Create Roughness Selafin File

Authored by Federica Scolari and Sebastian Schwindt

Note that the License and Disclaimer on https://hydro-informatics.com equally apply to the application of the workflow in this document.

If the study domain is characterized by regions of different roughness, it is not sufficient to define a global friction through a FRICTION COEFFICIENT keyword in the Steering file. To define roughness zones, create **geometry.slf** file either through **roughness XYZ points created with QGIS (Option A)** or **Closed Lines created with BlueKenue (Option B)**. Either way, **BlueKenue is required for assigning roughness from XYZ points or Closed Lines to create the geometry.slf selafin file**.

→ Option A: QGIS

1. Create a series of polygons defining the different roughness areas as shown in Figure 1.

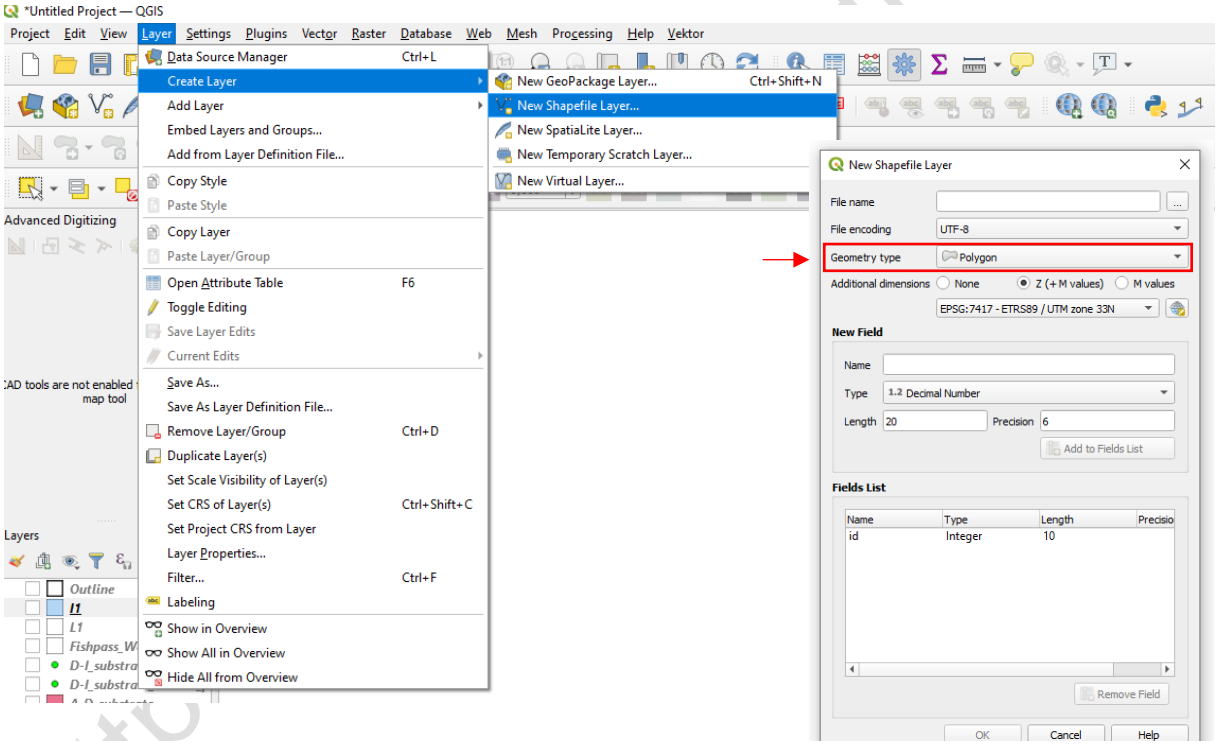


Figure 1: Create new Shapefile Layer.

In the example shown in Figure 2, two roughness zones are delineated with two polygons:

- Concrete areas (orange)
- Gravel areas (green)

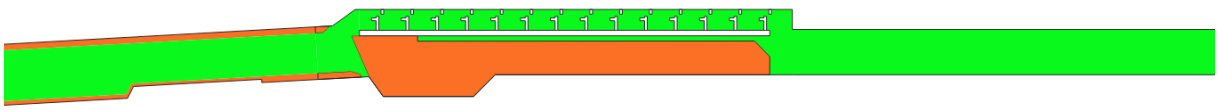


Figure 2: Polygons identifying the concrete (orange) and gravel areas (green).

2. Open the QGIS Processing Toolbox and select Vector creation > Random points inside polygon (Figure 3).

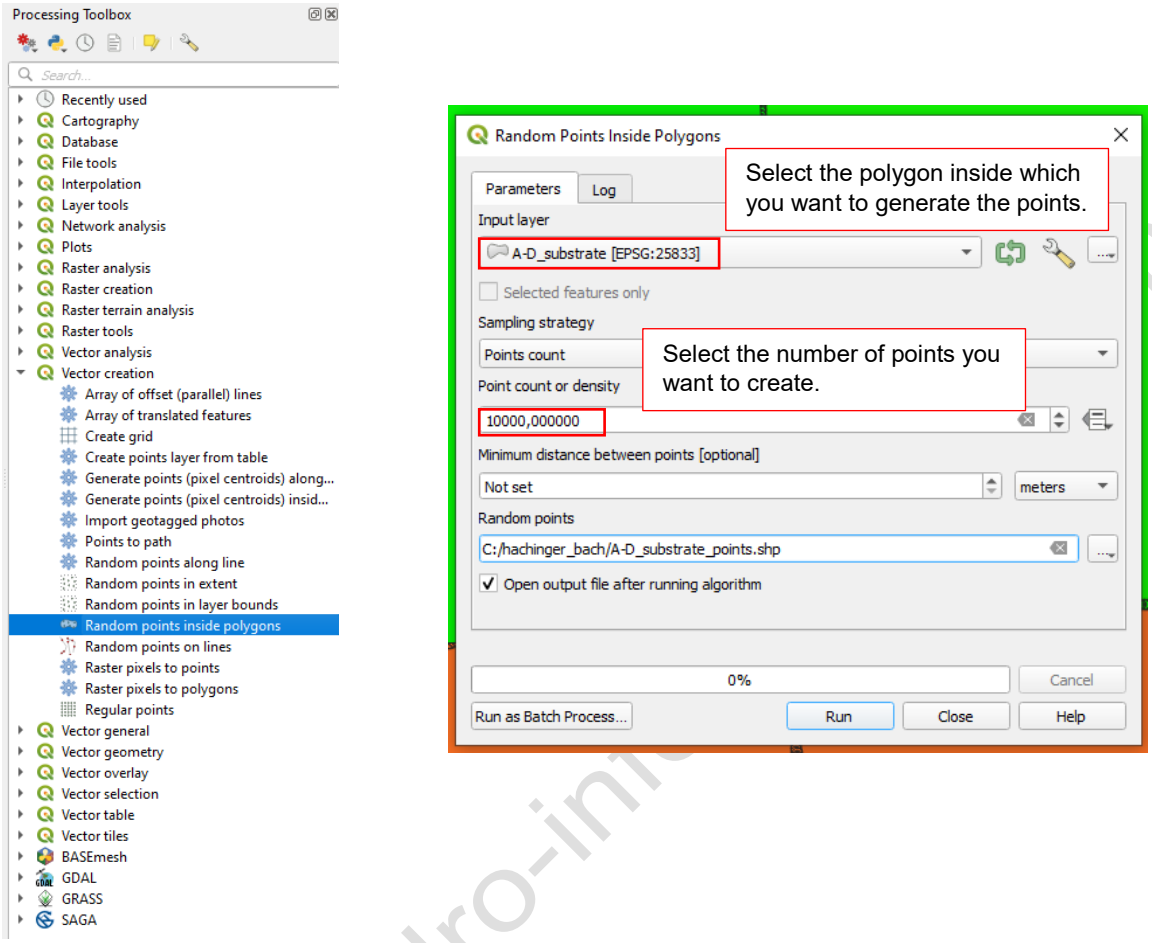


Figure 3: Create Random Points inside Polygons.

3. Repeat the same process for all polygons shown in Figure 4.

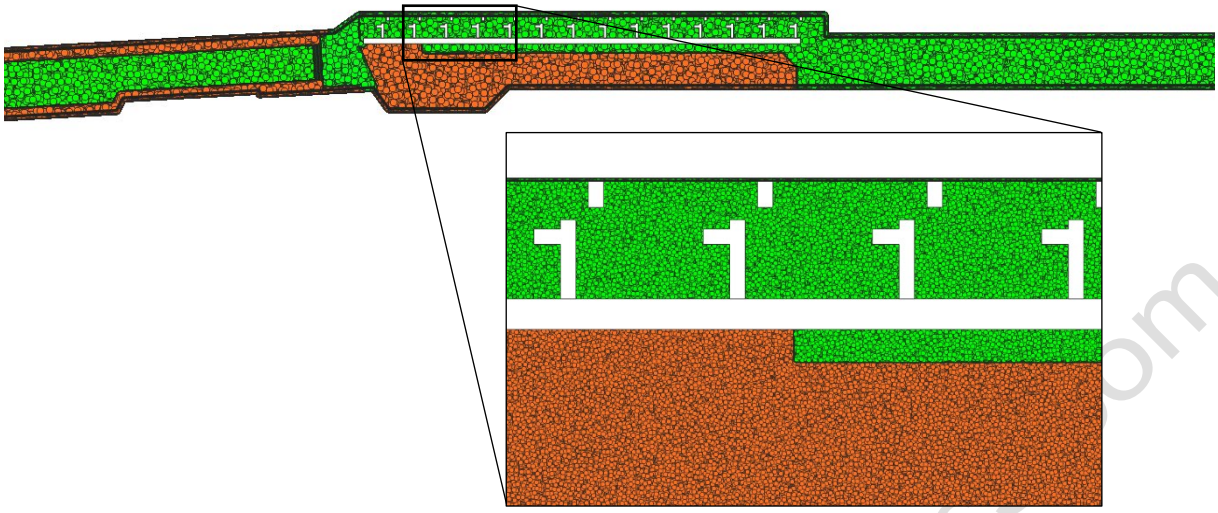


Figure 4: Polygons after having applied the Random Points inside Polygons tool.

4. Select the newly created point shapefile and open its Attribute Table (Figure 5).

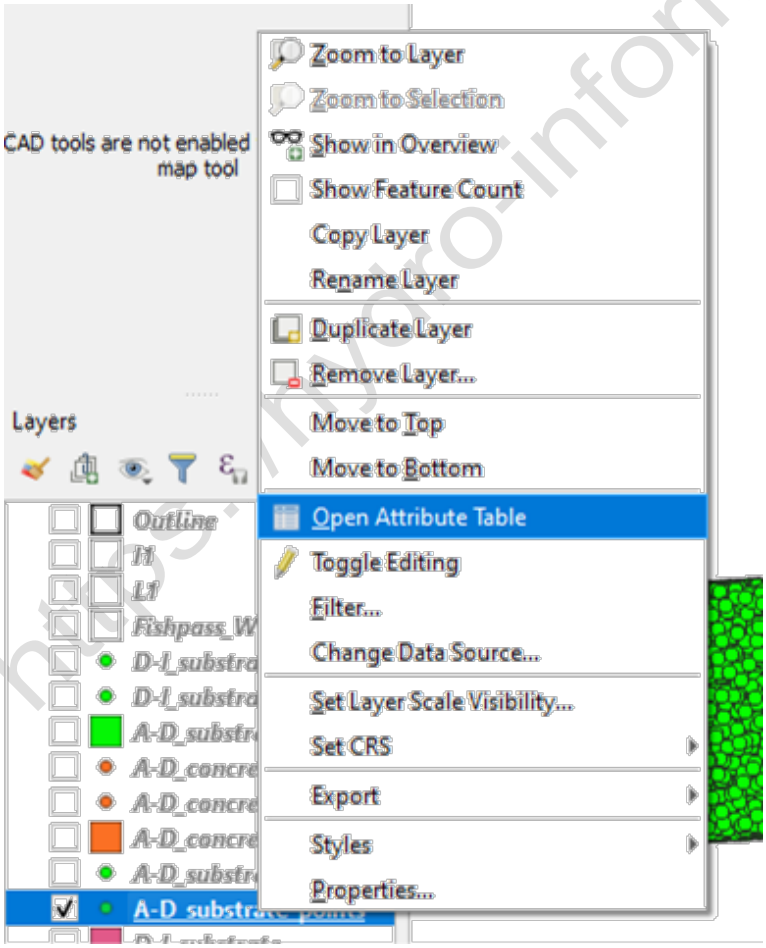


Figure 5. Open Attribute Table.

5. Open the Field calculator (Figure 6) and add the x and y coordinates (Figure 7) to the generated points.

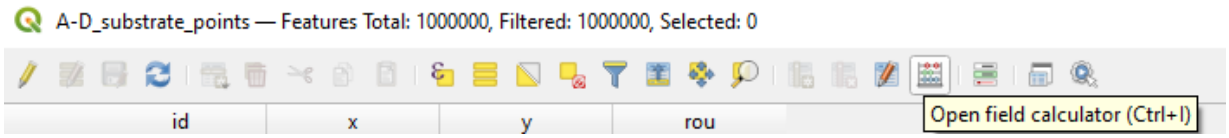


Figure 6: Open Field Calculator.

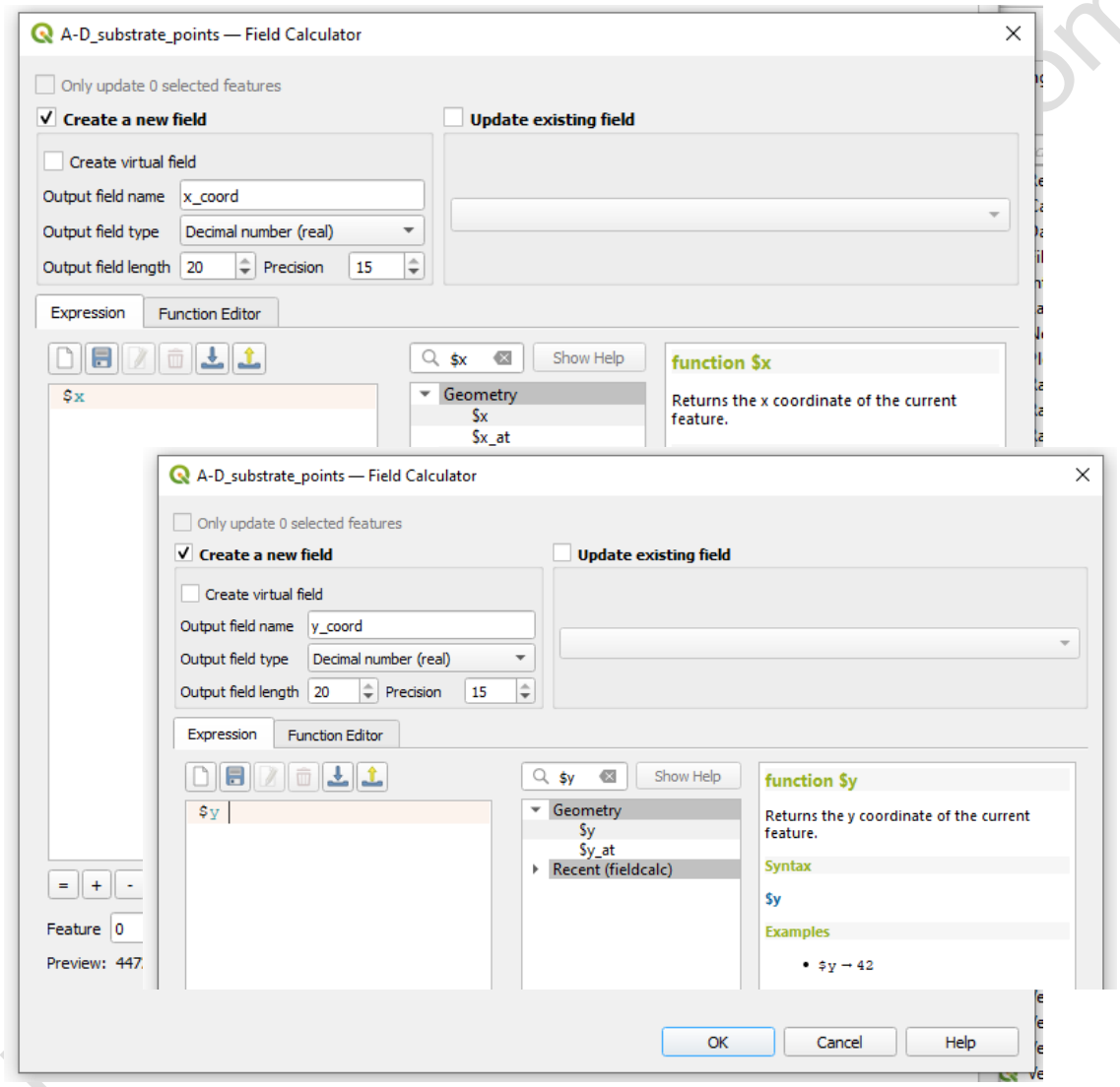


Figure 7: Add a new field for the x and y coordinate.

6. Similar as for the x and y coordinates, create a new field to assign a roughness value to every point (Figure 8).

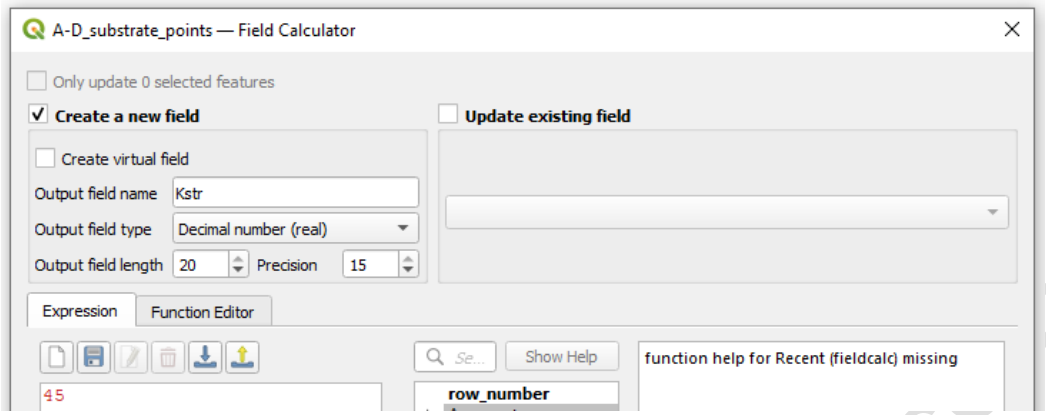


Figure 8: Add roughness value to points.

7. Export the point shapefile with the added x and y coordinate and roughness information as CSV file (Figure 9). If possible, use TAB as column separator.

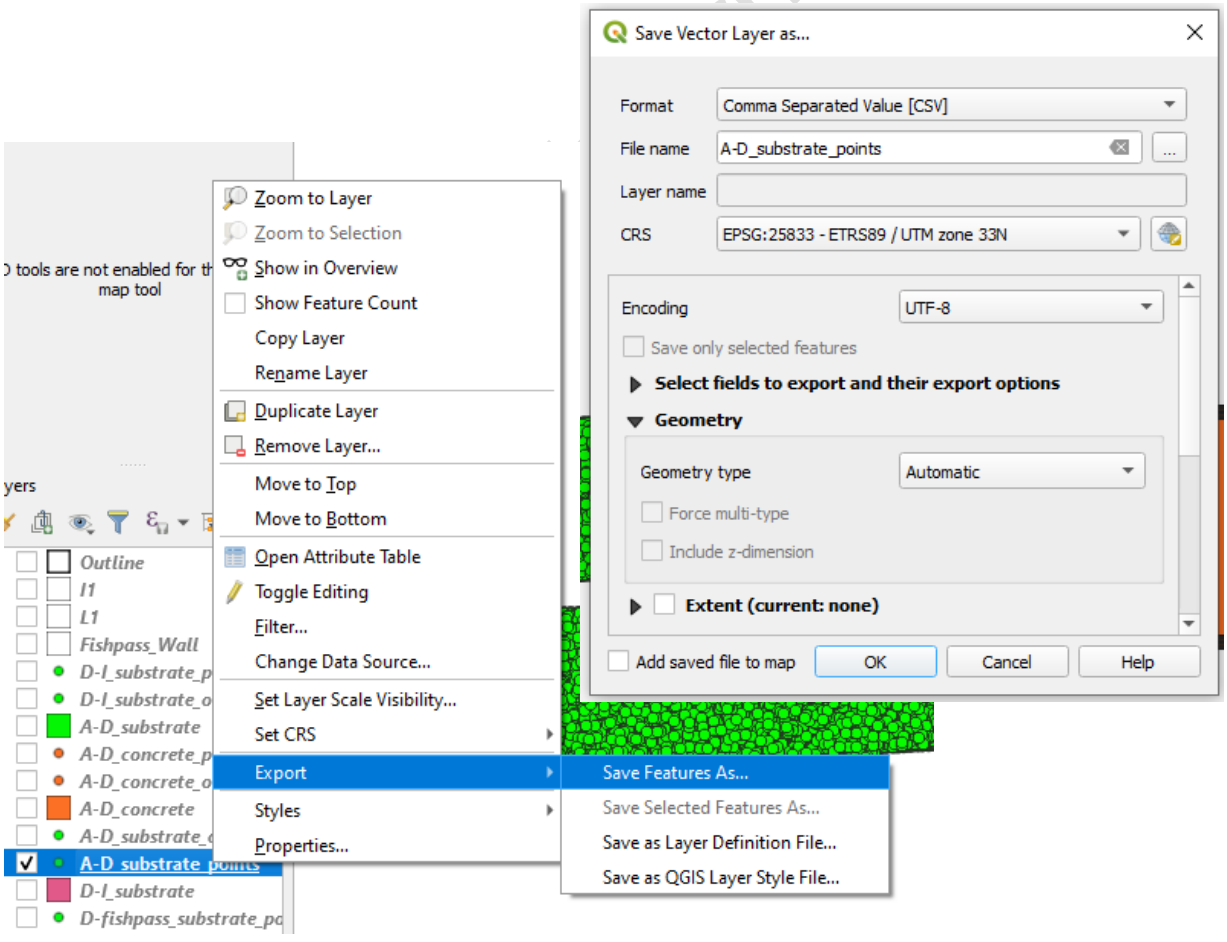


Figure 9: Save vector layer as CSV file.

8. Open the CSV file with a text editor. If the columns are separated with a comma, use find-and replace to ensure that the file has tab-separated column rather than comma-separated columns. (e.g., CTRL + H keys NotepadPlusPlus on Windows or CTRL+F in Atom). Save the file as Tab delimited XYZ file, which is required by BlueKenue. Read more about XYZ file conversion on https://hydro-informatics.com/geopy/use-qgis.html?highlight=xyz#raster-to-xyz.

→ Option B: BlueKenue

1. Instead of creating the polygons on QGIS it is also possible to define the different roughness areas directly in BlueKenue by generating a series of Closed Lines (Figure 10).

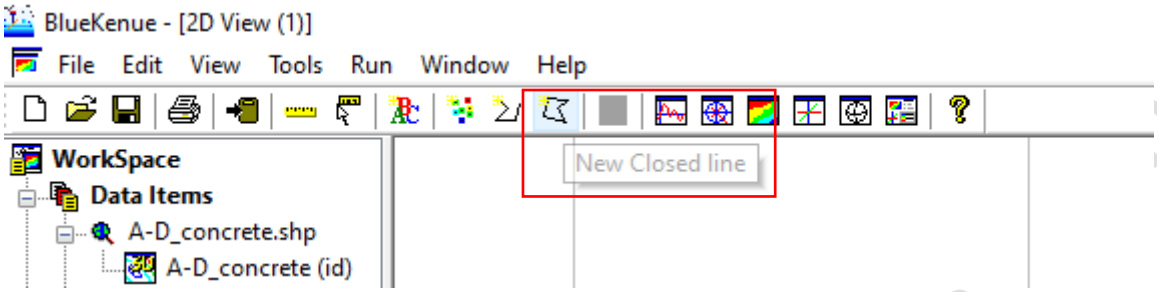


Figure 10: New Closed line tool in BlueKenue.

2. Once drawing is finished, press the Esc button and the window shown in Figure 11 will appear, where a roughness value can be assigned.

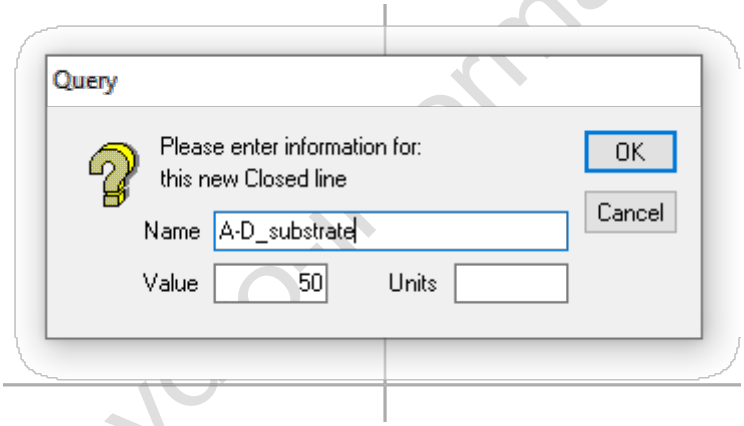


Figure 11: Assign the roughness value (here: a Strickler roughness of 50) to the area.

3. Assign a name to the area and the correct roughness value, then click OK. Figure 12 shows an example of a final result.

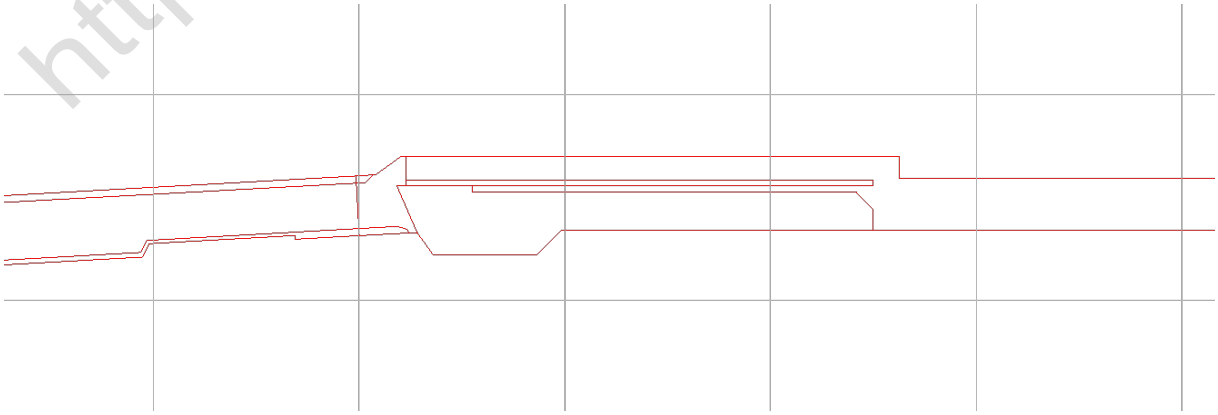


Figure 12: Final result of the different roughness areas.

→ **Generation of a BOTTOM FRICTION Selafin file with BlueKenue**

If option A (QGIS) was used to create the different roughness areas, import the xyz file from **File** > **Open** (Figure 13).

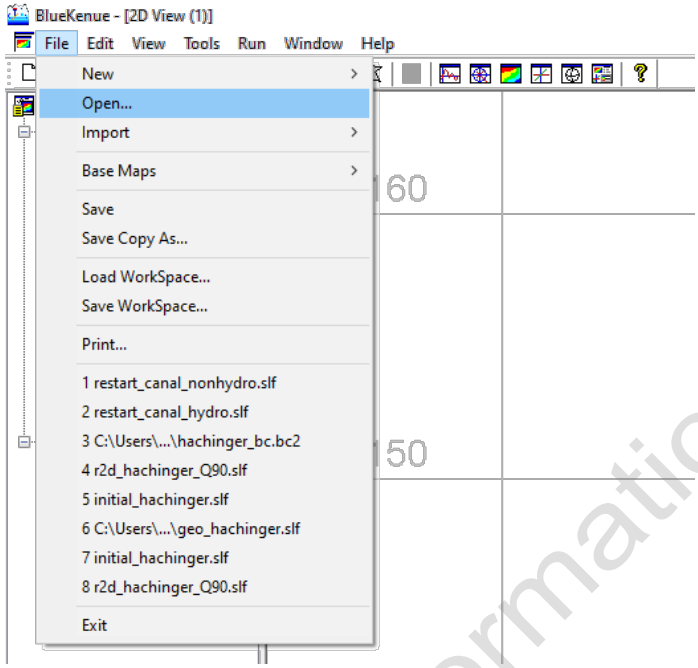
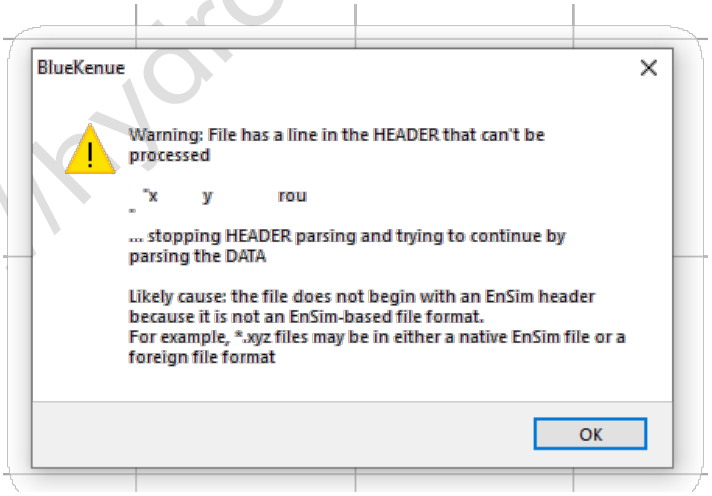


Figure 13: Import the xyz files containing the roughness information.

If the following notification pops up, press OK.



If option B (BlueKenue) was used, the files should already be open in BlueKenue. Otherwise, go to **File** > **Open**… and make sure to select the correct file type (switch SLF in the bottom-left of the open file dialog to t2d/t3d line file types).

The following instructions are the same, **regardless if option A or B** was used.

1. Import the computational mesh (e.g., qgismesh.slf) through **File** > **Open**….
   Note: To precisely assign the roughness areas, it is advisable to generate a submesh for every roughness area and use them to create the final mesh, as in the example in Figure 14.

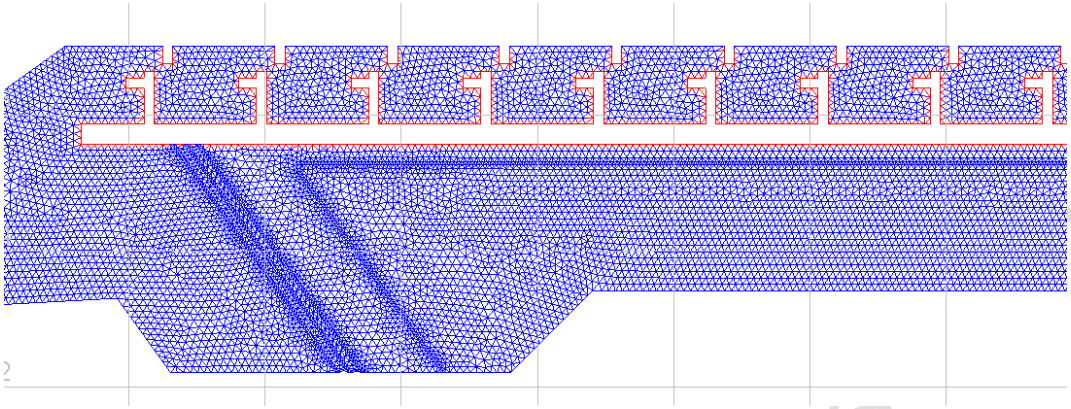


Figure 14: Final Mesh with submeshes for different roughness areas.

2. Open a new 2D Interpolator as shown in Figure 15.

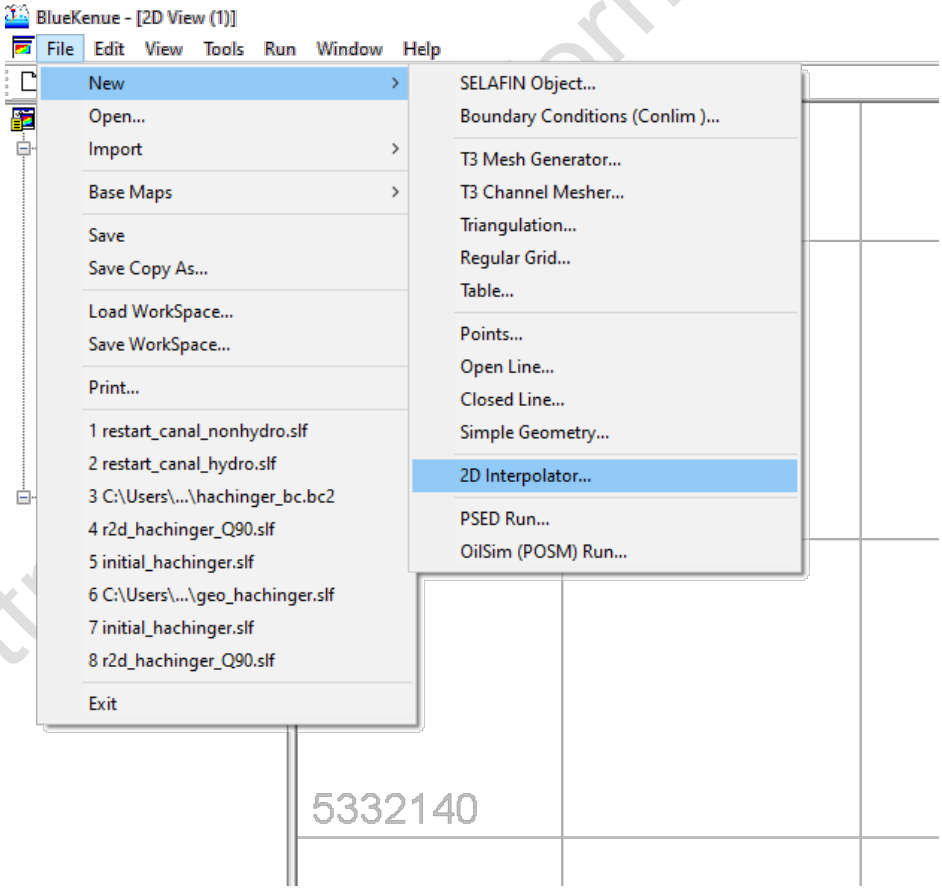


Figure 15: Open a new 2D Interpolator.

3. Drag and drop **either the .xyz file** or the **.t3d file (closed lines)** on the new 2D Interpolator (Figure 16).

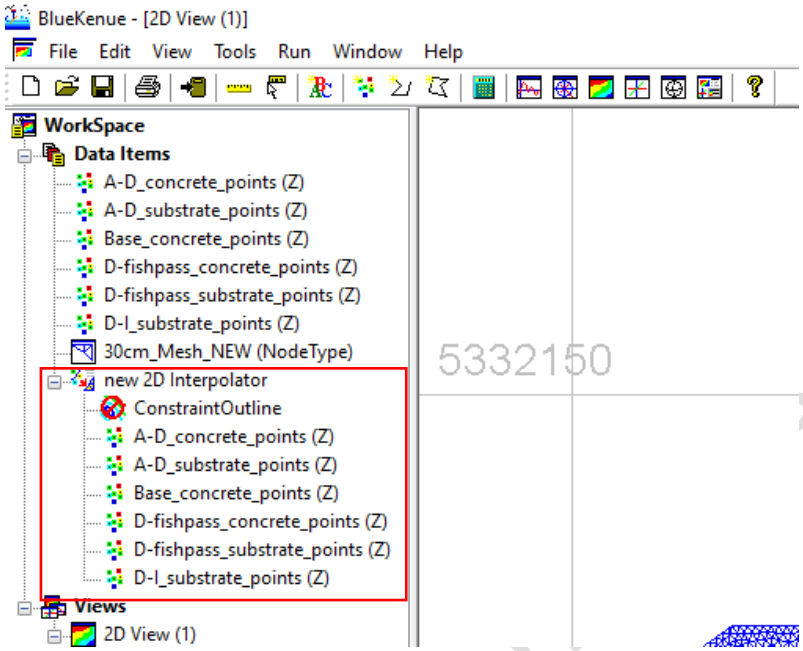


Figure 16: Add created files to the 2D interpolator.

4. Select the mesh then go to **Tools** > **Map Object** > **new 2D Interpolator** (see Figure 17).

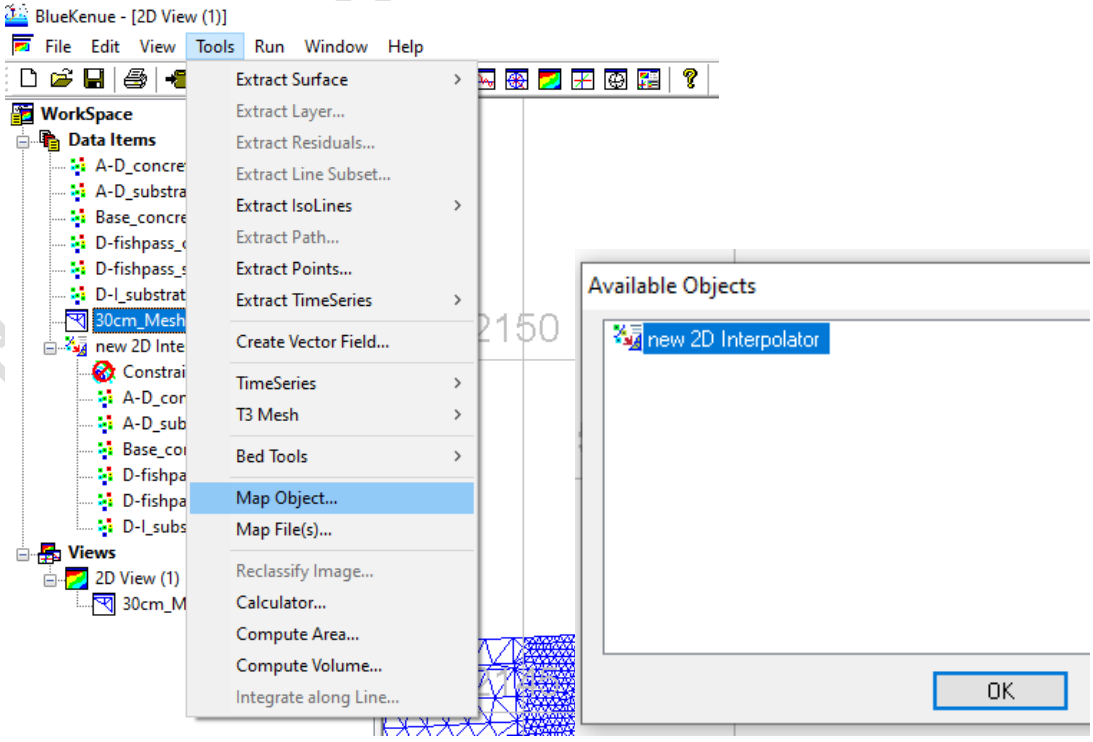
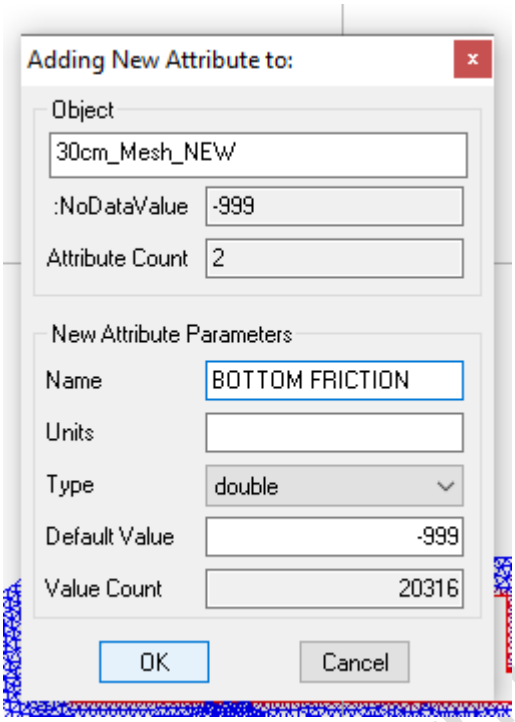


Figure 17: Map Mesh with 2D interpolator.

5. Add the new Attribute Information as shown in Figure 18.



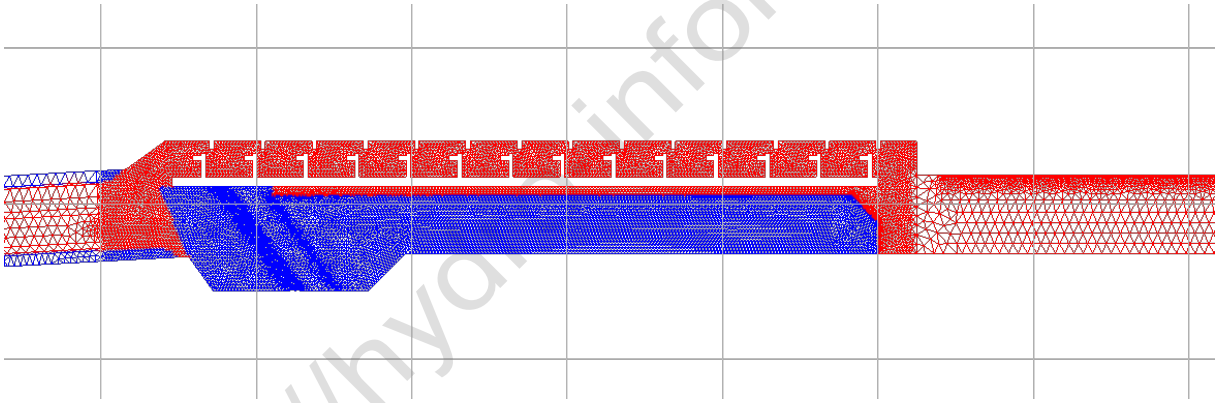


Figure 18: Example of the resulting BOTTOM FRICTION file.