

That CAD Girl

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Basics of Existing Ground Surface Generation

The accuracy of an existing ground surface model depends entirely on the accuracy of the data used to create the surface. This is the "garbage in - garbage out" theory.

If you are relying on someone else to provide existing ground data to you, use the guidelines below to ensure you receive the best data available.

Original Data to Request - In order of preference

LandXML file

- Can come from most any design software except GeoPak
- Can include data for some or all points, point groups, surfaces, alignments, profiles and cross sections

3D TIN Lines

- If using Land Desktop, make sure that the TIN is a collection of lines and not 3D faces. Faces are read into Land Desktop as point data and the program doesn't recognize the legs of the faces as breaklines.
- Civil 3D can read 3D faces as breaklines.
- Will most likely receive the lines in a DWG file
- If received from someone using Land Desktop, the 3D TIN lines or 3D faces will probably be on a layer with "SRF-VIEW" in the name. If the TIN is on such a layer, make certain they apply to the surface you are interested in.

Point File and Breaklines

- Point file can come in an ASCII format or as part of drawing
- If surface was created in Land Desktop, the breaklines will probably be on a layer with "SRF-FLT" in the name; however, the breaklines on this layer might apply for a different surface
- Breaklines from surveyor are highly preferable to creating breaklines from the points

Contours

- Never create a surface using only contours
- Always add points to contour data for surface. Also create breaklines if necessary

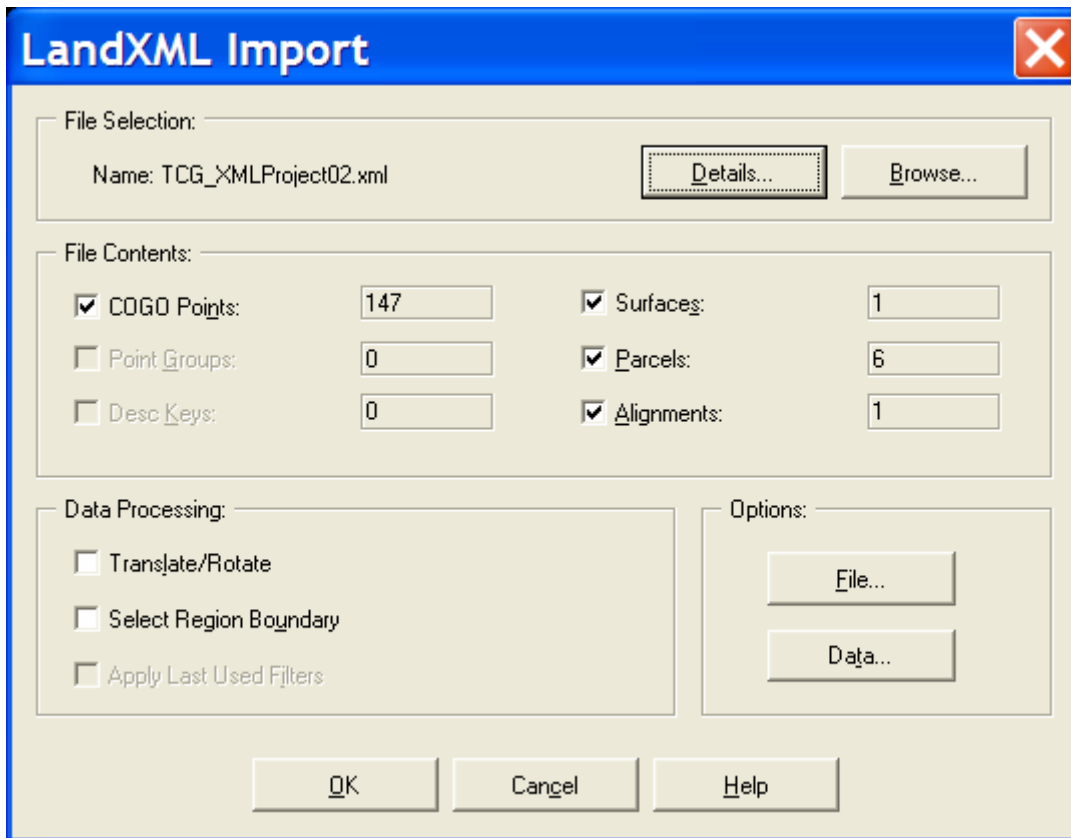
Spot Elevations

- As noted here, spot elevations will most likely be used with contour data.
- In addition to importing points from a text file, Land Desktop can generate spot elevation data from many different types of Autocad entities. Land Desktop can use points, lines, blocks, text, 3D faces and polyfaces to generate point data for a surface.

Creating a surface from a LandXML file

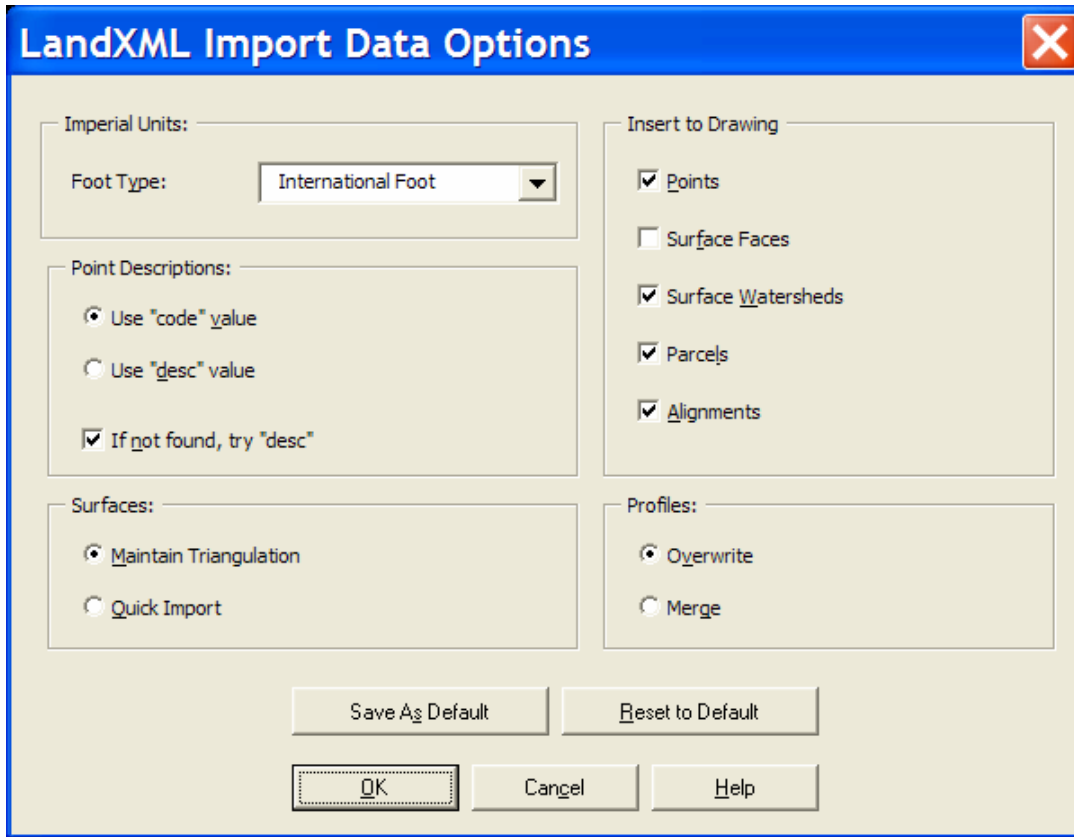
Initial Setup

- You must have a LandXML file (.xml extension) with a surface definition.
 - You must be attached to the correct Land Desktop project database.
1. Go to Projects> Import LandXML
 2. Browse to and select the desired XML file to import and pick OPEN
 3. In the "File Contents" portion of the "LandXML Import" dialog box, you will see the number of COGO points, point groups, surfaces, parcels and alignments that are defined in the selected XML file and are available for import. Place a checkmark next to any and all types of data that you wish to import into the project database. This step does NOT import, it only processes the LandXML file and prepares it for import.

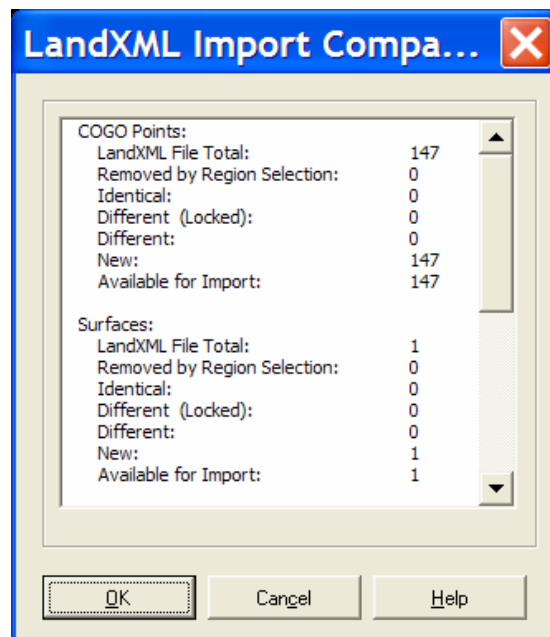


4. If you pick the DATA box in the Options portion of the dialog box, you can specify how Land Desktop is to handle point descriptions and surface triangulation on import.

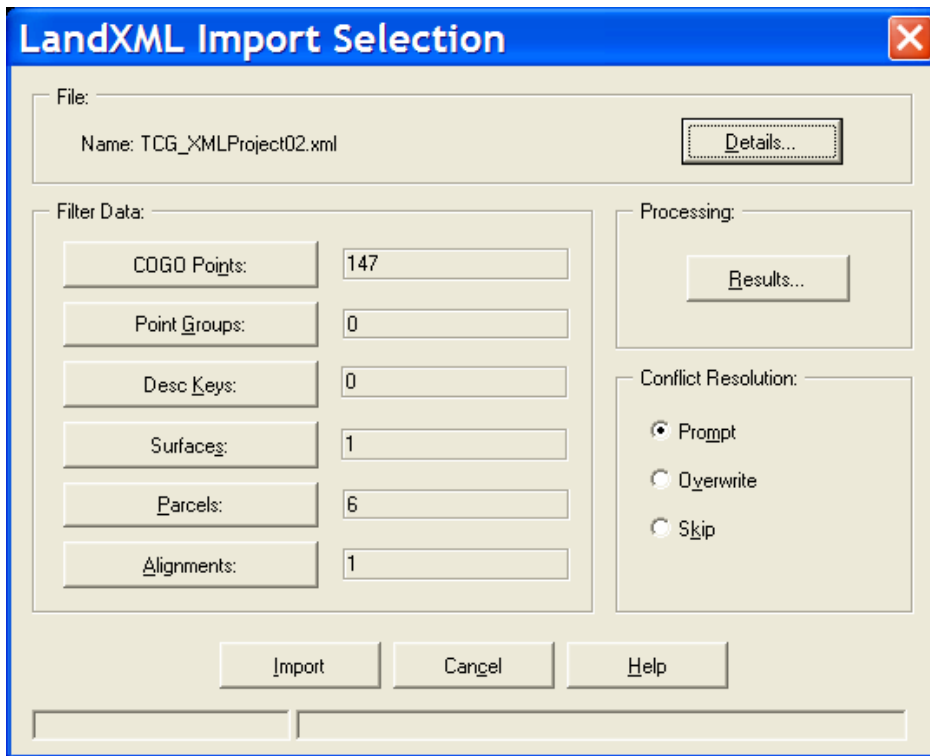
5. You can also specify whether the data is to be inserted into the drawing during import. If chosen to insert the project data into the drawing, the new entities will be drawn in accordance with the current drawing settings.



6. Pick OK to close the "LandXML Import Data Options" box and then OK again to close the "LandXML Import" box. This will cause Land Desktop to begin processing the LandXML file.
7. Before it is imported, Land Desktop will compare the contents of the LandXML file to the current project data and display the "LandXML Import Comparison Results" dialog box.



8. Once you pick OK in this dialog box and have been notified of all potential conflicts, you are given a second opportunity to select the data to be imported into the project database with the "LandXML Import Selection" dialog box. At this point you are also given the opportunity to pick some or all of the items for import. For instance, selecting the SURFACES button gives you the option of importing some or all of the surfaces contained in the LandXML file. Once you've selected all the data to be imported and set the "Conflict Resolution" settings as desired, pick the IMPORT button to proceed.

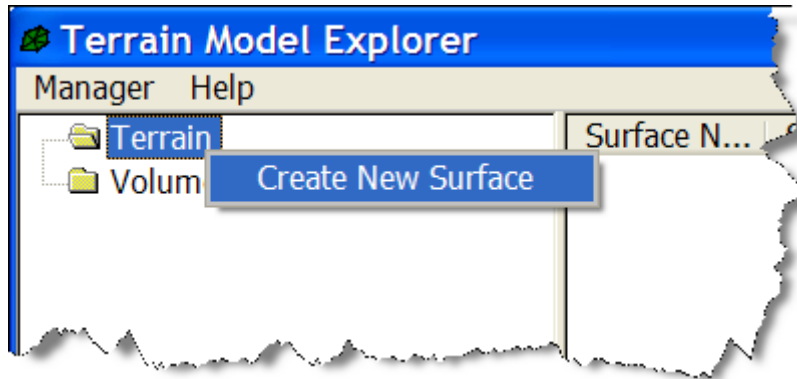


9. You can now go to Terrain Model Explorer and see that the surface is part of the project.

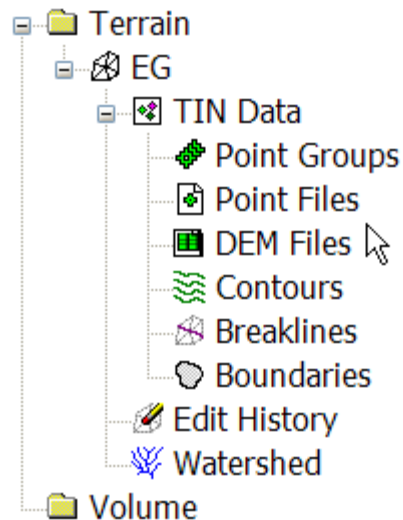
Creating a Surface Using TIN Data

Most of the process of creating an existing ground surface is the same.

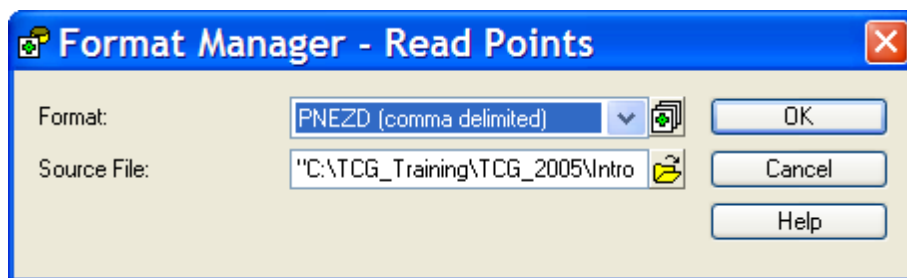
1. Go to Terrain> Terrain Model Explorer (TME)
2. In the left side of the box, right click on "Terrain" and pick on "Create New Surface".



3. Hit the plus sign "+" next to "Terrain" to expand this tree. You will see "Surface1" under "Terrain".
4. Right click on "Surface1" and go to "Rename" to give the surface a new name such as "EG" for Existing Ground.
5. Double-click on the new surface to expand the tree below so that you can see "TIN Data".



6. Follow the instructions below depending on the available data.
 - a. **If you have Point Groups...**
 1. Right click on Point Groups and go to Add Point Groups.
 2. Select the desire group.
 3. To remove a group from the TIN Data, right click on the point group name in the RIGHT side of the box and select "Remove".
 - b. **If you have a point file in ASCII/text format in which every point is to be used in the surface...**
 1. Right click on Point Files and go to Add Point Files.
 2. Select the correct format of the ASCII/text file in the top drop-down list.
 3. Browse to the correct file to import



- c. **If you have spot elevations in the form of elevated text (Z coordinate is the spot elevation) ...**
 1. Right click on Point Files and go to Add Points From Autocad Objects> Text
 2. At the command line, choose whether to select the text by Entity or by Layer.
 3. Select the text.
- d. **If you have elevated Autocad points/nodes (does not include AECC Point Objects)...**
 1. Right click on Point Files and go to Add Points from Autocad Objects> Points.
 2. At the command line, choose whether to select the points by Entity or by Layer.
 3. Select the points.
- e. **If you have spot elevations in the form of elevated blocks (Z coordinate is the spot elevation) ...**
 1. Right click on Point Files and go to Add Points from Autocad Objects> Blocks.
 2. At the command line, choose whether to select the blocks by Entity or by Layer.
 3. Select the blocks.

f. If you have 3D faces...

1. Right click on Point Files and go to Add Points from Autocad Objects> 3D faces.
2. At the command line, choose whether to select the faces by Entity or by Layer.
3. Select the 3D faces.

g. If you have 3D lines...

1. Although you have the ability to create point data using the endpoint elevation of 3D lines, it is better to define these entities as breakline data so that Land Desktop will take the entire line into account and not just the endpoints.
2. Right click on Breaklines and go to Define by 3D lines.
3. You are prompted to give a description for the breaklines. It is usually sufficient to use the surface name as a description for all the breaklines.
4. At the command line, choose whether to select the lines by Entity or by Layer.
5. Select the 3D lines.

h. If you have 3D polylines...

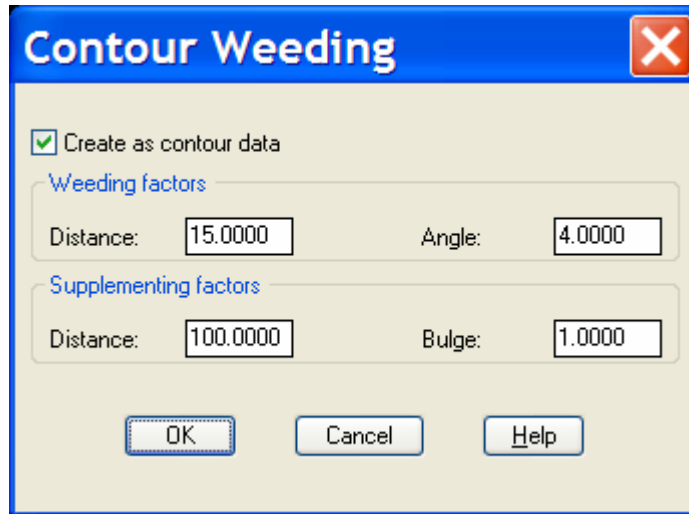
1. Right click on Breaklines and go to Define by Polyline.
2. You are prompted to give a description for the breaklines. It is usually sufficient to use the surface name as a description for all the breaklines.
3. Select the 3D polylines.
4. You are asked whether you want to "Delete Existing Objects?" Always answer "NO" to this question. Land Desktop will make a copy of the polylines/breaklines and put the copy on a new layer it creates called "SRF-FLT". This layer can usually be frozen and, if necessary, continue to work with your original polylines.

i. If you have 2D polylines defining your breakline locations...

1. This type of breakline is called a "Proximity Breakline". For this to work, the points connected by the 2D polylines must be defined as TIN DATA for the surface.
2. Right click on Breaklines and go to Proximity by Polylines.
3. You are prompted to give a description for the breaklines. It is usually sufficient to use the surface name as a description for all the breaklines.
4. Select the 2D polylines.
5. You are asked whether you want to "Delete Existing Objects?" Always answer "NO" to this question. Land Desktop will make a copy of the polylines/breaklines and put the copy on a new layer it creates called "SRF-FLT". This layer can usually be frozen and, if necessary, continue to work with your original polylines.

j. If you have elevated contours...

1. Right click on Contours and go to Add Contour Data.
2. Make sure there is a check in the box next to "Create as contour data".
3. Accept the defaults for the "Contour Weeding" box and hit "OK".



4. At the command line, choose whether to select the contours by Entity or by Layer.
5. Select the contours.
7. Now that the TIN data has been defined for the surface, we need to combine all the data and "Build" the surface. Right click on the surface name and go to "Build".
8. Make sure that the appropriate boxes are selected in order to use all the desired types of data. This is a good way to trouble shoot a bad surface. Although many types of TIN Data may have been defined, the surface can be built using only a few or all of the types of data. If you suspect you have a problem with your point data, unselect all other types of data in the Build dialog, build the surface and see if the problem occurs.
9. Whenever contour data is used to build a surface, make sure to select the option, "Minimize Flat Triangles Resulting from Contour Data".
10. Select OK.
11. Back in Terrain Model Explorer, select the surface name on the left side of the dialog box. Notice that the right side of the box populates with the new surface details.

Additional Check if Building Primarily with Contour Data

After getting surface built in the Land Desktop project, the following checks should be made to ensure that the surface model stored as project data matches the contours provided by the surveyor as closely as possible.

1. Set existing ground surface current in Land Desktop.
2. Isolate existing ground contour layers provided by others.
3. Make sure layer prefix is set to " * " in Terrain> Surface Display> Settings>
4. Create new contours using same contour interval as in the original file.
5. See how well newly created contours overlay the originals.
6. Use Inquiry> Elevation Track to check areas where contours don't match.
7. You can overlook where the new surface interpolates across gaps and outside of the surveyors apparent boundary. This can be taken care of with a surface boundary.

Adding a Surface Boundary

1. Go to Terrain> Edit Surface> Import 3D Lines. The surface 3D lines will come in on a layer that is named "SRF-VIEW" or ends in "SRF-VIEW".
2. Isolate the appropriate SRF-VIEW layer.
3. Go to Terrain> Edit Surface> Delete Line. Use this command to delete all extraneous TIN lines from the surface.
4. Once all lines have been deleted, go to Terrain> Surface Border> 2D Polyline. Say "Yes" when prompted to delete the old layer.
5. This will bring in a single closed polyline along the surface boundary. This new polyline will be on layer "SRF-BDR" or a layer ending in 'SRF-BDR".
6. Isolate the SRF-BDR layer.
7. Go to Terrain> Terrain Model Explorer and, if necessary, double-click on the surface name to expand the tree to see "TIN Data".
8. Right click on Boundaries and select "Add Boundary Definition". You can accept the default name for the boundary. This boundary is an "Outer" boundary and you can answer "Yes" when prompted to "Make Breaklines Along Edges?".
9. When you're back in Terrain Model Explorer, right click on the surface name and "Build" the surface again. You will be notified that the surface has been edited and that unless you select the button for "Apply Edit History" your changes will not be saved. Accept this condition and continue. In the "Build EG" dialog box, the same buttons should be selected as before. Also, make sure that the "Apply Boundaries" is selected.

Create Existing Ground Contours

1. Go to Terrain> Create Contours
2. Make sure that Surface name is correct at the top of the dialog box.
3. Make sure that the contour interval is set as desired, either 1 & 5 or 2 & 10.
4. Set the layer names for the new contours.
5. Pick "OK".

Create Contours

Surface: EG

Elevation Range

From: 210.00 To: 238.00 Vertical Scale: 1.00

Low Elevation: 209.12 High Elevation: 238.58 [Reset Elevations](#)

Intervals

Both Minor and Major Minor Only Major Only

Minor Interval: 2.00 Layer: CONT-MNR

Major Interval: 10.00 Layer: CONT-MJR

Properties

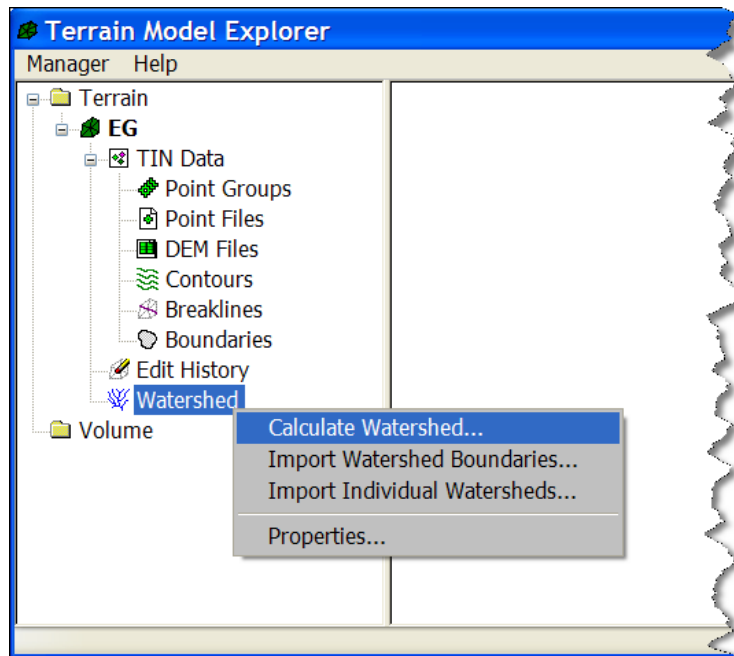
Contour Objects Polylines

Contour Style: Standard [Preview ...](#) [Style Manager >>](#)

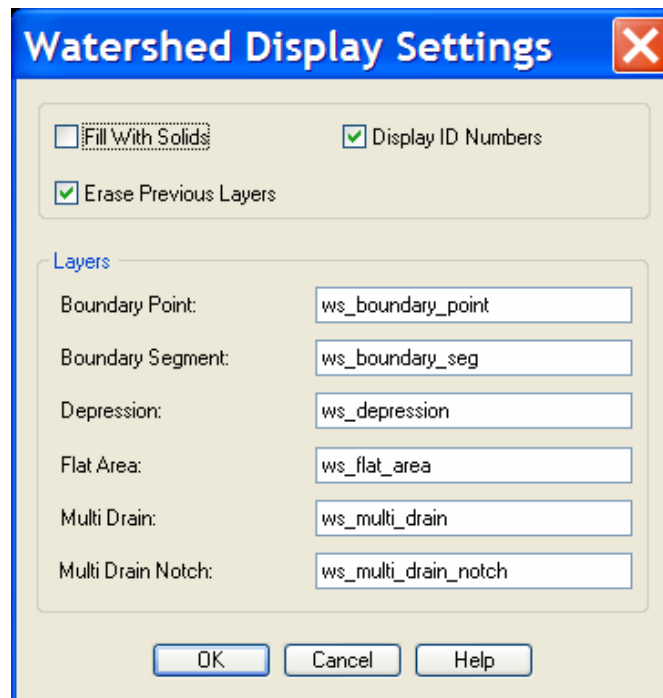
[OK](#) [Cancel](#) [Help](#)

Calculate and Import Watershed Areas

1. Go to Terrain> Terrain Model Explorer
2. If necessary, double-click on the surface name to expand the tree so that the “Watershed” item is visible.
3. Right click on “Watershed” and select “Calculate Watershed”. Accept the default settings and pick “OK”.



4. Right click on Watershed again and select “Import Watershed Boundaries”. Make sure to uncheck the box next to “Fill With Solids”.



5. The watershed boundaries and labels are imported on the layers defined in the Watershed Display Settings dialog box.