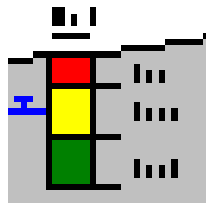Input and visualisation of stratigraphic logs, well casings, dynamic penetration tests, cone penetration tests, measured data diagrams and tables

GGU-STRATIG

VERSION 10

Contents:

1 Preface

The **GGU-STRATIG** program allows input and visualisation of stratigraphic logs and dynamic penetration tests according to German Standard DIN 4023. Additionally, measured data diagrams, tables, well casings (in the classical, as well as in a simplified, very space saving, manner) and cone penetration tests can be presented and edited.

Data input is in accordance with conventional WINDOWS operations and can therefore be learned almost entirely without the use of a manual. Graphic output supports the true-type fonts supplied with WINDOWS, so that excellent layout is guaranteed. Colour output and any graphics (e.g. files in formats BMP, JPG, PSP, TIF, etc.) are supported. DXF files can also be imported by means of the integrated Mini-CAD module (see the "**Mini-CAD**" manual).

The program has been thoroughly tested. No faults have been found. Nevertheless, liability for completeness and correctness of the program and the manual, and for any damage resulting from incompleteness or incorrectness, cannot be accepted.

2 Licence protection and installation

In order to guarantee a high degree of quality, a hardware-based copy protection system is used for the **GGU-STRATIG** program.

The GGU software protected by the *CodeMeter* copy protection system is only available in conjunction with the *CodeMeter stick* copy protection component (hardware for connection to the PC, "*CM stick*"). Because of the way the system is configured, the protected software can only be operated with the corresponding CM stick. This creates a fixed link between the software licence and the CM stick copy protection hardware; the licence as such is thus represented by the CM stick. The correct Runtime Kit for the CodeMeter stick must be installed on your PC.

Upon start-up and during running, the **GGU-STRATIG** program checks that a CM stick is connected. If it has been removed, the program can no longer be executed.

For installation of GGU software and the CodeMeter software please refer to the information in the *Installation notes for GGU Software International*, which are supplied with the program.

3 Language selection

GGU-STRATIG is a bilingual program. The program always starts with the language setting applicable when it was last ended.

The language preferences can be changed at any time in the "**?**" menu, using the menu item "**Spracheinstellung**" (for German) or "**Language preferences**" (for English).

4 Starting the program

After starting the program, you will see two menus at the top of the window:

- File

- ?

After clicking the "**File**" menu an existing file can be opened using the "**Load**" menu item. A new file can be created using the "**New**" menu item. Clicking on "**New**" an empty A3 page is displayed on the screen. Seven menus appear at the top of the window:

- File

- Edit

- Input

- Graphics preferences

- Preferences

- Layer polygons

- ?

After clicking one of these menus, the so-called menu items roll down, allowing you access to all program functions.

The program works on the principle of *What you see is what you get*. This means that the screen display represents, overall, what you will see on your printer. In the last consequence, this would mean that the screen display would have to be refreshed after every alteration you make. For reasons of efficiency and as this can take several seconds for complex screen contents, the **GGU-STRATIG** screen is not refreshed after every alteration.

If you would like to refresh the screen contents, press either [**F2**] or [**Esc**]. The [**Esc**] key additionally sets the screen display back to your current zoom, which has the default value 1.0, corresponding to an A3 format sheet.

5 Worked example: Input of a stratigraphic log

5.1 Opening the editor for creating a new or selecting an existing stratigraphic log

The most widely used function of the **GGU-STRATIG** program is for input and graphical visualisation of penetration tests as stratigraphic logs. The input options available in the "**Input/Stratigraphic log**" menu item will therefore be introduced in detail below using a worked example.

The menu item "**Input/Stratigraphic log**" allows input of new stratigraphic logs, or editing of existing logs. Additionally, gauge casings (backfill and/or casings) can be presented in a simplified manner. This simplified manner has a great advantage over the classical manner of well visualisation: With almost identical information content, it is much more space saving, as stratigraphic log, casing and backfill are all presented together.

Start the **GGU-STRATIG** program and open the "**Ex_Stratigraphic log.bop**" file provided with the program in the "**GGU-STRATIG\Examples\en**" folder. After clicking on the "**Input/Stratigraphic log**" menu item you will see the following dialog box:
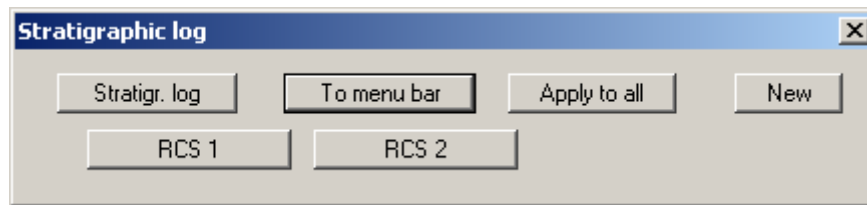
In this file two stratigraphic logs are already present, with the designations RCS 1 and RCS 2. The following actions are now possible:

- "**Stratigr. log**"
  The button indicates that you are using the stratigraphic log editor. After clicking the button you change to the "**Input/Well**" menu item (see Section 0). If you have a stratigraphic log with separate well visualisation, this allows you to quickly swap between the two element editing modes.

- "**To menu bar**"
  You return to the original menu bar.

- "**Apply to all**"
  Specific settings can be defined for all stratigraphic logs by clicking this button. The settings are adopted as the defaults for all new stratigraphic logs. This can also be used to easily modify the appearance of labelling for all existing stratigraphic logs, for example. Activate the required setting and then click the "**Apply to all**" button displayed after the respective check box.
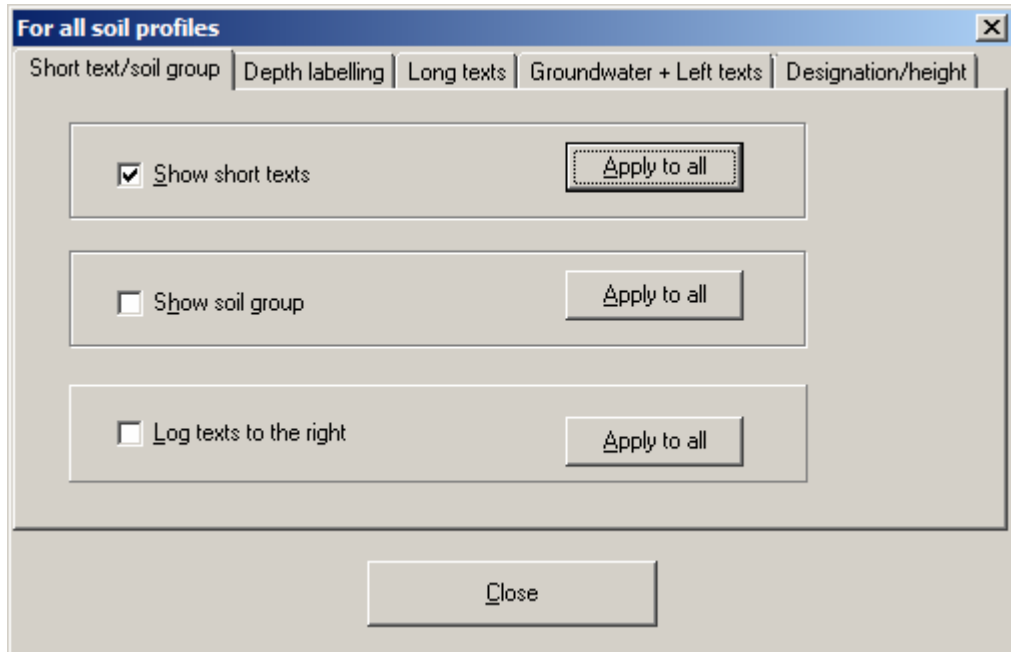
- "**New**"
  You can now enter a new stratigraphic log.

- "**RCS 1**", "**RCS 2**"
  By clicking the buttons labelled with the designations (here: RCS 1 and RCS 2) you can edit the data for the corresponding stratigraphic log.

5.2   Opening the editor for editing a single stratigraphic log

Click the"**RCS 1**" button in the original dialog box. The following dialog box for editing the stratigraphic log opens:
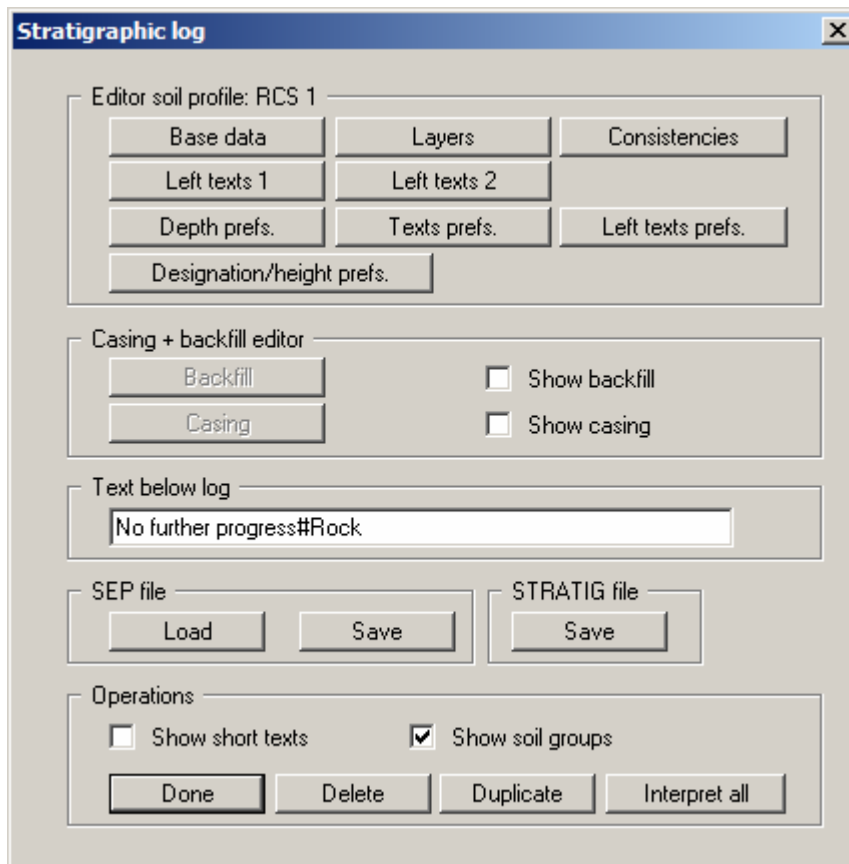
The following actions can be started in the subsequent dialog box for the selected RCS 1 stratigraphic log:

- "**Base data**"
  You can enter or edit the base data for the selected stratigraphic log (see notes in Section 5.3).

- "**Layers**"
  You can edit or enter the horizon structure for the selected stratigraphic log (see notes in Section 5.4).

- "**Consistencies**"
  You can enter or edit the consistency symbols to German Standard DIN 4023 for this stratigraphic log (see notes in Section 5.5).

- "**Left texts 1**" and "**Left texts 2**"
  Additional descriptive annotations can be added to the left of the stratigraphic log using these two buttons, e.g. water content, LOI, sample data, etc. (see notes in Section 5.6.1 and for samples in Section 5.4.3.4).

- "**Depth prefs.**"
  You can specify preferences for the presentation of layer depths. By selecting the "**Abs. heights only**" check box, the absolute height will be used (e.g. mAD) instead of the depth from the top of the stratigraphic log. With "**+ abs. height**", the absolute height will be given, additionally to the depth from the top of the stratigraphic log. By selecting the "**Depth labelling at left**" check box, the depth labelling will be entered at the left side of the stratigraphic log. The depth setting for all stratigraphic logs in a file (= geological section) can be activated using the "**Apply to all**" button ("**Depth labelling**" tab) in the "**Input/Stratigraphic log**" dialog box (see Section 5.1).

- "**Texts prefs.**"
  Using this button you can edit preferences for the presentation of the layer descriptions (see notes in Section 5.7).

- "**Left texts prefs.**"
  Clicking this button allows editing preferences for the presentation of the "**Left texts 1**" and the "**Left texts 2**" (see notes in Section 5.6.2).

- "**Designation/height prefs.**"
  The alignment and distance [mm] of the name and elevation data relative to the upper edge of the log can be individually specified for the individual stratigraphic log (also see notes in Section 5.3.2).

- "**Backfill**"
  First, activate the "**Show backfill**" check box. Then, using the "**Backfill**" button you can enter or edit the horizon structure of a backfill for your stratigraphic log (see notes in Section 5.8.3).

- "**Casing**"
  First, activate the "**Show casing**" check box. Then, using the "**Casing**" button you can enter or edit a casing for this stratigraphic log (see notes in Section 5.8.4).

- "**Text below log**"
  In this field you can enter a text, which will be displayed below the log. In order to create a line break, you must enter a "#" (e.g. no further progress#concrete).

- "**Load (SEP file)**"
  Clicking the button allows a file created using the *SchichtenErfassungsProgramm* (Strata Recording Program) SEP (Version 2) developed by *LBEG* (formerly *NLfB*) in Hannover, Germany to be imported. The abbreviations used in the SEP 2 program were developed for recording data from field investigations. The SEP 2 abbreviations are automatically interpreted and converted to the corresponding long text. The highest possible degree of compatibility between the **GGU-STRATIG** and **GGU-BORELOG** programs can be achieved by using the SEP 2 set of abbreviations. The SEP 2 abbreviations are described in more detail in Section 5.4.3.

- "**Save (SEP file)**"
  The abbreviation record can be exported in the LBEG Hannover SEP 2 program format. The only requirement is that stratigraphic data was entered using the SEP 2 abbreviations. The **GGU-STRATIG** program includes the SEP 2 abbreviations defined for the engineering geology field. Therefore, when exporting your bore log to a SEP 2 file, select the type "**Engineering geology (IG)**". An input box opens for the header data required by the LBEG SEP 2 program for every stratigraphic log.

- "**Save (STRATIG file)**"
  The active soil profile can be individually saved. All data from the original file are transferred (overall view, page format, reference staff, legend settings, header data).

- "**Show short text**"
  If this check box is activated the stratigraphic log is labelled using the short text. The short text for all stratigraphic logs in a file (= geological section) can be activated using the "**Apply to all**" button ("**Short text/soil group**" tab) in the "**Input/Stratigraphic log**" dialog box (see Section 5.1).

- "**Show soil group**"
  If this check box is activated the soil groups entered for the individual soil layers are shown in oval frames at the right of the stratigraphic log's long or short text in accordance with DIN 18196. The soil groups for all stratigraphic logs in a file (= geological section) can be activated using the "**Apply to all**" button ("**Short text/soil group**" tab) in the "**Input/Stratigraphic log**" dialog box (see Section 5.1).

- "**Done**"
  You will arrive back at the previous dialog box.

- "**Delete**"
  The currently displayed stratigraphic log will be deleted.

- "**Duplicate**"
  The currently displayed stratigraphic log will be duplicated. You will automatically find yourself in the "**Base data**" dialog box of the duplicated stratigraphic log.

- "**Interpret all**"
  All stratigraphic log abbreviations entered are reinterpreted by pressing this button. This is useful if settings have been modified, e.g. for displaying the short texts (see menu item "**Preferences/Abbreviations (SEP)**", Section 6.5.11.3). This makes it unnecessary to click through all strata and reinterpret them individually.

  If you also activate the "**Interpret all soil profiles again**" check box in the prompt, the strata in all stratigraphic logs in the current file are reinterpreted.

5.3.1   Editor for base data

After clicking on the "**Base data**" button the following dialog box opens:

The input made here is described in more detail in the following sections. Leave the dialog box using the "**OK**" button to save your input. If "**Cancel**" is clicked, input or alterations will not be accepted.

5.3.2 Notes on the "Designation and position" group box

The following input is made in this group box:

- "**Designation**"
  The entered designation is displayed by default directly above the corresponding strati-graphic log in the drawing. The name of the stratigraphic log can be forced into two lines by entering the "#" sign (e.g. "**RCS 1#2010-20-06**"). The text in the second line automati-cally uses a smaller font size.

- "**Height**"
  For the height input of the stratigraphic log (= top of sounding) a number must always be entered first, as this value serves as the y coordinate for graphical representation. If you use negative numbers, no space is allowed between the minus sign and the number. For de-scription of height a text may be entered, with one space distance to the number, e.g. "**m AD**". You may also do without text input. A height labelling with a text in front such as, e.g. "**AD +34.30 m**", can be activated using the "**Preferences/General**" menu item (see Sec-tion 6.5.1). The default position of the height data is below the name of the stratigraphic log.

The alignment and respective distances in [mm] to the top of the stratigraphic log of the log's des-ignation and height can be modified using the "**Designation/height prefs.**" button in the log's general data editor box (see Section 5.2). If the alignment and distance of names and elevation data for all stratigraphic logs in a file (= geological section) need to be uniformly adopted, this can be done using the "**Apply to all**" button ("**Designation/height**" tab) in the "**Input/Stratigraphic log**" dialog box (see Section 5.1). Another option for positioning the name and elevation of all existing stratigraphic logs can be found in the "**Preferences/General**" menu item (see Section 6.5.1). However, this also impacts all other input elements, e.g. dynamic penetration tests, wells or cone penetration tests.

> In order to have the stratigraphic log visible in the drawing, the lower drawing margin must be correctly set in the "**Input/Overall view**" menu item (see Section 6.3.2).

- "**x**"
  Input of the location of the stratigraphic log in x-direction is measured from the left page margin in metres in the scale of your drawing. If you have selected a scale in x-direction of 1:100, entering the number "**5.0**" will mean that the stratigraphic log will be displayed 5 cm (= 5 m) from the left page margin.

- "**Width**"
  The display width of the stratigraphic log is also defined in metres in the scale of the draw-ing. At a scale of 1:100 in x-direction this means that the stratigraphic log is displayed 1 cm wide for a width of "**1.0**".

- "**To the right**"
  The default position for layer labelling is at the right of the log. Layer labelling can be forced to the left side if this check box is deactivated. The alignment of all the stratigraphic logs in a file (= geological section) can be activated using the "**Apply to all**" button ("**Short text/soil group**" tab) in the "**Input/Stratigraphic log**" dialog box (see Section 5.1).

- "**Height displ.**"
  By entering a height displacement it is possible to display several logs above each other on a single sheet. This does not alter the actual height or depth data. They are still displayed exactly as the were surveyed (see figure below).
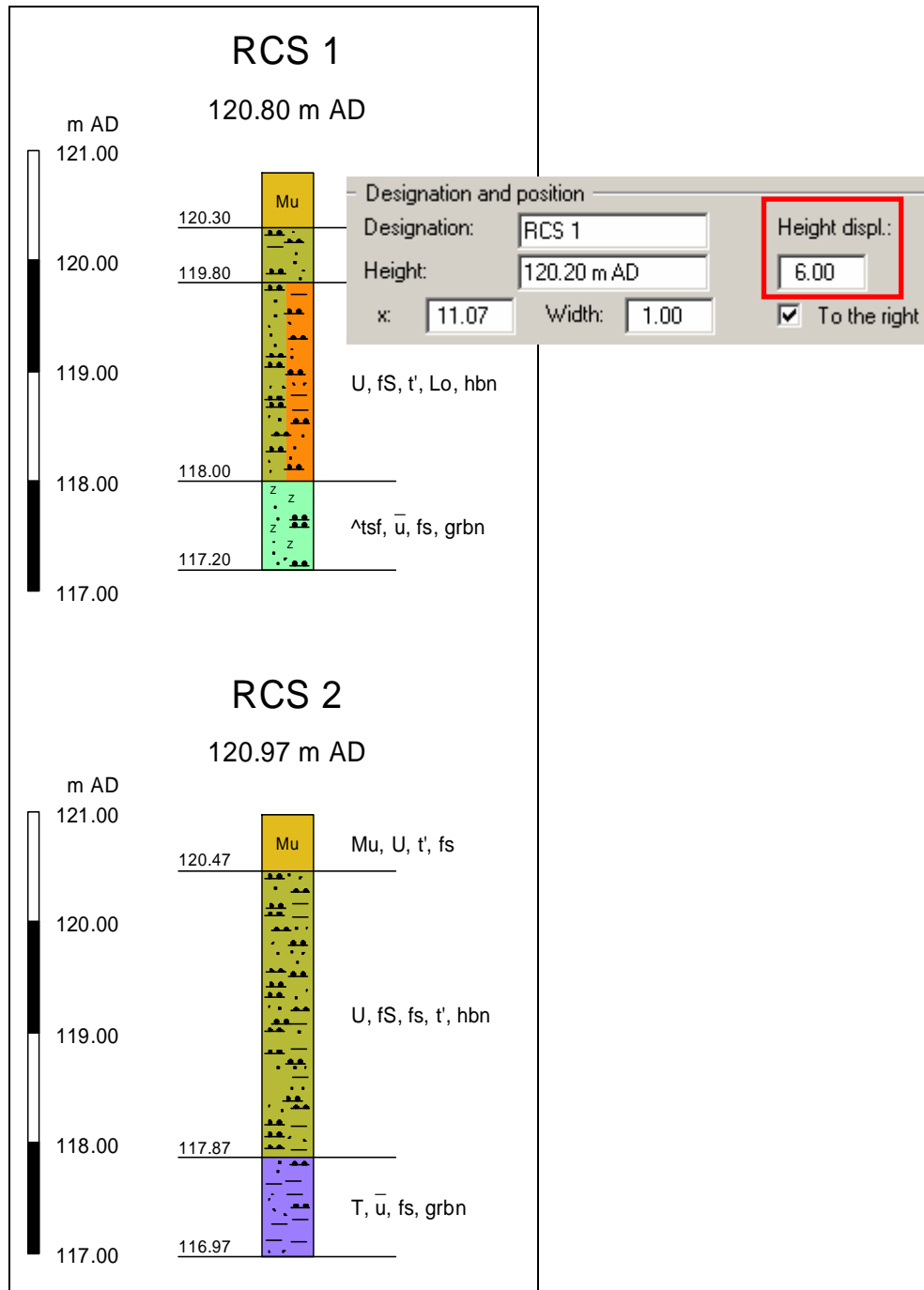
The second reference staff with the same height displacement can be used for the above log RCS 1 (see also "**Edit/Select**" and "**Input/Reference staffs**" menu items, Sections 6.2.10 and 6.3.4).

5.3.3 Notes on the "Groundwater" group box

The following groundwater input options are available:

- Groundwater at "**Bore end**", "**Drilled at**", "**Undisturbed**"
  Input relating to the groundwater table is made in metres measured from the top of the log (= m below grade). After the measured depth a text may be entered (e.g. the date), with one space distance to the number. The text is entered in the drawing below the groundwater line.

  If a negative number is entered no groundwater table is shown. The default value in all groundwater input boxes when the program starts is therefore **-1**.

  If the groundwater table for the stratum is interpreted from the SEP 2 abbreviations it is automatically entered in the appropriate groundwater line, depending on the abbreviations used (see Section 5.4.3.3).

  The groundwater table is displayed with the groundwater symbol corresponding to the input line. If enough space is available an increase or a drop are indicated by an arrow.

- "**Distance**"
  With your input, you can control the distance of the groundwater labelling from the stratigraphic log. The distance can also be modified to apply to several stratigraphic logs by pressing the "**Apply to all**" button ("**Groundwater + left texts**" tab) in the "**Input/Stratigraphic log**" dialog box (see Section 5.1).

- "**More**"
  Using this button you can define three further groundwater levels.
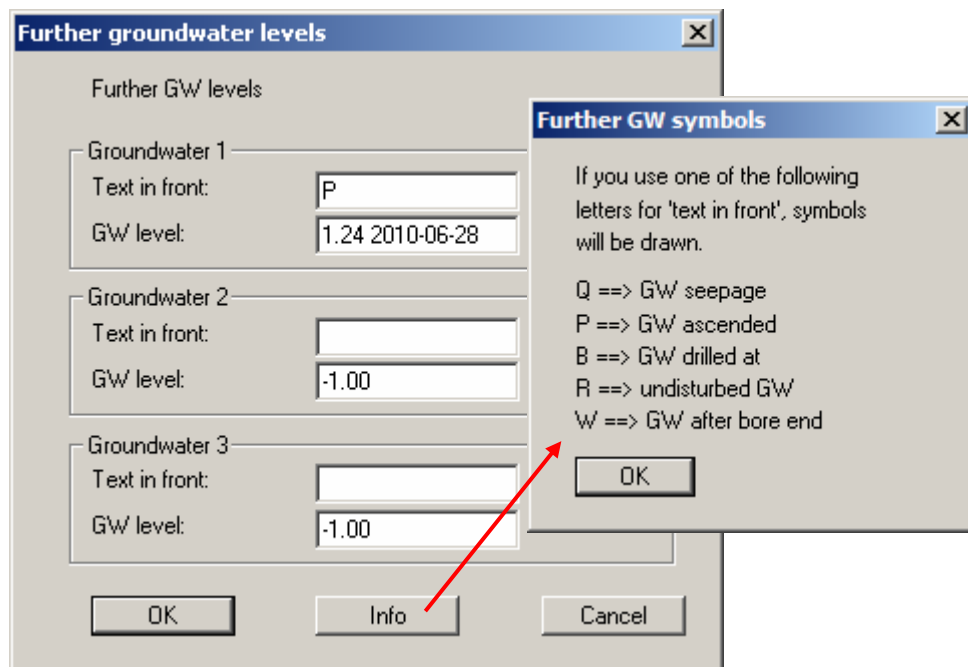
It is possible to enter the measuring date, for example, after the measured data, at a distance of one space. If the appropriate, defined letter is entered in the "**Text in front**" box a groundwater symbol is displayed. The letters are explained in a further dialog box after pressing the "**Info**" button.

5.3.4   Notes on the "Casing + backfill" group box

If you want to display a gauge casing directly adjacent to the stratigraphic log, define the general specifications for subsequent visualisation in this group box. A more detailed description of backfill and casing layer input can be found in Sections 5.8.3 and 5.8.4.

- "**Top of casing [m below grade]**"
  Enter the height of the casing relative to the top of the stratigraphic log (= ground level). If the pipe protrudes from the ground the height differential must be entered as a negative value (see figure below).
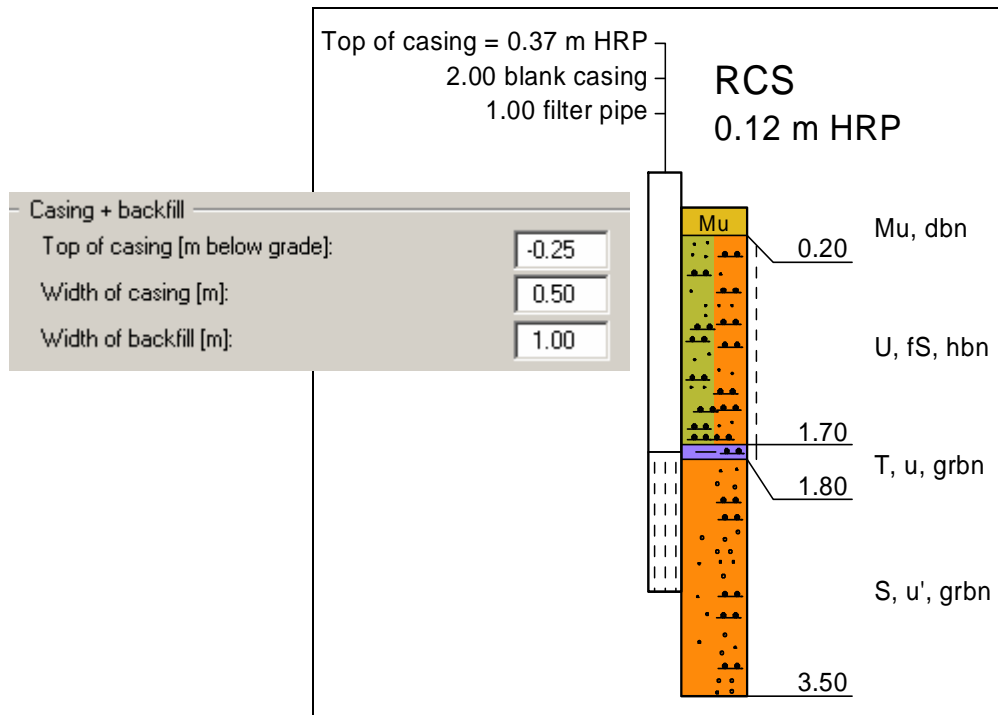
- "**Width of casing [m]**"
  Enter the casing display width in metres in the scale of your drawing. At a scale of 1:100 in x-direction this mean that the casing is displayed 1 cm wide for a width of "**1.0**". In the image above the casing is given as 0.50 m and is therefore displayed narrower than the stratigraphic log.

- "**Width of backfill [m]**"
  Enter the display width for the backfill in metres in the scale of your drawing. At a scale of 1:100 in x-direction a width of "**1.0**" means that the backfill is displayed 1 cm wide.

5.4.1   Editor box for layer input

After clicking on the "**Layers**" button, you can enter or edit the horizon structure for the corresponding stratigraphic log. The following dialog box shows the input for the first layer of our worked example:

Layer input is always possible via manual input of the description in the corresponding input boxes (see Section 5.4.2). It is much quicker to use the abbreviations in the uppermost line, the *abbreviation line*. By clicking the "**Interpret abbreviations**" button after entering the abbreviations, the program automatically enters the long texts associated with the abbreviations in the corresponding lines (see Section 5.4.3).

The editor box for layer input also contains six buttons, which have the following functions:

- "**OK**"
  Layer input is complete. Alterations to the displayed layer will be accepted.

- "**Cancel**"
  Layer input will be stopped. Alterations to the displayed layer will be rejected.

- "**Previous**"
  You will return to the previous layer. Alterations to the displayed layer will be accepted.

- "**Next**"
  You will move to the next layer. Alterations to the displayed layer will be accepted.

- "**Delete**"
  The layer displayed in the dialog window will be deleted.

- "**Paste**"
  An additional layer will be inserted in front of the layer displayed in the dialog window.

5.4.2 Manual layer input

For manual layer input you must first enter the depth of the layer, i.e. the layer base with reference to the top of the sounding (= m below grade). You can then type the desired layer description into the "**Long text**" group box using the keyboard.

A "**Short text**" may be added if required. This short text is displayed on a single line only in the subsequent visualisation; this may be necessary if the logs are very closely spaced. If you need to use the short text in your graphical visualisation in place of the long text, the "**Show short texts**" check box in the general stratigraphic log editor box must be activated (see Section 5.2). This setting can also be activated subsequently for several previously entered stratigraphic logs using the "**Apply to all**" button ("**Short text/soil group**" tab) in the "**Input/Stratigraphic log**" dialog box (see Section 5.1).

Further to this, you can enter a soil group according to DIN 18196 (e.g. as DIN abbreviation) for each layer. The soil groups entered will be shown above one another in an oval frame at the right of the log texts. They are only shown if the "**Show soil groups**" check box in the general stratigraphic log editor box is activated (see Section 5.2). This setting can also be activated subsequently for several previously entered stratigraphic logs using the "**Apply to all**" button ("**Short text/soil group**" tab) in the "**Input/Stratigraphic log**" dialog box (see Section 5.1).

The colours and signatures of all soil types given in DIN 4023 are defined by means of *code numbers* in **GGU-STRATIG**. The soil signatures for the respective code numbers cannot be modified. The soil colours can be adapted for correct colour rendering on your printer or plotter (see Section 6.5.12).

Four boxes for entering the code numbers can be seen at the bottom right of the layer input editor box. The first two *code boxes* are for entering the main soil types or accessory soil types with strong minor constituents. The second two code boxes are for entering accessory soil types with weak minor constituents. If numbers are entered in the first two code boxes the corresponding soil signatures are displayed for the entire layer. If entries are made in the second two code boxes the signature is only shown on one side of the layer. To improve the optical impression the soil signatures are distributed by means of a random generator.

If two main soil types are entered (= code numbers in the first two code boxes) the colour of the stratum is divided, if the "**Use the colours of the two main soil types**" check box is activated as default. If this colour division is not wanted, the colour division for this layer can be turned off by deactivating the check box. The colour division for stratigraphic logs can be turned off globally by going to the menu item "**Preferences/General**" and using the check box there (see Section 6.5.1).

Please note that when opening old files created using **GGU-STRATIG** older than main version 10, the "**Use the colours of the two main soil types**" check box is inactive. When using these old logs the program first checks whether there are two upper case soil type descriptors at the beginning and end of the line in text line A1. Only then is the colour visualisation divided for two main soil types (= code numbers in the first two code boxes). You can use the old method for advanced editing or or activate colour division globally using the check box provided in the menu item "**Preferences/General**". The strata are then adjusted correspondingly by the program.

5.4.3 Layer input using SEP 2 abbreviations

5.4.3.1 SEP 2 abbreviation line

Besides the manual input a much faster layer definition via the abbreviation interpretation is possible. Due to the greater flexibility, the SEP 2 abbreviations are recommended. Enter the desired abbreviations in the uppermost line, the *abbreviation line*, and then click the "**Interpret abbreviations**" button. The program automatically enters the long texts associated with the abbreviations in the corresponding lines.

A SEP 2 abbreviation line consists of seven input areas :

- Depth
- Stratigraphy (age)
- Petrography (main soil types + accessory soil types + characteristics if necessary)
- Genesis (origin)
- Colours
- Supplements
- Samples

These input areas are each separated by a *slash* " / ".

Several abbreviations within an input area are separated by *commas* " , ".

Exceptions:
In the petrography area, the main and accessory soil types are separated by a *semicolon* " ; " (see Section 5.4.3.2).
Several samples are separated by a *semicolon*, too (see Section 5.4.3.4).

Depth / Stratigraphy / Petrography (main) ; Petrography (accessory) / Genesis / Colours / Supplements / Samples

The available abbreviations are displayed in the layer input editor box if the required range is selected in "**SEP group**". An abbreviation is copied from the list to the end of the abbreviation line by double-clicking.

The SEP 2 program allows an abbreviation line length of 256 characters. **GGU-STRATIG** also allows this line length. If the number of abbreviation characters goes above a value of 60, the input window will scroll horizontally to the left. With the [**Home**] key you can return to the beginning of the line. With the [**End**] key you can move to the end of the abbreviation line.

5.4.3.2   Petrography: interpretation using SEP 2 abbreviations

The Petrography abbreviation range comprises the SEP 2 abbreviations for *main soil types* and *accessory soil types*. Additionally, abbreviations for *characteristics* can be entered in any position in the petrography area, e.g. information on grain roundness for a fine gravel constituent or on lime content. The abbreviations and corresponding long texts can be found under "**Preferences/Abbreviations (SEP)**" (see Section 6.5.11.2).

The main and accessory soil types in the abbreviation line are separated by a semicolon. This separation impacts only the allocation of the long texts in the 3 lines of long text, A1, A2 and B. It does not matter which of the 3 petrography ranges the abbreviations are taken from. Only the petrography header is relevant for interpretation. When allocating the long texts everything before the semicolon is treated as a main soil type. Everything following the semicolon is treated as an accessory soil type. The lines in which the long texts for main and accessory soil types are interpreted can be specified by pressing the "**Long texts**"button in the "**Preferences/Abbreviations (SEP)**" dialog box (see Section 6.5.11.3).

Quality information is noted by a number associated with the corresponding abbreviation. They are allocated as follows: "**1**" = "**very slightly**", "**2**" = "**slightly**", "**4**" ="**strongly**", "**5**" = "**very strongly**". It is not necessary to enter the "**3**" = "**medium**".

A maximum of four code numbers can be allocated for subsequent graphical soil type visualisation (also see Section 5.4.2, "**Manual layer input**"). The four code boxes are filled in from left to right when interpreting a SEP 2 abbreviation line. If a main soil type and an accessory soil type with weak minor constituents are present the second code box should not be used, because otherwise a strong signature will be used for the accessory soil type. In this case, enter the "**#**" sign as a placeholder in the second code box. The code box is then filled with the number **0** and then the third code box with the code for the accessory soil type.

- Example:
  The following layer is entered:
  Layer base = 2.35 m
  Medium sand, slightly fine-sandy, brown, soil group SE,
  stratigraphy, genesis and samples not present
  The abbreviation line is:
  2.35// mS; #, fs2// bn/ SaE
  After pressing the "**Interpret abbreviations**" button all input will be converted to long texts.

When saving a borehole as a SEP 2 file (see Section 5.2) the "**#**" sign is not adopted, thus retaining data compatibility to the SEP 2 program.

If an input is not required in an area, simply leave the area empty - in the above example: stratigraphy and genesis. The slash to the next input area follows directly.

Unnecessary input areas at the end of the abbreviation line are simply left blank - in the above example: no samples. The line ends after the soil group abbreviation.

Free text can be entered into any area. The free text must be entered in apostrophe's. For example:

- *2.35// 'Building rubble', mS; fs2, u4// bn// SaU2*
  The free text **Building rubble** will thus be interpreted into the "**Petrography**" area in front of medium sand.

If you would like to have the long text in **brackets**, simply enter these at the desired position in the abbreviation line. For example:

- *2.35// 'Building rubble', (mS); fs2, u4// bn/ SaU2*
  Medium sand, in long text, will then be placed in brackets.

5.4.3.3   Colours and supplements (soil group, consistencies, groundwater): interpretation using SEP 2 abbreviations

For *colour* input, two colours can also be combined. For example:

- gero ➜ yellowred   (ge = yellow; ro = red)

- dgnbn ➜ dark green-brown (d = dark; gn = green; bn = brown)

- hgr   ➜ light-grey   (h = light; gr = grey)

If an "=" is entered after the colour abbreviation, the long text will be supplemented with "**ish**". For example:

- ge= ➜ yellowish

- ro= ➜ reddish

If an abbreviation from a different input area is to be used in any of the areas, the **area designation** must be entered.

- S: for Stratigraphy

- P: for Petrography

- G: for Genesis

- F: for Colours

- Z: for Supplements

For example:

- *2,35// mS; fs2, u4, F:bn/// SaU*
  The colour **brown** (bn) will thus be interpreted into the "**Petrography**" area.

Using the *Supplements* input area in the SEP 2 abbreviation line it is possible to display the *soil group*, the *consistencies* or the *drilling progress*. It is also possible to combine a number of abbreviations, e.g. "**kos2-kos3**" for consistency "**soft to firm**".

In the supplements area abbreviations are also provided for describing *groundwater* conditions, e.g.: "**gws**" for GW drilled at or "**gwr** " for GW at rest. The depth information is entered in brackets following the abbreviation. Additional descriptions, e.g. the date, are entered in single quotation marks and follow after the depth data and a space or comma.

> The brackets containing the depth data must immediately follow the groundwater abbreviation, <u>without</u> a space. The decimal separator for depth input must be a *point*, <u>not</u> a comma.

For example:

- *2.35// 'Building rubble', mS; fs2, u4// bn/ SaU2, kos2-kos3, gws(2.66,'2010-30-08')*
  This enters *SU** as the soil group and the consistency symbol for *soft-firm* is used. A *groundwater level* of 2.66 m is entered in the "**Drilled at**" box.

The default setting does not adopt the textual representation of supplementary information in the stratigraphic log, e.g. drilling progress. It can be activated for one of the lines of long text in the menu item "**Preferences/Abbreviations (SEP)**"; "**Long texts**" dialog box (see Section 6.5.11.3).

5.4.3.4   Samples: interpretation using SEP 2 abbreviations

Input of *samples* follows at the end of the abbreviation line. After the final supplement input enter a slash and begin with the depth from which the sample was taken.

> It is important that the sample depth information is entered using a *decimal point*, <u>not</u> a comma.

You can then enter the sample designation (name) in brackets. For the description of the sample type, the SEP abbreviations are available once again, which you can view or supplement in "**Preferences/ Abbreviations (SEP)**", button "**Samples**" (see Section 6.5.11.2). It is not absolutely necessary to enter a description of the sample type. It is also possible to simply enter the depth and sample designation. The sample type (e.g. special sample) must also be placed in brackets and be separated from the sample designation by a *comma*.

If a further sample has been taken from the same horizon, separate the entries with a *semicolon* " **;** " and enter the depth, number and type in the same sequence.

- For example the entry
  .... / 1.2(S 1), (bp1) ; 2.4(S 2), (so)
  means:
  Sample S 1 is a very poor quality bore sample (= bp1) at a depth of 1.2 m
  (Visualisation at stratigraphic log with activated depth display: bp1 S 1 1.20).
  .Sample S 2 was taken as a special sample (= so) at a depth of 2.4 m
  (Visualisation at stratigraphic log with activated depth display: so S 2 2.40).

Using the format shown in the example before, the sample base level is entered. If the top and bottom of the sample need to be displayed, the appropriate check box must first be activated under "**Preferences/Abbreviations (SEP)**, dialog box button "**Samples/short texts**" (see Section 6.5.11.3). Depth input then follows the example below:

- ..../ 1.0-1.2(S 1), (kp)
  This means that both depths are shown in brackets after the sample designation
  (Visualisation at stratigraphic log with deactivated depth display: kp S 1 (1.00-1.20)).

Samples are interpreted as *Left texts* and drawn beside the stratigraphic log. Because the depths of samples are given in text format following the sample designation if sample visualisation with both depths is activated, the *Left texts* depth display should be deactivated (see Section 5.6.1).

The DIN 4023 symbols for disturbed samples (unfilled box), special samples (filled box) and core samples (box with cross) can also be interpreted at the same time using the corresponding SEP 2 abbreviation, as for special sample (= so) in the example. The allocations can be found by pressing the "**Assign (samples)**" button in the "**Preferences/Abbreviations (SEP)**" dialog box (see Section 6.5.11.3). If the sample type is not additionally required in text format in the symbol visualisation, delete the corresponding long text in the "**Preferences/Abbreviations (SEP)**" dialog box, "**Samples**" button (see Section 6.5.11.2).

5.4.3.5   *Text allocations when interpreting SEP 2 abbreviations*

After entering the abbreviations press the "**Interpret abbreviations**" button. The abbreviations are then converted to long texts. The program distributes to the three long texts internally as follows.

- Petrography (major constituent) ➔ long text line 1 = "**Text A1**"

- Petrography (minor constituent) ➔ long text line 3 = "**Text B**"

- Colour ➔ long text line 2 = "**Text A2**"

The main and accessory soil types in the abbreviation line are separated by a semicolon. This separation only impacts the allocation of the long texts in the 3 lines of long text, A1, A2 and B. It does not matter which of the 3 petrography ranges the abbreviations are taken from. Only the petrography header is relevant for interpretation. When allocating the long texts everything before the semicolon is treated as a main soil type. Everything following the semicolon is treated as an accessory soil type.

The lines in which the long texts are interpreted can be specified by pressing the "**Long texts**" button in the "**Preferences/Abbreviations (SEP)**" dialog box (see Section 6.5.11.3). The default setting is main soil type, accessory soil type and colour. Additionally, the long text allocations for the stratigraphy and genesis abbreviations or the supplements can be selected in the "**Long texts**" dialog box.

The SEP 2 program is much more consequential than the DIN 4023. The genetic expressions *topsoil*, *boulder clay*, *fill*, etc., e.g., are thrown into one pot with purely petrographic expressions (e.g. sand, gravel, etc.) in DIN 4023. If you would like to enter these genetic expressions in the first position in the long text line A1, using **GGU-STRATIG** (e.g. to 1.2 m fill, sand, silty), you must enter the following abbreviation line:

- *1,2// G:y, S, u*

Where "**G:**" stands for the genetic abbreviation area and the "**y**" is the SEP 2 abbreviation for fill from this area. In principle, it is also imaginable to enter the "**y**" abbreviation, together with the long text "**fill**" into the petrography area (see Section 6.5.11.2). This procedure may be pragmatic, as you can do without input of the "**G:**", you will, however, lose compatibility to the SEP 2 program. The functionality of the **GGU-STRATIG** program will not be restricted in any way. You can also create a completely different set of abbreviations with completely different long texts.

5.5   Define consistencies of a stratigraphic log

> If you are entering strata using the SEP abbreviations, you should also always enter the consistencies for each stratum compliant with DIN 4023 using the abbreviation line in the supplements group box. This ensures that if the stratum is subsequently edited and interpreted the consistencies are neither forgotten nor deleted.

A manual input or alteration is possible using the "**Consistencies**" button in the general editor box of your stratigraphic log. The following dialog box opens:
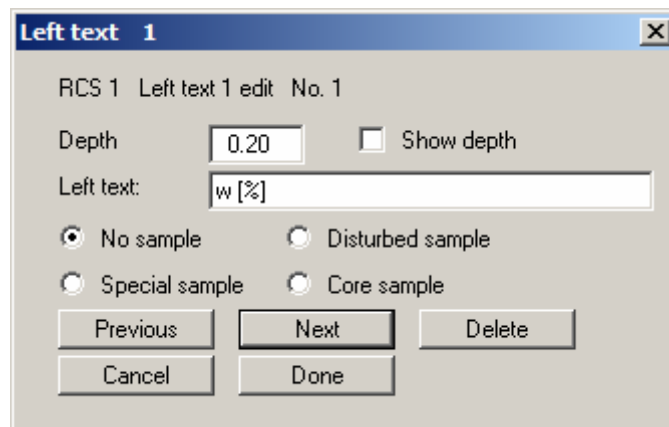

The consistencies can be entered in any order (not necessarily from top to bottom). In the first two lines you enter the upper and lower limit for each consistency. You can then select the desired consistency by clicking in the corresponding box. The buttons at the bottom of the dialog box perform the same actions as those for layer input (see Section 5.4.1).

5.6.1   Enter "Left texts"

Additional stratigraphic log information can be added using the buttons "**Left texts 1**" and "**Left texts 2**" in the general editor box. This information, e.g. water content, LOI, sample data, etc., is shown at the left of the stratigraphic log. The following dialog box opens to allow "**Left texts 1**" to be entered (example). The dialog box for "**Left texts 2**" is identical. The "**Left texts**" can be entered in any order.

It is necessary to enter the depth, measured from the top of the stratigraphic log, for subsequent height-correlated display of the texts at the stratigraphic log. Then enter the appropriate text (e.g.: w [%]).

When entering the sample data the symbols proposed in DIN 4023 for disturbed samples (unfilled box), special samples (filled box) and core samples (box with cross) can be activated using the appropriate check box. Sample data can be interpreted by using the corresponding SEP 2 abbreviations in the appropriate layer data (see Section 5.4.3.4).

If the "**Show depths**" check box is activated the depth is automatically shown at the right of the text. If sample display with both depths is activated (see Section 6.5.11.3) the "**Show depth**" check box in the dialog box above should not be activated, because the depths are already shown as text following the sample designation.

The depth can also be activated subsequently for several previously entered stratigraphic logs using the "**Apply to all**" button ("**Groundwater** + **left texts**" tab) in the "**Input/Stratigraphic log**" dialog box (see Section 5.1).

The buttons at the bottom of the dialog box perform the same actions as those for layer input (see Section 5.4.1).

5.6.2   Edit layout of "Left texts"

After clicking the "**Left texts prefs.**" button in the stratigraphic log general editor box formatting options can be selected for both "**Left texts 1**" and the "**Left texts 2**".
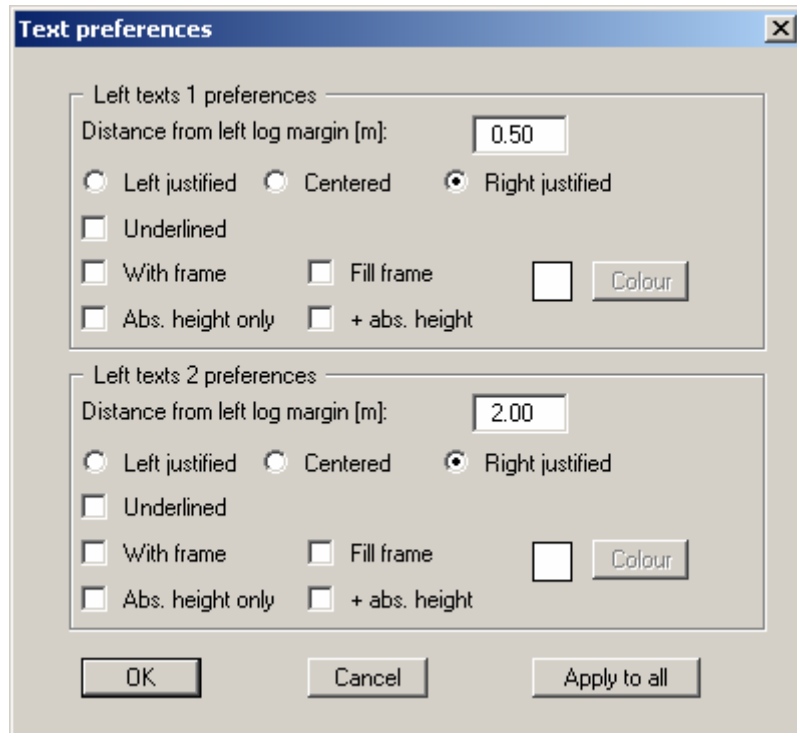

The texts can be displayed in two columns by entering different distances from the left log margin. For example, water content and LOI determined in the lab can be displayed side-by-side. A frame can be activated to further emphasise this additional information and a colour-fill selected. An activated frame is displayed over the whole length of the stratigraphic log and the same width as the defined text.

The settings for the type of depth labelling with absolute heights are only effective if the depth information is activated in "**Left texts 1**" and "**Left texts 2**" (see Section 5.6.1).

The settings defined in the above dialog box for the "**Left texts**" on the selected stratigraphic log can also be activated for all other stratigraphic logs in the current file by using the "**Apply to all**" button.

5.7   Edit text preferences

The layer description can be entered in long text lines A1, A2 and B or interpreted using SEP 2 abbreviations (see Section 5.4.3.5). The dialog box below shows the settings available for use with subsequent graphical visualisation at the stratigraphic log. The dialog box is accessed by pressing the "**Text prefs.**" button in the stratigraphic log general editor box. The default setting when the program starts is "**Two lines**".
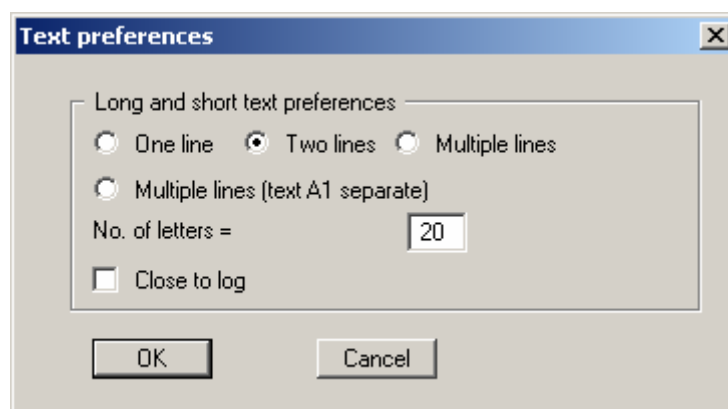

The long texts are always shown in the sequence A1, A2, B. The settings in the above dialog box primarily impact the height and width of the text. If very little room is available the long texts can also be modified using the font size settings (menu item "**Preferences/Font size selection**", Section 6.5.4). The following text settings can also be made in the above dialog box:

- "**One line**"
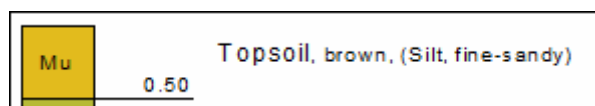
    All layer descriptions are output in a single line. The font sizes specified for the individual text lines are adopted. This setting only makes sense if there is enough space to the right. This helps prevent confusion where very thin layers are involved.

- "**Two lines**"
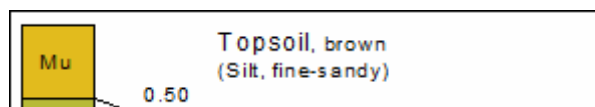
    Text A1 and Text A2 for the respective layer are shown in the first line. Text B is shown in the second line. The font sizes specified for the individual text lines are adopted.

- "**Multiple lines**"
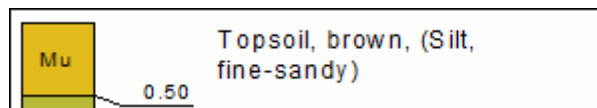
All texts are shown consecutively on several lines. With the setting above a line break is inserted after 20 characters, assuming a space or comma is included in the text. No hyphenations are inserted, i.e. line breaks only occur after whole words. The texts are uniformly displayed using the font size setting for Text A1.

- "**Multiple lines (text A1 separate)**"

Using this setting Text A1 is displayed separately in the first line. Texts A2 and B are shown consecutively on several lines starting from line two. The line break is inserted using the number of letters in analogy to the simple "**Multiple lines**". The font sizes specified for the individual text lines are also adopted for this setting. It is therefore possible to emphasise the main soil type by using a separate line and a larger font size.

- "**Close to log**"
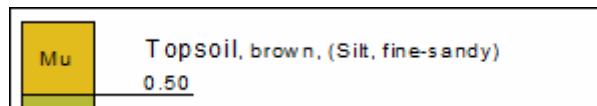
The distance of the text output to the stratigraphic log can be controlled using this check box. If the check box is activated the layer description begins approximately 5 mm away from the stratigraphic log, i.e. within the depth labelling field. If the check box is deactivated the text is entered approximately 3 mm away from the layer depth (see above at "**One line**").

The text settings can also be activated subsequently for several previously entered stratigraphic logs using the "**Apply to all**" button ("**Long texts**" tab) in the "**Input/Stratigraphic log**" dialog box (see Section 5.1).

If your log visualisation requires that the stratigraphic logs be very closely spaced the long texts can be switched off completely and only the short texts displayed. This is simplest using the "**Apply to all**" button in the "**Input/Stratigraphic log**" dialog box, then the "**Short text/soil groups**" tab. Activate the "**Show short texts**" check box (see Section 5.1). The short texts may also be moved "**Close to log**" (see previous paragraph).

5.8.1   Gauge and well casings in GGU-STRATIG

The **GGU-STRATIG** program provides a number of options for visualising gauges and wells.

A simple option is the "**Gauge**"; its casing and, if required, any backfill are drawn on the stratigraphic log (see "**Ex_GW to top of casing.bop**" file in the"**GGU-STRATIG\Examples\en**" folder).

The casing, which is shown completely surrounded by the backfill, is entered using the menu item "**Input/Well**" and is drawn separate to the stratigraphic log (see Section 0).

Another option is available by going to the menu item "**Input/Multiple gauge**". Here, several gauges with varying casing depths can be entered within a borehole backfill (see Section 6.3.7).

5.8.2   Activating gauge casing visualisation

To enter a gauge casing directly on the stratigraphic log the two check boxes "**Show backfill**" and "**Show casing**" must first be activated in the stratigraphic log's general editor box. These are deactivated by default. The layers can then be defined by pressing the "**Backfill**" and "**Casing**" buttons.
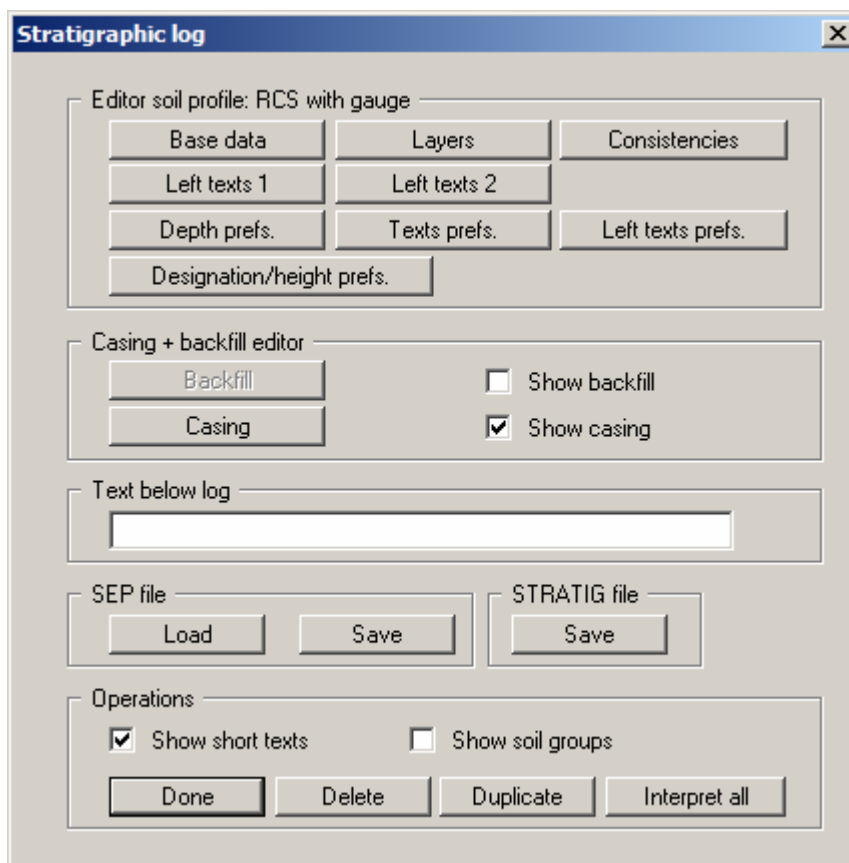
Visualisation of a backfill or casing can be switched off by deactivating the respective check box, without deleting the input data.

5.8.3   Defining backfill layers

The starting height (ground level) is entered in the stratigraphic log's base data under "**Designation and position**". Ground level always corresponds to the top of the backfill. Gauge backfill layer input is entered analogous to the procedure for entering borehole layers. After clicking the "**Backfill**" button the following dialog box opens:

Using the "**Interpret**" button the SEP 2 abbreviations can be used in the same way to automatically enter the long texts allocated to the abbreviations. However, only codes from the "**Petrography**" abbreviations range may be used. Here, too, the texts can be allocated to text lines TextA and TextB by separating the petrographic abbreviations with a semicolon. Additional information on the SEP 2 abbreviations can be found in Section 5.4.3.

5.8.4 Defining gauge casing layers

The starting height (ground level) is entered in the stratigraphic log's base data under "**Designation and position**". Ground level always corresponds to the top of the backfill.

The height of the casing *relative to ground level* is entered in the "**Casing + backfill**" input group box. If the pipe protrudes from the ground the height difference must be entered as a negative value (also see the example in Section 5.3.4).

After clicking the "**Casing**" button the following dialog box opens:

When entering the layers for the casing the difference to ground level must be either subtracted from or added to the depth of the pipe, as appropriate. If a 2 m long blank casing protruding 0.25 m above the ground is used, the length of pipe in the ground is entered as a depth of 1.75 m for casing layer 1.

6   Description of menu items

6.1   File menu

6.1.1   "New" menu item

Using this menu item you can delete all current input for stratigraphic logs, dynamic penetration tests, measured data diagrams, etc., together with the header data. You will have an empty page, and can then enter a new log.

6.1.2   "Load" menu item

You can load a previous file with information on stratigraphic logs, dynamic penetration tests, measured data diagrams, etc., which can then be edited. This file must have been created using the **GGU-STRATIG** program (e.g. in a previous sitting) or the **GGU-BORELOG** program (visualisation of bore logs).

6.1.3   "Add file" menu item

Using this menu item you can add a previously saved **GGU-STRATIG** file to the file which is currently opened and displayed on the screen. The data from the selected file will be added to the current data. Using this menu item, previously entered individual stratigraphic logs can be compiled into a geological section, for example.

When adding log data the settings for the overall graphics (height of lower drawing margin, scales in x- and y-directions, page format, header data) are adopted from the added file. All the logs required should therefore be compiled before changing the settings.

6.1.4   "Save" menu item

You can save data entered or edited during program use to a file, in order to have them available at a later date, or to archive them. The data is saved <u>without prompting</u> with the name of the current file.

6.1.5   "Save as" menu item

You can save data entered during program use to an existing file or to a new file, i.e. using a new file name. For reasons of clarity, it makes sense to use "**.bop**" as file suffix, as this is the suffix used in the file requester box for the menu item "**File/Load**". If you choose not to enter an extension when saving, "**.bop**" will be used automatically.

6.1.6   "Printer preferences" menu item

You can edit printer preferences (e.g. swap between portrait and landscape) or change the printer in accordance with WINDOWS conventions.

6.1.7 "Print and export" menu item

You can select your output format in a dialog box. You have the following possibilities:

- "**Printer**"
  allows graphic output of the current screen contents. to the WINDOWS standard printer or to any other printer selected using the menu item "**File/Printer preferences**". But you may also select a different printer in the following dialog box by pressing the "**Printer prefs./change printer**" button.
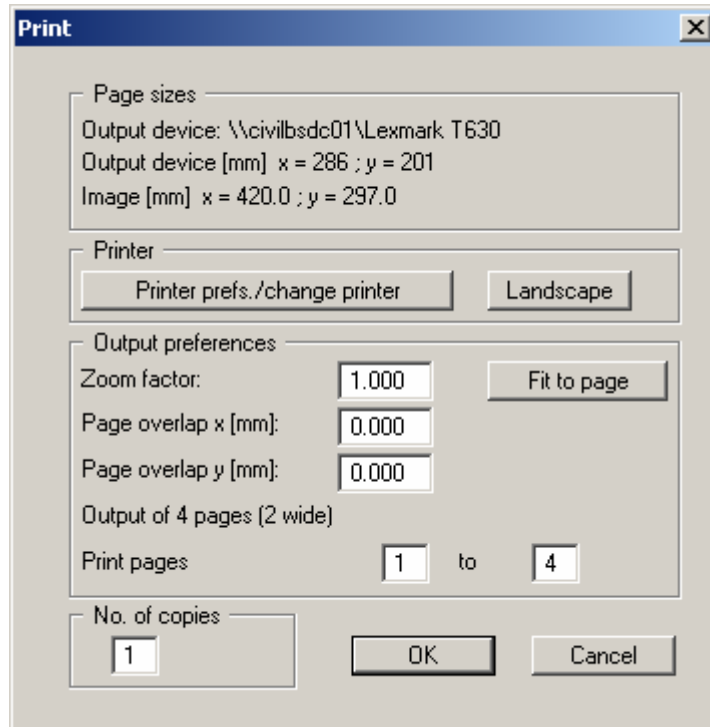
In the upper part of the dialog box, the maximum dimensions which the printer can accept are given. Below this, the dimensions of the image to be printed are given. If the image is larger than the output format of the printer, the image will be printed to several pages (in the above example, 4). In order to facilitate better re-connection of the images, the possibility of entering an overlap for each page, in x- and y-direction, is given. Alternatively, you also have the possibility of selecting a smaller zoom factor, ensuring output to one page ("**Fit to page**" button). Following this, you can enlarge to the original format on a copying machine, to ensure true scaling. Furthermore, you may enter the number of copies to be printed.

- "**DXF file**"
  allows output of the graphics to a DXF file. DXF is a common file format for transferring graphics between a variety of applications.

- "**GGUCAD file**"
  allows output of the graphics to a file, in order to enable further processing with the **GGUCAD** program. Compared to output as a DXF file this has the advantage that no loss of colour quality occurs during export.

- "**Clipboard**"
  The graphics are copied to the WINDOWS clipboard. From there, they can be imported into other WINDOWS programs for further processing, e.g. into a word processor. In order to import into any other WINDOWS program you must generally use the "*Edit/Paste*" function of the respective application.

- "**Metafile**"
  allows output of the graphics to a file in order to be further processed with third party software. Output is in the standardised EMF format (Enhanced Metafile format). Use of the Metafile format guarantees the best possible quality when transferring graphics.


  If you select the "**Copy/print area**" tool from the toolbar, you can copy parts of the graphics to the clipboard or save them to an EMF file. Alternatively you can send the marked area directly to your printer (see "**Tips and tricks**", Section 7.3).

  Using the "**Mini-CAD**" program module you can also import EMF files generated using other GGU applications into your graphics.

- "**MiniCAD**"
  allows export of the graphics to a file in order to enable importing to different GGU applications with the **Mini-CAD** module.

- "**GGUMiniCAD**"
  allows export of the graphics to a file in order to enable processing in the **GGUMiniCAD** program.

- "**Cancel**"
  Printing is cancelled.

6.1.8 "Batch print" menu item

If you would like to print several appendices at once, select this menu item. You will see the following dialog box:
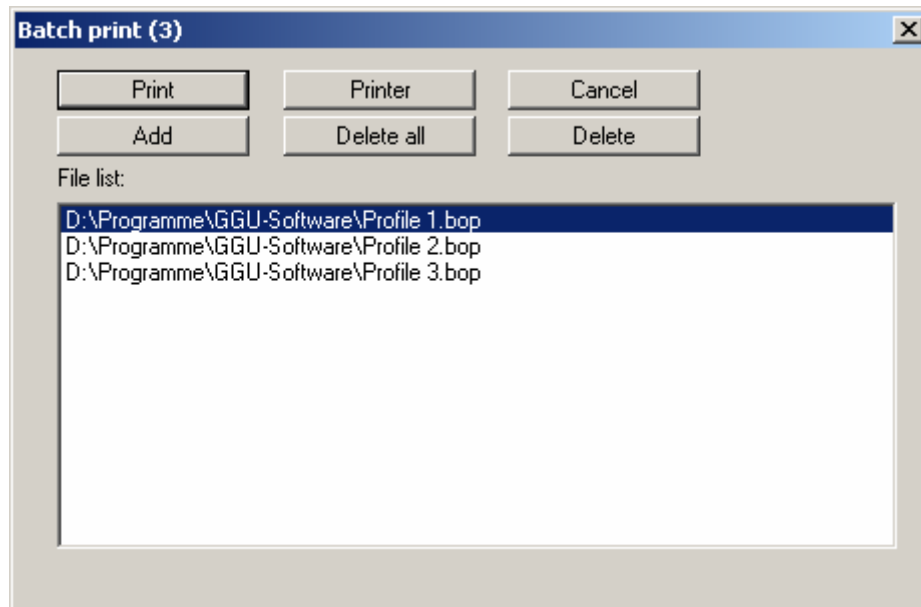
Create a list of files for printing using "**Add**" and selecting the desired files. The number of files is displayed in the dialog box header. Using "**Delete**" you can mark and delete selected individual files from the list. After selecting the "**Delete all**" button, you can compile a new list. Selection of the desired printer and printer preferences is achieved by pressing the "**Printer**" button.

You then start printing by using the "**Print**" button. In the dialog box which then appears you can select further preferences for printer output such as, e.g., the number of copies. These preferences will be applied to all files in the list.

6.1.9 "Exit" menu item

After a confirmation prompt, you can quit the program.

6.1.10 "1, 2, 3, 4" menu items

The "**1, 2, 3, 4**" menu items show the last four files worked on. By selecting one of these menu items the listed file will be loaded. If you have saved files in any other folder than the program folder, you can save yourself the occasionally onerous *rummaging* through various sub-folders.

6.2.1   General note on 'Edit' menu item functions

The items in this menu can only be selected if objects were previously marked (see Sections 6.2.9 and 6.2.10). For some of the menu items an appropriate action must have occurred first. The menu item "**Edit/Paste**", for example, is only active if an object was previously copied or cut.

The term *objects* in the description relating to these menu items refers to all elements definable in the "**Input**" menu, i.e. stratigraphic logs, dynamic penetration tests, cone penetration tests, tables, etc.

6.2.2   "Undo" menu item

If objects have been moved, copied or deleted using one of the menu items below, the last modification carried out can be undone using this menu item. A maximum of 10 undo steps can be taken. This function can also be reached by using the key combination [**Alt**] + [**Backspace**] or the tool

in the toolbar.

6.2.3   "Restore" menu item

When this menu item is selected the last actions, which you undid using the menu item "**Edit/Undo**" will be restored. Up to 10 restore steps can be made. This function can also be

reached by using the key combination [**Ctrl**] + [**Backspace**] or the tool   in the toolbar.

6.2.4   "Cut" menu item

Marked objects can be cut using this menu item. The objects are removed from the visualisation and saved to the Windows clipboard. The Windows key combination [**Ctrl**] + [**X**] can also be used to perform this action.

6.2.5   "Copy" menu item

After going to this menu item the marked objects are copied to the Windows clipboard. The Windows key combination [**Ctrl**] + [**C**] can also be used to perform this action. The copied objects can then be reinserted into the same file or a new **GGU-STRATIG** file (see "**Edit/Paste**" menu item).

6.2.6   "Paste" menu item

Using this menu item cut or copied objects are pasted from the Windows clipboard into your **GGU-STRATIG** file. The Windows key combination [**Ctrl**] + [**V**] can also be used.

If another file is opened or a new one created after cutting or copying objects, the old objects are pasted using the coordinates from the original file. If a copy of the object is pasted into the original file the copied object is placed directly on top of the template object.

6.2.7 "Delete" menu item

Previously marked objects can be deleted. It is also possible to simply press the [**Del**] key.

6.2.8 "Move" menu item

Marked objects can be moved by a given amount in x- and/or y-direction in the drawing scale by numerical input in a dialog box.

6.2.9 "Select all" menu item

All objects in the file can be marked using this menu item or the key combination [**Ctrl**] + [**A**]. The selected objects are displayed marked by small boxes as long as the menu item is activated. These objects can be moved in x-direction by left-clicking one of the objects and pulling them to the required position holding the mouse button pressed.

6.2.10 "Select" menu item

This menu item can be used to mark individual objects. Several objects can be marked by simultaneously holding the [**Shift**] key. The menu item is also activated by pressing [**F7**] or the tool in the toolbar.

The selected objects are displayed marked by small boxes as long as the menu item is activated. The objects can now be moved in x-direction by left-clicking one of the objects and pulling them to the required position holding the mouse button pressed.

The objects can now also be moved in y-direction by simultaneously holding the [**Shift**] key. A corresponding height displacement is automatically inserted in the respective base data for these objects. Two geological sections can be very quickly positioned on the sheet in this way (see "**Input/Stratigraphic log**", "**Base data**" dialog box, "**Notes on the "Designation and position" group box**", Section 5.3.2).

6.2.11 "Preferences" menu item

You can activate or deactivate the undo functions.

6.3   Input menu

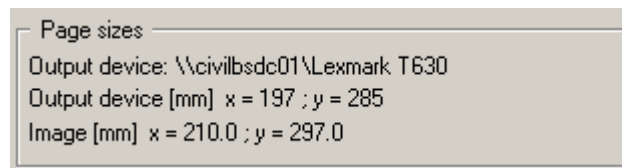### 6.3.1   Notes on the output sheet and coordinate systems

6.3.1.1   Output sheet - dimensions and 1:1 output

When the program starts it displays an A3 format output sheet. Thin (cutting) borders are drawn around the outside of the sheet; they are required for output on reel media on plotters. A thicker border enclosing the *drawing area* is drawn at a defined distance to the edge of the sheet. The defined margins are called *page margins* (see Section 6.3.14). All elements defined in the "**Input**" menu are displayed in the *drawing area* (e.g. penetration tests, wells, reference staffs, etc.).

The page size is defined using two separate menu items. The page width is specified in [m] in the selected scale using the menu item "**Input/Overall view**" (see Section 6.3.2). The page height is defined in [mm] using the menu item "**Input/Page format**" (see Section 6.3.14).

If the lines (cutting borders and page margins) need to be switched off and hidden they can be deactivated in "**Preferences/General**" (see Section 6.5.1). However, deactivated lines do not influence the size of the page or that of the drawing area. They are only switched off.

To achieve a 1:1 page output on the printer the page format must be reduced after switching off the borders such that the entire page lies within the printable area of the selected printer. The dimensions are shown in the top group box after going to the menu item "**File/Print and export**" and pressing the "**Printer**" button:

```
┌─ Page sizes ──────────────────────────────┐
│  Output device: \\civilbsdc01\Lexmark T630 │
│  Output device [mm]  x = 197 ; y = 285     │
│  Image [mm]  x = 210.0 ; y = 297.0         │
└────────────────────────────────────────────┘
```

For the dimensions shown the page format in x-direction must be smaller than 197 mm and smaller than 285 mm in y-direction. The non-printable area of the printer can be used as a margin and the page margins correspondingly reduced, for example. Header data must be moved by the reduced number of margin millimetres, because the header data coordinates remain unchanged by the change in page format.

In the "**Ex_Print 1-1.bop**" example file the borders were deactivated in the "**Preferences/General**" menu item dialog box and the page format subsequently edited as shown below:
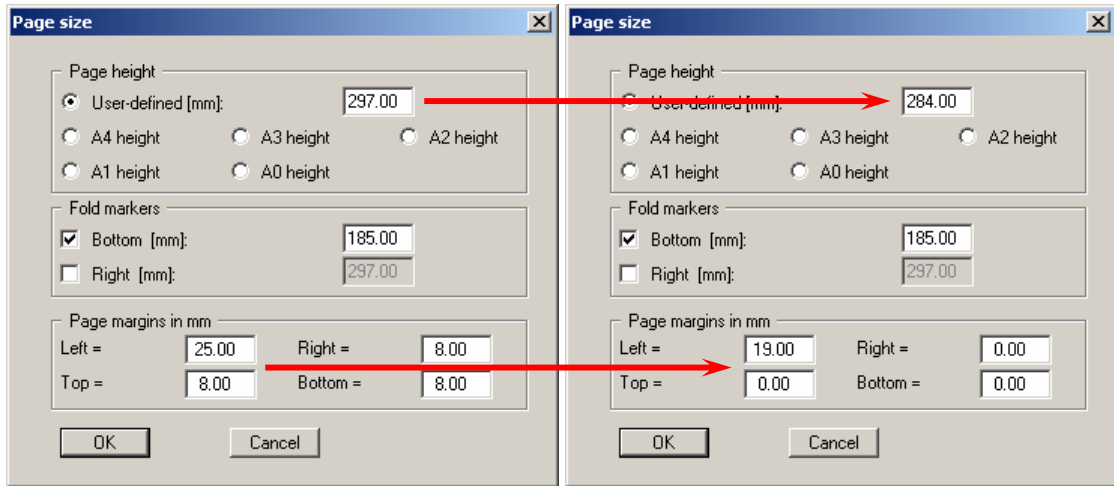
This brings the defined page within the printer dimensions and it can be printed directly using a zoom factor of 1.00:
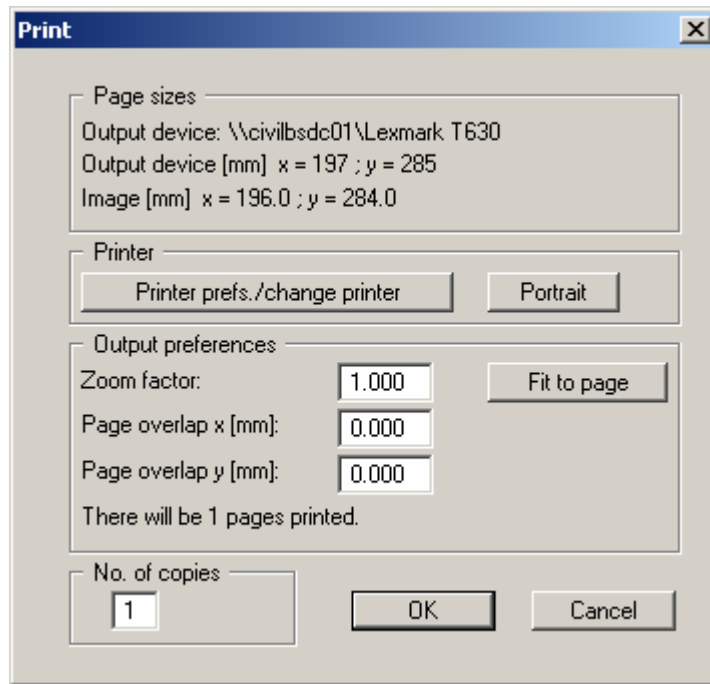
The page margins of the printout correspond to the original page margins, because the non-printable area at the top, bottom and right already correspond to the required border on the selected printer.

The header data are moved by 8 mm in x-direction and -5 mm in y-direction using the "**Modify objects**" icon in the **Header toolbar** popup menu:
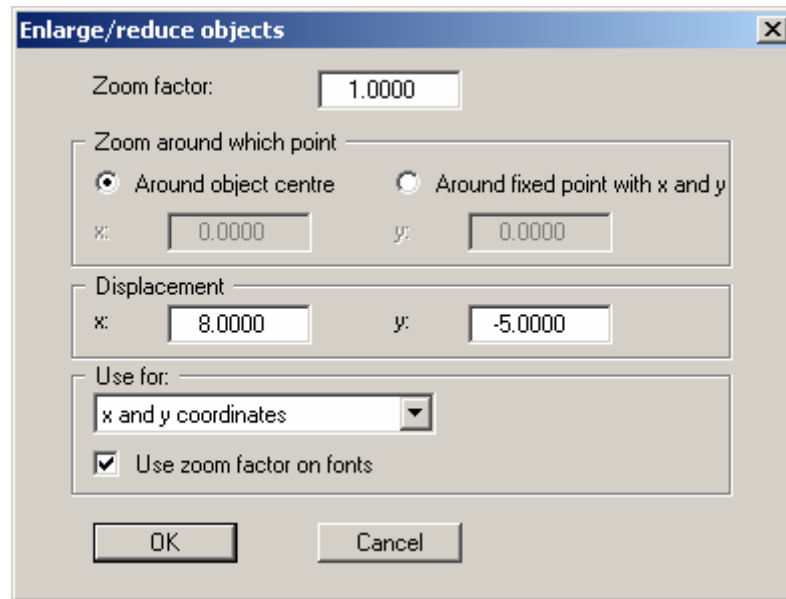
6.3.1.2 Log data coordinate system

Two different coordinate systems are implemented in the **GGU-STRATIG** program. The elements defined using this menu are always displayed in the log data coordinate system at the scale specified in the "**Input/Overall view**" menu item. If the scale is altered the elements are automatically adapted to fit.

For a to-scale height visualisation an appropriate reference height must be defined as the lower page margin. The right image boundary can be user-defined or calculated automatically by the program for a required page format according to the defined scale (see Section 6.3.2).

Your log visualisation can be supplemented by objects inserted using the **Mini CAD** system, opened from the "**Graphics preferences/Mini-CAD toolbar**" menu item. These **Mini-CAD** objects are drawn in the log data coordinate system and therefore undergo the same adaptations as penetration tests, for example, if the scale is changed or the height modified in the drawing.

6.3.1.3 Header data coordinate system

The second coordinate system, which relates to the output sheet, applies to the header data. The coordinates are defined in [mm] independent of any scale used. The origin is always the lower left corner of the page (x/y = 0/0). The page height, any fold markers and the page margins are defined in the "**Input/Page format**" menu item (see Section 6.3.14).

Header data can be entered and edited using the **Mini-CAD** system. The system can be activated via the "**Graphics preferences/Header toolbar**" menu item. If the right margin is modified via the "**Input/Overall view**" menu item the x-coordinates of the existing header data are adapted automatically by the program such that they always retain the same distance to the right margin. For example, if you expand an A4 page and increase its size to A3, the header remains at the right and is therefore in the correct position when folding the printed sheet later.

6.3.2 "Overall view" menu item

The scale and coordinate system of your log data are defined via this menu item. After clicking this menu item the following dialog box opens:
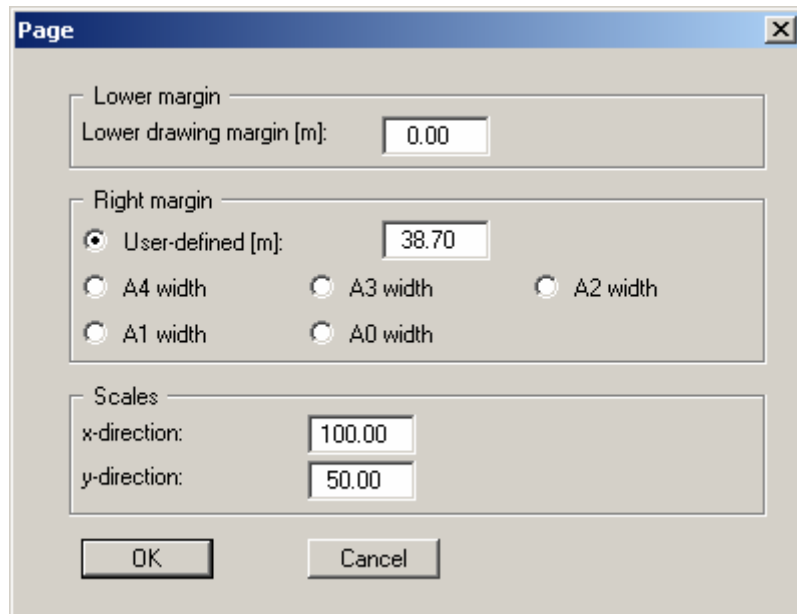
The lower drawing margin defines a reference height for visualisation of the stratigraphic log data. Obviously the lower drawing margin must always be slightly lower than the base of the deepest log, otherwise the logs will simply disappear off the top or bottom of the page. For example, given a starting height of 53.87 m AD (above datum) for a 5 m deep stratigraphic log and a 1:50 scale in y-direction, it is useful to adopt a lower drawing margin at 45 m AD to achieve vertically centred stratigraphic logs. If you don't want to compute the lower drawing margin yourself you can simply have the vertical alignment of your stratigraphic logs computed automatically by the program using the menu item "**Graphics preferences/Alignment**" or by pressing [**F9**] (see Section 6.4.3).

The right margin can be determined automatically by the program by selecting the different page formats. The right margin is the distance between the page margins as defined in the menu item "**Input/Page format**" and thus corresponds to the width of the *drawing area*. It is entered in [m] in the user-defined scale. In the dialog box shown above the settings for an A3 page with an x-direction scale of 1:100 can be seen. By default, a left filing margin of 2.5 cm and a right margin of 0.8 cm are defined (see "**Input/Page format**", Section 6.3.14). A total of 38.7 cm thus remain from the overall page width for the *drawing area*, which represents 38.70 m in x-direction at the defined scale of 1:100:

<div align="center">

DIN A3 = 42.0 cm - 2.5 cm - 0.8 cm = 38.7 cm

</div>

The scales for the x- and y-directions are defined in the dialog box's lower group box. If no correct, to-scale spacing needs to be used for the log visualisation, an x-direction scale of 1:100 should be retained for simplicity, because all *metre input* for the x-direction then correspond to centimetres. The point of reference for the x-direction is the left margin, which is always 0.0 m.

6.3.3   "Legends" menu item

6.3.3.1   Legend selection

Using this menu item you can select from various legends for the presentations you have entered.
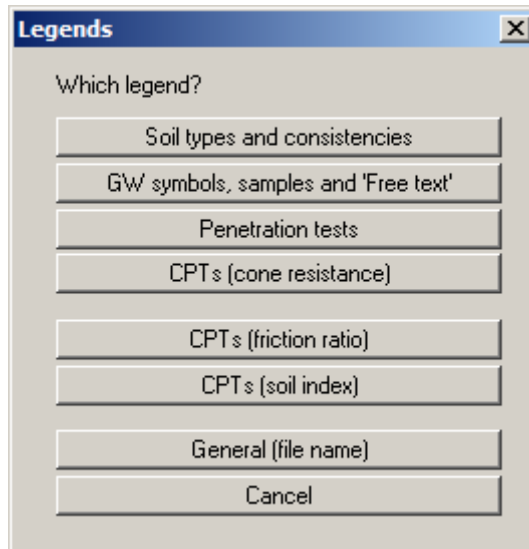
After selecting a legend you can define the desired layout (size, position etc.) in the dialog box which appears. Particulars for values with an effect on the legend presentation are given in further dialog boxes.

### 6.3.3.2 "Soil types and consistencies" legend

If you have created stratigraphic logs a legend explaining the soil types and consistencies can be displayed. The "**Show legend**" check box must be activated in the dialog box shown below.
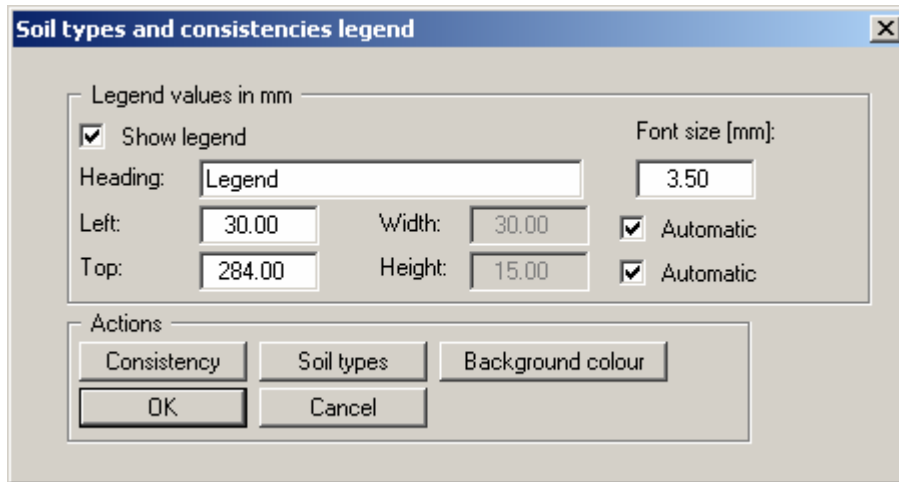
A legend heading can be given and the font size altered. To define the legend position on the output sheet it is sufficient to specify the upper left corner of the legend frame. If the "**Automatic**" check box is activated the width and height are determined by the program. Input is in [mm] in the header data coordinate system, because the size and position of the legend should not move in line with any scale changes made to the log data.

> The fastest way to modify the position of the legend is to press the [**F11**] function key and then to pull the legend to the new position with the left mouse button pressed.

By clicking on the "**Consistency**" button the following dialog box opens:
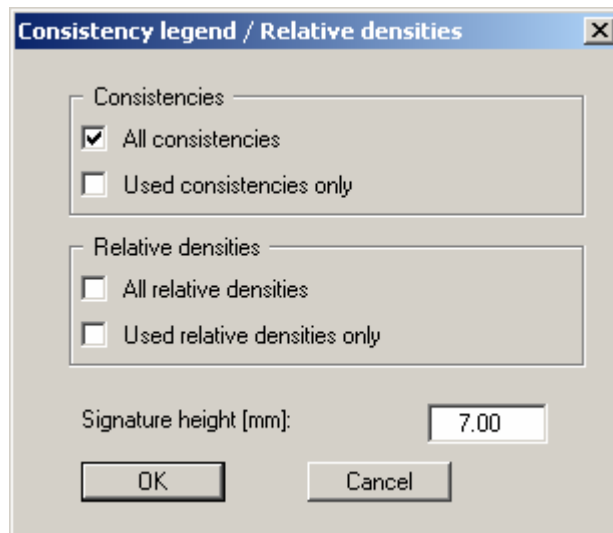
It is possible to display either all consistencies and relative densities in the legend by activating the corresponding check boxes, or only those that actually occur in the current logs. The signature heights can also be defined here.

By clicking on the "**Soil types**" button the following dialog box opens:
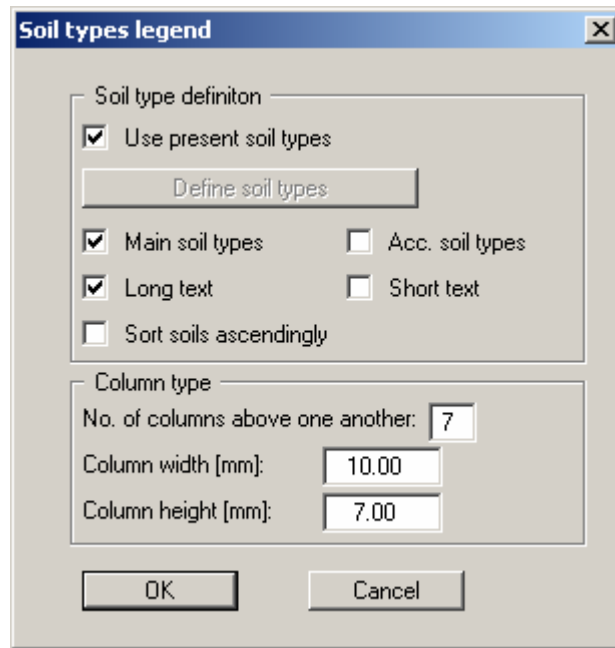
You can define the soil types to appear in the legend, or have them defined automatically by the program. For automatic definition, the "**Use present soil types**" check box is activated, and all currently displayed soil types will be described. The requirement for this is that the check boxes "**Main soil types**" and/or "**Acc. soil types**" are activated, otherwise the soil types will not be included in the legend.

The "**Long text**"and "**Short text**" check boxes determine with which text the legend entries are to be labelled. The sequence for the automatic legend is given by the code numbers allocated to the individual soil types (see Section 6.5.11.2, "**Preferences/Abbreviations (SEP)**") menu item, and may be in ascending or descending order. The column design can be defined in the column type group box at the bottom of the dialog box. The size of the legend is controlled using "**No. of columns above one another**"; where necessary, several columns are used.

If you would like to use the same legend for several logs, even when not all soil types are present in each individual log you can, after deactivating the "**Use present soil types**" check box, click on the "**Define soil types**" button. You will then see a dialog box, in which you can define your own soil types list, which will then appear in the legend.
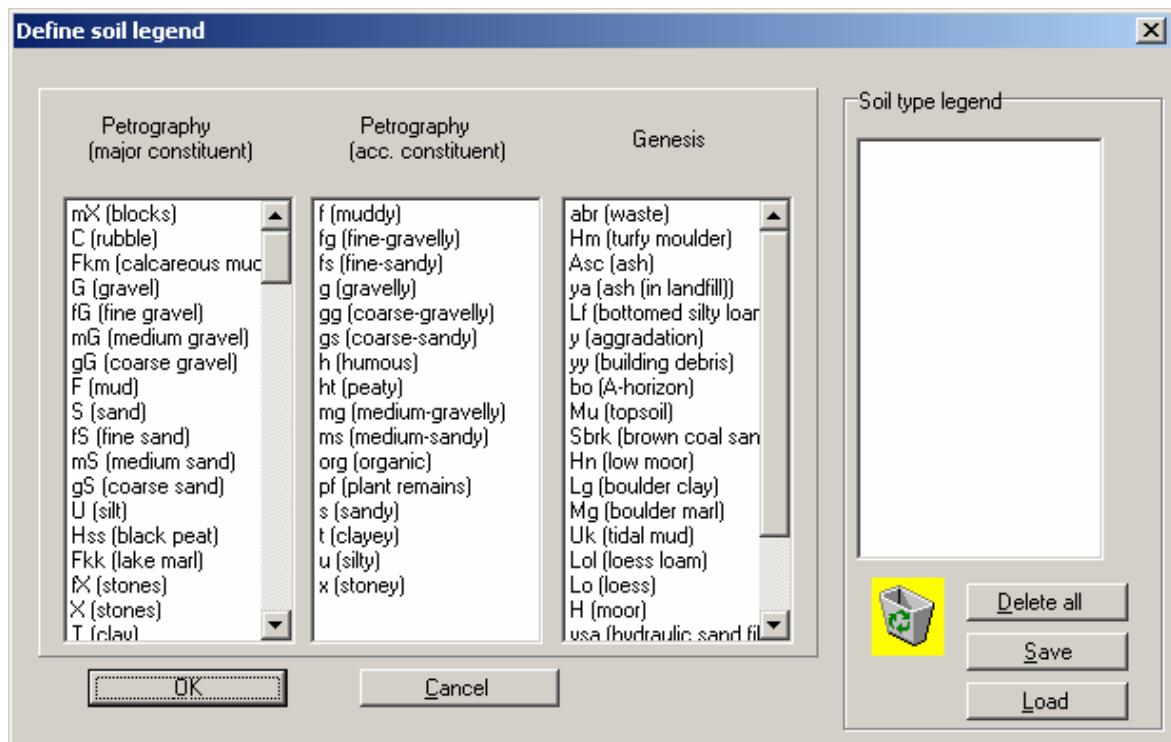
The required soil types are moved to the right-hand "**Soil type legend**" box by double-clicking the name. The required soil type can also be pulled to the box by holding the left mouse button, or the sequence of selected soil types in the right-hand box can be modified in the same way. Each combination can be saved in a file with the "**.boa**" suffix and then be loaded into any other log.

6.3.3.3 "GW symbols, samples and 'Free text'" legend

The groundwater and sample symbols can be explained or user-defined texts displayed as descriptions using this menu item. Activate the "**Show legend**" check box.
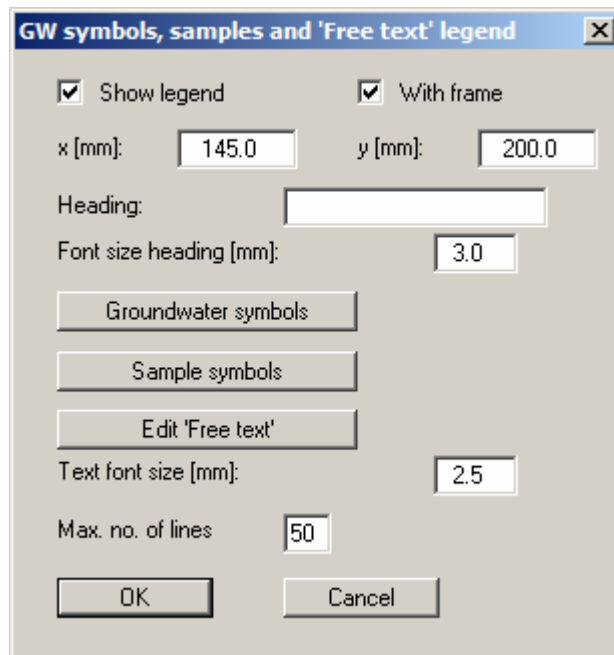
An optional frame can be drawn around the outside of this legend. A heading can be given and the font size altered. You can define and edit the position of the legend using the values "**x**" and "**y**". You control the size of the legend using "**Text font size**" and "**Max. no. of lines**"; where necessary, several columns are used.

If you would like to have the groundwater symbols explained, click on the "**Groundwater symbols**" button. You will then see the following dialog box:
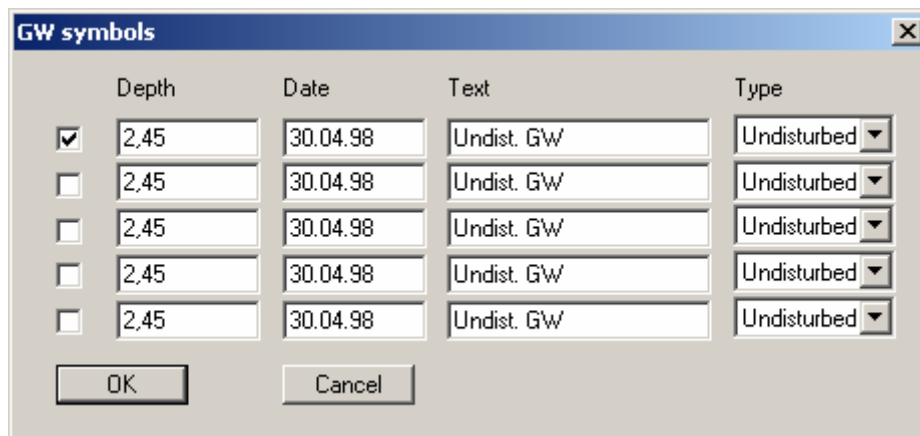
You can activate one or more rows. The various groundwater symbols can be selected at the end of each row. Now you need merely adjust the labelling for the selected groundwater symbol.

To use explanations of the sample symbols click the '**Sample symbols**' button and select the required explanation from the dialog box (special sample, core sample, disturbed sample).

After clicking "**Edit 'Free text'**" the user-defined texts can be entered in an editor window. The input can be saved in a "**.txt**" file via the editor window's "**File**" menu, or an existing text file can be opened. The text entered is adopted when the window is closed again.

6.3.3.4 "Penetration test" legend

A legend for dynamic penetration tests can be displayed using this dialog box. Activate the "**Show penetration test legend**" check box.
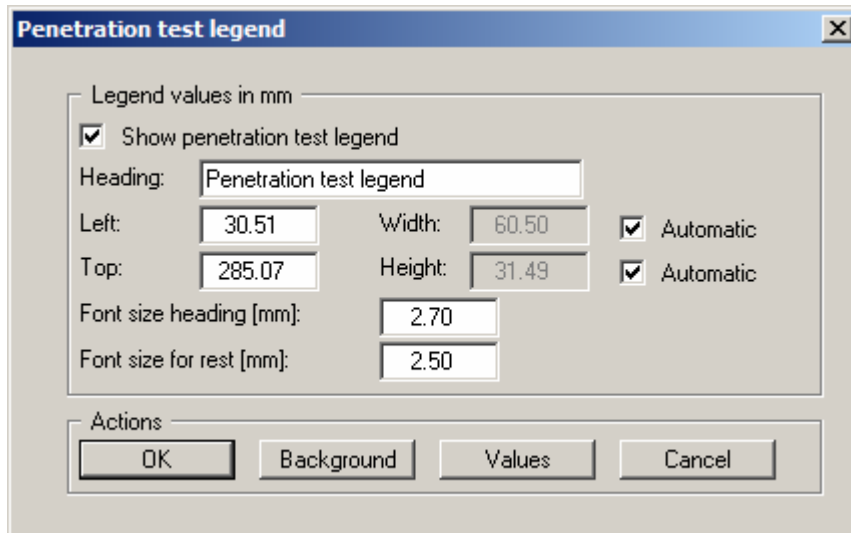

A legend heading can be entered. To define the legend position on the output sheet it is sufficient to specify the upper left corner of the legend frame. If the "**Automatic**" check box is activated the width and height are determined by the program. Input is in [mm] in the header data coordinate system, because the size and position of the legend should not move in line with any scale changes made to the log data. The font size for the heading and the remaining labelling can be modified. A coloured backdrop can be defined for the legend after pressing the "**Background**" button.

> The fastest way to modify the position of the legend is to press the [**F11**] function key and then to pull the legend to the new position with the left mouse button pressed.

By clicking on the "**Values**" button the following dialog box opens:
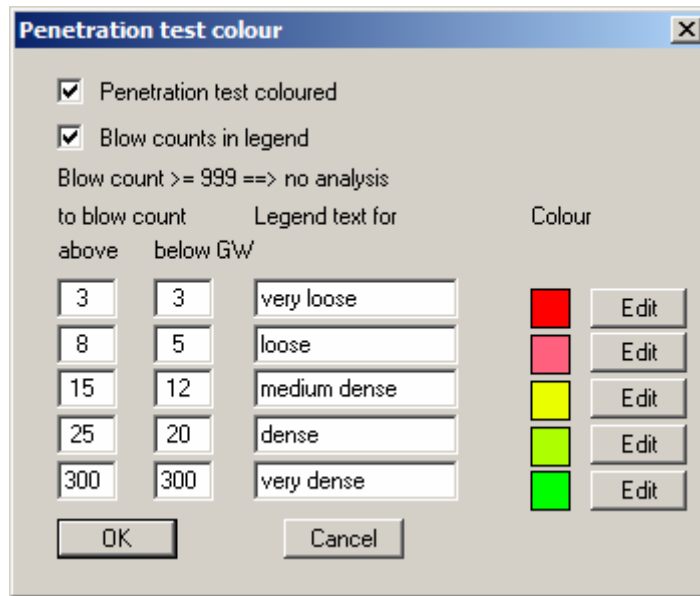
The "**Penetration test coloured**" check box must be activated to display the penetration diagrams in colour on the output sheet in accordance with your defined colour coding. Each colour, which can be edited with the "**Edit**" button, is taken from the blow count in the diagram. The colour boundaries are determined by the values for "**to blow count**". Boundary values can be given for blow counts above or below groundwater level (see "**Input/Penetration test**").

The text after this will be entered into the legend with the colour. Imaginable would be a text such as "**non-load bearing**", "**slightly load bearing**", etc. The boundary values can be displayed following the explanatory texts by activating the "**Blow counts in legend**" check box. The values for *above GW* and *below GW* are displayed respectively.
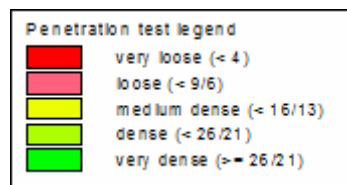
6.3.3.5 "CPTs (cone resistance)" legend

You can activate and define a legend for cone resistance, in complete analogy to the penetration tests legend. Instead of the blow count however, you here define ranges for cone resistance in the dialog box that you reach clicking on the "**Values**" button. If the "**Cone resistance qc coloured**" check box is activated, the cone resistance diagram is shown in colour in accordance with the defined boundary values.

6.3.3.6 "CPTs (friction ratio)" legend

You can activate and define a legend for the friction ratio, in complete analogy to the penetration tests legend. Instead of the blow count however, you here define ranges for the friction ratio. If the "**Friction ratio rf coloured**" check box is activated, the diagram is shown in colour in accordance with the defined boundary values. As the friction ratio can be correlated to the soil type, a kind of soil profile can be created with the appropriate choice of friction ratio areas.

If the colour-coded diagram is activated via the "**CPTs (friction ratio)**" legend, the "**CPTs (soil index)**" legend is automatically deactivated by the program, because the same diagram is evaluated with colour by both legends.

6.3.3.7 "CPTs (soil index)" legend

By activating this legend the cone penetration test friction ratio can be evaluated using the soil identification diagram. The following dialog box opens:

The soil identification diagram was developed from test series' in which the friction ratio was drawn against the cone resistance for a variety of soil types. This results in different polygons used to identify the soil types. They can be adapted for typical local evaluations using the "**Polygons**" button and saved in an "**.idx**" file. A soil type can be determined using only the CPT data by colour evaluating via the defined polygons.

6.3.3.8 "General (file name)" legend

If you click the "**Show legend**" check box, the legend with file information will be displayed. You can alter the shape and appearance of the legend.
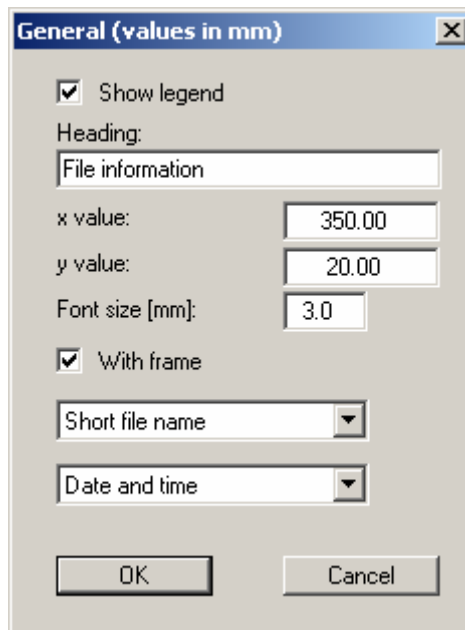
You can define and edit the position of the legend using the values "**x**" and "**y**". You control the size of the legend using "**Font size**". The legend can be displayed with or without a frame.

> The fastest way to modify the position of the legend is to press the [**F11**] function key and then to pull the legend to the new position with the left mouse button pressed.

By selecting the corresponding options the current file name can be shown in the legend, either with or without path and time information.

6.3.4 "Reference staffs" menu item

To gain a better overview of the profiles you have a maximum of two staff gauges displayed by the program. You can work with one staff gauge each at the left and/or right of the profiles. For two profiles with "**height displacement**", you can have the second staff gauge used with the same height displacement (see notes on height displacement in Section 5.3.2).

Select either "**Reference staff 1**" or "**Reference staff 2**" for editing in the dialog box. The following dialog box opens for both choices. The "**Show reference staff**" check box must be activated to allow editing.

All input in the dialog box is in [m] of the user-defined scale (see Section 6.3.2, "**Input/Overall view**"). The reference staff format, position, size and labelling can be adapted to suit user requirements. The position of the staff gauge can also edited using the menu items "**Input/Move object**" (see Section 6.3.15) and "**Input/Move all objects**" (see Section 6.3.16).

By entering a height displacement, the staff gauges can be placed above one another. The height displacement for the staff gauges and for the soundings must be equal.

For better visualization, horizontal auxiliary lines can be defined after activating the "**Show**" check box. The colour, pen width and distance of the lines to the page margins can be selected as desired.

In the default setting the reference staffs are behind all other elements. If geological sections use layer polygons and are very wide, the reference staffs and auxiliary lines can be drawn in front of the layer polygons for better navigation by activating the check box "**Draw reference staff in front of layer polygons**" using the "**Preferences/General**" menu item (see Section 6.5.1).

6.3.5 "Stratigraphic log" menu item

This menu item allows input of new stratigraphic logs, or editing of existing logs. Additionally, gauge casings (backfill and/or casings) can be presented in a simplified manner. This simplified manner has a great advantage over the classical manner of well visualisation: With almost identical information content, it is much more space saving, as stratigraphic log, casing and backfill are all presented together.

> Detailed information on this menu item's dialog boxes can be found in the "**Worked example: Input of a stratigraphic log**" (see Section 5).

Two abbreviation systems are available for layer input using abbreviations. Layer input using the SEP 2 abbreviations is described in detail in Section 5.4.3.
Due to the greater flexibility, the SEP 2 abbreviations are recommended.

The GGU abbreviation system is a relatively simple system for recording strata with its origins in engineering practice. It is only retained in the program for managing legacy data.
It should no longer be used.

6.3.6 "Well" menu item

6.3.6.1 Create new well or edit existing well

The menu item "**Well**" allows input and presentation of sounding well casings (with casing and backfill) in the classical manner (see "**Ex_Well.bop**" file). The casing is displayed centrally, surrounded by the backfill. After opening the example file and clicking this menu item the following dialog box opens:
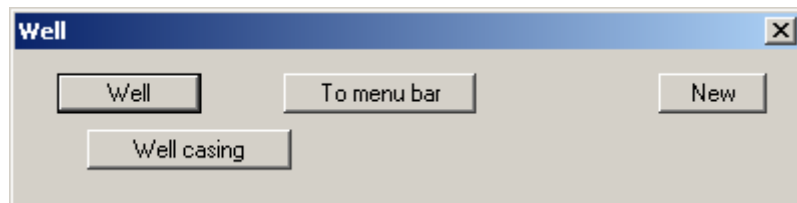
A well is included in the file. The following actions are now possible:
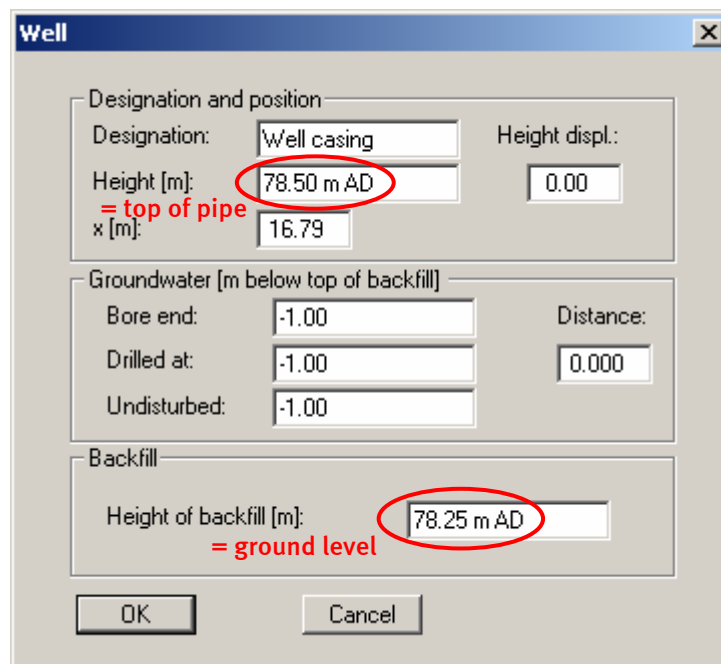
- "**Well**"
  The button indicates that you are in the well editor. After clicking this button you change to the menu item "**Input/Stratigraphic log**" (see Section 5.1). If you have a stratigraphic log with a separate well visualisation, this allows you to quickly swap between the two element editing modes.

- "**To menu bar**"
  You return to the original menu bar.

- "**New**"
  You can now enter a new well.

- "**Well casing**"
  By clicking the button labelled with the designation (here: Well casing) you can edit the data for the corresponding well.

If "**Well casing**" is clicked in the option box the following well editing dialog box opens:
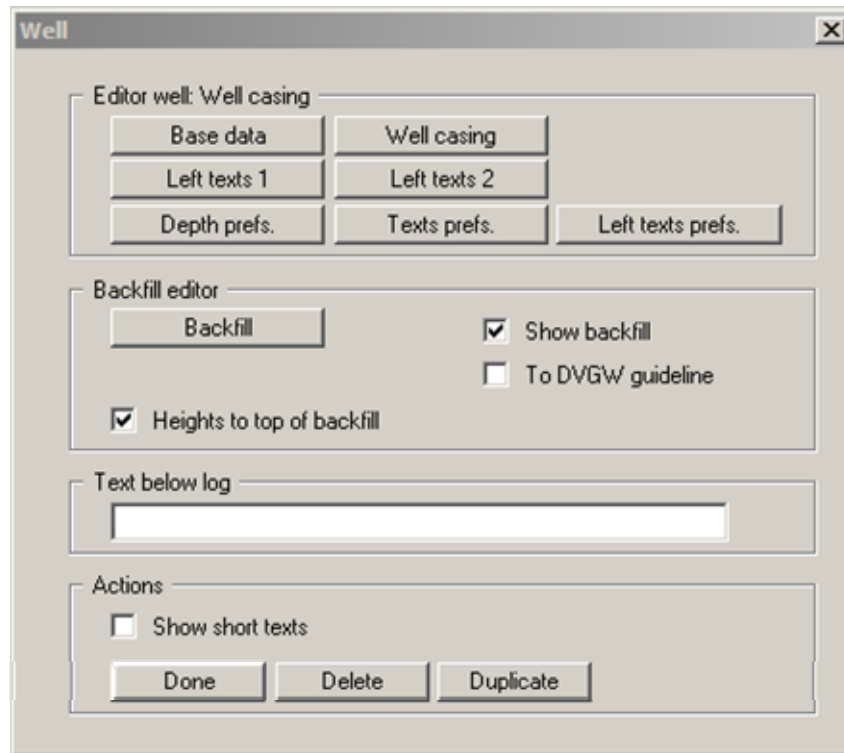
Data input is generally analogous to the "**Stratigraphic log**" menu item (see Section 5, descriptions of the "**Left texts 1**", "**Left texts 2**" and "**Left texts prefs.**" items in Section 5.6, "**Depth prefs.**" in Section 5.2 and "**Text prefs.**" in Section 5.7).

The height of the well casing (i.e. top of pipe) is entered in the well "**Base data**". The height of the fill (i.e. ground level) is also entered as the absolute height. Additional descriptions of the input boxes can be found in Section 5.3.

6.3.6.2 Entering the well casing and backfill

Pressing "**Well casing**" opens a dialog box for entering the well casing. In contrast to the gauge casing on the stratigraphic log the well casing layer data (= pipe lengths) are entered relative to the top of the casing (= top of pipe) and thus correspond to the actual pipe lengths employed. The subsequent casing visualisation width can be defined here separately for each layer.


For well casings, the following pre-defined *hatchings* are available with the given code numbers:

- 500   Filter pipe
- 510   Vertical lines
- 520   Horizontal lines
- 530   Cross hatching
- 540   Cap
- 550   Sump
- 560   Exterior line

If you would like to use special casing details in the profile, use the menu item "**Prefer-ences/Bitmaps**" (see Section 6.5.13). With this option it is possible to tie in drawings which you have created with a graphics program (e.g. Paintbrush).

Activate the "**Show backfill**" check box to enter the backfill details and then click the "**Backfill**" button. The same editor box as for entering backfill for a gauge on the stratigraphic log opens (see Section 5.8.3). However, it is also possible to define a separate backfill width for each layer of the well backfill.

For graphical visualisation of the well casing it makes sense to activate the "**Heights to top of backfill**" check box in the general editor box. If the layer depths are not specified as "**Abs. height only**", the relative heights of the casing and the backfill are shown relative to different starting heights. In the visualisation, different relative heights are then shown for the same heights, as demonstrated in the following example:
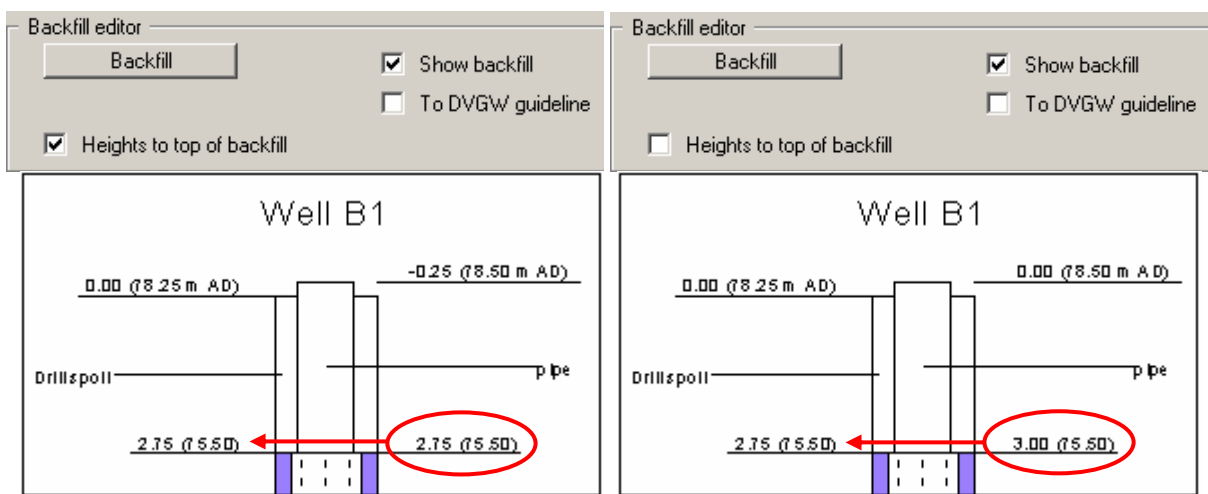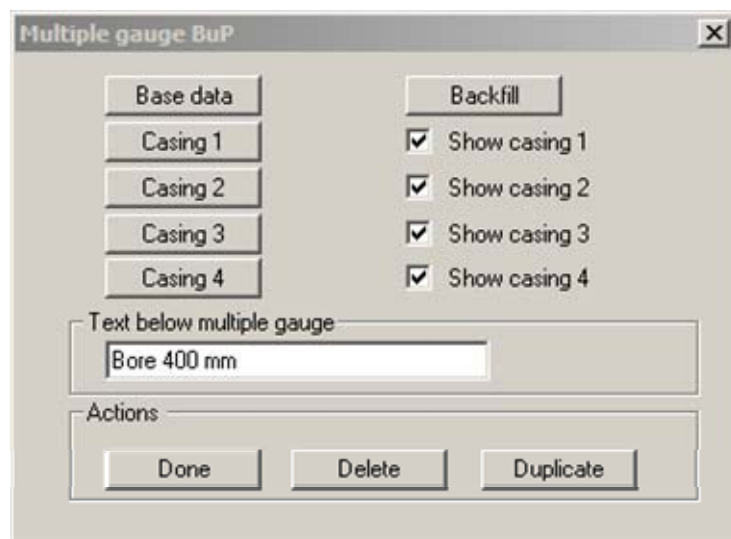
6.3.7 "Multiple gauge" menu item

This menu item allows input and/or editing of multiple gauges (see "**Ex_Water well.bop**" file). The menu item can also be used, in principle, for the presentation of individual gauges (well casing). After clicking on this menu item you will arrive at a dialog box which will allow definition of a new multiple gauge, or selection of a current one.
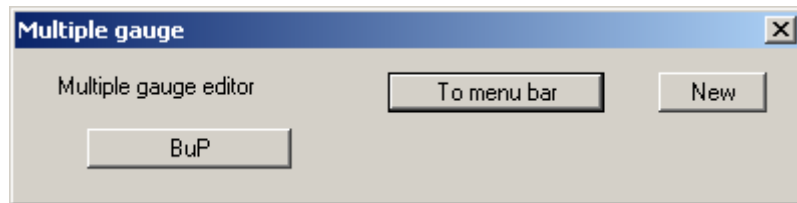
After clicking "**BuP**" you see the following dialog box:

In "**Base data**" you enter the name and the position of the gauge:

The heights of the individual casings are given with reference to the height of the backfill
(= ground level). If the pipes protrude from the ground the height difference must be entered as a
negative value (also see the example in Section 5.3.4). With "**dx**" the position of each casing, with
reference to the centre of the backfill, is given.

The backfill horizons and the individual casings are entered after clicking on the buttons "**Back-
fill**" and "**Casing 1**", "**Casing 2**" etc. The same editor box as for entering casing for a gauge on the
stratigraphic log opens (see Section 5.8.4). However, it is also possible to define a separate width
for each layer of the backfill or casing. In order to actually display the casings in the graphics the
"**Show casing 1**", etc., check boxes must be activated.

For gauge casings, the following pre-defined *hatchings* are available with the given code num-
bers:

- 500   Filter pipe
- 510   Vertical lines
- 520   Horizontal lines
- 530   Cross hatching
- 540   Cap
- 550   Sump
- 560   Exterior line

If you would like to use special casing details in the profile, use the menu item "**Prefer-
ences/Bitmaps**" (see Section 6.5.13). With this option it is possible to tie in drawings which you
have created with a graphics program (e.g. Paintbrush).

6.3.8 "Penetration test" menu item

6.3.8.1 Create new or edit existing dynamic penetration test

This menu item allows editing of dynamic penetration tests. A dialog box opens allowing a new dynamic penetration test to be entered, or an existing dynamic penetration test to be edited by clicking the button with the name of the existing test. Two dynamic penetration tests, DPL 1 and DPL 2, are already included in the "**Ex_DPT.bop**" example file:
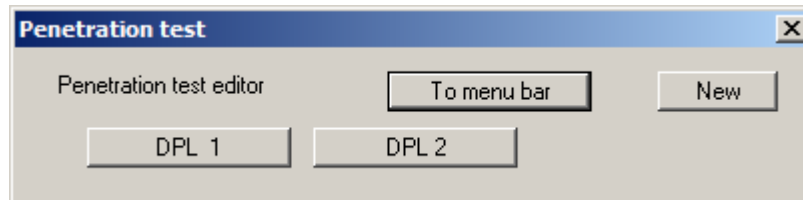
After clicking on the "**DPL 1**" button the following dialog box will be opened for the selected penetration test.
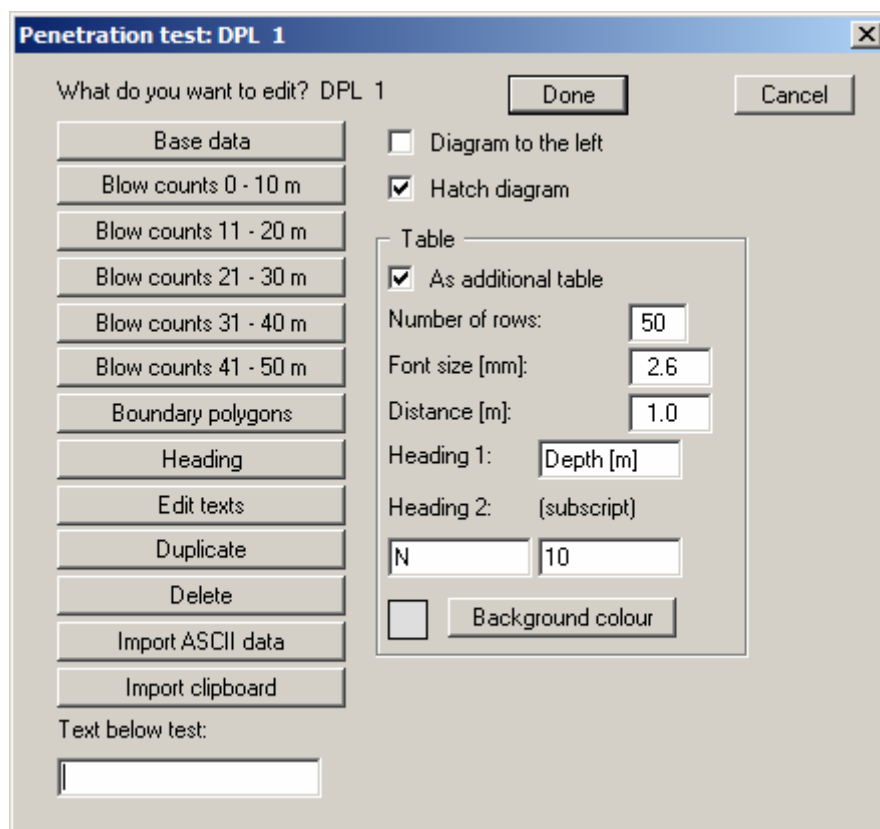
The following actions are possible:

- "**Base data**"
  You can enter or edit the base data for the corresponding penetration test (see notes in Section 6.3.8.2).

- "**Blow counts 0 - 10 m**", "**Blow counts 11 - 20 m**", etc.
  After clicking these buttons you can enter in following dialog boxes the blow counts for 0 to 10 m etc. Input of a negative number (e.g. "**-1**") or no number at all designates the end of the penetration test

  Using the "**Delete blow counts**" button you can, e.g. for a duplicated test, delete all blow counts.

- "**Boundary polygons**"
  After clicking this button you can have a polygon displayed within the penetration test diagram. This can be useful e.g., if boundary curves are to be displayed for dense, medium-dense, etc. compaction.

  Up to 3 boundary polygons can be defined. The "**Text 1**" and "**Text 2**" are entered in the diagram below the selected limit range. The actual polygon is entered after selecting the "**Edit values**" button. You will see a dialog box, in which you can enter the corner points of a polygon.

- "**Heading**"
  You can edit the text above the diagram. The program default is always "**Blow counts per 10 cm**".

- "**Edit texts**"
  A text commenting on the turning behaviour can be entered for each metre driven; it is displayed to the right of the diagram.

- "**Duplicate**"
  By clicking this button, you can duplicate the current penetration test. You will then find yourself in the "**Base data**" dialog box of the duplicated test.

- "**Delete**"
  After a security request the currently displayed test will be deleted.

- "**Import ASCII data**"
  This button allows ASCII data acquired from EDAS to be imported.

- "**Import clipboard**"
  Test data can be imported via the Windows clipboard. For example, if the blow count data are available in an Excel table, it is possible to copy the column containing the blow count data into the clipboard ("*Edit/Copy*") and then to paste them into the "**Blow count 0 - 10 m**" etc., dialog boxes by pressing "**Import clipboard**".

- "**Text below test**"
  In this field you can enter a text to be displayed below the penetration test. In order to create a line break, you must enter a "**#**" (e.g. no further progress#concrete).

- "**Diagram to the left**"
  By activating this check box, you can have the diagram mirrored.

- "**Hatch diagram** "
  With this check box you can switch a horizontal hatching of the displayed penetration diagram on or off. Colour-coded evaluation is activated via the legend (see Section 6.3.3.4).

- "**As additional table**"
  By activating this check box, you can have the penetration data displayed additionally as a table (see notes in Section 6.3.8.3).

6.3.8.2 Enter base data of a dynamic penetration test

After clicking the "**Base data**" button the following dialog box opens, allowing the dynamic penetration test layout to be edited.

- "**Designation**"
  The entered designation is displayed by default directly above the corresponding penetration test in the drawing. The name of the dynamic penetration test can be forced into two lines by entering the "#" sign (e.g. "**DPL 1#2010-20-06**"). The text in the second line automatically uses a smaller font size.

- "**Height**"
  For the height input of the penetration test (= top of test) a number must always be entered first, as this value serves as the y coordinate for graphical presentation. If you use negative numbers, no space is allowed between the minus sign and the number. For description of height a text may be entered, with one space distance to the number, e.g. "**m AD**".
  You may also do without text input. A height labelling with a text in front such as, e.g. "**AD +34.30 m**", can be activated using the "**Preferences/General**" menu item (see Section 6.5.1). The default position of the height data is below the name of the dynamic penetration test.

In order to have the penetration test visible in the drawing, the lower drawing margin must be correctly set in the "**Input/Overall view**" menu item (see Section 6.3.2).

- "**Height displ.**"
  A number of penetration test diagrams can positioned one above the other on the page by entering a height displacement. This does not alter the true heights or depths. They are displayed exactly as they were surveyed (see figure in Section 5.3.2, "**Input/Stratigraphic log**", "**Base data**" dialog box, "**Notes on the "Designation and position" group box**").

- "**x**"
  Input of the location of the dynamic penetration test in x-direction is measured from the left margin in metres in the scale of your drawing. If you have selected a scale in x-direction of 1:100, entering the number "**5.0**" will mean that the penetration test will be displayed 5 cm (= 5 m) from the left page margin.

  The position of the penetration test(s) can also edited using the menu items "**Input/Move object**" and "**Input/Move all objects**" (see Sections 6.3.15 and 6.3.16).

- "**Depth**"
  You can then give the depth to be displayed for the test diagram. This value need not correspond to the greatest blow count depth.

- "**Delta depth**"
  The spacing of the depth labelling is defined here. If "**1.0**" is entered the diagram is subdivided by a horizontal line every metre and labelled with the respective depth.

- "**Width**"
  Enter the width of the penetration test diagram in metres in the drawing scale. If you have selected a scale in x-direction of 1:100, entering the number "**4.00**" will mean that the penetration test will be displayed with a width of 4 cm (= 4 m).

- "**Maximum blow counts**"
  The maximum number of blows shown in the penetration test diagram is defined here. Using the above width settings (4 m = 4 cm) and maximum blow count (40), one blow corresponds exactly to 1 mm in the visualisation. If the drawing is printed true-to-scale, the blow count can be simply read off from the diagram.

- "**Delta blow counts**"
  The spacing of the blow count labelling is defined by this input. In the example above, the diagram is vertically subdivided by a line and labelled after every 10 blows by entering "**10**".

- "**Pen thickness**"
  This allows the pen thickness to be edited for the border and the *test graph* in the penetration test diagram.

- "**Groundwater**"
  If the dynamic penetration test has contacted groundwater the blow count can be evaluated colour-coded by depth above or below groundwater (see "**Penetration tests**" legend, Section 6.3.3.4). For this, you must enter the measured groundwater level here. If you enter "**999**", groundwater levels will not be considered. Groundwater table visualisation is switched off by default. Activate visualisation using the "**Show groundwater in DPTs**" in the "**Preferences/General**" menu item (see Section 6.5.1).

- "**Designation/Height**" group box
  Graphical visualisation of the designation and the height of the selected dynamic penetration test can be edited or switched off completely in this group box. The position can be specified individually for this dynamic penetration test.

  The same position for the designation and height can be defined for *all* dynamic penetration tests in the "**Preferences/General**" menu item (see Section 6.5.1). However, this also impacts all other input elements, e.g. stratigraphic logs, wells or cone penetration tests.

- "**Depth**" group box
  The alignment of the depth data can be edited or switched off in the dialog box's lower group box. It is possible to display the absolute height either additionally or on its own.

6.3.8.3   Additional visualisation of the blow count as a number or in a table

Blow counts greater than the specified boundary value, i.e. the specified maximum blow count, are often achieved in the lower reaches of the penetration test diagram. However, it may occasionally be necessary to be able to read the blow count from the diagram. In this case, activate the "**Label blow counts > maximum blow**" check box in the "**Preferences/General**" menu item (see Section 6.5.1). All blows over and above the defined maximum blow count are then entered at the right of the respective depth line.

If you need more than just a graphical evaluation of your test data the blow count can also be shown in a table adjacent to the penetration test diagram. Activate the table group box in the dynamic penetration test's general editor box using the "**As additional table**" check box:

> To achieve visualisation with a table row corresponding to a penetration depth of 10 cm (same graphical end depth for both the diagram and the table), define a font size of *1.3 mm* for an overall image scale for the y-direction of *1:50*. The font size in the example file should therefore be 2.6 mm for a scale of 1:25.

The number of lines should be adjusted to the sounding depth, i.e. 10 lines per 1 m depth. The distance is given in m in the current x scale, measured from the right diagram edge. You can edit the column headings and give a background colour for the table.

6.3.9 "CPT" menu item

Using this menu item you can edit cone penetration tests. A dialog box opens allowing a new cone penetration test to be entered by pressing the "**New**" button, or an existing cone penetration test to be selected for editing by clicking the button for the respective test. For example, if you open the "**Ex_CPT.bop**" example file the following dialog box opens after clicking "**CPT 1**":
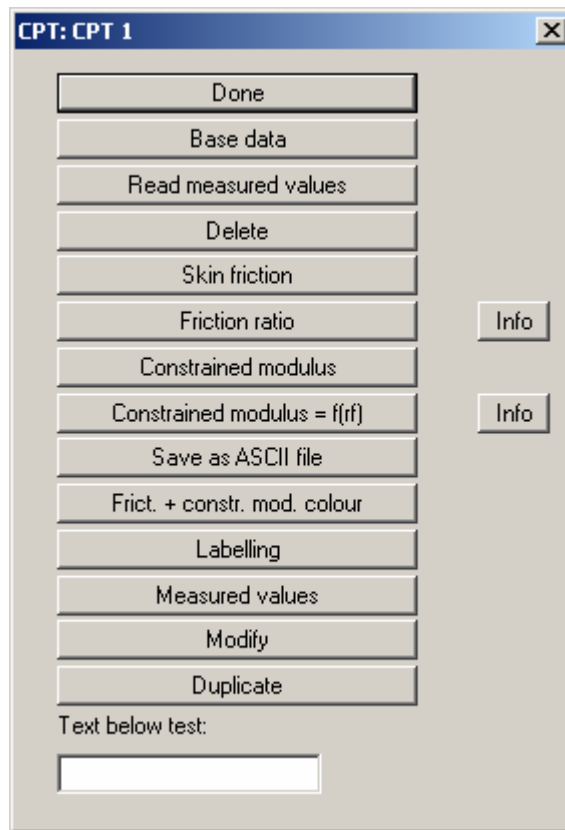
Several diagrams can be created for a cone penetration test evaluation. The cone resistance diagram is the central element of the cone penetration test and is always visualised. Visualisation of the skin friction, friction ratio and constrained modulus can be switched off. The cone penetration test editor box shown above can also be opened directly by double-clicking in the cone resistance diagram. When performing actions via the "**Edit**" menu (see Section 6.2) or simply moving objects using [**F11**], click in the cone resistance diagram as the central element of the cone penetration test. The following actions can be performed using the buttons and input boxes in the dialog box:

- "**Done**"
  You will arrive back at the previous dialog box. Alterations will be accepted.

- "**Base data**"
  You can enter or edit the base data for the corresponding CPT.

With "**Height**" and "**x**" you enter the position of the cone penetration test (CPT). Here, you can also enter a "**Height displacement**" (see "**Input/Stratigraphic log**", "**Base data**" dialog box, Section 5.3.2). "**Line strength**" designated the width with which the curve is drawn. With the "**Colour**" button you can alter the pen colour.

"**Min. cone resistance**", "**Max. cone resistance**" and "**Cone resistance increment**" control the cone resistance axes. "**Width of CPT**" and "**Depth of CPT**" control the depth and width of the cone resistance diagram on the page. The maximum depth achieved is shown on the right-hand button after the measured data are imported. Click the button to transfer the value to the "**Depth of CPT**" box. The vertical subdivision of the diagram is defined by the "**Depth increment**"; here, it is subdivided after each metre.

Alignment of the designation and height of the selected cone penetration test can be edited using the drop-down menu. At the bottom of the dialog box you can specify whether the absolute height should be additionally displayed or only the absolute height when displaying the depth data.

- "**Read measured values**"
  You can import the result data of a CPT from an ASCII file . The data in this file, which you will generally receive from the *cone resistance company*, must contain one value per row (depth, cone resistance and, optionally, skin friction). After selecting a file with measured values the following dialog box appears:
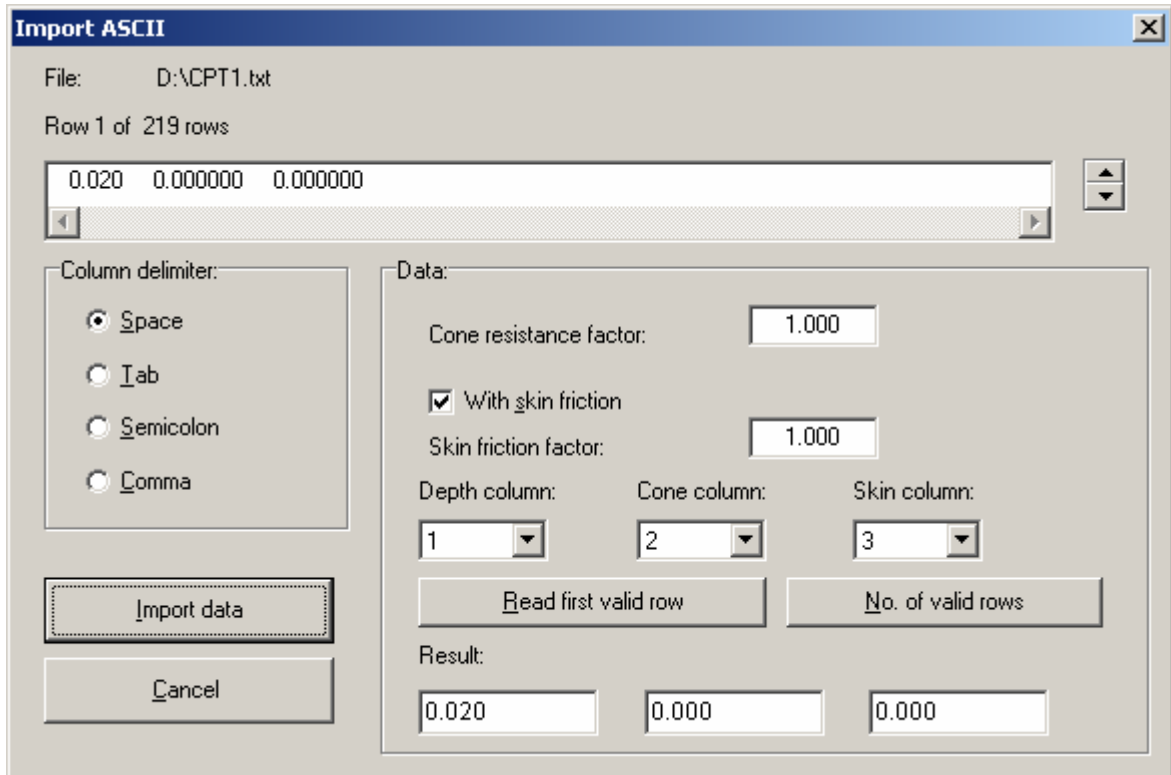
The current row of the ASCII file is shown at the top of the window. Using the arrows at the right you can move through the file. If the file also contains skin friction values, activate the "**With skin friction**" check box. When all input is correct, the result for this row will appear in the box below the columns. Otherwise "**Error**" will appear. You may then have to alter the column delimiter. If the file contains invalid as well as valid rows, these will be simply skipped when reading.

The program expects the values in MN/m². If the measured values are not in the correct dimension, you can enter a correction factor under "**Cone resistance factor**" and/or "**Skin friction factor**". Finally, select the "**Import data**" button. You will then see information on the number of rows read. You can then edit the CPT further, or evaluate it.

- "**Delete**"
  After a security request the currently displayed test will be deleted.

- "**Skin friction**"
  You can activate the skin friction display and set preferences for the skin friction values diagram. To do this, the following dialog box opens:
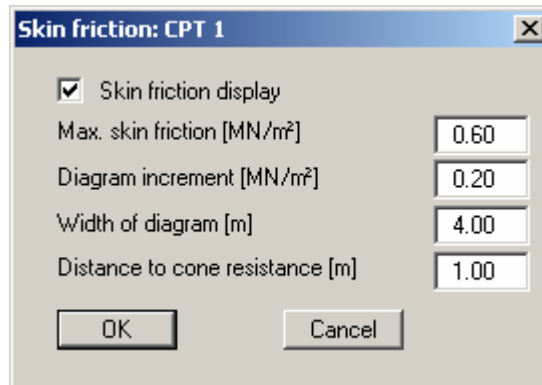
  With "**Distance to cone resistance**" you can control the distance of the skin friction diagram to the cone resistance diagram. Using the program defaults it will be displayed with a spacing of one metre (= 1 cm at a scale in x-direction of 1:100) to the left of the cone resistance diagram.

- "**Friction ratio**"
  The friction ratio can be calculated from the cone resistance and skin friction and displayed in a diagram. Clicking this button opens a dialog box analogous to the skin friction box. A list of friction ratio values for certain soil types can be viewed by clicking on the neighbouring "**Info**" button.

- "**Contrained modulus**"
  The constrained modulus can be approximately derived from the cone resistance and skin friction and displayed in a diagram (also see the following point). This dialog box also corresponds to that for skin friction.

- "**Contrained modulus = f(rf)**"
Dependent upon the friction ratio rf, the cone resistance must be multiplied by a factor, in order to arrive at the constrained modulus.

  In the following dialog box you enter the friction ratio rf up to which each factor is to be valid. The dialog box allows display of up to 8 value pairs. If more value are present you can move through the table with "**Forw.**" and "**Back**". If you would like to edit the number of value pairs, select the "**Edit no. of values**" button. If you would like to add a value pair, increase the number of value pairs and enter the values at the end of the table. Then select the "**Sort**" button. The table will be sorted according to increasing rf values. The sort function will always be called up after leaving the dialog box.

  If you would like to save the table, select the "**Save Es(rf)**" button. If you then keep the default file name, "**GGU-STRATIG.rfe**", the values in the table will be automatically active at the next program start. If you would like to load values from a previously saved file, select the "**Load Es(rf)**" button. A list of constrained moduli for certain soil types can be viewed by clicking on the neighbouring "**Info**" button.

- "**Save as ASCII file**"
You can save the values (depth, cone resistance and optionally skin friction) as an ASCII file.

- "**Frict. + constr. mod. colour**"
  The area between the measured data curve and the vertical axis can be coloured. The settings are modified in this dialog box.
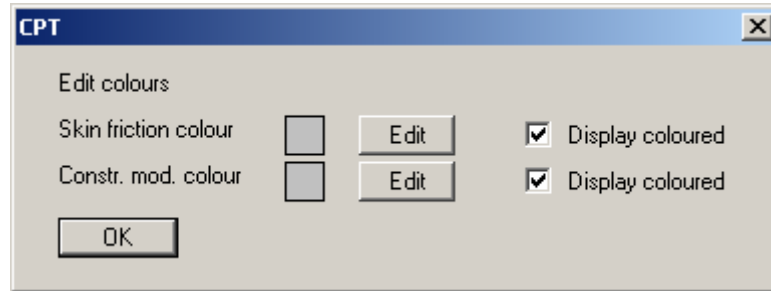
With reference to the colour presentation of cone resistance and friction ratio, please see the menu item "**Input/Legends**" ("**CPTs (cone resistance)**" legend, "**CPTs (friction ratio)**" legend and "**CPTs (soil index)**" legend, see Sections 6.3.3.5 to 6.3.3.7).

- "**Labelling**"
  The individual diagrams (cone resistance, skin friction, friction ratio and constrained modulus) are labelled at the top. In this box you can edit the default labelling

- "**Edit measured values**"
  You can edit loaded values or enter values completely by hand. Use of the dialog box corresponds almost exactly to that of the "**Constrained modulus = f(rf)**" dialog box described above. A "**Sort**" button is not present, the values will nevertheless be sorted automatically for increasing depth upon leaving the dialog box. In principle, the "**Edit values**" function can also be *abused* for other purposes. It is imaginable, e.g., to enter a water content profile, which can also be colour-coded (see "**CPTs (cone resistance)**" legend, Section 6.3.3.5).

  It is also possible to create a bar chart with variable bar width etc. The only limit is your imagination.

- "**Modify**"
  This button opens a dialog box which allows the measured data to be modified using a variety of operations involving constants.

- "**Duplicate**"
  By clicking this button, you can duplicate the current cone penetration test. You will then find yourself in the "**Base data**" dialog box of the duplicated test.

- "**Text below test**"
  In this field you can enter a text to be displayed below the cone penetration test. In order to create a line break, you must enter a "**#**" (e.g. no further progress#concrete).

6.3.10 "Measured data diagram" menu item

Using this menu item you can add measured data diagrams (e.g. water content profiles, concentration distributions, etc.) to your drawing. A data pair giving the depth and associated measured value are required for each entry. The values will be displayed as depth orientated bars, or connected as lines. The values axes can be subdivided linearly or logarithmically. In this menu item a dialog box opens allowing a new measured data diagram to be entered, or an existing measured data diagram to be edited by clicking the button with the name of the existing test. A measured data diagram named after the corresponding penetration test is reproduced in the example file "**Ex_Measured values + table.bop**". After clicking the "**RCS 3**" button the following editor box for the selected measured data diagram opens:
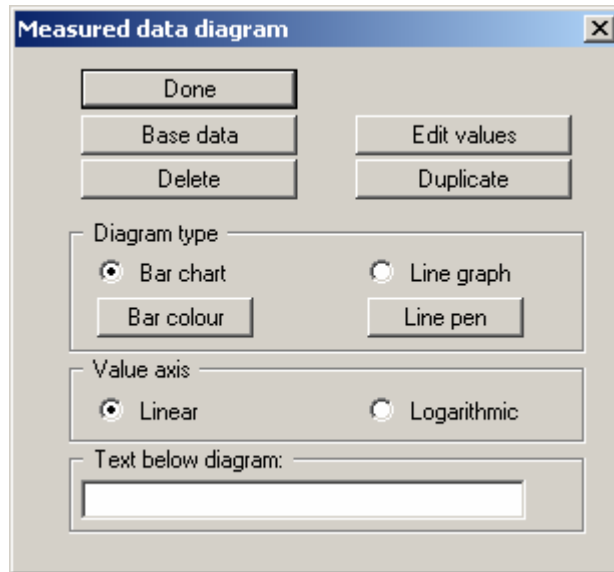
The buttons and switch boxes of this central input box will now be explained:

- "**Done**"
  You will arrive back at the previous dialog box. Alterations will be accepted.

- "**Base data**"
  The following dialog box, similarly structured to that for a dynamic penetration test, opens (see description in Section 6.3.8.2). The diagram name can be switched of in the visualisation by deactivating the corresponding check box.

If the "**Diagram at right**" check box is deactivated, the values will be entered into the diagram increasing to the left. Activate the respective labelling, which is displayed at the left or right of the diagram depending on the selected diagram orientation, using the "**Label measured values**" and "**Label depth**" check boxes. The font sizes can be defined separately.

- "**Edit values**"
  A further dialog box opens allowing new value pairs to be entered or existing pairs to be edited. The number of value pairs is entered after pressing "**x values to edit**". If more than 12 value pairs are defined you can navigate through the list using the "**Forw.**" and "**Back**" buttons. Jump directly to the required value pair by entering the measured data number and clicking "**Go to**". The input is adopted by clicking the "**Done**" button.

- "**Delete**"
  The current measured data diagram can be deleted.

- "**Duplicate**"
  The current measured data diagram will be duplicated. You will then find yourself in the "**Base data**" dialog box of the duplicated diagram.

- "**Bar chart**"/"**Line graph**"
  With these switch boxes you determine the type of diagram

- "**Bar colour**"
  You can edit the bar colour.

- "**Line pen**"
  You can edit the pen width and the pen colour of the line graph.

- "**Linear**" und "**Logarithmic**"
  You can edit the axes subdivisions.

- "**Text below diagram**"
  In this field you can enter a text to be displayed below the measured data diagram. In order to create a line break, you must enter a "**#**".

6.3.11 "Table" menu item

6.3.11.1 Create new table or edit existing table

Using this menu item you can display tables (e.g. with soil properties) depth orientated next to the stratigraphic log. In this menu item a dialog box opens allowing a new table to be entered, or an existing table to be edited by clicking the button with the name of the existing table. A table of soil properties is provided in the example file "**Ex_Measured values + table.bop**" provided with the program. After clicking the "**Soil properties**" button the following editor box for the selected table opens:
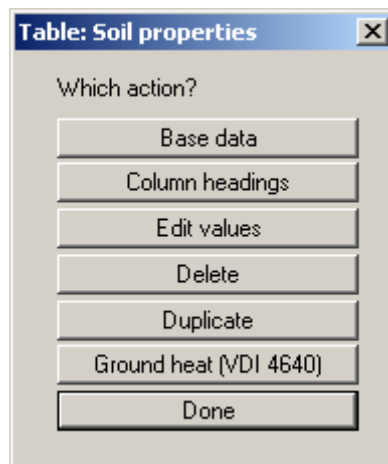
The following actions are possible clicking the buttons of the dialog box:

- "**Base data**"
  You can enter or edit the base data for the corresponding table (see Section 6.3.11.2).

- "**Column headings**"
  Four columns are defined in the example file. In addition, the "**Show depth column**" check box in the base data was activated (see Section 6.3.11.2). The dialog box shown below then opens:

The inputs below "**Heading 1**" will be shown in the 1st row of the table, the inputs below "**Heading 2**" in the 2nd row of the table.

- "**Edit values**"
  In the dialog box of this button input or editing of values to be shown in the table is carried out. For layer orientated table display, the layer depths of the corresponding stratigraphic log must be entered in the "**Depth**" column.

If new rows are entered they can then be sorted by depth using the "**Sort rows**" button. By clicking on "**Swap columns**", you can change the column sequence. The dialog box is modified accordingly for editing tables for utilising ground source heat to VDI 4640 (see Section 6.3.11.3).

- "**Delete**"
  The current table can be deleted after a security prompt.

- "**Duplicate**"
  The table will be duplicated. You will then find yourself in the "**Base data**" dialog box for the newly created table allowing you to change the name and other settings.

- "**Ground heat (VDI 4640)**"
  A ground source heat utilisation table including the specific heat extraction capacities for borehole heat exchanger to VDI 4640 can be created (see Section 6.3.11.3).

- "**Done**"
  You will arrive back at the previous dialog box. Alterations will be accepted.

6.3.11.2   Enter base data of a table

After clicking on the "**Base data**" button the following dialog box of the selected table opens:

You can give the table a "**Designation**". With "**x**", "**Height**" und "**Height displaement**" the table is positioned on the page. The height should correspond to that of the corresponding stratigraphic log. For depth presentation, you can choose between "**Abs. height only**" and "**+ abs. height**". You can determine whether or not the depth column is to be displayed and if so, with how many decimal places.
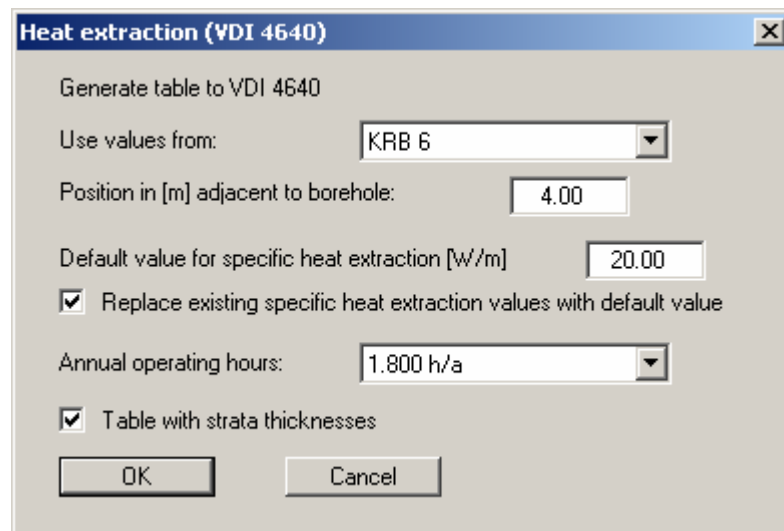
You can have the backgrounds coloured for various columns and heading rows. The number of rows and columns can be varied. For layer orientated displays, the number of rows must correspond to the number of layers in the corresponding stratigraphic log. The number of columns corresponds to the number of parameters you wish to show, not including the depth column.

Using the "**Table VDI 4640**" button you activate visualisation of a ground source heat utilisation table. This can also be achieved directly using the "**Ground heat (VDI 4640)**" button in the general tables editor box. If the ground source heat table is activated via the base data, you are asked whether the table headers should be created to VDI 4640 after exiting the dialog box. If you confirm this query the same dialog box opens as seen after pressing the "**Ground heat (VDI 4640)**" button (see Section 6.3.11.3).

6.3.11.3   Generate ground source heat utilisation table to VDI 4640

When exploiting the subsurface by means of borehole heat exchangers, the design of borehole heat exchangers for systems with heat pump outputs up to 30 kW and used in heating mode only should be carried out using specific heat extraction values (in W/m) from Table 2 of VDI 4640 Part 2. A corresponding table for entering the specific heat extraction of the drilled strata is implemented in **GGU-STRATIG**. Based on the input the program determines the heat extraction capacity for each stratum.

If you want to display a ground source heat utilisation table adjacent to the existing borehole, click the "**Ground heat (VDI 4640)**" button in the general editor box for tables. The following dialog box opens:

In the "**Ex_Geothermal energy.bop**" example file the ground source heat table is shown adjacent to hand percussion bore KRB 6. If a new VDI table is created and a number of boreholes are available, the borehole with the depth data for adoption in the table can be selected using the drop-down menu in the dialog box. Define the position of the table as the distance from the right edge of the selected borehole. The value of x in the base data is adjusted accordingly.

If a brand new table is created the values for the specific heat extraction capacity can initially all be defined as a default value for all layers. Select the annual operating hours "**1,800 h/a**"or "**2,400 h/a**" for evaluating the heat extraction capacity. The strata thicknesses can also be activated as an additional table column for use in the visualisation.

If the dialog box is then exited by pressing "**OK**", the name in the base data and the column headings are adjusted automatically. The specific heat extraction capacity of the soils in your borehole can be adjusted using the "**Edit values**" button in the general editor box for tables.

Table values

	Depth	Specific heat extraction
	[m]	[W/m]
1	1.700	25.0
2	2.700	45.0
3	5.600	50.0
4	36.000	85.0

OK   Cancel   Sort rows   Tab. 2, VDI 4640   Edit values
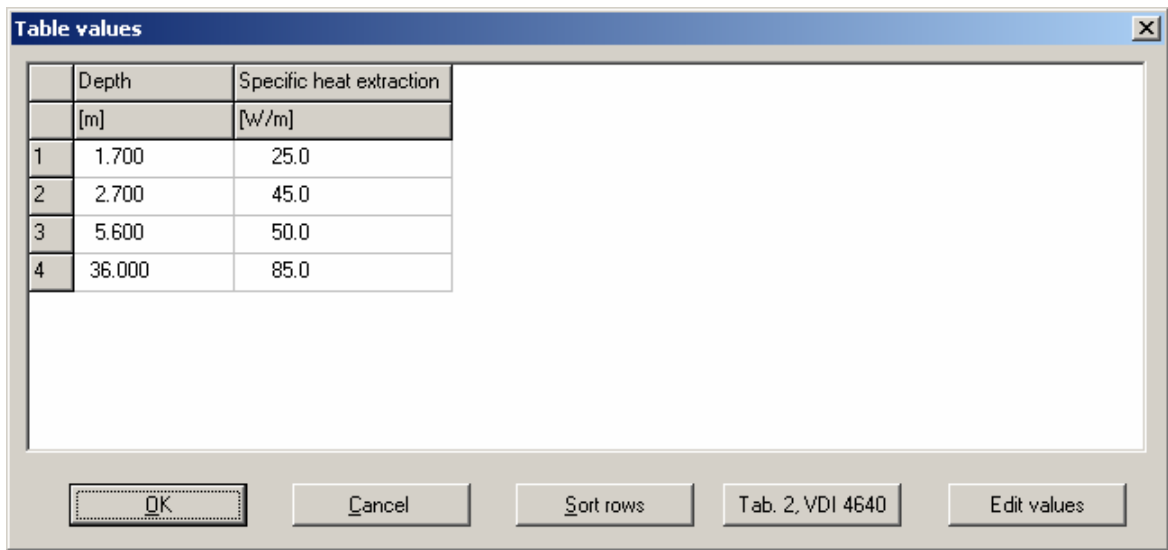
> Once the data has been edited ensure that the "**Replace existing specific heat extraction values by default values**" check box is deactivated when the dialog box "**Ground heat (VDI 4640)**" shown above is opened once more. If you open the dialog box again and exit by pressing "**OK**", all of the previously adjusted values will be reset to the defaults.

By pressing "**Tab. 2, VDI 4640**" it is possible to review the values for individual rocks given in '*Tabelle 2. Mögliche spezifische Entzugsleistungen für Erdwärmesonden*' (Table 2. Possible specific extraction values for borehole heat exchangers), *VDI 4640 Part 2, September 2001*.

Informationen

Table 2, VDI 4640, Part 2

Subsurface	For 1800 h/a	For 2400 h/a
Gravel, sand, dry	< 25 W/m	< 20 W/m
Gravel, sand, water-bearing	65-80 W/m	55-65 W/m
Gravel, sand, heav. water-bear.	80-100 W/m	80-100 W/m
Clay, loam, moist	35-50 W/m	30-40 W/m
Limestone (solid)	55-70 W/m	45-60 W/m
Sandstone	65-80 W/m	55-65 W/m
Felsic magmatites (e.g. granite)	65-85 W/m	55-70 W/m
Mafic magmatites (e.g. basalt)	40-65 W/m	35-55 W/m
Gneiss	70-85 W/m	60-70 W/m

OK

All previously entered values can be multiplied by a factor by pressing the "**Edit values**" button in the dialog box above.

The values in the "**Thickness [m]**" (if activated) and "**Heat extraction [W]**" columns in the table shown on the screen are determined automatically by the program. The ground source heat utilisation table also includes a total row, giving the extraction capacity for the entire thickness of the borehole.

6.3.12   "Statistics" menu item

Using this menu item you can have statistics on the current boreholes and penetration tests created. Further to this, it is possible to assign depth dependent prices per bored metre. With the individual prices, the program can determine the final cost.

6.3.13   "Test for height displacement" menu item

This menu item allows you to call up information on the number of objects displayed with a height displacement.

6.3.14 "Page format" menu item

This menu item allows you to adjust the height of the output sheet and the format of fold markers and page margins. The page width is defined via the menu item "**Input/Overall view**" (see Section 6.3.2). The following dialog box opens:
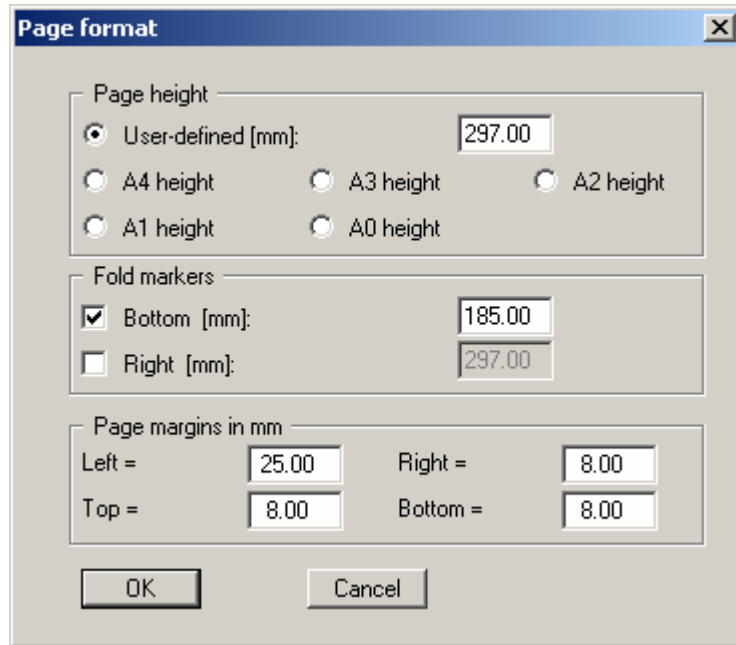
The A3 format is set as default. The program automatically draws thin (cutting) borders around the page, which are required when using paper rolls on a plotter. The borders can be switched off in the "**Preferences/General**" menu item by deactivating the "**With borders**" check box (see Section 6.5.1).

The page height can be user-defined at any height in the uppermost input box. Below this it is possible for the program to automatically determine the page height by selecting the different page formats. When using large page formats it can be very useful to activate fold markers to aid in folding subsequent printouts.

"**Page margins**" defines the position of a frame as a distance to the borders. This frame encloses the subsequent diagram (= *drawing area*). This frame can be switched off by deactivating the "**With margins**" check box in the "**Preferences/General**" menu item (see Section 6.5.1).

6.3.15 "Move object" menu item

With this menu item you can alter the position of an individual object. By default, objects with a fixed height (stratigraphic logs, wells, dynamic penetration tests, measured data diagrams, staff gauges) can be moved in the *x-direction* only. The legends, on the other hand, can be moved as desired. In order to move, click on "**OK**" in the dialog box and pull the object to its new position with the left mouse button pressed.

If you would like to move an individual object, e.g. a stratigraphic log, in the *y-direction*, you must simultaneously press the [**Shift**] key. The height displacement for this object will be automatically corrected in the base data dialog box. In order to move a further object, you must select the menu item "**Input/Move object**" once again. Alternatively, you can also press the [**F11**] key.

To move individual header texts or **Mini-CAD** texts, use the corresponding menu item "**Graphics preferences/Mini-CAD toolbar**" and/or "**Graphics preferences/Header toolbar**". For details please see the supplied "**Mini-CAD**" manual.

6.3.16 "Move all objects" menu item

With this menu item you can displace all displayed objects (except for drawing header and legends) by the same amount in x- and/or y-direction. To do this, click on "**OK**" in the dialog box and move the objects horizontally and vertically to the desired position with the left mouse button pressed. Alternatively, you can also open the menu item using the [**F12**] key.

If you simultaneously press the [**Shift**] key, the objects will only be moved horizontally. If you wish for vertical displacement only, then press the [**Ctrl**] key when moving.

This function moves all objects entered in the log data coordinate system or drawn using the **Mini-CAD** toolbar as one. If you have modified the elements in any way, e.g. by adding **Mini-CAD** elements to the stratigraphic log, you should always use this menu item to move them.

When displacing in the y-direction you are moving the lower drawing margin (see Section 6.3.2) and the value x in the base data of the individual elements when displacing in x-direction (distance from left page margin).

6.3.17 "Mirror" menu item

Using this menu item you can have the horizontal arrangement of the displayed objects mirrored, i.e. for log visualisation the direction of view is turned around, so to speak (before: 1, 2 ,3, after: 3, 2, 1). The default axis is the page centre.

In the dialog box you can select which objects are to be mirrored around which axis. If the "**Mirror texts too**" check box for stratigraphic logs and wells, and "**Mirror depths too**" check box for penetration test diagrams are deactivated, mirroring will only be with reference to the distance from the left page margin. The arrangement of texts and depths will not be influenced.

6.4.1   Notes on the sequence of display of elements

In the program's default settings the individual elements in the graphical visualisation are displayed in a given sequence and may thus be drawn on top of other elements. Reference staffs are drawn first, then layer polygons. Reference staffs and layer polygons are therefore always behind all other main program elements and any **Mini-CAD** objects. Measured data diagrams, dynamic penetration tests, tables, stratigraphic logs and wells are all drawn on top of these in the order they were entered. Objects drawn using "**Mini-CAD for log data**" are drawn at the very front. Main program elements can therefore be covered by **Mini-CAD** objects.

6.4.2   "Preferences" menu item

A number of general display settings can be specified using this menu item. The changed settings are always available when the program starts if they are saved in the "**GGU-STRATIG.alg**" file in the program folder using the menu item "**Preferences/Save graphics preferences**" (see Section 6.5.8).

You will see the following dialog box:
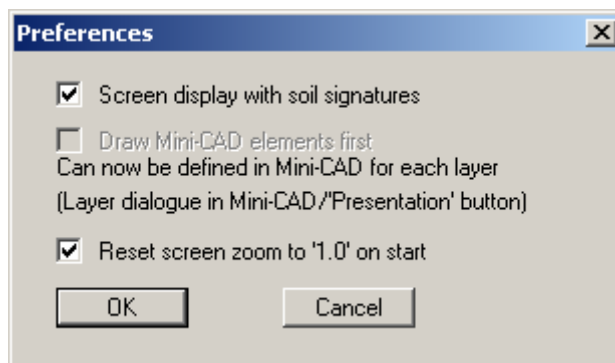
- "**Screen display with soil signatures**"
  In the default setting the soil signatures and hatchings used in the stratigraphic logs are displayed in the screen output. This may produce a long delay in screen build-up for very large layer polygons, for example. Deactivate the check box to remove the soil signatures in the screen display. The check box should be always activated if you have allocated user-defined hatching codes to your soil strata (see Section 6.5.14). This hatching is treated like soil signatures. Otherwise it may appear to you that the program has not implemented your hatching data.

  Drawing output to a printer or a file is not impacted by the above setting; here, output always includes the soil signatures and hatchings. If soil signatures are not required on your printout the "**Show signatures**" check box in the "**Preferences/General**" menu item dialog

- "*Draw Mini-CAD elements first*" - *This check box can no longer be selected!*
  Originally, the display sequence could be modified using this check box. In the program's default settings **Mini-CAD** elements are above elements defined using the "**Input**" menu; they may therefore cover stratigraphic logs, dynamic penetration tests, etc. In Version 7 of the integrated **Mini-CAD** module you can now work on a total 20 different layers. To

  move **Mini-CAD** objects behind the main program elements click the "**Layers**" icon in the **Mini-CAD** popup menu and deactivate the required layers in the "**Visualisation**" button dialog box. This draws the **Mini-CAD** elements in these layers first; they are therefore behind your stratigraphic log, for example.

- "**Reset screen zoom to '1.0' on start**"
  If the check box is deactivated and you have zoomed into your current log visualisation, the zoom is retained when you open a new file. You see exactly the same screen content in the newly opened file. If you regularly open new files while zooming, but still want to see it in its entirety, activate this check box.

6.4.3   "Alignment" menu item

With this menu item or alternatively by pressing the [**F9**] function key you can align the entered objects (stratigraphic logs, wells, penetration test's, etc.) within the page. You can use a vertical alignment between the top and bottom page margin and/or horizontal alignment of the objects between the furthest left and furthest right objects.
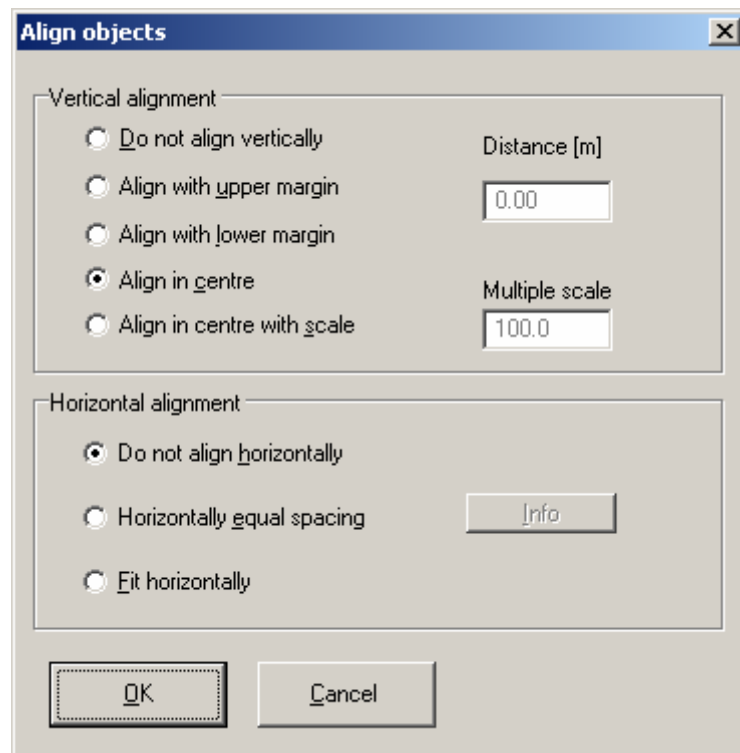
This function is used most often after creating new objects. If the lower margin has not yet been set to a height suitable for all objects you may not see any of the objects on the screen. Select the "**Align in centre**" option from the upper group box of the dialog box. The program then automatically defines a lower drawing margin such that all objects are visible, vertically central on the screen (also see notes on the lower drawing margin in Section 6.3.2).

6.4.4 "Refresh and zoom" menu item

The program works on the principle of *What you see is what you get*. This means that the screen display represents, overall, what you will see on your printer. In the last consequence, this would mean that the screen display would have to be refreshed after every alteration you make. For reasons of efficiency and as this can take several seconds for complex screen contents, the screen is not refreshed after every alteration.

If, e.g., after using the zoom function (see below), only part of the image is visible, you can achieve a complete view using this menu item.
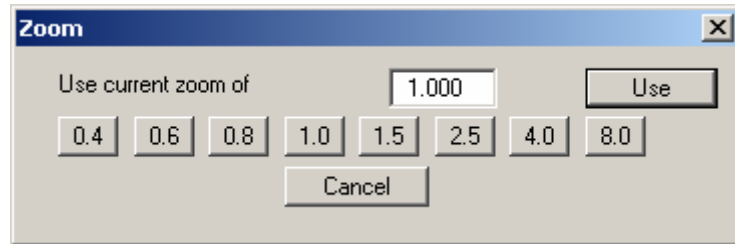
A zoom factor between 0.4 and 8.0 can be entered in the input box. By then clicking on "**Use**" to exit the box the current factor is accepted. By clicking on the "**0.4**", "**0.6**", etc. buttons, the selected factor is used directly and the dialogueue box closed.

It is much simpler, however, to get a complete overview using [**Esc**]. Pressing [**Esc**] allows a complete screen display using the zoom factor specified in this menu item. The [**F2**] key allows screen refreshing without altering the coordinates and zoom factor.

6.4.5 "Zoom info" menu item

By clicking two diametrically opposed points you can enlarge a section of the screen in order to view details better. An information box provides information on activating the zoom function and on available options.

6.4.6 "Mini-CAD toolbar" and "Header toolbar" menu items

Using these two menu items you can add free text to your drawing and add lines, circles, polygons and graphics (e.g. files in formats BMP, JPG, PSP, TIF, etc.). The same pop-up menu opens for both menu items, the icons and functions used are described in more detail in the **Mini-CAD** manual provided. The differences between the Mini-CAD and Header CAD are as follows:

- Objects created using "**Mini-CAD**" are drawn relative to the coordinate system of the stratigraphic logs, dynamic penetration tests or measured data diagrams (e.g. m AD elevations) selected for the drawing and are visualised accordingly (see Section 6.3.1.2). This menu item should therefore always be used if you need to enter additional information in the stratigraphic logs, dynamic penetration tests or measured data diagrams (for example, labelling slope inclinations or the locations of any footings). All information contained in these **Mini-CAD** data are saved with the profile data (file extension "**.bop**"). In addition, these objects can also be saved in a **Mini-CAD** file (file extension "**.mcd**"), and can then be imported into different **GGU-STRATIG** files or even into any other GGU program using the **Mini-CAD** pop-up menu.

- Objects created with the "**Header CAD**" are based on the page format (in mm). This makes them independent of the coordinate system of stratigraphic logs etc. and keeps them in the same position on the page (see Section 6.3.1.3). You should select the "**Header toolbar**" if you wish to place general information on the drawing (company logo, report numbers, plan numbers, stamp etc.). All **Header CAD** data are saved with the profile data (file extension "**.bop**"). When you save these header data using the "**Mini-CAD**" pop-up menu ("**.kpf**" as file suffix), they can be reloaded into a completely different log file (with different log coordinates). The saved header data will then always appear at the same position on the page. If the page width is altered the header data *wander* to the left or right automatically by the defined amount. This greatly simplifies header data management.

6.4.7 "Toolbar preferences" menu item

After starting the program a horizontal toolbar for menu items appears below the program menu bar. If you would rather work with a popup window with several columns, you can specify your preferences using this menu item. The smarticons can also be switched off.

At the bottom of the program window you find a status bar with further information. You can also activate or switch off the status bar here. The preferences will be saved in the "**GGU-STRATIG.alg**" file (see menu item "**Preferences/Save graphics preferences**") and will be active at the next time the program is started.

By clicking on the tools (smarticons) for the menu items you can directly reach most of the program functions. The meaning of the smarticons appears as a text box if you hover with the mouse pointer over the tools. Some of the tool functions cannot be activated from the normal menu items.

"**Zoom out**"
If you have previously *zoomed in*, this tool returns to a full screen display.

"**Zoom (-)**"/"**Zoom (+)**"
With the zoom functions you can zoom in or out of parts of the image, by clicking the left mouse button.

"**Copy/print area**"

Use this tool to copy only parts of the graphics in order to paste them, e.g. to a report. You will see information on this function and can then mark an area, which is copied to the clipboard or can be saved in a file. Alternatively you can send the marked area directly to your printer (see "**Tips and tricks**", Section 7.3).

"**Colour on/off**"

If you need to remove the colour from the system presentation, to create a black and white print-out, for example, use this on/off switch.

"**Legend on/off** "

Use this tool to switch the soil type and consistencies legend on and off. It is not possible to edit the legend.

"**Undo**"

By clicking this tool, the last performed action of objects or movement of legends made using the [**F11**] or [**F12**] function keys or the menu items "**Input/Move object**" or "**Input/Move all objects**"can be undone.

"**Restore**"

By clicking this tool, the last object action or legend movement undo carried out using "**Undo**" can be restored.

6.5.1   "General" menu item

The following dialog box opens:
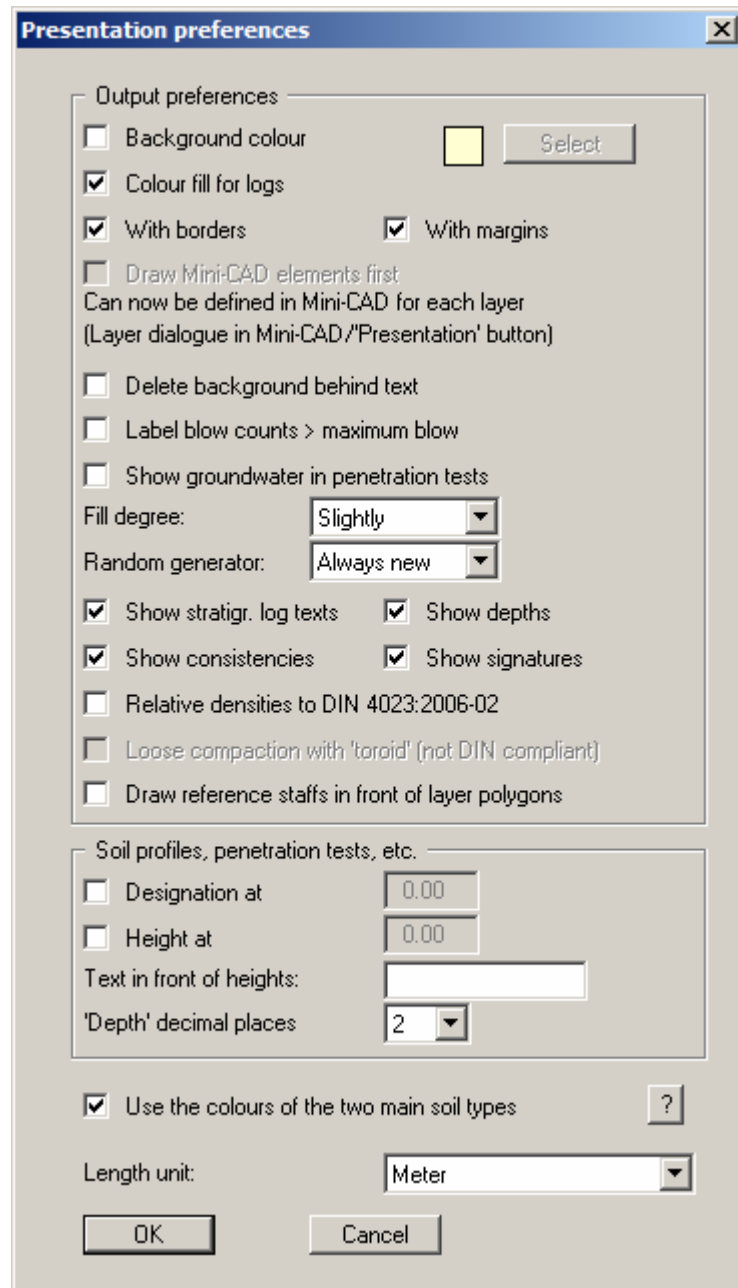
In the upper part of the dialog box you can specify output preferences:

- "**Background colour**"
  You can optically enhance the drawing with a background colour. You can switch the background colour display on and off, and select a colour using the button on the right.

- "**Colour fill for logs**"
  The stratigraphic logs and well casings can be coloured according to DIN. Only the main soil types will be considered. Colour fill is possible if at least one of the first two code boxes contains a valid code (see Section 5.4.2). With two main soil types, the profile will be vertically divided. Additional details on divided colour display can be found further down in the description of the "**Use the colours of the two main soil types**" check box. You can alter the colours for each main soil type with the menu item "**Preferences/Soil colours**"

  (see Section 6.5.12). The colour fill can be quickly switched on or off using the icon in the menu toolbar.

- "**With borders**"
  If you deactivate this check box, the outer page borders will not be printed. To allow you to still see the true page size the switched off borders are shown on the screen as purple lines. This allows, e.g. together with a page format fitted to the printer, printing of a single log or similar to an A4 printer, without it being necessary to use an output zoom factor < 1.0. This can save subsequent enlargement on a copying machine (see explanations of 1:1 print output in Section 6.3.1.1).

- "**With margins**"
  In the program's default setting the output sheet is shown with a frame around the *drawing area*. The distance of the frame from the sheet edge is defined in the menu item "**Input/Page format**" (see Section 6.3.14). The frame can be switched off by deactivating this check box.

- "*Draw Mini-CAD elements first*" - *This check box can no longer be selected!*
  Originally, the display sequence could be modified using this check box. In the program's default settings **Mini-CAD** elements are above elements defined using the "**Input**" menu; they may therefore cover stratigraphic logs, dynamic penetration tests, etc. In Version 7 of the integrated **Mini-CAD** module you can now work on a total 20 different layers. To

  move **Mini-CAD** objects behind the main program elements click the "**Layers**" icon in the **Mini-CAD** popup menu and deactivate the required layers in the "**Visualisation**" button dialog box. This draws the **Mini-CAD** elements in these layers first; they are therefore behind your stratigraphic log, for example.

- "**Delete background behind text**"
  If the text and the presentation overlap due to lack of space, the background can be deleted. However, beware of the visualisation sequence. Objects are drawn in the sequence they were created in. Objects drawn later are positioned in front of the previously drawn objects. If the background behind a text is deleted the texts still disappear behind subsequently defined objects. This can be seen in the figure below. The texts for S 1 disappear behind log S 3. The S 3 texts can be seen with deleted background in front of the S 2 log, because S 3 was the last stratigraphic log entered.
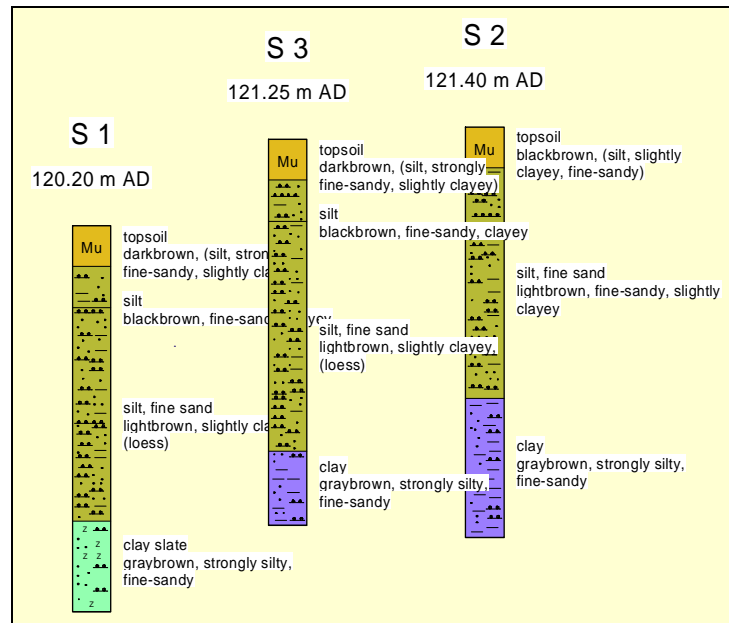
- "**Label blow counts > maximum blow**"
  If blow counts cannot be read from the penetration test diagram, because the blow count is greater than the defined maximum blow count, activate this check box. When activated, all blow counts over and above the defined maximum are shown as numbers beside the penetration test diagram (see Section 6.3.8.3).

- "**Show groundwater in DPTs**"
  If you have given a groundwater level in the penetration test's base data, you can have it displayed in the penetration test diagram by selecting this check box.

- "**Fill degree**"
  Here you can select from a very slightly to a very strong filling of the stratigraphic logs with soil signatures .

- "**Random generator**"
  Using the "**Always new**" setting the soil signatures are randomly redrawn at each screen refresh.

- "**Show stratigr. log texts**"/"**Show depths**"
  "**Show consistencies**"/"**Show signatures**"
  Using these four check boxes the respective visualisations on the stratigraphic logs in general can be switched off, i.e. in the screen display and in the print output. This can be useful for geological sections created using layer polygons, for example. Only the stratigraphic logs themselves, without any other annotations, are then shown on the layer blocks.

  The signatures can also be switched off on the screen only in order to facilitate faster screen refreshing. Deactivate the "**Screen display with soil signatures**" in the "**Graphics preferences/Preferences**" menu item (see Section 6.4.2).

- "**Relative densities to DIN 4023:2006-02**"
  DIN 4023:2006-02 does not differentiate between loose and very loose compaction. If this check box is activated the same signature is used for both relative densities and the "**Soil types and consistencies**" legend adjusted accordingly.

- "**Loose compaction with 'toroid' (not DIN compliant)**"
  If the DIN 4023:2006-02 check box is activated loose and very loose compaction can nevertheless be differentiated using this check box.

- "**Draw reference staff in front of layer polygons**"
  If geological sections use layer polygons and are very wide, the reference staffs can be drawn in front of the layer polygons by activating this check box. In the default setting the reference staffs are behind all other elements.

In the "**Stratigraphic logs, DPTs, etc.**" group box you can set the following preferences for the labelling of objects:

- "**Designation at**"
  By selecting this check box the names of stratigraphic logs, wells etc., will not appear directly above each object, but will all be displayed at the same height in the drawing. This height is to be given in absolute coordinates, e.g. in m AD.

- "**Height at**"
  The positioning of height entries of objects is analogous to that of the designations (see above).

- "**Text in front of heights**"
  If you enter e.g. "**AD**" in this box, the height labelling above the logs, tests etc. will be in the form of "**AD + 12.34**".

- "**'Depth' decimal places**"
  Define the number of decimal places for stratigraphic log depth labelling.

In the lower part of the dialog box you can specify the following preferences:

- "**Use the colours of the two main soil types**"
  In **GGU-STRATIG** the colours and soil signatures of all soil types specified in DIN 4023 are defined using *code numbers*, which are entered in the strata input editor. The main soil type soil colours are determined from the code numbers in the first two *code boxes*.

  If there are two main soil types (= code numbers in the first two code boxes), the profile is colour-divided using the soil colours defined in the first two code boxes. This colour division can be subdued for all soil profiles by deactivating the "**Use the colours of the two main soil types**" check box. Only the soil colour resulting from the code in the first code box is then adopted for use.

  Please note that when opening files created using **GGU-STRATIG** older than main version 10, the "**Use the colours of the two main soil types**" check box is inactive. When using these old logs the program first checks whether there are two main soil types in long text line A1 (= two upper case soil type descriptors at the beginning and end of the line). Only then is the colour visualisation divided for two main soil types (= code numbers in the first two code boxes).

  You can use the old method for editing these legacy files or activate colour division globally using the check box. If you confirm the query "**Use old colours?**" after activation, the "**Use the colours of the two main soil types**" check box is activated in all strata.

- "**Length unit**"
  The height and depth units can be specified here.

By clicking on "**OK**" the preferences will be accepted, with "**Cancel**" they will be rejected.

6.5.2 "Autosave preferences" menu item

To prevent data loss when making extended input an autosave function can be activated using this menu item.
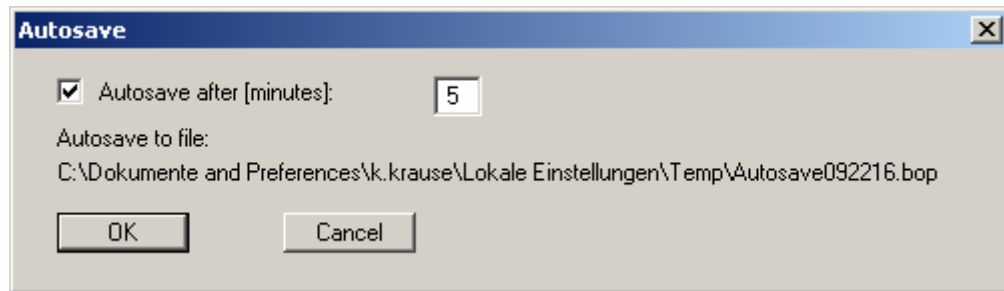
Specify the time period for saving the backup file. The backup path is specified by the program.

6.5.3 "Legend font selection" menu item

With this menu item you can switch to a different true-type font. All available true-type fonts are displayed in the dialog box.

6.5.4 "Font size selection" menu item

Use this menu item to alter the font sizes on element labelling (designation, height information, long texts, depth labelling, etc.). Input is subject to some restrictions, which are checked by the program. If you make entries which are not permitted, they will be automatically corrected, after an appropriate warning message.

The font sizes of text within legends are edited in the respective legend editor. Just double-click in a legend to do this.

6.5.5 "Pen colour and width" menu item

You can edit the pen colours and widths with which the elements or element frames are drawn.

6.5.6   "Groundwater" menu item

Using this menu item you can activate the coloured display of the groundwater level.. In the dialog box the colour and line width can be edited. Further to this you can determine, whether or not the groundwater is to be labelled additionally with the absolute height or with the absolute height only.
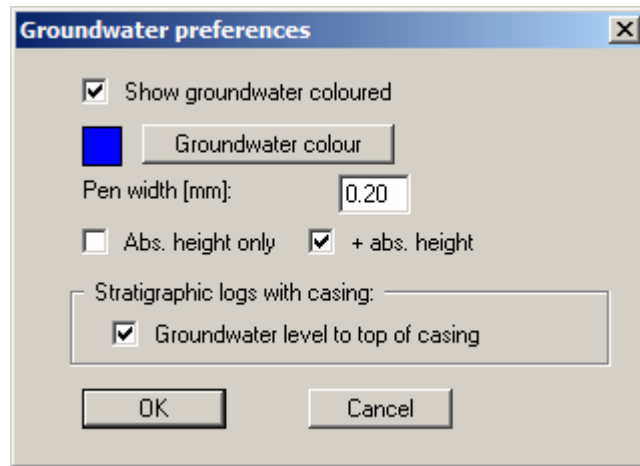
If you have entered a casing besides the stratigraphic log, you can have the ground water level given relative to the casing by activating the "**Groundwater level to top of casing**" check box. The groundwater level *input* in "**Input/Stratigraphic log**" "**Base data**" button must, however, still be given relative to ground level (see following illustration):
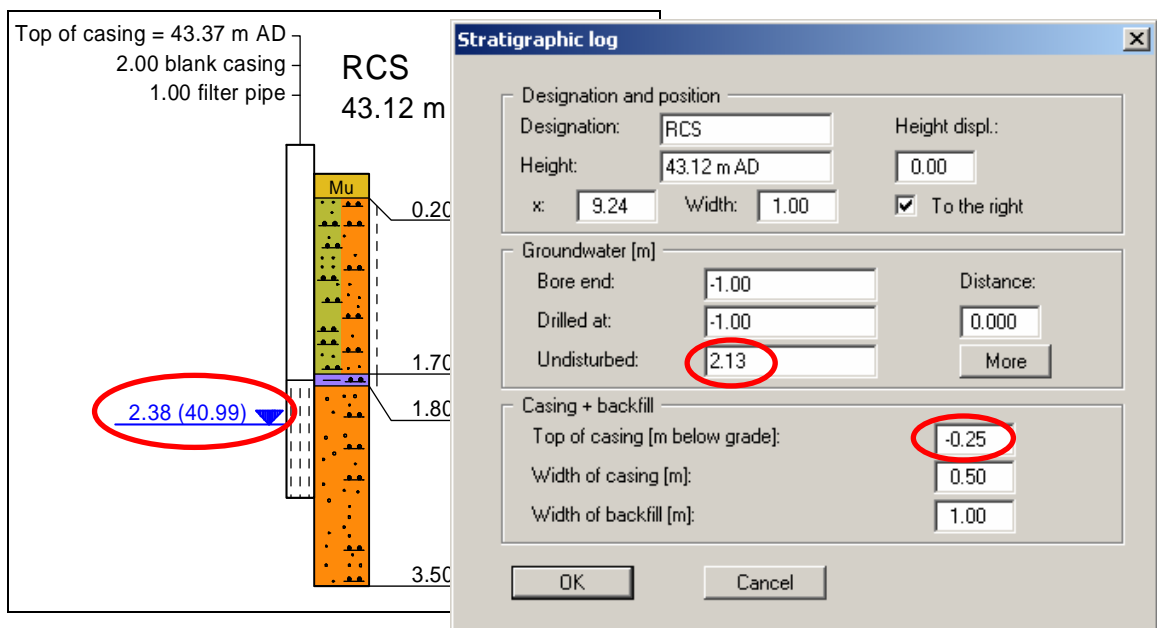
6.5.7 "Surface line" menu item

A horizontal surface line can be displayed to the right and left of the stratigraphic logs and wells, mainly to optically enhance the drawing. In this menu item, you can determine whether or not a surface line should be displayed and the width of the line.
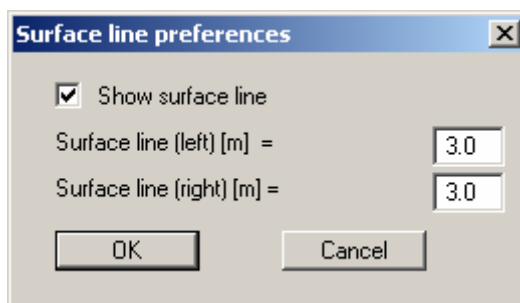
In addition to these straight auxiliary lines it is also possible to utilise the integrated **Mini-CAD** system's line-drawing function, allowing you to draw surface lines, grass lines, slope lines and much more (see "**Mini-CAD**" manual).

6.5.8 "Save graphics preferences" menu item

The preferences you made with the menu items of the "**Preferences**" menu can be saved to a file. If you select "**GGU-STRATIG.alg**" as file name, and save the file on the same level as the program, the data will be automatically loaded the next time the program is started and need not be entered again.

> If you do not go to "**File/New**" upon starting the program, but open a previously saved file instead, the preferences used at the time of saving are shown. If subsequent changes in the general preferences are to be used for existing files, these preferences must be imported using the menu item "**Preferences/Load graphics preferences**".

6.5.9 "Load graphics preferences" menu item

You can reload a graphics preferences file into the program, which was saved using the "**Preferences/Save graphics preferences**" menu item. Only the corresponding data will be refreshed.

6.5.10 "Abbreviations (GGU)" menu item

The GGU abbreviation system is a relatively simple system for recording strata with its origins in engineering practice. It is only retained in the program for managing legacy data.
It should no longer be used.

6.5.11 "Abbreviations (SEP)" menu item

6.5.11.1 *Use of SEP 2 abbreviations*

SEP stands for **S**chichten**E**rfassungs**P**rogramm.

The SEP program, Version 2 of which is implemented in **GGU-STRATIG**, was developed by LBEG (*Landesamt für Bergbau, Energie und Geologie*, formerly: *Niedersächsisches Landesamt für Bodenforschung*, *NLfB*) in Hannover and allows the acquisition of data collected in field investigations. This program includes a set of abbreviations that can also be selected for use in the **GGU-BORELOG** program for entering bore logs using abbreviations. If you have the **GGU-STRATIG** program, as well as **GGU-BORELOG** (visualisation of bore log data), you can achieve the highest possible compatibility between the data sets of both programs by exclusively using the SEP 2 abbreviations.

For a detailed study of the SEP 2 abbreviations please see the SEP 2 manual, available from the LBEG. After bore or sounding input, **GGU-STRATIG** allows saving in a SEP 2 compatible format, if you have used the SEP 2 abbreviations. You can thus achieve a high degree of compatibility to other applications. Loading of files created with the SEP 2 program is also supported (see Section 5.2).

The abbreviations defined by LBEG for the "**Engineering geology**" subset are included in the "**SEPKURZ-e.TXT**" file, which is included with the program. The existing SEP 2 abbreviations can be viewed, printed and, if necessary, modified with this menu item together with the long texts and short texts, and the code numbers for controlling soil signatures and colours.

> If files created using modified SEP 2 abbreviations are forwarded to third parties, compatibility with the *receiver's* programs cannot be guaranteed, because the modified abbreviations are not available and cannot therefore be interpreted.
>
> If data forwarding is required, e.g. at the client's request, it is better to work with the original SEP 2 file (for transfer to the SEP 2 program) or to send the modified "**SEPKURZ-e.txt**" file with the data (for transfer to **GGU-BORELOG** and **GGU-STRATIG**).

6.5.11.2 Edit SEP 2 abbreviations

The menu item "**Abbreviations (SEP)**" opens a dialog box with the "**SEP abbrevs.**" group box for editing abbreviations. The presentation of the texts interpreted using the SEP 2 abbreviations can be modified in the "**GGU-STRATIG preferences**" group box (see Section 6.5.11.3 below).
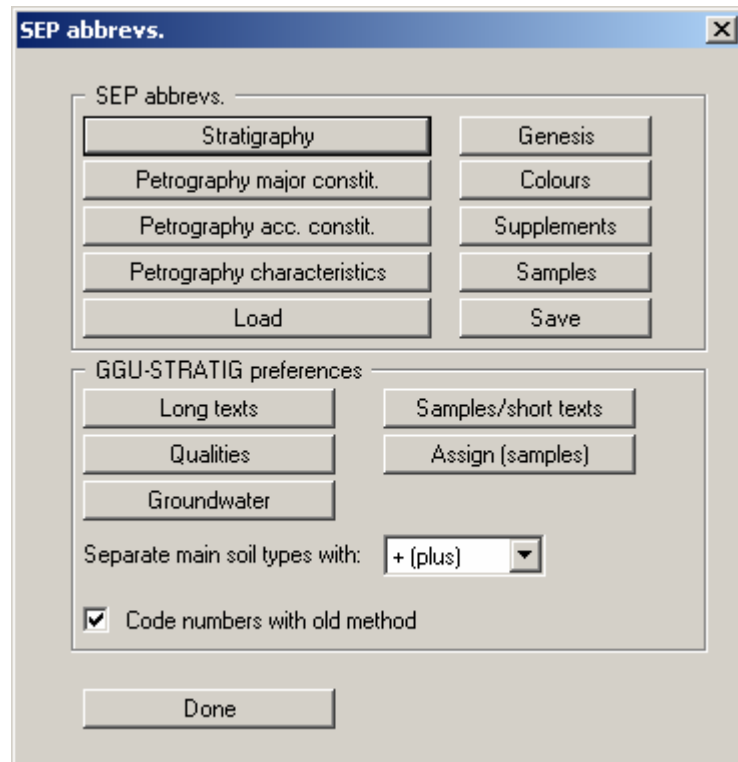
Click the individual field buttons to view the respective SEP 2 abbreviations and associated long texts, as shown in some of the displayed dialog boxes. For example, in the "**Petrography major constit.**" field a column with codes controlling visualisation of the DIN 4023 soil signatures and colours in **GGU-STRATIG** can be seen. The column allocations for the DIN 4022 form (visualiation of bore log data with the **GGU-BORELOG** program) can be viewed in the "**Supplements**" field
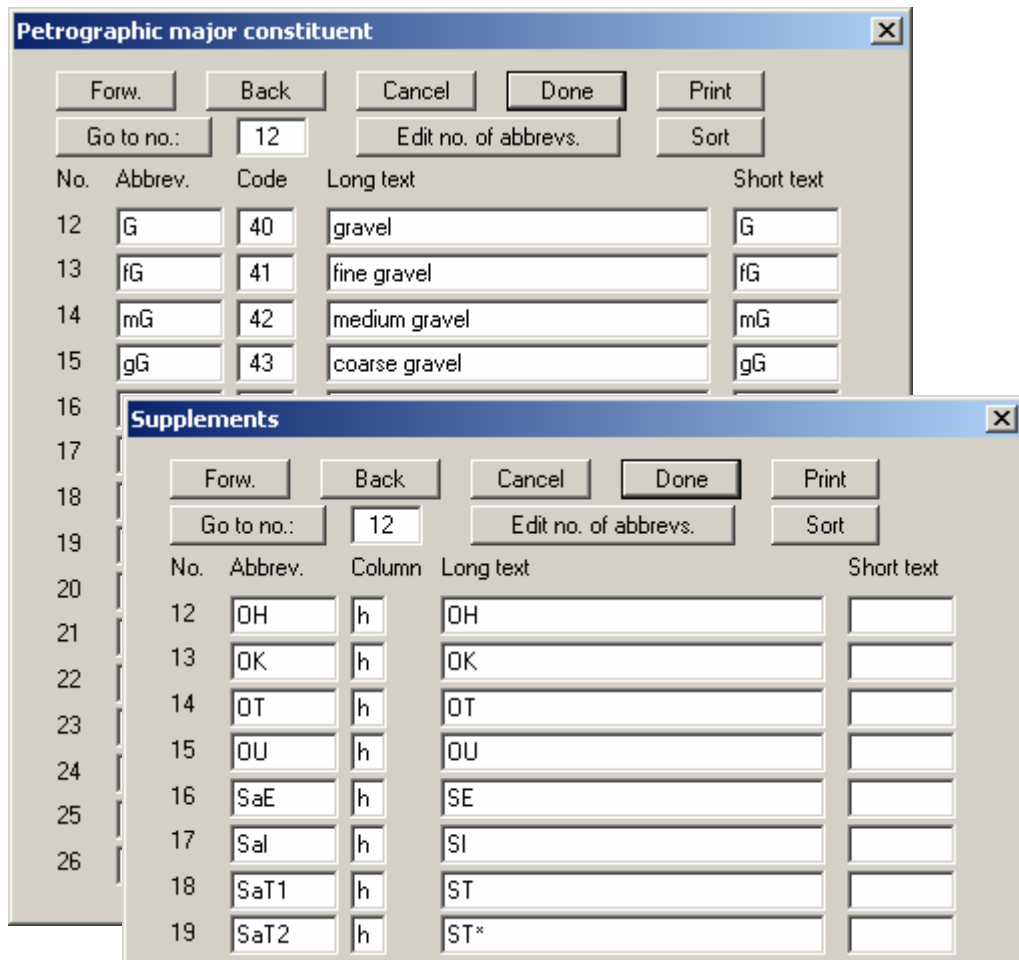
If the SEP 2 file has been modified, it can be saved under a different name by pressing "**Save**". This file is then available for subsequent sessions under the "**Load**" entry. If "**SEPKURZ-e.TXT**" is used as the file name and the file is saved in the program folder, the file be automatically loaded the next time the program is started.

> When making modifications please note that the same abbreviations file must be used in both programs if the data are transferred to **GGU-BORELOG**.

6.5.11.3   Edit preferences for visualisation

For visualisation in the **GGU-STRATIG** program, you can set preferences in the lower part of the dialog box:

- "**Longtexts**"
  The default allocations of the long texts interpreted from the abbreviations in the individual long text lines Text A1, Text A2 and Text B can be adapted to user requirements.
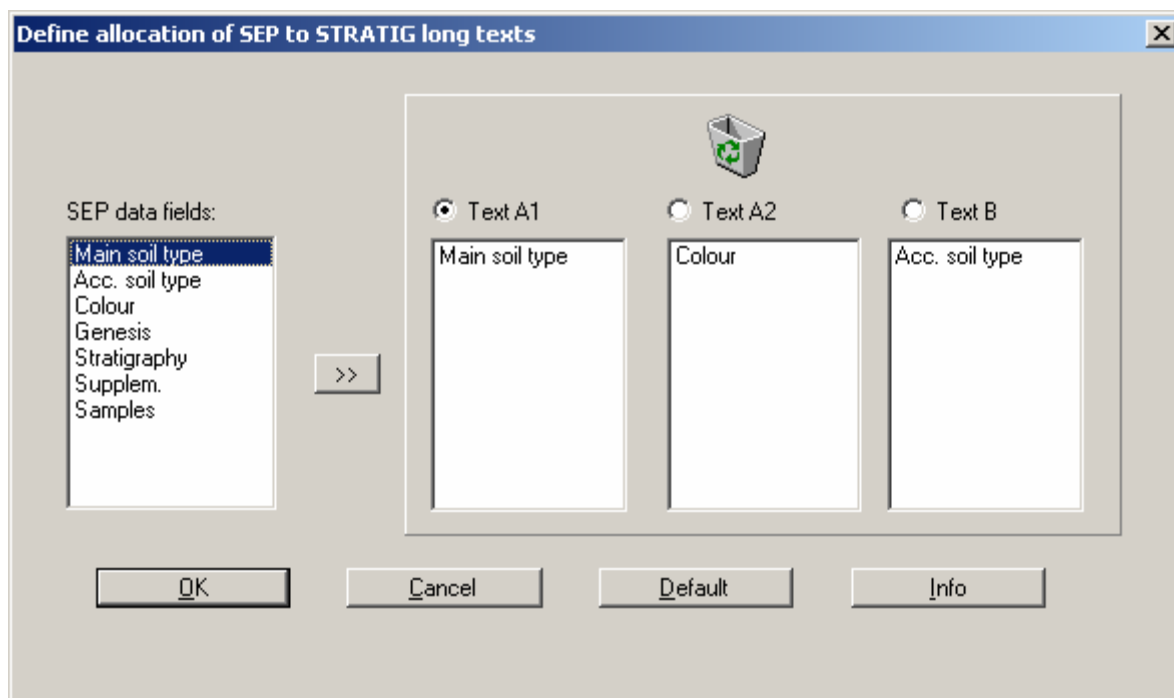
The SEP data field selected on the left is copied to the currently selected text box on the right by pressing ">>". The simplest procedure is to drag the SEP 2 data field into the required text box holding the left mouse button pressed. The sequence within the text box can also be altered in this way. The "**Default**" button resets the distribution of the texts to the program defaults.

- "**Samples/short texts**"
  The dialog box that opens when this button is pressed allows you to modify what is transferred to the short text line when the SEP 2 abbreviations are interpreted.
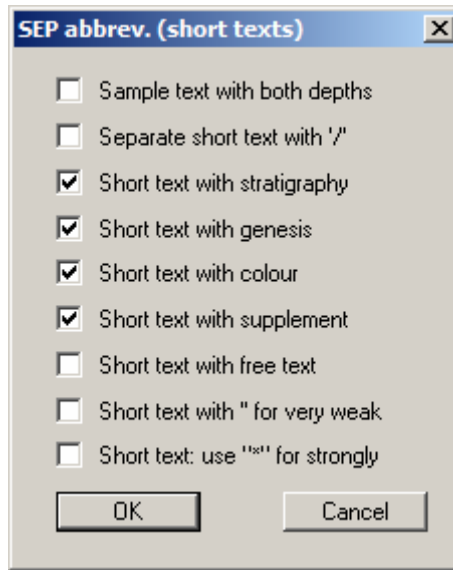
If samples are entered for a specific stratigraphic log, both depths (from … - ...) can be activated here (also see Section 5.4.3.4).

In compliance with DIN, a strong minor constituents is shown by an overline ($\overline{u}$). In short text in the dialog boxes the program uses the "@" symbol in front of the corresponding letter, which is converted to an overline in the graphics. If this graphic conversion does not function correctly when exporting to other programs, the "@" symbol can also be replaced by the "*" symbol.

If you edit the short text preferences, you must re-interpret the abbreviation lines of your layers. To do this simultaneously for all layers of a stratigraphic log, you may use the "**Interpret all**" button (see "**Example: Input of a stratigraphic log**", Section 5.2).

- "**Qualities**"
  You can alter the text presentation e.g., from "**slightly**" to "**somewhat**".

If the language is changed during an active session from English to German, the German translation of the quality descriptions can be called up using the "**Reset**" button.

- "**Assign (samples)**"
  The symbols to DIN 4023 for disturbed sample (unfilled box), special sample (filled box) and core sample (box with cross) can also be interpreted at the same time using the corresponding SEP 2 abbreviations. The allocation of abbreviations (here, named short texts) to symbols is carried out in this dialog box.
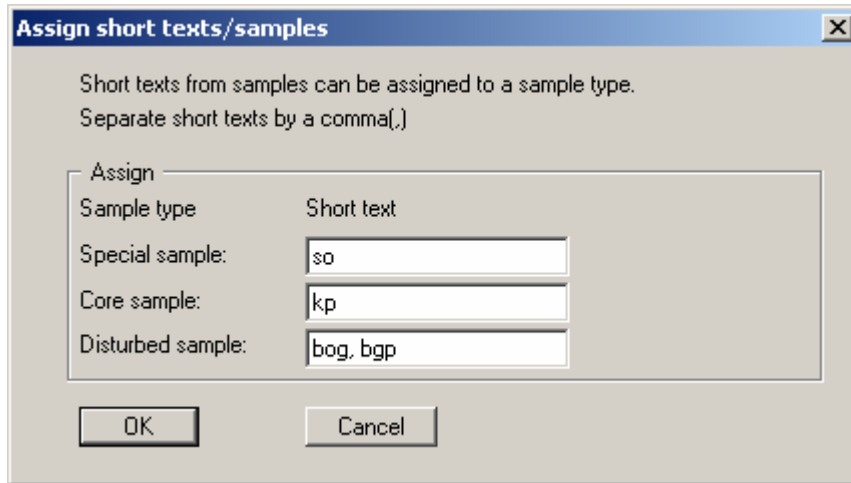
- "**Groundwater**"
  This button opens a dialog box allowing you to modify the allocation of the groundwater abbreviations to the types of groundwater.

- "**Separate main soil types with:**"
  If you have two main soil types in a single layer, you can specify whether they are displayed with a comma, a plus sign or a text "**and**" in this option box.

- "**Code numbers with old method**"
  The code numbers can also be generated in the sequence specified in the settings of the "**Long texts**" button. Just deactivate this check box.

6.5.12 "Soil colours" menu item

The stratigraphic logs and the well casings can be coloured in accordance with DIN. Colours may be defined for every main soil type, and can be edited at will.

The dialog box allows saving of a soil colour file (default suffix "**.col**"). If you select "**GGU-STRATIG.col**" as file name, and save the file on the same level as the **GGU-STRATIG** program, the saved colours will be automatically loaded at the next program start.

The dialog box also allows loading of a different file with colour information.

6.5.13 "Bitmaps" menu item

In rare cases it may be desirable to use soil hatching other than those prescribed by DIN. In this case it is possible to create a stratigraphic log fill using bitmaps. These bitmaps (in WINDOWS BMP format) can be created using, e.g., the "**Paintbrush**" program, which is installed with every WINDOWS installation. This file format can also be created with other WINDOWS graphics programs (e.g. Corel-Draw). Further to this, you have the possibility of creating bitmap templates with the help of a scanner.

Filling of a log with a bitmap graphic is done by entering the appropriate code number during layer input (see below). The abbreviations and code numbers contained in the "**SEPKURZ-e.TXT**" file can be edited or supplemented in order to allocate the bitmaps to abbreviations and thus to long and short texts.

For filling of stratigraphic logs with user-defined bitmaps the code numbers 901 to 999 are available. Correspondingly, the dialog box contains a continuous, non-editable, numbering from 901 upwards.
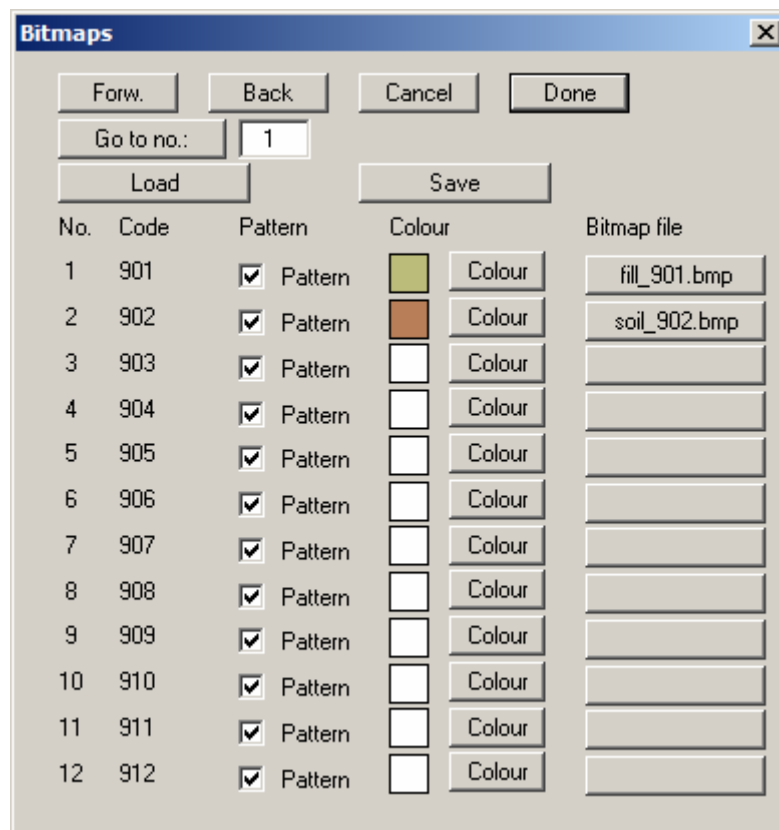
After clicking on the action button after each code number a file requester box opens with which you can allocate a code number to a bitmap file. The bitmap file must be in the "**Bitmaps**" folder, which is on the program level (e.g. "C:\All programs\GGU-Software\GGU-STRATIG\Bitmaps").

Bitmap graphics have a defined width and height when created, e.g. with "**Paintbrush**". The program increases or reduces this width to the width of the stratigraphic log, when you select the "**Pattern**" check box. The resulting height of the bitmap presentation in the stratigraphic log is then determined automatically. In this manner a vertically displaced hatching is repeated until the layer is completely filled. If the "**Pattern**" check box is deactivated, the bitmap will be stretched or compressed to the full height of the soil layer.

User-defined bitmaps will only be displayed on the screen, exactly the same as for default soil signatures, if the "**Screen display with soil signatures**" check box is activated in the "**Graphics preferences/Preferences**" menu item (see Section 6.4.2). They will, however, be entered when printing the stratigraphic logs, independently of the setting of this check box.

In principle, bitmaps can also be used in colour. Problems may occur if you try to send such a bitmap to an output device which is not capable of colour output. Quite often, ugly grey scales will be the result. In order to achieve higher flexibility there is a "**Colour**" button behind each bitmap file, with which you can allocate a colour to the bitmap. This colour will only be entered when the "**Colour fill for logs**" check box is activated, in the menu item "**Preferences/General**" (see Section 6.5.1). Each selected colour will be shown in the dialog box.

You can save the bitmaps in a file with suffix "**.bit**" or load a "**.bit**" file. If you select "**GGU-STRATIG.bit**" as file name, and save the file on the same level as the **GGU-STRATIG** program, the saved bitmaps and colours will be automatically loaded at the next program start.

6.5.14 "Hatching" menu item

For filling of areas with hatching the code numbers 801 to 850 are available.

Using the "**Forw.**"/"**Back**"/"**Go to no.**" buttons you can move through the dialog box.

The "**Info**" button provides information on the available input options. For example, to generate hatching for concrete define codes 801 and 802, as shown in the dialog box above, and then use the codes in your soil profile.

User-defined hatching will only be displayed on the screen, if the "**Screen display with soil signatures**" check box is activated in the "**Graphics preferences/Preferences**" menu item (see Section 6.4.2).

You can save the hatching in a file with suffix "**.srf**" or load a "**.srf**" file. If you select "**GGU-STRATIG.srf**" as file name, and save the file on the same level as the **GGU-STRATIG** program, the saved hatching and colours will be automatically loaded at the next program start.

6.6.1   "Define polygon" menu item

Use this menu item to generate geological sections, for example. All the information you need to define layer polygons is provided in a message box:
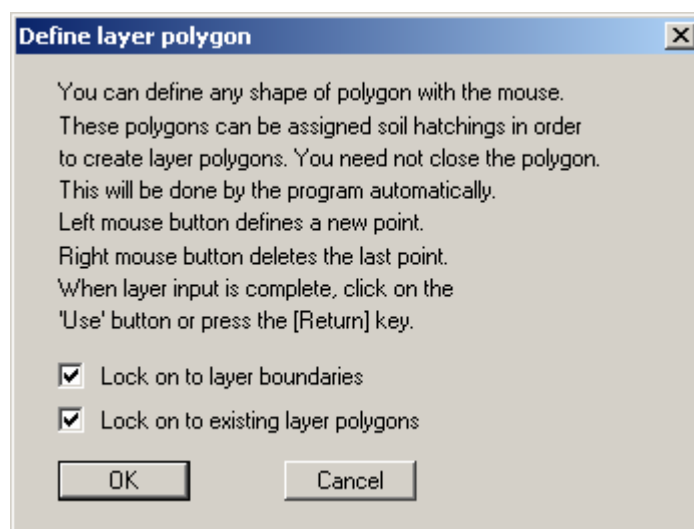
With activated "**Lock on to layer boundaries**" and "**Lock on to existing layer polygons**" check boxes it is possible to exactly position the polygon points. After completing a polygon an editor opens for additional editing of the current polygon. It can also be opened later for each defined polygon via the menu item "**Layer polygons/Edit polygon**" (see Section 6.6.2).

If you lock on to layer boundaries when defining layer polygons, the program automatically adopts the code number for the polygon fill (i.e. colour and soil signature) from the soil layer lying above the last polygon point. The last point should therefore lock on to a layer boundary. The last code number setting is adopted as the default for the next defined polygon unless you lock on to a different layer boundary again.

Layer polygons are always the first element drawn and are therefore located behind the stratigraphic logs, penetration tests, etc. In the default state, only the reference staffs are drawn behind the layer polygons. If the reference staff lines are to be visible in front of the layer polygons, activate the "**Draw reference staffs in front of layer polygons**" check box in the menu item "**Preferences/General**" (see Section 6.5.1).

6.6.2 "Edit polygon" menu item

An editor for each layer polygon can be opened with the mouse by clicking in the appropriate polygon with the left mouse button. The following box appears:
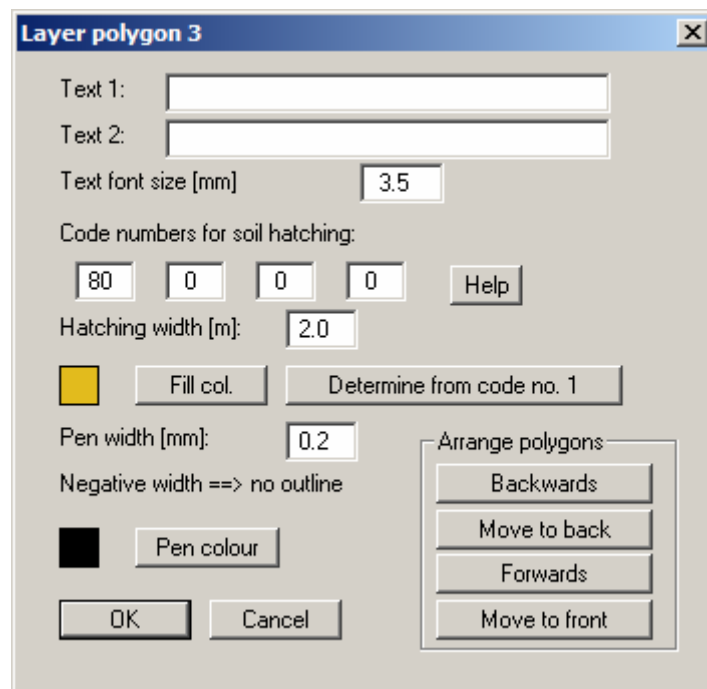
A defined polygon can be automatically labelled using the input in the two text lines. You can define the font size, the position is determined automatically. The program determines the centre point of your defined polygon and places the two text lines centrally at that point. The text background is deleted. If the automatically positioned texts collide with other graphic elements leave the text lines in the above editor box empty and add the annotation as texts using the **Mini-CAD** system (see "**Mini-CAD**" manual).

If the program automatically allocated a code number when defining polygons the corresponding soil colour has already been adopted. However, after clicking the "**Fill col.**" button it is possible to select a different colour or to adjust the fill colour after entering different code numbers by pressing the "**Determine from code no. 1**" button.

The polygon outline can be altered to suit your needs by adjusting the pen width and colour.

If more than one polygon is present the "**Arrange polygons**" field appears. The polygons are displayed in the sequence in which they were drawn, i.e. those defined first are further back and those defined last are at the front. This sequence can be altered by clicking the buttons. The following options are available:

- "**Backwards**"   polygon will be moved back by one position

- "**Move to back**"   polygon will be moved to the rearmost position

- "**Forwards**"   polygon will be moved forwards by one position

- "**Move to front**"   polygon will be moved to the foremost position

6.6.3 "Delete polygon" menu item

You can delete any layer polygon with the mouse by clicking in the appropriate polygon with the left mouse button. [**Backspace**] restores the last deletion.

6.6.4 "Delete all polygons" menu item

Using this menu item all layer polygons can be deleted after a security request.

6.6.5 "Move polygon point" menu item

A polygon point can be moved with the left mouse button pressed.

6.6.6 "Edit polygon point" menu item

After clicking on a polygon point you can edit the coordinates of this point in a dialog box.

6.6.7 "Paste/Delete polygon point" menu item

You may add individual polygon points or delete current points. The dialog box explains the possibilities.
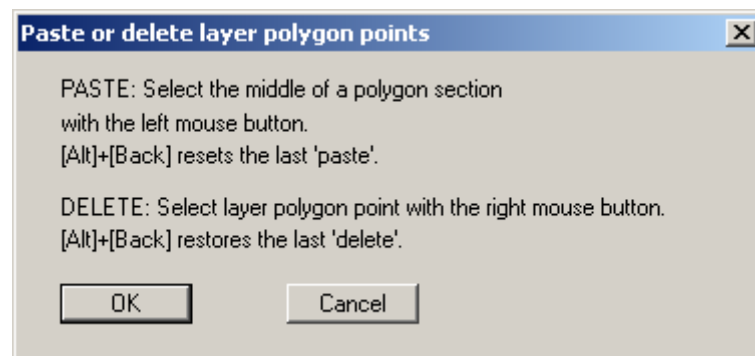
6.7.1 "Copyright" menu item

You will see a copyright message and information on the program version number.

The "**System**" button shows information on your computer configuration and the folders used by **GGU-STRATIG**.

6.7.2 "Maxima" menu item

You will see information on the default program maxima.

6.7.3 "Help" menu item

The **GGU-STRATIG** manual is opened as a PDF document. The help function can also be accessed using the [**F1**] function key.

6.7.4 "GGU on the web" menu item

Using this menu item you can access the GGU Software website: www.ggu-software.com. Keep in touch with new program versions and the regular *download* offers.

If you would like to be automatically notified about program innovations, please register for the Newsletter in our Knowledge Base. Go to the following website: http://kbase.civilserve.com.

6.7.5 "GGU support" menu item

This menu item takes to the GGU-Software Support area at www.ggu-software.com.

6.7.6 "What's new?" menu item

You will see information on program improvements in comparison to older versions.

6.7.7 "Language preferences" menu item

This menu item allows you to switch the menus and the graphics from German to English and vice versa. To work in German, deactivate the two check boxes "**translate dialogues, menus**" und "**translate graphics**". You then select the German abbreviation file from the drop-down menu: "**SEP-Kuerzel (deutsch)**".

If you have already entered or opened an English-language profile, you must reinterpret the strata after converting to German in order to have the German designations displayed. To do this simultaneously for all layers of a stratigraphic log, you may use the "**Interpret all**" ("**alle interpr.**") button (see "**Example: Input of a stratigraphic log**", Section 5.2).

Alternatively, you can work bilingually, e.g. with German dialogueue boxes but with graphic output in English. The program always starts with the language setting applicable when it was last ended.

7 Tips and tricks

7.1 Keyboard and mouse

You can scroll the screen with the keyboard using the cursor keys and the [**Page up**] and [**Page down**] keys.

By double-clicking with the left mouse button in certain screen areas you can reach almost all of the program input dialog boxes.

- By double-clicking over a stratigraphic log, a well, a multiple gauge, a penetration test, a CPT, a measured data diagram or a table, you will open the corresponding "**Base data**" dialog box.

- By double-clicking below, or with pressed [**Shift**] key, over a stratigraphic log, a well, a penetration test or a table, you will open the corresponding "**Input**" dialog box.

- By double-clicking in a stratigraphic log, a backfill or a casing, the "**Layers**" dialog box for that layer will be opened.

- By double-clicking in a penetration test, the "**Blow counts …**" dialog box will be opened.

- By double-clicking in a measured data diagram, the "**Edit values**" dialog box will be opened.

- By double-clicking in a legend, the "**Legend**" dialog box will be opened.

- By double-clicking on a drawing object (text, line or graphics) created with "**Mini-CAD**" oder "**Header CAD**", the input box will be opened.

- By double-clicking in free areas of the sheet, the "**Overall view**" dialog box will be opened.

- By double-clicking in free areas of the sheet, with the [**Shift**] key pressed, the "**Page format**" dialog box will be opened.

- Slow screen output can be cancelled with a click of the right mouse button.

- By clicking and pulling with the mouse, with [**Ctrl**] pressed, you activate the zoom function, i.e. the selected section will fill the screen.

- If, in a short text, you would like to have a letter overlined, then you must enter a "@" in front of the letter.

Furthermore you can use the mouse wheel to zoom in /out or scrolling the screen display. The folling mouse wheel functions are available:

- Mouse wheel up   = move screen image up

- Mouse wheel down   = move screen image down

- [**Ctrl**] + mouse wheel up   = enlarge screen image (zoom in)

- [**Ctrl**] + mouse wheel down = shrink screen image (zoom out)

- [**Shift**] + mouse wheel up   = move screen image right

- [**Shift**] + mouse wheel down = move screen image left

If you click the right mouse button anywhere on the screen a context menu containing the principal menu items opens.

```
Overall view
Legends
Reference staff 1
Stratigraphic log
Well
DPT

Page format
Preferences/General
Groundwater general

Cut
Copy
Paste
```
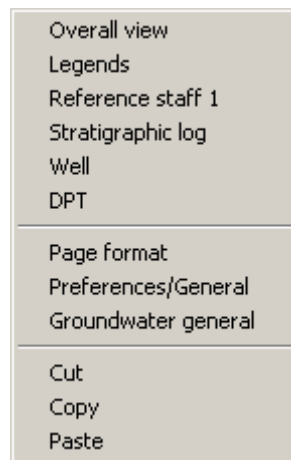
7.2   Function keys

Some of the function keys are assigned program functions. The allocations are noted after the corresponding menu items. The individual function key allocations are:

- [**Esc**] refreshes the screen contents and sets the screen back to the given page format. This is useful if, for example, you have used the zoom function to display parts of the screen and would like to quickly return to a complete overview.

- [**F1**] opens the manual file.

- [**F2**] refreshes the screen without altering the current magnification.

- [**F5**] opens the menu item "**Input/Reference staffs**"

- [**F6**] opens the menu item "**Input/Stratigraphic log**"

- [**F7**] opens the menu item "**Edit/Select**"

- [**F8**] opens the menu item "**Input/penetration test**"

- [**F9**] opens the menu item "**Graphics preferences/Alignment**"

- [**F11**] opens the menu item "**Input/Move object**"

- [**F12**] opens the menu item "**Input/Move all objects**"

7.3 "Copy/print area" icon

A dialog box opens when the "**Copy/print area**" icon ![icon] in the menu toolbar is clicked, describing the options available for this function. For example, using this icon it is possible to either copy areas of the screen graphics and paste them into the report, or send them directly to a printer.

In the dialog box, first select where the copied area should be transferred to: "**Clipboard**", "**File**" or "**Printer**". The cursor is displayed as a cross after leaving the dialog box and, keeping the left mouse button pressed, the required area may be enclosed. If the marked area does not suit your requirements, abort the subsequent boxes and restart the function by clicking the icon again.

If "**Clipboard**" was selected, move to the MS Word document (for example) after marking the area and paste the copied graphics using "*Edit/Paste*".

If "**File**" was selected, the following dialog box opens once the area has been defined:
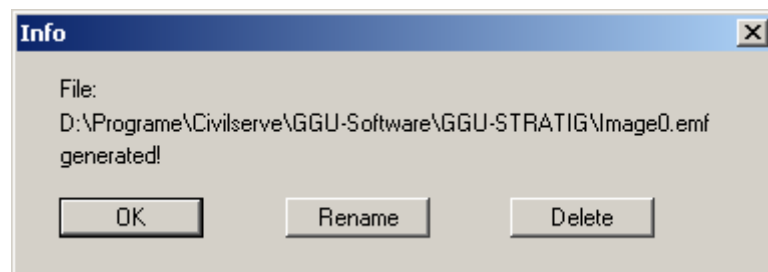
The default location of the file is the folder from which the program is started and, if several files are created, the file is given the file name "**Image0.emf**" with sequential numbering. If the "**Rename**" button in the dialog box is clicked, a file selector box opens and the copied area can be saved under a different name in a user-defined folder. Saving can be aborted by pressing the "**Delete**" button.

If the "**Printer**" button was pressed in the first dialog box, a dialog box for defining the printer settings opens after marking the area. Following this, a dialog box for defining the image output settings opens. After confirming the settings the defined area is output to the selected printer.

No logs can be seen on the output sheet.

➔ Check the height of the lower drawing margin (menu item "**Input/Overall view**"). Does it correspond to the elevations of your logs?
The fastest way to achieve optimum alignment is via the menu item "**Graphics prefer-ences/Alignment**" or by pressing [**F9**]. Select the "**Align in centre**" option in the "**Vertical alignment**" group box. The lower drawing margin is determined automatically by the pro-gram.

No soil signatures are displayed on the screen.

➔ Activate the "**Screen display with soil signatures**" check box in the menu item "**Graphics preferences/Preferences**".

No soil signatures are displayed in the printout.

➔ Activate the "**Show signatures**" check box in the menu item "**Preferences/General**".

No hatchings defined via code numbers are shown in the stratigraphic logs.

➔ The hatchings defined via code numbers are treated the same way as the normal soil sig-natures. Activate the "**Screen display with soil signatures**" check box in the menu item "**Graphics preferences/Preferences**". Or activate the "**Show signatures**" check box in the menu item "**Preferences/General**".

The dynamic penetration test diagram is not shown in colour.

➔ Click the "**Penetration tests**" button in the "**Input/Legends**" menu item. Click the "**Values**" button in the legend dialog box. Activate the "**Penetration test coloured**" check box in the next dialog box.

8 Index