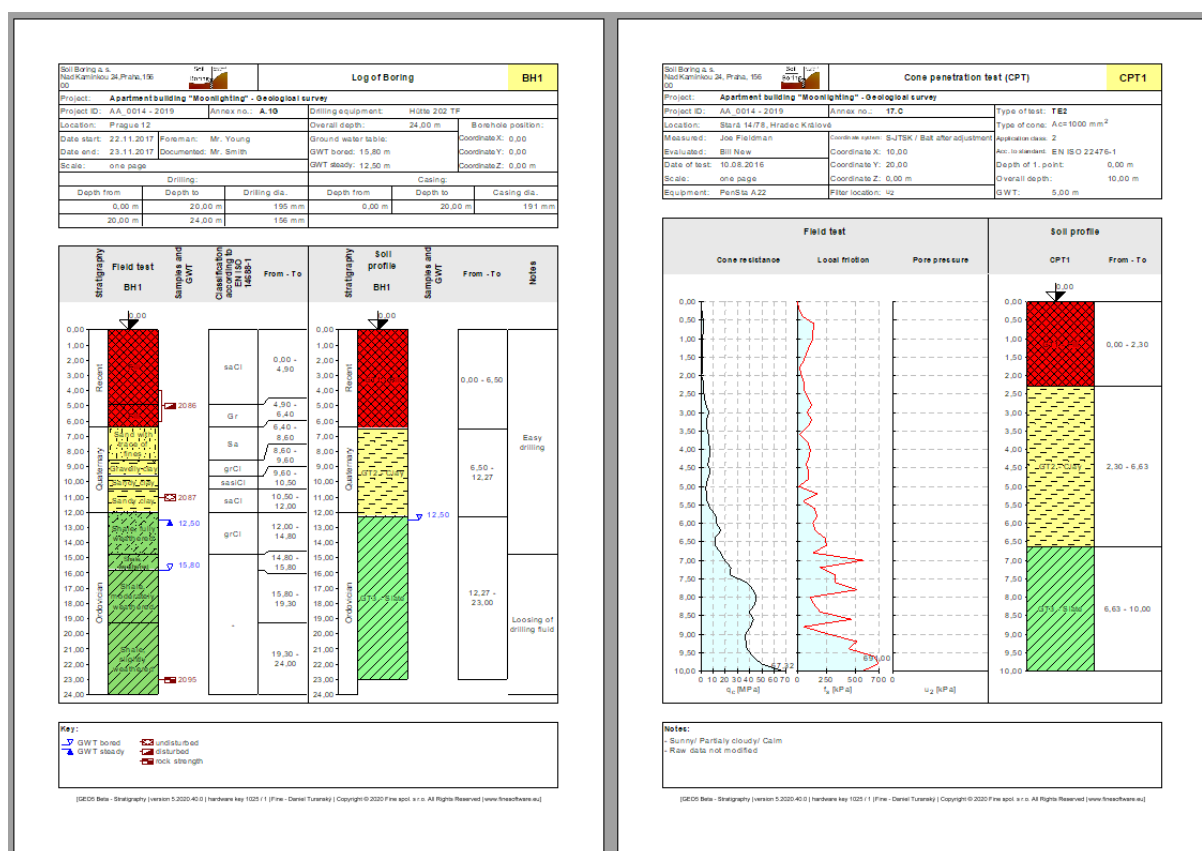


## Izrada profila tla iz terenskih ispitivanja

Program: Stratigrafija  
 Datoteka: Demo\_manual\_43\_1.gsg  
 Demo\_manual\_43\_2.gsg

Bušotine i neka druga terenska ispitivanja moraju biti pojednostavljena ili interpretirana za geološko modeliranje ili izradu 3D modela slojeva tla. Potrebno je izraditi geotehničke vrste tla, definirati debljine slojeva tla za svako ispitivanje.

**Zadatak:** Interpretirajte terenska ispitivanja iz inženjerskog priručnika br. 42 u profil tla.



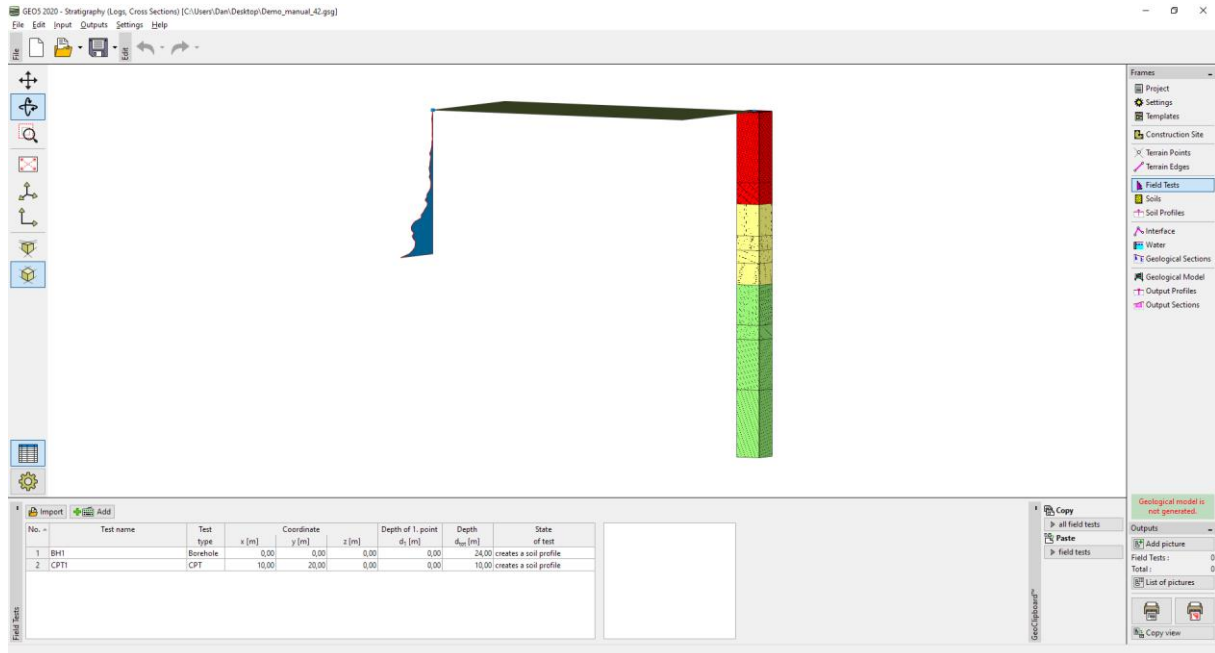
### Rješenje:

Postoje dva načina na koji možemo postupiti:

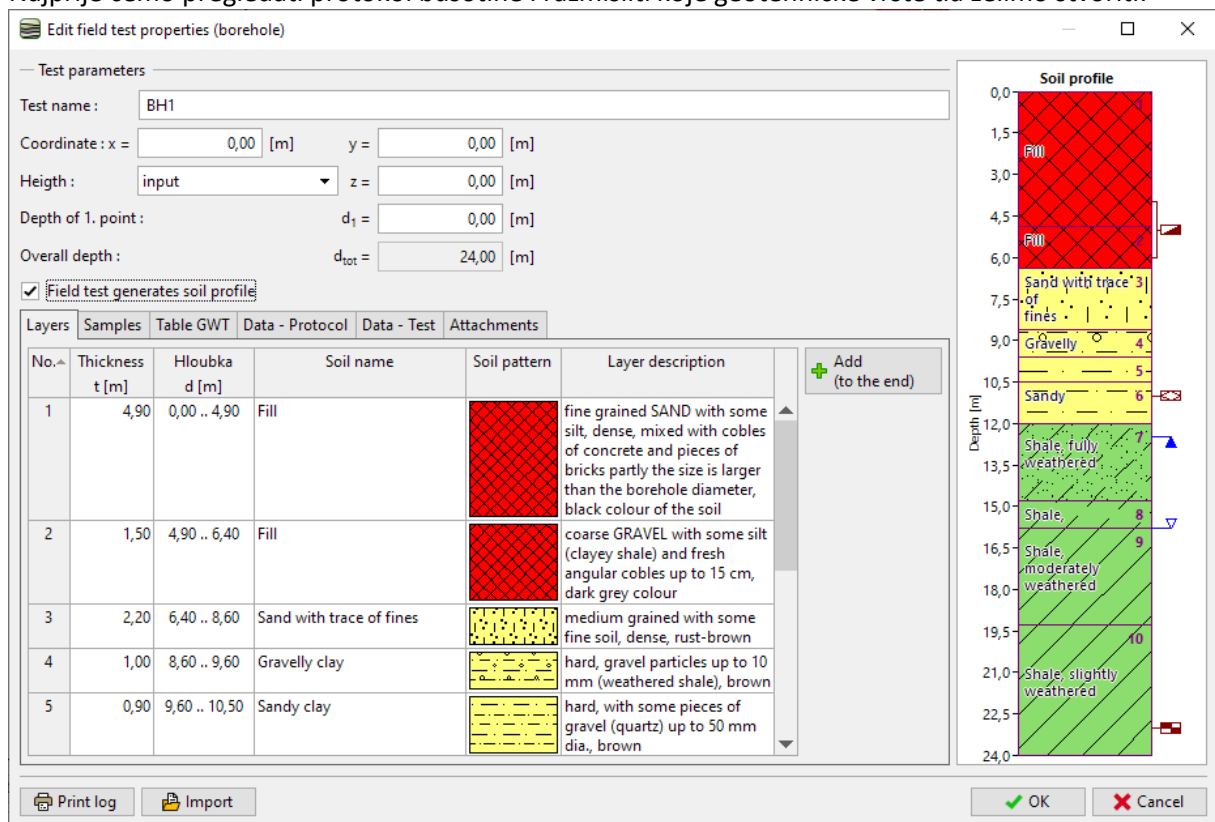
- Interpretacija terenskih ispitivanja zasebno u kartici "Soil Profile"
- Interpretacija terenskih ispitivanja prilikom izrade geoloških presjeka
- Kombinacija oba slučaja

## Pristup 1 – Interpretacija terenskih ispitivanja u kartici “Soil Profile”

Otvorit ćemo datoteku Demo\_manual\_42.gsg i pregledati unesena ispitivanja – bušotina “BH1” i CPT “CPT1”.



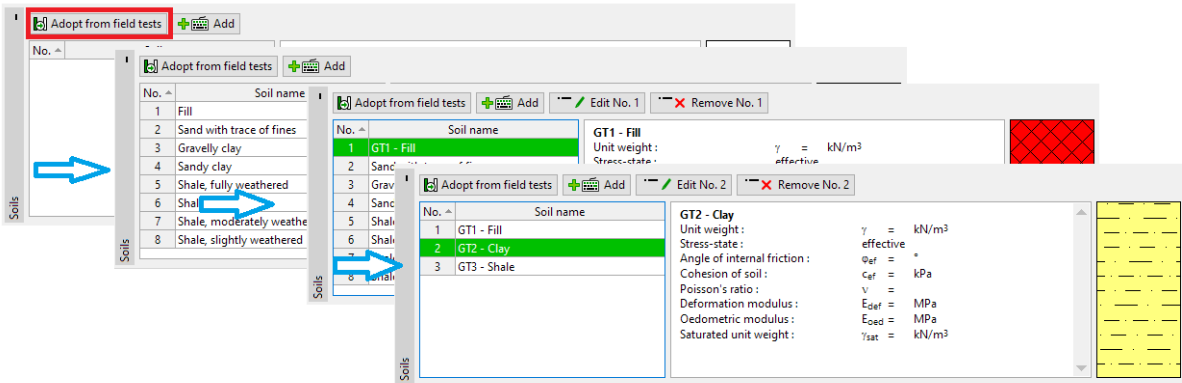
Najprije ćemo pregledati protokol bušotine i razmisliti koje geotehničke vrste tla želimo stvoriti.



Rješenje nikad nije najjasnije; načini pojednostavljenja se uvijek razlikuju – na primjer:

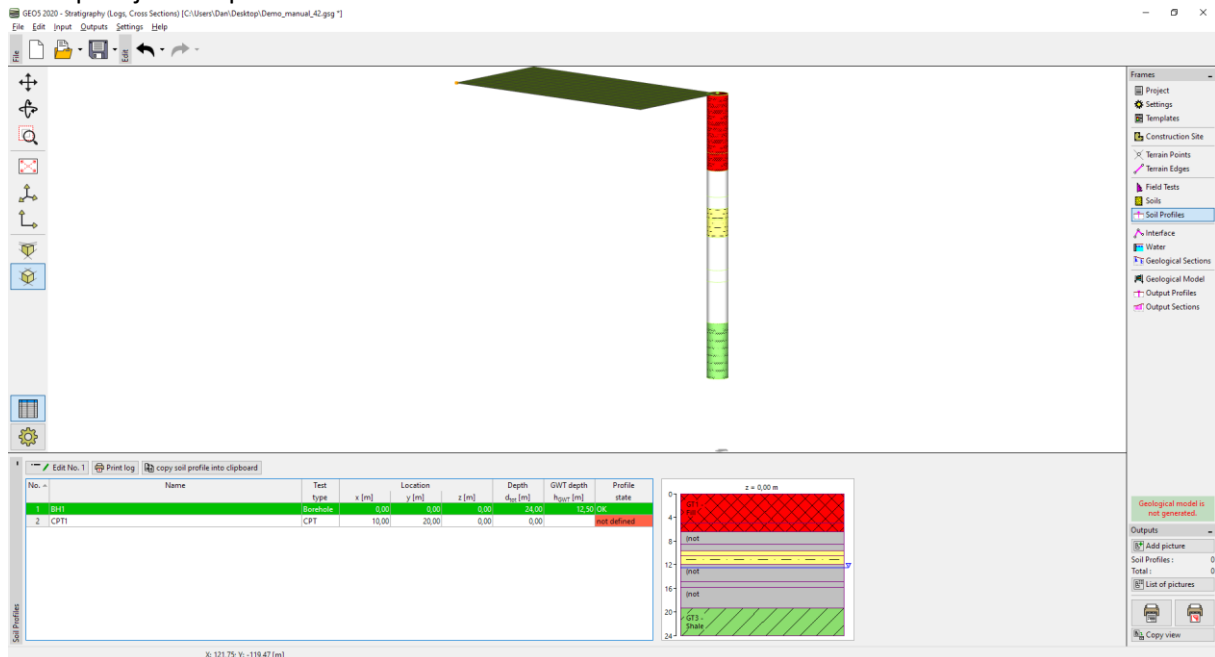
- GT1 Landfill, GT2 Sand, GT3 Clay, GT4 Weathered Slate, GT5 Slate
- GT1 Landfill, GT2 Fine-grained soils, GT3 Slate

U našem primjeru odabrat ćemo značajan stupanj pojednostavljenja te ćemo nastaviti raditi sa samo tri geotehničke vrste. Prelazim u karticu “Soils”. Kako ne bismo morali ponovno unositi nazive, uzorke, boje tla, preuzimamo ih iz ispitivanja. Promijenit ćemo individualne nazive tla i obrisati druga tla.



*Napomena: Nova tla se mogu također dodati izradom profila tla ili geološkog presjeka; nije potrebno vraćati se u ovu karticu.*

Odabrat ćemo bušotinu BH1 – vidimo da se granica slojeva kopirala iz definirane bušotine. Također su se parcijalno kopirala i tla.



## Otvorit ćemo profil tla i urediti ga.

**Parameters**

GWT depth:  $h_{GWT} = 12,50$  [m]

Soil profile is active for geological model generation

No. -	Thickness [m]	Depth [m]	Soil name
1	4,90	0,00 - 4,90	GT1 - Fill
2	1,50	4,90 - 6,40	GT1 - Fill
3	2,20	6,40 - 8,60	(not assigned)
4	1,00	8,60 - 9,60	(not assigned)
5	0,90	9,60 - 10,50	GT2 - Clay
6	1,50	10,50 - 12,00	GT2 - Clay
7	2,80	12,00 - 14,80	(not assigned)
8	1,00	14,80 - 15,80	(not assigned)
9	3,50	15,80 - 19,30	(not assigned)
10	4,70	19,30 - 24,00	GT3 - Shale

## Dodijelit ćemo tla svim slojevima.

No. -	Thickness [m]	Depth [m]	Soil name
1	4,90	0,00 - 4,90	GT1 - Fill
2	1,50	4,90 - 6,40	GT1 - Fill
3	2,20	6,40 - 8,60	GT2 - Clay
4	1,00	8,60 - 9,60	GT2 - Clay
5	0,90	9,60 - 10,50	GT2 - Clay
6	1,50	10,50 - 12,00	GT2 - Clay
7	2,80	12,00 - 14,80	GT3 - Shale
8	1,00	14,80 - 15,80	GT3 - Shale
9	3,50	15,80 - 19,30	GT3 - Shale
10	4,70	19,30 - 24,00	GT3 - Shale

Na kraju uklanjamo ponavljajuće granice – najjednostavniji način je ujediniti iste slojeve u jedan koristeći opciju “Merge layers with the same soil” in padajućem izborniku (pritisakom desne tipke miša).

No. -	Thickness [m]	Depth [m]	Soil name
1	6,40	0,00 - 6,40	GT1 - Fill
2	5,60	6,40 - 12,00	GT2 - Clay
3	12,00	12,00 - 24,00	GT3 - Shale

## Rezultat je profil tla s tri sloja.

Edit soil profile

— Identification  
Name: BH1  
Coordinate: x = 0,00 [m] y = 0,00 [m]  
z = 0,00 [m]  
Depth of the 1st point from original terrain: d<sub>1</sub> = 0,00 [m]

— Parameters  
GWT depth: h<sub>GWT</sub> = 12,50 [m]  
 Soil profile is active for geological model generation

— View field test  
GWT bored: GWT<sub>b</sub> = 15,80 m  
GWT steady: GWT<sub>s</sub> = 12,50 m

— Layers of soil profile

No.	Thickness [m]	Depth [m]	Soil name
1	6,40	0,00 - 6,40	GT1 - Fill
2	5,60	6,40 - 12,00	GT2 - Clay
3	12,00	12,00 - 24,00	GT3 - Shale

Buttons: Print log, copy soil profile into clipboard, OK, Cancel

GEO5 2020 - Stratigraphy (Logs, Cross Sections) [C:\Users\Dan\Desktop\Demo\_manual\_42.gsp 1]

File Edit Input Outputs Settings Help

Project Settings Templates Construction Site Terrain Points Terrain Edges Field Tests Soils Soil Profiles Interface Water Geological Sections Geological Model Output Profiles Output Sections

Soil Profiles

No.	Name	Test type	x [m]	Location y [m]	z [m]	Depth d <sub>1</sub> [m]	GWT depth h <sub>GWT</sub> [m]	Profile state
1	BH1	Borehole	0,00	0,00	0,00	24,00	12,50	OK
2	CPT1	CPT	10,00	20,00	0,00	0,00		not defined

Buttons: Print log, copy soil profile into clipboard, OK, Cancel

Nakon toga interpretirat ćemo i CPT. Kad se otvori dijaloški prozor, program evaluira CPT ispitivanje Robertson metodom i stvara slojeve tla.

Edit soil profile

— Identification  
Name: CPT1  
Coordinate: x = 10,00 [m] y = 20,00 [m]  
z = 0,00 [m]  
Depth of the 1st point from original terrain: d<sub>1</sub> = 0,00 [m]

— Classification  
Classification type: Robertson 2010  
Penetrometer net area ratio: α = 0,75 [-]  
Unit weight: input γ = 19,00 [kN/m<sup>3</sup>]  
Minimum thickness of layer: h = 0,25 [m]

— Parameters  
GWT depth: h<sub>GWT</sub> = (no water) [m]  
 Soil profile is active for geological model generation

— View field test  
Classification type: Robertson 2010  
Cone resistance q




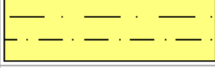

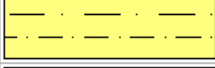

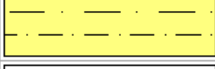










— Layers of soil profile

No.	Thickness [m]	Depth [m]	Soil name
			Clay - silty clay lo
			Silt mixtures - clayey
			Sand mixtures - silty sand to sandy silt
			Sand mixtures - silty
			Sands - clean sand
			Sands - clean sand to silty sand

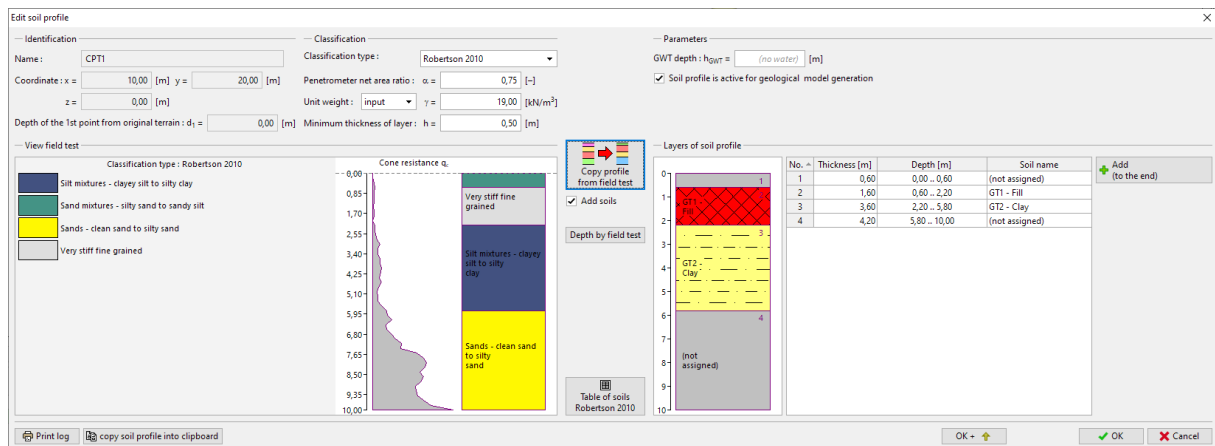
Buttons: Print log, copy soil profile into clipboard, OK, Cancel

Možemo dodijeliti vrste tla prema Robertsonu, u naše geotehničke vrste. Pritisnite tipku "Table of soils Robertson 2010" i probajte dodijeliti tla.

Table of soils (Robertson 2010) ✕

Soil description		Assigned soil	
Sensitive fine grained		(not assigned)	 Add soil
Organic soils - clay		GT2 - Clay ▼	 Add soil
Clay - silty clay to clay		GT2 - Clay ▼	 Add soil
Silt mixtures - clayey silt to silty clay		GT2 - Clay ▼	 Add soil
Sand mixtures - silty sand to sandy silt		(not assigned)	 Add soil
Sands - clean sand to silty sand		(not assigned)	 Add soil
Gravelly sand to dense sand		(not assigned)	 Add soil
Very stiff sand to clayey sand		GT1 - Fill ▼	 Add soil
Very stiff fine grained		GT1 - Fill ▼	 Add soil

Promijenit ćemo veličinu minimalnog sloja na 0.5 m kako bismo smanjili broj slojeva i dodijelili izrađene slojeve profilu.



Zatim ćemo modificirati profil dodjelom slojeva Škriljca i spajanjem sloja zapunjenja.

Soil profile editor window showing identification, classification, parameters, and layers of soil profile.

**Identification:** Name: CPT1, Classification type: Robertson 2010, Penetrometer net area ratio:  $\alpha = 0,75 [-]$ , Unit weight:  $\gamma = 19,00 [kN/m^3]$ , Minimum thickness of layer:  $h = 0,50 [m]$

**Parameters:** GW depth:  $h_{GW} = (no\ water) [m]$ ,  Soil profile is active for geological model generation

**View field test:** Cone resistance  $q_c$  vs Depth [m] plot. Legend: Silt mixtures - clayey silt to silty clay, Sand mixtures - silty sand to sandy silt, Sands - clean sand to silty sand, Very stiff fine grained.

**Layers of soil profile:**

No.	Thickness [m]	Depth [m]	Soil name
1	2,20	0,00 - 2,20	GT1 - Fill
2	3,60	2,20 - 5,80	GT2 - Clay
3	4,20	5,80 - 10,00	GT3 - Shale

Sad je profil izrađen.

3D visualization of the soil profile and associated data tables.

**Soil Profiles Table:**

No.	Name	Test type	x [m]	y [m]	z [m]	Depth $d_{test}$ [m]	GW depth $h_{GW}$ [m]	Profile state
1	BH1	Borehole	0,00	0,00	0,00	24,00	12,50	OK
2	CPT1	CPT	10,00	-10,00	0,00	10,00		OK

**Soil Profile Layers Table (z = 0,00 m):**

No.	Thickness [m]	Depth [m]	Soil name
1	2,20	0,00 - 2,20	GT1 - Fill
2	3,60	2,20 - 5,80	GT2 - Clay
3	4,20	5,80 - 10,00	GT3 - Shale

## Pristup 2 – izrada profila tla korsteći geološke presjeke

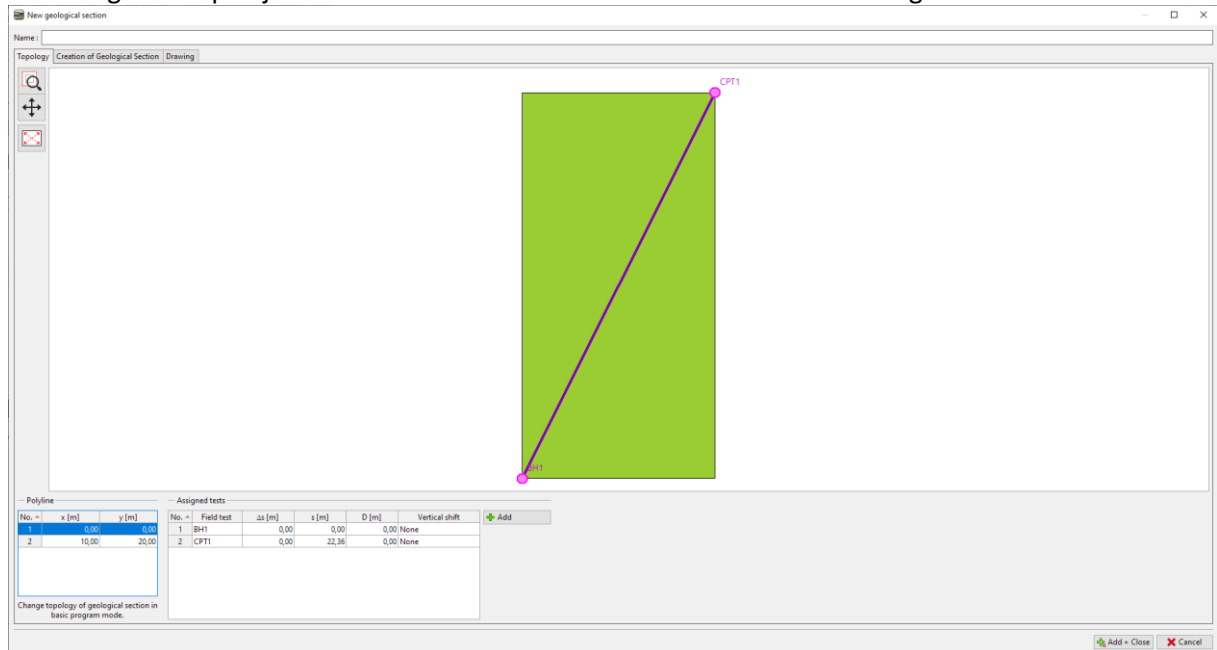
Ova metoda ima za prednost to što možemo izraditi našu ideju za više profila u isto vrijeme. Također možemo odlučiti koje geotehničke vrste izraditi do izrade samog presjeka.

Ponovno otvaramo datoteku *Demo\_manual\_42.gsg*.

Idemo u karticu “Geological Sections”.

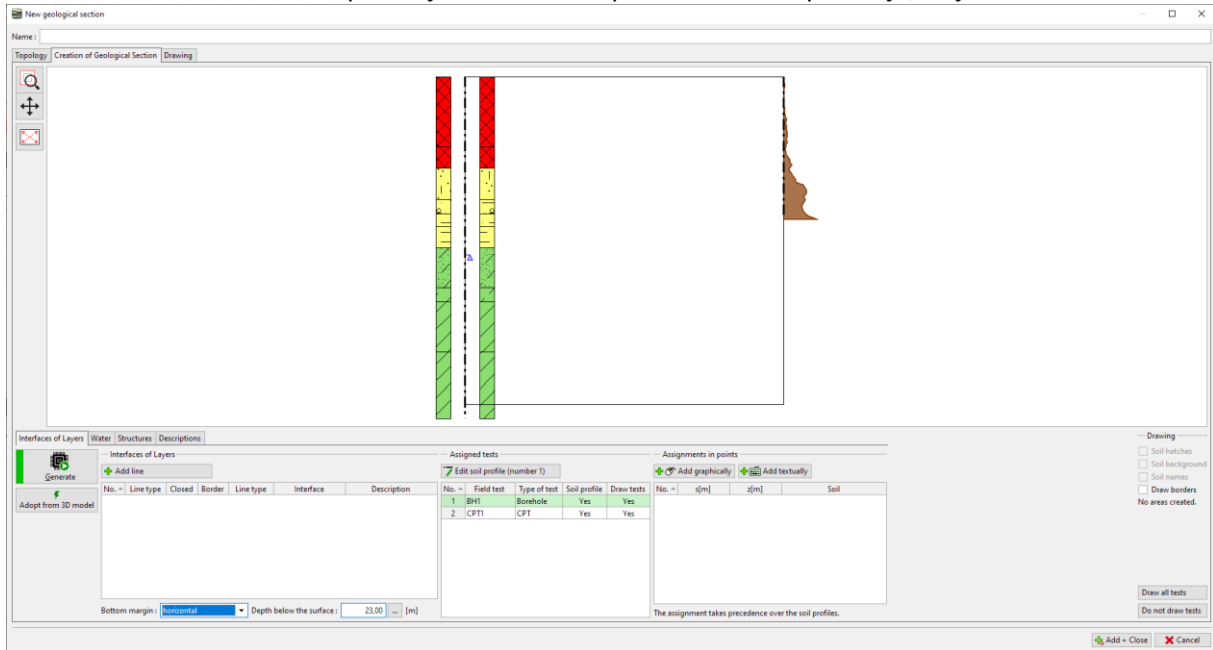


Unesite geološki presjek od BH1 do CPT1 i idite u karticu “Creation of Geological Section”.

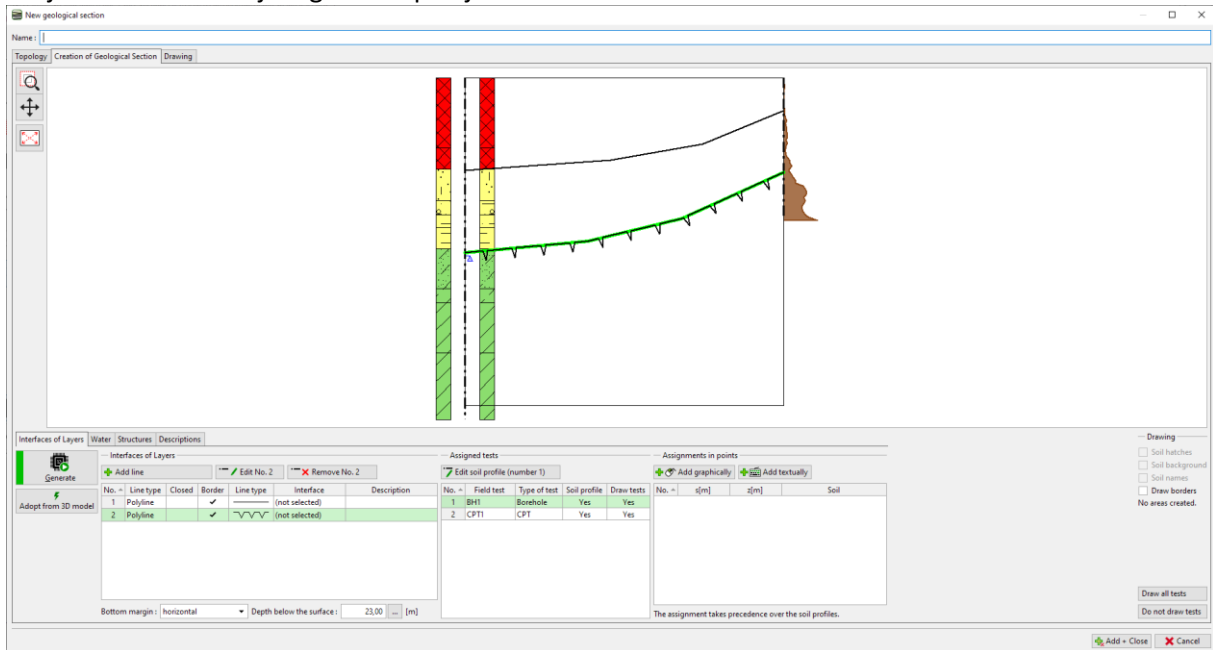




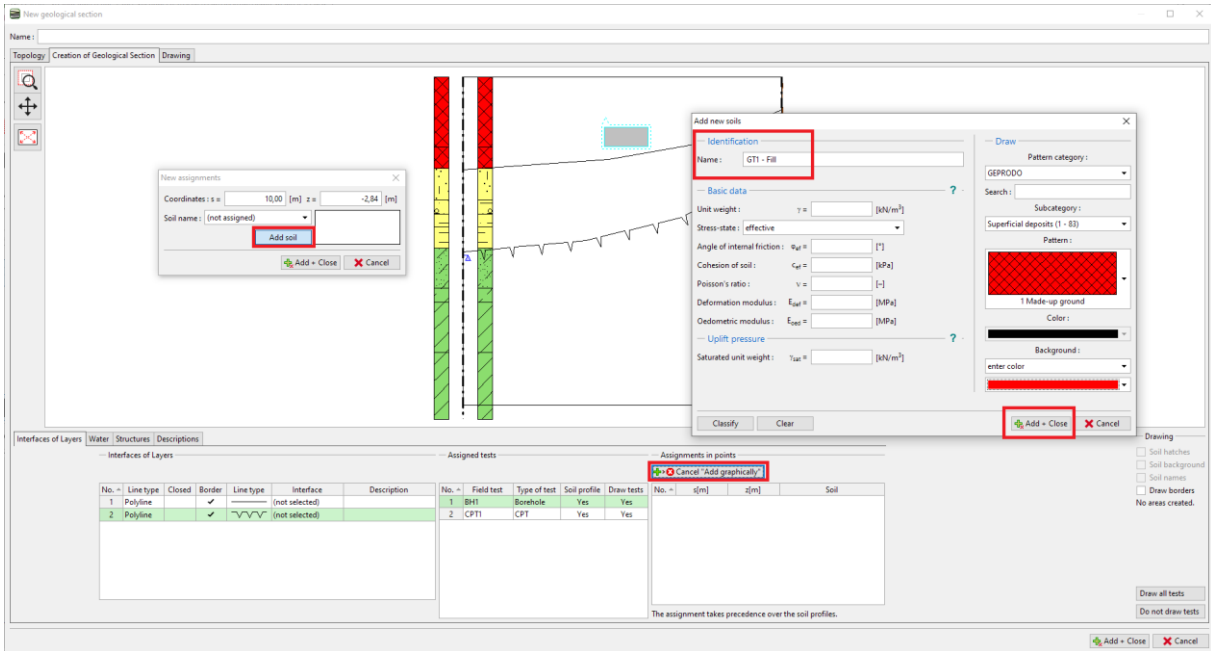
Vidimo odabrana terenska ispitivanja. Profili tla su prikazani u osi ispitivanja, ali još nisu izrađeni.



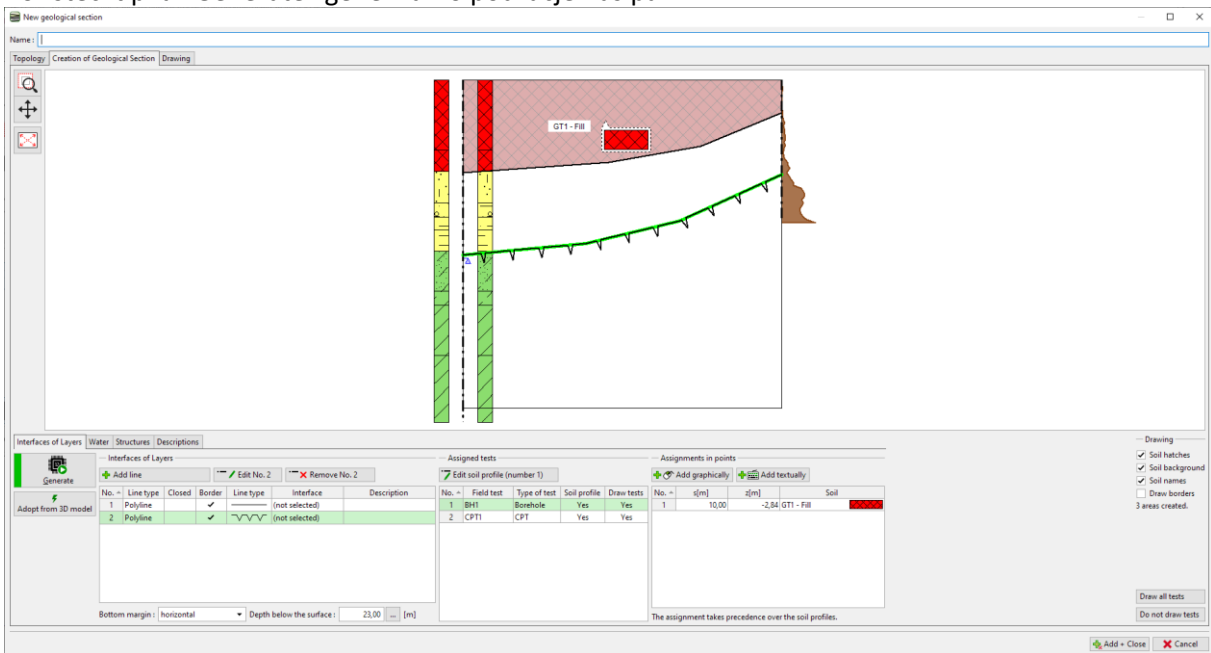
Unijet ćemo našu ideju u geološki presjek.



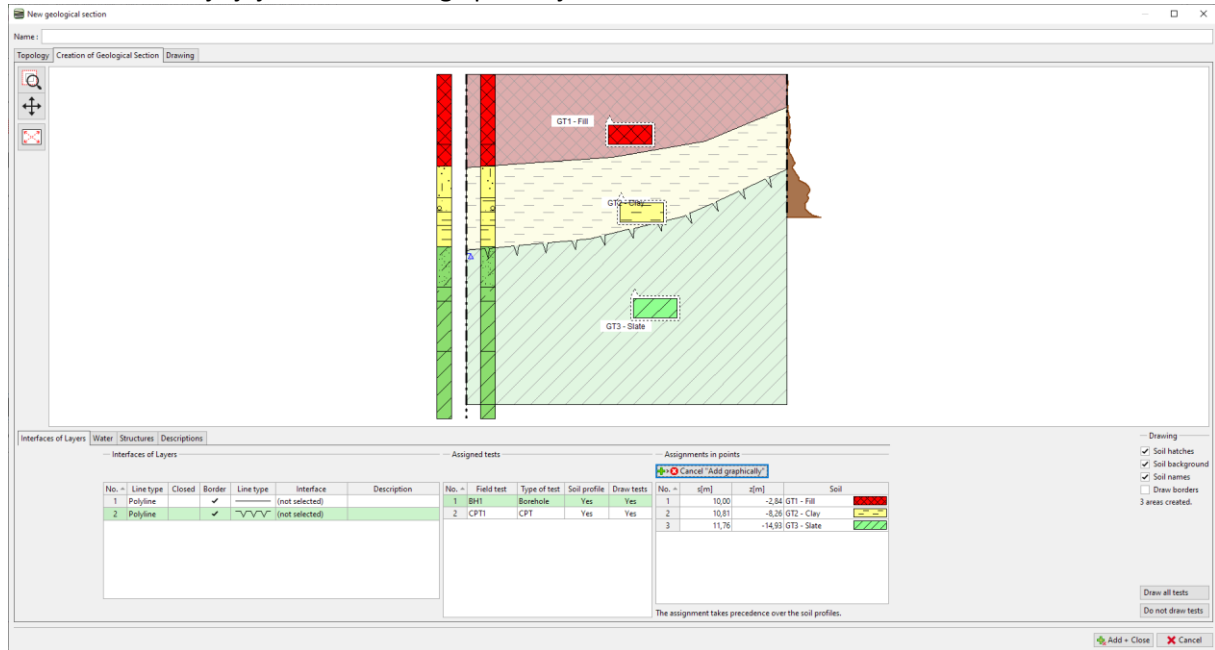
Unijet ćemo točke zadatke u područje i dodijeliti tla i odgovarajuće geotehničke vrste. Ako vrsta već nije izrađena, možemo to učiniti sada.



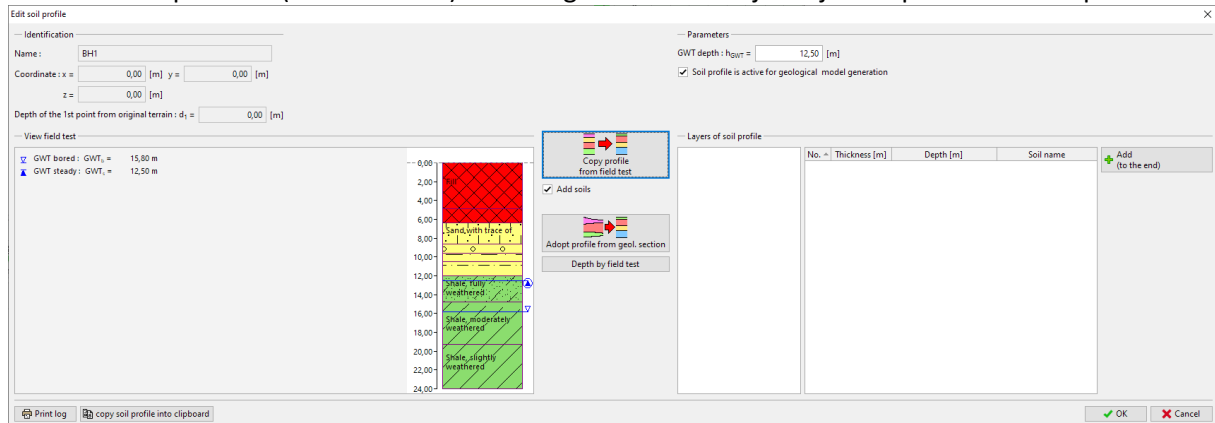
Koristeći tipku "Generate" generiramo područje nasipa.



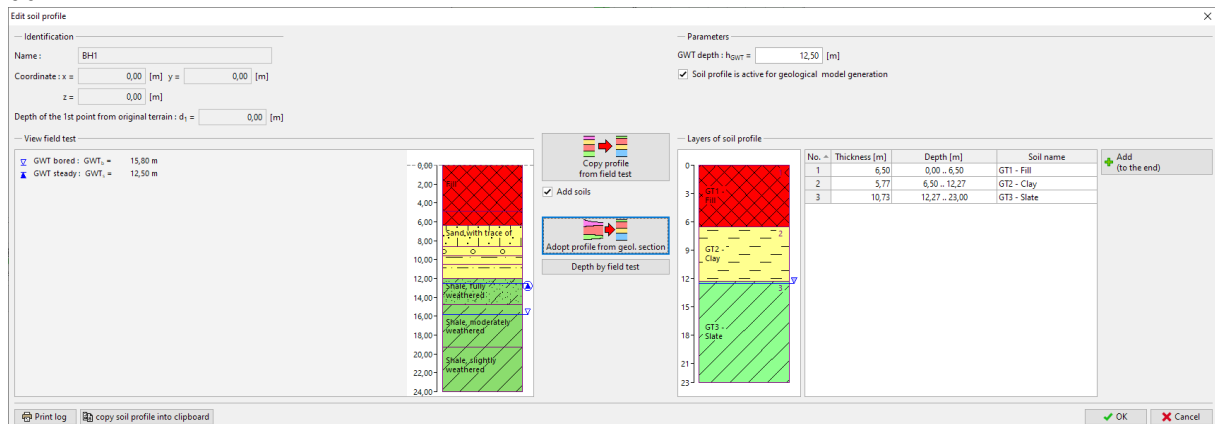
Na isti način dodjeljujemo tla na druga područja.



Otvorit ćemo profil tla (bušotina BH1) i urediti ga. Možemo vidjeti dijaloški prozor za unos profila tla.



Koristeći tipku "Adopt profile from geol. section" svi podaci iz geološkog presjeka se prenose u profil tla.



## Dodijelit ćemo individualne slojeve u odgovarajuće geotehničke vrste - tla.

Edit soil profile

Identification: Name: BH1  
 Coordinate: x = 0,00 [m] y = 0,00 [m]  
 z = 0,00 [m]  
 Depth of the 1st point from original terrain: d<sub>1</sub> = 0,00 [m]

Parameters: GWT depth: h<sub>GWT</sub> = 12,50 [m]  
 Soil profile is active for geological model generation

View field test: GWT bored: GWT<sub>b</sub> = 15,80 m  
 GWT steady: GWT<sub>s</sub> = 12,50 m

Layers of soil profile

No.	Thickness [m]	Depth [m]	Soil name
1	6,50	0,00 - 6,50	GT1 - Fill
2	5,77	6,50 - 12,27	GT2 - Clay
3	10,73	12,27 - 23,00	GT3 - Slate

Buttons: Copy profile from field test, Add soils, Depth by field test, Add (to the end)

## Ponoviti ćemo proces za CPT također. To se može napraviti za dubinu modela (ispod) ili samo za dubinu terenskog ispitivanja.

Edit soil profile

Identification: Name: CPT1  
 Classification type: do not classify  
 Coordinate: x = 10,00 [m] y = 20,00 [m]  
 z = 0,00 [m]  
 Depth of the 1st point from original terrain: d<sub>1</sub> = 0,00 [m]

Parameters: GWT depth: h<sub>GWT</sub> = (no water) [m]  
 Soil profile is active for geological model generation

View field test: Cone resistance q.

Layers of soil profile

No.	Thickness [m]	Depth [m]	Soil name
1	2,30	0,00 - 2,30	GT1 - Fill
2	4,33	2,30 - 6,63	GT2 - Clay
3	16,37	6,63 - 23,00	GT3 - Slate

Buttons: Insert interface into profile, Adopt profile from geol. section, Depth by field test, Add (to the end)

## Nakon toga se vraćamo u presjek i vidimo da su se profili tla izradili.

New geological section

Toplogy: Creation of Geological Section | Drawing

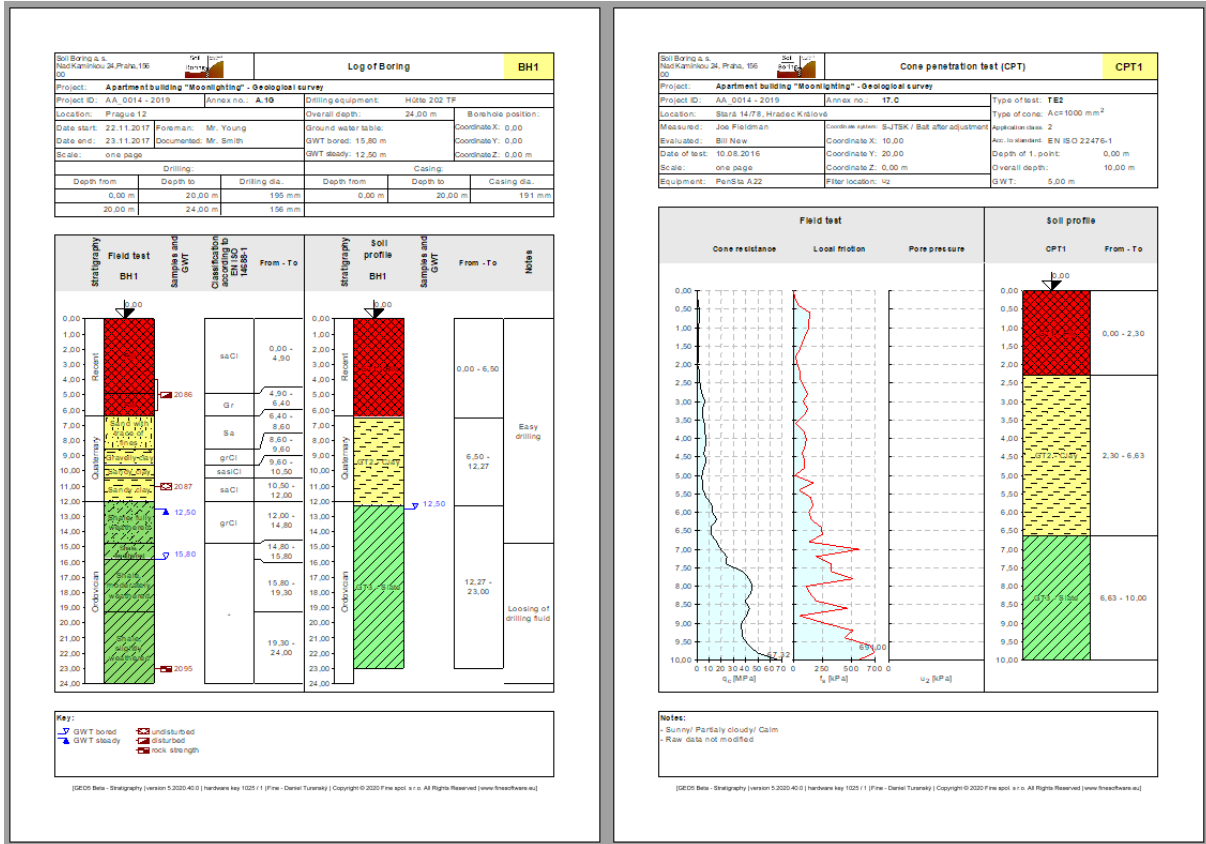
Interfaces of Layers: Water, Structures, Descriptions

Interfaces of Layers				Assigned tests				Assignments in points				
No.	Line type	Closed	Border	No.	Field test	Type of test	Soil profile	Draw tests	No.	s [m]	z [m]	Soil
1	Polylines			1	BH1	Borehole	Yes	Yes	1	10,00	-2,04	GT1 - Fill
2	Polylines			2	CPT1	CPT	Yes	Yes	2	10,81	-8,26	GT2 - Clay
									3	11,76	-14,93	GT3 - Slate

Buttons: Add line, Edit No. 2, Remove No. 2, Add graphically, Add textually, Draw all tests, Do not draw tests, Add - Close, Cancel

## Rad s profilima tla

Program, odnosno odabrani predložak sadrži potokole za ispis profila tla – kao izvještaj terenskog ispitivanja i njegove interpretacije.



Nakon toga generiram 3D model slojeva tla iz izrađenih profila tla.

