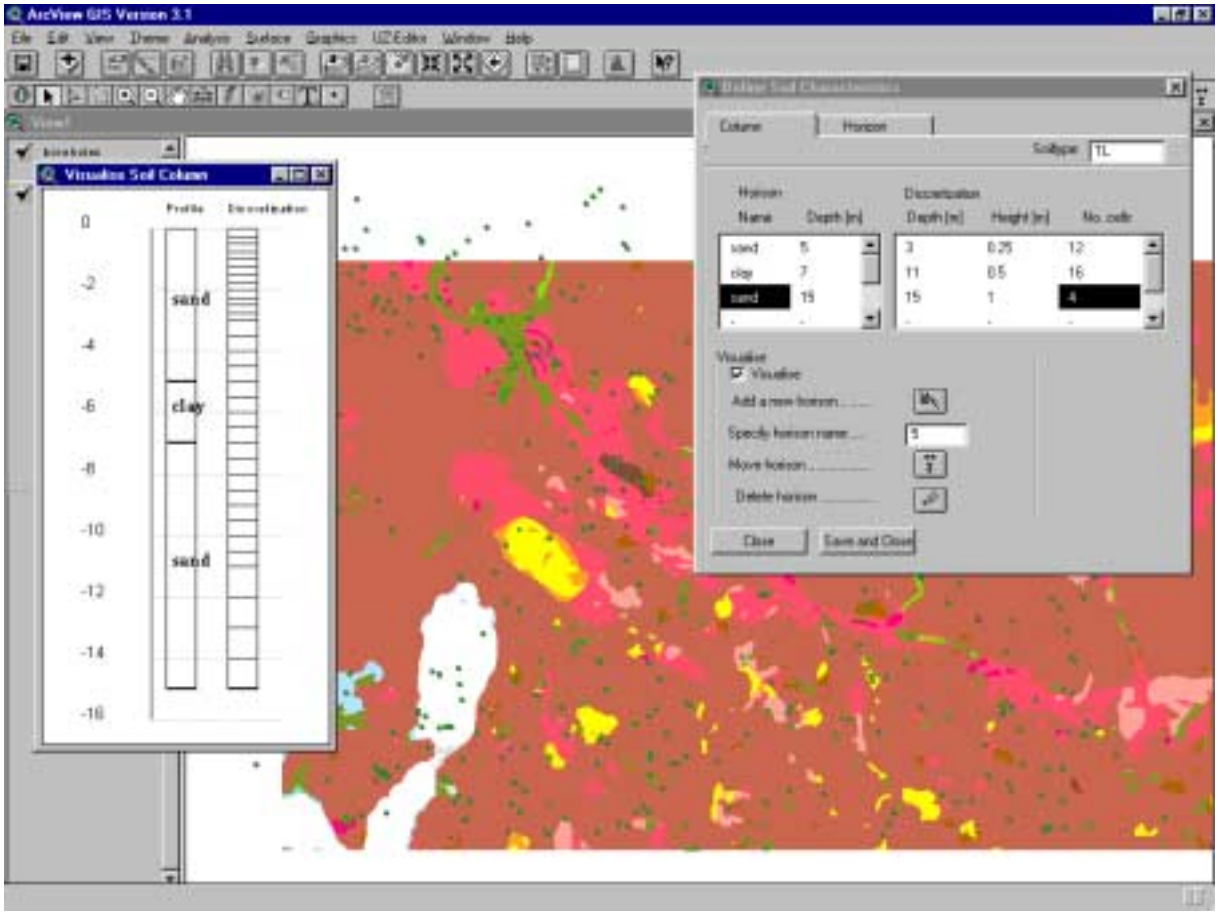
UZ Editor 2000



User Guide

Soil properties setup in the unsaturated zone

DHI – Institute for Water and Environment
March 2000

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DHI could be contacted by:

DHI - Water & Environment
Agern Alle 11
DK- 2970 Hørsholm
Denmark

Phone: (+45) 45 16 92 00
Fax: (+45) 45 16 92 92
E-mail: software@dhi.dk
Home page: www.dhi.dk

Table of Content

DHI UZ-Editor (ArcView extension)

Instruction for the DHI UZ-Editor (Version 2000).
DHI March 2000.

1 Getting started

This user guide assumes that the user is familiar with the ESRI product ArcView 3.1 or later. The user must also be familiar with the ArcView extension Spatial Analyst 1.1 as well. Basic ArcView functions described in one of the ESRI manuals are not explained in this user guide, but is assumed to be known by the user.

1.1 Requirements

UZ-Editor requires ArcView 3.1 or later and the ArcView extension Spatial Analyst 1.1 or later.

1.2 Installation

If UZ-Editor is purchased as a setup program, double click on the setup.exe file from the enclosed CD-ROM for installation of UZ-Editor. The setup program will install the necessary avx file in the EXT32 folder.

If UZ-Editor is purchased as an avx file, this file should be moved manually to the EXT32 folder (Usually c:\Esri\Av_gis30\Arcview\Ext32), or to the userext folder, if desired.

1.3 How to start UZ-Editor

To enable UZ-Editor the user must load it as an extension. The extension menu is located under the file menu for the project window. Select “DHI UZ-Editor”. During the load procedure the extension Spatial Analyst will be automatically loaded, if it is not already loaded. If the Spatial Analyst extension is not available the UZ-Editor will fail to load.

1.4 Menu

Invoking UZ-Editor will modify the menu of the View window. An additional part of the menu called UZ-Editor appears, see Figure 1. This menu contains the following four items:

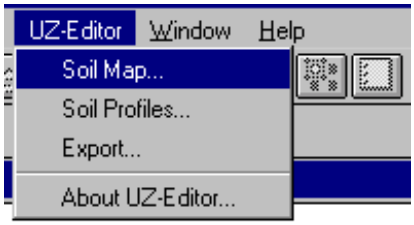

Figure 1 UZ-Editor menu

- Soil Map: Load and edit soil map, representing areas with dominant soil in the unsaturated zone.
- Soil profiles: Define soil profiles, discretization, soil horizons and hydraulic parameters.

- Export: Export the defined profiles and hydraulic parameters to ASCII or MIKE SHE format.
- About UZ-Editor: Information about UZ-Editor and how to contact DHI.

All the files generated during an UZ-Editor session is by default saved in the ArcView working directory.

Important Note: If the user is using the program Exceed, it is recommended not to use the directory c:\exceed as the working directory in ArcView, because this could cause problems running UZ-Editor. The working directory is changed from the File menu of the View.

2 Soil Map

The Soil Map menu item opens the Soil Map dialog box, enabling the user to load a soil map, check for and remove overlapping polygons, group soils, and check for soil types falling out of the grid, see Figure 2.

Figure 2 Soil Map dialog box.

2.1 Load

The main input to UZ-Editor is a soil map representing the distribution of soil types representing the unsaturated zone. Many organisations offer maps representing the soil types close to the ground surface, which could either be purchased or downloaded for free (e.g. FAO, GEUS).
In UZ-editor the user is free to choose which kind of map to use, as long as it is loadable in ArcView, the only requirement is that the soil areas are represented as polygons with a unique ID for each soil type.
When selecting the Load option in the Soil Map dialog box, another dialog box shown in Figure 3 appears.

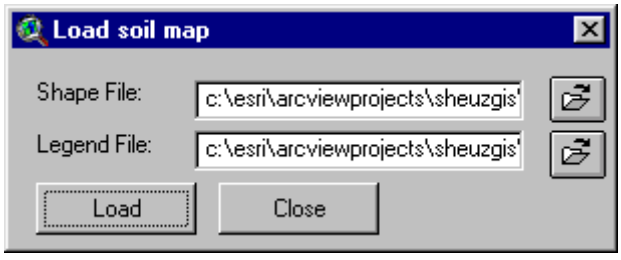

Figure 3 Load Soil Map.

Specify the ArcView shape file (*.shp) to load. Optionally, specify the ArcView legend file (*.avl) to represent the soil types. Only soil types present in the soil map will be shown in the legend.

2.2 Polygon Check

Often soil map generation is done in several steps. Typically, the dominant soil type of an area is the first polygon to be drawn. Subsequently, polygons of minor soil types are drawn on top of the first polygon. Consequently, in some subareas two or more overlapping polygons will be present. UZ-Editor facilitates the removal of all underlying polygons so that the only visual polygons on top are preserved. This removal is necessary in order to ensure correct calculations by UZ-Editor.

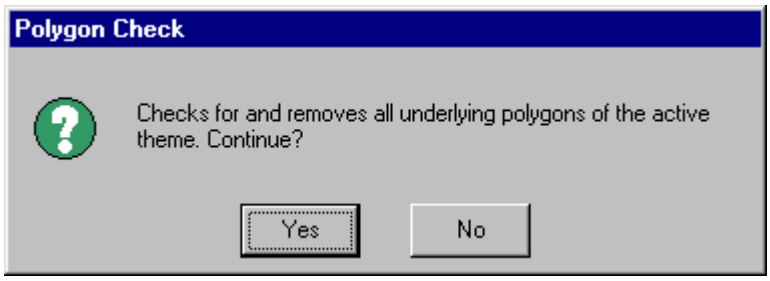

Figure 4 Warning for polygon check

When selecting the Polygon Check menu item the user is first prompted acording to Figure 4, pressing No cancels the procedure, while Yes executes the procedure. If the soil theme contains many polygons the procedure could take some time. The procedure will edit the active theme, so in order to keep the original theme, the user will have to make a copy.

2.3 Group

In many cases the used soil map is classified due to some other criterias than the ones intented by the user. If, for instance the soils are classified in more groups than for the user. The Group menu item enables the user to lump some of the soil types into a common soil group, see Figure 5.

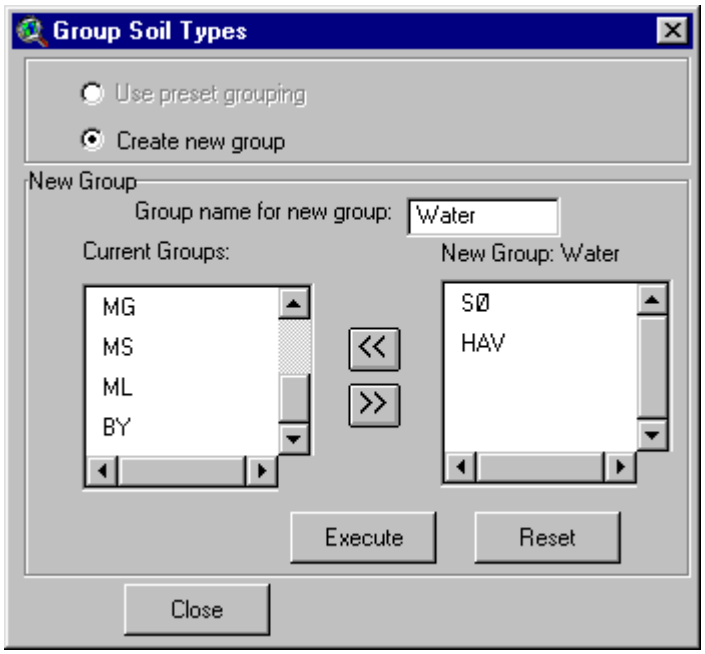

Figure 5 Group Soil Types dialog box.

The recommended procedure:

- Press **Create new group** to define a new soil group. Enables the definition of a new soil group. When selected the groups or soil types in the active polygon theme will be shown in the **Current Groups** list.
- Type the name for the new group in the textbox, e.g. sand or clay.
- Select the soils from the **current groups** to add to the new group. Shows a list of the current groups in the active polygon theme. The list will be taken from the legend field in the attribute table. To move groups to the newly defined group select one or more, multiple selection is enabled by holding down the shift key, and use the "<<" and ">>" tool.
- Press **Update theme** to update the groups in the theme. Updates the active theme from the defined groups. If a new group is defined it will create a new field in the attribute table (tmpleg) and use this field in the legend definition.
- Press **Reset** to reset the changes
- Press **Close** to exit the dialog box.

2.4 Grid Check

Enables the user to check for soil groups "falling out " when converting the soil classification map to a grid, see Figure 6.
When converting a polygon theme to a grid theme each cell in the output grid will only be assigned one value although several soil areas could be present within the single cell area. The grid check will check for soil areas that are not the dominant soil in any cells. These soil areas will then be excluded from the soil classification map and replaced by the dominant soil type in the cell.
Each cell in the grid is divided in 100 sub-cells (10x10), each of the 100 sub-cells are then given the value from the centre of the sub-cell. The majority value from the 100 sub-cells is calculated and assigned to the original cell. In case of equal majority the cell value is picked arbitrarily from the equal majority values. The new grid is then checked against the original grid for missing soil types. The user is prompted if any soil areas are excluded, and also if an entire soil group is 'falling out'.

Recommended procedure:

- Press the **Grid Set-up** button to define the grid, if it is not already defined, see Section 2.5.
- Press the **Grid Check** button to start the grid checking procedure.

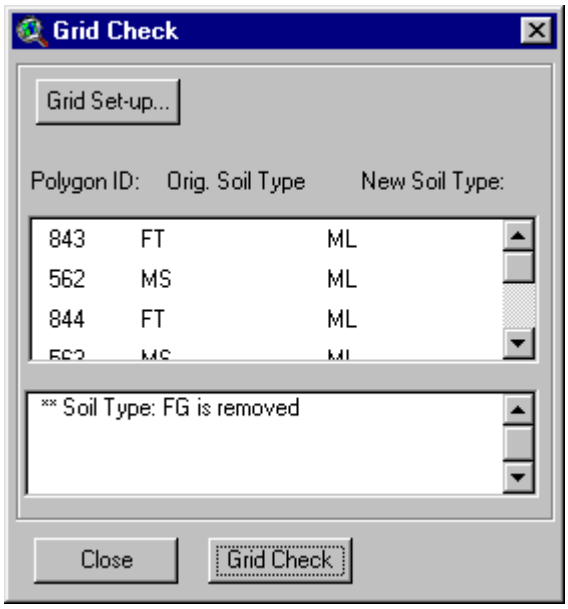

Figure 6 Grid Check dialog box.

2.5 Grid set-up

Enables the user to define the output grid, see This will be used when checking for soil groups “falling out”, see Section 2.4, and when exporting the soil data to an external format, see Section 4.1.

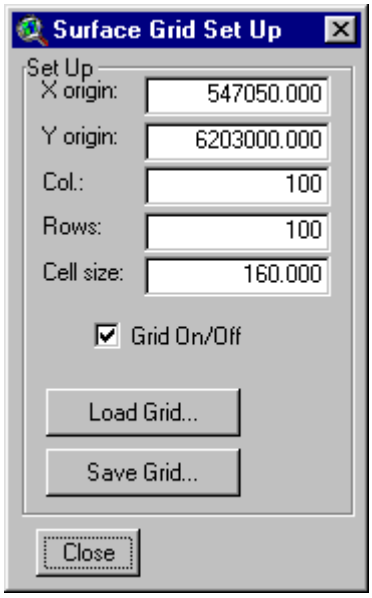

Figure 7 Grid set-up dialog box.

When entering the grid set-up dialog box, see Figure 7, it contains the initial settings for the chosen theme. If the theme is a grid theme the initial settings will be the actual settings for the grid, but if the theme is a feature theme then the actual settings are non-existing, and default values are applied (rows, columns and cell size equal to 100). x and y origins are of the lower left corner of the active theme.

Recommended procedure:

- Change the grid settings by typing new values.
- Save grid settings to an ASCII file by pressing the **Save Grid** button. The format of the grid definition ASCII file is described in Appendix1.
- To load a grid set-up from a grid definition ASCII file or a MIKE SHE T2 file, select the **Load Grid** button. The format of the grid definition ASCII file is described in Appendix 1.
- The Grid on/off checkbox enables/disables graphical display of the grid in the view.

3 Soil Profiles

The Soil Profiles menu item, accessible from the UZ-Editor menu in the view, enables the user to define soil profiles for each of the soil types, see Figure 8.

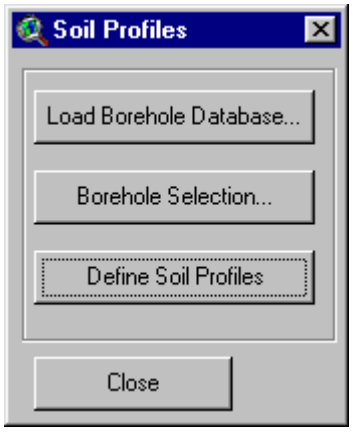

Figure 8 Soil Profiles dialog box.

3.1 Load Borehole Database

UZ-editor enables the use of borehole information when generating soil profiles for the unsaturated zone. In MIKE SHE where the unsaturated zone profiles are defined from the ground surface to the groundwater table, the profiles could in many cases have a considerable length. This implies that borehole information could improve the creation of the profile.

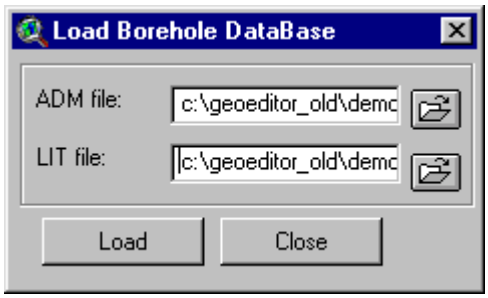

Figure 9 Load Borehole Database dialog box.

Only borehole databases in the PC-Zeus format are loadable, see Appendix 2 for description. The user should specify the ADM and the LIT file, see Figure 9. The ADM file is then loaded to the view as a point theme, while the LIT file is loaded to ArcView as a table.

3.2 Borehole Selection

Borehole selection can be performed when a borehole database is loaded to the project, see Figure 10. If accessed from the Soil Profile dialog box, the borehole selection works on a global scale, meaning that boreholes which are not selected will be removed from the View. If accessed from the Define Soil Profiles dialog box, see Section 3.3, the selection is only for the current soil profile.

The borehole selection can be entered initially when starting the soil profiling or at a later state if the user wants to redefine the borehole selection.

The purpose is to select only the boreholes that fulfil the criteria established by the user. An example could be that the user only wants to work with boreholes that contain limestone, are more than 10 meters deep, and are constructed before March 1 1990.

The user may select or deselect the boreholes from different criteria. The selection only works on the extracted data, meaning that the user is selecting the subset of the extracted data that fulfil the established criteria.

When opening a new project, by default the boreholes containing no geological data will not be selected. However, if the user presses the **Select All** button these will be included in the selection, although they do not contain any geological information.

At the bottom of the borehole selection dialog box the number of selected boreholes are shown along with the total number of boreholes.

Notice: When the dialog box first appears the number of selected boreholes could be less than the total number. This will occur in cases when data are missing in the lithological database or in case of boreholes containing blanks in the lithology field.

Recommended procedure:

Creating query strings in the Current Selection Statement list box does the selection of boreholes, see Figure 10. It can be done by typing the statements but preferably by selecting the attribute and the values from the dialog box. When selecting an attribute from the **Select Attribute** list box, the values in the selected boreholes are shown in the **Select Values** list box. If the desired selection criterion contains several sub criteria it is recommended to select them one by one. This makes the selection more fast, and it is easier to see the effect of a given sub criterion. More **Select Values** can be selected at once by holding down the *shift key*.

Use the **Select All** button to clear the current selection by selecting all boreholes. This will also clear the **Selected Statements** list box.

Use the **Execute current selection** button to execute the current selections. If a query string is executed successfully the string is written in the **Selected Statements** list box. Otherwise an error message appears in the list box.

The available attributes for queries are:

Area Code: Select by municipality or area code.
Borehole ID: Select by borehole ID.
Lith. Symbol: Select by lithological symbol. Selects or deselects the boreholes containing the selected symbol in at least one layer.
Single Lith. Symbol: Select by single lithological symbol. Selects or deselects the boreholes only containing the selected symbol, e.g. boreholes only containing sand.
Lith. Symb. Within d.b.s.: Select by lithological symbol within depth below surface. The user is prompted for a depth interval and boreholes containing the selected lithological symbol within the specified depth interval are selected or deselected.

Boreholes Type: Select by boreholes type, e.g. abstraction borehole.
Depth: Select by borehole depth.
Date: Select by borehole construction date.
Water Table Info: Select boreholes containing water table information or boreholes not containing any water table information.
Screen Info: Select boreholes containing screen information or boreholes not containing any screen information.

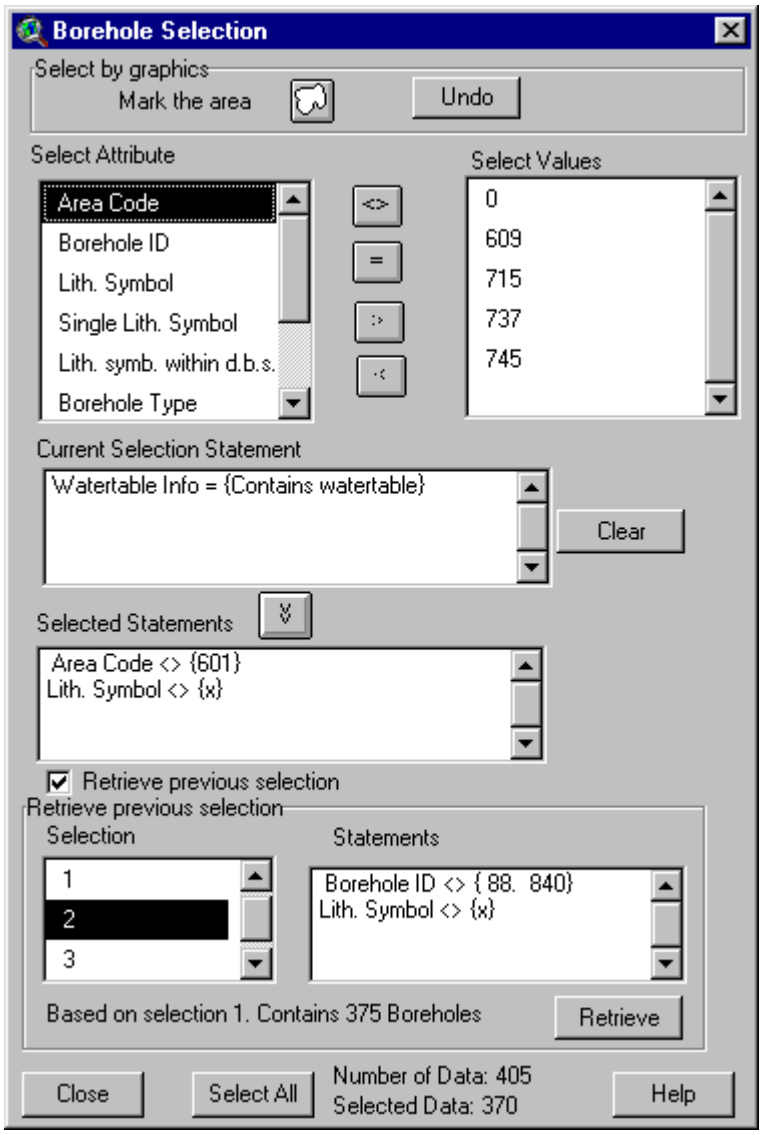

Figure 10 The Borehole Selection dialog box.

Retrieving an old selection:

Every time the user enters the Borehole Selection dialog box, makes a new selection, and closes the dialog box, the selected boreholes are extracted from the current Boreholes theme and a new Boreholes theme is created. The current theme is saved and can at a later stage be retrieved from the Borehole selection dialog box.

When checking the **Retrieve previous selection** check box on, the dialog box is enlarged and the retrieve selection options appears as shown in Figure 10.

Each selection is increasingly numbered with number 0 as the original data set. When the user selects a previously defined selection, the number of boreholes within the chosen selection, a reference to the selection it is based on, and the query strings used to define the chosen selection are shown. Pressing the **Retrieve** button retrieves the chosen selection.

When retrieving a previous selection, the current selection is checked against the previous selection with respect to added boreholes. If the current selection contains boreholes not present in the previous selection, the user is prompted for including these boreholes as shown in Figure 11.

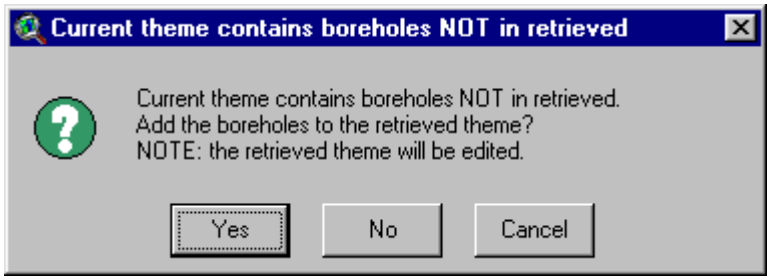

Figure 11 Retrieve previous selection.

Yes activates a dialog box to select which boreholes to add, see Figure 12. **No** results in that the added boreholes of the current theme are not added to the previous theme. **Cancel** aborts the retrieve process.

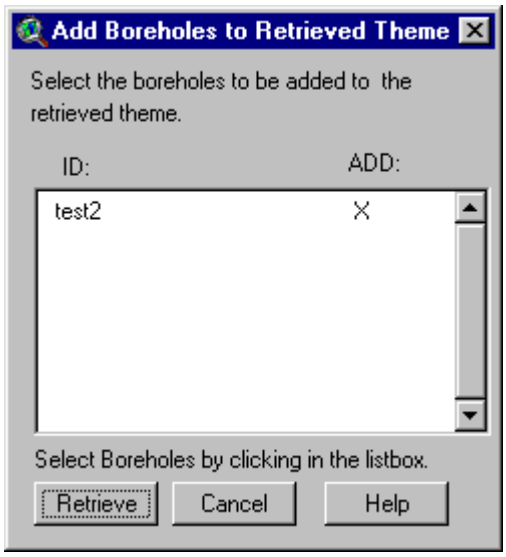

Figure 12 Add Boreholes to retrieved theme.

If added boreholes of the current selection are desired to be included in the retrieval of the previous selection, these can either be added totally or individually by toggling the ADD on and off, see Figure 12. By default all added boreholes are selected. Pressing **Retrieve** adds the selected boreholes to the previous borehole selection and retrieves it.

3.3 Define Soil Profiles

The Define Soil Profiles option allows the user to define the soil profiles for the unsaturated zone for each of the soil groups and to define the hydraulic parameters for each soil horizon within the soil profile.
If a borehole database has been loaded an option for automatic generation of the soil profiles using the available information in the database is enabled. Soil profiles and vertical discretization can be defined and displayed on the screen. Hydraulic parameters for each of the soil horizons can be defined by using predefined values or by using Pedotransfer and hydraulic functions. All the defined information is stored in an internal format and can be exported to various formats, see Section 4.

3.3.1 Select soil group

When selecting the Define Soil Profiles option the Define Soil Profiles dialog is opened, see Figure 13.

The user should define the soil type to work with and eventually use the automatic profile generation option if a borehole database is loaded.

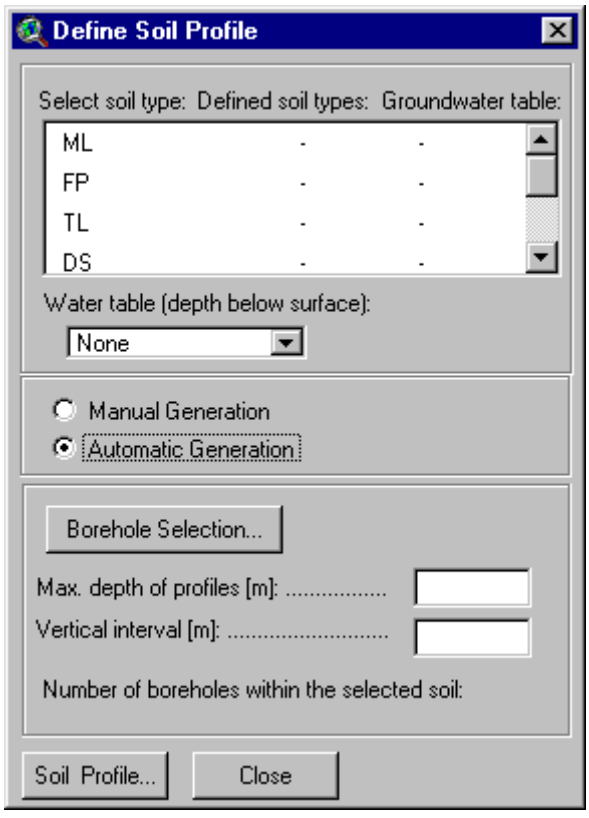

Figure 13 Edit Soil Profile dialog box.

When selecting a soil type from the list the polygons of the soil type theme containing the desired soil type are selected illustrating the extent of the soil type.

The maximum depth to the groundwater table is calculated if a surface theme of the groundwater table is selected in the dialog box. Prior to this operation the groundwater table theme must be added to the view.

When a borehole database is loaded, the boreholes located within the areas representing the selected soil type are selected, and the automatic generation option for the soil profile is enabled. When generating the soil profile using the information from the borehole database a maximum of 20 boreholes can be used. If the number of selected boreholes exceeds 20 the 20 boreholes with the thinnest most upper geological layer are used. This underscores the importance of the initial borehole selection. Opening the borehole selection to be used prior to the automatic generation, see Section 3.2. Also from the Define Soil Profiles dialog box the Borehole Selection can be effectuated. This borehole selection works essentially the same way as described in Section 3.2 but the selection is on a local scale, only influencing the number of selected boreholes.

Using the automatic option the maximum depth and the vertical interval has to be specified by the user. The maximum depth is used to correspond the automatic generated profile depth by the depth of the unsaturated zone. The vertical interval defines by which interval the dominant soil is determined.

3.3.2 Define Soil Characteristics – Column

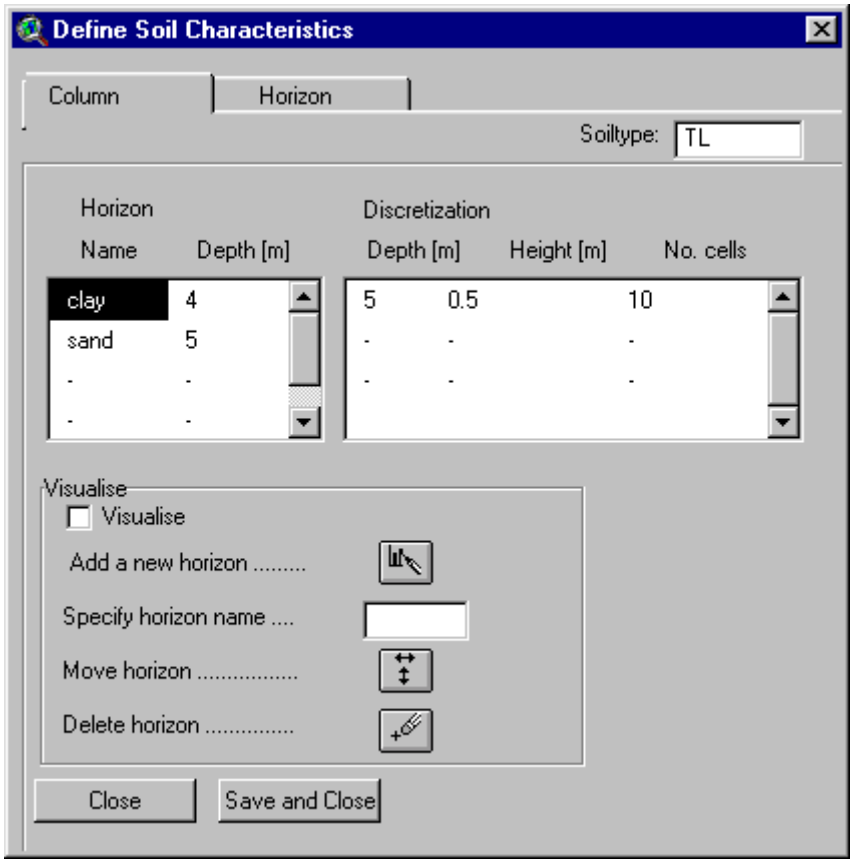

Figure 14 Define Soil Characteristics - Column dialog box

When pressing the Soil profile button of the Define Soil Profile dialog box the Define Soil Characteristics dialog box appears, see Figure 14. This dialog box has in a column and a horizon sheet.

The definition of a soil column includes:

- Specification of soil horizons and depth to bottom (depth from top of soil profile to bottom of horizon). For each horizon the soil characteristics are specified in the Horizon

section. The name and the depth is entered in the list by selecting a cell and typing a value. The depth is the thickness of the soil horizon [m].

- Specification of the discretization of the numerical calculation grid in an unsaturated flow model, e.g. MIKE SHE. The number of cells and the height of the cells [m] are entered, by selecting a cell and typing a value. The depth is automatically calculated.
- The parameters could also be entered by clicking the visualise checkbox on and using the tools to define the values.

Short description of the visual tools:

- **Add soil horizon:** Add a new soil horizon to the profile. To define a soil horizon select the tool and click at the position of the lower border of the soil horizon. The soil horizon symbol will be taken from the **Soil horizon Symbol** textbox. If the symbol exists in the soil map the same legend classification is used.
- **Move soil horizon:** Move a soil horizon by selecting the tool and clicking at the lower border for a soil horizon, then drag the soil horizon to the new position. The other soil horizons in the profile are adjusted according to the new positions.
- **Delete Soil horizon:** Delete a soil horizon by selecting the tool and clicking within a soil horizon.

3.3.3 Define Soil Characteristics – Horizon

In the Horizon sheet the user should specify the hydraulic parameters for each of the soil horizons defined in the Column sheet.

The soil horizons defined are listed in the topmost listbox. Selecting a soil horizon from the listbox displays any saved parameters for this soil horizon. The Copy Horizon data copies the parameters from another soil horizon to the present.
If the hydraulic parameters are known, e.g. from measurements, they could be typed in the dialog box. Optionally texture data (known or estimated) is entered to calculate the hydraulic parameters using a user specified Pedotransfer function.
Eventually, retention data can be calculated using the **Retention Data** option and shown using the **Show curves** option. Otherwise, retention data can be entered manually, e.g. from measurements. The calculated retention data is edited by selecting a cell and typing a new value.

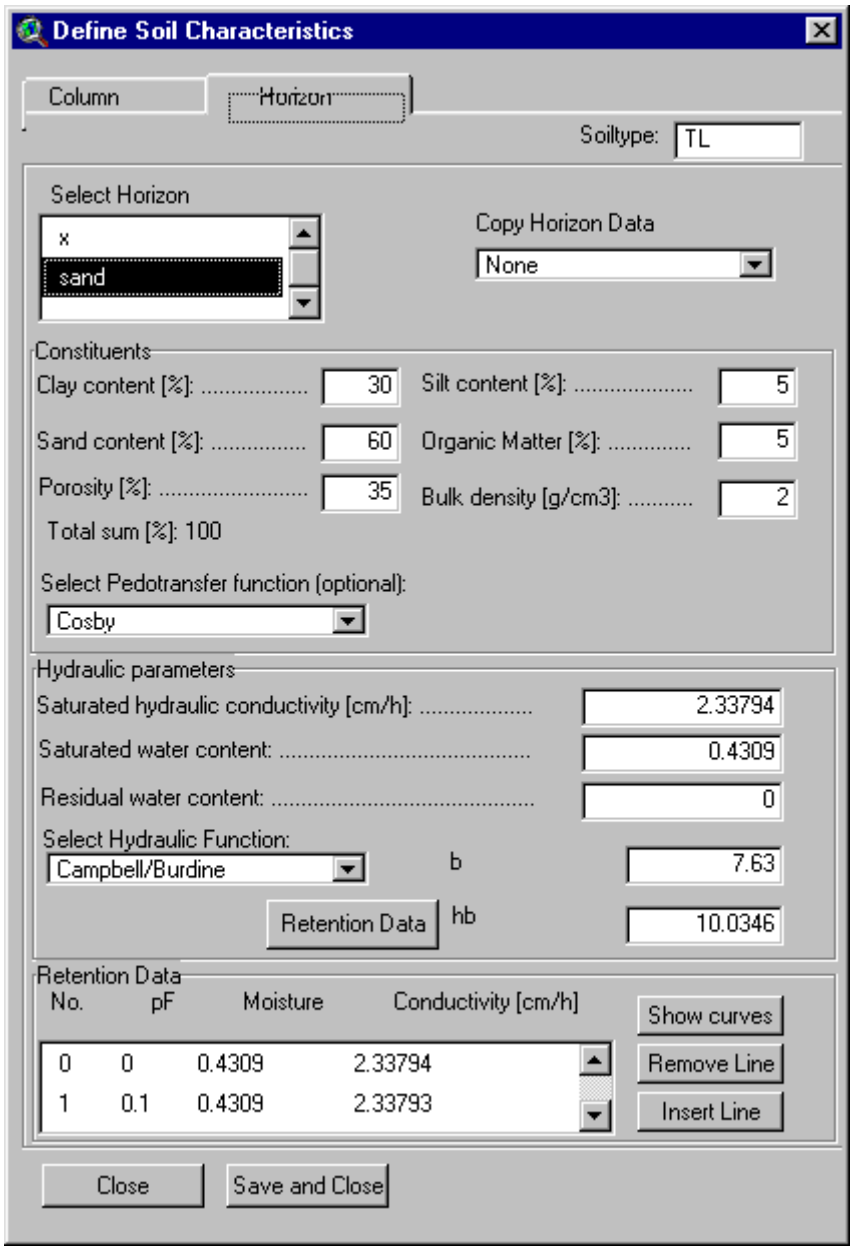

Figure 15 Define Soil Characteristics – Horizon dialog box.

4 Export

The export option, accessible from the UZ-Editor menu of the View window, enables the user to export the soil profiles and the defined soil parameters to either ASCII or MIKE SHE format.

4.1 Export of Spatial and UZ data

Export of spatial and UZ data includes export of the polygon theme and the layer parameters.

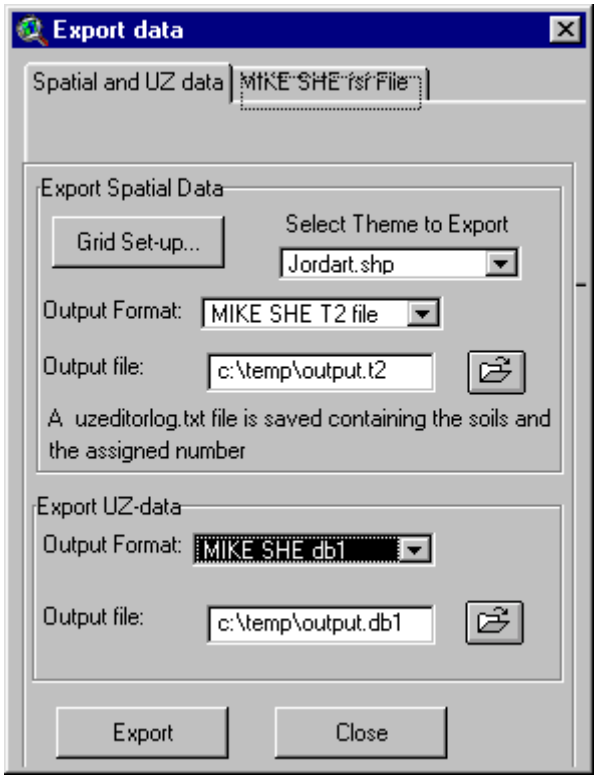

Figure 16 Export data - Spatial and UZ Data dialog box..

Export of spatial data is available in two formats, ArcView grid and MIKE SHE T2 format. The user should specify:

- The output grid, see Section 2.5.
- The ArcView theme to export (Polygon theme).
- The output format, ArcView grid or MIKE SHE T2 file (see Appendix 1 for more details).
- The output filename.

When exporting the spatial data a *.txt file, containing the filter between the integer values in the grid and the string values in the polygon, is made, see Figure 17.

```
**********The UZ-Editor (version 2000)**********
Connection between soil types and grid codes
0 : ML
1 : FP
2 : TL
3 : DS
4 : DG
```

Figure 17 Filter between grid integer values and soil types.

Export of UZ data implies export of the hydraulic parameters associated with the defined horizons in the profiles.
The user should specify:

- Output format, ASCII or MIKE SHE db1 format, see Appendix 1 for more details, for description of the db1 format se the MIKE SHE manual.
- Output filename.

4.2 Export to MIKE SHE fsf file

The Export facility includes an option for generating the UZ-part of the MIKE SHE fsf file (flow set up file). When generating this file the T2 file (with the spatial distribution) and the MIKE SHE database file (db1) file should be known.

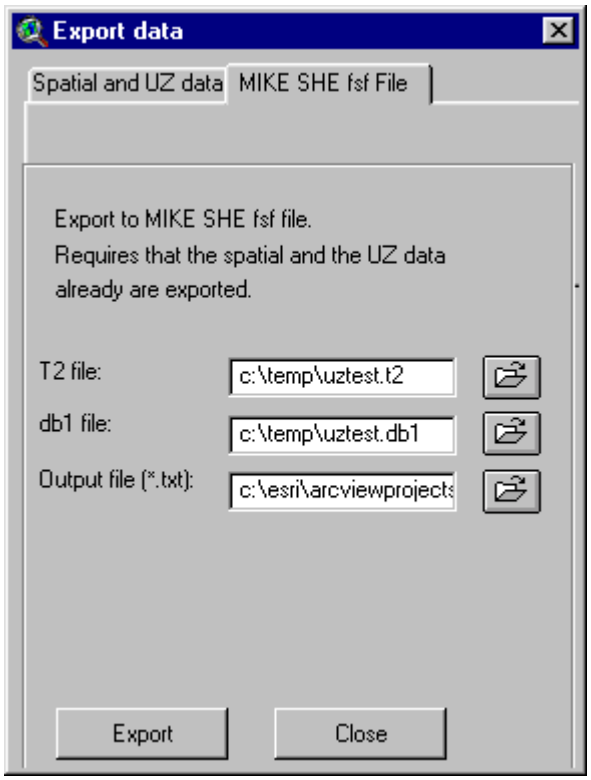

Figure 18 Export data - MIKE SHE fsf dialog box.

Export to MIKE SHE fsf file includes:

- Specify the T2 file containing the spatial data.

- Specify the MIKE SHE db1 file containing the horizons and their hydraulic parameters.
- Specify the output *.txt file.

The data is saved to a *.txt file, the user should then insert the content of the *.txt file into the MIKE SHE fsf file.

Figure 19 shows an example of a txt file to be copied into the MIKE SHE fsf file. The text file, except the last two lines, should be copied to the fsf file. The user should notice that the path to the grid code file, T2 file, and the soil database file, db1 file, is correct.

Note: when defining the hydraulic parameters using the UZ-editor the exponent is not calculated. The user should, for each of the soils, specify the exponent.

```
============================================================
UZ INPUT PART
============================================================
UZ Solution option : 1
Prof grid code file: c:\temp\sheuzgis.t2
Paved area      T/F: F
Paved area file    :
Class opt.(1/2/3/4): 3
ndepth           1: 8
depth,i=1,ndepth  1: -1.000000 -1.000000 -1.000000 -1.000000 -1.000000
depth,i=1,ndepth  1: -1.000000 -1.000000 -1.000000
gw-file          1:
uz-code          2:
Part.Auto Cl.code 4:
Bypass option T/F  : F
Bypass code file   :
No. of codes       : 0
No. soilprofile def: 1
1 'DS '
            2
            1.0000 'ms' 'c:\temp\sheuzgis.db1'
            5.0000 'ds' 'c:\temp\sheuzgis.db1'
            1
            1.0000 5

****END OF FILE****
<<<< Copy the file to a MIKE SHE fsf file >>>>
```

Figure 19 Example of txt fil to copy to the fsf file.

APPENDIX 1

File format

Grid definition file

The grid definition file is an ASCII file used to save a grid set-up, see Figure 20. The format of the grid definition file is used for all the MIKE SHE – GIS extensions with respect to grid definition.

```
Grid Properties for DHI GIS
Grid properties Tinglev Mose 50 meter
xorg. -283471.9981
yorg. 52711.9960
Columns 110
Rows 110
Cellsize 50
```

Figure 20 The grid definition file.

Line 1: This line identifies the file as a grid definition file. In older versions this line could be "Grid Properties for MIKE SHE GIS".
Line 2: User comments.
Line 3: The x-coordinate for the lower left corner.
Line 4: The y-coordinate for the lower left corner.
Line 5: The number of columns.
Line 6: The number of rows.
Line 7: The dimension of the grid cells (squares).

T2 FILE

The T2 file is an ASCII file used for matrix data by MIKE SHE, see Figure 21.

```
FILETYPE DATATYPE VERNO:  22 100 502
NX NY DIM XORIG YORIG  :  110 110  5.0000000E+001 -2.8347200E+005  5.2711996E+004
DELETE UTMZONE ORIENT  :  -1E-035 0 0.000000
MIN MAX MEAN ST.DEV    :  1.803138E+001 2.809112E+001 2.123936E+001 1.703041E+000
Theme: grid3
     110
        20.0172        20.04639        20.03877        20.03072     20.02321
       20.01772        20.01595         20.0356        20.05353        20.08295
       20.12196        20.16773        20.25547        20.31303        20.45654
       20.51945        20.57864         20.7403        20.79562        20.84761
```

Figure 21 The format of the T2 file

The header lines (5) specifies the kind of data in the file. Each line in the header consists of 24 characters of text (which will be skipped when reading) followed by information;

Line 1: Specifies the data file type, the data type and the version number (530 for MIKE SHE version 5.3).

File type: 21- the data in the data file is considered to be integers (grid codes) even though the data is written as reals.

22-the data in the data file is considered to be reals even though the data is written as integers.

Data type: the data type is presently not used but the only allowable type is:
57: Any grid data.

Line 2: Specifies the dimensions and origin of the data;
nx, ny: dimensions of the matrix.
dim: dimension of the grid squares.
xorig, yorig: location of the origin in the coordinate system.

Line 3: Defines a delete value that defines areas with missing values or outside the catchment, the UTM zone (specify a zero if unused) and the orientation of the matrix data.
Line 4: Defines some statistical parameters for the data values in the data file.

Line 5: text line.

ArcView Grid file format

The ASCII raster file format is a simple format that can be used to transfer raster data between various applications. It is basically a few lines of header data followed by lists of cell values, see Figure 22. The header data includes the following keywords and values:

ncols - number of columns in the data set.
nrows - number of rows in the data set.
xllcenter or xllcorner - x-coordinate of the center or lower-left corner of the lower-left cell.
yllcenter or yllcorner - y-coordinate of the center or lower-left corner of the lower-left cell.
cellsize - cell size for the data set.
nodata_value - value in the file assigned to cells whose value is unknown. This keyword and value is optional. The nodata_value defaults to -9999.

The first row of data is at the top of the data set, moving from left to right. Cell values should be delimited by spaces. No carriage returns are necessary at the end of each row in the data set. The number of columns in the header is used to determine when a new row begins. The number of cell values must be equal to the number of rows times the number of columns. The ASCII raster file format can only be imported or exported using the Spatial or 3D Analysts.

```
ncols         100
nrows         100
xllcorner     547050
yllcorner     6203000
cellsize      100
NODATA_value  -9999
0 0 2 2 2 0 0 0 0 0 0 0 0 0 0 3 3 3 0 3 3 4 3 3 3 3 1 1 0 0 0 0 0 0 0 0 3 3 0 0
0 0 0 0 5 0 0 0 0 0 0 0 0 0 0 0 0 0 7 7 0 0 0 0 0 0 0 0 8 0 0 0 0 0 0 0 0 0 0 0
```

Figure 22 ArcView ASCII grid format.

Soil parameter ASCII file

The soil parameter ASCII file is used to save the soil parameters to an ASCII file, see Figure 23.
All lines containing "*" are considered as a comment line.

The format of the ASCII file is shown on the below figure.

The ASCII file contains:

For each of the profiles
- The vertical discretization.
- The soils included in the profile.

For each of the soils within a profile:
- Bottom of the soil.
- Texture data (silt, clay, sand and organic content, bulk density)
- Soil physical characteristics (Ks, Theta s, Theta, res, theta eff, pF fc, pF W, tmp1 and tmp2)
- Name of the retention and conductivity function used.
- Retention curve data.

The last line in the ASCII file is "**END OF FILE**"

**** ASCII FILE FOR THE UZ-EDITOR ****
Date : 08/03/1999
****
Profile: FP
****
*The vertical discretization

Bottom	Height	No. Cell
2.5	0.5	5
8.5	1	6

****
Soil: ds
****
The bottom: -2.57627
*Soil Parameters
*Textur:
Silt Content[%]: 10.0
Clay content[%]: 10
Sand Content[%]: 80.0
Organic content[%]: 0
Bulk density[g/cm3]:
*Soil physical characteristics:
Ks: 1.56315e-005
Theta s: 0.3877
Theta res: 0.01
Theta eff:
pF fc: 1
pF W: 4.2
tmp1: 6.96627
tmp2: 0.225734
*Retention and Conductivity function
Retention function: Cambell
Conductivity function: Mualem
*Retention curve

No.	pF	Moisture	K
0	0.00000	0.387700	1.56315e-005
1	0.10000	0.385050	1.55679e-005
2	0.20000	0.356915	1.48801e-005
3	0.50000	0.292494	1.32102e-005
4	1.00000	0.250150	1.20238e-005
5	1.50000	0.228272	1.13763e-005
6	1.70000	0.221912	1.11831e-005
7	2.00000	0.213919	1.09367e-005
8	3.00000	0.195209	1.03434e-005
9	4.20000	0.180931	9.87362e-006
10	6.00000	0.166935	9.39674e-006

END OF FILE

Figure 23 Soil parameters ASCII file.

APPENDIX 2

PC Zeus files

The UZ-Editor has been made to use the PC Zeus database files as input files.
This format is developed by the Geological Survey of Denmark and Greenland (GEUS).

The data are subdivided in two file:

- One describing the administrative data, the **ADM** file.
- One describing the lithology, the **LIT** file.

The **ADM** and the **LIT** files are both employing the dBase format.

The ADM file

An example illustrating the different features of the **ADM** file..
The names of the features are given in Danish (Name (DK)) but in the table in addition an English name and description is included.
The column "Type" describes the format; for strings the length and a 'c', for numeric the length a dot the number of decimals and a 'n'.

Name (DK)	Name (UK)	Description	Type
DGUNR	ID	BOREHOLE ID	10c
BB	DRILLER	Borehole DRILLER	18c
KOM	MUNICIPALITY	MUNICIPALITY	3n
STED1	PLACE1	PLACE 1	60c
STED2	PLACE2	PLACE 2	60c
SAGSNR	ACCNO	ACOUNT NUMBER	13c
LOEBNR	SERNO	SERIAL NUMBER	13c
UTMX	XCOR	X-COORDINATE	6n
UTMY	YCOR	Y-COORDINATE	7n
KOTE	LEVEL	GROUND LEVEL	6.2n
DATO	DATE	DATE	8n
FORMAAL	PURPOSE	PURPOSE OF BOREHOLE	1c
METODE	METHOD	DRILLING METHOD	2c
ANV	USE	BOREHOLE USE	2c
BORDIA1	WELLDIA1	BOREHOLE DIAMETER 1	4n
BORTCM1	WELLUNIT1	UNIT FOR ABOVE	1c
BORDYB1	WELLDEPTH1	DEPTH OF PIPE 1	5.1n
BORDIA2	WELLDIA2	BOREHOLE DIAMETER 2	4n
BORTCM2	WELLUNIT2	UNIT FOR ABOVE	1c
BORDYB2	WELLDEPTH2	DEPTH OF PIPE 2	5.1n
BORDIA3	WELLDIA3	BOREHOLE DIAMETER 3	4n
BORTCM3	WELLUNIT3	UNIT FOR ABOVE	1c
BORDYB3	WELLDEPTH3	DEPTH OF PIPE 3	5.1n

FORDIA1	CASINGDIA1	CASING DIAMETER 1	4n
FORTCM1	CASINGUNIT1	UNIT FOR ABOVE	1c
FORDYB1	CASINGDEPTH1	DEPTH OF CASING 1	5.1n
FORMAT1	CASINGMAT1	MATERIAL FOR CASING 1	1c
FORDIA2	CASINGDIA2	CASING DIAMETER 2	4n
FORTCM2	CASINGUNIT2	UNIT FOR ABOVE	1c
FORDYB2	CASINGDEPTH2	DEPTH OF CASING 2	5.1n
FORMAT2	CASINGMAT2	MATERIAL FOR CASING 2	1c
FORDIA3	CASINGDIA3	CASING DIAMETER 3	4n
FORTCM3	CASINGUNIT3	UNIT FOR ABOVE	1c
FORDYB3	CASINGDEPTH3	DEPTH OF CASING 3	5.1n
FORMAT3	CASINGMAT3	MATERIAL FOR CASING 3	1c
FILDIA1	SCREENDIA1	DIAMETER OF SCREEN 1	4n
FILTCM1	SCREENUNIT1	UNIT FOR ABOVE	1c
FILFRA1	SCREENFROM1	TOP OF SCREEN 1	5.1n
FILTIL1	SCREENTO1	BOTTOM OF SCREEN 1	5.1n
FILMAT1	SCREENMAT1	MATERIAL FOR SCREEN 1	1c
FILDIA2	SCREENDIA2	DIAMETER OF SCREEN 2	4n
FILTCM2	SCREENUNIT2	UNIT FOR ABOVE	1c
FILFRA2	SCREENFROM2	TOP OF SCREEN 2	5.1n
FILTIL2	SCREENTO2	BOTTOM OF SCREEN 2	5.1n
FILMAT2	SCREENMAT2	MATERIAL FOR SCREEN 2	1c
FILDIA3	SCREENDIA3	DIAMETER OF SCREEN 3	4n
FILTCM3	SCREENUNIT3	UNIT FOR ABOVE	1c
FILFRA3	SCREENFROM3	TOP OF SCREEN 3	5.1n
FILTIL3	SCREENTO3	BOTTOM OF SCREEN 3	5.1n
FILMAT3	SCREENMAT3	MATERIAL FOR SCREEN 3	1c
VSPDYB1	WATDEPTH1	DEPTH TO WATER 1	5.1n
VSPDATO1	WATDATE1	DATE 1	8n
VSPDYB2	WATDEPTH2	DEPTH TO WATER 2	5.1n
VSPDATO2	WATDATE2	DATE 2	8n
VSPDYB3	WATDEPTH3	DEPTH TO WATER 3	5.1n
VSPDATO3	WATDATE3	DATE 3	8n
PEJDYB1	LEVEL1	WATERLEVEL 1	5.1n
PEJDATO1	LEVELDATE1	DATE 1	8n
PEJDYB2	LEVEL2	WATERLEVEL 2	5.1n
PEJDATO2	LEVELDATE2	DATE 2	8n
PEJDYB3	LEVEL3	WATERLEVEL 3	5.1n
PEJDATO3	LEVELDATE3	DATE 3	8n
YDEM31	ABSTRAC1	ABSTRACTION 1	5.1n
SAENK1	DRAWDOWN1	DRAWDOWN 1	5.1n
PUMTID1	PUMPTIME1	PUMP TIME 1	6n
YDEM32	ABSTRAC2	ABSTRACTION 2	5.1n
SAENK2	DRAWDOWN2	DRAWDOWN 2	5.1n
PUMTID2	PUMPTIME2	PUMP TIME 2	6n
YDEM33	ABSTRAC3	ABSTRACTION 3	5.1n
SAENK3	DRAWDOWN3	DRAWDOWN 3	5.1n
PUMTID3	PUMPTIME3	PUMP TIME 3	6n
TRANSMIS	TRANS	TRANSMISSIVITY	7.5n
MAGASINTAL	STORAGE	STORAGE	7.5n

VGRAD	EFF	EFFICIENCY	2n
NOTAT1	NOTE1	NOTE 1	70c
NOTAT2	NOTE2	NOTE 2	70c
NOTAT3	NOTE3	NOTE 3	70c
STATUS	STATUS	NOTE	2c

The LIT file

An example illustrating the different features of the **LIT** file..
The names of the features are given in Danish (Name (DK)) but in the table in addition an English name and description is included.
The column "Type" describes the format; for strings the length and a 'c', for numeric the length a dot the number of decimals and a 'n'.

Name (DK)	Name (UK)	Description	Type
DGUNR	ID	BOREHOLE ID	10c
LBUND	LAYBOT	BOTTOM OF LAYER	5.1n
BJA	ROCK	ROCK	3c
DGUSYM	SYMBOL	SYMBOL	2c
BLAND1	BICOM 1	BI-COMPNENT 1	2c
BIBJA1	CON1	CONTENT OF ABOVE	3c
BLAND2	BICOM2	BI-COMPONENT 2	2c
BIBJA2	CON2	CONTENT OF ABOVE	3c
BLANDK	LIMECON	LIME CONTENT	2c
KALKH	CHALKY	CHALKY	2c
TEXTUR	TEXTUR	TEXTUR	5c
FARVE	COLOUR	COLOUR	5c