SOILVISION 10 Help Manual - 12/16/2019

SWCC Estimation

Estimate the SWCC Theoretically

The SWCC is required for unsaturated transient seepage analysis.

What is required for most SWCC estimation methods is a description of the grain-size distribution and one situ volume-mass properties such as porosity, dry density, or specific gravity. In this case, let us assume that the user has measured the Specific Gravity and the Saturated Volumetric Water Content (VWC) of the material. Follow the steps below to enter SWCC information:

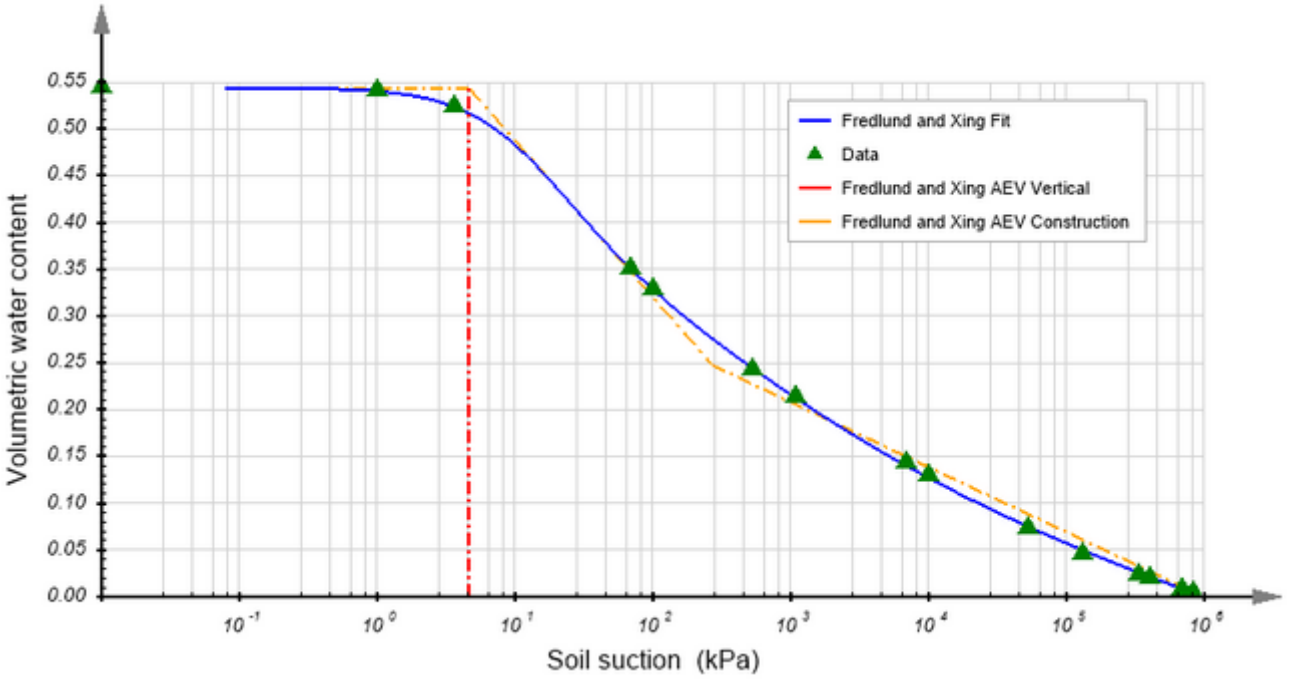
1. Select the **SWCC** button to open Drying SWCC dialog,
2. Enter **0.45** Saturated GWC (as a ratio) value,
3. Click on the **Vol-Mass State..** button,
4. Click **Calculate**,
5. Click *OK* to close Volume-Mass dialog.

The user is now able to use the laboratory data as the source to calculate the SWCC curve through different fitting algorithms. The fitting algorithms can now be initiated by following these steps:

1. In the Drying SWCC dialog, select the **Fredlund and Xing Fit** Method from the drop list of fitting methods,
2. Select the Source Type of **Data,**
3. Next, select the Source as **Laboratory Data.** Then click the *Data...* button open the data table dialog,
4. Enter the table of values for the SWCC Data found in the table below by copying and pasting them using the Paste Points button and press Apply Fit to accept the changes,

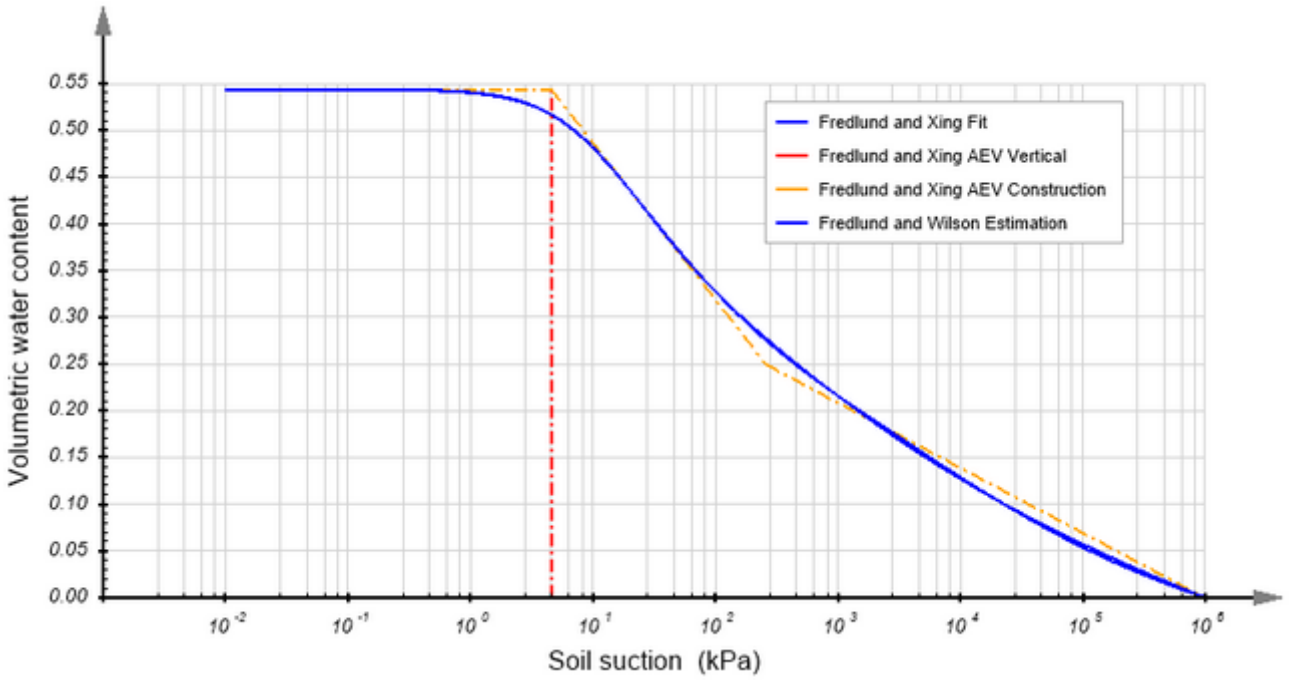
Suction (kPa)	GWC
0.01	0.45
1	0.447
3.63	0.433
69.18	0.29
100	0.271
524.81	0.201
1096.48	0.176
6918.31	0.118
10000.00	0.107
52480.75	0.060
131825.67	0.038
331131.12	0.019
398107.17	0.016
691830.97	0.006
831763.77	0.003

5. Click Graph icon at the bottom of the dialog to view graph (the graph should look like the graph below),
6. Close the graph then click *OK* to close dialogs.



The user is now able to initiate the algorithm to estimate the silt material properties. In this tutorial, let us make use of the Fredlund and Wilson physio-empirical methods of estimating soil behaviour. The Fredlund and Wilson (1997) method is utilized in this case since it can be used to estimate the SWCC for finer materials such as silt. The estimation algorithms can now be initiated by following these steps:

7. In the Drying SWCC dialog, select the **Fredlund and Xing Fit** Method from the drop list of fitting methods,
8. Select the Source Type of **Estimation,**
9. Next, select the Source as **Fredlund and Wilson.** This step tells the software to use the Fredlund and Wilson (1997) estimation,
10. Press Apply Fit to fit the curve,
11. Click Graph icon at the bottom of the dialog to view graph - the graph should look similar to the one below,
12. Close the graph then click *OK* to close dialogs.



N O T E :

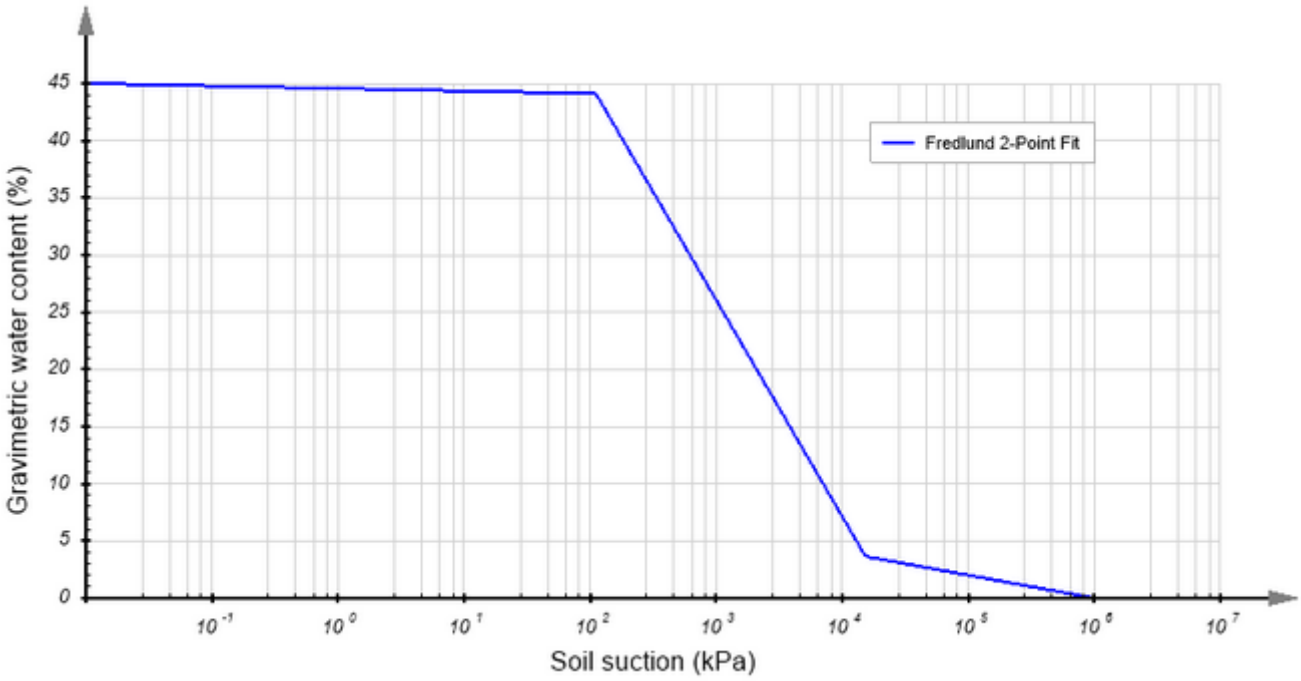
The following section refers to functionality that is only available with an SVSOILS Advanced license.

The SWCC can also be estimated by data mining. This method requires a description of the grain-size distribution and a in situ volume-mass properties such as porosity, dry density, or specific gravity. In this case let us assume that the user has measured the Specific Gravity and the Saturated Volumetric Water Content (VWC) of the material. Follow the steps below to enter SWCC information:

1. Select the **SWCC** button to open Drying SWCC dialog,
2. Enter **0.45** Saturated GWC (as a ratio),

In this tutorial we will make use of the Fredlund 2-Point data mining method to estimate SWCC. The estimation can be initiated by following these steps:

1. In the Drying SWCC dialog, select the **Fredlund 2-Point Fit** Fitting Method from the drop list,
2. Select **Database** from the Source Type drop-down list and **Data Mining** as the Source,
3. Click on the Search... button to open the Fredlund 2-Point Fit dialog,
4. Check **Projects：Select All**,
5. Select **Search by Texture,**
6. Click the **Search** button,
7. Click *OK* to close Fredlund 2-Point Fit dialog,
8. Click Graph icon at the bottom of the dialog to view graph - the graph should look similar to the one below,
9. Close the graph then click *OK* to close dialogs.


Gravimetric water content (%)
45
40
35
30
25
20
15
10
5
0
Fredlund 2-Point Fit
10 -1
10 0
10 1
10 2
10 3
10 4
10 5
10 6
10 7
Soil suction (kPa)