



VSE

VSE S.r.l.

PIAZZALE CADORNA N. 14 - MILANO (MI)

C.F. 02607460223 e P.IVA 13156270962

REA MI - 2615671

Copia conforme all'originale sottoscritto digitalmente da RICCIARDI MARCO, CALEFFI CARLO

Regione Emilia - Romagna

Comune di Caorso

Provincia di Piacenza

Provvedimento Autorizzatorio Unico Regionale (P.A.U.R.)

Titolo:

Impianto di produzione di energia elettrica da fonte fotovoltaica
"CAORSO"

Oggetto:

RELAZIONE GEOLOGICA, GEOTECNICA E SISMICA IMPIANTO
Allegato 4: verifiche a liquefazione

Codifica Elaborato:

RV.

01

Impresa/Studio di progettazione:



Servizi Integrati Gestionali Ambientali srl
Circonvallazione Piazza D'Armi, 130 48122
Ravenna (RA)
C.F. e P.I. 01465700399

Progettista:

Dott. Geol. Carlo Caleffi - Engeo srl



Latitudine:
Longitudine:

Cod. File:

RV.01_CAORSO_PD_00_GEOL_ALL 4 VERIFICHE LIQUEFAZIONE.pdf

Scala:

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Formato:

-

Codice:

PD

Rev.:

00

Rev.	Data	Descrizione revisione:	Redatto:	Controllato:	Approvato:
0	02/2025	Prima emissione	Dott. Geol. Alessandro Ferrari	Dott. Geol. Carlo Caleffi	Ing. Viviana Masucci
1	mm/aaaa				
2	mm/aaaa				



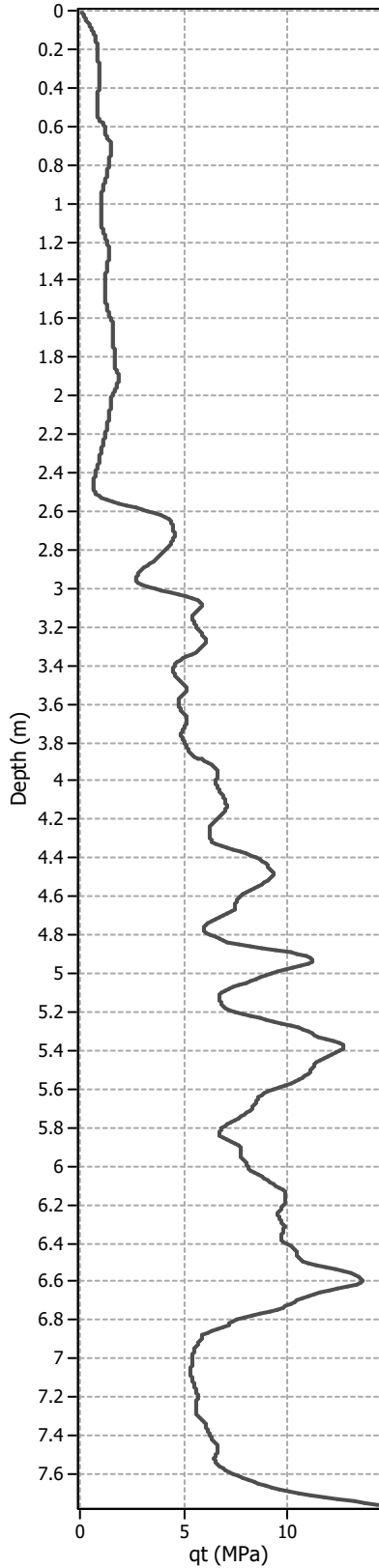
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ENGINEERING GEOLOGY

Engeo S.r.l.
via Adorni, 2 - 43121 Parma
info@engeo.it
www.engeo.it

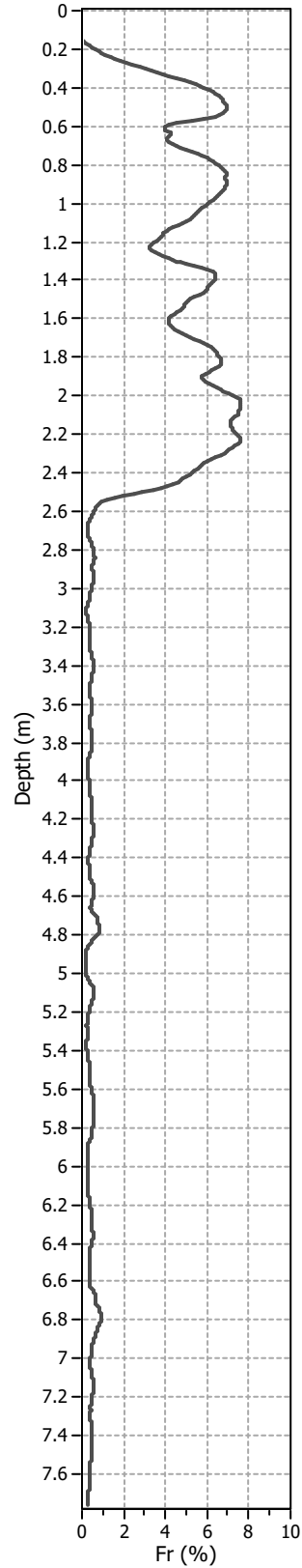
Project: Impianto fotovoltaico
Location: Caorso (PC)

CPT: CPTU1
Total depth: 7.76 m

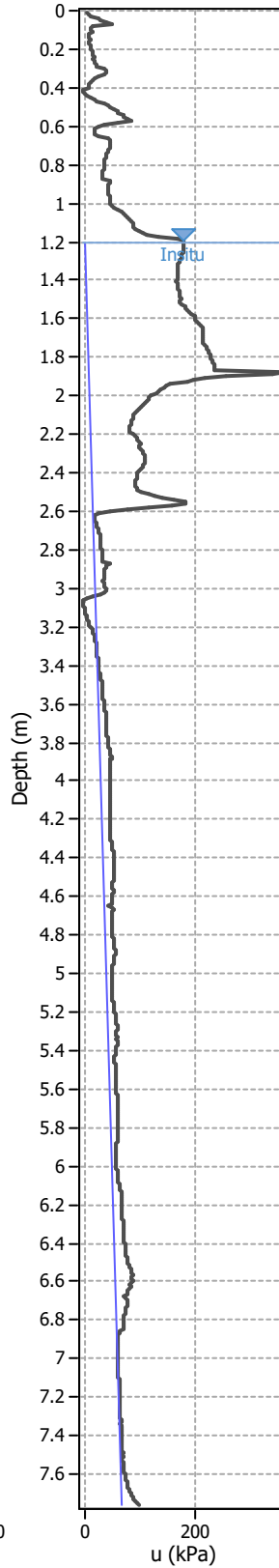
Cone resistance



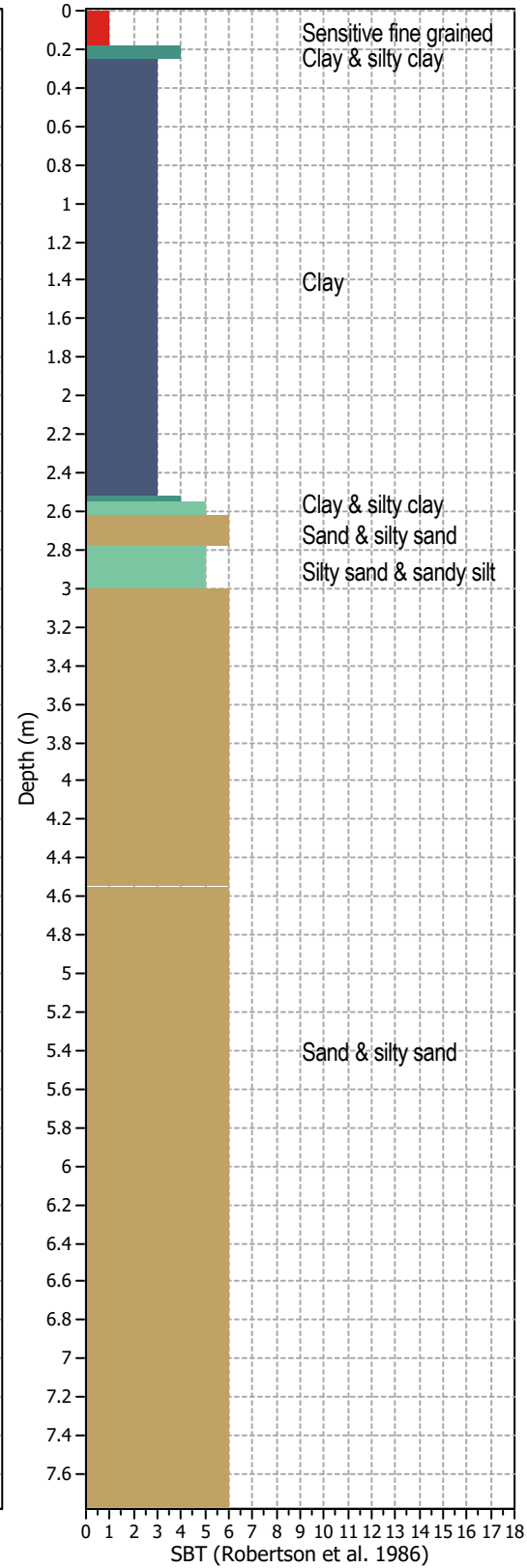
Norm. friction ratio



Pore pressure



Soil Behaviour Type



Analysis method: NCEER (1998)
Fines correction method: NCEER (1998)
Points to test: Based on Ic value
Earthquake magnitude M_w : 5.60
Peak ground acceleration: 0.09

G.W.T. (in-situ): 1.20 m
G.W.T. (earthq.): 1.00 m
Average results interval: 5
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT

Use fill: No
Fill height: N/A
Fill weight: N/A
Trans. detect. applied: Yes
 K_0 applied: Yes

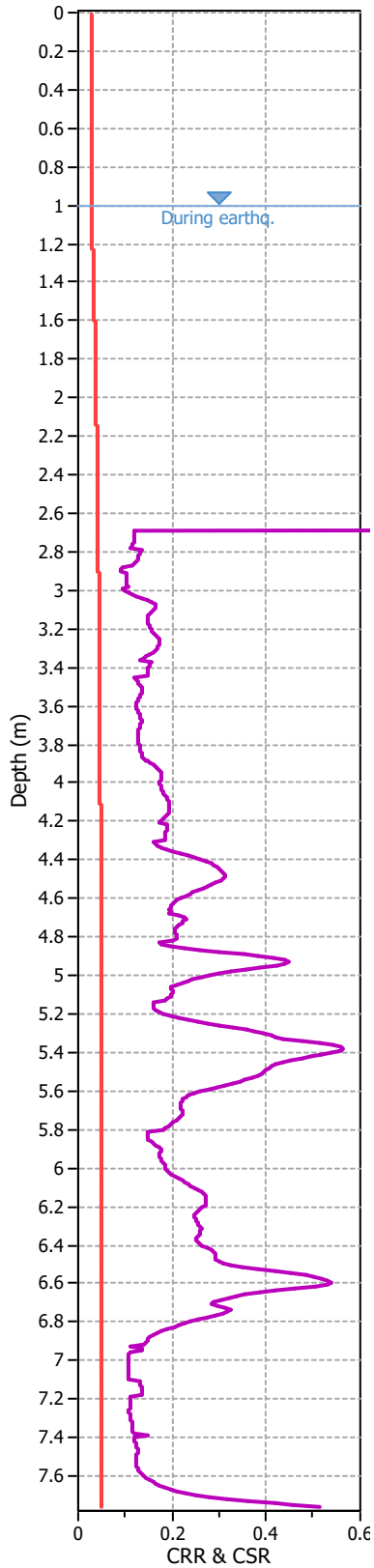
Clay like behavior applied: No
Limit depth applied: No
Limit depth: N/A
MSF method: Method based



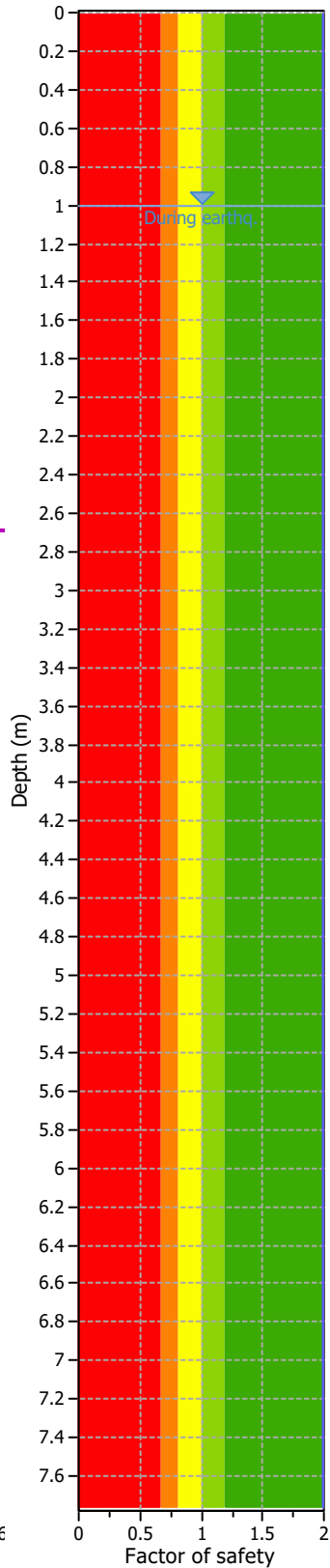
Project: Impianto fotovoltaico
Location: Caorso (PC)

CPT: CPTU1
Total depth: 7.76 m

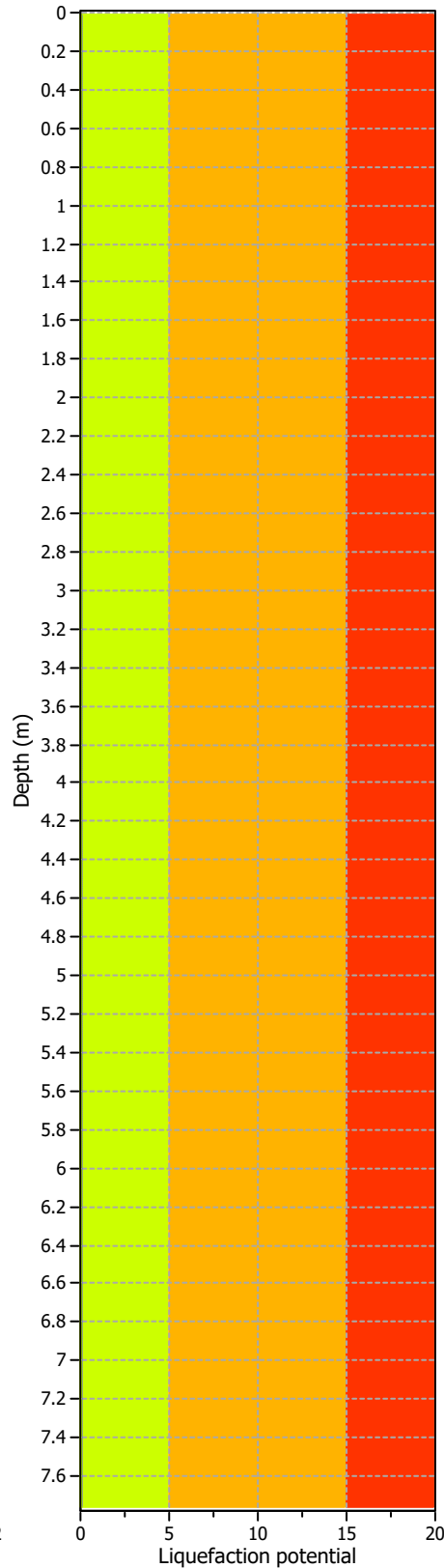
CRR plot



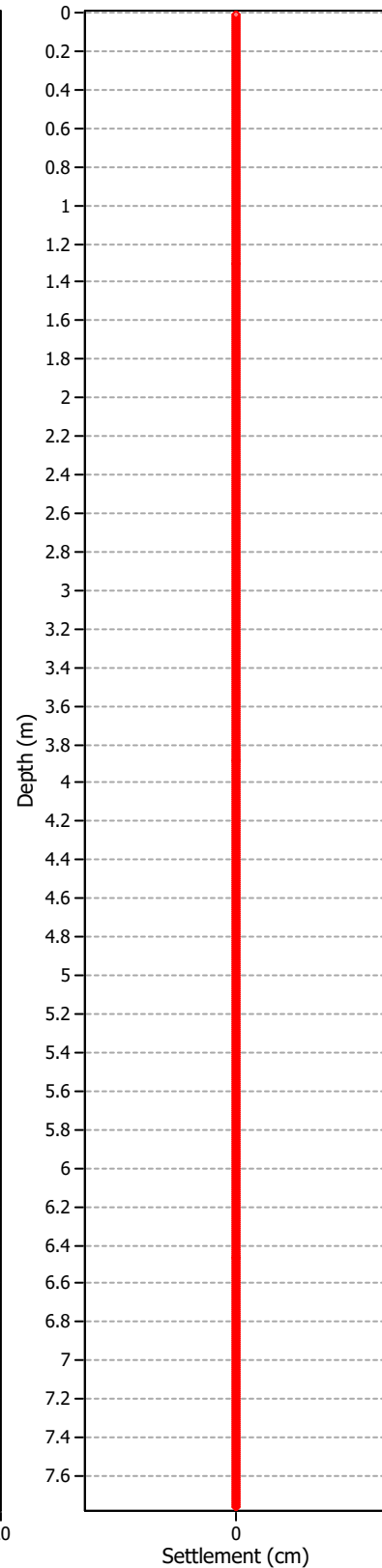
FS Plot



LPI



Vertical settlements



Analysis method: NCEER (1998)
Fines correction method: NCEER (1998)
Points to test: Based on I_c value
Earthquake magnitude M_w : 5.60
Peak ground acceleration: 0.09

G.W.T. (in-situ): 1.20 m
G.W.T. (earthq.): 1.00 m
Average results interval: 5
 I_c cut-off value: 2.60
Unit weight calculation: Based on SBT

Use fill: No
Fill height: N/A
Fill weight: N/A
Trans. detect. applied: Yes
 K_0 applied: Yes

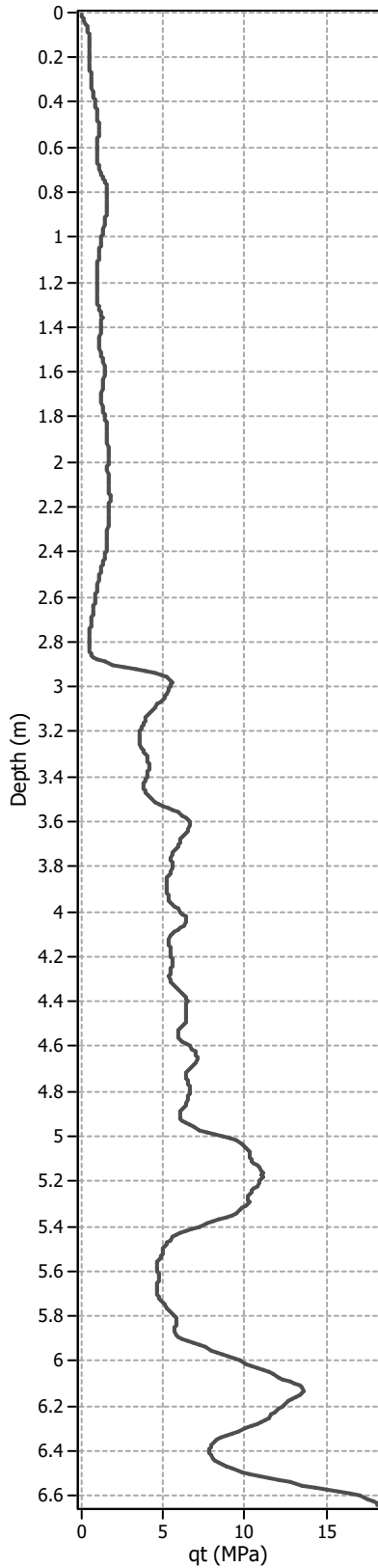
Clay like behavior applied: Sands only
Limit depth applied: No
Limit depth: N/A
MSF method: Method based



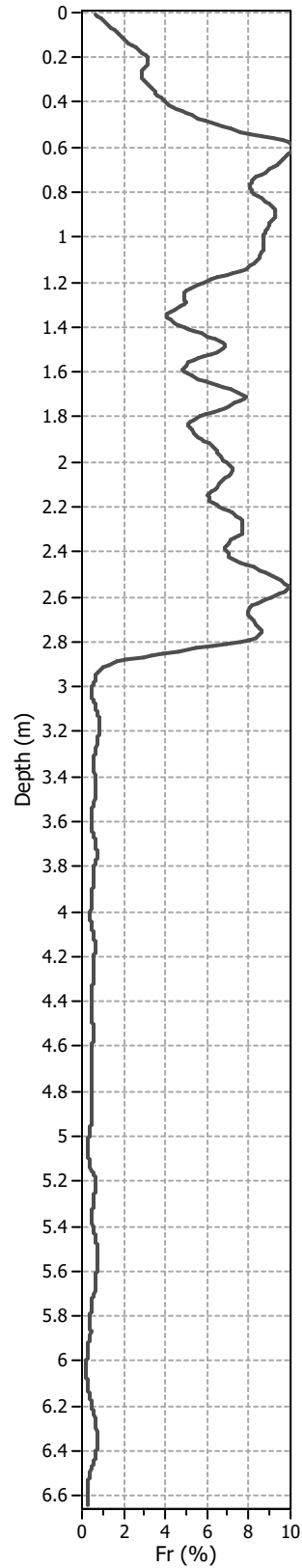
Project: Impianto fotovoltaico
Location: Caorso (PC)

CPT: CPTU2
Total depth: 6.64 m

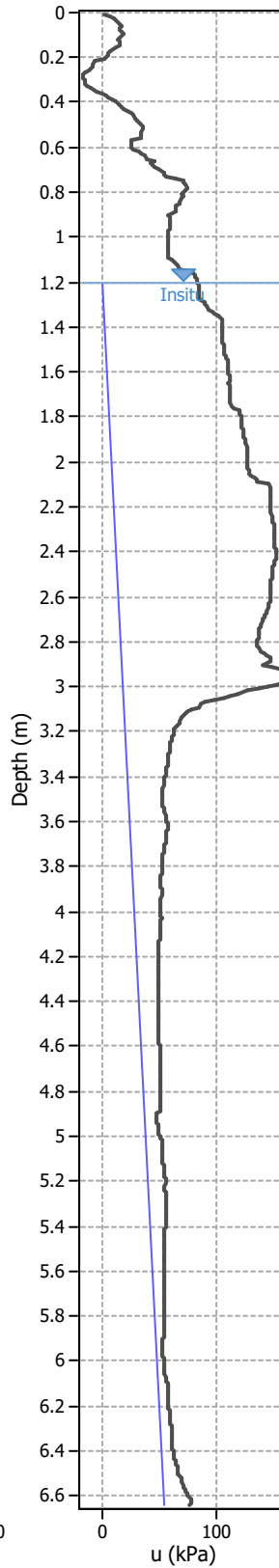
Cone resistance



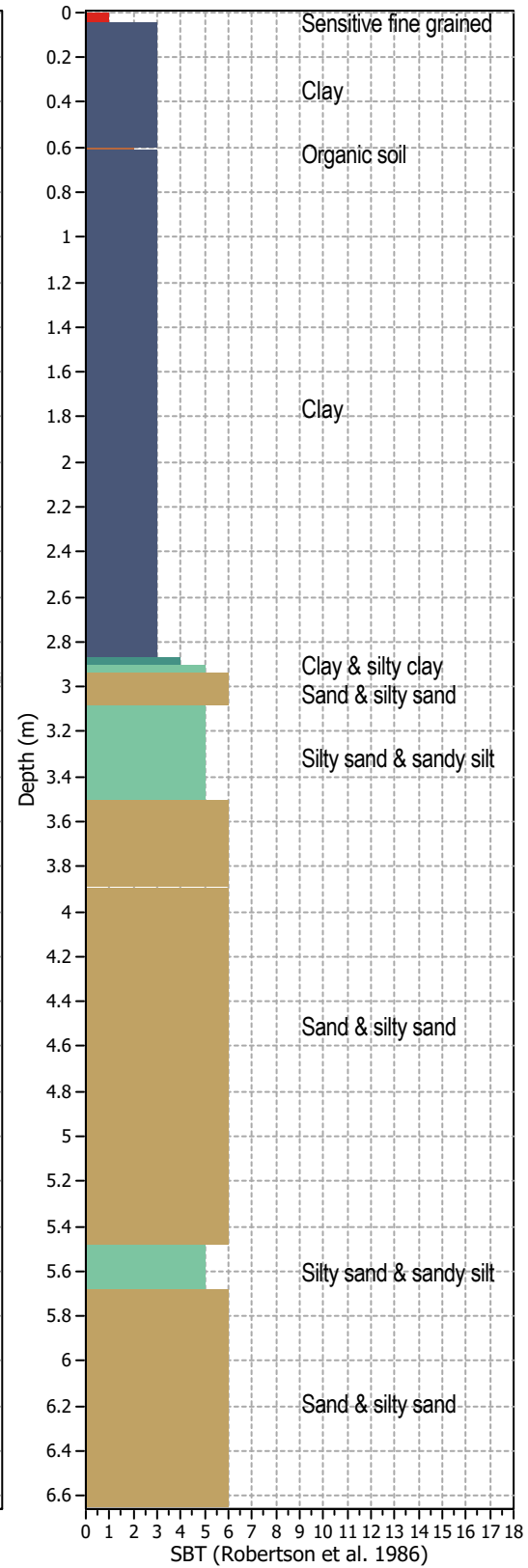
Norm. friction ratio



Pore pressure



Soil Behaviour Type



Analysis method: NCEER (1998)
Fines correction method: NCEER (1998)
Points to test: Based on Ic value
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Peak ground acceleration: 0.09

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G.W.T. (earthq.): 1.00 m
Average results interval: 5
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT

Use fill: No
Fill height: N/A
Fill weight: N/A
Trans. detect. applied: Yes
 K_0 applied: Yes

Clay like behavior applied: No
Limit depth applied: No
Limit depth: N/A
MSF method: Method based



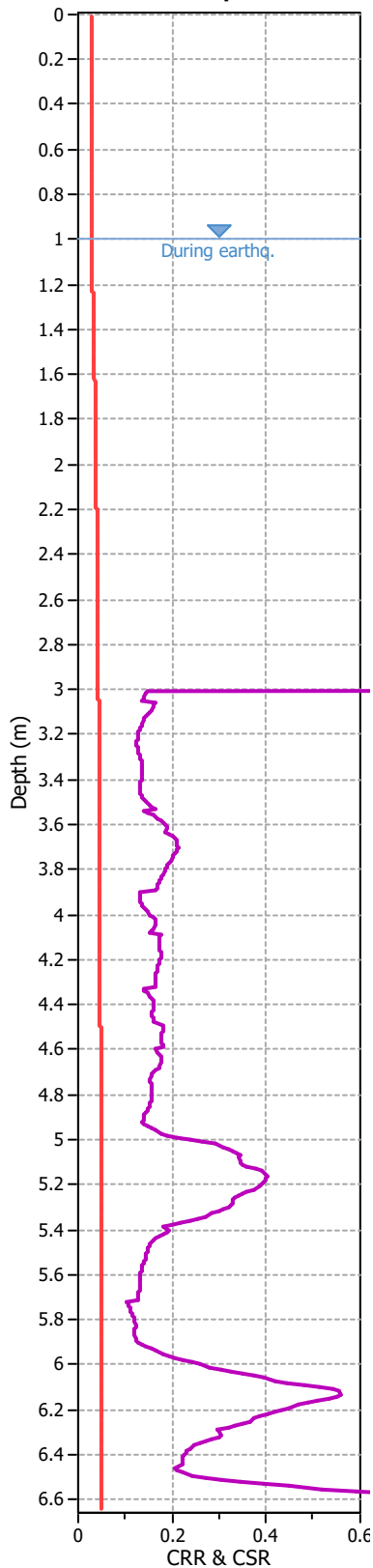
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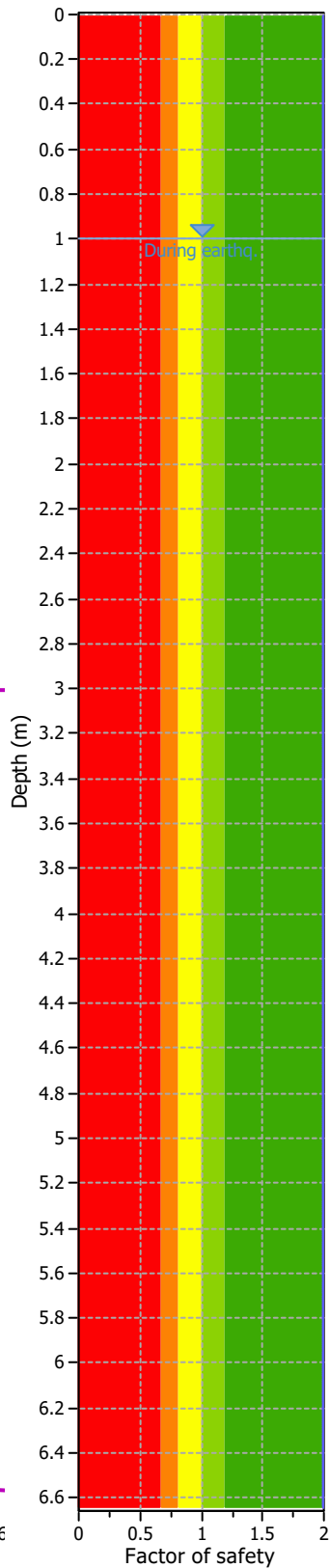
Project: Impianto fotovoltaico
Location: Caorso (PC)

CPT: CPTU2
Total depth: 6.64 m

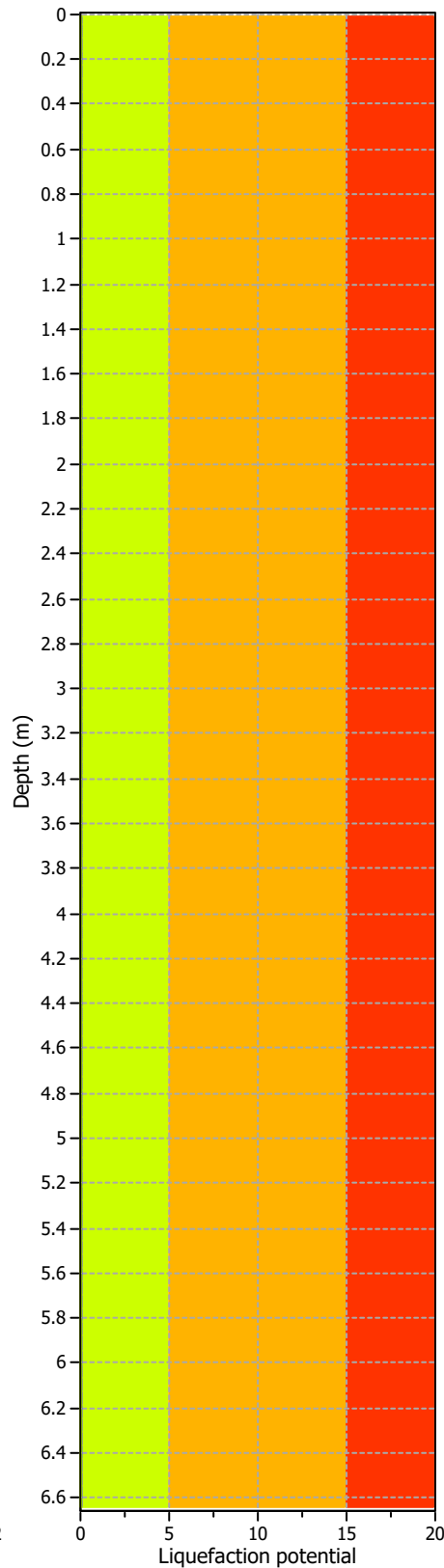
CRR plot



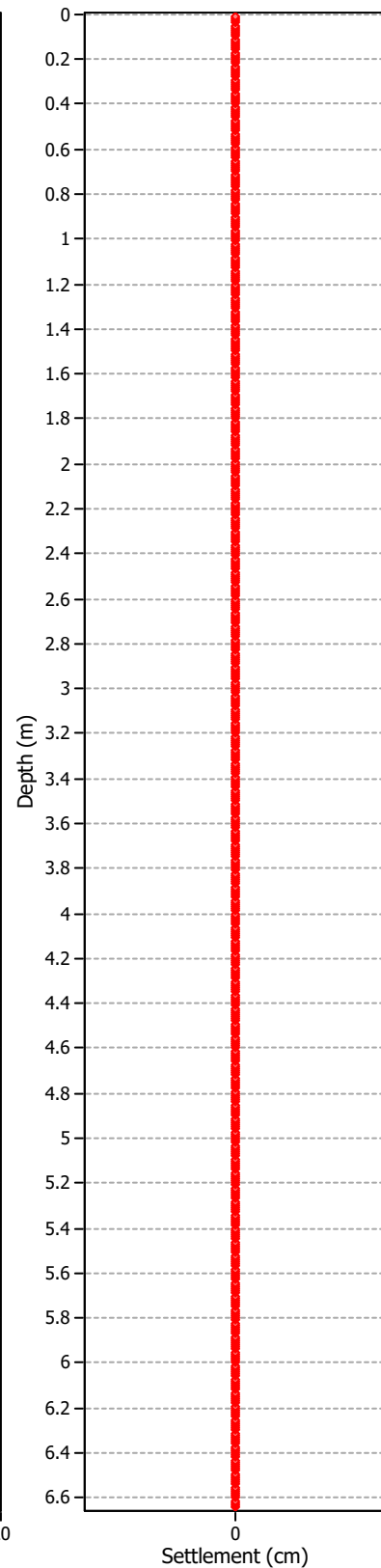
FS Plot



LPI



Vertical settlements



Analysis method: NCEER (1998)
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Points to test: Based on Ic value
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Clay like behavior applied: Sands only
Limit depth applied: No
Limit depth: N/A
MSF method: Method based



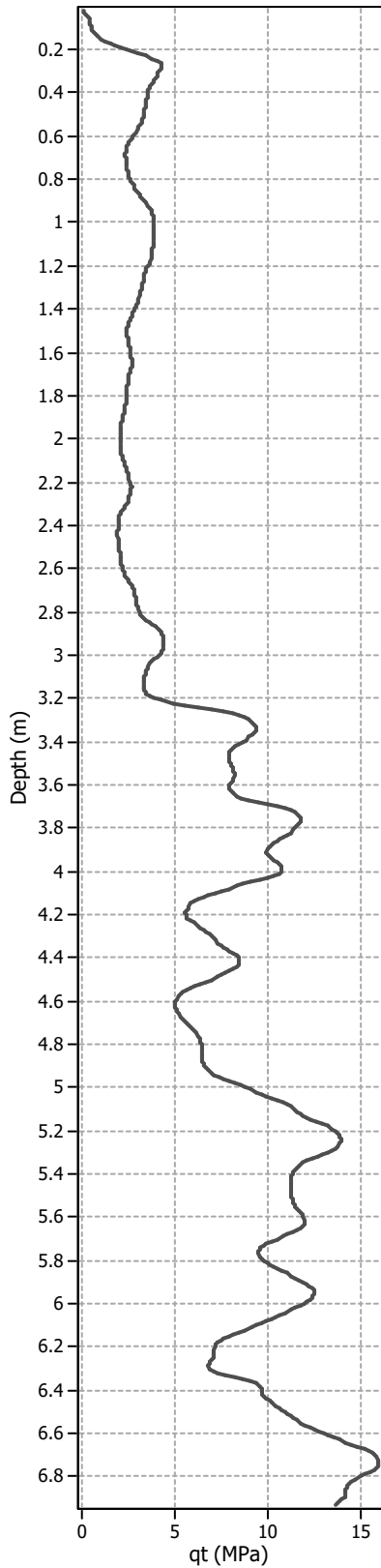
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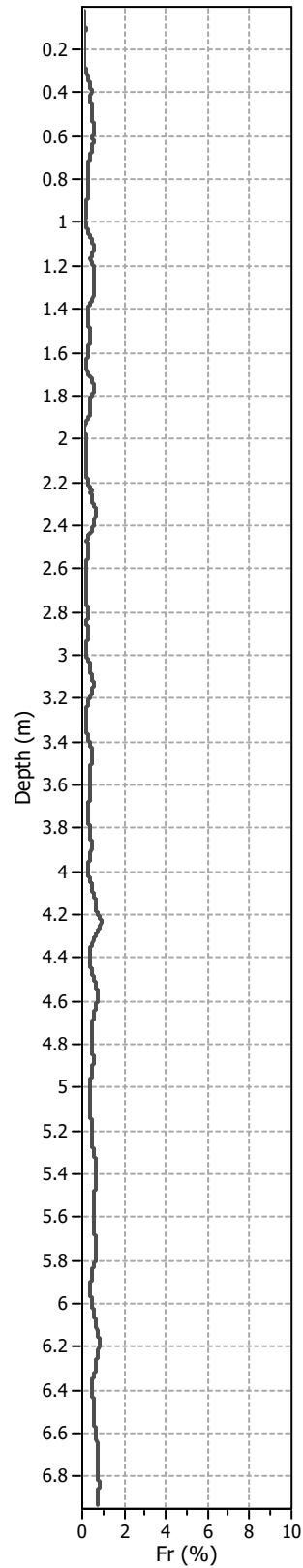
Project: Impianto fotovoltaico
Location: Caorso (PC)

CPT: CPTU3
Total depth: 6.93 m

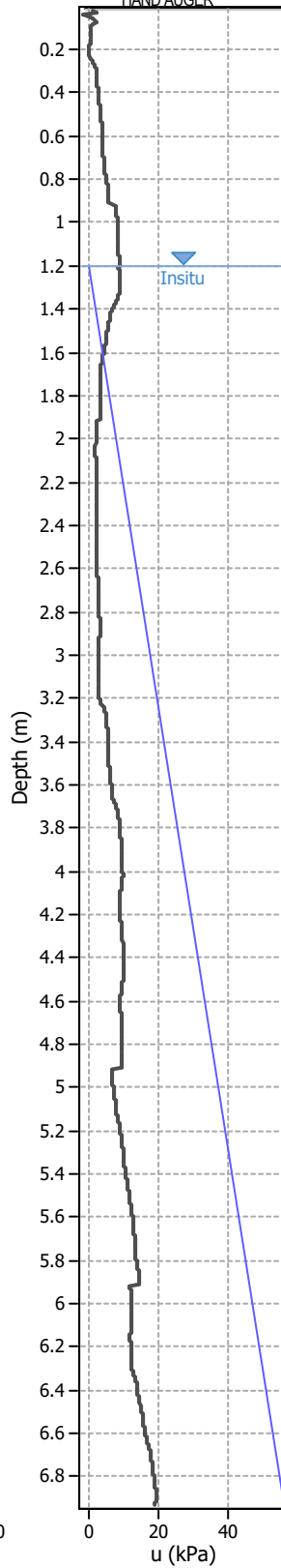
Cone resistance



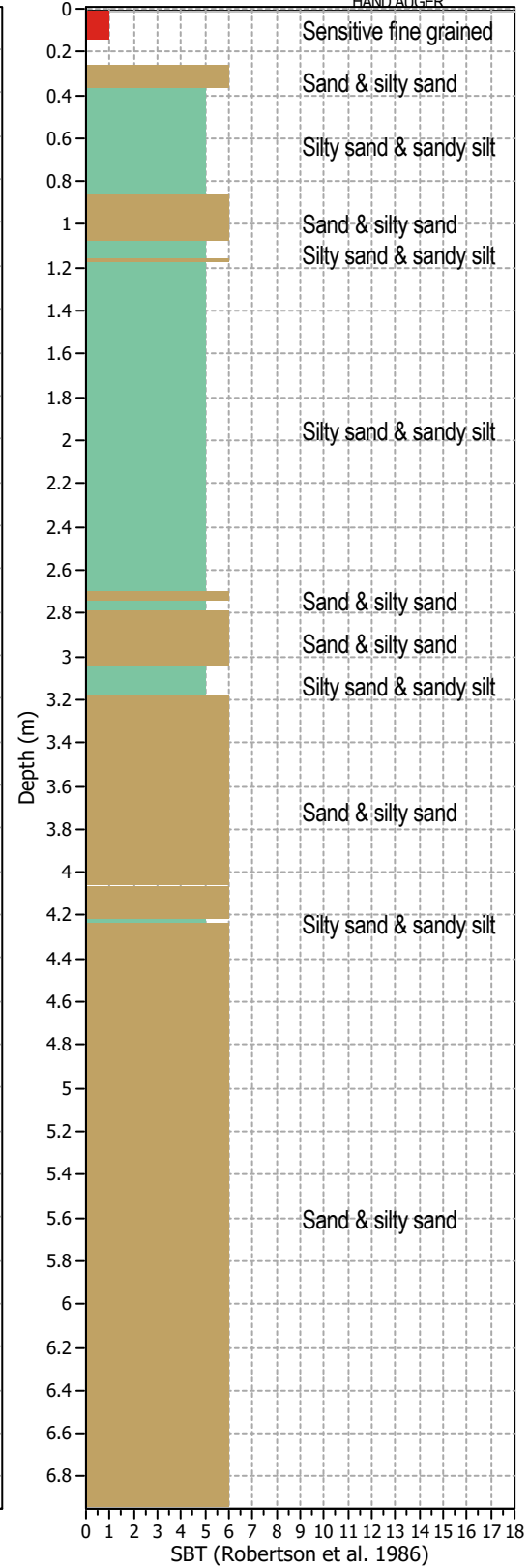
Norm. friction ratio



Pore pressure



Soil Behaviour Type



Analysis method:	NCEER (1998)	G.W.T. (in-situ):	1.20 m	Use fill:	No	Clay like behavior	
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	applied:	Sands only
Points to test:	Based on Ic value	Average results interval:	5	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	5.60	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.09	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

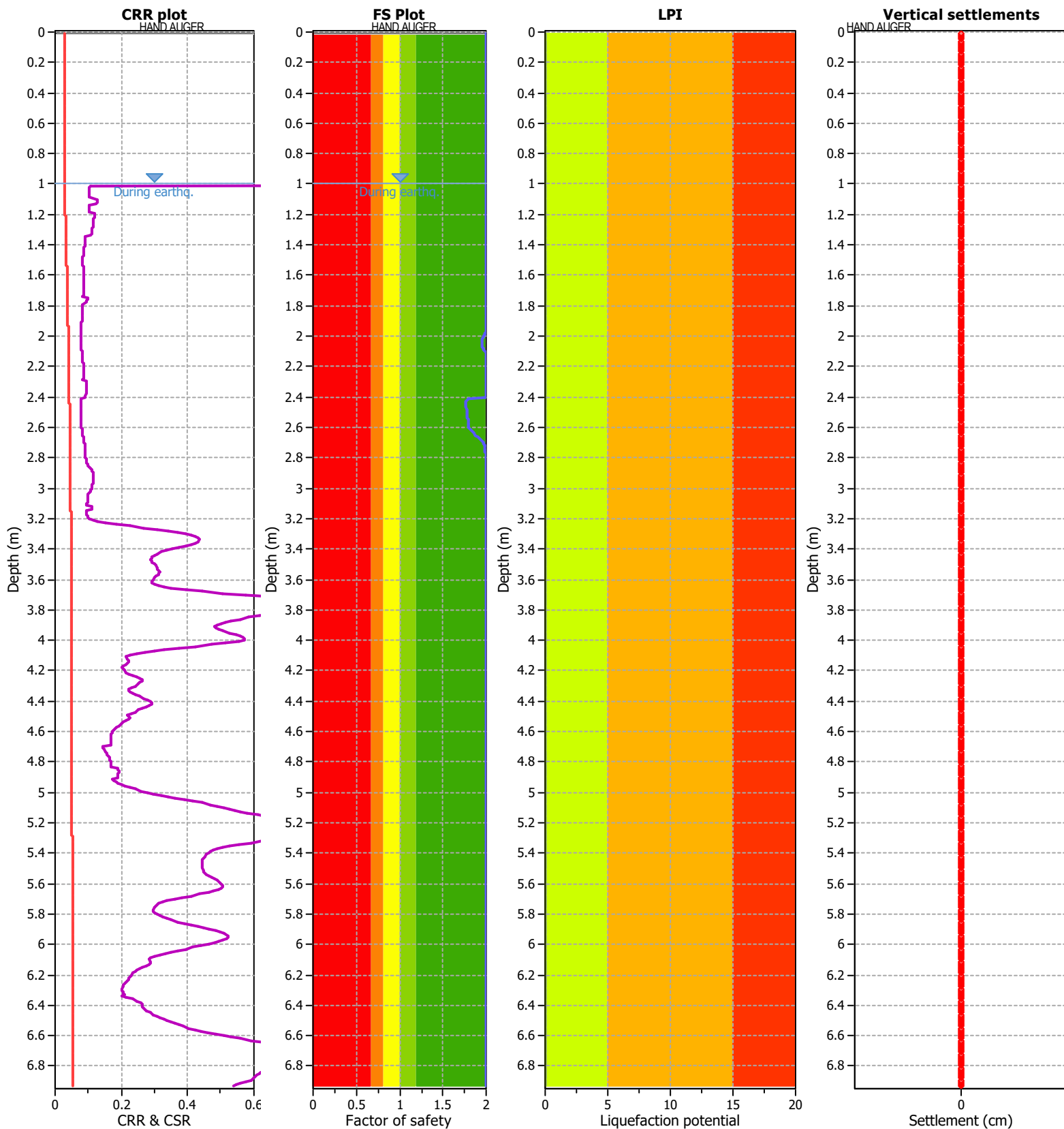


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Project: Impianto fotovoltaico
Location: Caorso (PC)

CPT: CPTU3
Total depth: 6.93 m



Analysis method: NCEER (1998)
Fines correction method: NCEER (1998)
Points to test: Based on Ic value
Earthquake magnitude M_w : 5.60
Peak ground acceleration: 0.09

G.W.T. (in-situ): 1.20 m
G.W.T. (earthq.): 1.00 m
Average results interval: 5
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT

Use fill: No
Fill height: N/A
Fill weight: N/A
Trans. detect. applied: Yes
 K_0 applied: Yes

Clay like behavior applied: Sands only
Limit depth applied: No
Limit depth: N/A
MSF method: Method based