WinSLAMM can perform this type of analysis. You will enter your rain gardens as Land Use Biofiltration. You will enter the data for one rain garden and then put a "5" in the "Number of Devices in the Source Area or Land Use" cell. You then enter the catch basins as a Drainage Control. The runoff resulting from the rain gardens will then be routed to the catch basin. Note that you should not use the particulate reduction option in the biofilters, as you would be double-counting the reduction of the particulates removed by the catchbasin.

Modeling Control Practices in Series – Street Cleaning and Wet Detention Ponds (December 2008)

Q. What is the correct way to model watersheds that contain street sweeping that lead to a wet pond so pollutant removal is not double-counted?

A. At this time, WinSLAMM does not modify the particle size distribution resulting from street cleaning. Therefore, when modeling Street Cleaning followed by a Wet Detention Pond, the model will see the same size particles (but less of them) that it saw for Street Cleaning. Because street cleaning and wet detention ponds will remove the same large size particles (and the pond also removing more of the smaller particles normally), judgment needs to be used when modeling street cleaning and wet detention ponds.

If data is available regarding the resulting particle size distribution from street cleaning, the user can create a project specific particle size distribution to enter into the model.

Refer to the local regulatory agency to determine what is acceptable for the project area.

Stormwater Control Practices – Infiltration Practices/Cisterns

Biofilter Removal Efficiencies (December 2008)

Q. I have a question in regards to the biofiltration portion of the WinSLAMM model. I've plugged in all the information in regards to my biofiltration area and it has a spot where it automatically calculates "Percent solids reduction due to engineered soil". For our engineered soil, we were going to use a loamy soil and so the program plugs in 49 for the % reduction. If I change the size of the biofiltration device or the depth of the engineered soil, it doesn't change this number. The only thing that changes it is the soil type selection, but nothing goes past the 49. Just for the heck of it, I ran through the calculation module and it says that I have 93.98% reduction, even though it still shows 49% in the biofiltration area. Can you shed some light on what is happening?

A. The percentage reduction values were summarized from Dr. Pitt's research. Currently, the soil treatment examines several particle size ranges separately. The effluent quality for each size range is dependent on the influent concentration for each soil/media type (and considering an "irreducible" concentration). The earlier version of

the soil treatment for biofilters assumed a constant percentage reduction, as an interim method before the more recent change to the model. The reductions are calculated based on the soil type you choose and the particle size distribution you enter. The calculations also assume that the engineered soil is 18 inches or deeper. This reduction is only applied to water that passes through the engineered soil and is then collected in an underdrain and discharged to the surface waters. It does not affect surface waters bypassing the bioretention device (receives zero treatment) or water that infiltrates into the native soil (receives 100% treatment), for example.

By making the biofilter bigger or deeper, you are adding more storage volume, which aids in the TSS reduction because the more water you store; the greater the chance the water can be treated or infiltrated instead of being bypassed.

My guess is that your biofilter is also infiltrating water into the native soil. This infiltration provides 100% treatment of the runoff that is infiltrated into the native soil. So when the program calculates the reduction from the water being infiltrated and the water being treated by the engineered soil, it adds up to 94% in your case.

Biofilter Ponding Durations

Q: Can SLAMM be used to predict the time it would take the water to stay in the rain garden before it infiltrates or evaporates, etc?

A: WinSLAMM reports numerous data regarding the performance of a biofilter, including the ponding durations. To obtain this data, go into the "Detailed Output Options" form under the "Tools" menu and check the box for the "Water Balance File" under the "Biofilters". Then select "Save .INI file". Once you run the model, the program will create a separate comma separated value file in the directory you have the .dat file saved. You can open this file in Microsoft Excel and review the data. Each column in the comma separated value file is defined in the Help File that comes with the program.

Rain Barrel/Cistern Storage Duration (June 2007)

Q. We are using rain barrels as a BMP for roof runoff. When we use the biofiltration input screen and click on rain barrels/cisterns the load reduction results are not sensitive to the number of rain barrels used. The results do not change when we add more rain barrels.

A. Review the biofilter water balance file to see if the results you are seeing make sense. You are probably not filling up the rain cistern during the model run. Therefore, additional ones wouldn't matter.

To look at the water balance file, go to Tool/Default Model Options and check the biofilter water balance file option.

Modeling Biofilters in version 9.2 or Prior (December 2007)

Q. I am modeling a biofilter in version 9.2. My results do not seem reasonable.

A. In WinSLAMM versions prior to 9.3.0, there are two options in modeling biofilters. In versions prior to version 9.3.0, the flow rate through the engineered soil is not included in

the biofilter calculations. Therefore, if there is an underdrain, the capacity of the underdrain is the limiting factor. This can cause a biofilter to be undersized if the user does not do the necessary checks.

The first check is to model the biofilter exactly as designed (the pea gravel layer, underdrain, engineered soil layer, vertical standpipe, actual native soil seepage rate, etc). The user can then calculate the percent TSS reduction using a weighted average of the volume through the orifice, the volume infiltrated and the volume that goes through the overflow structures. This is done using the detailed output from the Biofilter Water Balance File. However, if the user chooses to do this, they need to double check that the calculated infiltration rate through the soil for each event agrees with what they would think is reasonable. To determine what the model calculated the infiltration rate through the engineered soil, you take the Event Peak Outflow in cfs, divide it by the surface area of the biofilter, and then convert the units from ft/sec to inches per hour. If the infiltration rate seems higher than what you believe is reasonable, then the user needs to keep increasing the surface area until the calculated value seems reasonable.

The second way is to only model the very upper portion of the biofilter. So, if by design, your biofilter has 6 inches of open air depression, you would enter the Top Area as the top of your depression, the bottom area would be the area at the bottom of your 6 inch depression. The depth would be 6 inches. The depths of rock fill and engineer soils are zero. The Native Soil Seepage Rate because the engineered soil infiltration rate. You enter your overflow structures – so if for example you have a vertical standpipe that sticks up 3 inches into your depression, then its distance from the bottom would be .25 feet. The program will then calculate the pollution reduction based on the amount of water that is infiltrated through the engineered soil. You then need to multiply this percentage by the allowable percentage according to your regulatory agency. For example, in the WDNR's 1004 code, it is 90%. This method obviously ignores the infiltrate rate through the native soil. If you are in tight clays, chances are this assumption is okay. But if you are in an area where you would see some infiltration into the native soil, this method may oversize the biofilter.

In WinSLAMM version 9.3.0, and later, the algorithm was revised and biofilters should be modeled as detailed in the construction plans.

Cost Data

Default Cost Information (February 2007)

Q. What are the costs for the BMPs based on?

A. The pre-determined cost data for all practices except catchbasin cleaning have been developed from the SEWRPC (Southeastern Wisconsin Regional Planning Commission) Technical Report Number 31, "Costs of Urban Nonpoint Source Water Pollution Control Measures" (June 1991). These costs have been updated to 2005 values by using the Engineering News Record cost indices. In addition, costs are also available from many studies throughout the US and are adjusted by inflation indices for different areas and times. Arvind Narayanan (a UA grad student) summarized this info in his master's thesis, which is the basis for the following report: Arvind and Pitt stormwater cost report

WinSLAMM vs WinDETPOND

WinSLAMM vs WinDETPOND (March 2008)

Q. Could you please give me a brief description of what WinDETPOND does that WinSLAMM does not do?

A. WinDETPOND is much more flexible when examining sedimentation processes (basically has more data output options). In WinSLAMM, some of the details are not readily shown, which may be important when evaluating a specific design. Both models examine detention the same way, but WinDETPOND also considers short-circuiting (rarely very detrimental). Basically, WinDETPOND is our test bed and many options start life there and are then installed in WinSLAMM later, after we work with it for awhile. If you are doing R&D work, WinDETPOND will be important. WinSLAMM will help you evaluate how the unit will function in a more complex area though.