

H9 - Flood line analysis using a DEM layer

This how-to page reviews how to perform a flood inundation analysis using PCSWMM. A DEM layer is required for this type of analysis.


Creating the Flood analysis layers

In this section the required layers for flood inundation analysis will be created. The first thing that is required is that the PCSWMM model is run.


1. Click on the **Run**  button the current PCSWMM model for the rainfall and duration the analysis is to be preformed for.

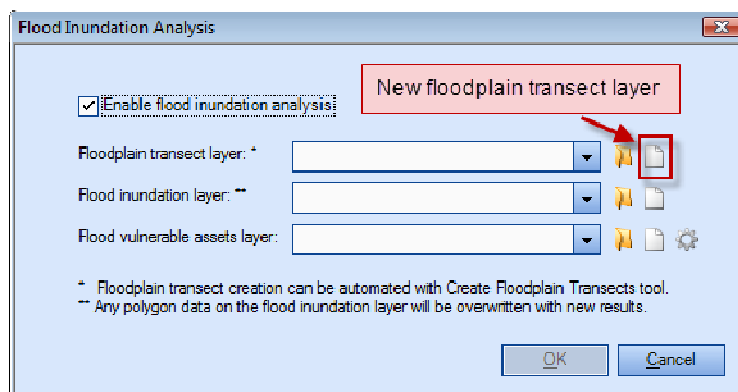
How to Create a Transects layer in PCSWMM

To create a transect layer a digital elevation model (DEM) layer must be available for the transect lines to copy the station elevation data available from the DEM layer.

1. Click on the **Layers** button.
2. Click on the **Open layer**  button in the **Layer manager**.
3. Navigate to the location of the DEM.
4. Click **Open**.

The transect layer can now be created. By using the Flood inundation tool to generate the specific layers the user can guarantee that the layers are structured correctly for flood analysis.

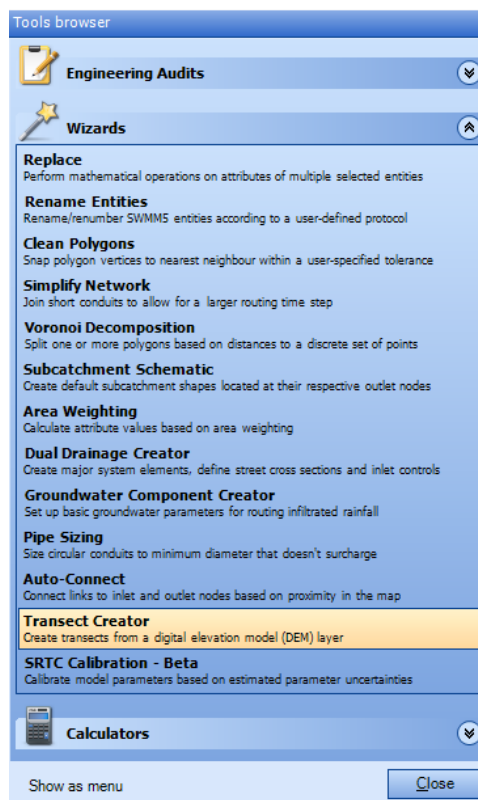
5. Click on the **File** menu and select **Flood Analysis...**
6. In the **Flood Inundation Analysis** check the **Enable flood inundation analysis** box.
7. Beside the **Floodplain transect layer** click on the **New**  button box beside the dropdown box.




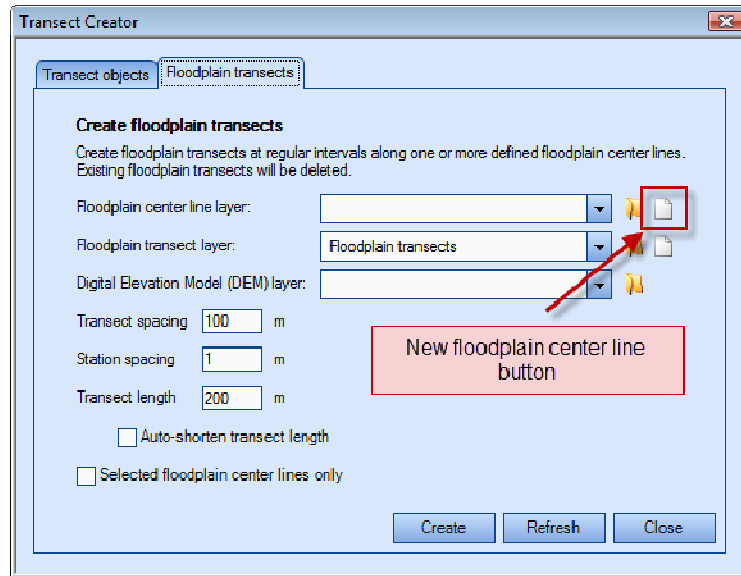
8. Browse to a known location and save the newly created transect layer. The name can be changed to something specific to the project or can be left with the default name **Floodplain transects**.
9. Click **Yes** when asked if you wish to close the dialog and start adding floodplain transect lines.

At this time transects can be manually added by clicking on the **Add** button and drawing lines perpendicularly to the center channel however for larger models it is easier to use the **Transect creator** tool.

10. Click on the **Tools**  button and select **Transect Creator** from the **Wizards** section.



11. In the **Transect creator** window select the **Floodplain transects** tab.
12. Click on the **New**  button beside the **Floodplain center line layer** dropdown box.



13. Browse to a known location and save the newly created layer. The name can be changed to something specific to the project or can be left with the default name **Floodplain center lines**.
14. Click **Yes** when asked if you wish to close the dialog and start adding floodplain center lines.


At this time transects can be manually added by clicking on the **Add** button and drawing lines representing the main channel centerlines however if the model already includes a SWMM5 conduit layer (includes both conduits and natural channels) then a center line can be quickly and accurately generated using the join tool. To do this:


15. Click on the conduits layer in the **Project panel**.
16. Click **Ctrl-A** keys to select all of the conduits in the model.

17. Click on the **Copy**  button.




18. Click on the **Layers** button and select the **Floodplain center lines** layer from the list.
19. Click **Close** in the **Layer manager**.

20. Click on the **Paste**  button to paste the conduit lines to the centerlines layer.

21. Click on the **Layers**  button and un check both the **Junctions** and **Conduits** layer.

Now the Floodplain center lines layer contains all of the line segments from the conduits layer. Now they will need to be joined to make a single line.

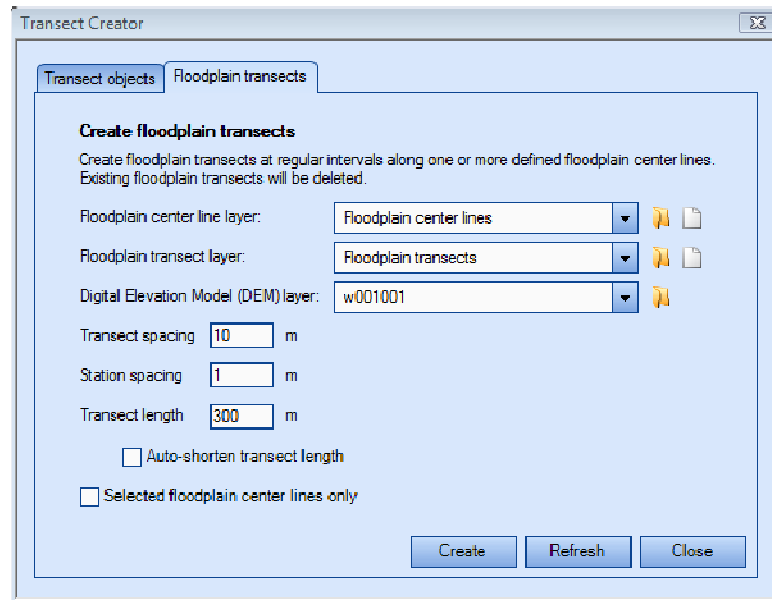
22. With the **Layers manager** still open, click on the **Floodplain center lines**

23. Click on the **Join**  button.
24. Click **Analyze** to join all of the lines.
25. Click **Apply**. Now all the lines should be a single line.
26. Click **Close** to close the **Join** window.

27. Click on the **Tools**  button and select **Transect Creator** from the **Wizards** section.
28. In the **Transect creator** window select the **Floodplain transects** tab.

Now all of the required layers for automatically generating the floodplain transects area available.

29. Match up the centerline layer, transect layer and DEM layer with the associated layers.
30. Specify how far apart you want each transect.

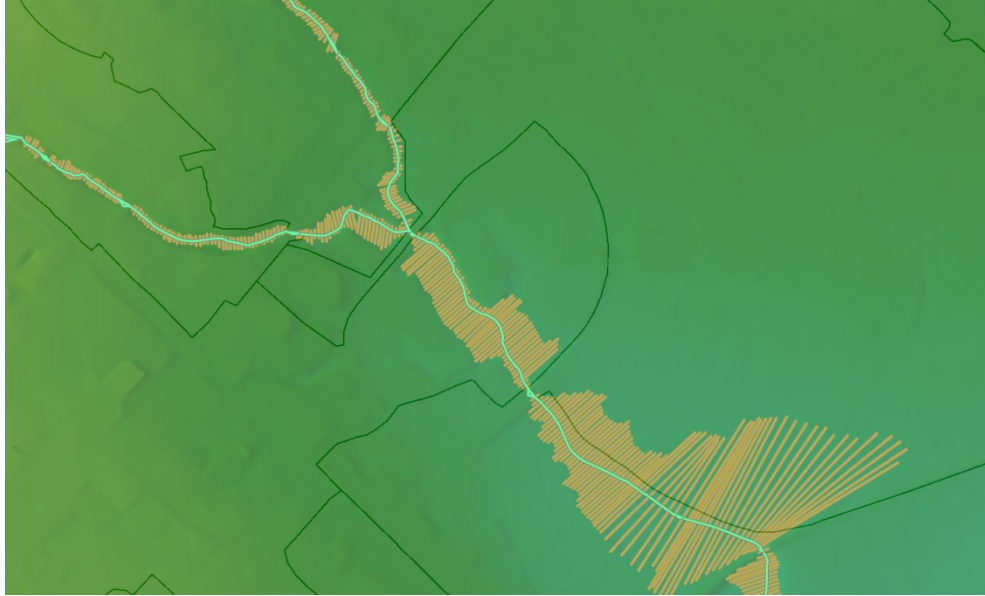


31. Check the **Auto-shorten transect length** if you wish to have PCSWMM automatically shorten the transects where the water does not exceed a certain distance.
32. Click on the **Create** button. This step may take a few minutes.


It is un-likely that the transect layer was drawn perfectly however this tool can save a lot of time.

33. Go down the centerline and edit the **floodplain transects layer** using the **Edit**, **Delete** and **Add** buttons.


This step can take a lot of time however it is important that the main channel is captured in each transect in order to accurately estimate the water depth at that location. The screen shot below shows an example of a part of a transect layer that was automatically generated using the **Transect creator** tool and then manually edited.



How to Create a Flood inundation layer

1. Click on **File** and select **Flood Analysis...**
2. Check **Enable flood inundation analysis** button and under **Flood inundation layer** select **New**  button.
3. Browse to a known location and save the newly created layer. The name can be changed to something specific to the project or can be left with the default name **Flood inundation**.

How to Create a Flood Vulnerable Assets layer in PCSWMM

1. If the **Flood Inundation Analysis** window is no longer open, click on **File** and select **Flood Analysis...**
2. Check **Enable flood inundation analysis** button and under **Flood vulnerable assets layer** select **New**  button.
3. Specify if the **Flood vulnerable assets** (FVA) layer will be a **Point** or **Polygon** layer.

Note:

A points FVA layer will have the same attributes as a polygon layer however a polygon layer is beneficial if showing houses and building footprints.





4. Browse to a known location and save the newly created layer. The name can be changed to something specific to the project or can be left with the default name **Flood vulnerable assets**.
5. Select a location for the new layer and click the **Save** button.

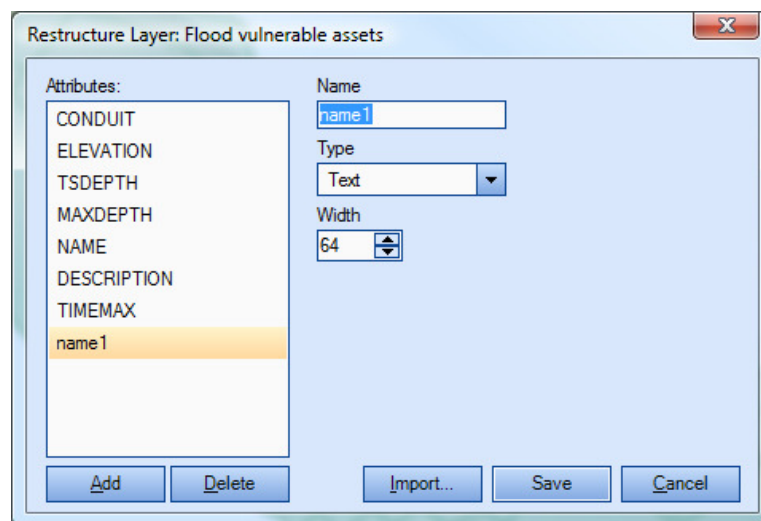
6. Click **Ok**.
7. A FVA layer will be created and will consist of the following attributes :

Displayed Name	Units	Field Name	Description
Name		NAME	Name of flood vulnerable asset (FVA), should not include spaces
Description		DESCRIPTION	User description of FVA, can include spaces
Closest Conduit		CONDUIT	Attribute controlled by PCSWMM
Flooding Elevation	m	ELEVATION	
Depth	m	TSDEPTH	Attribute controlled by PCSWMM
Max Depth	m	MAXDEPTH	Attribute controlled by PCSWMM
Time Max. Depth	m	TIMEMAX	Attribute controlled by PCSWMM
GIS_LENGTH	m	GIS_LENGTH	Attribute controlled by PCSWMM
GIS_AREA	ha	GIS_LENGTH	Attribute controlled by PCSWMM

Note: Any other information (i.e. additional fields) can be included in the layer, and are in-fact encouraged, as they can be presented in the web interface for use by the flood-duty officers (e.g. street address, telephone number, cost of impact, and any other relevant information). This can be done by adding a user-defined attribute.

To add a user-defined attribute using PCSWMM

1. Open the **Map panel**  and select the **Layers**  button.
2. Click on the FVA layer and click on the **lock/unlock**  button to unlock the layer.
3. With the layers panel still open click on the **Restructure**  button.
4. Select the **Add** button in the Restructure dialog.
5. Assign the Name of the new FVA layer attribute and select the type depending on the information being added.



Restructure Layer: Flood vulnerable assets

Attributes:

- CONDUIT
- ELEVATION
- TSDEPTH
- MAXDEPTH
- NAME
- DESCRIPTION
- TIMEMAX
- name 1

Name: name 1

Type: Text

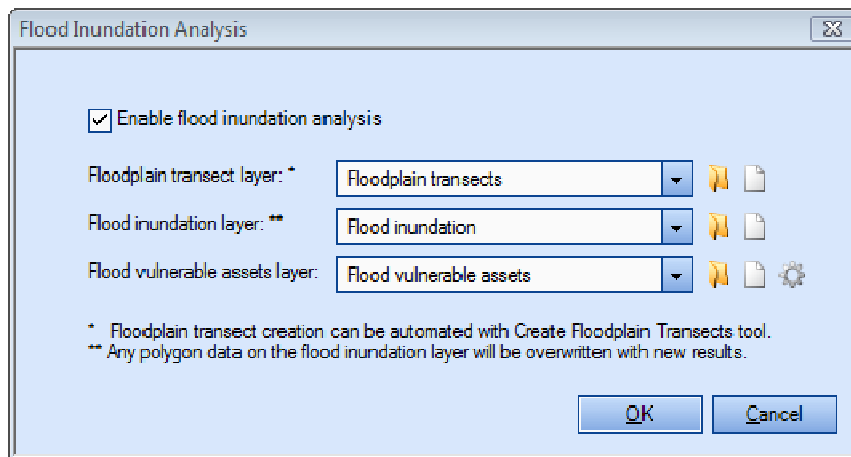
Width: 64

Buttons: Add, Delete, Import..., Save, Cancel

6. Click **Save**.

Generating results from the Flood inundation layer

1. If the **Flood Inundation Analysis** window is no longer open, click on **File** and select **Flood Analysis...**
2. Match up the transect, flood inundation and flood vulnerable assets layer with the associated layers.



3. Click on the **Ok** button.

The Flood inundation layer should now be showing the peak estimated extent of the flooding.

Last Updated: November 14, 2011

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