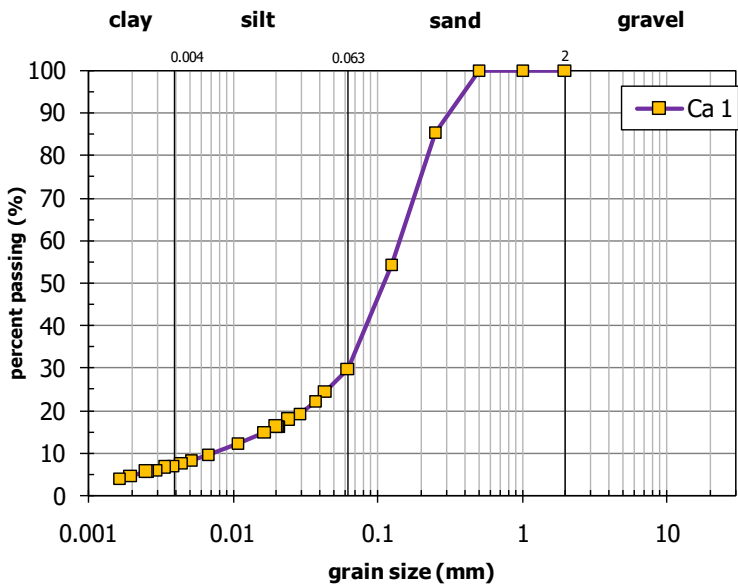


Salvatonica, Municipality of Bondeno (FE) – “Ca 1”

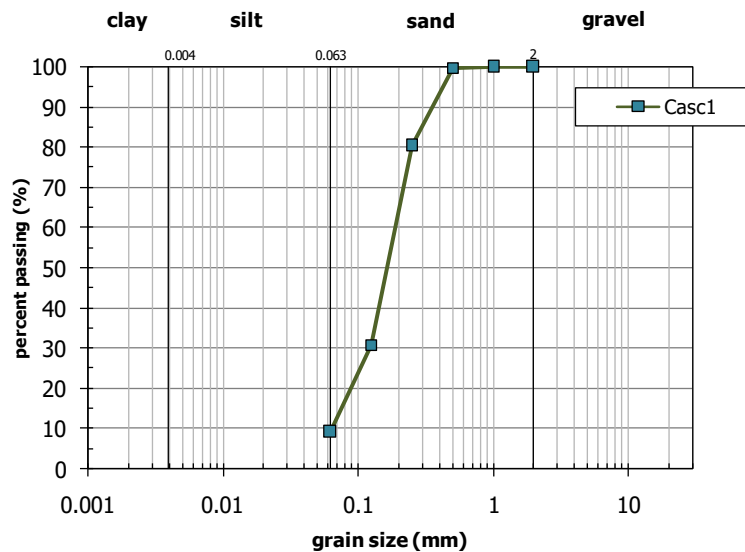
Site:	Salvatonica, Municipality of Bondeno (FE)			
Location map:				
Sand boil sample:	Ca1			
Coordinates (WGS 84):	Latitude: 44°54'59.17"N		Longitude: 11°27'54.92"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	---			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: ---		Dip: ---	

Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 35 %	U = 21.33	C = 3.31	σ = 2.875
Compositional information:	---			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ tests	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground

acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

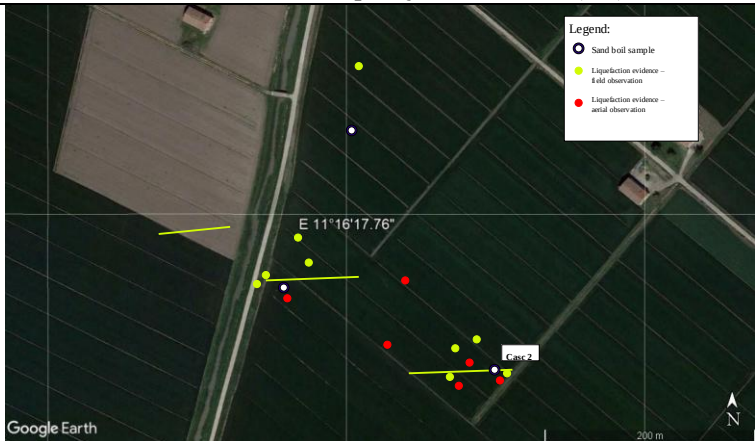
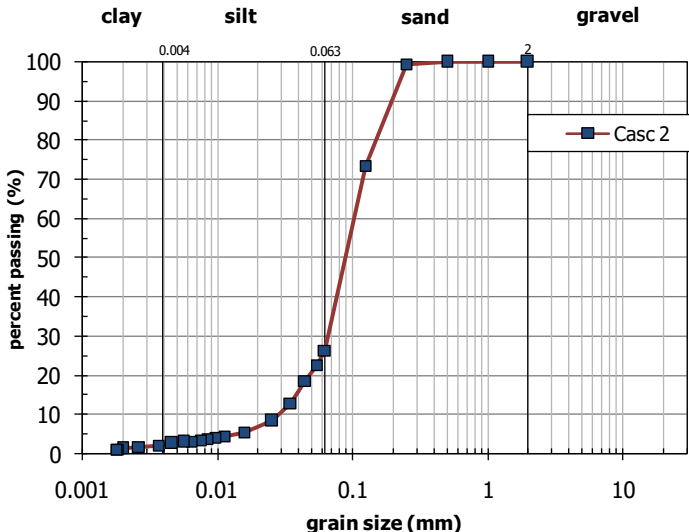
Cascinetta, Municipality of Bondeno (FE) – “Casc 1”

Site:	Cascinetta, Municipality of Bondeno (FE)			
Location map:				
Sand boil sample:	Casc1			
Coordinates (WGS 84):	Latitude: 44°53'59.63"N		Longitude: 11°16'17.93"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	30/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: ---		Dip: ---	
	Fracture, length 20 m			
Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 13%	U = 2.92	C = 1.37	σ = ---
Compositional information:	---			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical

settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

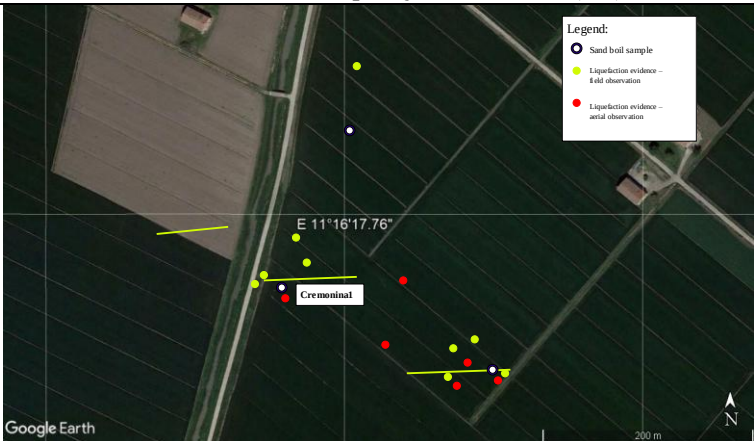
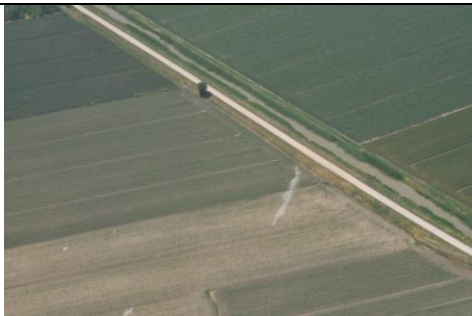
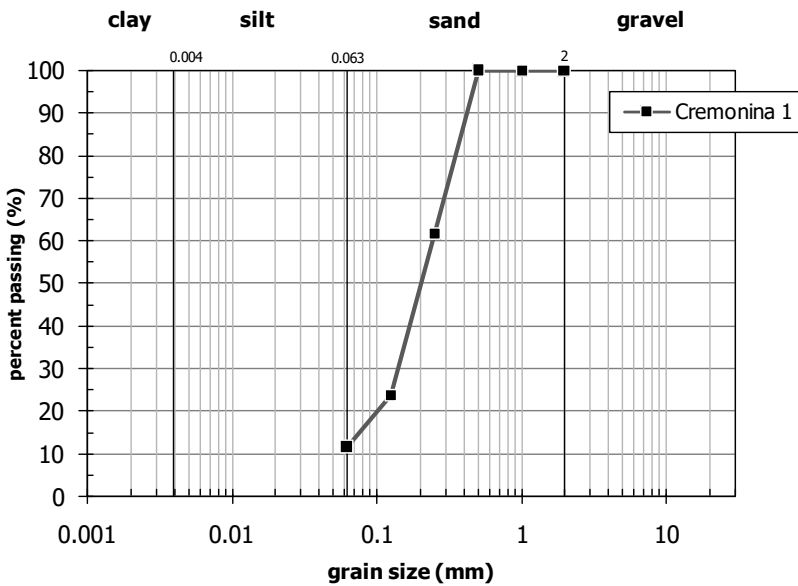
Cascinetta, Municipality of Bondeno (FE) – “Casc 2”

Site:	Cascinetta, Municipality of Bondeno (FE)			
Location map:				
Sand boil sample:	Casc 2			
Coordinates (WGS 84):	Latitude: 44°53'52.29"N		Longitude: 11°16'24.18"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☐	
				
Date of sampling:	30/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 90°		Dip: 0°	
	Fracture with sand, length 30 m			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 37%	U = 3.45	C = 1.46	σ = ---
Compositional information:	---			

Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

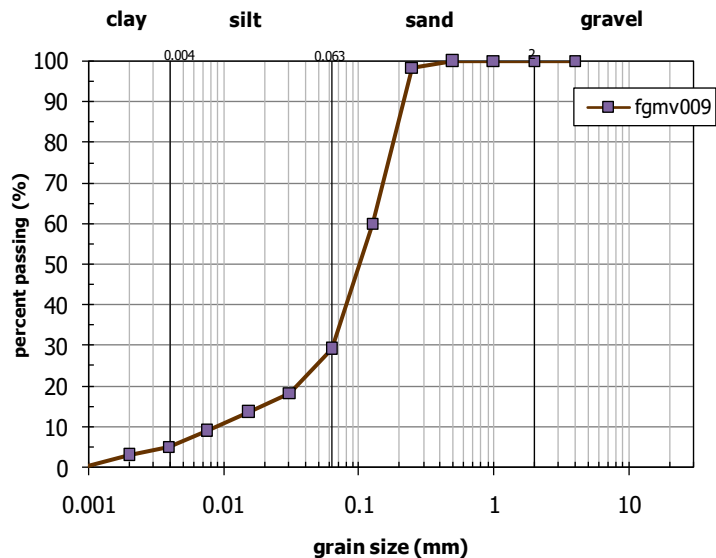
Cascinetta, Municipality of Bondeno (FE) – “Cremonina 1”

Site:	Cascinetta, Municipality of Bondeno (FE)			
Location map:				
Sand boil sample:	Cremonina 1			
Coordinates (WGS 84):	Latitude: 44°53'54.96"N		Longitude: 11°16'15.12"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☐	
			---	
Date of sampling:	---			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 60°		Dip: 0°	
	Fracture with sand, length ≥ 30 m			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 14%	U = ---	C = ---	σ = 1.717

Compositional information:	---	
Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

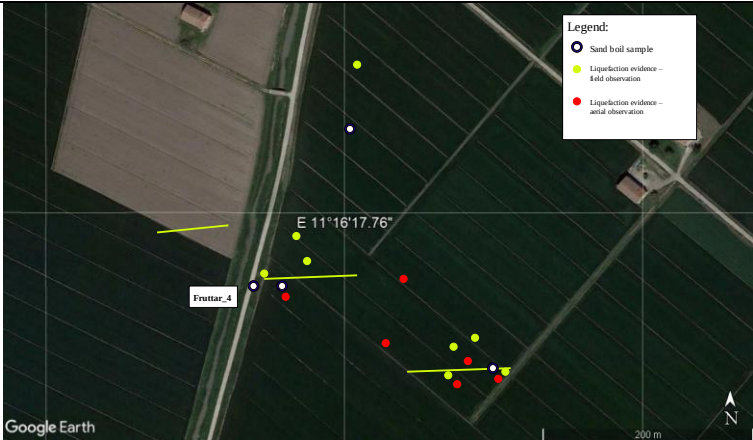
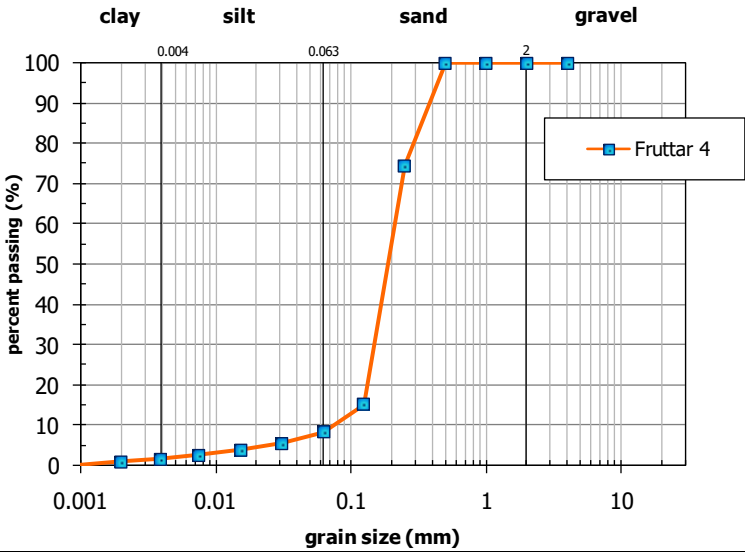
Bondeno, Municipality of Bondeno (FE) – “fgmv009”

Site:	Bondeno, Municipality of Bondeno (FE)			
Location map:				
Sand boil sample:	fgmv009			
Coordinates (WGS 84):	Latitude: 44°53'51.62"N		Longitude: 11°22'14.40"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	23/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 70°		Dip: 0°	
	Fracture with sand parallel to the road, length 30 m with an opening of 5 cm; sand boils in its terminal part			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 37%	U =13.68	C = 3.42	σ =0.08
Compositional information:	---			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical

settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Cascinetta, Municipality of Bondeno (FE) – “Fruttar 4”

Site:	Cascinetta, Municipality of Bondeno (FE)		
Location map:			
Sand boil sample:	Fruttar 4		
Coordinates (WGS 84):	Latitude: 44°53'55.00"N		Longitude: 11°16'13.98"E
Sand boil image from:	Aerial photography: ☒		Field observations: ☐
			---
Date of sampling:	25/05/2012		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒		May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: variabili 55°, 70°, 65°		Dip: 0°
	Fracture with light grey sand, length 45 m. Sand thickness 15-20 cm.		
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)		
	FC = 10%	U = 2.93	C = 1.55 $\sigma = 1.9399$

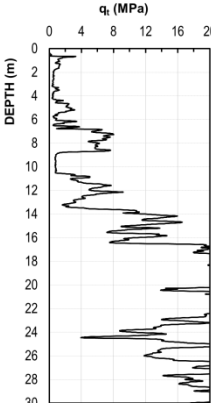
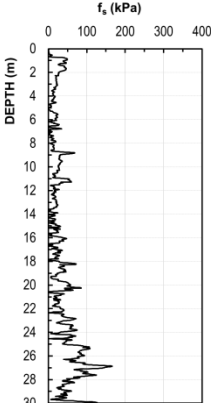
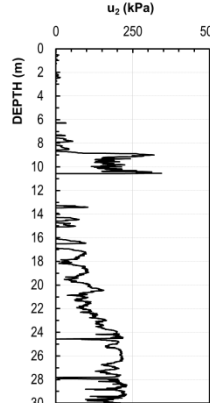
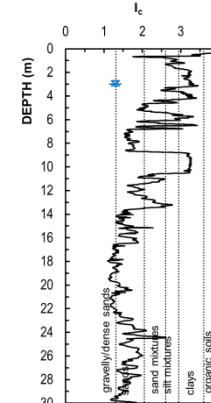
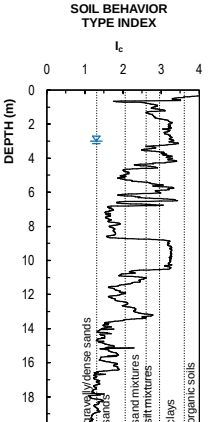
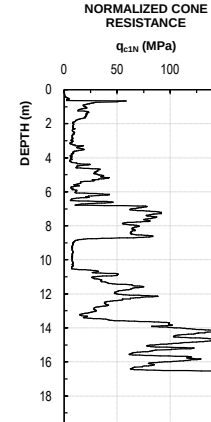
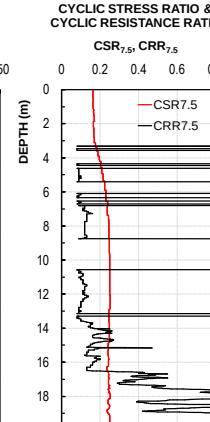
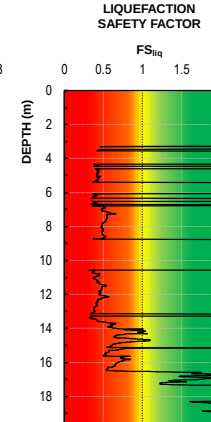
Compositional information:	---	
Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	---	

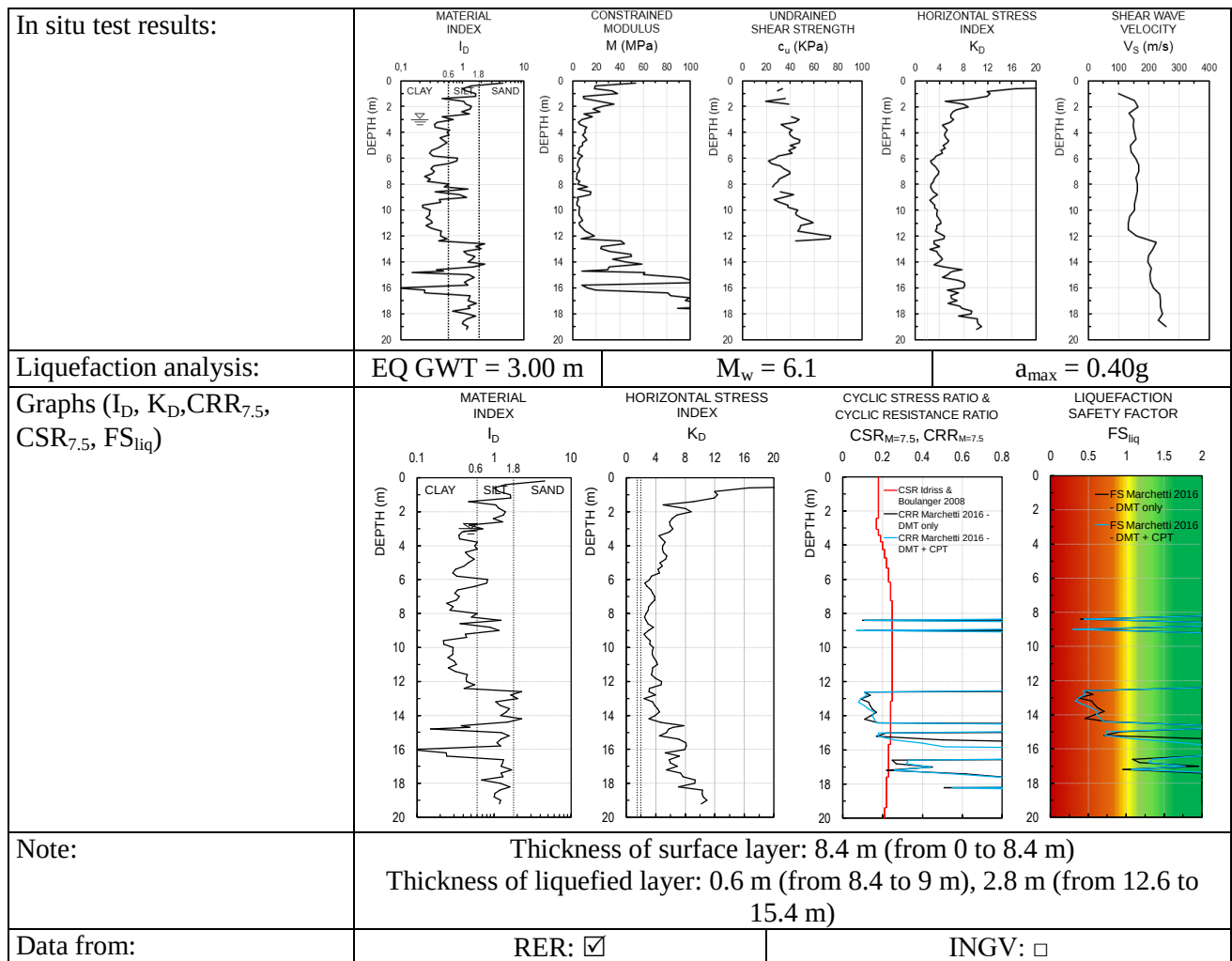
M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Redena, Municipality of Bondeno (FE) – “Gavello 1”

Site:	Redena, Municipality of Bondeno (FE)	
Location map:		
Sand boil sample:	Gavello 1	
Coordinates (WGS 84):	Latitude: 44°55'8.16"N	Longitude: 11°16'38.07"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐

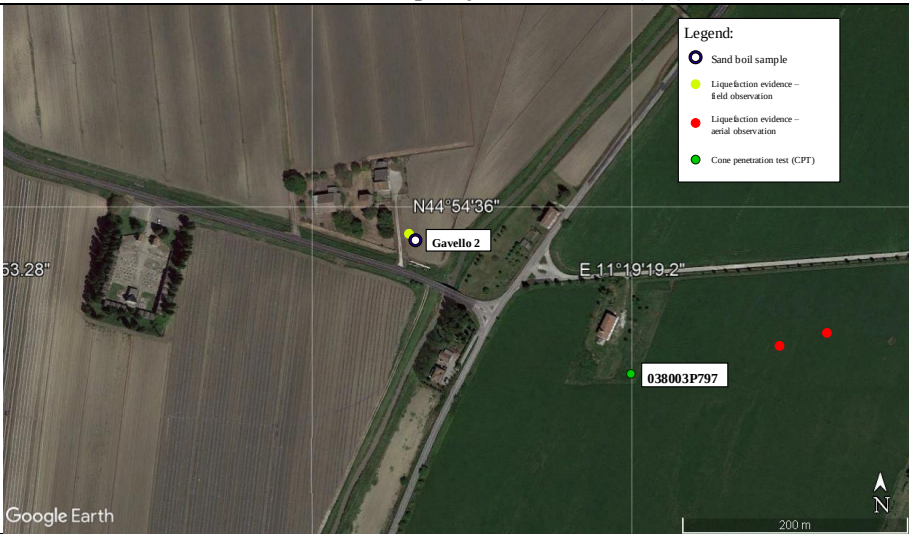
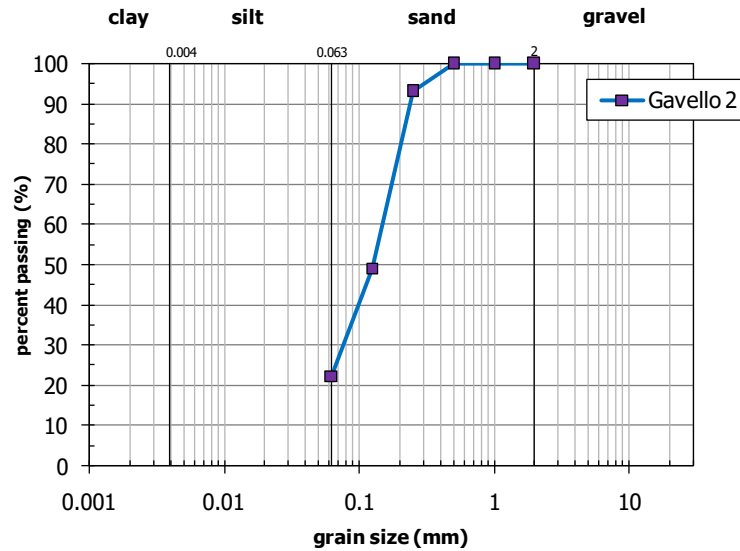
Date of sampling:	30/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 160°	Dip: 0°
	Sand boil, thickness 10cm	
Liquefaction-induced land damage category:	3 No lateral spreading but minor to moderate quantities of ejected material	
Grain size distribution curve:		

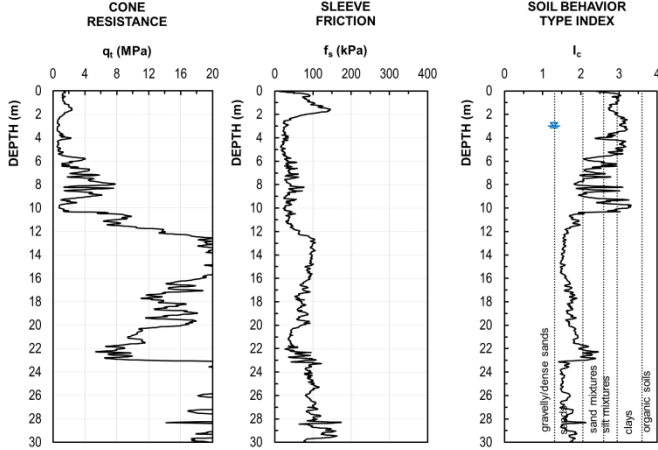
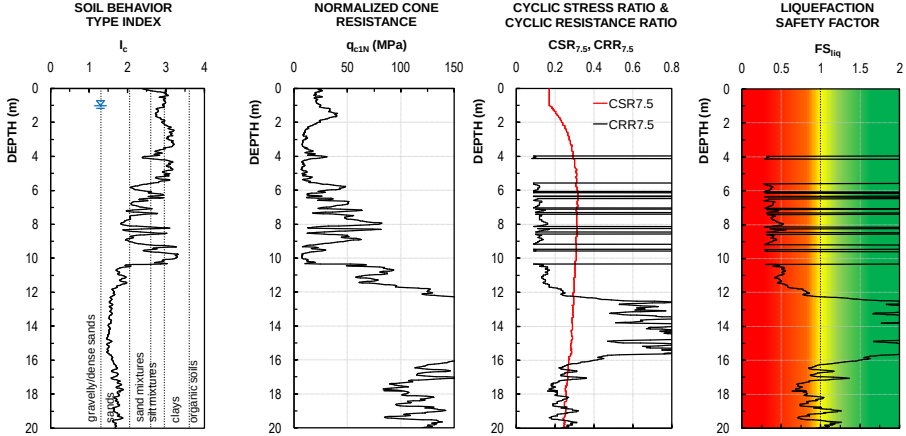
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)			
	FC = 8%	U = 3.82	C = 1.31	$\sigma = 1.704$
Compositional information:	---			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	CPTuA - 038003P482			
Coordinates (WGS 84):	Latitude:44°55'5.35"N		Longitude:11°16'38.43"E	
Date:	03/06/2013			
Address:	Via Comunale			
Depth to GWT during in situ test:	3.00m			
In situ test results:	CONE RESISTANCE q_t (MPa)  SLEEVE FRICTION f_s (kPa)  PORE PRESSURE u_2 (kPa)  SOIL BEHAVIOR TYPE INDEX I_c 			
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 6.1$	$a_{max} = 0.40g$	
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c  NORMALIZED CONE RESISTANCE q_{c1N} (MPa)  CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$  LIQUEFACTION SAFETY FACTOR FS_{liq} 			
	LPI = 20.96	LSN = 27.77	S = 0.29 m	
Note:	Thickness of surface layer: 4.3 m (from 0 to 4.3 m) Thickness of liquefied layer: 4.4 m (from 4.3 to 8.7 m), 5.9 m (from 10.6 to 16.5 m)			
Data from:	RER: ☒		INGV: ☐	
In situ test:	DMTa - 038003P860			
Coordinates (WGS 84):	Latitude:44°55'8.24"N		Longitude: 11°16'38.17"E	
Date:	28/05/2017			
Address:	Strada Comunale			
Depth to GWT during in situ test:	3.00m			



M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Gavello, Municipality of Bondeno (FE) – “Gavello 2”

Site:	Gavello, Municipality of Bondeno (FE)			
Location map:				
Sand boil sample:	Gavello 2			
Coordinates (WGS 84):	Latitude: 44°54'35.14"N		Longitude: 11°19'10.19"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	30/05/2015			
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒		May 29 th , 2012, $M_w = 5.9$: ☐	
Liquefaction features:	Strike: ---		Dip: ---	
	Isolated sand boil			
Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 27%	U = ---	C = ---	$\sigma = 1.622$
Compositional information:	---			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	CPTuA :038003P797			

Coordinates (WGS 84):	Latitude: 44°54'31.21"N		Longitude: 11°19'19.18"E
Date:	13/02/2015		
Address:	Via Piretta Rovere		
Depth to GWT during in situ test:	3.00m		
In situ test result:			
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 6.1$	$a_{max} = 0.42g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})			
	LPI = 17.01	LSN = 18.84	S = 0.24 m
Note:	Thickness of surface layer: 5.6 m (from 0 to 5.6 m) Thickness of liquefied layer: 6.6 m (from 5.6 to 12.2 m), 4 m (from 16 to 20 m)		
Data from:	RER: ☒		INGV: ☐

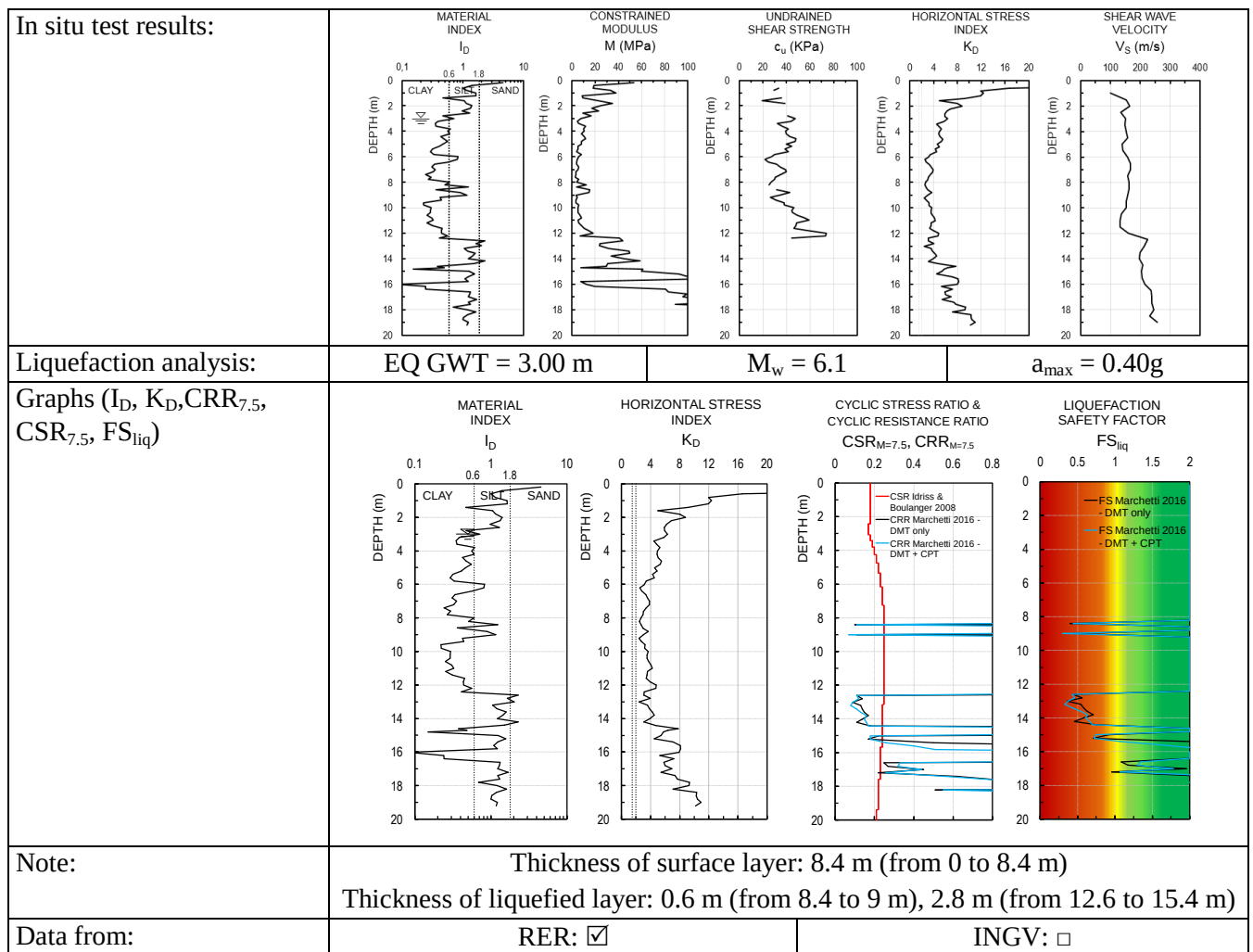
M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Redena, Municipality of Bondeno (FE) – “INS04”

Site:	Redena, Municipality of Bondeno (FE)	
Location map:		
Sand boil sample:	INS04	
Coordinates (WGS 84):	Latitude: 44°55'8.07"N	Longitude: 11°16'37.99"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐

Date of sampling:	25/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 160°	Dip: 0°
	Fracture parallel to a failure in the field	
Liquefaction-induced land damage category:	3 No lateral spreading but minor to moderate quantities of ejected material	
Grain size distribution curve:		
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)	

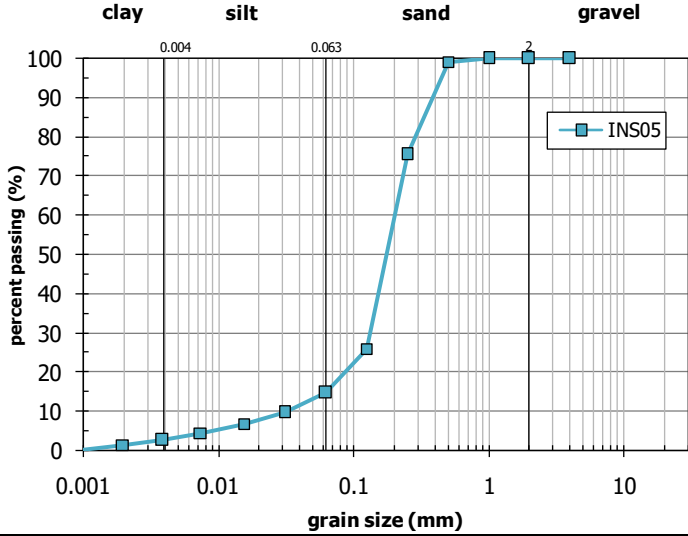
	FC = 7%	U = 2.62	C = 1.20	$\sigma = 1.844$
Compositional information:	---			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	CPTuA: 038003P482			
Coordinates (WGS 84):	Latitude: 44°55'5.34"N		Longitude: 11°16'38.45"E	
Date:	03/06/2013			
Address:	Via Comunale			
Depth to GWT during in situ test:	3.00 m			
In situ test result:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 6.1$	$a_{max} = 0.40g$	
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c NORMALIZED CONE RESISTANCE q_{c1N} (MPa) CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ LIQUEFACTION SAFETY FACTOR FS_{liq}			
	LPI = 20.96	LSN = 27.77	S = 0.29 m	
Note:	Thickness of surface layer: 4.3 m (from 0 to 4.3 m) Thickness of liquefied layer: 4.4 m (from 4.3 to 8.7 m), 5.9 m (from 10.6 to 16.5 m)			
Data from:	RER: ☒		INGV: ☐	
In situ test:	DMTa: 038003P860			
Coordinates (WGS 84):	Latitude: 44°55'8.22"N		Longitude: 11°16'38.17"E	
Date:	28/05/2017			
Address:	Strada Comunale			
Depth to GWT during in situ test:	3.00 m			



M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Redena, Municipality of Bondeno (FE) – “INS05”

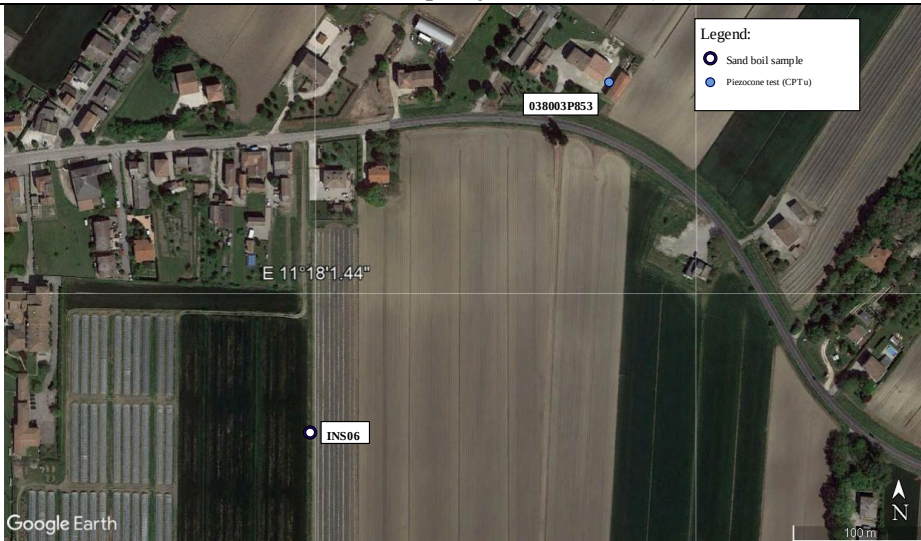
Site:	Redena, Municipality of Bondeno (FE)		
Location map:			
Sand boil sample:	INS05		
Coordinates (WGS 84):	Latitude: 44°54'37.71"N		Longitude: 11°18'0.24"E
Sand boil image from:	Aerial photography: ☒		Field observations: ☐
			---
Date of sampling:	---		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒		May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: ---		Dip: ---

Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 17%	U = 6.67	C = 2.40 $\sigma = 2.641$
Compositional information:	---		

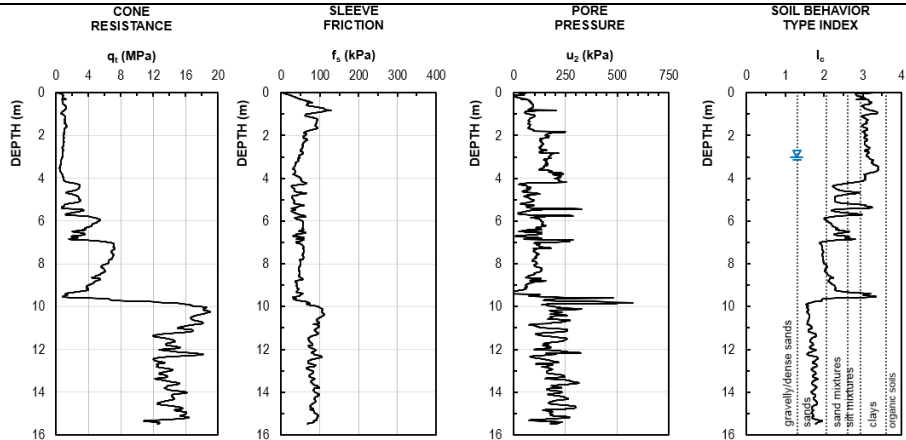
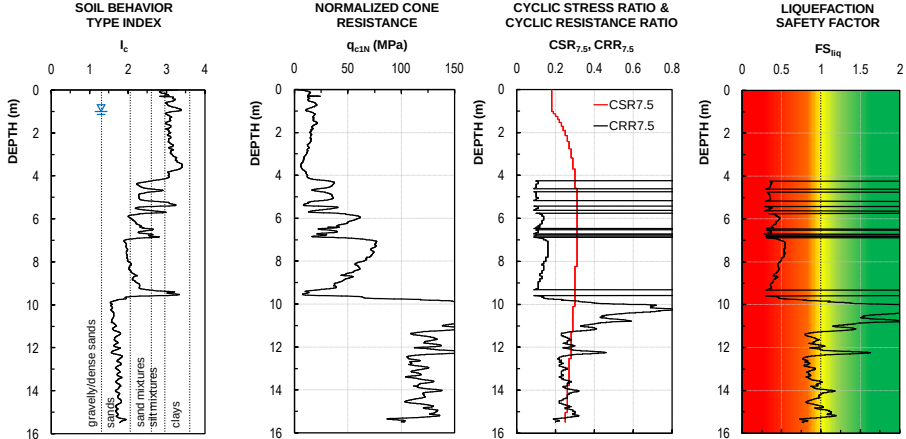
Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Gavello, Municipality of Bondeno (FE) – “INS06”

Site:	Gavello, Municipality of Bondeno (FE)			
Location map:				
Sand boil sample:	INS06			
Coordinates (WGS 84):	Latitude: 44°54'45.64"N		Longitude: 11°18'1.34"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	---			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: ---		Dip: ---	

Liquefaction-induced land damage category:	3 No lateral spreading but minor to moderate quantities of ejected material			
Grain size distribution curve:	clay silt sand gravel 0.004 0.063 2 100 90 80 70 60 50 40 30 20 10 0 percent passing (%) 0.001 0.01 0.1 1 10 grain size (mm) INS06			
Soil classification (USCS):	Silty Sand (SM)			
	FC = 36%	U = 53.13	C = 2.94	σ = 5.52
Compositional information:	---			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	CPTuA : 038003P853			

Coordinates (WGS 84):	Latitude: 44°53'43.66"N		Longitude: 11° 5'42.04"E
Date:	06/02/2015		
Address:	Viale Antonio Gramsci		
Depth to GWT during in situ test:	3.00 m		
In situ test result:			
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 6.1$	$a_{max} = 0.41g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})			
	LPI = 18.55	LSN = 21.31	S = 0.16 m
Note:	Thickness of surface layer: 4.2 m (from 0 to 4.2 m) Thickness of liquefied layer: 5.1 m (from 4.2 to 9.3 m)		
Data from:	RER: ☒		INGV: ☐

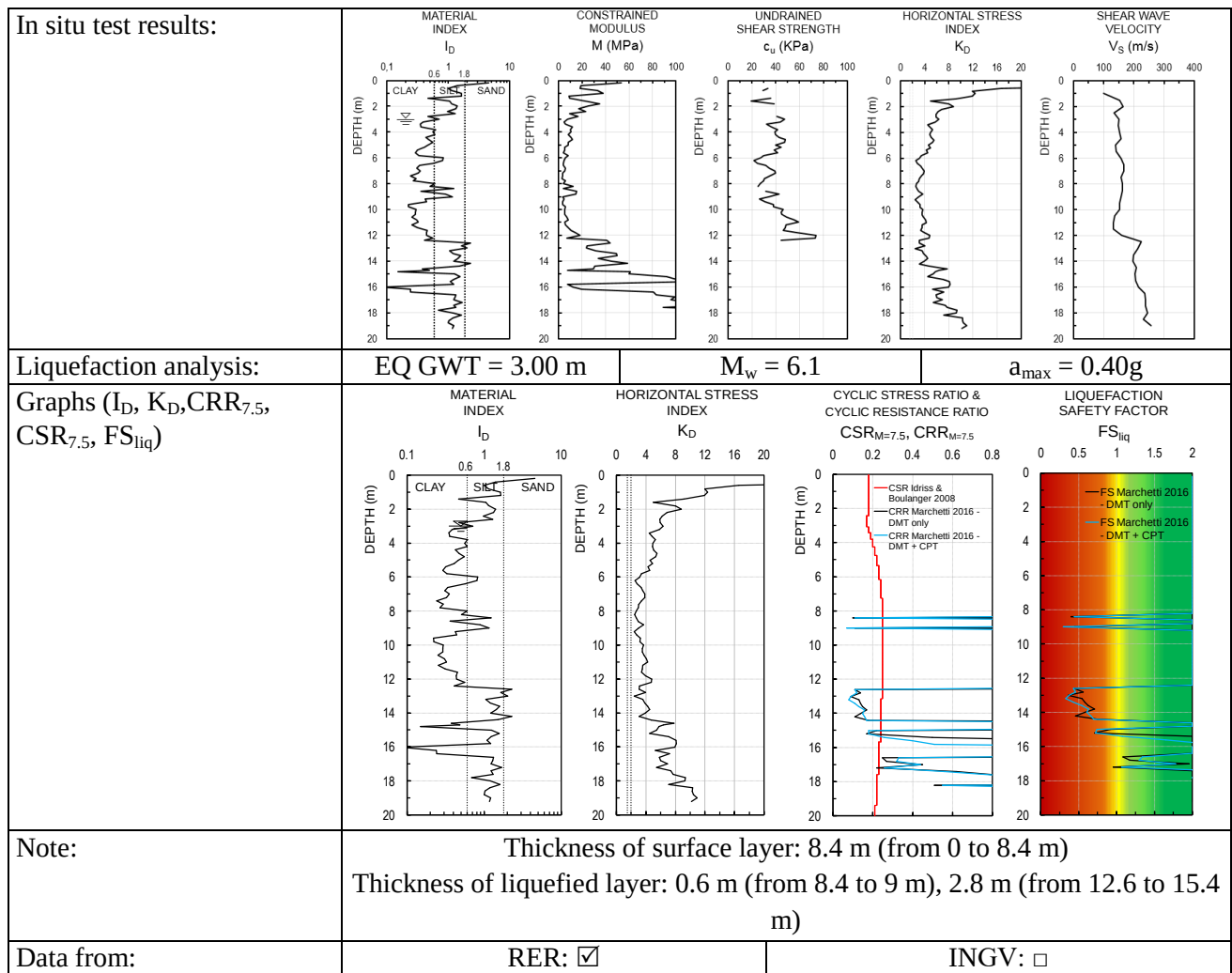
M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Redena, Municipality of Bondeno (FE) – “INS09”

Site:	Redena, Municipality of Bondeno (FE)			
Location map:				
Sand boil sample:	INS09			
Coordinates (WGS 84):	Latitude: 44°55'8.07"N		Longitude: 11°16'37.99"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☐	

Date of sampling:	---			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 160°		Dip: 0°	
	Fracture parallel to a failure in the field			
Liquefaction-induced land damage category:	3 No lateral spreading but minor to moderate quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)			
	FC = 10%	U = 4.00	C = 1.28	σ = 2.087

Compositional information:	---			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒		
Data from:	INGV: ☒	UNIMORE: ☐		
In situ test:	CPTuA: 038003P482			
Coordinates (WGS 84):	Latitude: 44°55'5.35"N	Longitude: 11°16'38.43"E		
Date:	03/06/2013			
Address:	Via Comunale			
Depth to GWT during in situ test:	3.00 m			
In situ test result:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u₂ (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 3.00 m	M _w = 6.1	a _{max} = 0.40g	
Graphs (I _c , q _{c1N} , CRR _{7.5} , CSR _{7.5} , FS _{liq})	SOIL BEHAVIOR TYPE INDEX I_c	NORMALIZED CONE RESISTANCE q_{c1N} (MPa)	CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO CSR_{7.5}, CRR_{7.5}	LIQUEFACTION SAFETY FACTOR FS_{liq}
	LPI = 20.96	LSN = 27.77	S = 0.29 m	
Note:	Thickness of surface layer: 4.3 m (from 0 to 4.3 m) Thickness of liquefied layer: 4.4 m (from 4.3 to 8.7 m), 5.9 m (from 10.6 to 16.5 m)			
Data from:	RER: ☒	INGV: ☐		
In situ test:	DMTa: 038003P860			
Coordinates (WGS 84):	Latitude: 44°55'8.25"N	Longitude: 11°16'38.16"E		
Date:	28/05/2017			
Address:	Strada Comunale			
Depth to GWT during in situ test (m):	3.00 m			

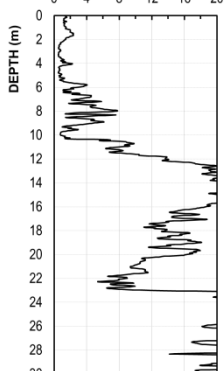
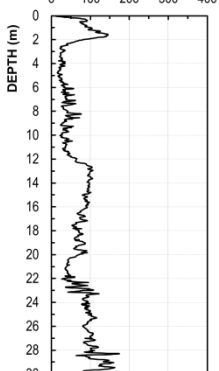
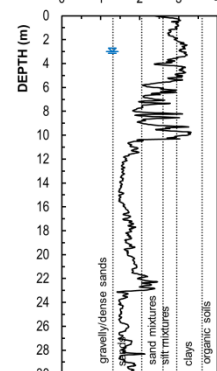
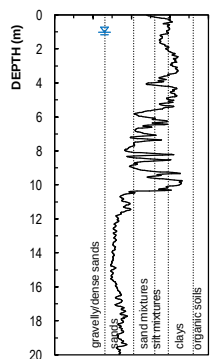
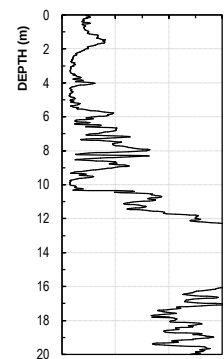
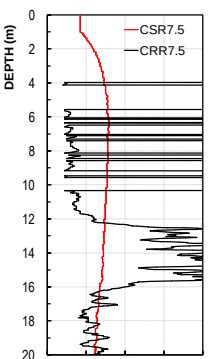
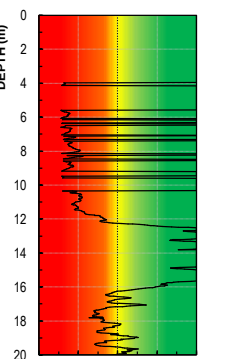


M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Gavello, Municipality of Bondeno (FE) – “Prospera 1”

Site:	Gavello, Municipality of Bondeno (FE)			
Location map:				
Sand boil sample:	Prospera 1			
Coordinates (WGS 84):	Latitude: 44°54'30.38"N		Longitude: 11°19'42.10"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☐	

Date of sampling:	30/05/2015			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 50°		Dip: 0°	
	Fracture, length 10 m, partly dry			
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 23%	U = ---	C = ---	σ = 1.859
Compositional information:	---			

Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒		
Data from:	INGV: ☐	UNIMORE: ☒		
In situ test:	CPTuA :038003P797			
Coordinates (WGS 84):	Latitude: 44°54'31.21"N	Longitude: 11°19'19.18"E		
Date:	13/02/2015			
Address:	Via Piretta Rovere			
Depth to GWT during in situ test:	3.00 m			
In situ test result:	CONE RESISTANCE q_t (MPa)  SLEEVE FRICTION f_s (kPa)  SOIL BEHAVIOR TYPE INDEX I_c 			
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 6.1$	$a_{max} = 0.42g$	
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c 	NORMALIZED CONE RESISTANCE q_{c1N} (MPa) 	CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ 	LIQUEFACTION SAFETY FACTOR FS_{liq} 
	LPI = 13.73	LSN = 18.13	S = 0.23 m	
Note:	Thickness of surface layer: 5.6 m (from 0 to 5.6 m) Thickness of liquefied layer: 6.6 m (from 5.6 to 12.2 m)			
Data from:	RER: ☒		INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

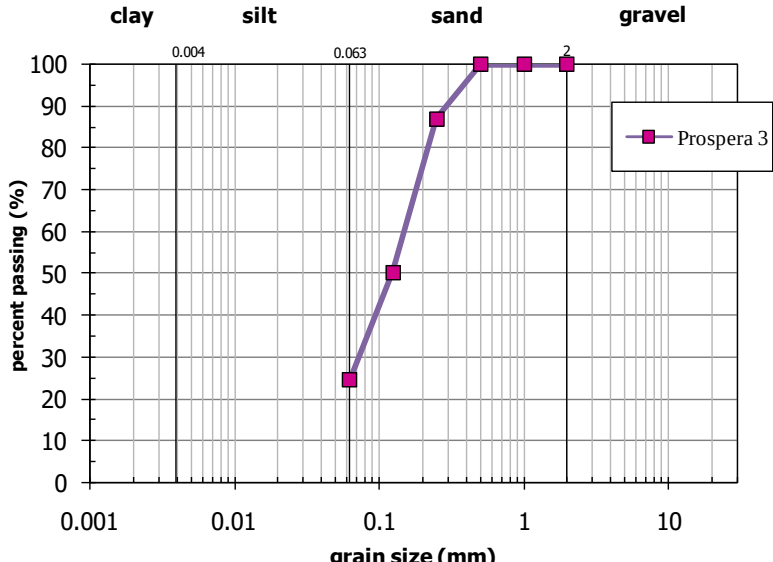
Gavello, Municipality of Bondeno (FE) – “Prospera 2”

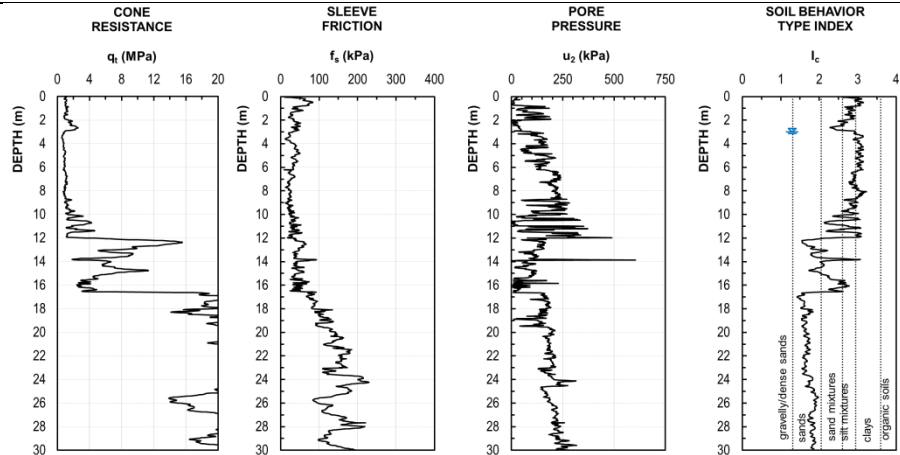
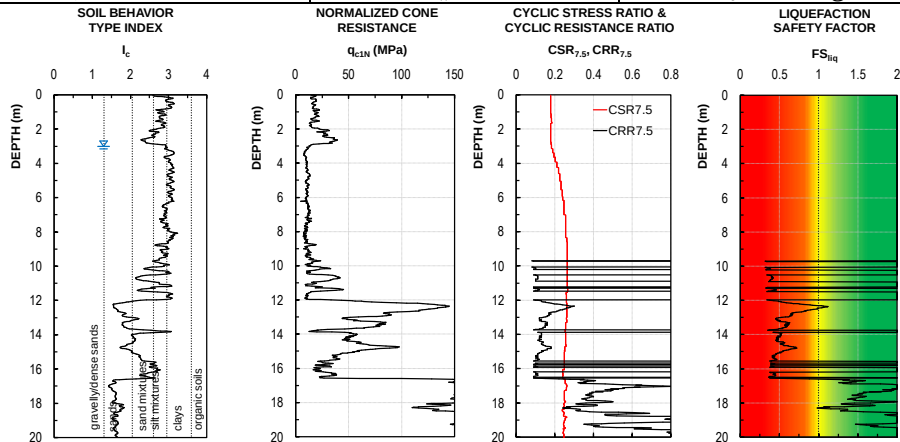
Site:	Gavello, Municipality of Bondeno (FE)																	
Location map:																		
Sand boil sample:	Prospera 2																	
Coordinates (WGS 84):	Latitude: 44°54'22.37"N		Longitude: 11°19'55.06"E															
Sand boil image from:	Aerial photography: ☐		Field observations: ☐															
	---		---															
Date of sampling:	30/05/2015																	
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐															
Liquefaction features:	Strike: 130°		Dip: 0°															
	Fracture, length 15 m, perpendicular to the rows																	
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material																	
Grain size distribution curve:	<table border="1"><caption>Grain Size Distribution Data for Prospera 2</caption><thead><tr><th>Grain Size (mm)</th><th>Percent Passing (%)</th></tr></thead><tbody><tr><td>0.075</td><td>10</td></tr><tr><td>0.15</td><td>25</td></tr><tr><td>0.3</td><td>60</td></tr><tr><td>0.6</td><td>100</td></tr><tr><td>1.0</td><td>100</td></tr><tr><td>2.0</td><td>100</td></tr></tbody></table>				Grain Size (mm)	Percent Passing (%)	0.075	10	0.15	25	0.3	60	0.6	100	1.0	100	2.0	100
Grain Size (mm)	Percent Passing (%)																	
0.075	10																	
0.15	25																	
0.3	60																	
0.6	100																	
1.0	100																	
2.0	100																	
Soilclassification (USCS):	Silty Sand (SM)																	
	FC = 13%	U = 3.91	C = 1.41	σ = 1.766														
Compositional information:	---																	
Paleoriver assignment:	Po																	
Morphologicalfeatures:	Flat interfluvial depression: ☐		Fluvial ridge: ☒															
Data from:	INGV: ☐		UNIMORE: ☒															
In situ test:	---																	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical

settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

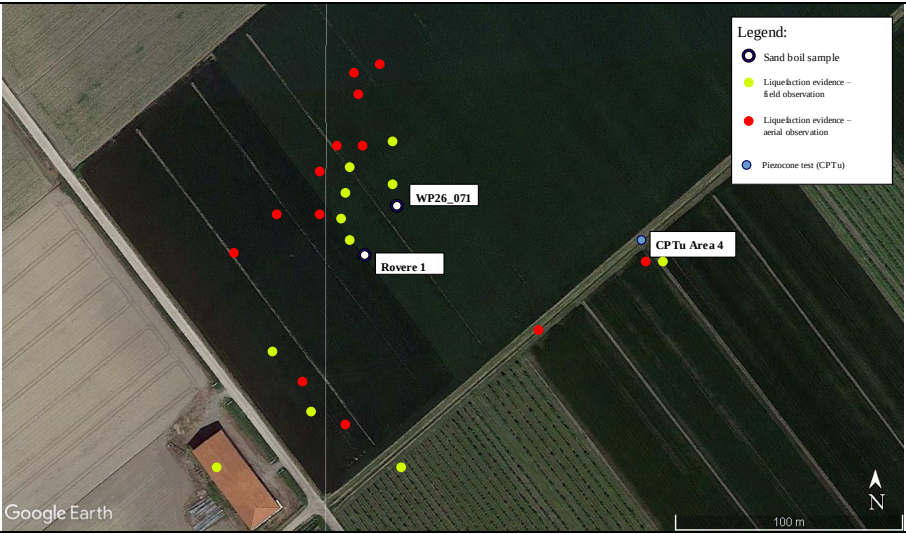
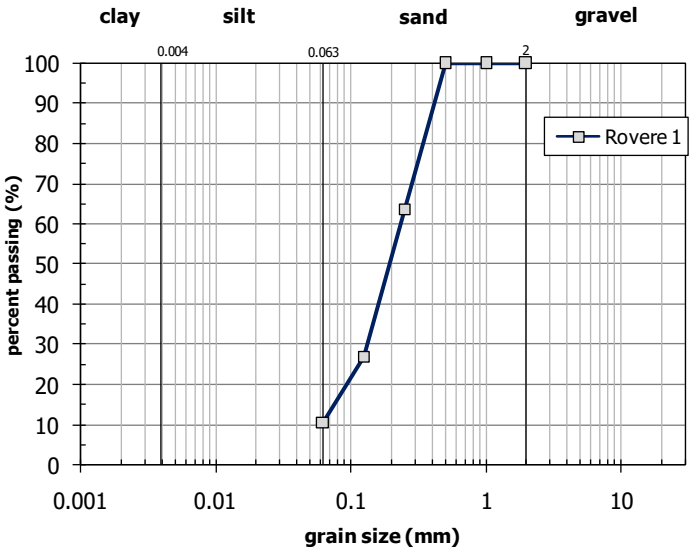
Gavello, Municipality of Bondeno (FE) – “Prospera 3”

Site:	Gavello, Municipality of Bondeno (FE)		
Location map:			
Sand boil sample:	Prospera 3		
Coordinates (WGS 84):	Latitude: 44°54'15.39"N	Longitude: 11°20'13.82"E	
Sand boilimage from:	Aerial photography: ☐	Field observations: ☐	
	---	---	
Date of sampling:	30/05/2015		
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒	May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 135°	Dip: 0°	
	Big fractures with sand		
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 30%	U = ---	C = --- $\sigma = 1.72$
Compositional information:	---		
Paleoriver assignment:	Po		
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒	
Data from:	INGV: ☐	UNIMORE: ☒	
In situ test:	CPTuA :038003P840		
Coordinates (WGS 84):	Latitude: 44°45'27.30"N	Longitude: 11°18'49.88"E	
Date:	17/12/2014		
Address:	Via Fava Augusto		

Depth to GWT during in situ test:	3.00m		
In situ test results:			
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 6.1$	$a_{max} = 0.43g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})			
	LPI = 7.43	LSN = 9.35	S = 0.13 m
Note:	Thickness of surface layer: 10 m (from 0 to 10 m) Thickness of liquefied layer: 5.9 m (from 10 to 15.9 m)		
Data from:	RER: ☒		INGV: ☐

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Gavello, Municipality of Bondeno (FE) – “Rovere 1”

Site:	Gavello, Municipality of Bondeno (FE)	
Location map:		
Sand boil sample:	Rovere 1	
Coordinates (WGS 84):	Latitude: 44°53'23.27"N	Longitude: 11°17'23.41"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
		---
Date of sampling:	30/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 20°	Dip: 0°
	Fracture with sand	
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		

Soil classification (USCS):	Silty Sand (SM)			
	FC =13%	U = ---	C = ---	$\sigma = 1.775$
Compositional information:	---			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Redena, Municipality of Bondeno (FE) – “San Martino 4”

Site:	Redena, Municipality of Bondeno (FE)			
Location map:				
Sand boil sample:	San Martino 4			
Coordinates (WGS 84):	Latitude: 44°54'53.07"N		Longitude: 11°14'43.46"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☐	

Date of sampling:	30/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: ---		Dip: ---	
	Small dry sand boil. Sand thickness 1 cm.			
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 17%	U = ---	C = ---	σ = 1.631

Compositional information:	---	
Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Redena, Municipality of Bondeno (FE) – “San Martino 5”

Site:	Redena, Municipality of Bondeno (FE)			
Location map:				
Sand boil sample:	San Martino 5			
Coordinates (WGS 84):	Latitude: 44°54'52.08"N		Longitude: 11°14'46.54"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☐	

Date of sampling:	30/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: ---		Dip: ---	
	Small dry sand boil. Sand thickness 1 cm			
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)			
	FC = 12%	U = 3.08	C = 1.51	σ = 1.629

Compositional information:	---	
Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Redena, Municipality of Bondeno (FE) – “San Martino 6”

Site:	Redena, Municipality of Bondeno (FE)			
Location map:				
Sand boil sample:	San Martino 6			
Coordinates (WGS 84):	Latitude: 44°54'47.69"N		Longitude: 11°14'48.99"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☐	

Date of sampling:	30/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 135°		Dip: 0°	
	Very long fracture with sand. Small dry sand boil; sand thickness 1 cm.			
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)			
	FC = 12%	U = 3.86	C = 1.04	σ = 1.864

Compositional information:	---	
Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

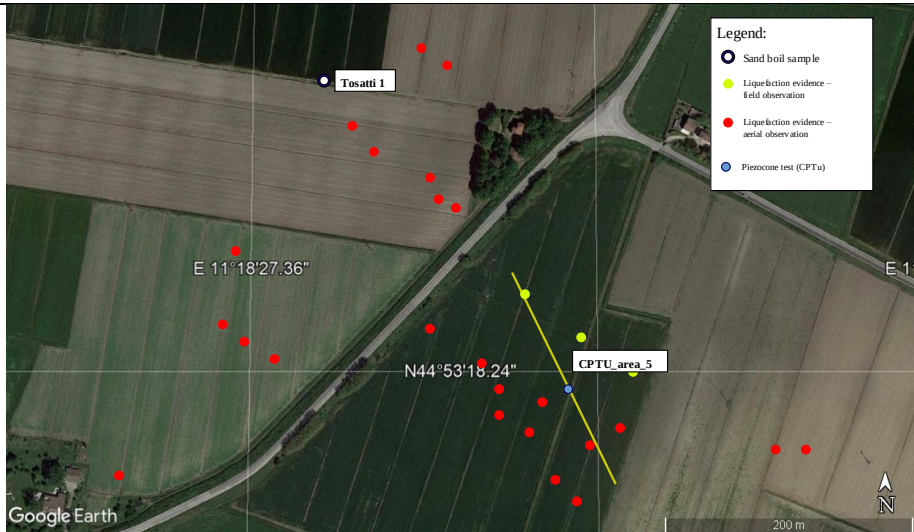
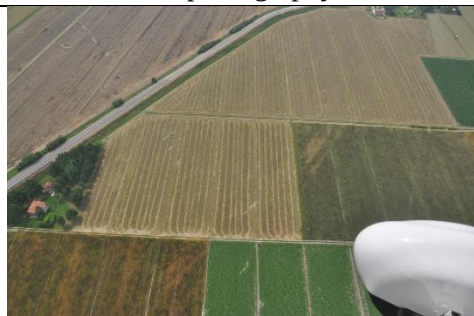
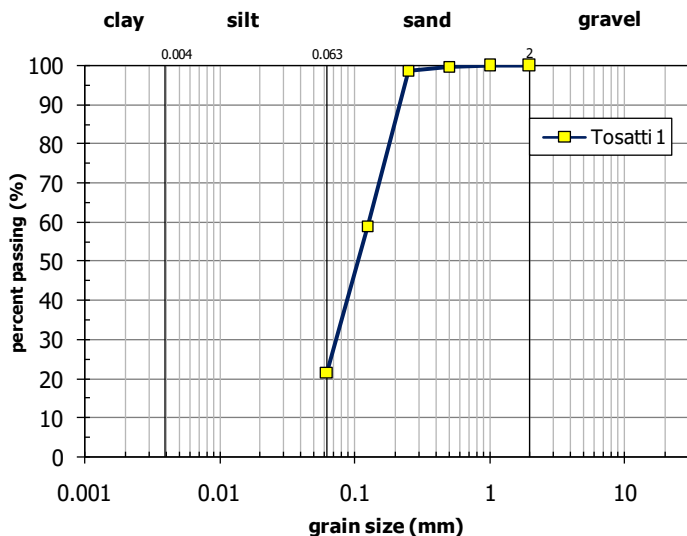
Redena, Municipality of Bondeno (FE) – “San Martino 6bis”

Site:	Redena, Municipality of Bondeno (FE)		
Location map:			
Sand boil sample:	San Martino 6bis		
Coordinates (WGS 84):	Latitude: 44°54'47.69"N		Longitude: 11°14'48.99"E
Sand boil image from:	Aerial photography: ☒		Field observations: ☐
Date of sampling:	30/05/2012		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒		May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 135°		Dip: 0°
	Very long fracture with sand, sample collected from the finer distal portion		
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 41%	U = 4.52	$\sigma = 2.124$

Compositional information:	---	
Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

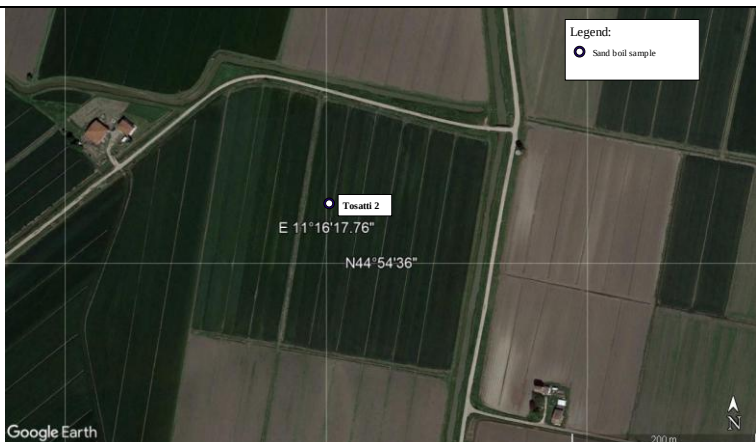
Gavello, Municipality of Bondeno (FE) – “Tosatti 1”

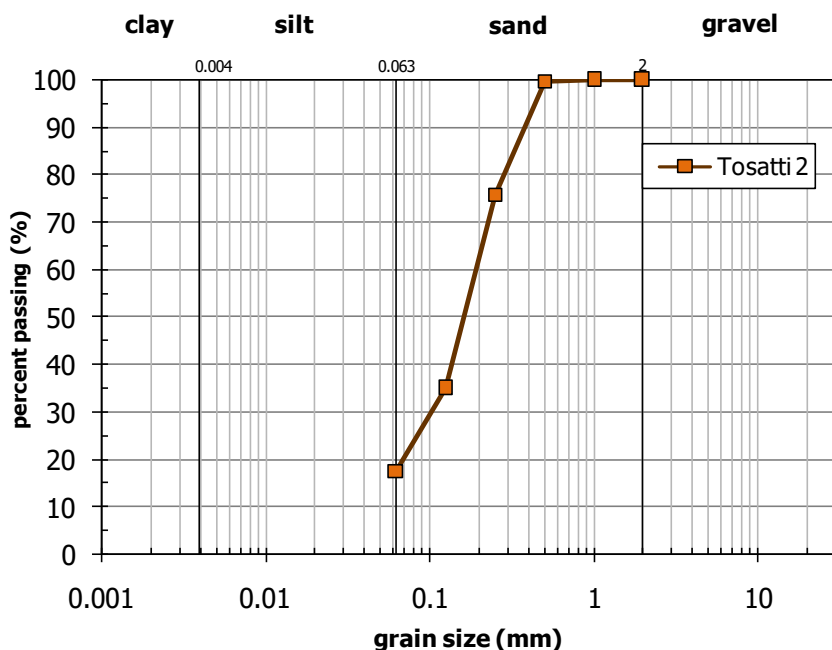
Site:	Gavello, Municipality of Bondeno (FE)			
Location map:				
Sand boil sample:	Tosatti 1			
Coordinates (WGS 84):	Latitude: 44°53'26.00"N		Longitude: 11°18'30.00"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☐	
			---	
Date of sampling:	---			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: ---		Dip: ---	
	Long fracture with sand			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 30%	U = ---	C = ---	σ= 1.535

Compositional information:	---	
Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

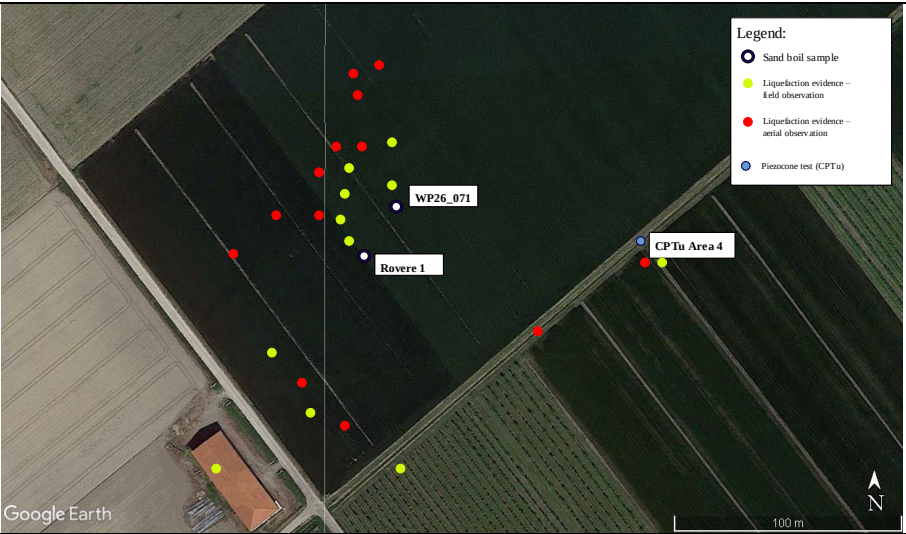
Gavello, Municipality of Bondeno (FE) – “Tosatti 2”

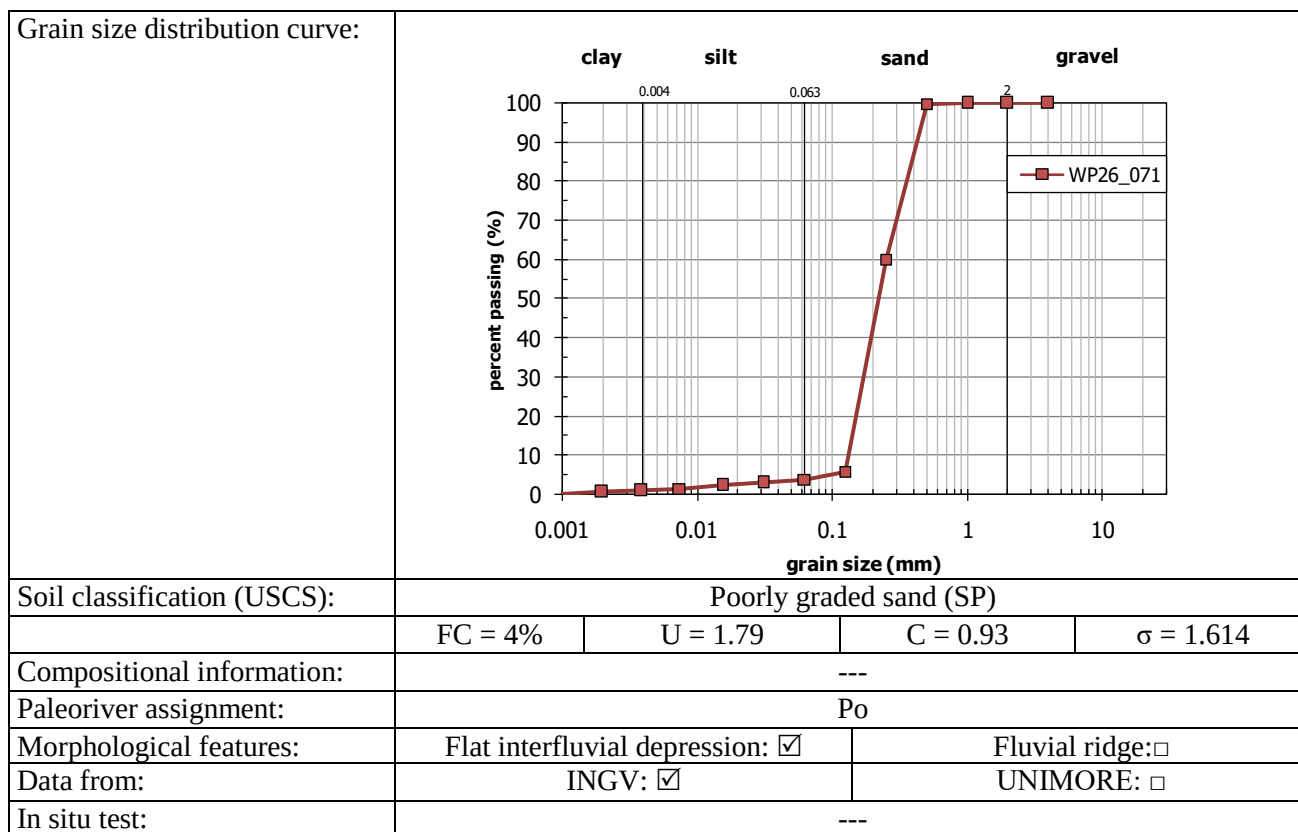
Site:	Gavello, Municipality of Bondeno (FE)			
Location map:				
Sand boil sample:	Tosatti 2			
Coordinates (WGS 84):	Latitude: 44°54'38.00"N		Longitude: 11°16'18.00"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	---			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: ---		Dip: ---	

Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 22%	U = ---	C = ---	σ = 1.758
Compositional information:	---			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Scortichino, Municipality of Bondeno (FE) – “WP26_071”

Site:	Scortichino, Municipality of Bondeno (FE)	
Location map:		
Sand boil sample:	WP26_071	
Coordinates (WGS 84):	Latitude: 44°53'24.00"N	Longitude: 11°17'24.00"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
		---
Date of sampling:	---	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 35°, 360°	Dip: 0°
	Continuation of the fracture crossing a 1.5m-wide ditch. 2 sand boils inside the ditch, with width 50cm and thickness 35cm. Fracture with grey quartz sand in the field, length 30 m	
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material	



M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Cascinetta, Municipality of Bondeno (FE) – “WP26_072”

Site:	Cascinetta, Municipality of Bondeno (FE)			
Location map:				
Sand boil sample:	WP26_072			
Coordinates (WGS 84):	Latitude: 44°53'56.40"N		Longitude: 11°16'15.60"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☐	

Date of sampling:	26/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 70°		Dip: 0°	
	Fracture with grey quartzzy sand in the field, length 50 m. Numerous small coalescent mud boils			
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)			
	FC = 8%	U = 2.60	C = 1.75	σ = 1.715

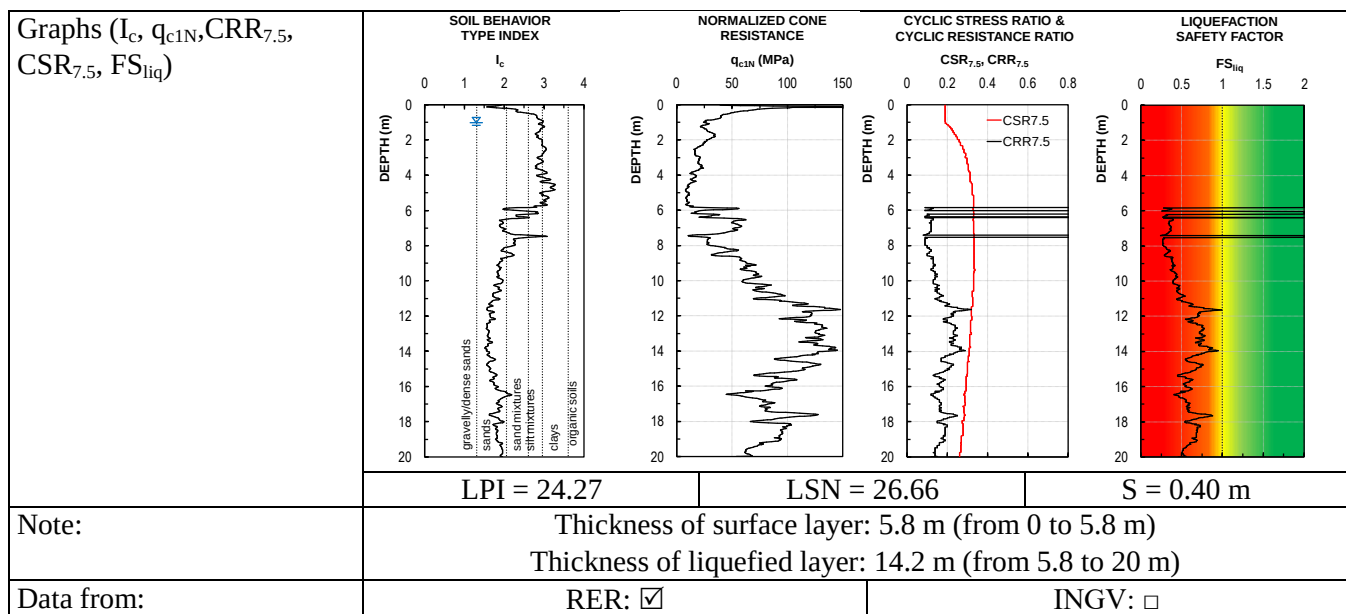
Compositional information:	---	
Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Casumaro, Municipality of Bondeno (FE) – “WP39”

Site:	Casumaro, Municipality of Bondeno (FE)	
Location map:		
Sand boil sample:	WP39	
Coordinates (WGS 84):	Latitude: 44°50'15.50"N	Longitude: 11°26'16.33"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
		---
Date of sampling:	---	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 105°	Dip: 0°
	Fracture, length 45 m	
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material	

Grain size distribution curve:	clay silt sand gravel			
Soil classification (USCS):	Silty Sand (SM)			
	FC = 30%	U = 8.06	C = 2.53	$\sigma = 2.634$
Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	CPTuA: CPTu: 13244			
Coordinates (WGS 84):	Latitude: 44°50'19.02"N		Latitude: 11°26'32.41"E	
Date:	20/05/2014			
Address:	Via Correggese			
Depth to GWT during in situ test:	3.00m			
In situ test result:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 6.1$	$a_{max} = 0.46g$	



M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Casumaro, Municipality of Bondeno (FE) – “WP42”

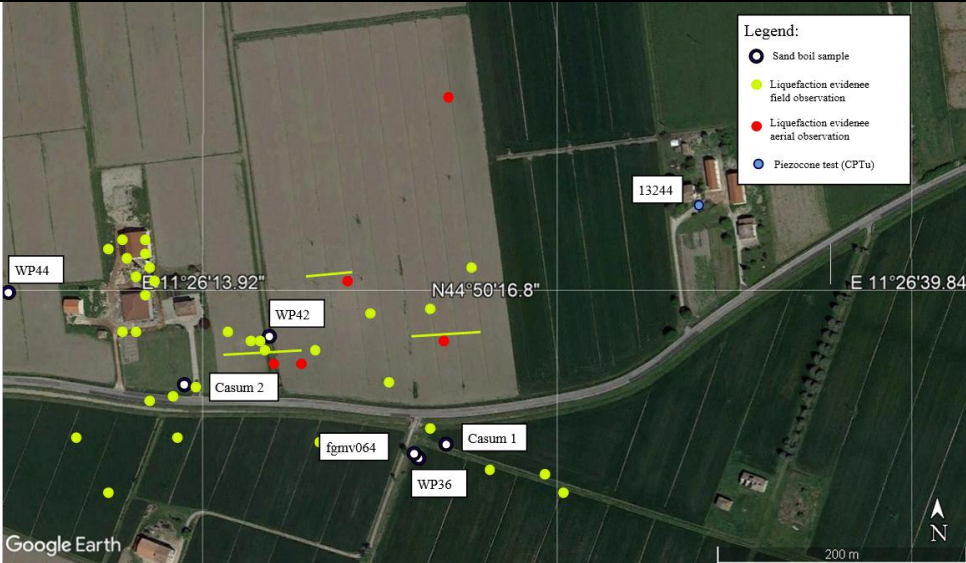
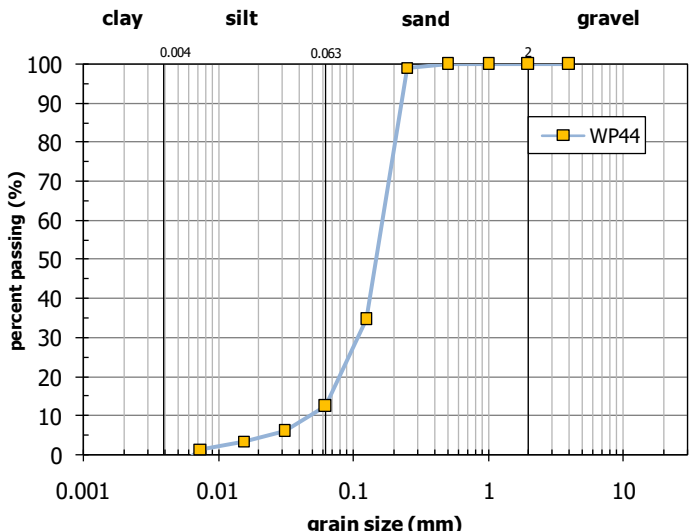
Site:	Casumaro, Municipality of Bondeno (FE)	
Location map:		
Sand boil sample:	WP42	
Coordinates (WGS 84):	Latitude: 44°50'14.32"N	Longitude: 11°26'13.27"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐

Date of sampling:	---	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: ---	Dip: ---
	Liquefaction with abundant sand and water	
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		

Soil classification (USCS):	Silty Sand (SM)			
	FC = 27%	U = 17.35	C = 3.84	$\sigma = 2.981$
Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	CPTuA: CPTu: 13244			
Coordinates (WGS 84):	Latitude: 44°50'19.02"N		Latitude: 11°26'32.41"E	
Date:	20/05/2014			
Address:	Via Correggese			
Depth to GWT during in situ test:	3.00m			
In situ test result:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_z (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 1.00 m		$M_w = 6.1$	$a_{max} = 0.46g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c NORMALIZED CONE RESISTANCE q_{c1N} (MPa) CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ LIQUEFACTION SAFETY FACTOR FS_{liq}			
	LPI = 24.27		LSN = 26.66	S = 0.40 m
Note:	Thickness of surface layer: 5.8 m (from 0 to 5.8 m) Thickness of liquefied layer: 14.2 m (from 5.8 to 20 m)			
Data from:	RER: ☒		INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

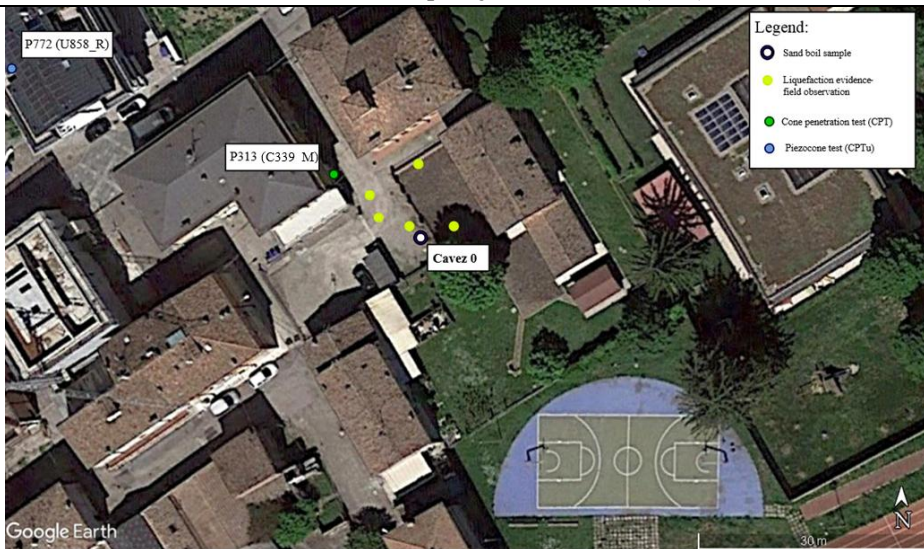
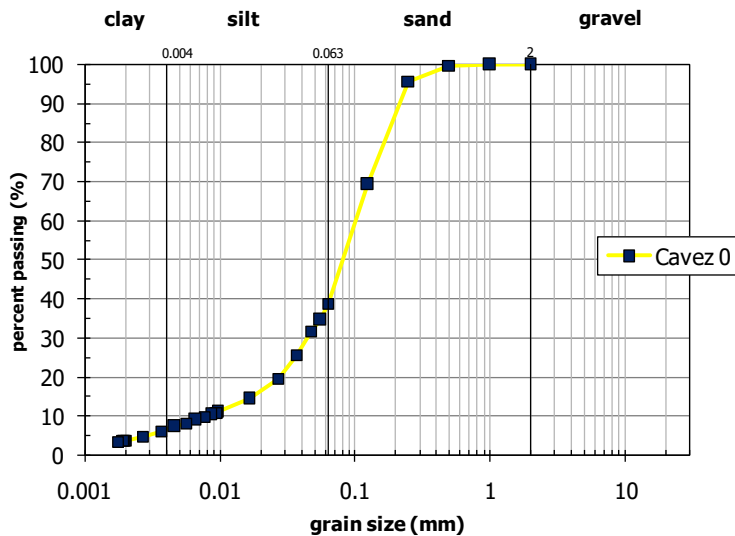
Casumaro, Municipality of Bondeno (FE) – “WP44”

Site:	Casumaro, Municipality of Bondeno (FE)	
Location map:		
Sand boil sample:	WP44	
Coordinates (WGS 84):	Latitude: 44°50'16.69"N	Longitude: 11°26'4.70"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
		---
Date of sampling:	---	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 0°	Dip: 0°
	Fracture, length 10 m. Fosso Savenizza	
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		

Soil classification (USCS):	Silty Sand (SM)			
	FC = 18%	U = 3.62	C = 1.80	$\sigma = 2.065$
Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	CPTuA: CPTu: 13244			
Coordinates (WGS 84):	Latitude: 44°50'19.02"N		Latitude: 11°26'32.41"E	
Date:	20/05/2014			
Address:	Via Correggese			
Depth to GWT during in situ test:	3.00m			
In situ test result:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_z (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 1.00 m		M _w = 6.1	a _{max} = 0.46g
Graphs (I _c , q _{c1N} ,CRR _{7.5} , CSR _{7.5} , FS _{liq})	SOIL BEHAVIOR TYPE INDEX I_c NORMALIZED CONE RESISTANCE q_{c1N} (MPa) CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO CSR_{7.5}, CRR_{7.5} LIQUEFACTION SAFETY FACTOR FS_{liq}			
	LPI = 24.27		LSN = 26.66	S = 0.40 m
Note:	Thickness of surface layer: 5.8 m (from 0 to 5.8 m) Thickness of liquefied layer: 14.2 m (from 5.8 to 20 m)			
Data from:	RER: ☒		INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Cavezzo, Municipality of Cavezzo (MO) – “Cavez 0”

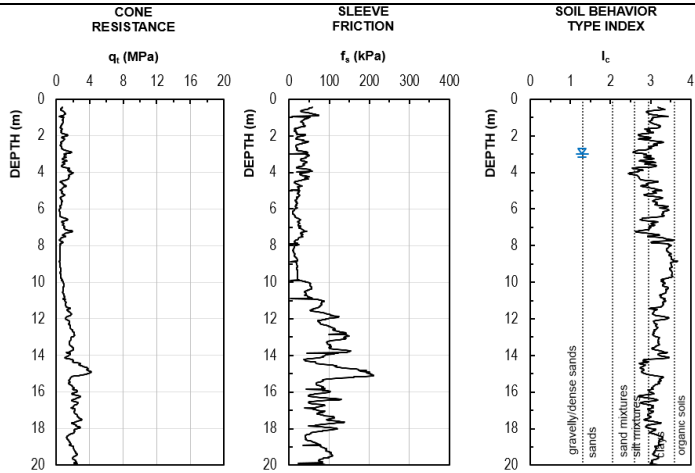
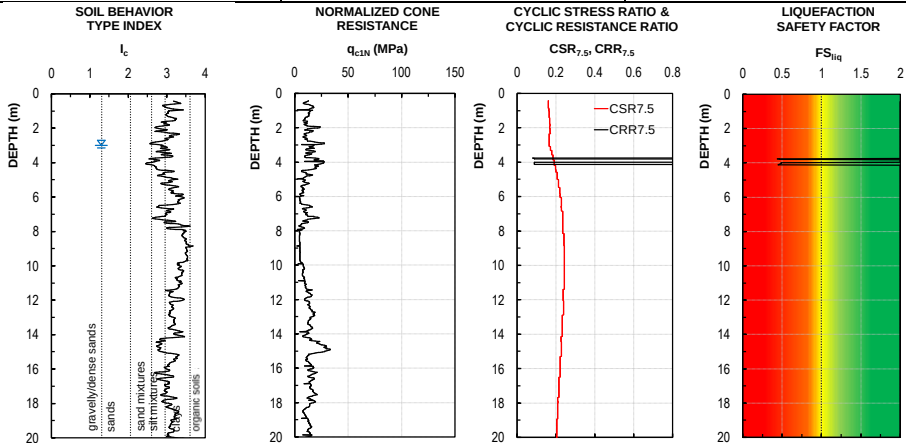
Site:	Cavezzo, Municipality of Cavezzo (MO)			
Location map:				
Sand boil sample:	Cavez0			
Coordinates (WGS 84):	Latitude: 44°50'14.21"N		Longitude: 11°1'55.81"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☒	
	---			
Date of sampling:	30/05/2012			
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☐		May 29 th , 2012, $M_w = 5.9$: ☒	
Liquefaction features:	Strike: 0°		Dip: 0°	
	Areal upwelling of fine sand from road, well and manhole			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 46%	U = 12.5	C = 2.53	$\sigma = 2.568$

Compositional information:	Q+F = 42 %; L = 27.67 %; C = 28.67 % Q + F = quartz + feldspars; L = siliclastic lithics; C = carbonates			
Paleoriver assignment:	Secchia			
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒		
Data from:	INGV: ☐	UNIMORE: ☒		
In situ test:	CPTuA: 036009P313			
Coordinates (WGS 84):	Latitude: 44°50'14.49"N	Longitude: 11° 1'55.21"E		
Date:	06/08/2012			
Address:	Via Ernesto Papazzoni			
Depth to GWT during in situ test:	3.00 m			
In situ test results: (q_b , f_s , u_2 , I_c)	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 5.9$	$a_{max} = 0.42g$	
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c	NORMALIZED CONE RESISTANCE q_{c1N} (MPa)	CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$	LIQUEFACTION SAFETY FACTOR FS_{liq}
	LPI = 4.16	LSN = 5.92	S = 0.04 m	
Note:	Thickness of surface layer: 7.4 m (from 0 to 7.4 m) Thickness of liquefied layer: 0.8 m (from 7.4 to 8.2 m)			
Data from:	RER: ☒		INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Cavezzo, Municipality of Cavezzo (MO) – “Cavez 1”

Site:	Cavezzo, Municipality of Cavezzo (MO)			
Location map:	Legend: Sand boil sample Liquefaction evidence-field observation Cone penetration test (CPT)			
Sand boil sample:	Cavez 1			
Coordinates (WGS 84):	Latitude: 44°50'6.69"N		Longitude: 11° 1'36.31"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	30/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☐		May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 30°		Dip: 0°	
	Fracture with fine sand/clay, length 4 m and opening ≤ 4 cm. Throw 4-5 cm with NW down			
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material			
Grain size distribution curve:	clay silt sand gravel			
Soil classification (USCS):	Silty Sand (SM)			
	FC = 15%	U = ---	C = ---	σ = 1.742
Compositional information:	Q+F = 35.33 %; L = 31.67 %; C = 31 % Q + F = quartz + feldspars; L = siliclastic lithics; C = carbonates			
Paleoriver assignment:	Secchia			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	CPTuA: 036009P824			
Coordinates (WGS 84):	Latitude: 44°50'7.33"N		Longitude: 11° 1'35.07"E	

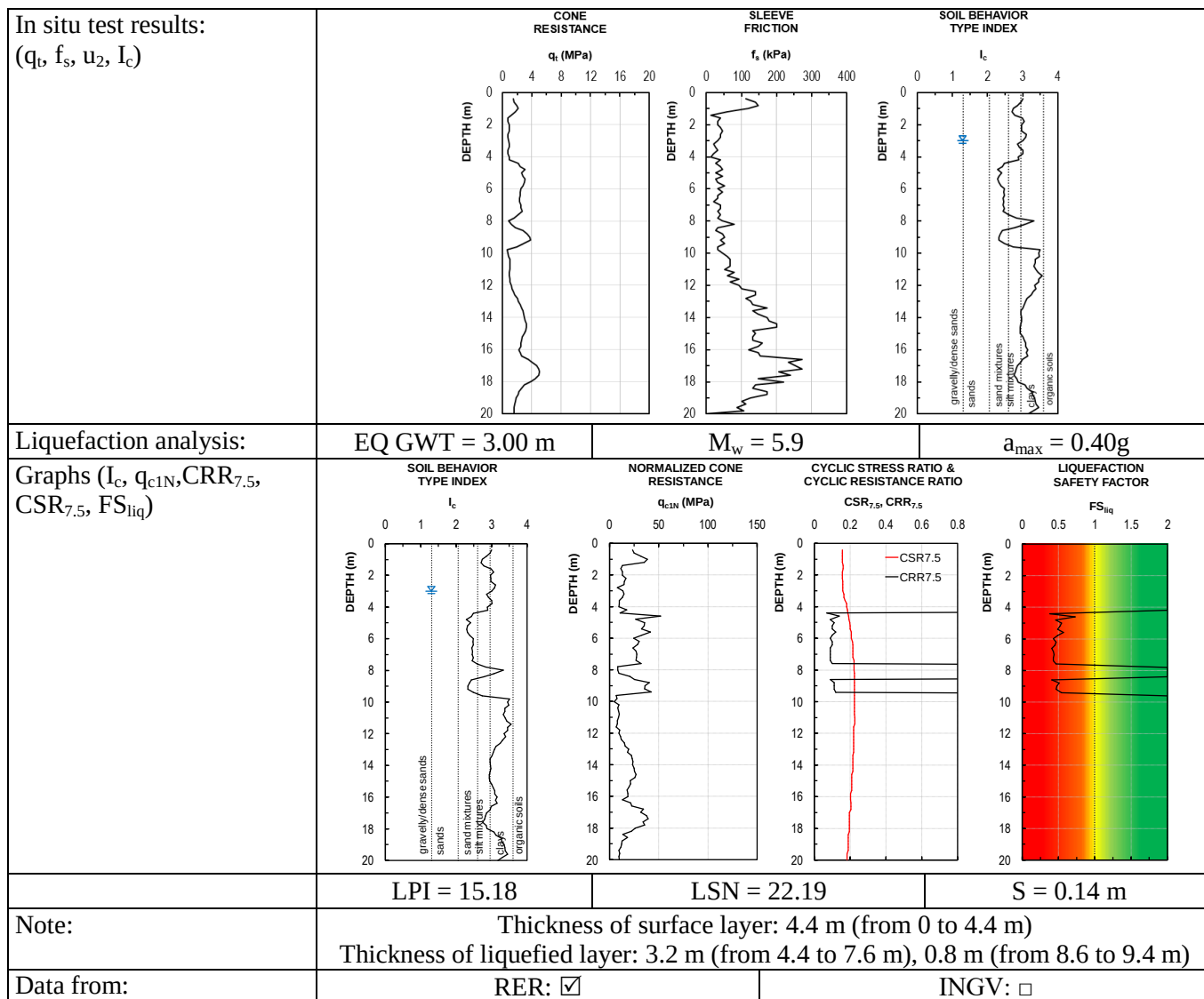
Date:	11/01/2017		
Address:	Via Cavour		
Depth to GWT during in situ test:	3.00 m		
In situ test results: (q_b , f_s , u_2 , I_c)			
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 5.9$	$a_{max} = 0.42g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})			
	LPI = 0.85	LSN = 1.76	S = 0.01 m
Note:	Thickness of surface layer: 3.8 m (from 0 to 3.8 m) Thickness of liquefied layer: 0.6 m (from 3.8 to 4.2 m)		
Data from:	RER: ☒		INGV: ☐

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Cavezzo, Municipality of Cavezzo (MO) – “Voltone 1”

Site:	Cavezzo, Municipality of Cavezzo (MO)		
Location map:			
Sand boil sample:	Voltone 1		
Coordinates (WGS 84):	Latitude: 44°49'20.33"N	Longitude: 11° 0'33.51"E	
Sand boil image from:	Aerial photography: ☐	Field observations: ☐	
	---	---	
Date of sampling:	30/05/2012		
Seismic event:	May 20 th , 2012, M _w = 6.1: ☐	May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: ---	Dip: ---	
	Fractures with liquefaction		
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 41%	U = 20.0	C = 3.47 σ = 2.828
Compositional information:	Q+F = 38%; L = 32.33%; C = 25.67% Q + F = quartz + feldspars; L = siliclastic lithics; C = carbonates		
Paleoriver assignment:	Secchia		
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒	
Data from:	INGV: ☐	UNIMORE: ☒	
In situ test:	CPTuA: 036009P779		

Coordinates (WGS 84):	Latitude: 44°49'21.80"N		Latitude: 11° 0'31.70"E
Date:	19/12/2014		
Address:	Via San Luigi		
Depth to GWT during in situ test:	3.00 m		
In situ test results: (q_t , f_s , u_2 , I_c)	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c		
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 5.9$	$a_{max} = 0.40g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c NORMALIZED CONE RESISTANCE q_{c1N} (MPa) CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ LIQUEFACTION SAFETY FACTOR FS_{liq}		
	LPI = 17.99	LSN = 28.12	S = 0.16 m
Note:	Thickness of surface layer: 3.5 m (from 0 to 3.5 m) Thickness of liquefied layer: 5.2 m (from 3.5 to 8.7 m)		
Data from:	RER: ☒		INGV: ☐
In situ test:	CPTuB: 036009P597		
Coordinates (WGS 84):	Latitude: 44°49'22.16"N		Latitude: 11° 0'32.49"E
Date:	17/04/2014		
Address:	Via San Luigi		
Depth to GWT during in situ test (m):	3.00 m		



M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Cavezzo, Municipality of Cavezzo (MO) – “Voltone 2”

Site:	Cavezzo, Municipality of Cavezzo (MO)	
Location map:		
Sand boil sample:	Voltone 2	
Coordinates (WGS 84):	Latitude: 44°49'15.37"N	Longitude: 11° 0'29.31"E
Sand boil image from:	Aerial photography: ☐	Field observations: ☒

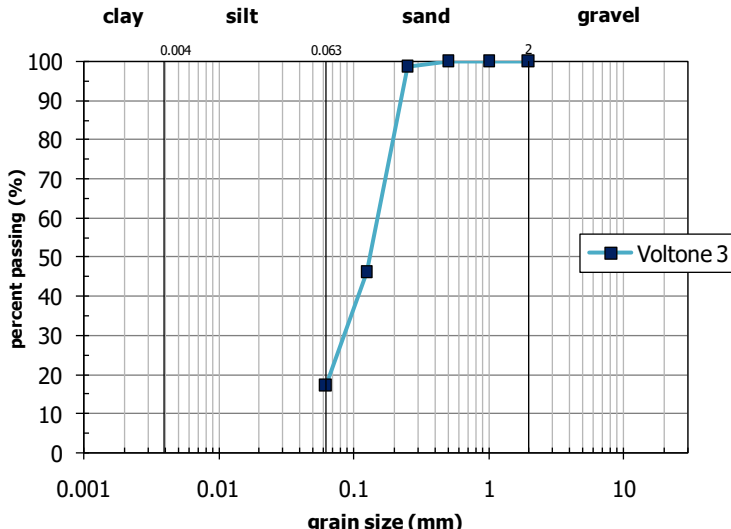
Date of sampling:	30/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☐	May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 0°	Dip: 0°
	Small bridge failure in correspondence of a ditch with diffuse liquefaction. Sand upwelling in the ditch for a length of about 500m	
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)	

	FC = 10%	U = 4.13	C = 1.47	$\sigma = 1.610$
Compositional information:	Q+F = 29.67 %; L = 35 %; C = 34.33 % Q + F = quartz + feldspars; L = siliclastic lithics; C = carbonates			
Paleoriver assignment:	Secchia			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	CPTuA: 036009P771			
Coordinates (WGS 84):	Latitude: 44°49'14.73"N		Longitude: 11° 0'26.10"E	
Date:	01/06/2016			
Address:	Via Uccivello			
Depth to GWT during in situ test:	3.00 m			
In situ test results: (q_b , f_s , u_2 , I_c)	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 3.00 m		$M_w = 5.9$	$a_{max} = 0.40g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c NORMALIZED CONE RESISTANCE q_{c1N} (MPa) CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ LIQUEFACTION SAFETY FACTOR FS_{liq}			
	LPI = 16.86		LSN = 28.60	S = 0.16 m
Note:	Thickness of surface layer: 3.0 m (from 0 to 3.0 m) Thickness of liquefied layer: 5.6 m (from 3.0 to 8.6 m)			
Data from:	RER: ☒		INGV: ☐	

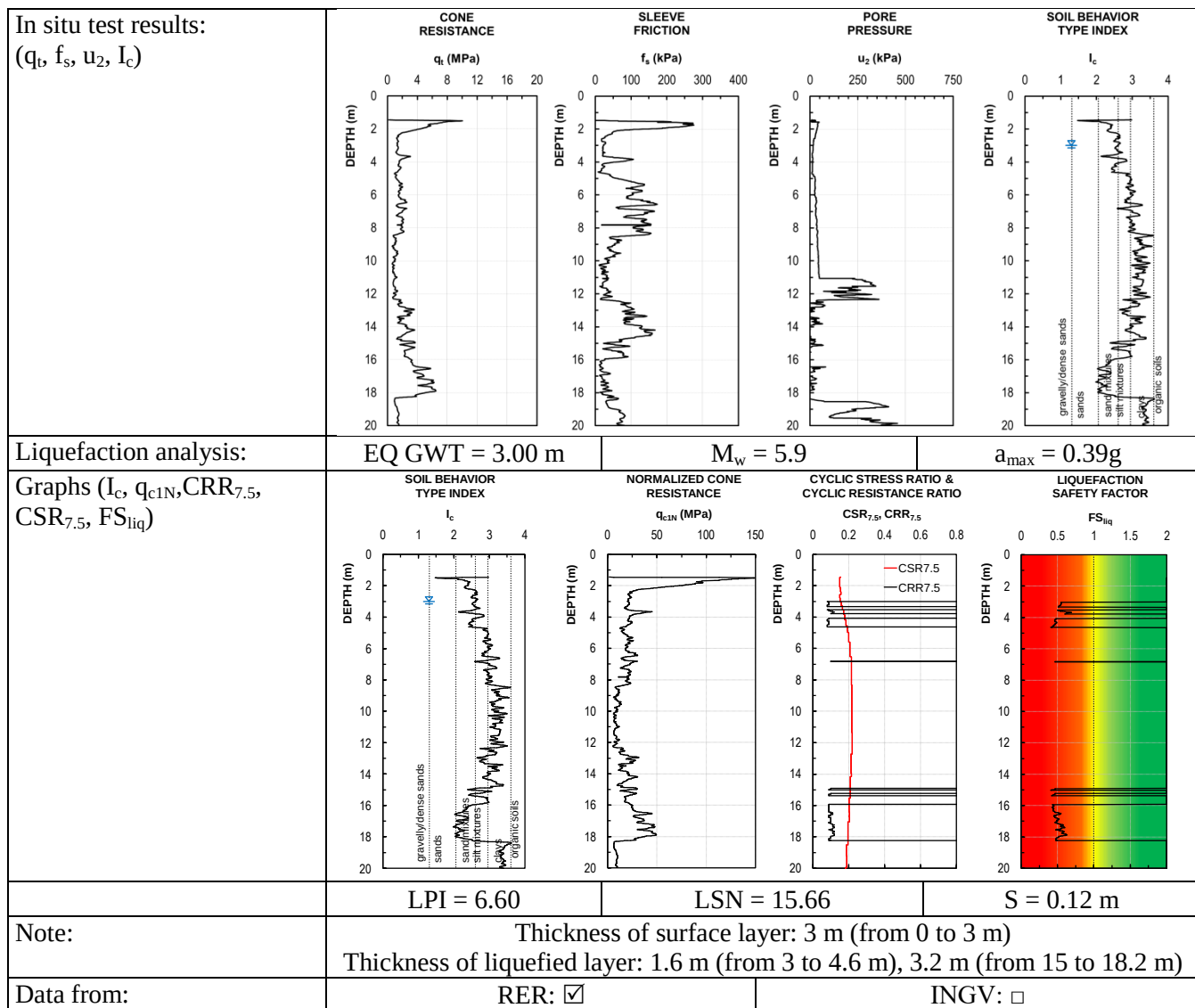
M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Cavezzo, Municipality of Cavezzo (MO) – “Voltone 3”

Site:	Cavezzo, Municipality of Cavezzo (MO)			
Location map:				
Sand boil sample:	Voltone 3			
Coordinates (WGS 84):	Latitude: 44°49'8.24"N		Longitude: 11° 0'21.72"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☒	
	---			
Date of sampling:	30/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☐		May 20 th , 2012, M _w = 6.1: ☐	
Liquefaction features:	Strike: ---		Dip: ---	

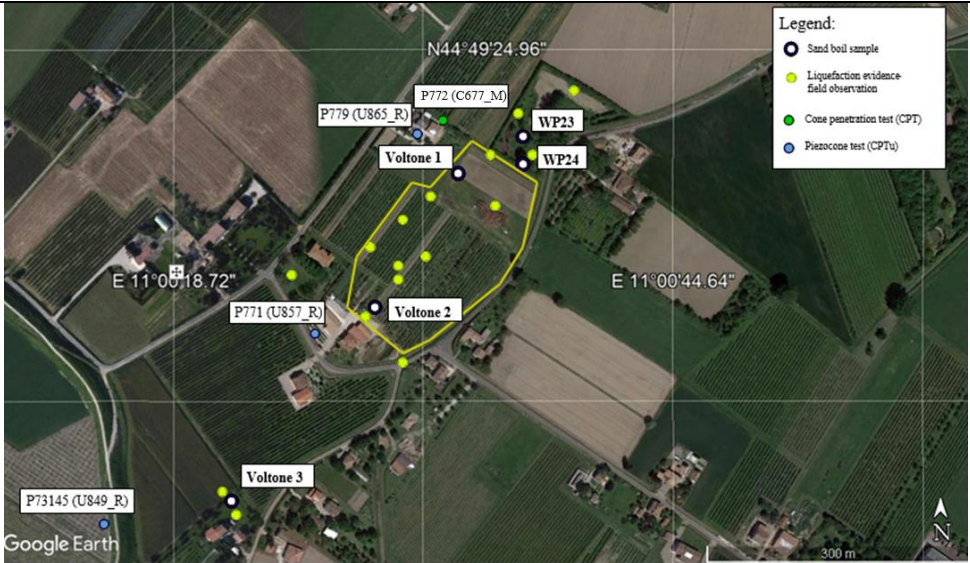
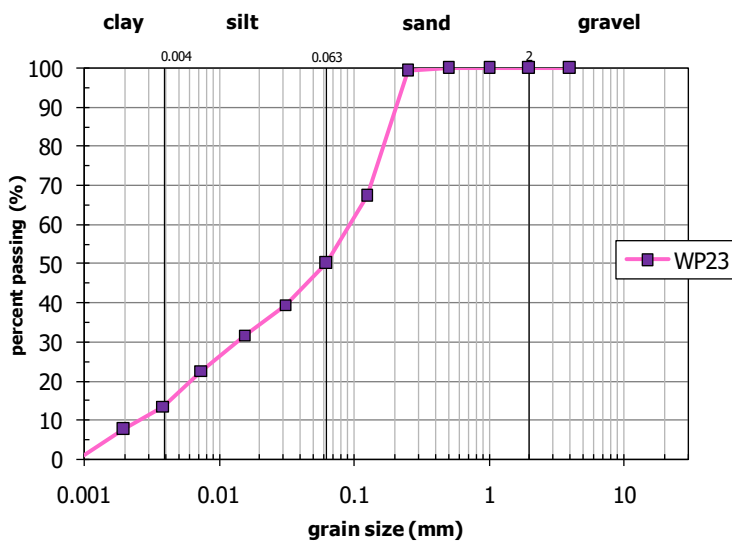
Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material			
Grain size distribution curve:	clay silt sand gravel  0.004 0.063 2 100 90 80 70 60 50 40 30 20 10 0 0.001 0.01 0.1 1 10 percent passing (%) grain size (mm) —■— Voltone 3			
Soil classification (USCS):	Silty Sand (SM)			
	FC = 24%	U = ---	C = ---	σ = 1.515

Compositional information:	Q+F = 36.33 %; L = 36.67 %; C = 25.33 % Q + F = quartz + feldspars; L = siliclastic lithics; C = carbonates		
Paleoriver assignment:	Secchia		
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒	
Data from:	INGV: ☐	UNIMORE: ☒	
In situ test:	CPTuA: 036009P73144		
Coordinates (WGS 84):	Latitude: 44°49'4.24"N	Latitude: 11° 0'14.56"E	
Date:	07/07/2014		
Address:	Via Rebuttina		
Depth to GWT during in situ test:	3.00 m		
In situ test results: (q_t , f_s , u_2 , I_c)	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c		
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 5.9$	$a_{max} = 0.39g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c NORMALIZED CONE RESISTANCE q_{c1N} (MPa) CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ LIQUEFACTION SAFETY FACTOR FS_{liq}		
	LPI = 6.75	LSN = 14.30	S = 0.10 m
Note:	Thickness of surface layer: 3 m (from 0 to 3 m) Thickness of liquefied layer: 2.2 m (from 3 to 5.2 m), 2.4 m (from 11.2 to 13.6 m), 0.8 m (from 17.4 to 18.2 m)		
Data from:	RER: ☒	INGV: ☐	
In situ test:	CPTuB: 036009P73145		
Coordinates (WGS 84):	Latitude: 44°49'6.41"N	Longitude: 11° 0'15.84"E	
Date:	07/07/2014		
Address:	Via Rebuttina		
Depth to GWT during in situ test:	3.00 m		

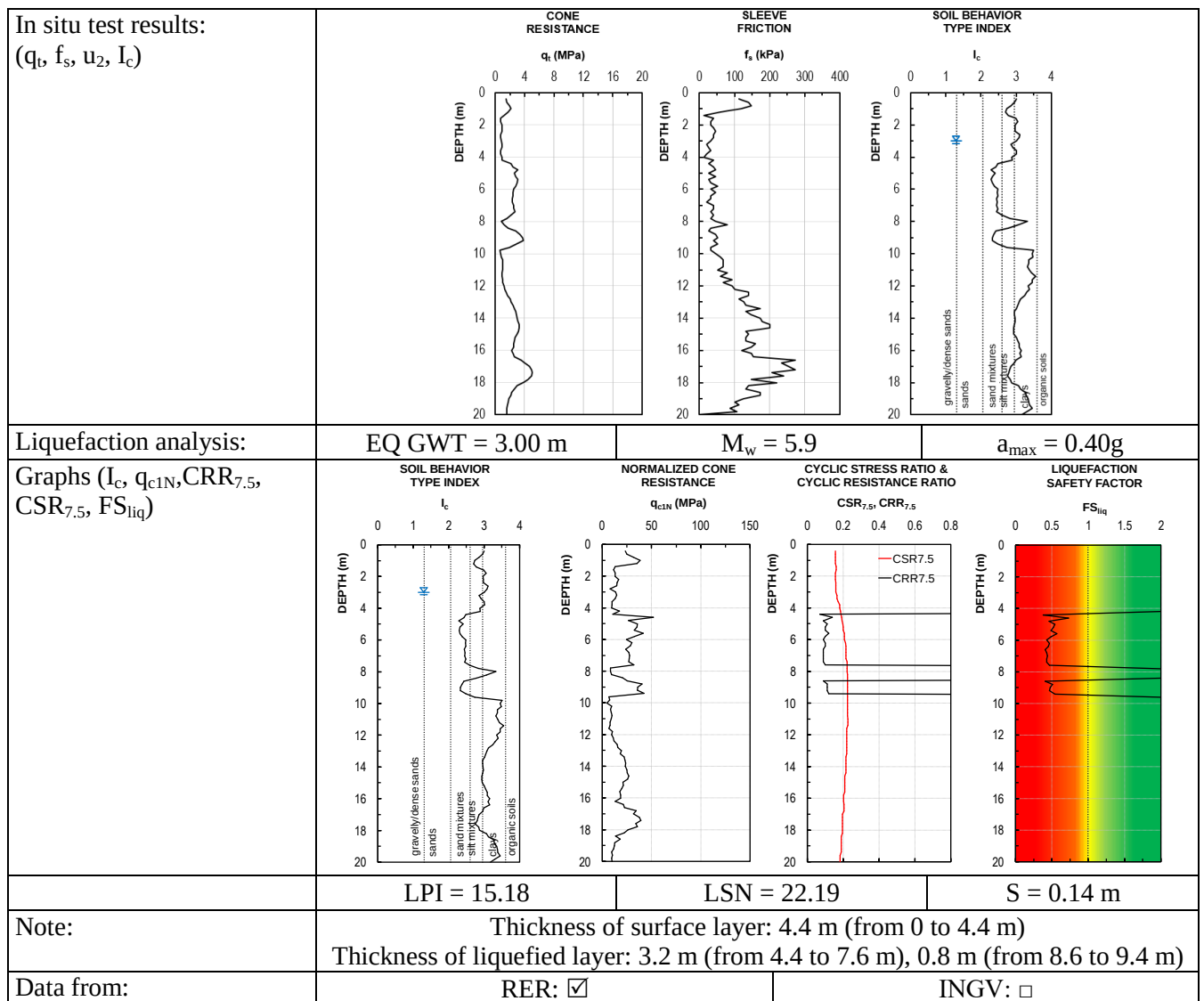


M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Voltone, Municipality of Cavezzo (MO) – “WP23”

Site:	Voltone, Municipality of Cavezzo (MO)	
Location map:		
Sand boil sample:	WP23	
Coordinates (WGS 84):	Latitude: 44°49'21.72"N	Longitude: 11° 0'36.90"E
Sand boil image from:	Aerial photography: ☐	Field observations: ☒
	---	
Date of sampling:	05/06/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☐	May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 0	Dip: 0
	Hazel sandy-siltydeposit	
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		
Soil classification (USCS):	Sandy Silt (ML)	

	FC = 54%	U = 35.19	C = 0.76	$\sigma = 5.322$
Compositional information:	---			
Paleoriver assignment:	Secchia			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	CPTuA: 036009P779			
Coordinates (WGS 84):	Latitude: 44°49'21.80"N		Latitude: 11° 0'31.70"E	
Date:	19/12/2014			
Address:	Via San Luigi			
Depth to GWT during in situ test:	3.00 m			
In situ test results: (q_b , f_s , u_2 , I_c)	CONE RESISTANCE q_c (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 3.00 m		$M_w = 5.9$	$a_{max} = 0.40g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c NORMALIZED CONE RESISTANCE q_{c1N} (MPa) CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ LIQUEFACTION SAFETY FACTOR FS_{liq}			
	LPI = 17.99		LSN = 28.12	S = 0.16 m
Note:	Thickness of surface layer: 3.5 m (from 0 to 3.5 m) Thickness of liquefied layer: 5.2 m (from 3.5 to 8.7 m)			
Data from:	RER: ☒		INGV: ☐	
In situ test:	CPTuB: 036009P597			
Coordinates (WGS 84):	Latitude: 44°49'22.16"N		Latitude: 11° 0'32.49"E	
Date:	17/04/2014			
Address:	Via Gavioli			
Depth to GWT during in situ test:	3.00 m			



M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Voltone, Municipality of Cavezzo (MO) – “WP24”

Site:	Voltone, Municipality of Cavezzo (MO)			
Location map:				
Sand boil sample:	WP24			
Coordinates (WGS 84):	Latitude: 44°49'20.86"N		Longitude: 11° 0'36.97"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	05/06/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☐		May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 20°		Dip: 0°	
	Fracture with grey medium sand, length 5 m			
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 42%	U = 41.03	C = 0.52	σ=5.15
Compositional information:	---			
Paleoriver assignment:	Secchia			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	CPTuA: 036009P779			
Coordinates (WGS 84):	Latitude: 44°49'21.80"N		Latitude: 11° 0'31.70"E	

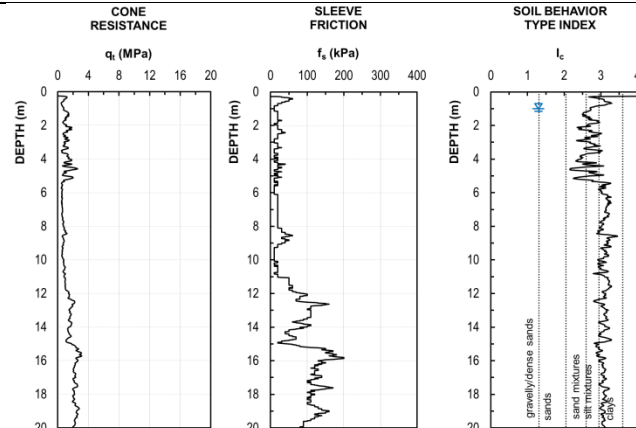
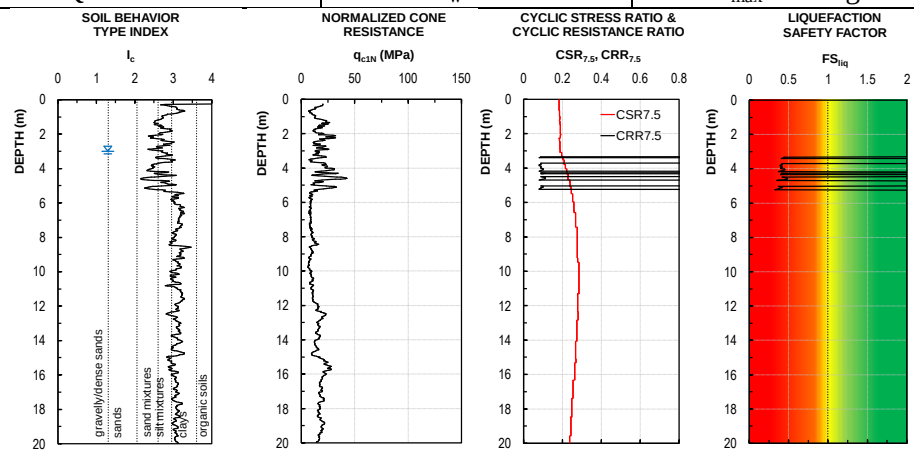
Date:	19/12/2014		
Address:	Via San Luigi		
Depth to GWT during in situ test:	3.00 m		
In situ test results: (q_b , f_s , u_2 , I_c)	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c		
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 5.9$	$a_{max} = 0.40g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c NORMALIZED CONE RESISTANCE q_{c1N} (MPa) CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ LIQUEFACTION SAFETY FACTOR FS_{liq}		
	LPI = 17.99	LSN = 28.12	S = 0.16 m
Note:	Thickness of surface layer: 3.5 m (from 0 to 3.5 m) Thickness of liquefied layer: 5.2 m (from 3.5 to 8.7 m)		
Data from:	RER: ☒		INGV: ☐
In situ test:	CPTuB: 036009P597		
Coordinates (WGS 84):	Latitude: 44°49'22.16"N		Latitude: 11° 0'32.49"E
Date:	17/04/2014		
Address:	Via Gavioli		
Depth to GWT during in situ test:	3.00 m		

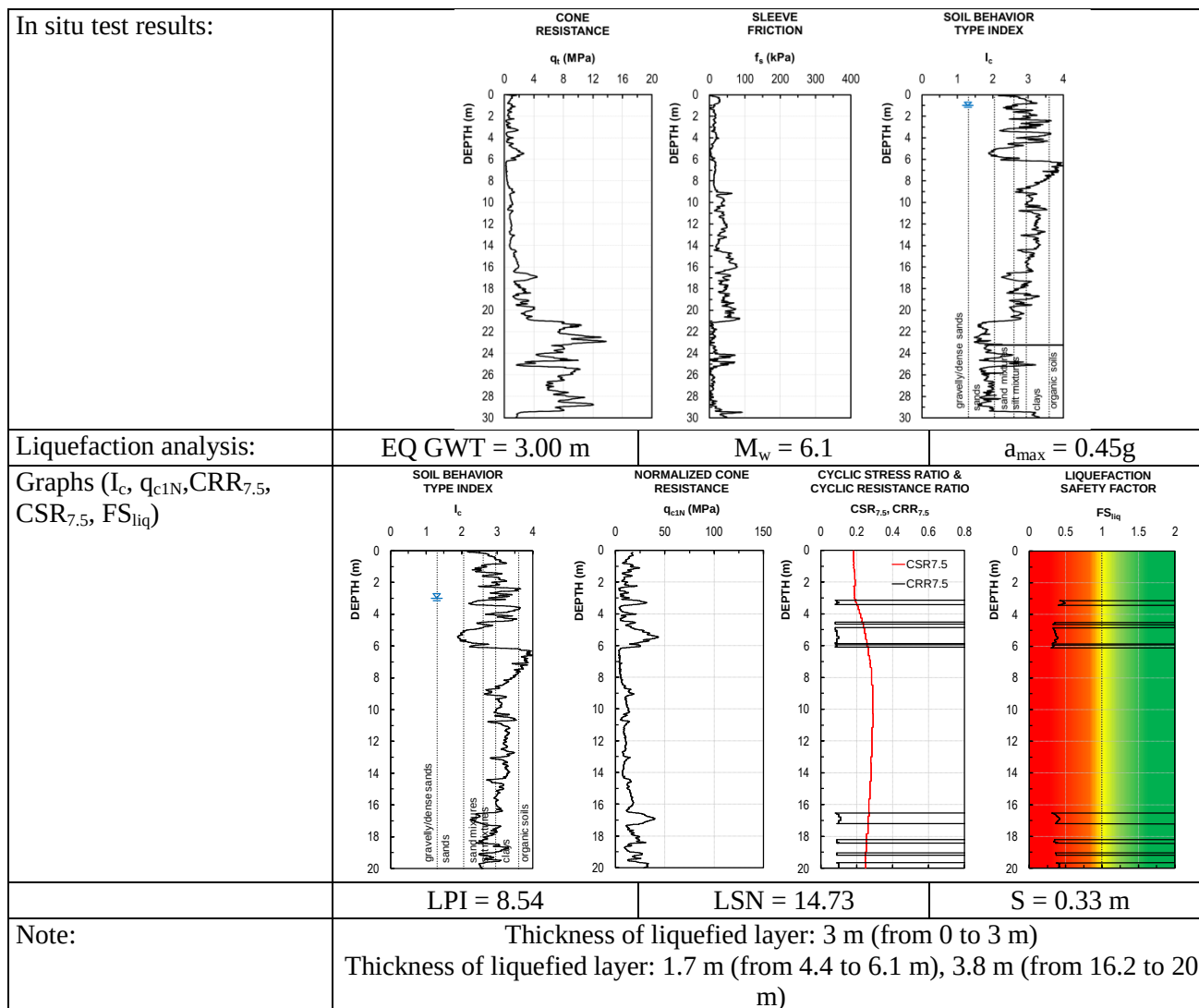
In situ test results: (q_b , f_s , u_2 , I_c)	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) SOIL BEHAVIOR TYPE INDEX I_c		
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 5.9$	$a_{max} = 0.40g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c NORMALIZED CONE RESISTANCE q_{c1N} (MPa) CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ LIQUEFACTION SAFETY FACTOR FS_{liq}		
	LPI = 15.18	LSN = 22.19	S = 0.14 m
Note:	Thickness of surface layer: 4.4 m (from 0 to 4.4 m) Thickness of liquefied layer: 3.2 m (from 4.4 to 7.6 m), 0,8 m (from 8.6 to 9.4 m)		
Data from:	RER: ☒		INGV: ☐

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Dodici Morelli, Municipality of Cento (FE) – “Morelli 1”

Site:	Dodici Morelli, Municipality of Cento (FE)		
Location map:			
Sand boil sample:	Morelli 1		
Coordinates (WGS 84):	Latitude: 44°47'50.48"N	Longitude: 11°17'31.44"E	
Sand boil image from:	Aerial photography: ☒	Field observations: ☐	
Date of sampling:	30/05/2012		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐	
Liquefaction features:	Strike: ---	Dip: ---	
	Abundant upwelling of sand from the well		
Liquefaction-induced land damage category:	3 No lateral spreading but minor to moderate quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 37%	U = 8.67	$C = 2.17$ $\sigma = 2.383$
Compositional information:	---		
Paleoriver assignment:	Reno		

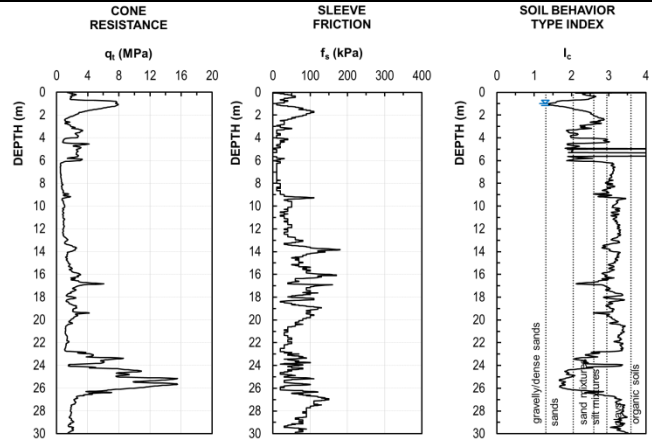
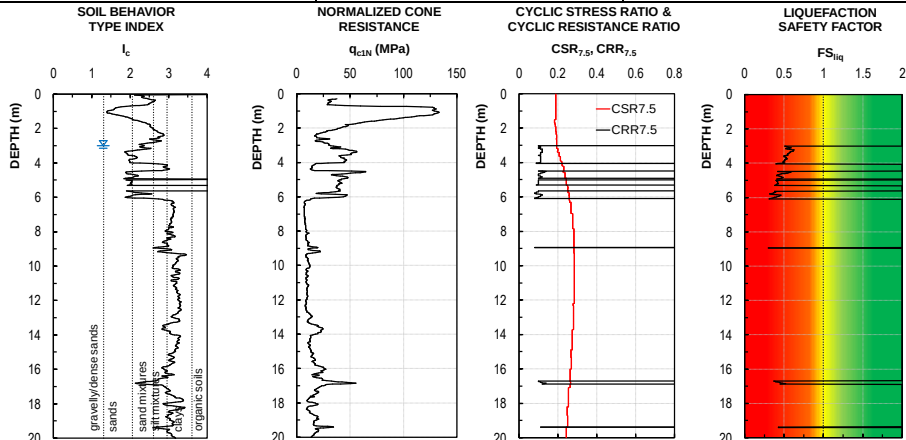
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	CPTuA: 038004P698	
Coordinates (WGS 84):	Latitude: 44°47'47.47"N	Longitude: 11°17'40.16"E
Date:	23/04/2014	
Address:	Via Busi	
Depth to GWT during in situ test:	1.00 m	
In situ test results:		
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 6.1$
		$a_{max} = 0.45g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})		
	LPI = 4.94	LSN = 8.69
		S = 0.04 m
Note:	Thickness of surface layer: 3.7 m (from 0 to 3.7 m) Thickness of liquefied layer: 1.5 m (from 3.7 to 5.2 m)	
Data from:	RER: ☒	INGV: ☐
In situ test:	CPTuB: 038004P842	
Coordinates (WGS 84):	Latitude: 44°47'42.90"N	Longitude: 11°17'25.91"E
Date:	28/05/2013	
Address:	Via Zigalotto	
Depth to GWT during in situ test:	1.00 m	



M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Dodici Morelli, Municipality of Cento (FE) – “Morelli 2”

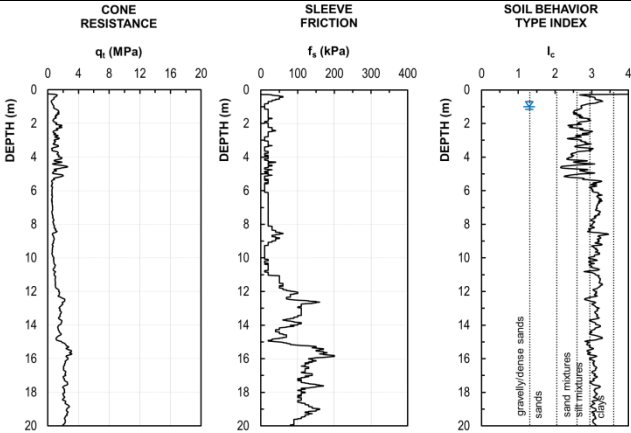
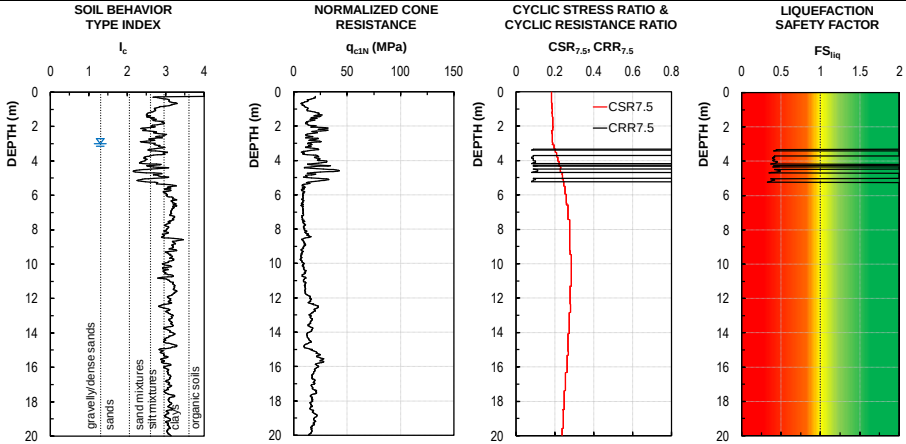
Site:	Dodici Morelli, Municipality of Cento (FE)		
Location map:			
Sand boil sample:	Morelli 2		
Coordinates (WGS 84):	Latitude: 44°48'18.00"N	Longitude: 11°17'56.98"E	
Sand boil image from:	Aerial photography: ☐	Field observations: ☐	
	---	---	
Date of sampling:	30/05/2012		
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒	May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: ---	Dip: ---	
	Fracture, length 10 m and thickness 30 cm		
Liquefaction-induced land damage category:	3 No lateral spreading but minor to moderate quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 28%	U = ---	C = --- $\sigma = 1.689$
Compositional information:	---		
Paleoriver assignment:	Reno		
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒	
Data from:	INGV: ☐	UNIMORE: ☒	
In situ test:	CPTuA: 038004P49		
Coordinates (WGS 84):	Latitude: 44°48'13.50"N	Longitude: 11°17'56.06"E	
Date:	03/01/2012		
Address:	Via Monsignore di Sotto		

Depth to GWT during in situ test:	1.00m		
In situ test results:			
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 6.1$	$a_{max} = 0.46g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})			
	LPI = 9.48	LSN = 16.25	S = 0.15 m
Note:	Thickness of surface layer: 3 m (from 0 to 3 m) Thickness of liquefied layer: 3 m (from 3 to 6 m)		
Data from:	RER: ☒		INGV: ☐

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

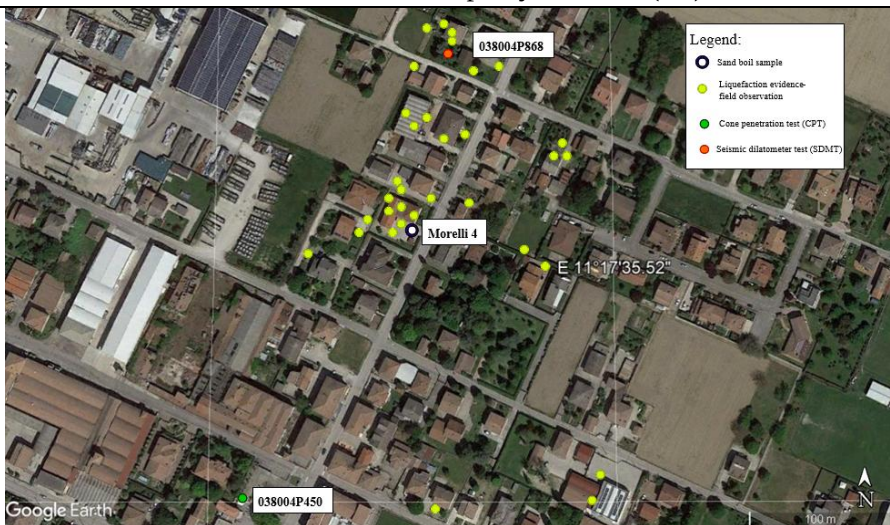
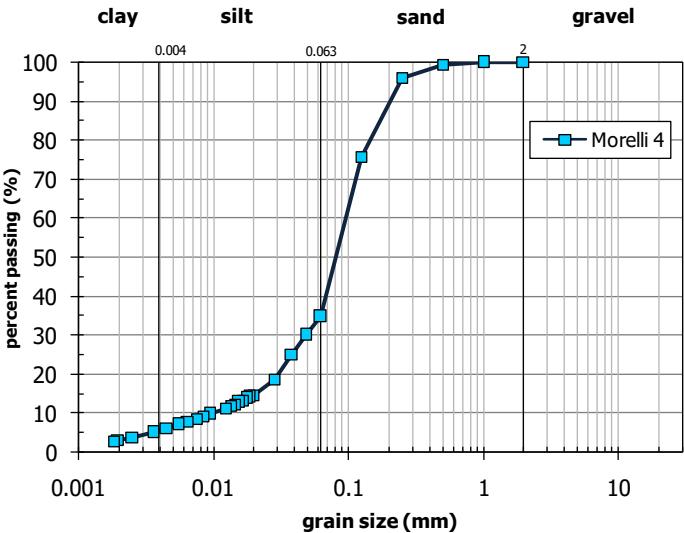
Dodici Morelli, Municipality of Cento (FE) – “Morelli 3”

Site:	Dodici Morelli, Municipality of Cento (FE)		
Location map:			
Sand boil sample:	Morelli 3		
Coordinates (WGS 84):	Latitude: 44°47'51.40"N	Longitude: 11°17'41.13"E	
Sand boil image from:	Aerial photography: ☐	Field observations: ☐	
	---	---	
Date of sampling:	30/05/2012		
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒	May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: ---	Dip: ---	
	Abundant upwelling of sand from the well. Well settlement 30 cm		
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Sandy Silt (ML)		
	FC = 27%	U = ---	C = --- $\sigma = 1.512$
Compositional information:	---		
Paleoriver assignment:	Reno		
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒	
Data from:	INGV: ☐	UNIMORE: ☒	
In situ test:	CPTuA: 038004P698		
Coordinates (WGS 84):	Latitude: 44°47'47.47"N	Longitude: 11°17'40.16"E	
Date:	23/04/2014		

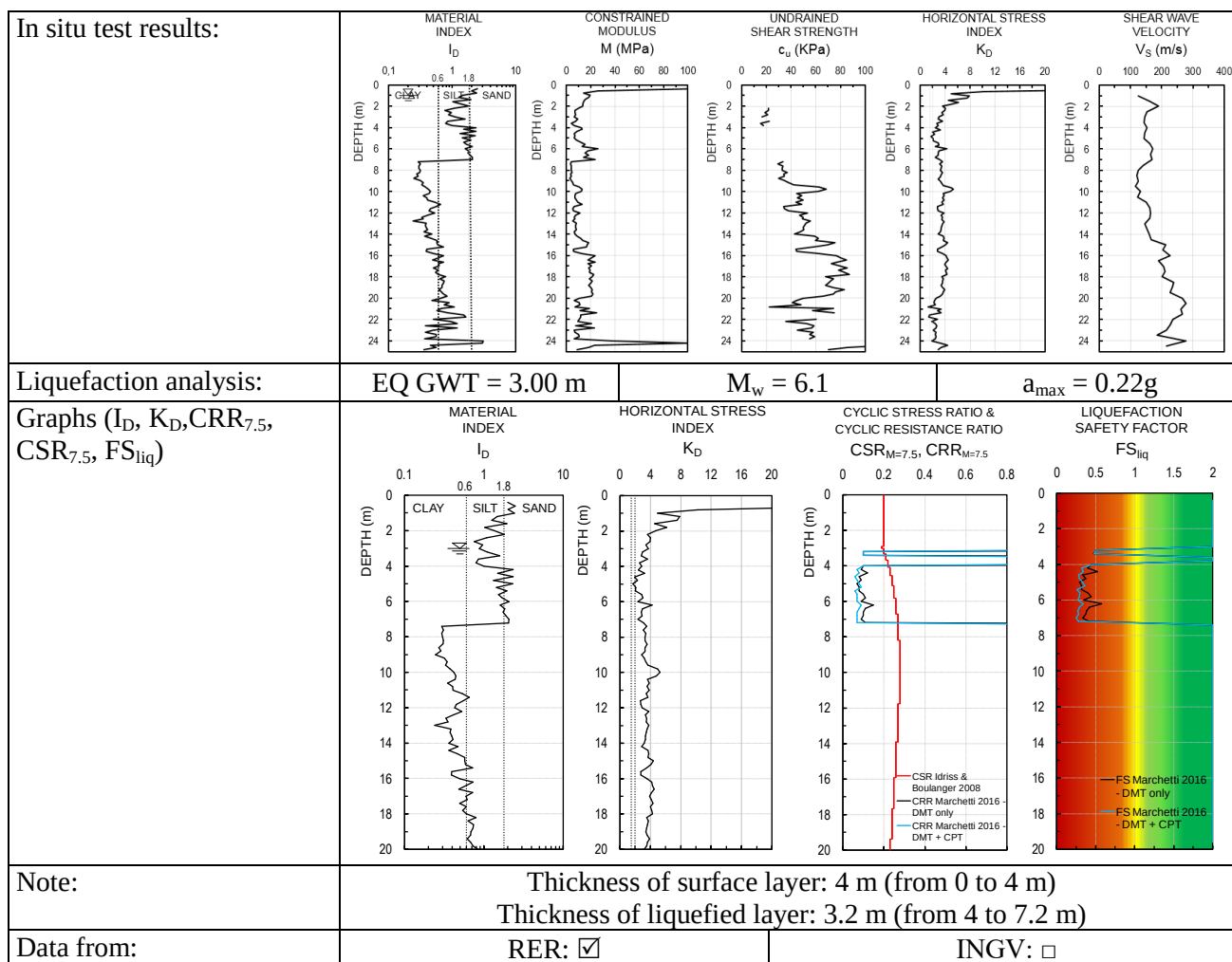
Address:	Via Busi		
Depth to GWT during in situ test:	1.00m		
In situ test results:			
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 6.1$	$a_{max} = 0.45g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})			
	LPI = 4.94	LSN = 8.69	S = 0.04 m
Note:	Thickness of surface layer: 3.5 m (from 0 to 3.5 m) Thickness of liquefied layer: 2 m (from 3.5 to 5.5 m)		
Data from:	RER: ☒		INGV: ☐

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Dodici Morelli, Municipality of Cento (FE) – “Morelli 4”

Site:	Dodici Morelli, Municipality of Cento (FE)	
Location map:		
Sand boil sample:	Morelli 4	
Coordinates (WGS 84):	Latitude: 44°47'34.30"N	Longitude: 11°17'28.88"E
Sand boil image from:	Aerial photography: ☐	Field observations: ☒
	---	
Date of sampling:	30/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 85	Dip: 0
	Upwelling of sand from the well. Sand boils	
Liquefaction-induced land damage category:	4 ■ No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		
Soil classification (USCS):	Silty Sand (SM)	

	FC = 45%	U = 9.5	C = 2.63	$\sigma = 2.52$
Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	CPTuA: 038004P450			
Coordinates (WGS 84):	Latitude: 44°47'28.37"N		Longitude: 11°17'23.64"E	
Date:	11/04/2013			
Address:	Via Maestrola			
Depth to GWT during in situ test:	1.00m			
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 6.1$	$a_{max} = 0.45g$	
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c	NORMALIZED CONE RESISTANCE q_{c1N} (MPa)	CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$	LIQUEFACTION SAFETY FACTOR FS_{liq}
	LPI = 5.36	LSN = 11.52	S = 0.37 m	
Note:	Thickness of surface layer: 3.1 m (from 0 to 3.1 m) Thickness of liquefied layer: 2.2 m (from 3.1 to 5.3 m), 5 m (from 15 to 20 m)			
Data from:	RER: ☒		INGV: ☐	
In situ test:	DMTa: 038004P868			
Coordinates (WGS 84):	Latitude: 44°47'38.69"N		Longitude: 11°17'30.18"E	
Date:	11/07/2016			
Address:	Via Zigalotto			
Depth to GWT during in situ test:	1.00 m			



M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Dodici Morelli, Municipality of Cento (FE) – “WP09 XII Mor”

Site:	Dodici Morelli, Municipality of Cento (FE)	
Location map:		
Sand boil sample:	WP09 XII Mor	
Coordinates (WGS 84):	Latitude: 44°47'50.21"N	Longitude: 11°17'39.59"E
Sand boil image from:	Aerial photography: ☐	Field observations: ☒

Date of sampling:	05/06/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 0°	Dip: 0°
	Upwelling of medium to fine sand from the well. Well level has risen about 4 m	
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		
Soil classification (USCS):	Silty Sand (SM)	

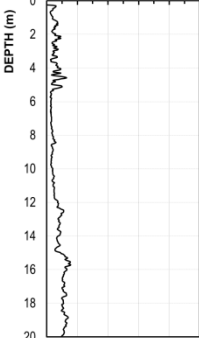
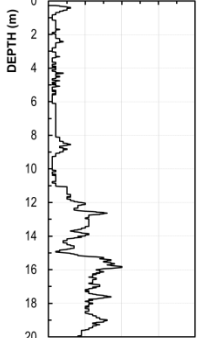
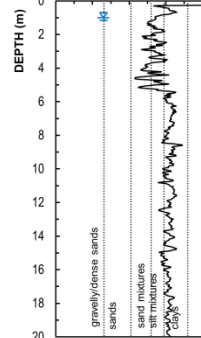
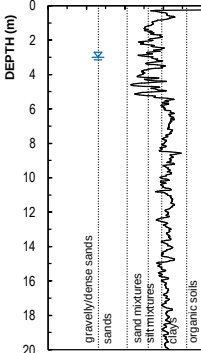
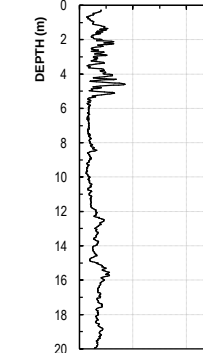
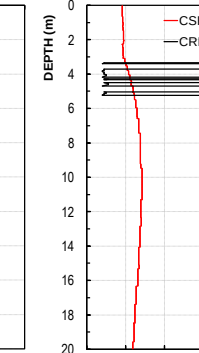
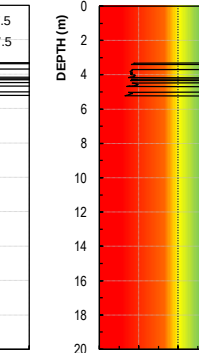
	FC = 26%	U = 20.59	C = 6.46	$\sigma = 3.412$
Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	CPTuA: 038004P698			
Coordinates (WGS 84):	Latitude: 44°47'47.47"N		Longitude: 11°17'40.16"E	
Date:	23/04/2014			
Address:	Via Busi			
Depth to GWT during in situ test:	1.00m			
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 3.00 m		$M_w = 6.1$	$a_{max} = 0.45g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c NORMALIZED CONE RESISTANCE q_{c1N} (MPa) CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ LIQUEFACTION SAFETY FACTOR FS_{liq}			
	LPI = 4.94		LSN = 8.69	S = 0.04 m
Note:	Thickness of surface layer: 3.5 m (from 0 to 3.5 m) Thickness of liquefied layer: 2 m (from 3.5 to 5.5 m)			
Data from:	RER: ☒		INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Dodici Morelli, Municipality of Cento (FE) – “WP12”

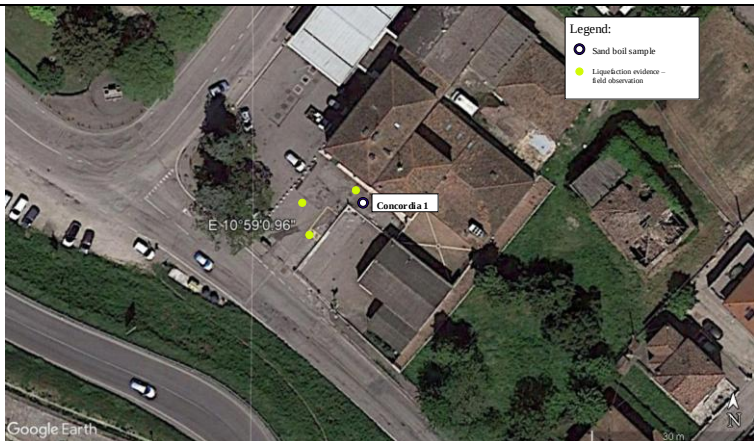
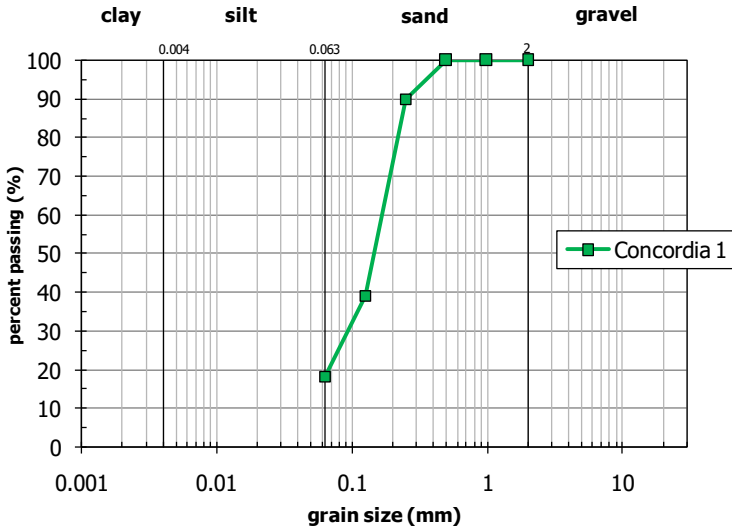
Site:	Dodici Morelli, Municipality of Cento (FE)			
Location map:				
Sand boil sample:	WP12			
Coordinates (WGS 84):	Latitude: 44°47'51.32"N		Longitude: 11°17'41.39"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☒	

Date of sampling:	05/06/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 0°		Dip: 0°	
	Upwelling of fine sand from the well. Well depth 14 m			
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 26%	U = 20.63	C = 6.14	σ = 3.225

Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒		
Data from:	INGV: ☒	UNIMORE: ☐		
In situ test:	CPTuA: 038004P698			
Coordinates (WGS 84):	Latitude: 44°47'47.47"N	Longitude: 11°17'40.16"E		
Date:	23/04/2014			
Address:	Via Busi			
Depth to GWT during in situ test:	1.00m			
In situ test results:	CONE RESISTANCE q_t (MPa)  SLEEVE FRICTION f_s (kPa)  SOIL BEHAVIOR TYPE INDEX I_c 			
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 6.1$	$a_{max} = 0.45g$	
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c  NORMALIZED CONE RESISTANCE q_{c1N} (MPa)  CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$ $CRR_{7.5}$  LIQUEFACTION SAFETY FACTOR FS_{liq} 	LPI = 4.94	LSN = 8.69	S = 0.04 m
Note:	Thickness of liquefied layer: 3.5 m (from 0 to 3.5 m) Thickness of liquefied layer: 2 m (from 3.5 to 5.5 m)			
Data from:	RER: ☒		INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

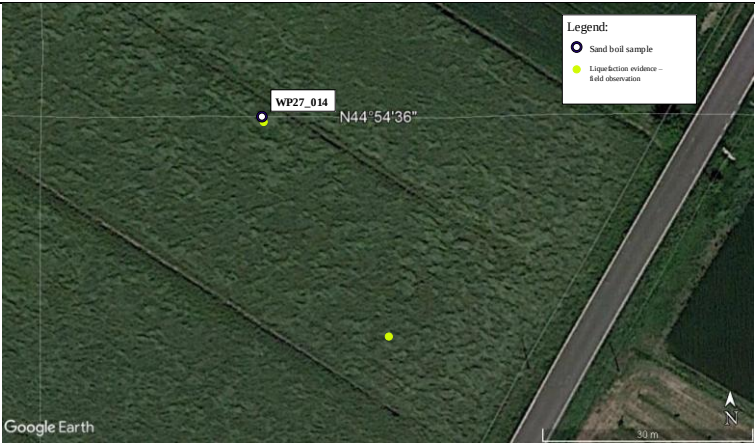
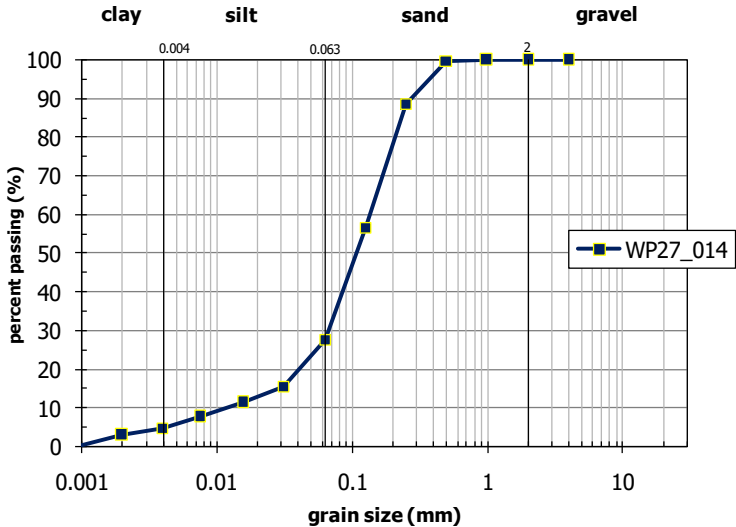
Concordia sul Secchia, Municipality of Concordia sul Secchia (MO) – “Concordia 1”

Site:	Concordia sul Secchia, Municipality of Concordia sul Secchia (MO)			
Location map:				
Sand boil sample:	Concordia 1			
Coordinates (WGS 84):	Latitude: 44°54'41.68"N		Longitude: 10°59'1.88"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☐	
			---	
Date of sampling:	---			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☐		May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: ---		Dip: ---	
	Yellow sand leakage from fissures in the asphalt;in correspondence ofTamoil gas station			
Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 23%	U = ---	C = ---	σ = 1.878
Compositional information:	---			

Paleoriver assignment:	Secchia	
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Concordia sul Secchia, Municipality of Concordia sul Secchia (MO) – “WP27_014”,

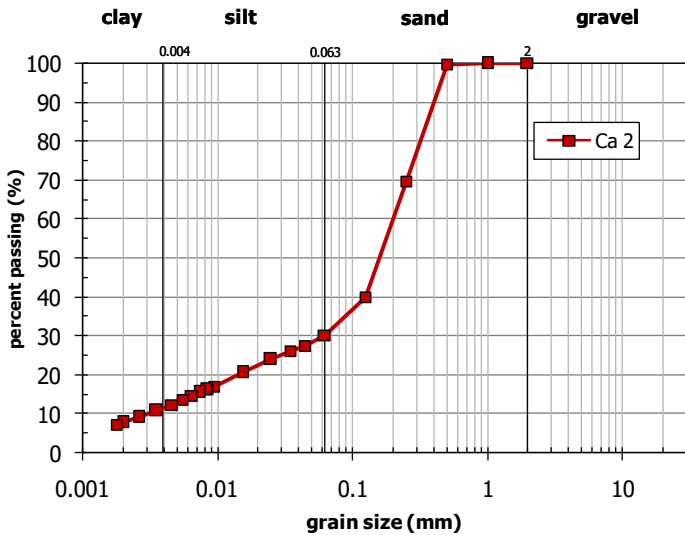
Site:	Concordia sul Secchia, Municipality of Concordia sul Secchia (MO)		
Location map:			
Sand boil sample:	WP27_014		
Coordinates (WGS 84):	Latitude: 44°54'36.00"N		Longitude: 11° 2'16.80"E
Sand boil image from:	Aerial photography: ☒		Field observations: ☒
	 		
Date of sampling:	27/05/2012		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☐		May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 160°		Dip: 0°
	Fracture with light grey fine sand, length 20 m. Circular ground failures in correspondence of the mud boils		
Liquefaction-induced land damage category:	3 No lateral spreading but minor to moderate quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 34%	U = 10.77	C = 2.54 $\sigma = 3.224$

Compositional information:	---	
Paleoriver assignment:	Secchia or Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Porporana, Municipality of Ferrara (FE) – “Ca2”

Site:	Porporana, Municipality of Ferrara (FE)		
Location map:			
Sand boil sample:	Ca2		
Coordinates (WGS 84):	Latitude: 44°49'34" N	Longitude: 11°00'26" E	
Sand boil image from:	Aerial photography: ☐	Field observations: ☐	
	Photo	Photo	
Date of sampling:	---		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐	
Liquefaction features:	Strike: ---	Dip: ---	

Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 33%	U = 66.67	C = 6.62 $\sigma = 3.438$
Compositional information:	---		
Paleoriver assignment:	Po		
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒	
Data from:	INGV: ☐	UNIMORE: ☒	
In situ test:	---		

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical

settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Rossa, Municipality of Finale Emilia(MO) – “Ca rossa 1”

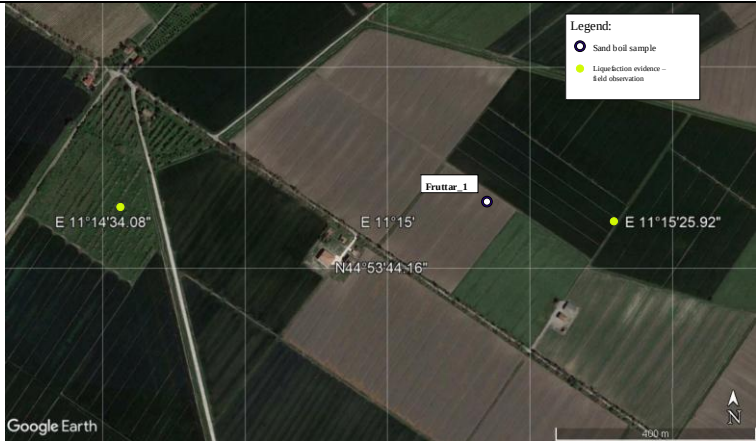
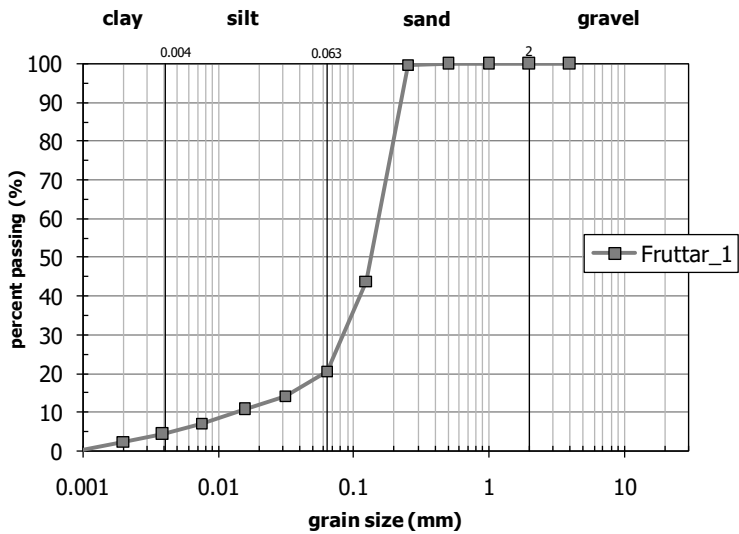
Site:	Rossa, Municipality of Finale Emilia (MO)		
Location map:			
Sand boil sample:	Ca rossa 1		
Coordinates (WGS 84):	Latitude: 44°53'23.35"N	Longitude: 11°16'57.84"E	
Sand boil image from:	Aerial photography: ☒	Field observations: ☐	

Date of sampling:	30/05/2012		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐	
Liquefaction features:	Strike: ---	Dip: ---	
	Fracture, length 1 m.		
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)		
	FC = 8%	U = 4.24	C = 2.21 $\sigma = 1.667$
Compositional information:	---		
Paleoriver assignment:	Po		

Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Finale Emilia, Municipality of Finale Emilia (MO) – “Fruttar_1”

Site:	Finale Emilia, Municipality of Finale Emilia (MO)		
Location map:			
Sand boil sample:	Fruttar_1		
Coordinates (WGS 84):	Latitude: 44°53'48.19"N		Longitude: 11°15'9.29"E
Sand boil image from:	Aerial photography: ☒		Field observations: ☐
			---
Date of sampling:	---		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒		May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 85°		Dip: 0°
	Fracture with grey-light blue sand. No sand upwelling from the well.		
Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 26%	U = 12.31	$C = 3.39$ $\sigma = 2.759$
Compositional information:	---		
Paleoriver assignment:	Po		
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐

Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Martino Spino, Municipality of Mirandola(MO) – “INS07”

Site:	S. Martino Spino, Municipality of Mirandola (MO)		
Location map:			
Sand boil sample:	INS07		
Coordinates (WGS 84):	Latitude: 44°54'59.44"N	Longitude: 11°14'8.58"E	
Sand boil image from:	Aerial photography: ☒	Field observations: ☐	

Date of sampling:	---		
Seismic event:	May 20 th , 2012, M _w = 6.1: ☐	May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: ---	Dip: ---	

Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 32%	U = 12.8	C = 2.45 σ = 3.206
Compositional information:	---		

Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Martino Spino, Municipality of Mirandola (MO) – “INS08”

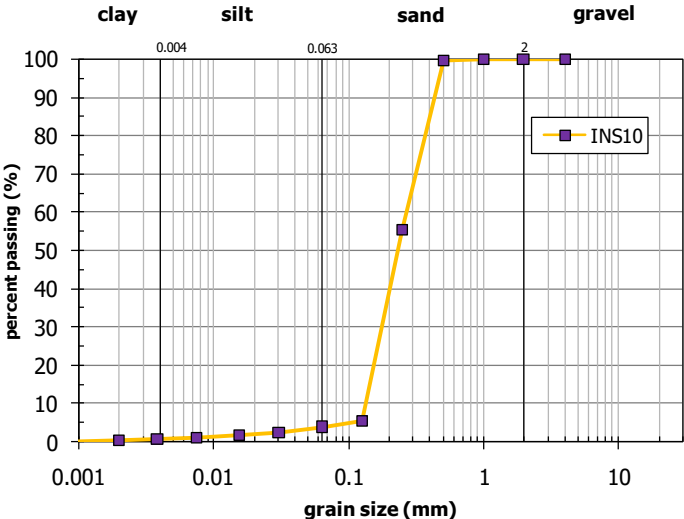
Site:	S. Martino Spino, Municipality of Mirandola (MO)		
Location map:			
Sand boil sample:	INS08		
Coordinates (WGS 84):	Latitude:44°55'21.72"N	Longitude:11°13'45.43"E	
Sand boil image from:	Aerial photography: ☒	Field observations: ☐	

Date of sampling:	---		
Seismic event:	May 20 th , 2012, M _w = 6.1: ☐	May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 62°	Dip: 0°	
	Fracture associated with a small pond (hot water reported);linear liquefactions at the edge of the road with ejection of yellow sand		
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)		
	FC = 7%	U = 2.58	C = 1.02 σ = 1.867

Compositional information:	---	
Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Martino Spino, Municipality of Mirandola (MO) – “INS10”

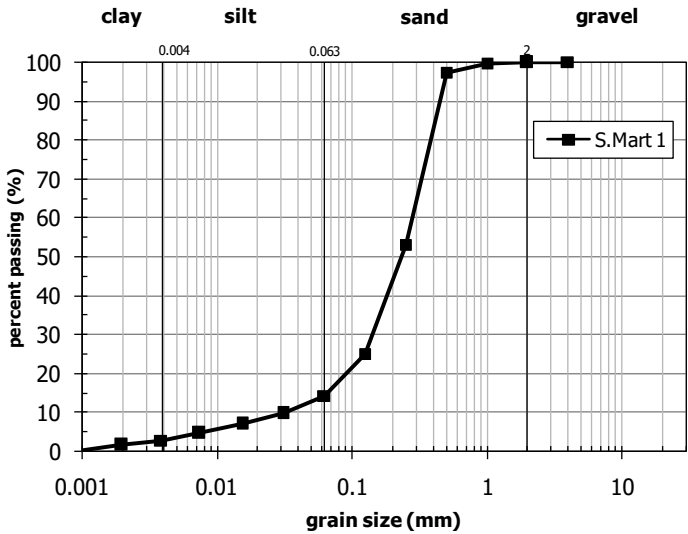
Site:	S. Martino Spino, Municipality of Mirandola (MO)	
Location map:		
Sand boil sample:	INS10	
Coordinates (WGS 84):	Latitude: 44°54'54.53"N	Longitude: 11°13'51.58"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
	 ---	
Date of sampling:	---	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☐	May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 65°	Dip: 0°
	Fracture, length 3 m. Sand thickness > 30 cm. No liquefaction on the fields to the north. Locality of Pascoli - Via Zanzur: rising of the bottom of the ditch with sand ejection. Fracture parallel to the ditch, filled with sand and fractured; thin salt crusts on the surface	
Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material	
Grain size distribution curve:		

Soil classification (USCS):	Poorly graded sand (SP)			
	FC = 4%	U = 2.0	C = 0.83	$\sigma = 1.612$
Compositional information:	---			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Martino Spino, Municipality of Mirandola (MO) – “S.Mart1”

Site:	S. Martino Spino, Municipality of Mirandola (MO)		
Location map:			
Sand boil sample:	S.Mart1		
Coordinates (WGS 84):	Latitude: 44°54'59.17"N		Longitude: 11°14'8.55"E
Sand boil image from:	Aerial photography: ☒		Field observations: ☐
			---
Date of sampling:	---		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☐		May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 0°		Dip: 0°

Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 17%	U = 9.16	C = 2.91 $\sigma = 2.859$
Compositional information:	---		

Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Martino Spino, Municipality of Mirandola (MO) – “San Martino 1”

Site:	S. Martino Spino, Municipality of Mirandola (MO)																
Location map:																	
Sand boil sample:	San Martino 1																
Coordinates (WGS 84):	Latitude: 44°55'14.78"N	Longitude: 11°14'11.05"E															
Sand boil image from:	Aerial photography: ☒	Field observations: ☐															

Date of sampling:	30/05/2012																
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☐	May 29 th , 2012, $M_w = 5.9$: ☒															
Liquefaction features:	Strike: 40°	Dip: 0°															
	Fracture with sand, length 300 m. Other fractures with sandparallel to the main one																
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material																
Grain size distribution curve:	<table border="1" style="margin-top: 10px;"> <caption>Grain Size Distribution Data for San Martino 1</caption> <thead> <tr> <th>Grain Size (mm)</th> <th>Percent Passing (%)</th> </tr> </thead> <tbody> <tr><td>0.075</td><td>15</td></tr> <tr><td>0.15</td><td>55</td></tr> <tr><td>0.25</td><td>100</td></tr> <tr><td>0.425</td><td>100</td></tr> <tr><td>0.75</td><td>100</td></tr> <tr><td>1.5</td><td>100</td></tr> </tbody> </table>			Grain Size (mm)	Percent Passing (%)	0.075	15	0.15	55	0.25	100	0.425	100	0.75	100	1.5	100
Grain Size (mm)	Percent Passing (%)																
0.075	15																
0.15	55																
0.25	100																
0.425	100																
0.75	100																
1.5	100																
Soil classification (USCS):	Silty Sand (SM)																
	FC = 24%	U = ---	C = --- $\sigma = 1.533$														
Compositional information:	---																
Paleoriver assignment:	Po																

Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Martino Spino, Municipality of Mirandola (MO) – “San Martino 2a”

Site:	S. Martino Spino, Municipality of Mirandola (MO)			
Location map:				
Sand boil sample:	San Martino 2a			
Coordinates (WGS 84):	Latitude: 44°54'59.00"N		Longitude:11°14'7.87"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☐	

Date of sampling:	30/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☐		May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 116°		Dip: 0°	
	Wet sand boils;Fracture with sand, length ≥ 30 m.			
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 27%	U = ---	C = ---	σ = 1.948
Compositional information:	---			

Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Martino Spino, Municipality of Mirandola (MO) – “San Martino 2b”

Site:	S. Martino Spino, Municipality of Mirandola (MO)	
Location map:		
Sand boil sample:	San Martino 2b	
Coordinates (WGS 84):	Latitude: 44°54'59.00"N	Longitude: 11°14'7.87"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐

Date of sampling:	30/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☐	May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 116°	Dip: 0°
	Fracture with sand, length ≥ 30 m, sample collected from the finer distal portion	
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		
Soil classification (USCS):	Silt with sand (ML)	

	FC = 73%	U = 13.89	C = 2.45	$\sigma = 2.952$
Compositional information:	---			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Martino Spino, Municipality of Mirandola(MO) – “San Martino 3”

Site:	S. Martino Spino, Municipality of Mirandola (MO)																
Location map:																	
Sand boil sample:	San Martino 3																
Coordinates (WGS 84):	Latitude: 44°54'59.67"N	Longitude: 11°14'8.47"E															
Sand boil image from:	Aerial photography: ☒	Field observations: ☐															
Date of sampling:	30/05/2012																
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☐	May 29 th , 2012, $M_w = 5.9$: ☒															
Liquefaction features:	Strike: ---	Dip: ---															
	Small wet boil with clay lenses																
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material																
Grain size distribution curve:	<table border="1" style="margin-top: 10px; width: 100%;"> <caption>Grain Size Distribution Data for San Martino 3</caption> <thead> <tr> <th>Grain Size (mm)</th> <th>Percent Passing (%)</th> </tr> </thead> <tbody> <tr><td>0.075</td><td>12</td></tr> <tr><td>0.15</td><td>25</td></tr> <tr><td>0.3</td><td>35</td></tr> <tr><td>0.6</td><td>95</td></tr> <tr><td>1.0</td><td>98</td></tr> <tr><td>2.0</td><td>100</td></tr> </tbody> </table>			Grain Size (mm)	Percent Passing (%)	0.075	12	0.15	25	0.3	35	0.6	95	1.0	98	2.0	100
Grain Size (mm)	Percent Passing (%)																
0.075	12																
0.15	25																
0.3	35																
0.6	95																
1.0	98																
2.0	100																
Soil classification (USCS):	Silty Sand (SM)																
	FC = 15%	U = ---	C = ---														
Compositional information:	---																
Paleoriver assignment:	Po																

Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

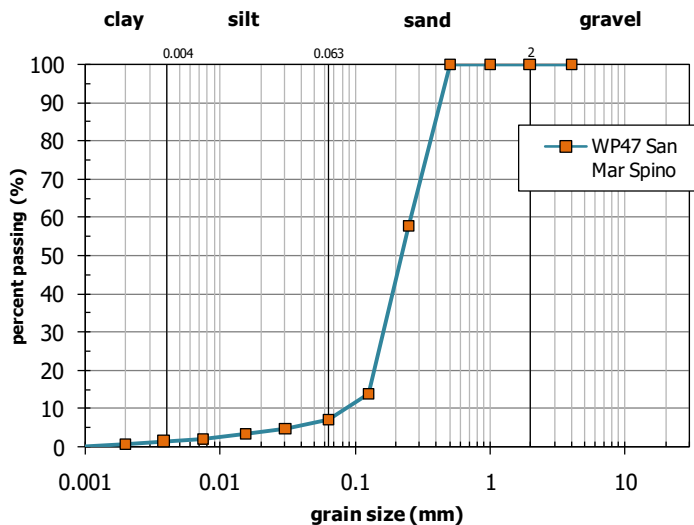
S. Martino Spino, Municipality of Mirandola(MO) – “WP45”

Site:	S. Martino Spino, Municipality of Mirandola (MO)		
Location map:			
Sand boil sample:	WP45		
Coordinates (WGS 84):	Latitude: 44°55'16.86"N	Longitude: 11°13'43.93"E	
Sand boil image from:	Aerial photography: ☒	Field observations: ☐	
Date of sampling:	06/06/2012		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☐	May 29 th , 2012, $M_w = 5.9$: ☒	
Liquefaction features:	Strike: 20°	Dip: 0°	
	Linear liquefactions at the edge of the road with yellow sand ejection		
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 19%	U = 7.14	$C = 2.57$ $\sigma = 2.91$
Compositional information:	---		

Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

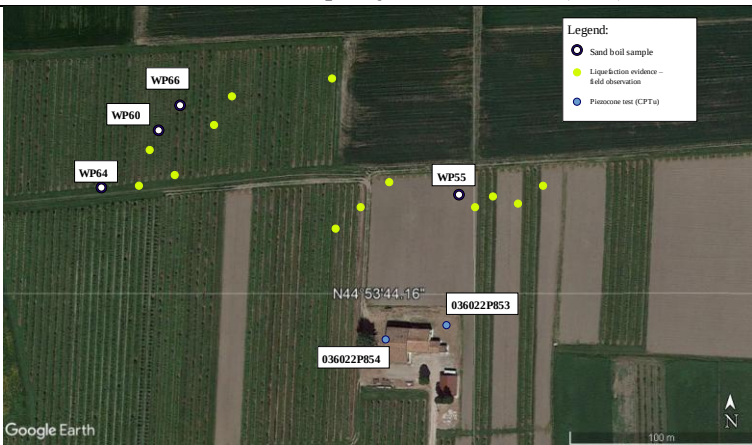
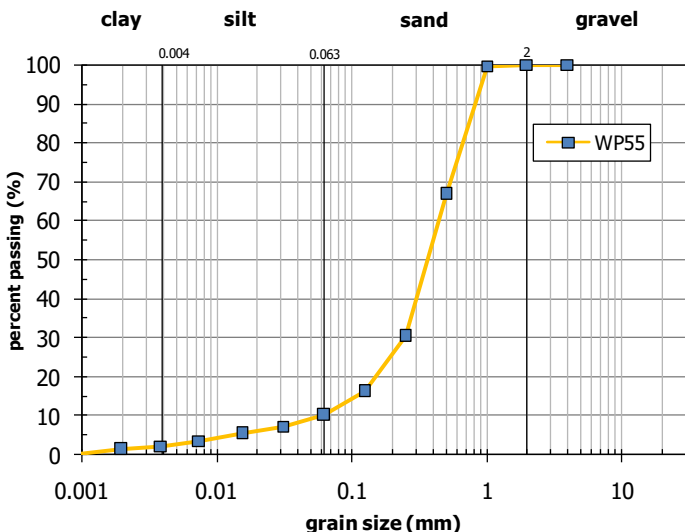
S. Martino Spino, Municipality of Mirandola (MO) – “WP47 San Mar Spino”

Site:	S. Martino Spino, Municipality of Mirandola (MO)		
Location map:			
Sand boil sample:	WP47 San Mar Spino		
Coordinates (WGS 84):	Latitude: 44°54'52.24"N	Longitude: 11°14'0.24"E	
Sand boil image from:	Aerial photography: ☒	Field observations: ☐	
		---	
Date of sampling:	06/06/2012		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☐	May 29 th , 2012, $M_w = 5.9$: ☒	
Liquefaction features:	Strike: 0°	Dip: 0°	
	Liquefaction along the ditch		
Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)		
	FC = 9%	U = 3.13	C = 1.19 $\sigma = 1.955$
Compositional information:	---		
Paleoriver assignment:	Po		

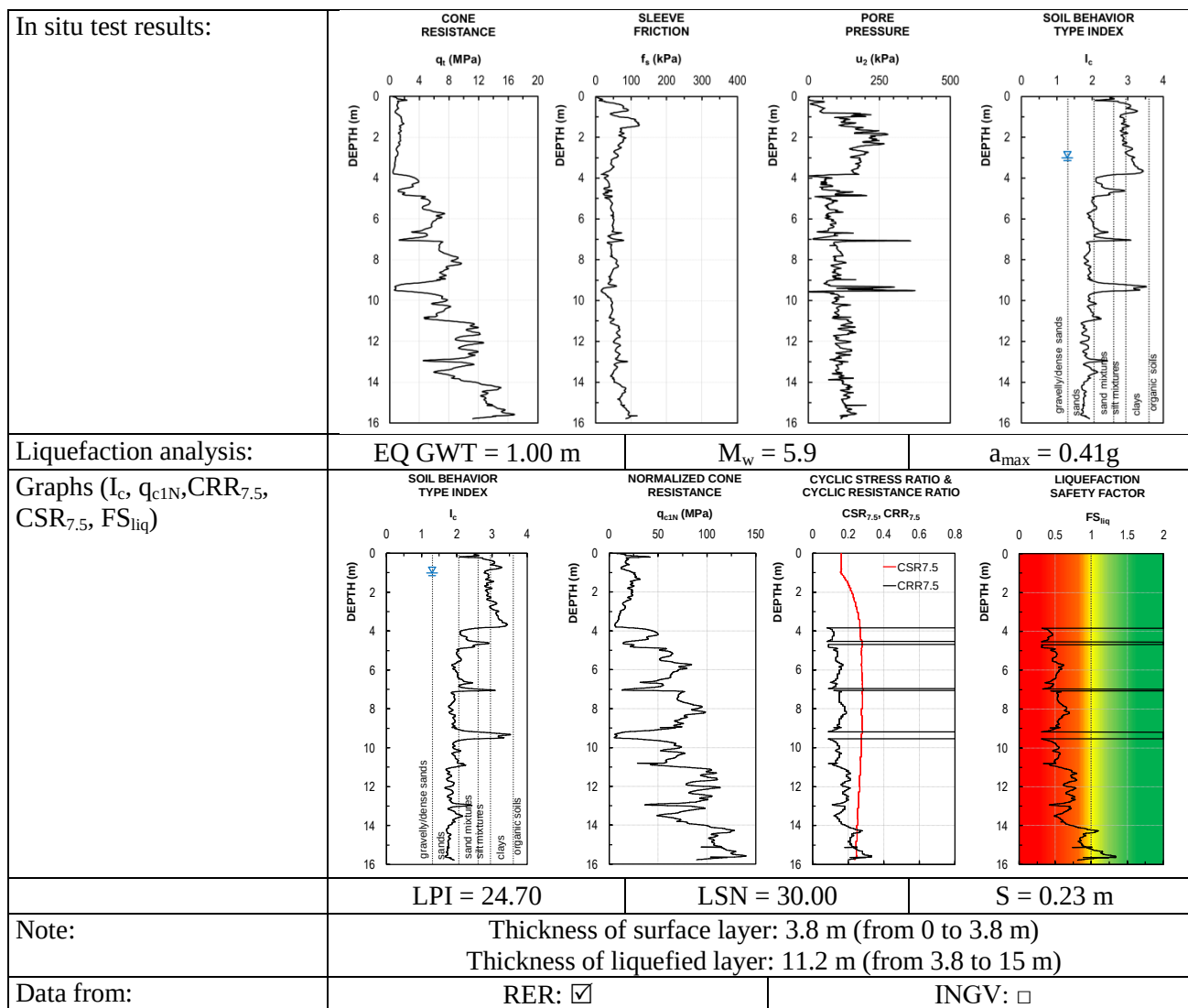
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Civiale, Municipality of Mirandola (MO) – “WP55”

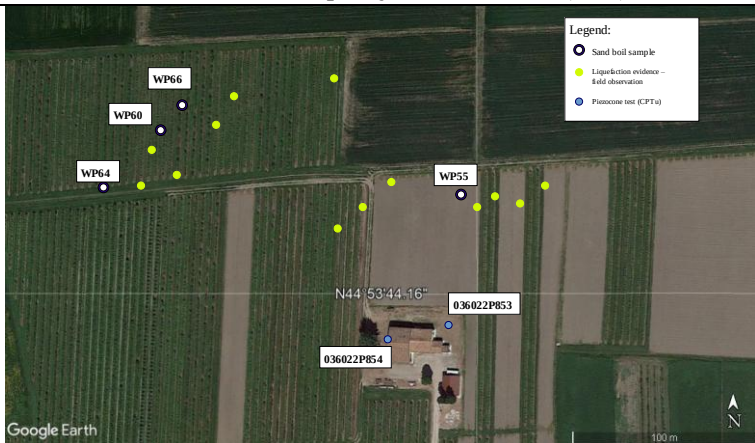
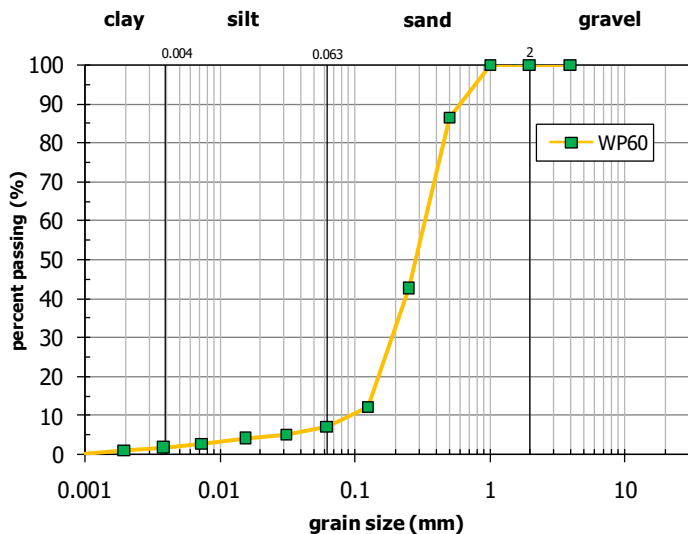
Site:	Cividale, Municipality of Mirandola (MO)		
Location map:			
Sand boil sample:	WP55		
Coordinates (WGS 84):	Latitude: 44°53'45.85"N	Longitude: 11° 5'42.36"E	
Sand boil image from:	Aerial photography: ☐	Field observations: ☐	
	---	---	
Date of sampling:	07/06/2012		
Seismic event:	May 20 th , 2012, M _w = 6.1: ☐	May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 100°	Dip: 0°	
	Fracture with sand, length 30 m. To the South of via Gazzuoli		
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)		
	FC = 11%	U = 5.38	C = 2.75 σ = 2.94
Compositional information:	---		
Paleoriver assignment:	Secchia or Po		
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐	
Data from:	INGV: ☒	UNIMORE: ☐	
In situ test:	CPTuA: 036022P853		
Coordinates (WGS 84):	Latitude: 44°53'43.62"N	Longitude: 11° 5'42.04"E	
Date:	21/03/2013		

Address:	Viale Antonio Gramsci			
Depth to GWT during in situ test:	3.00 m			
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u₂ (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 1.00 m		M _w = 5.9	a _{max} = 0.41g
Graphs (I _c , q _{c1N} , CRR _{7.5} , CSR _{7.5} , FS _{liq})	SOIL BEHAVIOR TYPE INDEX I_c NORMALIZED CONE RESISTANCE q_{c1N} (MPa) CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO CSR_{7.5}, CRR_{7.5} LIQUEFACTION SAFETY FACTOR FS_{liq}			
	LPI = 17.13		LSN = 20.73	S = 0.15 m
Note:	Thickness of surface layer: 4.2 m (from 0 to 4.2 m) Thickness of liquefied layer: 5.6 m (from 4.2 to 9.8 m), 2.2 m (from 11.3 to 13.5 m)			
Data from:	RER: ☒		INGV: ☐	
In situ test:	CPTuB: 036022P854			
Coordinates (WGS 84):	Latitude: 44°53'43.39"N		Longitude: 11° 5'40.54"E	
Date:	22/03/2013			
Address:	Viale Antonio Gramsci			
Depth to GWT during in situ test:	3.00 m			



M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Civiale, Municipality of Mirandola (MO) – “WP60”

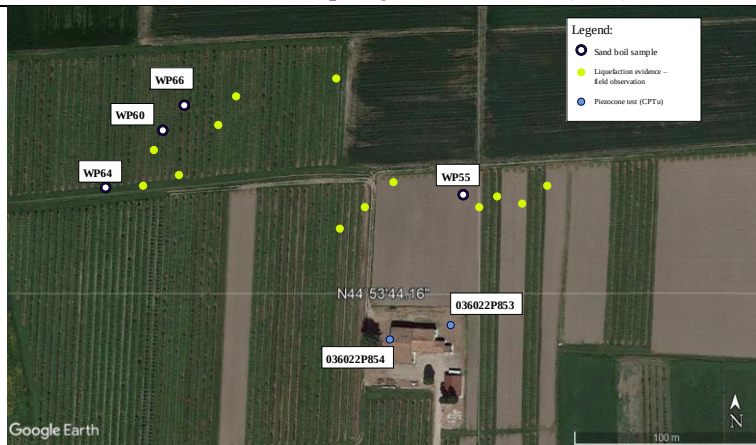
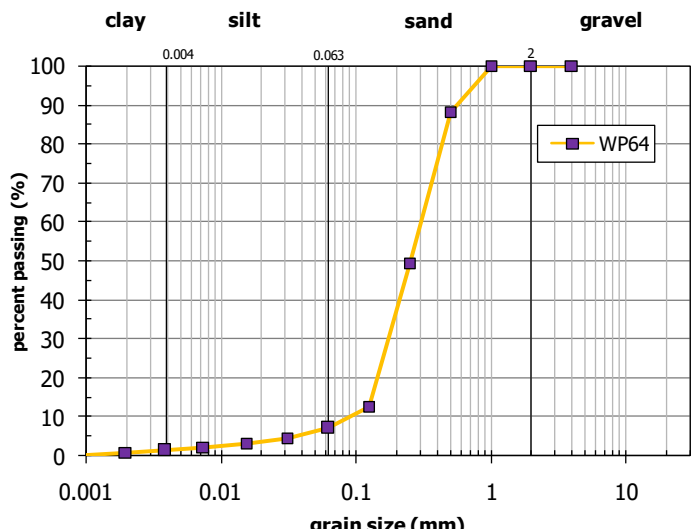
Site:	Civiale, Municipality of Mirandola (MO)			
Location map:				
Sand soil sample:	WP60			
Coordinates (WGS 84):	Latitude:44°53'46.97"N		Longitude:11° 5'34.98"E	
Sand soil image from:	Aerial photography: ☐		Field observations: ☒	
	---			
Date of sampling:	07/06/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☐		May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 80°		Dip: 0°	
	Fracture with sand, length 5 m. To the South of via Gazzuoli			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)			
	FC = 9%	U = 3.67	C = 1.22	σ = 2.26
Compositional information:	---			

Paleoriver assignment:	Secchia or Po		
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐	
Data from:	INGV: ☒	UNIMORE: ☐	
In situ test:	CPTuA: 036022P854		
Coordinates (WGS 84):	Latitude: 44°53'43.39"N	Longitude: 11° 5'40.54"E	
Date:	22/03/2013		
Address:	Viale Antonio Gramsci		
Depth to GWT during in situ test:	3.00 m		
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c		
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 5.9$	$a_{max} = 0.41g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c NORMALIZED CONE RESISTANCE q_{c1N} (MPa) CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ LIQUEFACTION SAFETY FACTOR FS_{liq}		
	LPI = 24.70	LSN = 30.00	S = 0.23 m
Note:	Thickness of surface layer: 4.2 m (from 0 to 4.2 m) Thickness of liquefied layer: 5.6 m (from 4.2 to 9.8 m), 2.2 m (from 11.3 to 13.5 m)		
Data from:	RER: ☒	INGV: ☐	
In situ test:	CPTuB: 036022P853		
Coordinates (WGS 84):	Latitude: 44°53'43.62"N	Longitude: 11° 5'42.04"E	
Date:	21/03/2013		
Address:	Viale Antonio Gramsci		
Depth to GWT during in situ test:	3.00 m		

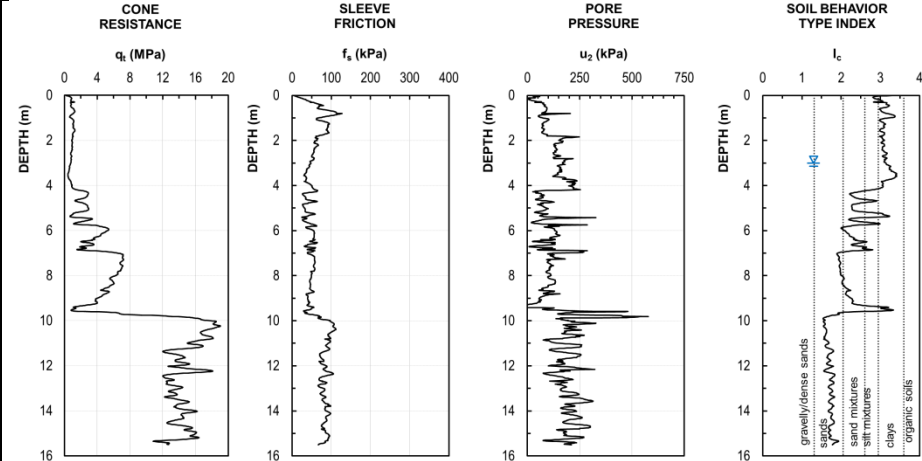
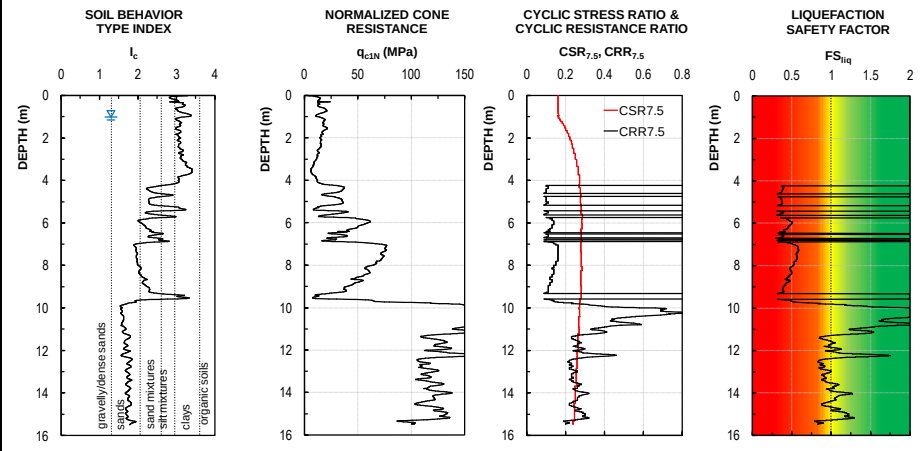
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 5.9$	$a_{max} = 0.41g$	
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c	NORMALIZED CONE RESISTANCE q_{c1N} (MPa)	CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$	LIQUEFACTION SAFETY FACTOR FS_{liq}
	LPI = 17.13	LSN = 20.73	S = 0.15 m	
Note:	Thickness of surface layer: 4.2 m (from 0 to 4.2 m) Thickness of liquefied layer: 5.6 m (from 4.2 to 9.8 m), 2.2 m (from 11.3 to 13.5 m)			
Data from:	RER: ☒		INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Civiale, Municipality of Mirandola (MO) – “WP64”

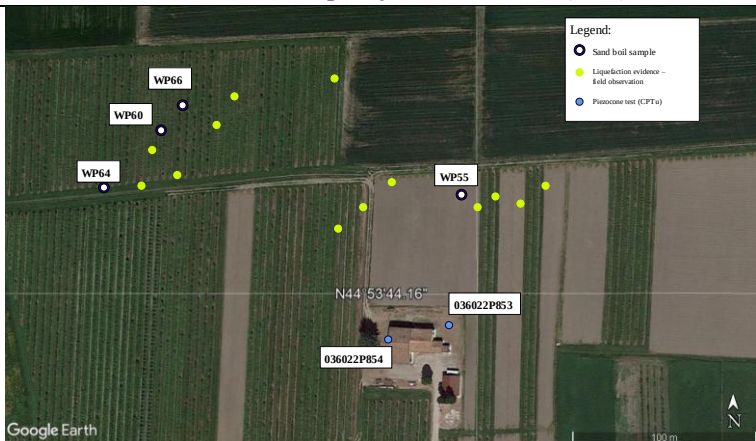
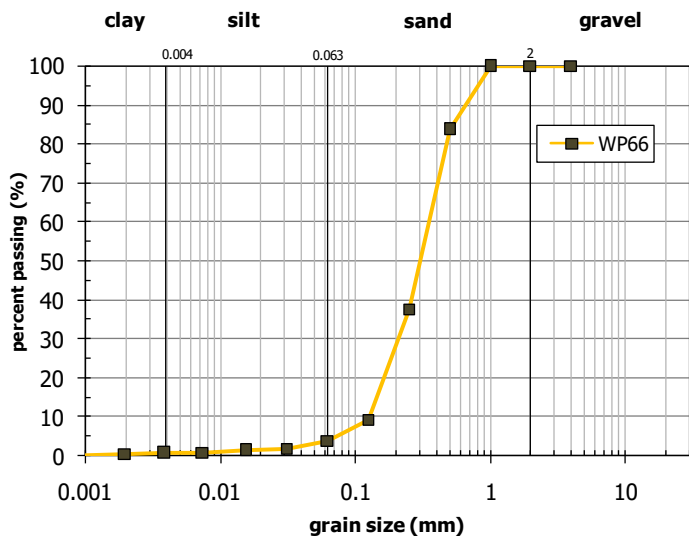
Site:	Civiale, Municipality of Mirandola (MO)			
Location map:				
Sand boil sample:	WP64			
Coordinates (WGS 84):	Latitude: 44°53'46.00"N		Longitude: 11° 5'33.58"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☒	
	---			
Date of sampling:	07/06/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☐		May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 70°		Dip: 0°	
	Fracture with sand, length 10 m. To the South of via Gazzuoli			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)			
	FC = 8%	U = 3.16	C = 1.01	σ = 2.16
Compositional information:	---			

Paleoriver assignment:	Secchia or Po			
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐		
Data from:	INGV: ☒	UNIMORE: ☐		
In situ test:	CPTuA: 036022P854			
Coordinates (WGS 84):	Latitude: 44°53'43.39"N	Longitude: 11° 5'40.54"E		
Date:	22/03/2013			
Address:	Viale Antonio Gramsci			
Depth to GWT during in situ test:	3.00 m			
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 5.9$	$a_{max} = 0.41g$	
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c	NORMALIZED CONE RESISTANCE q_{c1N} (MPa)	CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$	LIQUEFACTION SAFETY FACTOR FS_{liq}
	LPI = 24.70	LSN = 30.00	S = 0.23 m	
Note:	Thickness of surface layer: 4.2 m (from 0 to 4.2 m) Thickness of liquefied layer: 5.6 m (from 4.2 to 9.8 m), 2.2 m (from 11.3 to 13.5 m)			
Data from:	RER: ☒	INGV: ☐		
In situ test:	CPTuB: 036022P853			
Coordinates (WGS 84):	Latitude: 44°53'43.62"N	Longitude: 11° 5'42.04"E		
Date:	21/03/2013			
Address:	Viale Antonio Gramsci			
Depth to GWT during in situ test:	3.00 m			

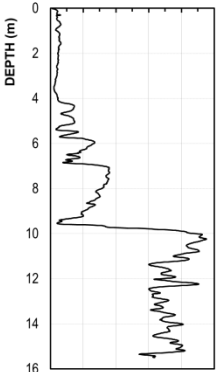
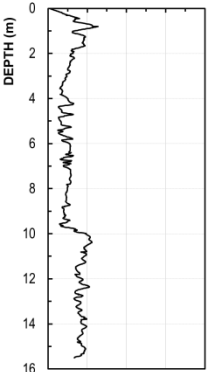
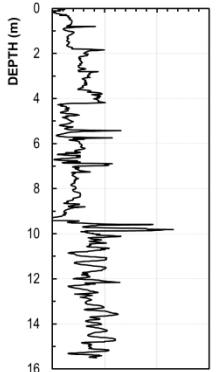
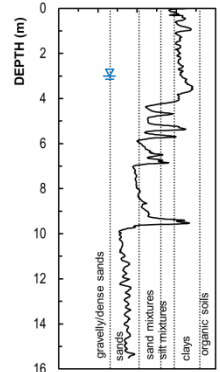
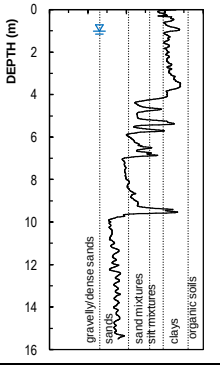
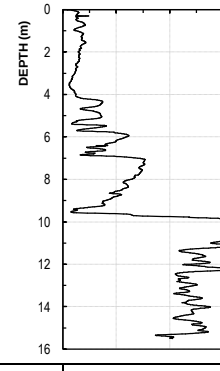
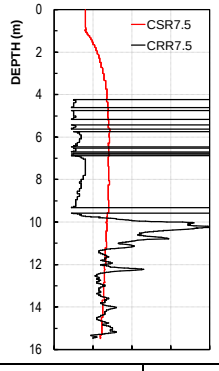
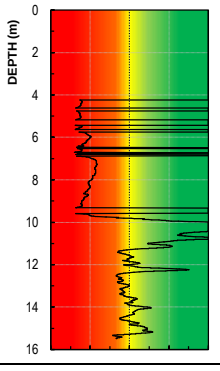
In situ test results:			
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 5.9$	$a_{max} = 0.41g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})			
	LPI = 17.13	LSN = 20.73	S = 0.15 m
Note:	Thickness of surface layer: 4.2 m (from 0 to 4.2 m) Thickness of liquefied layer: 5.6 m (from 4.2 to 9.8 m), 2.2 m (from 11.3 to 13.5 m)		
Data from:	RER: ☒	INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Civiale, Municipality of Mirandola (MO)– “WP66”

Site:	Civiale, Municipality of Mirandola (MO)			
Location map:				
Sand boil sample:	WP66			
Coordinates (WGS 84):	Latitude: 44°53'47.40"N		Longitude: 11° 5'35.48"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☒	
	---			
Date of sampling:	07/06/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☐		May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 70°		Dip: 0°	
	Fracture with sand, length 30 m. To the South of via Gazzuoli			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)			
	FC = 5%	U = 2.77	C = 0.94	σ = 1.959
Compositional information:	---			

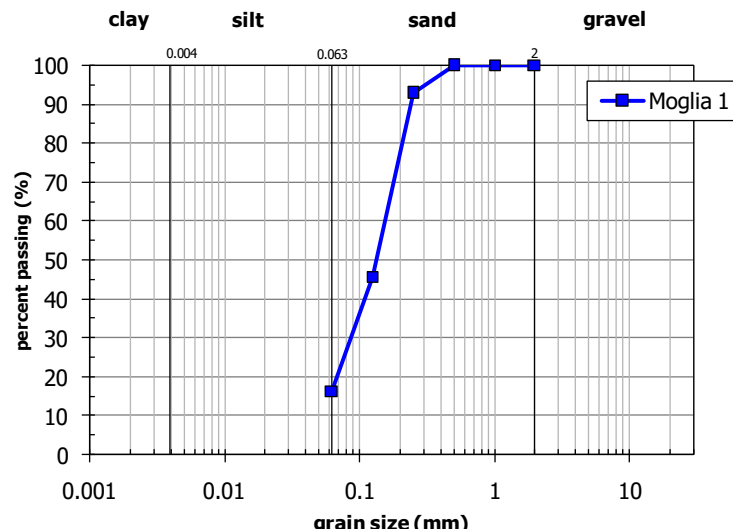
Paleoriver assignment:	Secchia or Po		
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐	
Data from:	INGV: ☒	UNIMORE: ☐	
In situ test:	CPTuA: 036022P854		
Coordinates (WGS 84):	Latitude: 44°53'43.39"N	Longitude: 11° 5'40.54"E	
Date:	22/03/2013		
Address:	Viale Antonio Gramsci		
Depth to GWT during in situ test:	3.00 m		
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c		
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 5.9$	$a_{max} = 0.41g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c NORMALIZED CONE RESISTANCE q_{c1N} (MPa) CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ LIQUEFACTION SAFETY FACTOR FS_{liq}		
	LPI = 24.70	LSN = 30.00	S = 0.23 m
Note:	Thickness of surface layer: 4.2 m (from 0 to 4.2 m) Thickness of liquefied layer: 5.6 m (from 4.2 to 9.8 m), 2.2 m (from 11.3 to 13.5 m)		
Data from:	RER: ☒	INGV: ☐	
In situ test:	CPTuB: 036022P853		
Coordinates (WGS 84):	Latitude: 44°53'43.62"N	Longitude: 11° 5'42.04"E	
Date:	21/03/2013		
Address:	Viale Antonio Gramsci		
Depth to GWT during in situ test:	3.00 m		

In situ test results:	CONE RESISTANCE q_t (MPa)  SLEEVE FRICTION f_s (kPa)  PORE PRESSURE u_2 (kPa)  SOIL BEHAVIOR TYPE INDEX I_c 			
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 5.9$	$a_{max} = 0.41g$	
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c  NORMALIZED CONE RESISTANCE q_{c1N} (MPa)  CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$  LIQUEFACTION SAFETY FACTOR FS_{liq} 			
	LPI = 17.13	LSN = 20.73	S = 0.15 m	
Note:	Thickness of surface layer: 4.2 m (from 0 to 4.2 m) Thickness of liquefied layer: 5.6 m (from 4.2 to 9.8 m), 2.2 m (from 11.3 to 13.5 m)			
Data from:	RER: ☒		INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

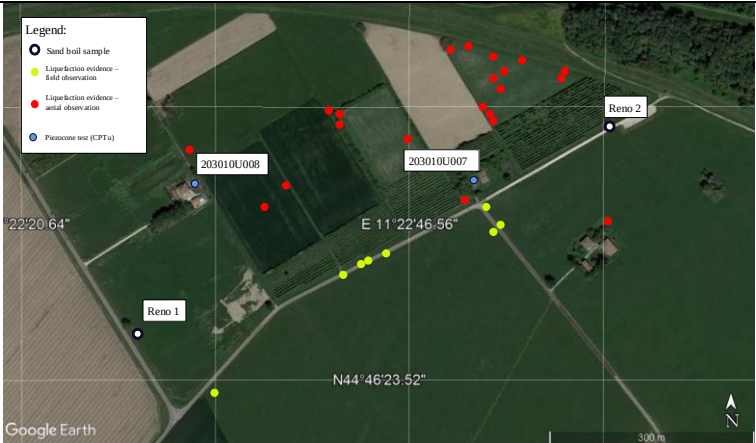
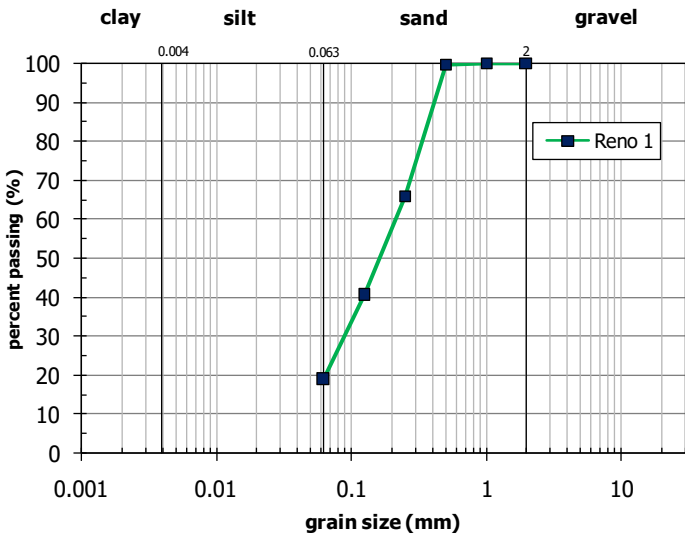
Moglia, Municipality of Moglia (MN) – “Moglia 1”

Site:	Moglia, Municipality of Moglia (MN)			
Location map:				
Sand boil sample:	Moglia 1			
Coordinates (WGS 84):	Latitude: 44°55'53.20"N		Longitude: 10°54'29.75"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	30/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☐		May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 0°		Dip: 0°	

Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 24%	U = 17.35	C = 3.84	σ = 1.619
Compositional information:	---			
Paleoriver assignment:	Secchia			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

La Bisana-Dosso, Municipality of Pieve di Cento (BO) – “Reno 1”

Site:	La Bisana-Dosso, Municipality of Pieve di Cento (BO)		
Location map:			
Sand boil sample:	Reno 1		
Coordinates (WGS 84):	Latitude: 44°46'25.66"N		Longitude: 11°22'28.45"E
Sand boil image from:	Aerial photography: ☒		Field observations: ☐
			---
Date of sampling:	---		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒		May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 40°		Dip: 0°
	Fracture, length 40 m. Associated liquefaction (crater)		
Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 24%	U = ---	C = --- $\sigma = ---$
Compositional information:	---		
Paleoriver assignment:	Reno		

Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐		
Data from:	INGV: ☐	UNIMORE: ☒		
In situ test:	CPTuA: 203010U008			
Coordinates (WGS 84):	Latitude:44°46'32.75"N	Longitude: 11°22'32.42"E		
Date:	01/06/2012			
Address:	Via BoscoPanfilia			
Depth to GWT during in situ test:	1.00m			
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u₂ (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 1.00 m	M _w = 6.1	a _{max} = 0.42g	
Graphs (I _c , q _{c1N} ,CRR _{7.5} , CSR _{7.5} , FS _{liq})	SOIL BEHAVIOR TYPE INDEX I_c NORMALIZED CONE RESISTANCE q_{c1N} (MPa) CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO CSR_{7.5}, CRR_{7.5} LIQUEFACTION SAFETY FACTOR FS_{liq}			
	LPI = 24.44	LSN = 54.08	S = 0.15 m	
Note:	Thickness of surface layer: 1 m (from 0 to 1 m) Thickness of liquefied layer: 4.9 m (from 1 to 5.9 m)			
Data from:	RER: ☒	INGV: ☐		

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

La Bisana-Dosso, Municipality of Pieve di Cento (BO) – “Reno 2”

Site:	La Bisana-Dosso, Municipality of Pieve di Cento (BO)		
Location map:			
Sand boil sample:	Reno 2		
Coordinates (WGS 84):	Latitude: 44°46'35.53"N	Longitude:11°23'0.17"E	
Sand boil image from:	Aerial photography: ☒	Field observations: ☐	
Date of sampling:	---		
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒	May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 0°	Dip: 0°	

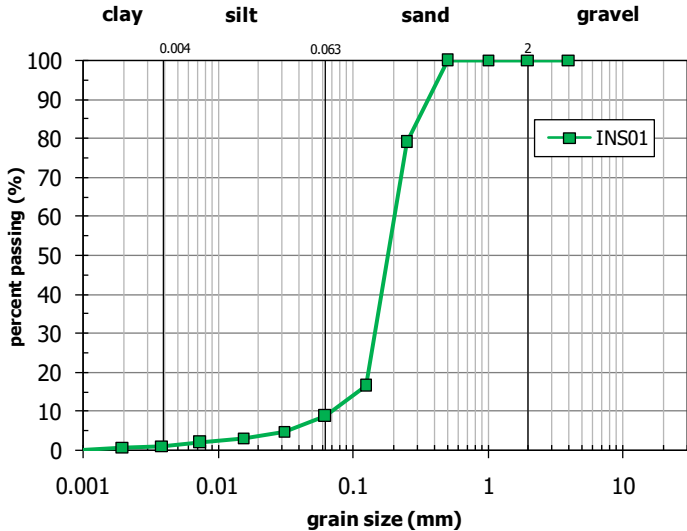
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)		
	FC = 7%	U = 2.67	C = 1.15 σ = ---
Compositional information:	---		
Paleoriver assignment:	Reno		

Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐		
Data from:	INGV: ☐	UNIMORE: ☒		
In situ test:	CPTuA: 203010U007			
Coordinates (WGS 84):	Latitude: 44°46'33.05"N	Longitude: 11°22'51.01"E		
Date:	---			
Address:	Via Confine			
Depth to GWT during in situ test:	1.00m			
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 6.1$	$a_{max} = 0.42g$	
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c	NORMALIZED CONE RESISTANCE q_{c1N} (MPa)	CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$	LIQUEFACTION SAFETY FACTOR FS_{liq}
	LPI =18.17	LSN = 26.45	S = 0.11 m	
Note:	Thickness of surface layer: 2.7 m (from 0 to 2.7 m) Thickness of liquefied layer: 4.1 m (from 2.7 to 6.8 m)			
Data from:	RER: ☒	INGV: ☐		

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Quistello, Municipality of Quistello (MN) – “INS01”

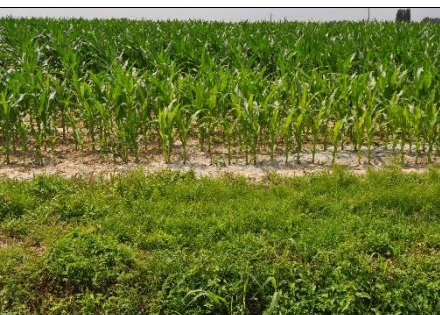
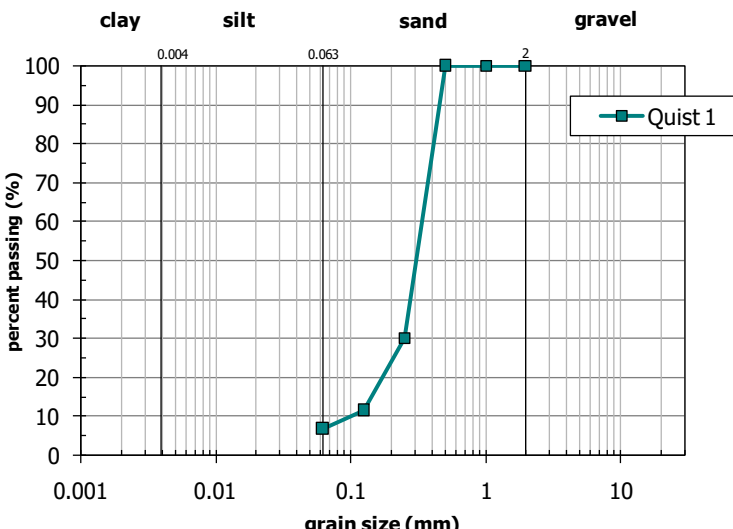
Site:	Quistello, Municipality of Quistello (MN)		
Location map:			
Sand boil sample:	INS01		
Coordinates (WGS 84):	Latitude: 45°0'29.93"N		Longitude: 10°59'18.46"E
Sand boil image from:	Aerial photography: ☒		Field observations: ☐
			---
Date of sampling:	---		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☐		May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 0°		Dip: 0°

Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)		
	FC = 11%	U = 2.86	C = 1.61 $\sigma = 1.853$
Compositional information:	---		
Paleoriver assignment:	Po		

Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Quistello, Municipality of Quistello (MN) – “Quist1”

Site:	Quistello, Municipality of Quistello (MN)			
Location map:				
Sand boil sample:	Quist 1			
Coordinates (WGS 84):	Latitude: 45°0'50.74"N		Longitude: 10°59'46.89"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☒	
	 			
Date of sampling:	---			
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☐		May 29 th , 2012, $M_w = 5.9$: ☒	
Liquefaction features:	Strike: 0°		Dip: 0°	
	FractureN135 with sand			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)			
	FC = 7%	U = 3.3	C = 1.89	$\sigma = 1.522$
Compositional information:	---			

Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Quistello, Municipality of Quistello (MN) – “Quist2”

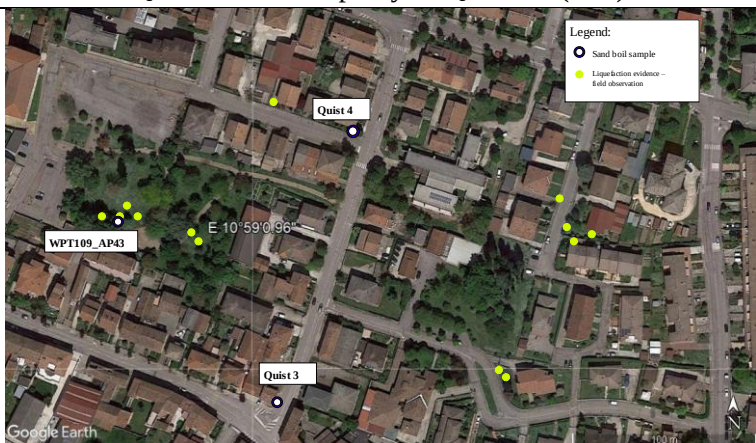
Site:	Quistello, Municipality of Quistello (MN)			
Location map:				
Sand boil sample:	Quist 2			
Coordinates (WGS 84):	Latitude: 45° 0'48.30"N		Longitude: 10°59'53.00"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☒	
Date of sampling:	---			
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☐		May 29 th , 2012, $M_w = 5.9$: ☒	
Liquefaction features:	Strike: ---		Dip: ---	

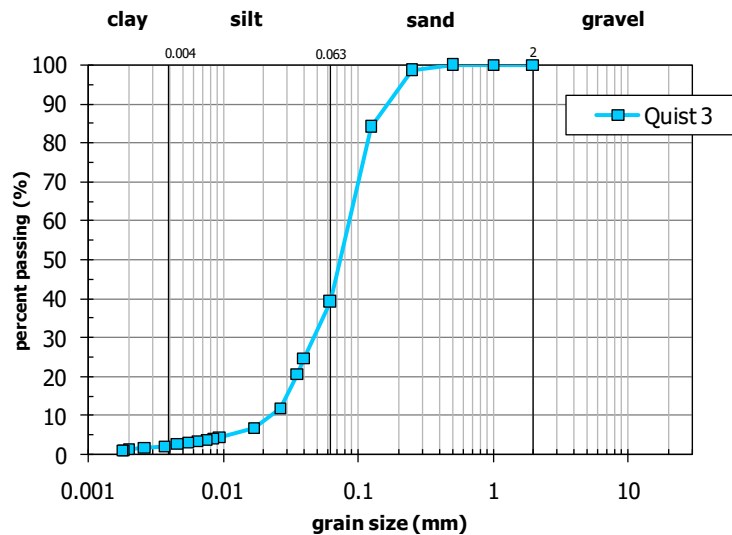
Liquefaction-induced land damage category:	3 No lateral spreading but minor to moderate quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)			
	FC = 10%	U = 4.8	C = 2.50	$\sigma = 1.526$
Compositional information:	---			

Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Quistello, Municipality of Quistello (MN) – “Quist 3”, località “Quistello”

Site:	Quistello, Municipality of Quistello (MN)		
Location map:			
Sand boil sample:	Quist 3		
Coordinates (WGS 84):	Latitude: 45°0'25.30"N	Longitude: 10°59'1.51"E	
Sand boil image from:	Aerial photography: ☐	Field observations: ☐	
	---	---	
Date of sampling:	---		
Seismic event:	May 20 th , 2012, M _w = 6.1: ☐	May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 0°	Dip: 0°	

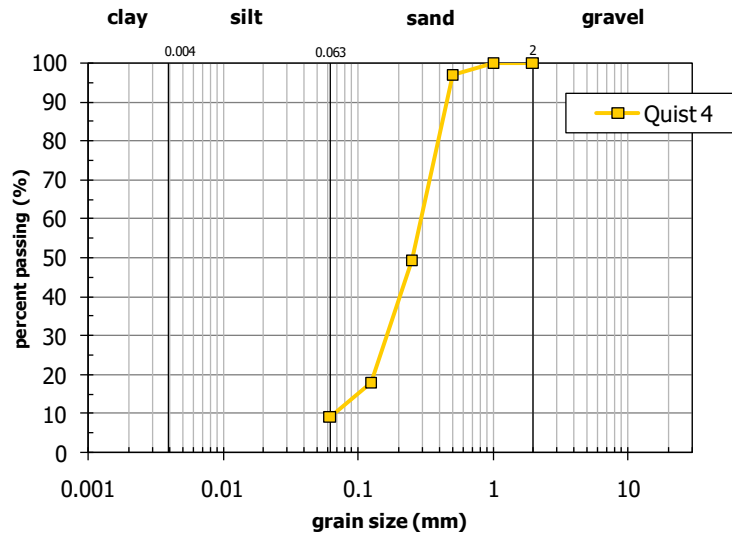
Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Sandy Silt (ML)		
	FC = 50%	U = 3.87	C = 1.13 σ= ---
Compositional information:	---		
Paleoriver assignment:	Po		
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐	
Data from:	INGV: ☐	UNIMORE: ☒	
In situ test:	---		

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical

settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Quistello, Municipality of Quistello (MN) – “Quist 4”

Site:	Quistello, Municipality of Quistello (MN)			
Location map:				
Sand boil sample:	Quist 4			
Coordinates (WGS 84):	Latitude: 45°0'30.03"N		Longitude: 10°59'3.42"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	---			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☐		May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 0°		Dip: 0°	

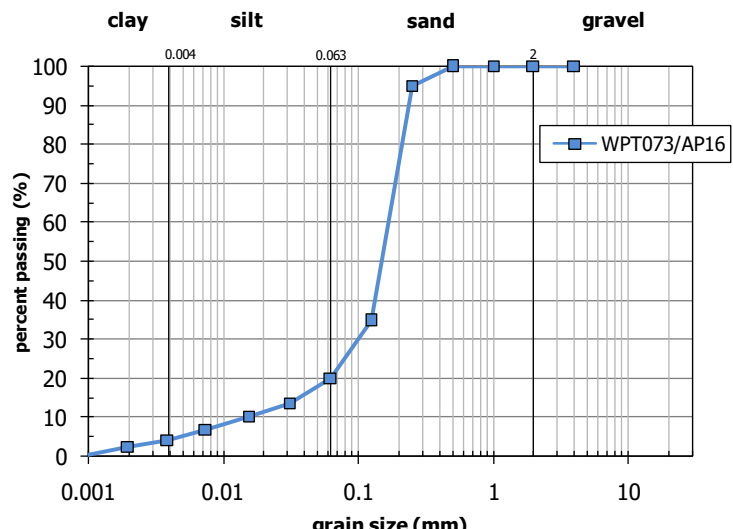
Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 12%	U = 4.21	C = 1.32	σ = 1.698
Compositional information:	---			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical

settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Quistello, Municipality of Quistello (MN) – “WPT073/AP16”

Site:	Quistello, Municipality of Quistello (MN)			
Location map:				
Sand boil sample:	---			
Coordinates (WGS 84):	Latitude: 45°0'32.76"N		Longitude: 10°59'28.57"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☒	
				
Date of sampling:	---			
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☐		May 29 th , 2012, $M_w = 5.9$: ☒	
Liquefaction features:	Strike: 0°		Dip: 0°	

Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 23%	U = 12.0	C = 3.7	$\sigma = 2.78$
Compositional information:	---			

Paleoriver assignment:	Po	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Quistello, Municipality of Quistello (MN) – “WPT109/AP43”

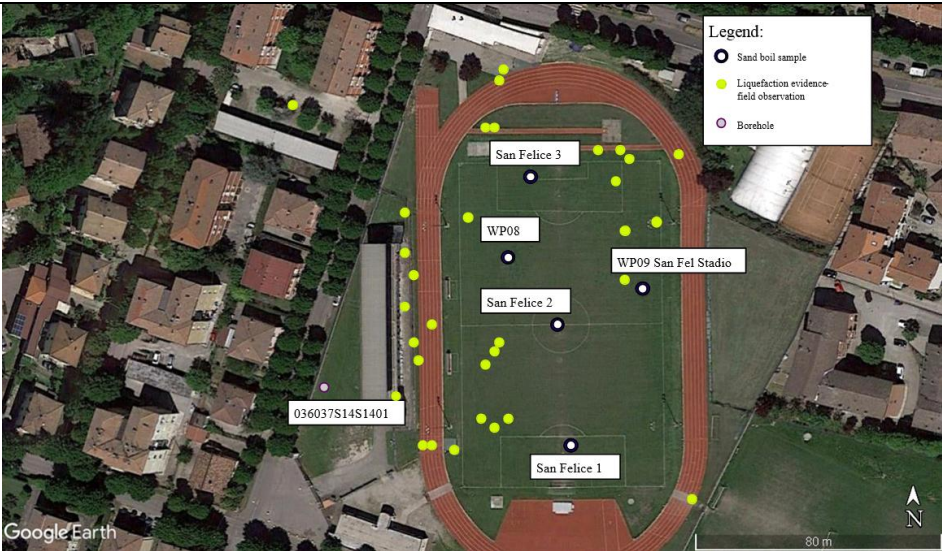
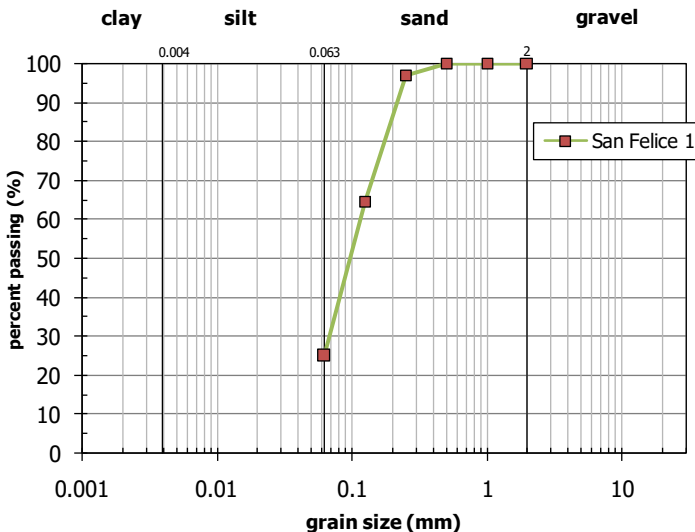
Site:	Quistello, Municipality of Quistello (MN)	
Location map:		
Sand boil sample:	WPT109/AP43	
Coordinates (WGS 84):	Latitude: 45°0'28.48"N	Longitude: 10°58'57.68"E
Sand boil image from:	Aerial photography: ☐	Field observations: ☒
Date of sampling:	---	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☐	May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 0°	Dip: 0°

Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material	

Grain size distribution curve:	clay silt sand gravel 0.004 0.063 2 percent passing (%) grain size (mm) WPT109/AP43			
Soil classification (USCS):	Silty Sand (SM)			
	FC = 23%	U = 6.8	C = 2.12	$\sigma = 2.752$
Compositional information:	---			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

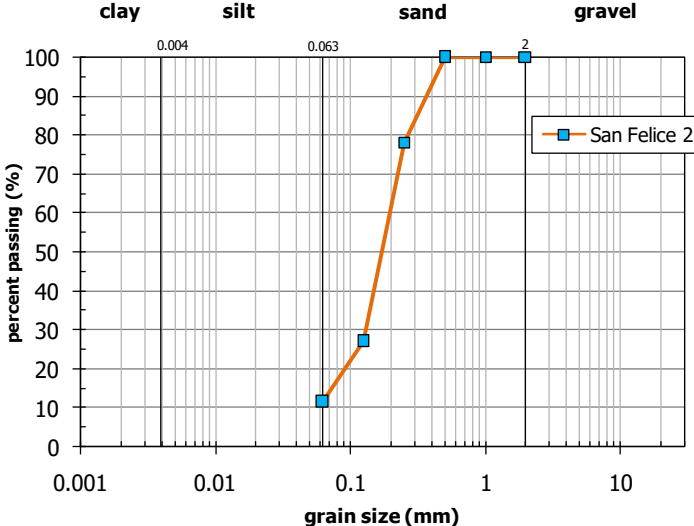
S. Felice sul Panaro, Municipality of S.Felice sul Panaro (MO) – “San Felice 1”

Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)	
Location map:		
Sand boil sample:	San Felice 1	
Coordinates (WGS 84):	Latitude: 44°50'5.91"N	Longitude: 11° 8'36.15"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☒
		
Date of sampling:	26/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 20°	Dip: 0°
	Elongated sand ejecta, 9.5 m long.	
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		
Soil classification (USCS):	Silty Sand (SM)	

	FC = 35%	U = ---	C = ---	$\sigma = 1.554$
Compositional information:	---			
Paleoriver assignment:	Panaro -Secchia			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	Borehole: 036037S14S1401			
Coordinates (WGS 84):	Latitude: 44° 50' 6.497 N		Longitude: 11° 8' 32.531"E	
Data:	02/07/2013			
Address:	Via Giani Costa			
Graph:	Borehole log Depth (m)			
Note:	---			
Data from:	RER: ☒		INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

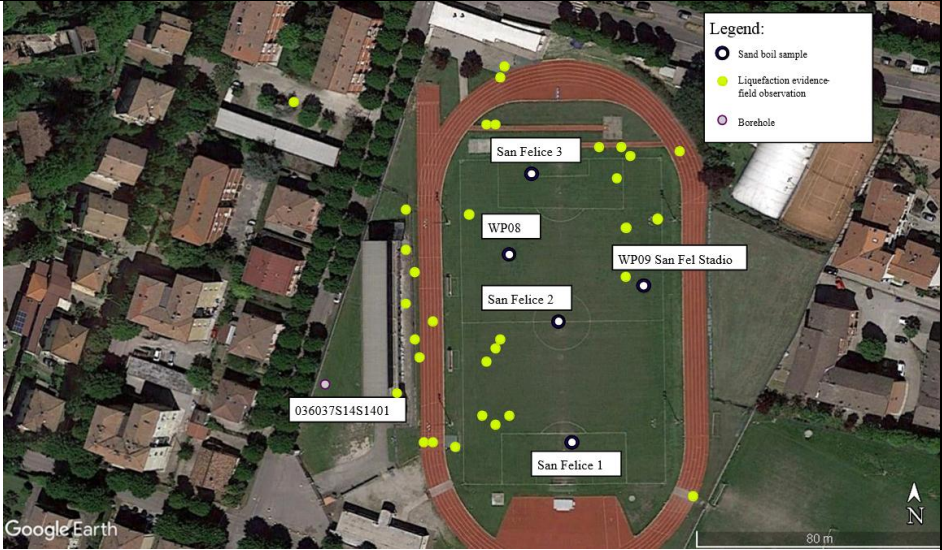
S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “San Felice 2”

Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)	
Location map:		
Sand boil sample:	San Felice 2	
Coordinates (WGS 84):	Latitude: 44°50'7.09"N	Longitude: 11° 8'35.96"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☒
		
Date of sampling:	26/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 175°	Dip: 0°
	Fracture, length 10 m	
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		

Soil classification (USCS):	Silty Sand (SM)			
	FC = 14%	U = ---	C = ---	$\sigma = 1.672$
Compositional information:	---			
Paleoriver assignment:	Panaro - Secchia			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	Borehole: 036037S14S1401			
Coordinates (WGS 84):	Latitude: 44° 50' 6.497 N		Longitude: 11° 8' 32.531"E	
Data:	02/07/2013			
Address:	Via Giani Costa			
Graph:	Borehole log			
Note:	---			
Data from:	RER: ☒		INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “San Felice 3”

Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)	
Location map:		
Sand boil sample:	San Felice 3	
Coordinates (WGS 84):	Latitude: 44°50'8.64"N	Longitude: 11° 8'35.57"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
		---
Date of sampling:	26/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 195°	Dip: 0°
	Fracture, length 12.5 m	
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material	

Grain size distribution curve:	clay silt sand gravel <table border="1"><caption>Grain Size Distribution Data for San Felice 3</caption><thead><tr><th>Grain Size (mm)</th><th>Percent Passing (%)</th></tr></thead><tbody><tr><td>0.075</td><td>22</td></tr><tr><td>0.15</td><td>48</td></tr><tr><td>0.3</td><td>95</td></tr><tr><td>0.6</td><td>100</td></tr><tr><td>1.2</td><td>100</td></tr><tr><td>2.5</td><td>100</td></tr></tbody></table>				Grain Size (mm)	Percent Passing (%)	0.075	22	0.15	48	0.3	95	0.6	100	1.2	100	2.5	100														
Grain Size (mm)	Percent Passing (%)																															
0.075	22																															
0.15	48																															
0.3	95																															
0.6	100																															
1.2	100																															
2.5	100																															
Soil classification (USCS):	Silty Sand (SM)																															
	FC = 28%	U = ---	C = ---	$\sigma = 1.603$																												
Compositional information:	---																															
Paleoriver assignment:	Panaro - Secchia																															
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒																													
Data from:	INGV: ☐		UNIMORE: ☒																													
In situ test:	Borehole: 036037S14S1401																															
Coordinates (WGS 84):	Latitude: 44° 50' 6.497 N		Longitude: 11° 8' 32.531"E																													
Data:	02/07/2013																															
Address:	Via Giani Costa																															
Graph:	Borehole log <table border="1"><caption>Borehole Log Data</caption><thead><tr><th>Depth (m)</th><th>Soil Description</th></tr></thead><tbody><tr><td>0 - 2</td><td>Clayey silt and fine sand</td></tr><tr><td>2 - 4</td><td>Clayey silt</td></tr><tr><td>4 - 6</td><td>Fine sand and fine silty sand</td></tr><tr><td>6 - 10</td><td>Sand</td></tr><tr><td>10 - 12</td><td>Silt, clayey silt and clay</td></tr><tr><td>12 - 15</td><td>Clay</td></tr><tr><td>15 - 18</td><td>Clayey silt</td></tr><tr><td>18 - 22</td><td>Silty sand</td></tr><tr><td>22 - 28</td><td>Sand</td></tr><tr><td>28 - 32</td><td>Sandy silt and silty sand</td></tr><tr><td>32 - 38</td><td>Clay</td></tr><tr><td>38 - 48</td><td>Sand</td></tr><tr><td>48 - 50</td><td>Silty sand</td></tr></tbody></table>				Depth (m)	Soil Description	0 - 2	Clayey silt and fine sand	2 - 4	Clayey silt	4 - 6	Fine sand and fine silty sand	6 - 10	Sand	10 - 12	Silt, clayey silt and clay	12 - 15	Clay	15 - 18	Clayey silt	18 - 22	Silty sand	22 - 28	Sand	28 - 32	Sandy silt and silty sand	32 - 38	Clay	38 - 48	Sand	48 - 50	Silty sand
Depth (m)	Soil Description																															
0 - 2	Clayey silt and fine sand																															
2 - 4	Clayey silt																															
4 - 6	Fine sand and fine silty sand																															
6 - 10	Sand																															
10 - 12	Silt, clayey silt and clay																															
12 - 15	Clay																															
15 - 18	Clayey silt																															
18 - 22	Silty sand																															
22 - 28	Sand																															
28 - 32	Sandy silt and silty sand																															
32 - 38	Clay																															
38 - 48	Sand																															
48 - 50	Silty sand																															
Note:	---																															
Data from:	RER: ☒		INGV: ☐																													

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “San Felice 4”

Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)			
Location map:				
Sand boil sample:	San Felice 4			
Coordinates (WGS 84):	Latitude: 44°50'10.70"N		Longitude: 11° 8'40.38"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	26/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: ---		Dip: ---	

Liquefaction-induced land damage category:	3 No lateral spreading but minor to moderate quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 14%	U = ---	C = ---	σ = 1.744
Compositional information:	---			
Paleoriver assignment:	Panaro - Secchia			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical

settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “San Felice 5”

Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)			
Location map:				
Sand boil sample:	San Felice 5			
Coordinates (WGS 84):	Latitude: 44°50'10.71"N		Longitude:11°8'40.59"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	26/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: ---		Dip: ---	

Liquefaction-induced land damage category:	3 No lateral spreading but minor to moderate quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 20%	U = ---	C = ---	σ = 1.865
Compositional information:	---			
Paleoriver assignment:	Panaro - Secchia			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical

settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “San Felice 7”

Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)		
Location map:			
Sand boil sample:	San Felice 7		
Coordinates (WGS 84):	Latitude: 44°50'13.99"N	Longitude: 11°8'35.46"E	
Sand boil image from:	Aerial photography: ☒	Field observations: ☒	
Date of sampling:	26/05/2012		
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒	May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 0°	Dip: 0°	
	Sand boil, fine gray sand. Diameter 20 m		
Liquefaction-induced land damage category:	3 No lateral spreading but minor to moderate quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 23%	U = ---	C = --- σ = 1.611
Compositional information:	---		
Paleoriver assignment:	Panaro - Secchia		

Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “San Felice 8”

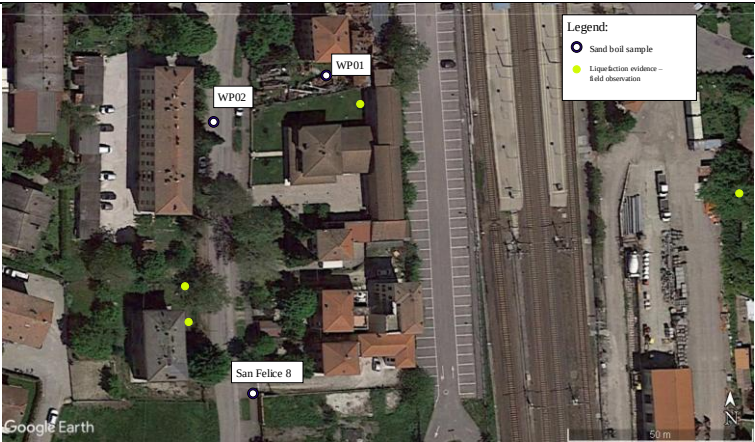
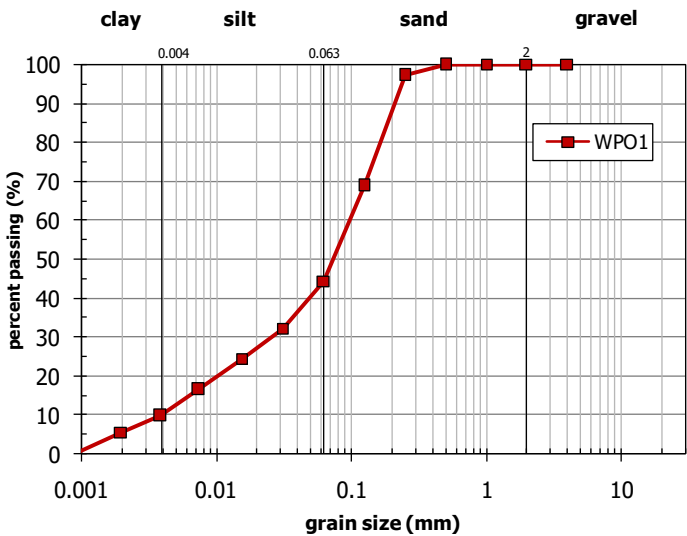
Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)	
Location map:		
Sand boil sample:	San Felice 8	
Coordinates (WGS 84):	Latitude: 44°50'0.49"N	Longitude: 11°8'21.34"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐

Date of sampling:	26/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$:	May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 0°	Dip: 0°
	Via Perossaro Vecchia n. 538. Abandoned well with diameter 1 m and depth 10-12 m. Water level: 1.00 m b.g.l. (24/05/12). About 20 m ³ sand ejection (inclusive of another well)	
Liquefaction-induced land damage category:	3 No lateral spreading but minor to moderate quantities of ejected material	
Grain size distribution curve:		

Soil classification (USCS):	Silty Sand (SM)			
	FC = 40%	U = 15.56	C = 1.98	$\sigma = 2.823$
Compositional information:	---			
Paleoriver assignment:	Panaro - Secchia			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

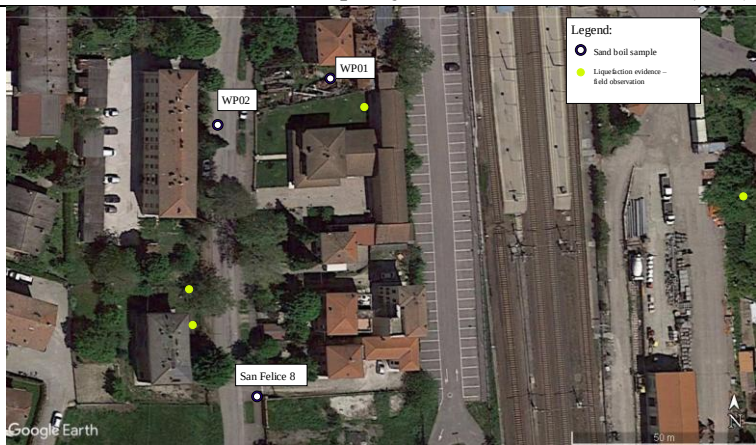
S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “WP01”,

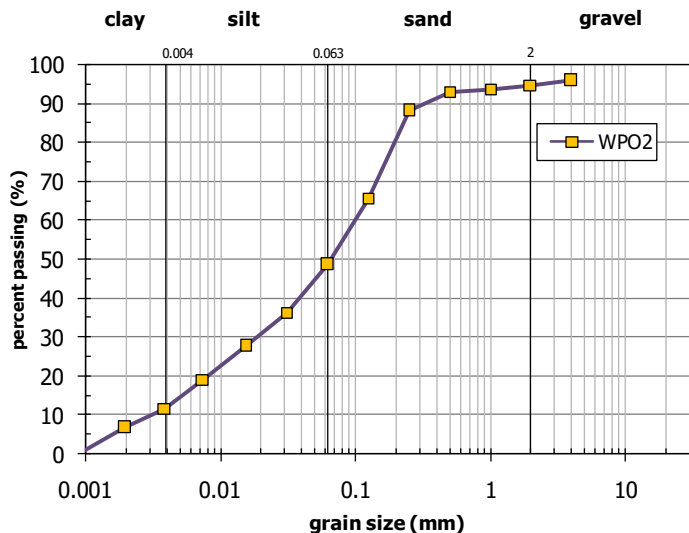
Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)	
Location map:		
Sand boil sample:	WP01	
Coordinates (WGS 84):	Latitude: 44°50'3.34"N	Longitude: 11°8'22.24"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☒
		
Date of sampling:	22/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 0°	Dip: 0°
	Via Perossaro Vecchia: building under construction. Sand upwelling from a manhole at the edge of the sidewalk. Sand thickness 3-4 cm	
Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material	
Grain size distribution curve:		
Soil classification (USCS):	Sandy Silt (ML)	

	FC = 51%	U = 25.0	C = 1.69	$\sigma = 4.659$
Compositional information:	---			
Paleoriver assignment:	Panaro - Secchia			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “WP02”

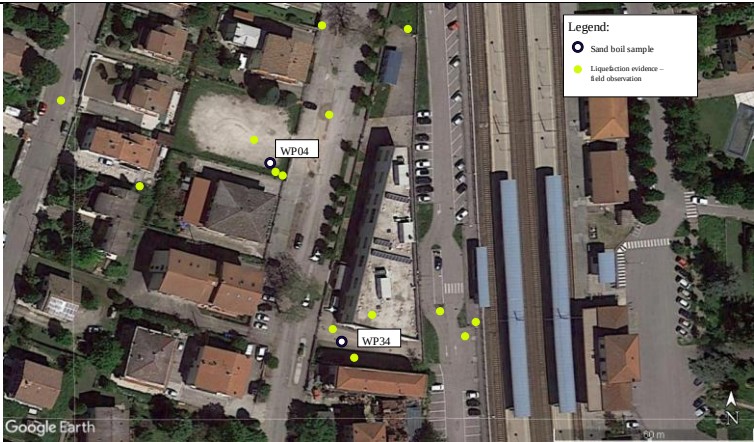
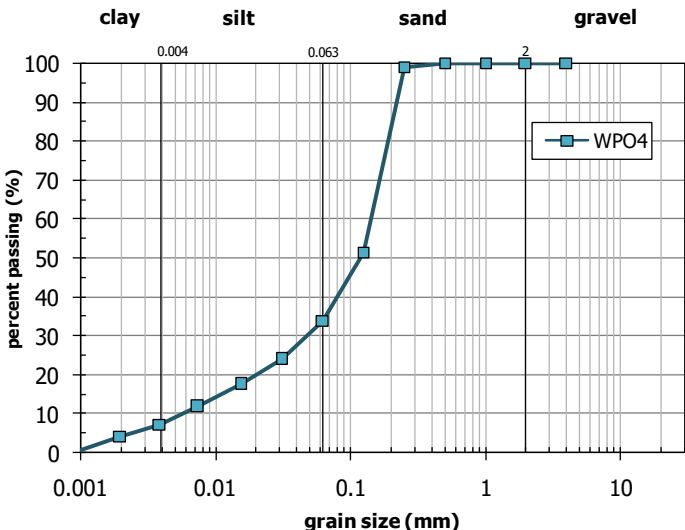
Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)			
Location map:				
Sand boil sample:	WP02			
Coordinates (WGS 84):	Latitude: 44°50'2.87"N		Longitude:11°8'20.87"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☒	
				
Date of sampling:	22/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 0°		Dip: 0°	

Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material			
Grain size distribution curve:	clay silt sand gravel 0.004 0.063 2  percent passing (%) grain size (mm) WP02			
Soil classification (USCS):	Sandy Silt (ML)			
	FC = 52%	U = 31.25	C = 1.13	σ = 7.545

Compositional information:	---	
Paleoriver assignment:	Panaro - Secchia	
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

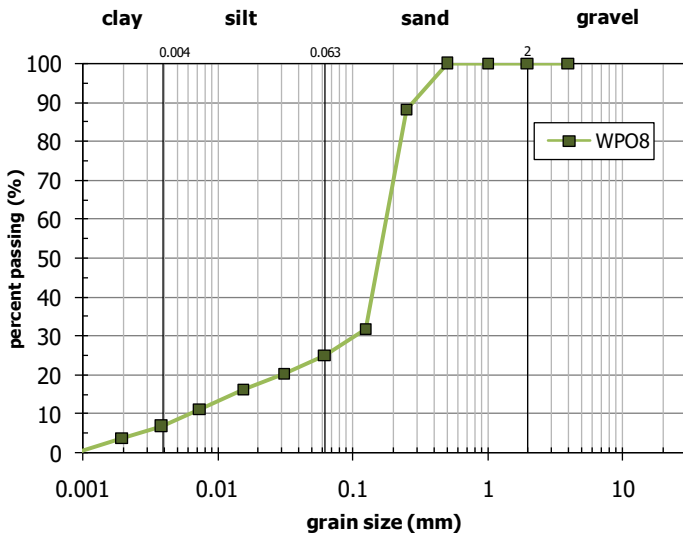
S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “WP04”,

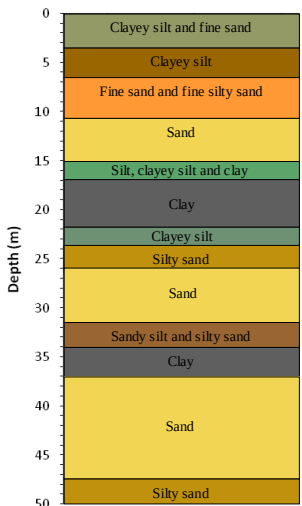
Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)	
Location map:		
Sand boil sample:	WP04	
Coordinates (WGS 84):	Latitude: 44°50'6.29"N	Longitude: 11° 8'20.94"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
		---
Date of sampling:	22/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 76°	Dip: 0°
	Via Perossaro, Vecchia 346. Sand ejection. Coarser grain size with respect to that of the sports ground area. E-W fractures with ground uplift and paving damage	
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		
Soil classification (USCS):	Silty Sand (SM)	

	FC = 38%	U = 25.0	C = 3.87	σ = 3.968
Compositional information:	---			
Paleoriver assignment:	Panaro - Secchia			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

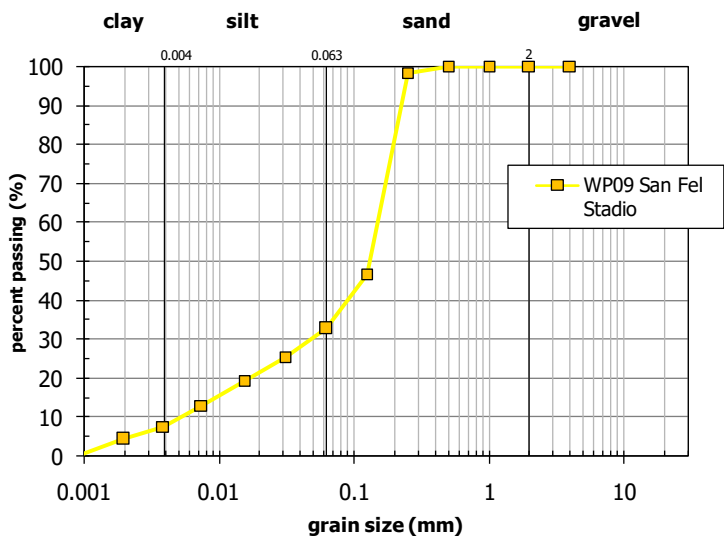
S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “WP08”,

Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)			
Location map:				
Sand boil sample:	WP08			
Coordinates (WGS 84):	Latitude: 44°50'7.73"N		Longitude: 11°8'35.12"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☒	
				
Date of sampling:	22/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 0		Dip: 0	
	Fracture, length 20 m			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 26%	U = 30.0	C = 11.20	σ = 4.209

Compositional information:	---	
Paleoriver assignment:	Panaro - Secchia	
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	Borehole: 036037S14S1401	
Coordinates (WGS 84):	Latitude: 44° 50' 6.497 N	Longitude: 11° 8' 32.531"E
Data:	02/07/2013	
Address:	Via Giani Costa	
Graph:	Borehole log 	
Note:	---	
Data from:	RER: ☒	INGV: ☐

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

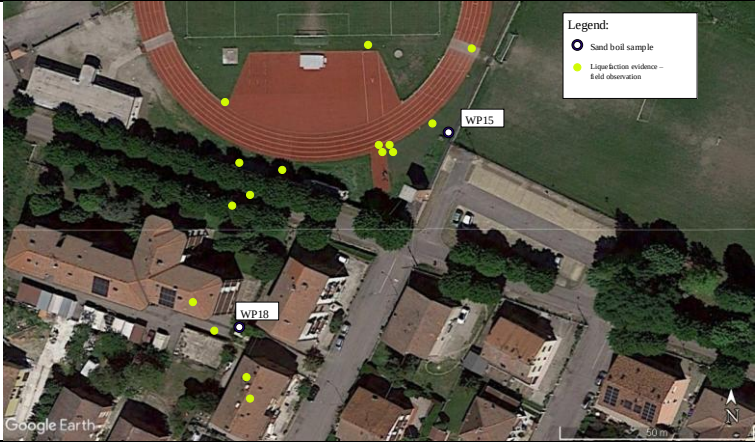
S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “WP09 San Fel stadio”

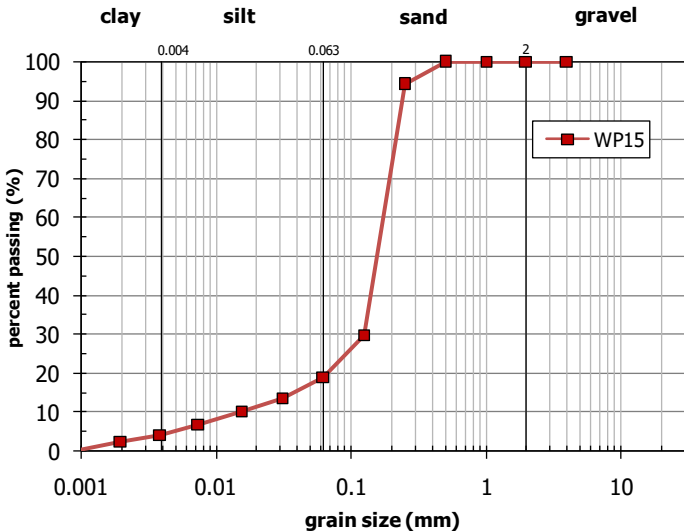
Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)	
Location map:		
Sand boil sample:	WP09 San Fel stadio	
Coordinates (WGS 84):	Latitude: 44°50'7.51"N	Longitude: 11°8'37.36"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
		---
Date of sampling:	22/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 40°	Dip: 0°
	Fracture, length 16 m	
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		
Soil classification (USCS):	Silty Sand (SM)	

	FC = 36%	U = 29.09	C = 2.84	σ = 4.230
Compositional information:	---			
Paleoriver assignment:	Panaro - Secchia			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “WP15”,

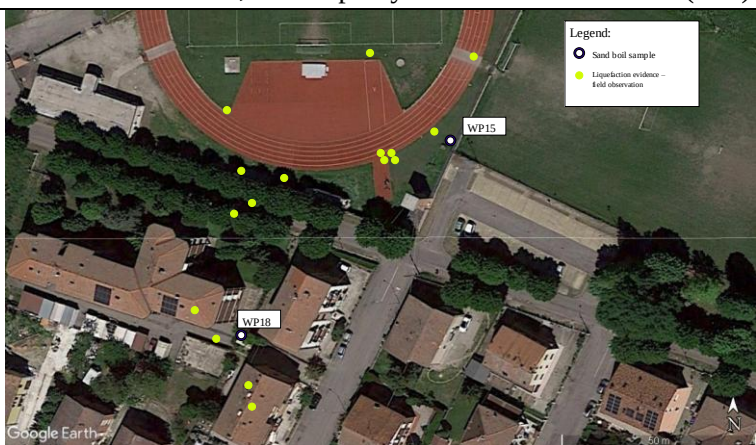
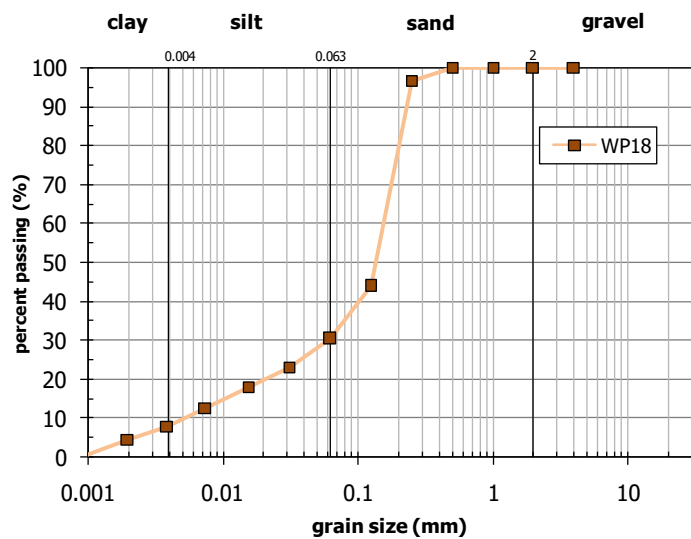
Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)		
Location map:			
Sand boil sample:	WP15		
Coordinates (WGS 84):	Latitude: 44°50'4.60"N	Longitude: 11°8'37.61"E	
Sand boil image from:	Aerial photography: ☐	Field observations: ☒	
	---		
Date of sampling:	22/05/2012		
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒	May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 0°	Dip: 0°	

Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 21%	U = 10.59	C = 5.52 σ = 2.797
Compositional information:	---		

Paleoriver assignment:	Panaro - Secchia	
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “WP18”

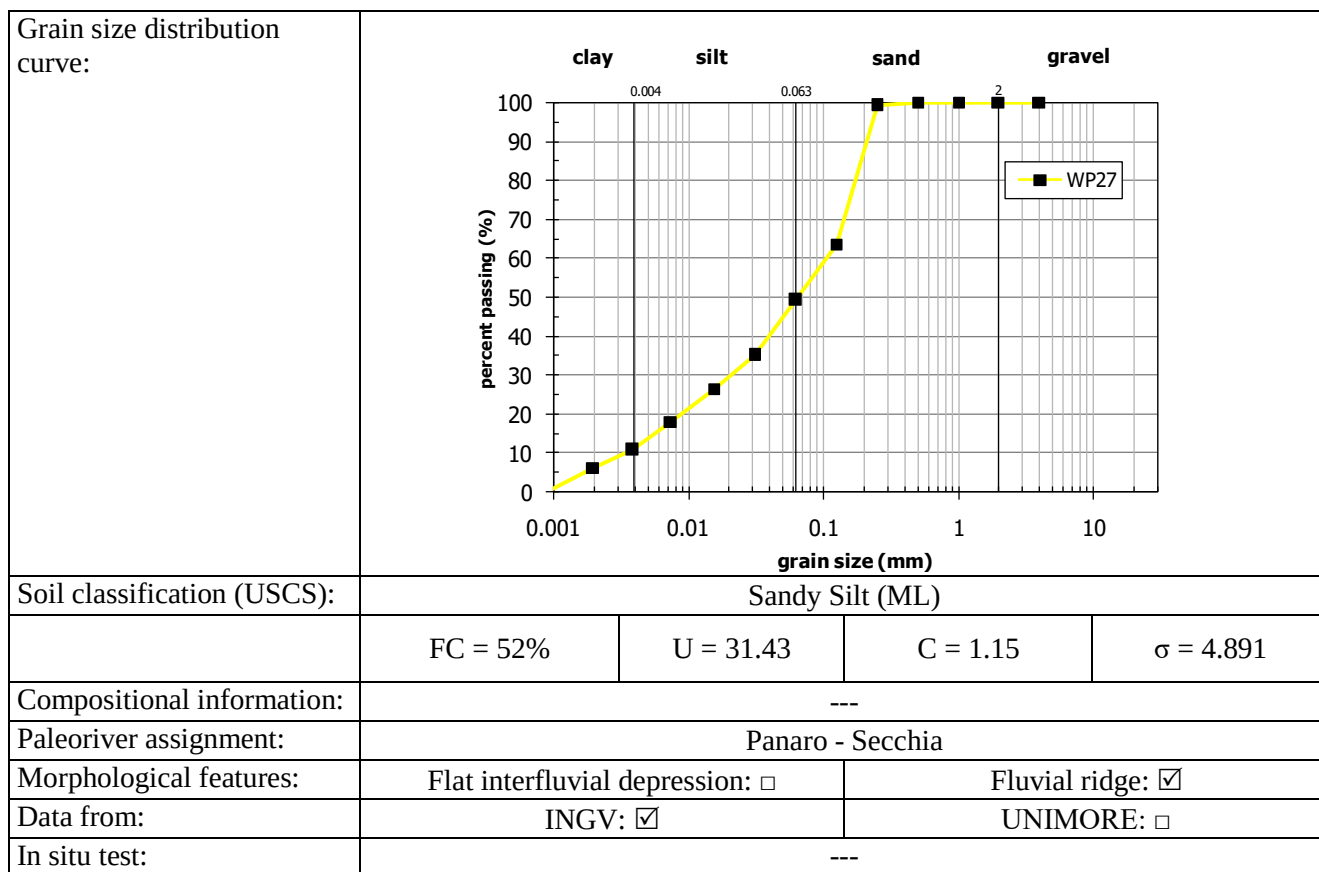
Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)			
Location map:				
Sand boil sample:	WP18			
Coordinates (WGS 84):	Latitude: 44°50'3.05"N		Longitude: 11°8'35.20"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	22/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 100°		Dip: 0°	
	Fracture, length 2 m			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 33%	U = 29.1	C = 4.51	σ = 4.185
Compositional information:	---			
Paleoriver assignment:	Panaro - Secchia			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical

settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

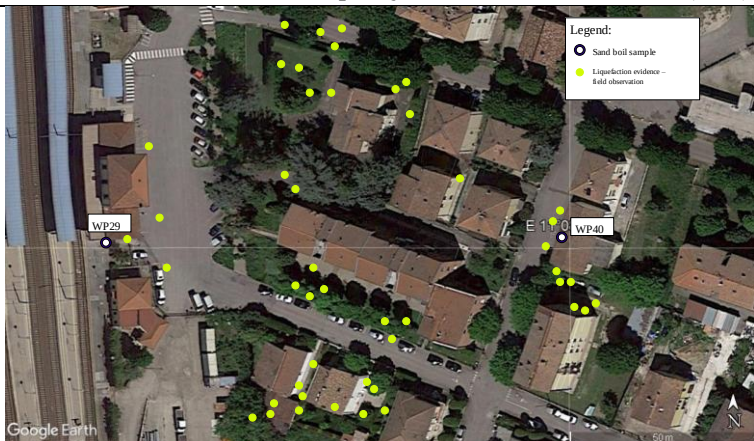
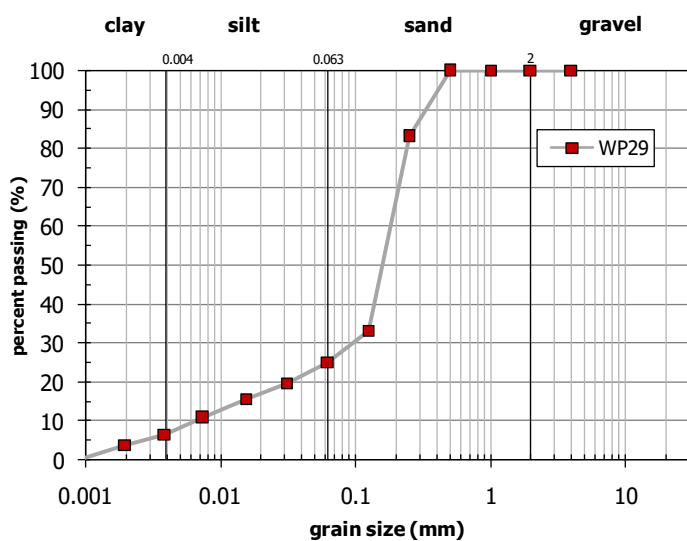
S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “WP27”

Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)	
Location map:		
Sand boil sample:	WP27	
Coordinates (WGS 84):	Latitude: 44°50'2.44"N	Longitude: 11°8'27.89"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☒
		
Date of sampling:	22/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 76°	Dip: 0°
	Fracture, length 7.5 m	
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material	



M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

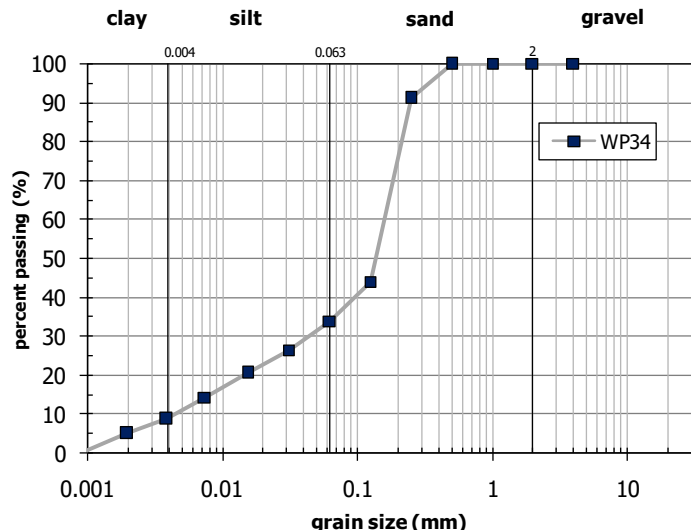
S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “WP29”

Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)			
Location map:				
Sand boil sample:	WP29			
Coordinates (WGS 84):	Latitude: 44°50'3.88"N		Longitude: 11°8'25.55"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☒	
				
Date of sampling:	22/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: 0°		Dip: 0°	
	San Felice train station			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 27%	U = 29.23	C = 7.31	σ = 4.237
Compositional information:	---			

Paleoriver assignment:	Panaro - Secchia	
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

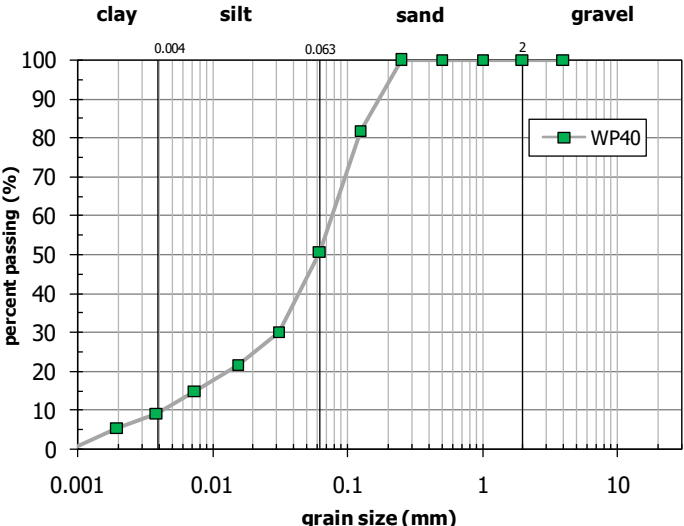
S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “WP34”

Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)	
Location map:		
Sand boil sample:	WP34	
Coordinates (WGS 84):	Latitude: 44°50'4.60"N	Longitude: 11°8'21.95"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
		---
Date of sampling:	22/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 0°	Dip: 0°
	Eco Byte company.Sand upwelling from the well.	
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		
Soil classification (USCS):	Silty Sand (SM)	

	FC = 34%	U = 35.56	C = 2.81	$\sigma = 4.834$
Compositional information:	---			
Paleoriver assignment:	Panaro - Secchia			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO) – “WP40”,

Site:	S. Felice sul Panaro, Municipality of S. Felice sul Panaro (MO)	
Location map:		
Sand boil sample:	WP40	
Coordinates (WGS 84):	Latitude: 44°50'3.91"N	Longitude: 11°8'31.13"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☒
		
Date of sampling:	06/06/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☒
Liquefaction features:	Strike: 0°	Dip: 0°
	Sand upwelling from the roadside	
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		

Soil classification (USCS):	Sandy Silt (ML)			
	FC = 59%	U = 17.78	C = 1.47	$\sigma = 4.087$
Compositional information:	---			
Paleoriver assignment:	Panaro - Secchia			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	Borehole: 036037S14S1401			
Coordinates (WGS 84):	Latitude: 44° 50' 6.497 N		Longitude: 11° 8' 32.531"E	
Data:	02/07/2013			
Address:	Via Giani Costa			
Graph:	Borehole log			
Note:	---			
Data from:	RER: ☒		INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Stoffi, Municipality of S.Giacomo delle Segnate (MN) – “INS02”

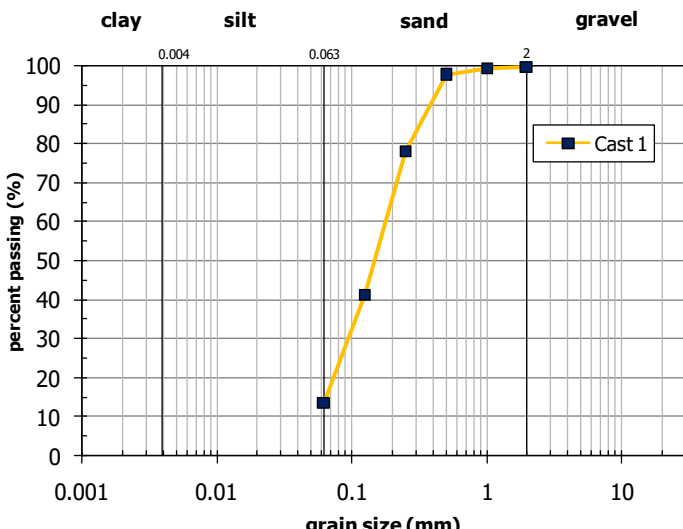
Site:	Stoffi, Municipality of S. Giacomo delle Segnate (MN)			
Location map:				
Sand boil sample:	INS02			
Coordinates (WGS 84):	Latitude:44°56'37.51"N		Longitude: 10°57'43.56"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	---			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☐		May 29 th , 2012, M _w = 5.9: ☒	
Liquefaction features:	Strike: ---		Dip: ---	

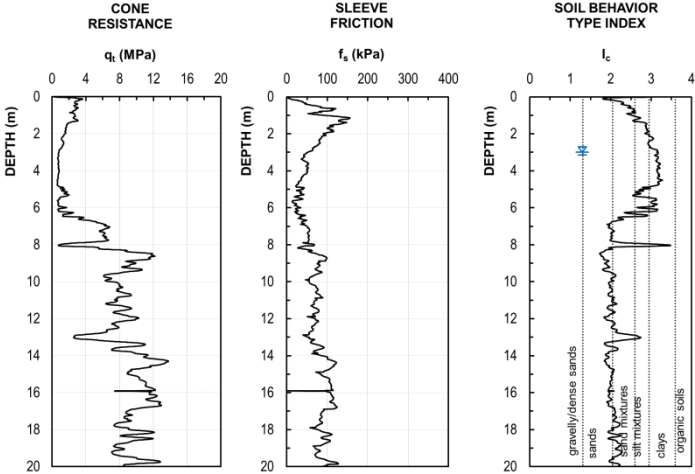
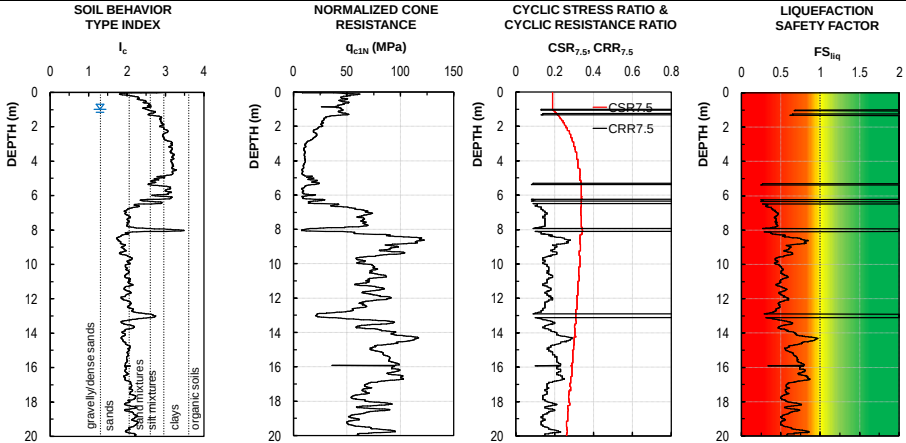
Liquefaction-induced land damage category:	3 No lateral spreading but minor to moderate quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 13%	U = 6.67	C = 2.40	σ = 2.498
Compositional information:	---			
Paleoriver assignment:	Secchia or Po			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical

settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

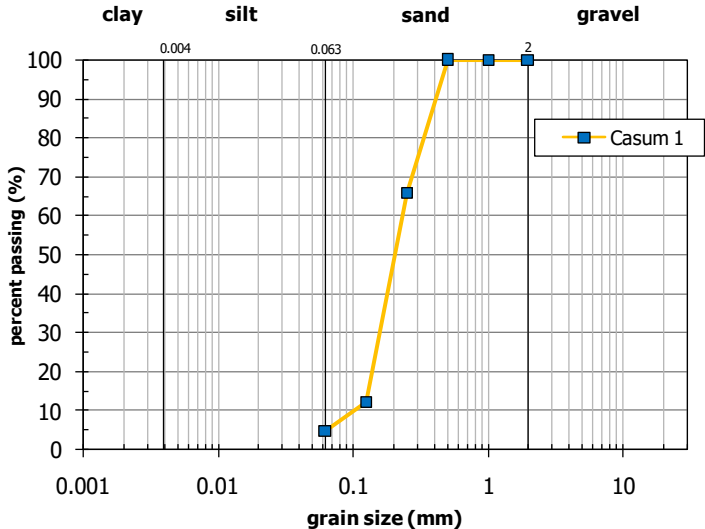
Mirabello, Municipality of Terre del Reno (FE) – “Cast1”

Site:	Mirabello, Municipality of Terre del Reno (FE)			
Location map:				
Sand boil sample:	Cast1			
Coordinates (WGS 84):	Latitude: 44°50'2" N		Longitude: 11°26'50" E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	30/06/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 140°		Dip: 0°	
	Fracture, length 25 m. Fondo S. Gaetano, sample taken on the right of the house			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 21%	U = ---	C = ---	σ = 1.530
Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	CPTuA: 038016P295			

Coordinates (WGS 84):	Latitude: 44°50'3.02"N		Longitude: 11°27'1.74"E
Date:	28/06/2014		
Address:	SP468R		
Depth to GWT during in situ test:	3.00 m		
In situ test results:			
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 6.1$	$a_{max} = 0.46g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})			
	LPI = 21.47	LSN = 26.41	S = 0.30 m
Note:	Thickness of surface layer: 6.2 m (from 0 to 6.2 m) Thickness of liquefied layer: 13.8 m (from 6.2 to 20 m)		
Data from:	RER: ☒		INGV: ☐

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Casumaro, Municipality of Terre del Reno (FE) – “Casum1”

Site:	Casumaro, Municipality of Terre del Reno (FE)	
Location map:		
Sand boil sample:	Casum1	
Coordinates (WGS 84):	Latitude: 44°50'12.83"N	Longitude: 11°26'22.80"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
		---
Date of sampling:	---	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 75	Dip: 0
	Fracture, length 3 m. Locality Lodi	
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		

Soil classification (USCS):	Poorly graded sand with silt (SP-SM)			
	FC = 6%	U = 2.3	C = 1.26	$\sigma = 1.610$
Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	CPTuA: 13244			
Coordinates (WGS 84):	Latitude: 44°50'19.02"N		Longitude: 11°26'32.41"E	
Date:	20/05/2014			
Address:	Via Correggese			
Depth to GWT during in situ test:	3.00m			
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 1.0 m		$M_w = 6.1$	$a_{max} = 0.46g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c NORMALIZED CONE RESISTANCE q_{c1N} (MPa) CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ LIQUEFACTION SAFETY FACTOR FS_{liq}			
	LPI = 24.27		LSN = 26.66	S = 0.40 m
Note:	Thickness of surface layer: 5.8 m (from 0 to 5.8 m) Thickness of liquefied layer: 14.2 m (from 5.8 to 20 m)			
Data from:	RER: ☒		INGV: ☐	

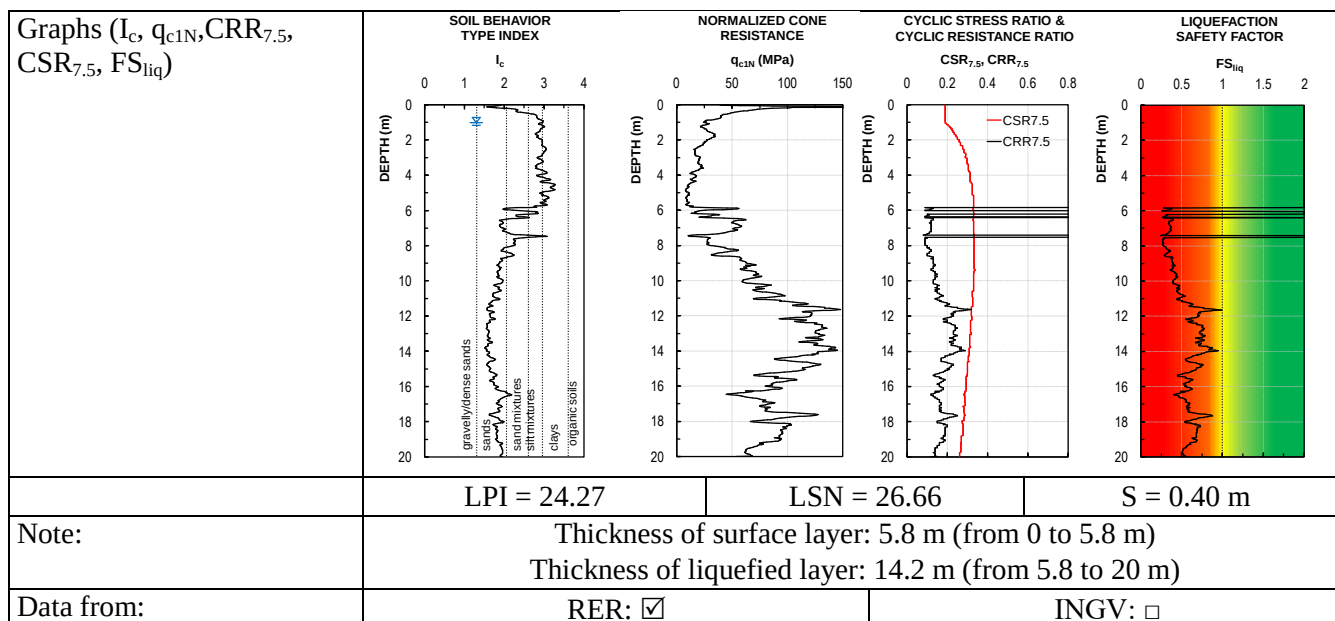
M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Casumaro, Municipality of Terre del Reno (FE) – “Casum2”

Site:	Casumaro, Municipality of Terre del Reno (FE)	
Location map:		
Sand boil sample:	Casum2	
Coordinates (WGS 84):	Latitude: 44°50'14.32"N	Longitude: 11°26'13.26"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
		---
Date of sampling:	---	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 0°	Dip: 0°

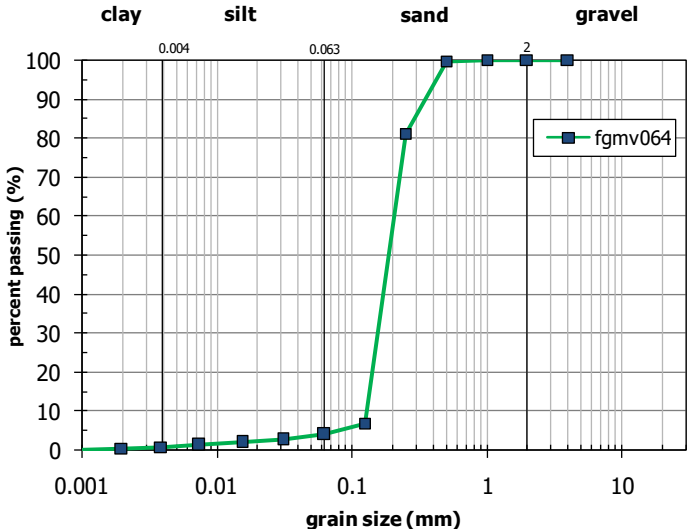
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material	

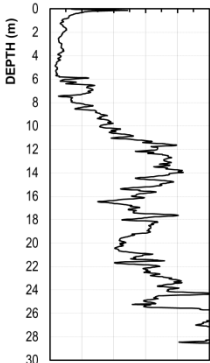
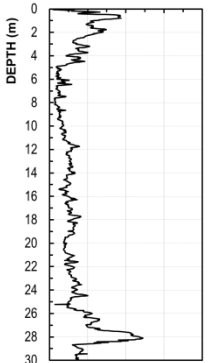
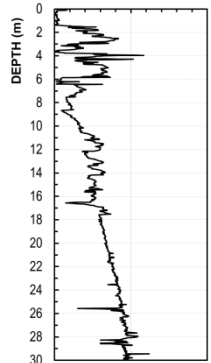
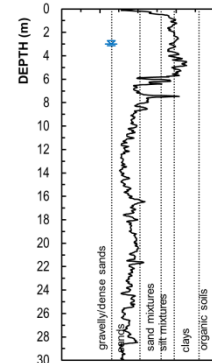
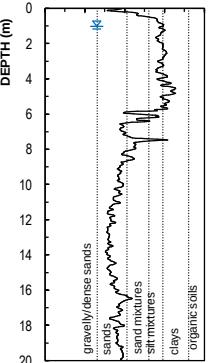
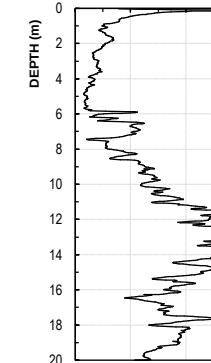
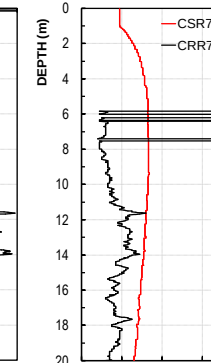
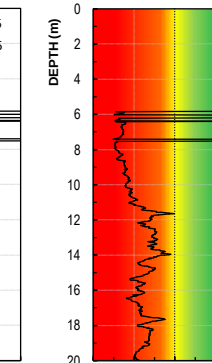
Grain size distribution curve:	clay silt sand gravel percent passing (%) grain size (mm) Casum 2			
Soil classification (USCS):	Silty Sand (SM)			
	FC = 33%	U = ---	C = ---	$\sigma = 1.525$
Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	CPTuA: 13244			
Coordinates (WGS 84):	Latitude: 44°50'19.02"N		Latitude: 44°50'19.02"N	
Date:	20/05/2014			
Address:	Via Correggese			
Depth to GWT during in situ test:	3.00m			
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u₂ (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 1.0 m	M _w = 6.1	a _{max} = 0.46g	



M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

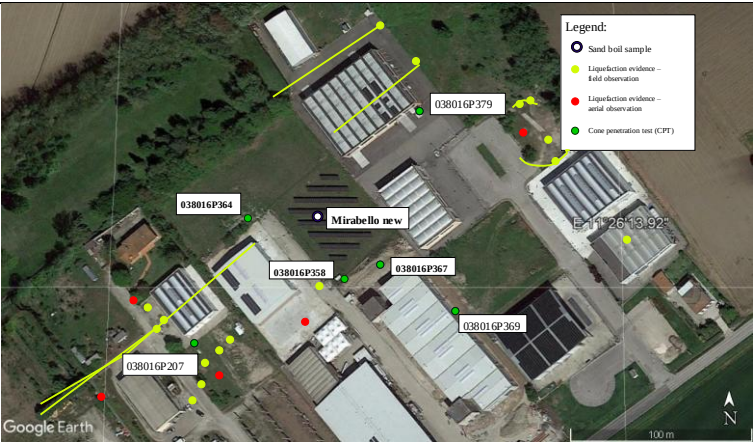
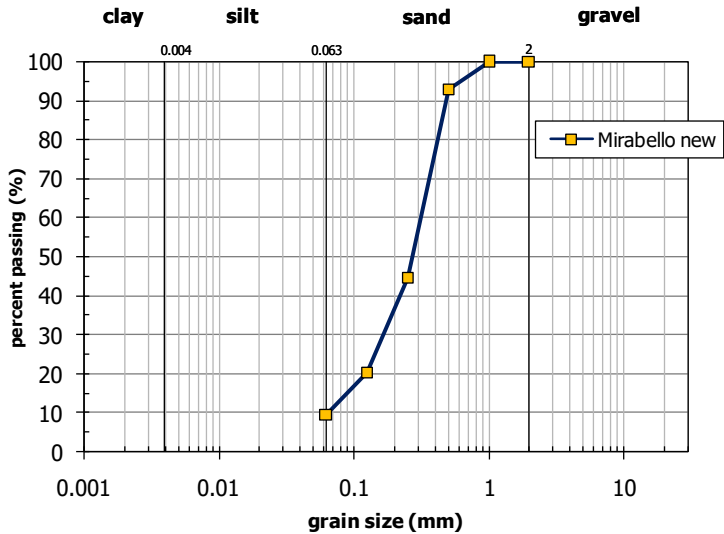
Casumaro, Municipality of Terre del Reno (FE) – “fgmv064”

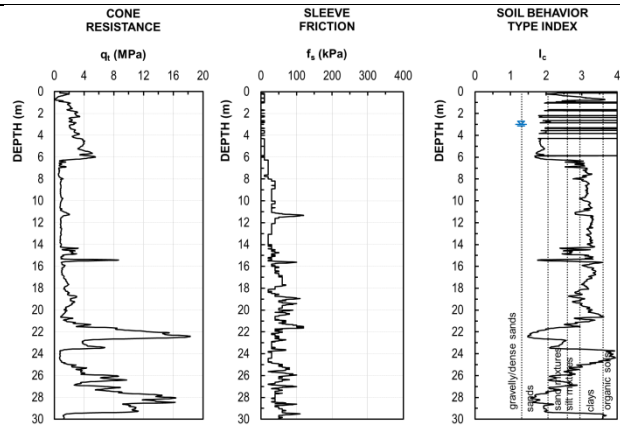
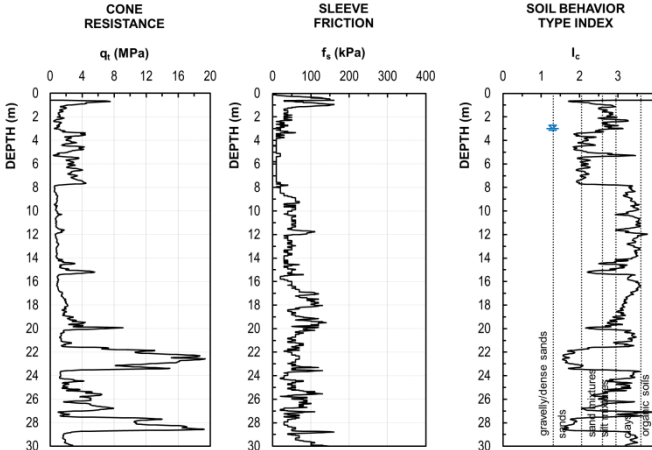
Site:	Casumaro, Municipality of Terre del Reno (FE)	
Location map:		
Sand boil sample:	fgmv064	
Coordinates (WGS 84):	Latitude: 44°50'12.62"N	Longitude: 11°26'21.79"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
		---
Date of sampling:	---	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 70°	Dip: 0°
	Fracture, length 7 m	
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		

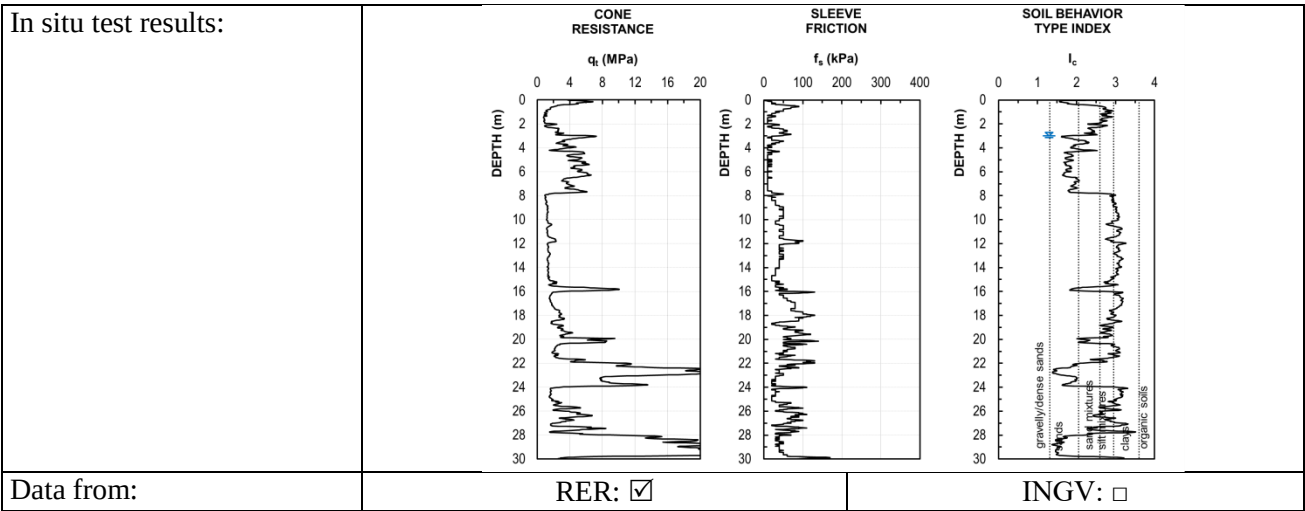
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)			
	FC = 5%	U = 1.53	C = 0.98	$\sigma = 1.531$
Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	CPTuA: 13244			
Coordinates (WGS 84):	Latitude: 44°50'19.02"N		Latitude: 44°50'19.02"N	
Date:	20/05/2014			
Address:	Via Correggese			
Depth to GWT during in situ test:	3.00m			
In situ test results:	CONE RESISTANCE q_t (MPa)  SLEEVE FRICTION f_s (kPa)  PORE PRESSURE u_2 (kPa)  SOIL BEHAVIOR TYPE INDEX I_c 			
Liquefaction analysis:	EQ GWT = 1.0m	$M_w = 6.1$	$a_{max} = 0.46g$	
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c 	NORMALIZED CONE RESISTANCE q_{c1N} (MPa) 	CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ 	LIQUEFACTION SAFETY FACTOR FS_{liq} 
	LPI = 24.27	LSN = 26.66	S = 0.40 m	
Note:	Thickness of surface layer: 5.8 m (from 0 to 5.8 m) Thickness of liquefied layer: 14.2 m (from 5.8 to 20 m)			
Data from:	RER: ☒		INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Mirabello, Municipality of Terre del Reno (FE) “Mirabello new”

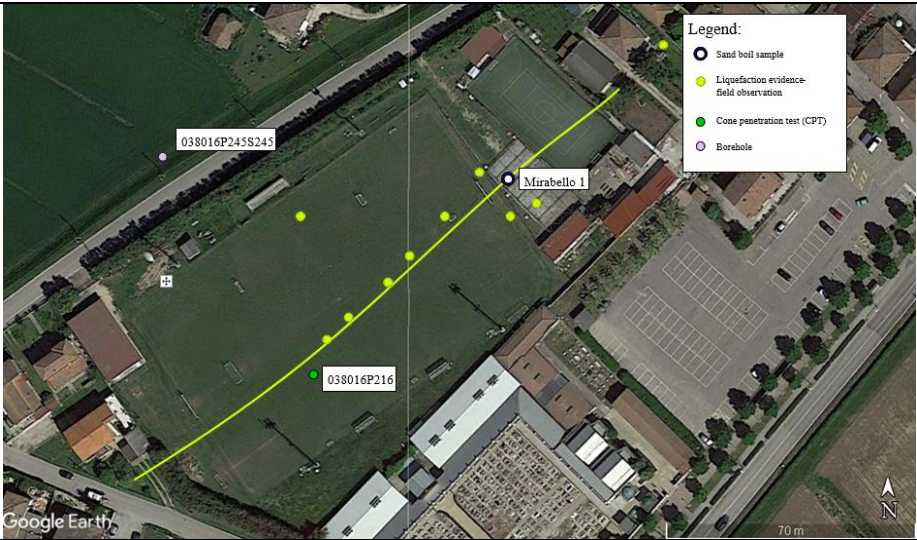
Site:	Mirabello, Municipality of Terre del Reno (FE)		
Location map:			
Sand boil sample:	Mirabello new		
Coordinates (WGS 84):	Latitude: 44°48'47.31"N		Longitude: 11°26'6.25"E
Sand boil image from:	Aerial photography: ☒		Field observations: ☐
			---
Date of sampling:	---		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒		May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 103°		Dip: 0°
	Fracture with silty sand, length 15 m		
Liquefaction-induced land damage category:	5 ■ Moderate to major lateral spreading; ejected material often observed		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 12%	U = 4.61	C = 1.48 $\sigma = 1.827$
Compositional information:	---		

Paleoriver assignment:	Reno	
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	CPTuA: 038016P364	
Coordinates (WGS 84):	Latitude: 44°48'47.28"N	Longitude: 11°26'4.42"E
Date:	27/03/2015	
Address:	Corso Italia	
Depth to GWT during in situ test:	3.00 m	
In situ test results:	 The figure shows three depth-based plots for CPTuA. The first plot, 'CONE RESISTANCE', shows q_t (MPa) on the x-axis (0 to 20) against depth (m) on the y-axis (0 to 30). The second plot, 'SLEEVE FRICTION', shows f_s (kPa) on the x-axis (0 to 400) against depth (m) on the y-axis (0 to 30). The third plot, 'SOIL BEHAVIOR TYPE INDEX', shows I_c on the x-axis (0 to 4) against depth (m) on the y-axis (0 to 30). The soil behavior index plot includes a legend for soil types: gravely/dense sands, sands, silty sands, silty clays, clays, and organic soils.	
Data from:	RER: ☒	INGV: ☐
In situ test:	CPTuB: 038016P358	
Coordinates (WGS 84):	Latitude: 44°48'46.22"N	Longitude: 11°26'7.00"E
Date:	14/09/2012	
Address:	Corso Italia	
Depth to GWT during in situ test:	3.00 m	
In situ test results:	 The figure shows three depth-based plots for CPTuB. The first plot, 'CONE RESISTANCE', shows q_t (MPa) on the x-axis (0 to 20) against depth (m) on the y-axis (0 to 30). The second plot, 'SLEEVE FRICTION', shows f_s (kPa) on the x-axis (0 to 400) against depth (m) on the y-axis (0 to 30). The third plot, 'SOIL BEHAVIOR TYPE INDEX', shows I_c on the x-axis (0 to 4) against depth (m) on the y-axis (0 to 30). The soil behavior index plot includes a legend for soil types: gravely/dense sands, sands, silty sands, silty clays, clays, and organic soils.	
Data from:	RER: ☒	INGV: ☐
In situ test:	CPTuC: 038016P367	
Coordinates (WGS 84):	Latitude: 44°48'46.43"N	Longitude: 11°26'7.90"E
Date:	03/09/2014	
Address:	Corso Italia	
Depth to GWT during in situ test:	3.00m	

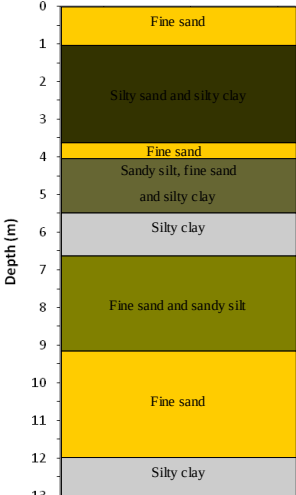


M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Mirabello, Municipality of Terre del Reno (FE) – “Mirabello 1”

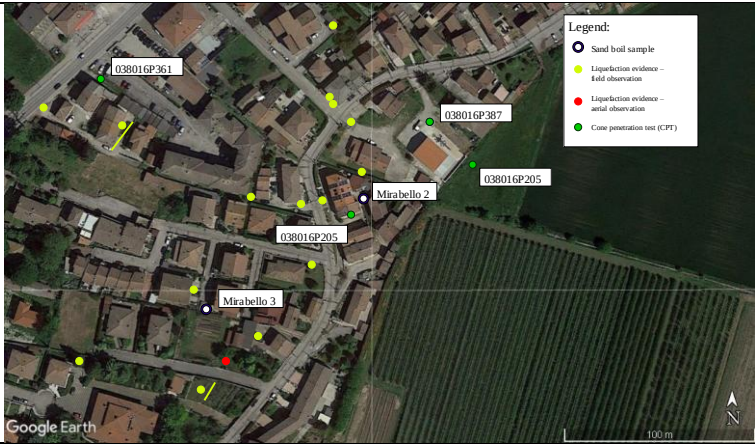
Site:	Mirabello, Municipality of Terre del Reno (FE)	
Location map:		
Sand boil sample:	Mirabello 1	
Coordinates (WGS 84):	Latitude: 44°49'23.00"N	Longitude: 11°27'20.00"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
		---
Date of sampling:	---	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 40°	Dip: 0°
	Fracture affecting the road (failure to the N), a small perimetral wall of an house and its garden	
Liquefaction-induced land damage category:	6 Several lateral spreading; ejected material often observed	

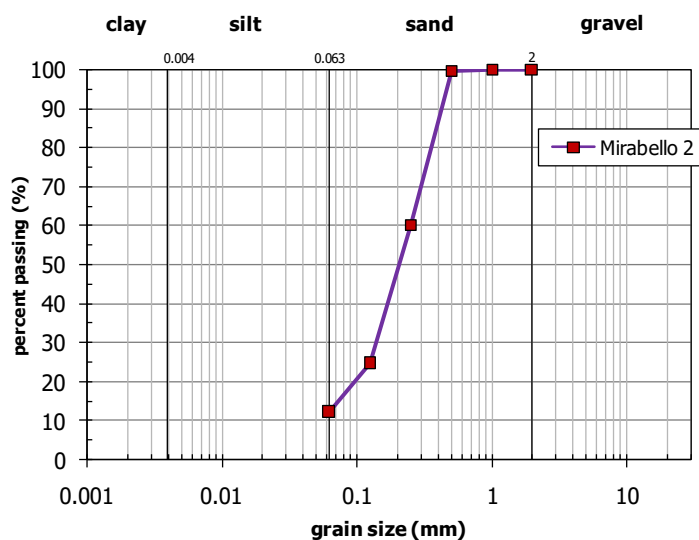
Grain size distribution curve:	clay silt sand gravel			
Soil classification (USCS):	Silty Sand (SM)			
	FC = 48%	U = 19.0	C = 2.88	$\sigma = ---$
Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	CPTuA: 038016P216			
Coordinates (WGS 84):	Latitude: 44°49'21.26"N		Longitude: 11°27'17.54"E	
Date:	06/06/2012			
Address:	Via IV Novembre			
Depth to GWT during in situ test:	3.00 m			
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Data from:	RER: ☒		INGV: ☐	
In situ test:	Borehole: 038016P245			
Coordinates (WGS 84):	Latitude: 44.82282 °		Longitude: 11.45427°	
Data:	05/07/2012			
Address	Via ArginePostale			

Graph:	Borehole log 	
Note:	---	
Data from:	RER: ☒	INGV: ☐

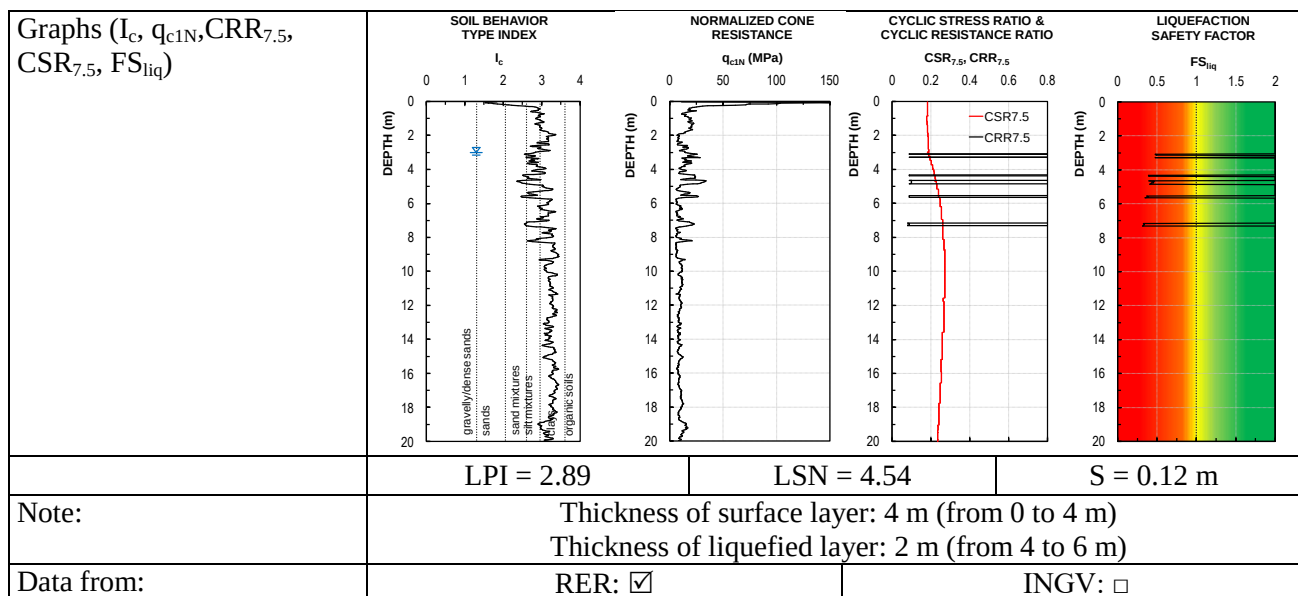
M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Mirabello, Municipality of Terre del Reno (FE) – “Mirabello 2”

Site:	Mirabello, Municipality of Terre del Reno (FE)		
Location map:			
Sand boil sample:	Mirabello 2		
Coordinates (WGS 84):	Latitude: 44°49'39.41"N	Longitude: 11°27'57.42"E	
Sand boil image from:	Aerial photography: ☐	Field observations: ☐	
	---	---	
Date of sampling:	---		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐	
Liquefaction features:	Strike: ---	Dip: ---	

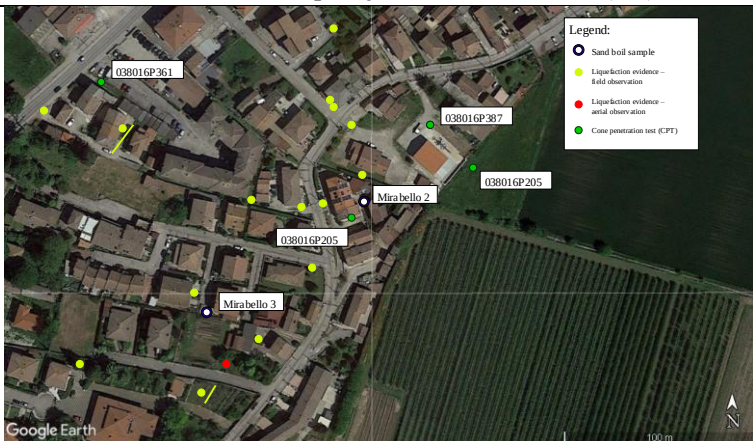
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 15%	U = ---	C = --- $\sigma = 1.723$
Compositional information:	---		
Paleoriver assignment:	Reno		
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒	
Data from:	INGV: ☐	UNIMORE: ☒	
In situ test:	CPTuA: 038016P205		
Coordinates (WGS 84):	Latitude: 44°49'39.18"N	Longitude: 11°27'57.18"E	
Date:	02/05/2013		
Address:	Via ArgineVecchio		

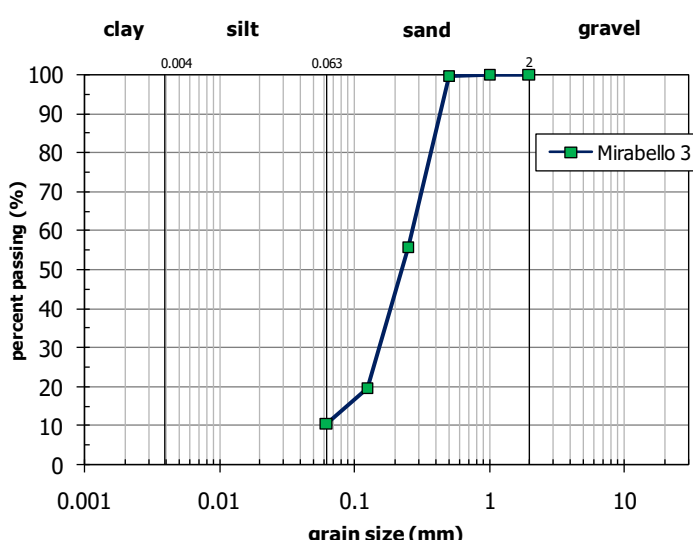
Depth to GWT during in situ test:	3.00 m		
In situ test results:			
Liquefaction analysis:	EQ GWT = 3.0 m	$M_w = 6.1$	$a_{max} = 0.44g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})			
	LPI = 10.17	LSN = 12.17	S = 0.18 m
Note:	Thickness of surface layer: 6.8 m (from 0 to 6.8 m) Thickness of liquefied layer: 2.3 m (from 6.8 to 9.1 m)		
Data from:	RER: ☒		INGV: ☐
In situ test:	CPTuB: 038016P387		
Coordinates (WGS 84):	Latitude: 44°49'40.73"N		Longitude: 11°27'58.97"E
Date:	18/02/2014		
Address:	Via Argine Vecchio		
Depth to GWT during in situ test (m):	3.00 m		
In situ test results:			
Liquefaction analysis:	EQ GWT = 3.0 m	$M_w = 6.1$	$a_{max} = 0.44g$



M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Mirabello, Municipality of Terre del Reno (FE) – “Mirabello 3”

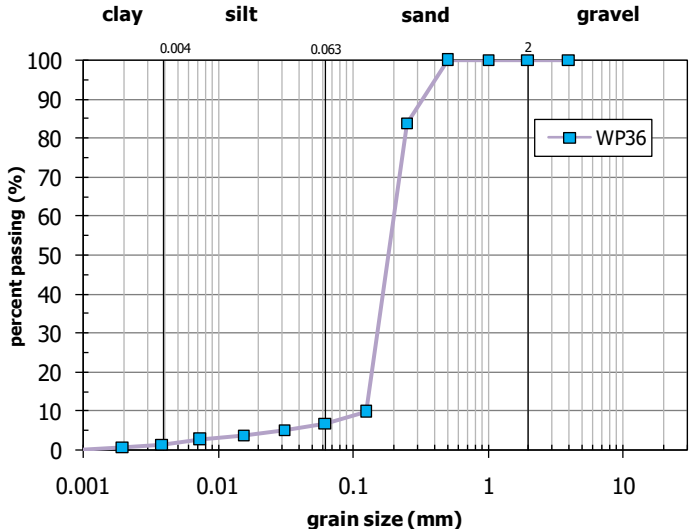
Site:	Mirabello, Municipality of Terre del Reno (FE)			
Location map:				
Sand boil sample:	Mirabello 3			
Coordinates (WGS 84):	Latitude: 44°49'37.56"N		Longitude: 11°27'53.76"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☐	
			---	
Date of sampling:	---			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: ---		Dip: ---	

Liquefaction-induced land damage category:	5 ■ Moderate to major lateral spreading; ejected material often observed			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 12%	U = ---	C = ---	σ = 1.683
Compositional information:	---			

Paleoriver assignment:	Reno	
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	CPTuA: 038016P205	
Coordinates (WGS 84):	Latitude: 44°49'39.18"N	Latitude: 44°49'39.18"N
Date:	02/05/2013	
Address:	Via Argine Vecchio	
Depth to GWT during in situ test (m):	3.00 m	
In situ test results:		
Data from:	RER: ☒	INGV: ☐

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Casumaro, Municipality of Terre del Reno (FE) – “WP36”

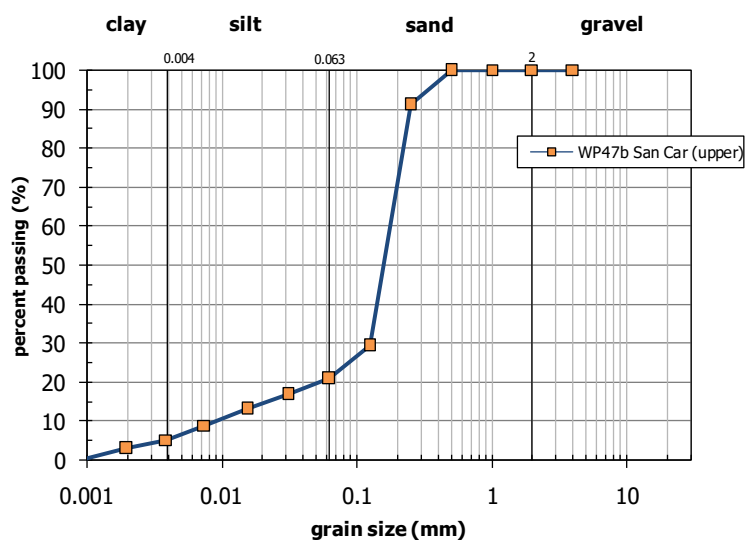
Site:	Mirabello, Municipality of Terre del Reno (FE)	
Location map:		
Sand boil sample:	WP36	
Coordinates (WGS 84):	Latitude: 44°50'12.55"N	Longitude: 11°26'21.80"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
		---
Date of sampling:	---	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 75°	Dip: 0°
	Fracture, length 6 m. Locality Lodi	
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		

Soil classification (USCS):	Poorly graded sand with silt (SP-SM)			
	FC = 8%	U = 1.33	C = 0.56	$\sigma = 1.748$
Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	CPTuA: 13244			
Coordinates (WGS 84):	Latitude: 44°50'19.02"N		Latitude: 44°50'19.02"N	
Date:	20/05/2014			
Address:	Via Correggese			
Depth to GWT during in situ test:	3.00m			
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 1.0 m		$M_w = 6.1$	$a_{max} = 0.46g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c NORMALIZED CONE RESISTANCE q_{c1N} (MPa) CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ LIQUEFACTION SAFETY FACTOR FS_{liq}			
	LPI = 24.27		LSN = 26.66	S = 0.40 m
Note:	Thickness of surface layer: 5.8 m (from 0 to 5.8 m) Thickness of liquefied layer: 14.2 m (from 5.8 to 20 m)			
Data from:	RER: ☒		INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Casumaro, Municipality of Terre del Reno (FE) – “WP47 San Car (upper)”

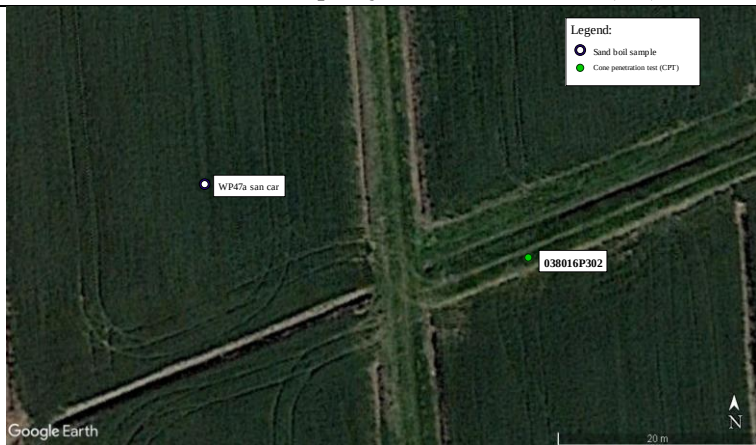
Site:	Casumaro, Municipality of Terre del Reno (FE)		
Location map:			
Sand boil sample:	WP47 San Car (upper)		
Coordinates (WGS 84):	Latitude: 44°50'13.56"N	Longitude: 11°24'58.82"E	
Sand boil image from:	Aerial photography: ☐	Field observations: ☐	
	---	---	
Date of sampling:	---		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐	
Liquefaction features:	Strike: 60°	Dip: 0°	

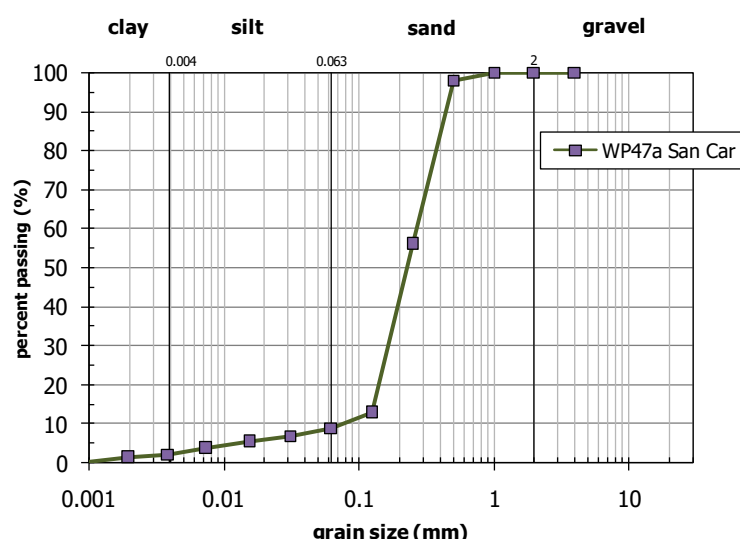
Liquefaction-induced land damage category:	3 No lateral spreading but minor to moderate quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 22%	U = 18,95	C = 9.88 $\sigma = 3.396$
Compositional information:	---		
Paleoriver assignment:	Reno		
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐	
Data from:	INGV: ☒	UNIMORE: ☐	
In situ test:	CPTuA: 038016P302		
Coordinates (WGS 84):	Latitude: 44°50'13.31"N	Latitude: 44°50'13.31"N	
Date:	05/07/2014		
Address:	SP468R		

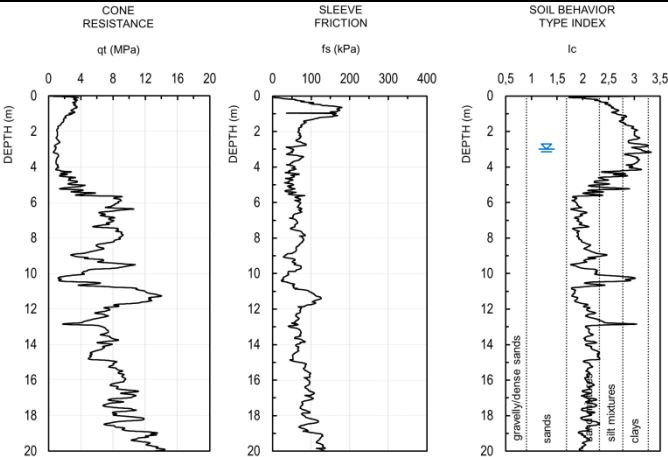
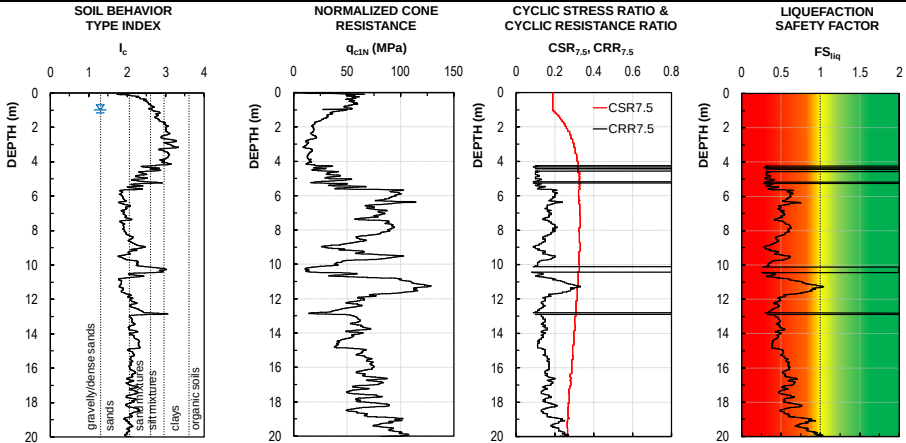
Depth to GWT during in situ test:	3.00 m		
In situ test results:			
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 6.1$	$a_{max} = 0.46g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})			
	LPI = 28.78	LSN = 32.29	S = 0.34 m
Note:	Thickness of surface layer: 4.2 m (from 0 to 4.2 m) Thickness of liquefied layer: 15.8 m (from 4.2 to 20 m)		
Data from:	RER: ☒		INGV: ☐

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Casumaro, Municipality of Terre del Reno (FE) – “WP47a San Car”

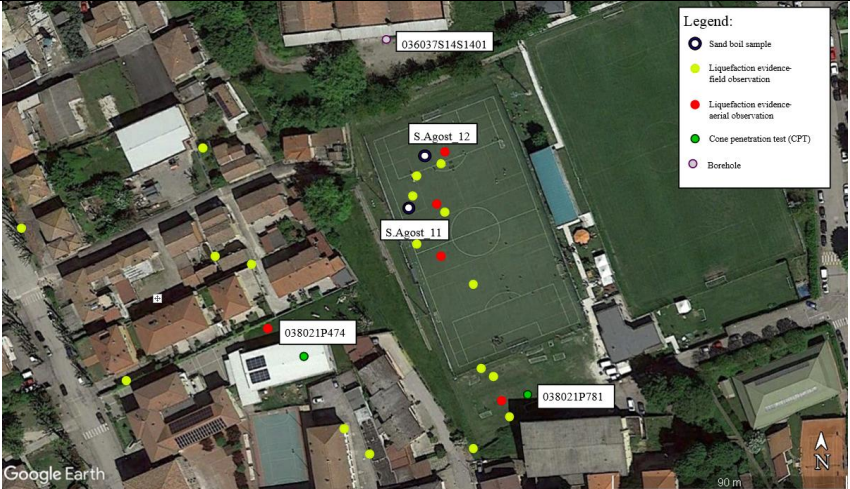
Site:	Casumaro, Municipality of Terre del Reno (FE)		
Location map:			
Sand boil sample:	WP47a San Car		
Coordinates (WGS 84):	Latitude: 44°50'13.56"N	Longitude: 11°24'58.82"E	
Sand boil image from:	Aerial photography: ☐	Field observations: ☐	
	---	---	
Date of sampling:	---		
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒	May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 60°	Dip: 0°	

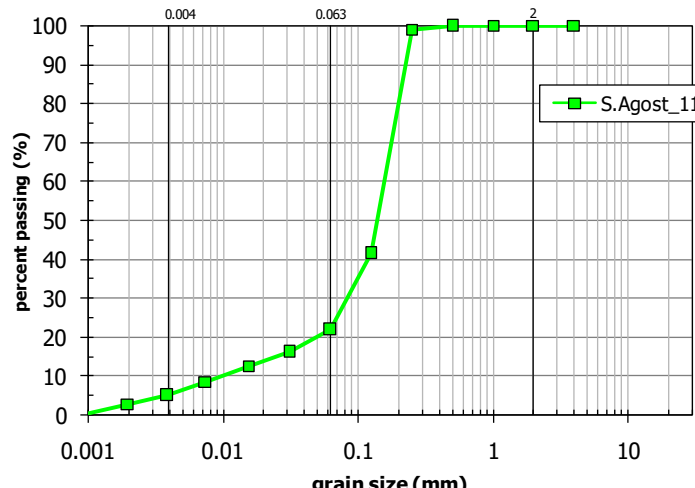
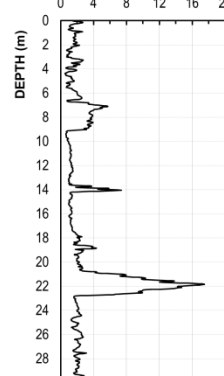
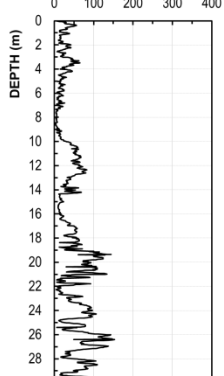
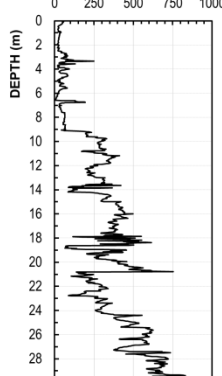
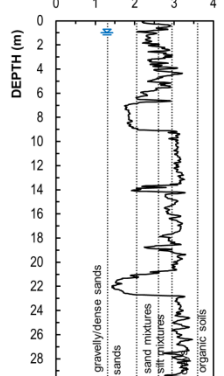
Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material		
Grain size distribution curve:			
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)		
	FC = 10%	U = 3.26	C = 1.26 σ = 2.259
Compositional information:	---		
Paleoriver assignment:	Reno		
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐	
Data from:	INGV: ☒	UNIMORE: ☐	
In situ test:	CPTuA: 038016P302		
Coordinates (WGS 84):	Latitude: 44°50'13.31"N	Longitude: 11°25'0.31"E	
Date:	05/07/2014		
Address:	SP468R		

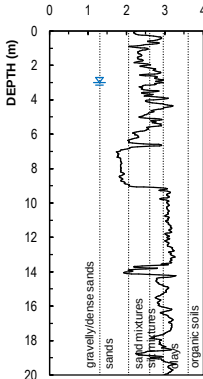
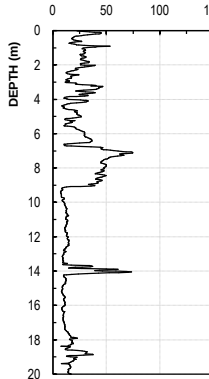
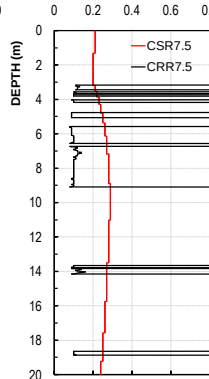
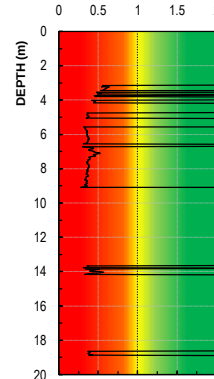
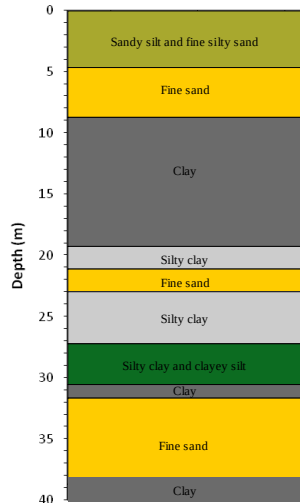
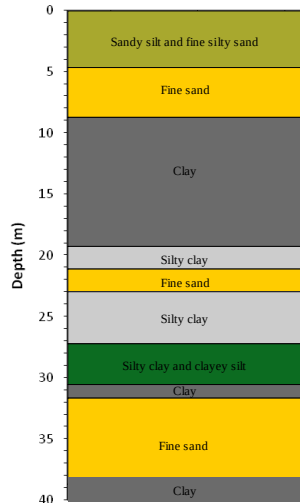
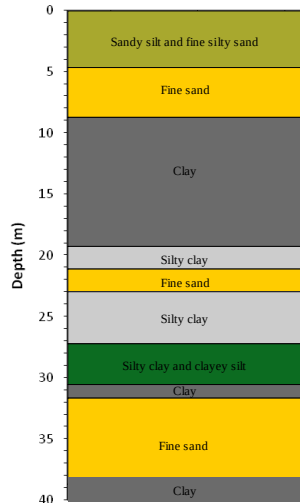
Depth to GWT during in situ test:	3.00 m		
In situ test results:			
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 6.1$	$a_{max} = 0.46g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, FS_{liq})			
	LPI = 28.78	LSN = 32.29	S = 0.34 m
Note:	Thickness of surface layer: 4.2 m (from 0 to 4.2 m) Thickness of liquefied layer: 15.8 m (from 4.2 to 20 m)		
Data from:	RER: ☒		INGV: ☐

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Agostino, Municipality of Terre del Reno (FE) – “S.Agost_11”

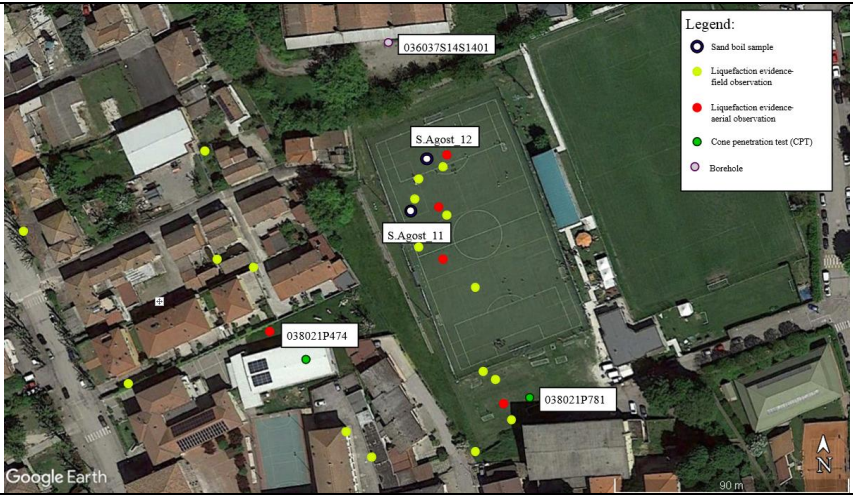
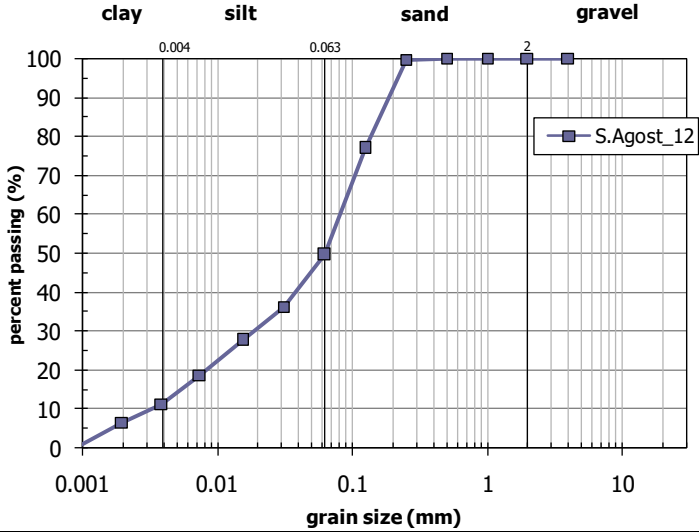
Site:	S. Agostino, Municipality of Terre del Reno (FE)	
Location map:		
Sand boil sample:	S.Agost_11	
Coordinates (WGS 84):	Latitude: 44°47'37.86"N	Longitude: 11°23'14.46"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
		---
Date of sampling:	24/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 38	Dip: 0
	4 brown sand boils in a row. Preexisting fracture possibly reactivated in the northern portion of the soccer field	
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material	

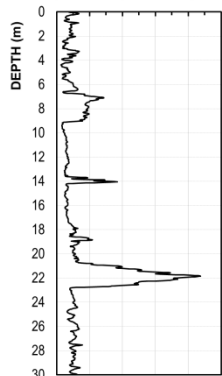
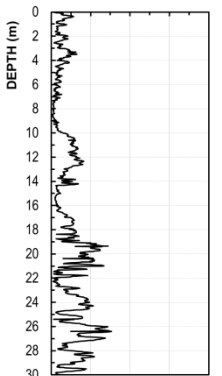
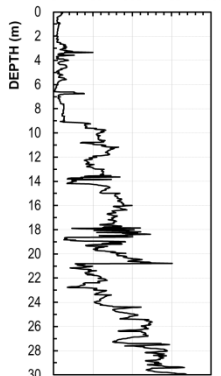
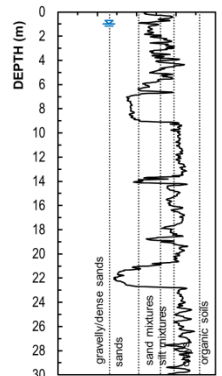
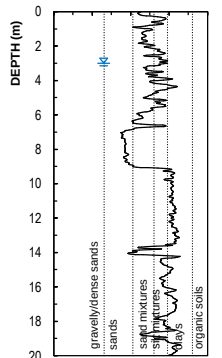
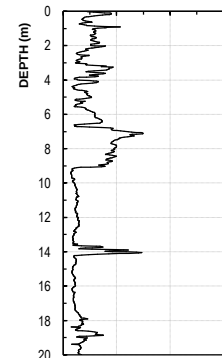
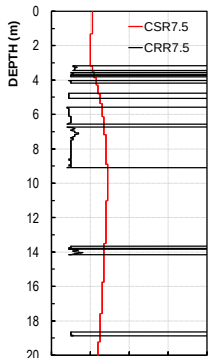
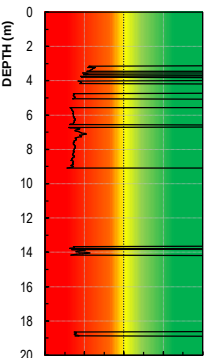
Grain size distribution curve:	clay silt sand gravel 			
Soil classification (USCS):	Silty Sand (SM)			
	FC = 26%	U = 16.82	C = 0.04	$\sigma = 3.02$
Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	CPTuA: 038021P781			
Coordinates (WGS 84):	Latitude: 44°47'35.70"N		Longitude: 11°23'16.51"E	
Date:	27/08/2014			
Address:	Via Statale			
Depth to GWT during in situ test (m):	1.00m			
In situ test results:	CONE RESISTANCE q_t (MPa)  SLEEVE FRICTION f_s (kPa)  PORE PRESSURE u_2 (kPa)  SOIL BEHAVIOR TYPE INDEX I_c 			
Liquefaction analysis:	EQ GWT = 3.00 m		$M_w = 6.1$	$a_{max} = 0.46g$

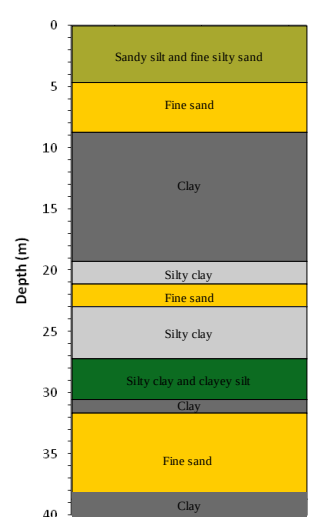
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c  NORMALIZED CONE RESISTANCE q_{c1N} (MPa)  CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$  LIQUEFACTION SAFETY FACTOR FS_{liq}  LPI = 18.43 LSN = 23.78 S = 0.20 m <tr><td>Note:</td><td colspan="3">Thickness of surface layer: 3.2 m (from 0 to 3.2 m) Thickness of liquefied layer: 5.9 m (from 3.2 to 9.1 m)</td></tr> <tr><td>Data from:</td><td colspan="2">RER: ☒</td><td>INGV: ☐</td></tr> <tr><td>In situ test:</td><td colspan="3">Borehole: 038021P452</td></tr> <tr><td>Coordinates (WGS 84):</td><td colspan="2">Latitude: 44°47'39.894"N</td><td>Longitude: 11°23' 14.064"E</td></tr> <tr><td>Data:</td><td colspan="3">02/07/2013</td></tr> <tr><td>Address:</td><td colspan="3">Viale Giuseppe Mazzini</td></tr> <tr><td>Graph:</td><td colspan="3"> Borehole log  </td></tr> <tr><td>Note:</td><td colspan="3">---</td></tr> <tr><td>Data from:</td><td colspan="2">RER: ☒</td><td>INGV: ☐</td></tr>			Note:	Thickness of surface layer: 3.2 m (from 0 to 3.2 m) Thickness of liquefied layer: 5.9 m (from 3.2 to 9.1 m)			Data from:	RER: ☒		INGV: ☐	In situ test:	Borehole: 038021P452			Coordinates (WGS 84):	Latitude: 44°47'39.894"N		Longitude: 11°23' 14.064"E	Data:	02/07/2013			Address:	Viale Giuseppe Mazzini			Graph:	Borehole log 			Note:	---			Data from:	RER: ☒		INGV: ☐
Note:	Thickness of surface layer: 3.2 m (from 0 to 3.2 m) Thickness of liquefied layer: 5.9 m (from 3.2 to 9.1 m)																																						
Data from:	RER: ☒		INGV: ☐																																				
In situ test:	Borehole: 038021P452																																						
Coordinates (WGS 84):	Latitude: 44°47'39.894"N		Longitude: 11°23' 14.064"E																																				
Data:	02/07/2013																																						
Address:	Viale Giuseppe Mazzini																																						
Graph:	Borehole log 																																						
Note:	---																																						
Data from:	RER: ☒		INGV: ☐																																				

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Agostino, Municipality of Terre del Reno (FE) – “S.Agost_12”

Site:	S. Agostino, Municipality of Terre del Reno (FE)	
Location map:		
Sand boil sample:	S.Agost_12	
Coordinates (WGS 84):	Latitude: 44°47'38.54"N	Longitude: 11°23'14.75"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
		---
Date of sampling:	24/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 68°	Dip: 0°
	Grey sand upwelling in the northern portion of the soccer field	
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		
Soil classification (USCS):	Sandy Silt (ML)	

	FC = 56%	U = 22.86	C = 1.29	$\sigma = 4.71$
Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	CPTuA: 038021P781			
Coordinates (WGS 84):	Latitude: 44°47'35.70"N		Longitude: 11°23'16.51"E	
Date:	27/08/2014			
Address:	Via Statale			
Depth to GWT during in situ test:	1.00m			
In situ test results:	CONE RESISTANCE q_t (MPa)  SLEEVE FRICTION f_s (kPa)  PORE PRESSURE u_2 (kPa)  SOIL BEHAVIOR TYPE INDEX I_c 			
Liquefaction analysis:	EQ GWT = 3.00 m		$M_w = 6.1$	$a_{max} = 0.46g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c  NORMALIZED CONE RESISTANCE q_{c1N} (MPa)  CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$  LIQUEFACTION SAFETY FACTOR FS_{liq} 			
	LPI = 18.43		LSN = 23.78	S = 0.20 m
Note:	Thickness of surface layer: 3.2 m (from 0 to 3.2 m) Thickness of liquefied layer: 5.9 m (from 3.2 to 9.1 m)			
Data from:	RER: ☒		INGV: ☐	
In situ test:	Borehole: 038021P452			
Coordinates (WGS 84):	Latitude: 44° 47' 39.894"N		Longitude: 11° 23' 14.064"E	
Data:	02/07/2013			
Address:	Viale Giuseppe Mazzini			

Graph:	Borehole log 	
Note:	---	
Data from:	RER: ☒	INGV: ☐

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Carlo, Municipality of Terre del Reno (FE) – “San Carlo M_5”

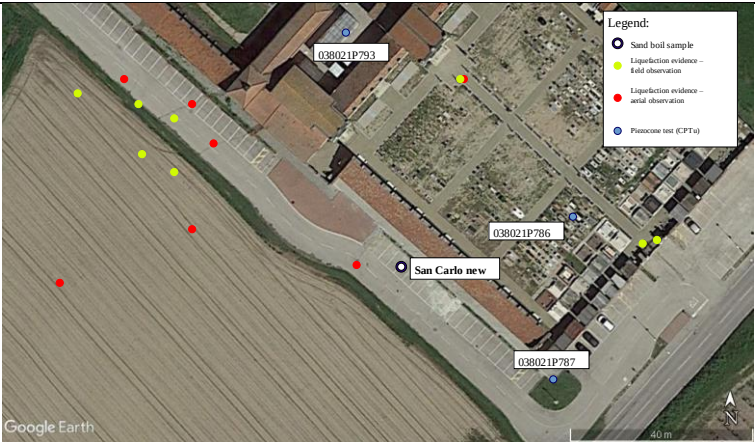
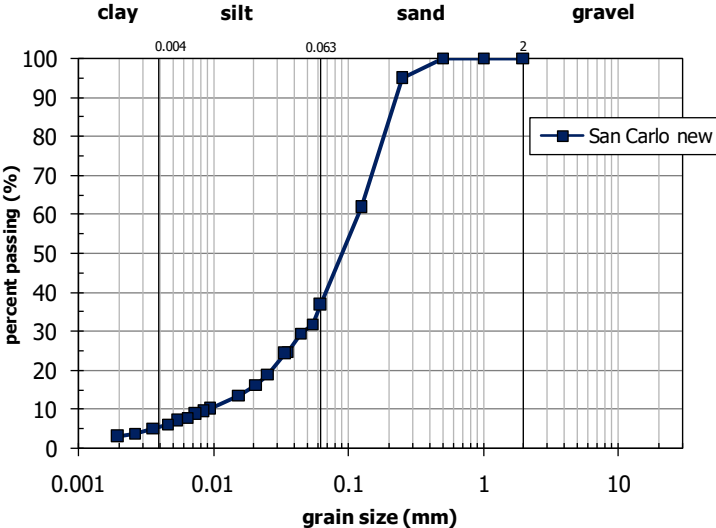
Site:	S. Carlo, Municipality of Terre del Reno (FE)		
Location map:			
Sand boil sample:	San Carlo M_5		
Coordinates (WGS 84):	Latitude: 44°47'57.16"N		Longitude: 11°24'7.20"E
Sand boil image from:	Aerial photography: ☒		Field observations: ☐

Date of sampling:	24/05/2012		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒		May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 35°		Dip: 0°
	Fractures with grey sand, length ≥ 200 m. Sand thickness ≤ 2 m. Deformation band (width ≥ 30 m) perpendicular to the main fractures		
Liquefaction-induced land damage category:	6 ■ Several lateral spreading; ejected material often observed		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 37%	U = 35.6	$\sigma = 4.569$

Compositional information:	---	
Paleoriver assignment:	Reno	
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

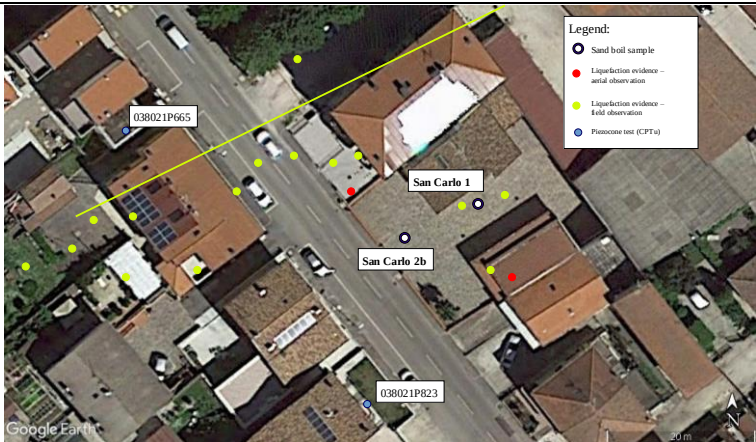
S. Carlo, Municipality of Terre del Reno (FE) – “San Carlo new”

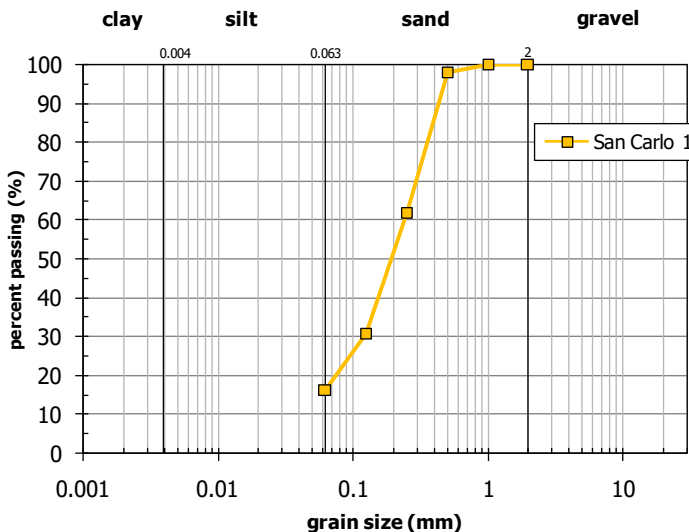
Site:	S. Carlo, Municipality of Terre del Reno (FE)	
Location map:		
Sand boil sample:	San Carlo new	
Coordinates (WGS 84):	Latitude: 44°47'47.87"N	Longitude: 11°23'59.48"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☒
		
Date of sampling:	---	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 20°	Dip: 0°
	Fracture in the cemetery's wall continuing to the SW on the asphalt (length 15 m) and ending in the adjacent field	
Liquefaction-induced land damage category:	6 ■ Several lateral spreading; ejected material often observed	
Grain size distribution curve:		
Soil classification (USCS):	Silty Sand (SM)	

	FC = 43%	U = 13.33	C = 1.88	$\sigma = ---$
Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	CPTuA: 038021P786			
Coordinates (WGS 84):	Latitude: 44°47'48.25"N		Longitude: 11°24'1.28"E	
Date:	25/09/2014			
Address:	Via Statale			
Depth to GWT during in situ test (m):	1.00m			
In situ test results:	CONE RESISTANCE q_t (MPa) 048121620 024681012141618202224262830 DEPTH (m) SLEEVE FRICTION f_s (kPa) 0100200300400 024681012141618202224262830 DEPTH (m) PORE PRESSURE u₂ (kPa) 0250500750 024681012141618202224262830 DEPTH (m) SOIL BEHAVIOR TYPE INDEX I_c 01234 024681012141618202224262830 DEPTH (m) gravelly/dense sands sands sand mixtures silt mixtures organic soils			
Data from:	RER: ☒		INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Carlo, Municipality of Terre del Reno (FE) – “San Carlo 1”

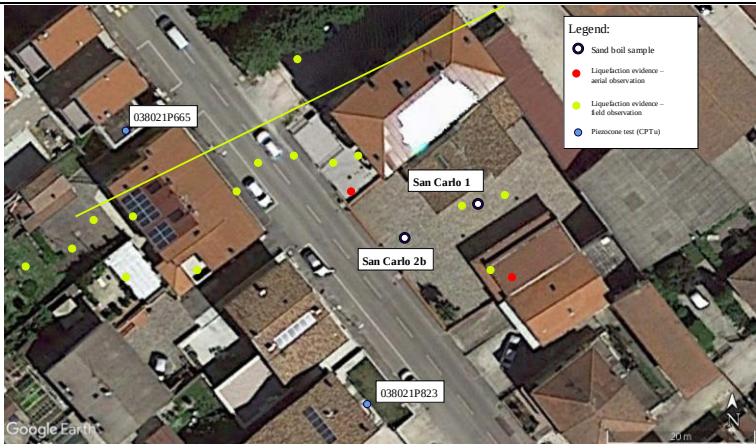
Site:	S. Carlo, Municipality of Terre del Reno (FE)		
Location map:			
Sand boil sample:	San Carlo 1		
Coordinates (WGS 84):	Latitude: 44°48'12.43"N		Longitude: 11°24'33.43"E
Sand boil image from:	Aerial photography: ☒		Field observations: ☐
			---
Date of sampling:	26/05/2012		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒		May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: ---		Dip: ---

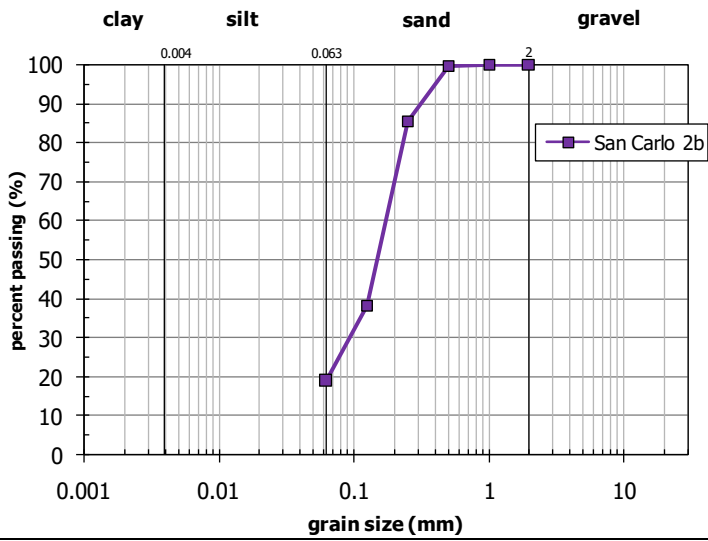
Liquefaction-induced land damage category:	5 ■ Moderate to major lateral spreading; ejected material often observed		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 20%	U = ---	$\sigma = 1.793$
Compositional information:	---		

Paleoriver assignment:	Reno	
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	CPTuA: 038021P823	
Coordinates (WGS 84):	Latitude: 44°48'11.54"N	Longitude: 11°24'32.76"E
Date:	18/05/2015	
Address:	Via Risorgimento	
Depth to GWT during in situ test:	1.00 m	
In situ test results:		
Data from:	RER: ☒	INGV: ☐
In situ test:	CPTuB: 038021P665	
Coordinates (WGS 84):	Latitude: 44°48'12.75"N	Longitude: 11°24'31.22"E
Date:	13/02/2014	
Address:	Via Risorgimento	
Depth to GWT during in situ test:	1.00 m	
In situ test results:		
Data from:	RER: ☒	INGV: ☐

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Carlo, Municipality of Terre del Reno (FE) – “San Carlo 2b”

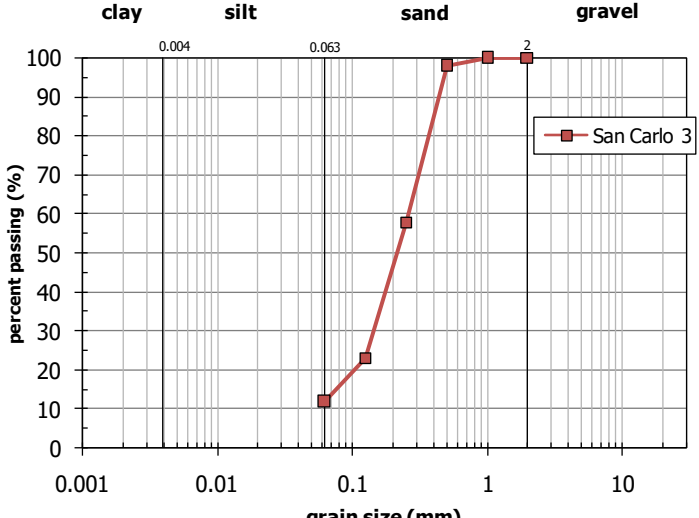
Site:	S. Carlo, Municipality of Terre del Reno (FE)		
Location map:			
Sand boil sample:	San Carlo 2b		
Coordinates (WGS 84):	Latitude: 44°48'12.26"N		Longitude: 11°24'32.94"E
Sand boil image from:	Aerial photography: ☒		Field observations: ☐
			---
Date of sampling:	26/05/2012		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒		May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: ---		Dip: ---

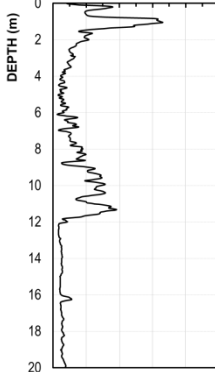
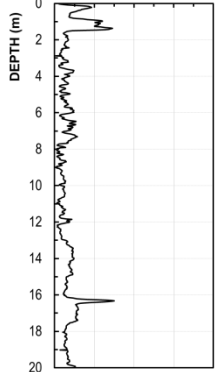
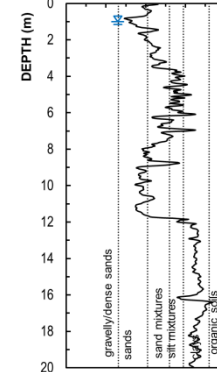
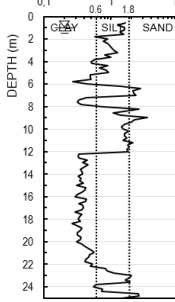
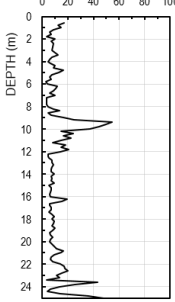
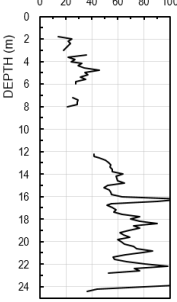
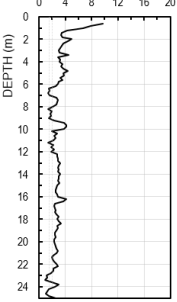
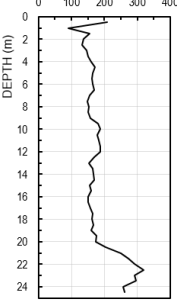
Liquefaction-induced land damage category:	5 ■ Moderate to major lateral spreading; ejected material often observed		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 24%	U = ---	C = --- $\sigma = 1.666$
Compositional information:	---		

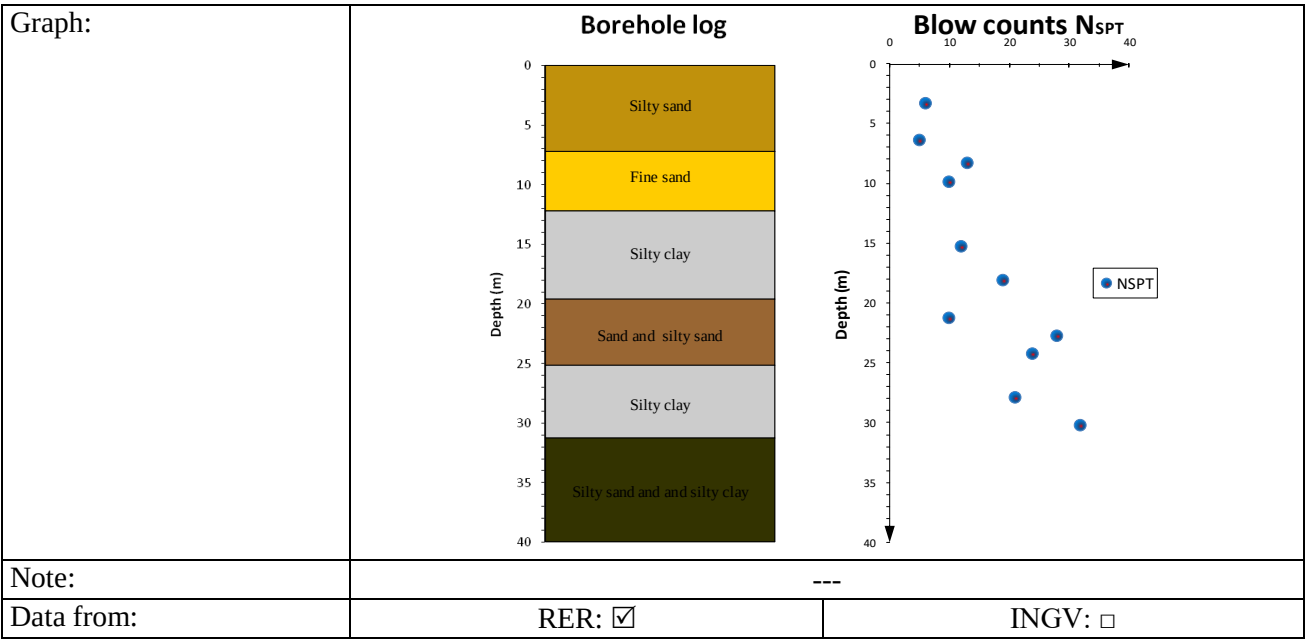
Paleoriver assignment:	Reno		
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒	
Data from:	INGV: ☐	UNIMORE: ☒	
In situ test:	CPTuA: 038021P823		
Coordinates (WGS 84):	Latitude: 44°48'11.54"N	Longitude: 11°24'32.76"E	
Date:	18/05/2015		
Address:	Via Risorgimento		
Depth to GWT during in situ test:	1.00 m		
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c		
Data from:	RER: ☒	INGV: ☐	
In situ test:	CPTuB: 038021P665		
Coordinates (WGS 84):	Latitude: 44°48'12.75"N	Longitude: 11°24'31.22"E	
Date:	13/02/2014		
Address:	Via Risorgimento		
Depth to GWT during in situ test:	1.00 m		
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c		
Data from:	RER: ☒	INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Carlo, Municipality of Terre del Reno (FE) – “San Carlo 3”

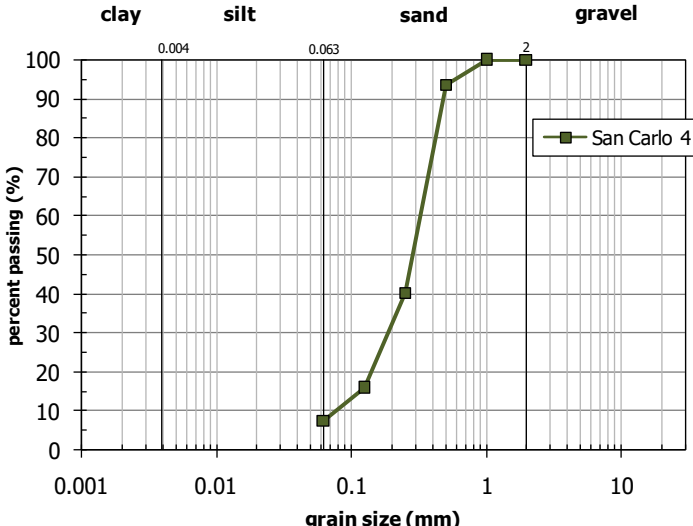
Site:	S. Carlo, Municipality of Terre del Reno (FE)		
Location map:			
Sand boil sample:	San Carlo 3		
Coordinates (WGS 84):	Latitude: 44°48'12.65"N	Longitude: 11°24'25.52"E	
Sand boil image from:	Aerial photography: ☒	Field observations: ☐	
	 ---		
Date of sampling:	26/05/2012		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐	
Liquefaction features:	Strike: 60°	Dip: 0°	
	Fracture with liquefaction, length 65 m, toward Via De Gasperi		
Liquefaction-induced land damage category:	5 Moderate to major lateral spreading; ejected material often observed		
Grain size distribution curve:			

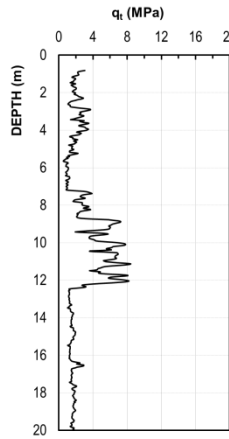
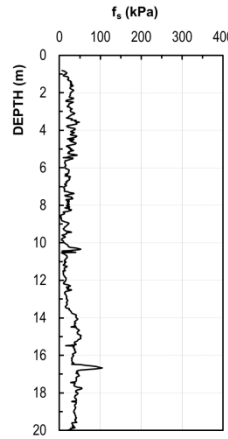
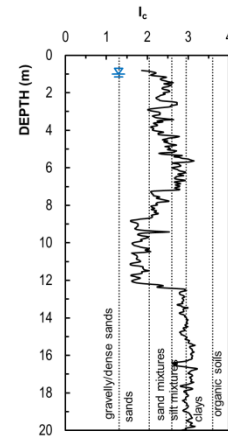
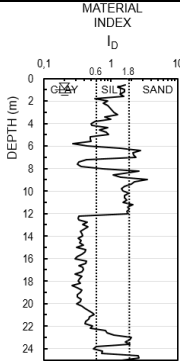
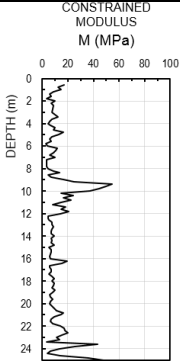
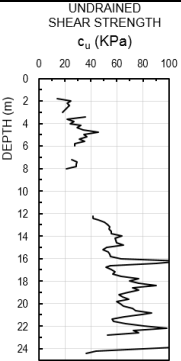
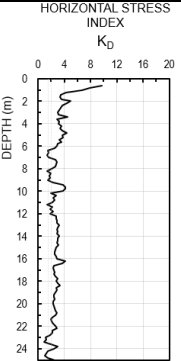
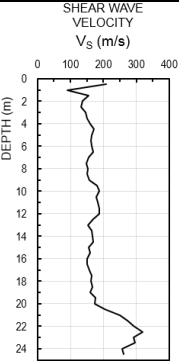
Soil classification (USCS):	Silty Sand (SM)				
	FC = 14%	U = ---	C = ---	σ= 1.728	
Compositional information:	---				
Paleoriver assignment:	Reno				
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒		
Data from:	INGV: ☐		UNIMORE: ☒		
In situ test:	CPTuA: 038021P192				
Coordinates (WGS 84):	Latitude: 44°48'12.88"N		Longitude: 11°24'25.96"E		
Date:	26/05/2012				
Address:	Via Gramsci				
Depth to GWT during in situ test:	1.00m				
In situ test results:	CONE RESISTANCE q_t (MPa)  SLEEVE FRICTION f_s (kPa)  SOIL BEHAVIOR TYPE INDEX I_c 				
Data from:	RER: ☒		INGV: ☐		
In situ test:	DMTa: 038021P764				
Coordinates (WGS 84):	Latitude: 44°48'11.19"N		Longitude: 11°24'28.57"E		
Date:	28/02/2013				
Address:	Via Morandi				
Depth to GWT during in situ test:	1.00m				
In situ test results:	MATERIAL INDEX I_D  CONSTRAINED MODULUS M (MPa)  UNDRAINED SHEAR STRENGTH c_u (KPa)  HORIZONTAL STRESS INDEX K_D  SHEAR WAVE VELOCITY V_s (m/s) 				
Data from:	RER: ☒		INGV: ☐		
In situ test:	Borehole: 038021P161				
Coordinates (WGS 84):	Latitude: 44° 48' 12.996"N		Longitude: 11° 24' 25.919"E		
Data:	21/06/2012				
Address:	Via Gramsci				



M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Carlo, Municipality of Terre del Reno (FE) – “San Carlo 4”

Site:	S. Carlo, Municipality of Terre del Reno (FE)		
Location map:			
Sand boil sample:	San Carlo 4		
Coordinates (WGS 84):	Latitude: 44°48'10.01"N	Longitude: 11°24'27.20"E	
Sand boil image from:	Aerial photography: ☒	Field observations: ☐	
		---	
Date of sampling:	26/05/2012		
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒	May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 60°	Dip: 0°	
	Fracture, length 9 m		
Liquefaction-induced land damage category:	5  Moderate to major lateral spreading; ejected material often observed		
Grain size distribution curve:			

Soil classification (USCS):	Poorly graded sand with silt (SP-SM)				
	FC = 9%	U = 4.00	C = 1.41	$\sigma = 1.746$	
Compositional information:	---				
Paleoriver assignment:	Reno				
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒		
Data from:	INGV: ☐		UNIMORE: ☒		
In situ test:	CPTuA: 038021P689				
Coordinates (WGS 84):	Latitude: 44°48'10.98"N		Longitude: 11°24'24.98"E		
Date:	19/07/2013				
Address:	Via De Gasperi				
Depth to GWT during in situ test:	1.00m				
In situ test results:	CONE RESISTANCE q_t (MPa)  SLEEVE FRICTION f_s (kPa)  SOIL BEHAVIOR TYPE INDEX I_c 				
Data from:	RER: ☒		INGV: ☐		
In situ test:	DMTa: 038021P764				
Coordinates (WGS 84):	Latitude: 44°48'11.19"N		Longitude: 11°24'28.57"E		
Date:	28/02/2013				
Address:	Via Morandi				
Depth to GWT during in situ test:	1.00m				
In situ test results:	MATERIAL INDEX I_D  CONSTRAINED MODULUS M (MPa)  UNDRAINED SHEAR STRENGTH c_u (kPa)  HORIZONTAL STRESS INDEX K_D  SHEAR WAVE VELOCITY V_s (m/s) 				
Data from:	RER: ☒		INGV: ☐		

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Carlo, Municipality of Terre del Reno (FE) – “San Carlo 5”

Site:	S. Carlo, Municipality of Terre del Reno (FE)			
Location map:				
Sand boil sample:	San Carlo 5			
Coordinates (WGS 84):	Latitude: 44°48'6.51"N		Longitude: 11°24'27.45"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☐	

Date of sampling:	26/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: ---		Dip: ---	

Liquefaction-induced land damage category:	5 Moderate to major lateral spreading; ejected material often observed			
Grain size distribution curve:				
Soil classification (USCS):	Sandy Silt (ML)			
	FC = 54%	U = 5.33	C = 1.33	σ = 2.068
Compositional information:	---			

Paleoriver assignment:	Reno	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Carlo, Municipality of Terre del Reno (FE) – “San Carlo 6”

Site:	S. Carlo, Municipality of Terre del Reno (FE)			
Location map:				
Sand boil sample:	San Carlo 6			
Coordinates (WGS 84):	Latitude: 44°48'4.86"N		Longitude: 11°24'24.67"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☐	

Date of sampling:	26/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: ---		Dip: ---	

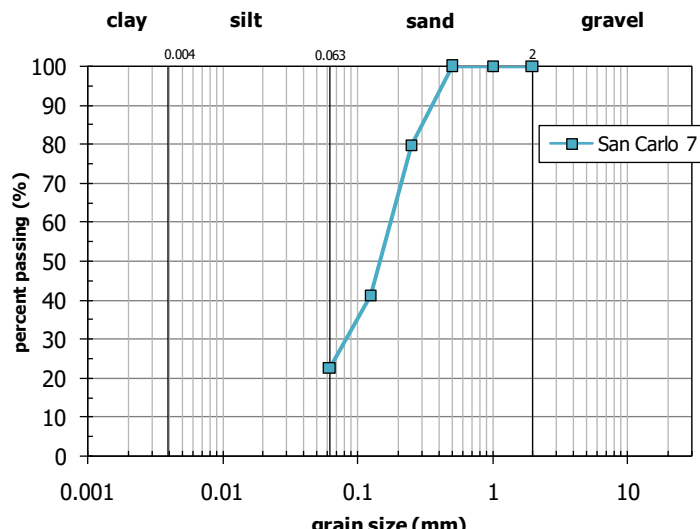
Liquefaction-induced land damage category:	5 Moderate to major lateral spreading; ejected material often observed			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 45%	U = 10.56	C = 2.92	σ = 2.666
Compositional information:	---			

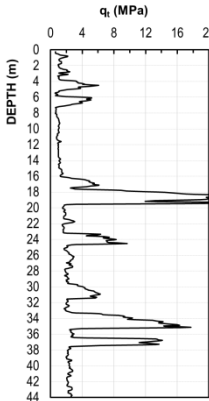
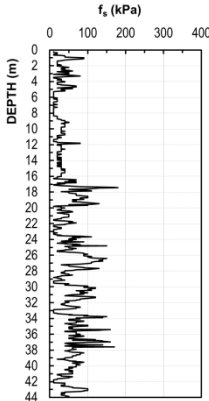
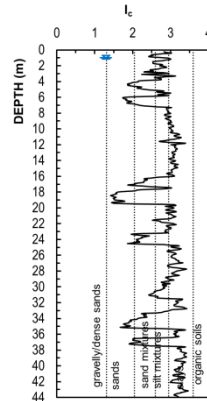
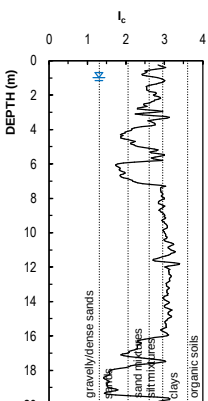
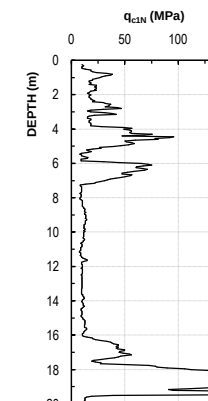
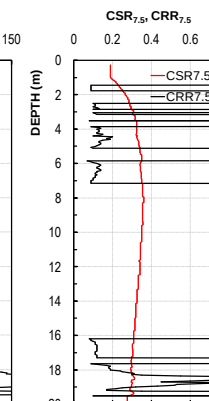
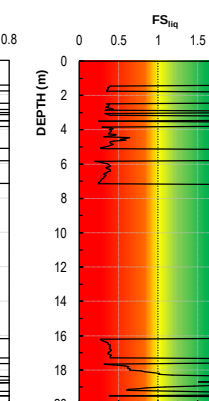
Paleoriver assignment:	Reno	
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐
Data from:	INGV: ☐	UNIMORE: ☒
In situ test:	---	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Carlo, Municipality of Terre del Reno (FE) – “San Carlo 7”

Site:	S. Carlo, Municipality of Terre del Reno (FE)			
Location map:				
Sand boil sample:	San Carlo 7			
Coordinates (WGS 84):	Latitude: 44°48'2.16"N		Longitude: 11°24'20.81"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☐	
			---	
Date of sampling:	26/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: ---		Dip: ---	

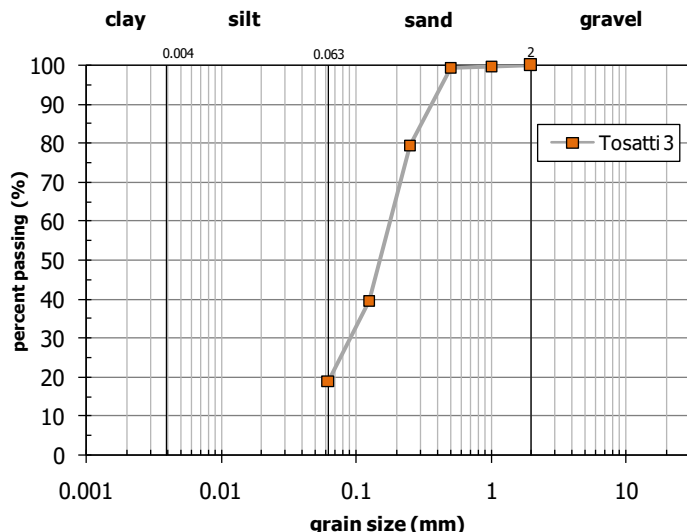
Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 28%	U = ---	C = ---	σ = 1.768
Compositional information:	---			

Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐		
Data from:	INGV: ☐	UNIMORE: ☒		
In situ test:	CPTuA: 038021P112			
Coordinates (WGS 84):	Latitude: 44°47'59.49"N	Longitude: 11°24'16.19"E		
Date:	31/10/1996			
Address:	Via Statale			
Depth to GWT during in situ test:	1.00 m			
In situ test results:	CONE RESISTANCE q_c (MPa)  SLEEVE FRICTION f_s (kPa)  SOIL BEHAVIOR TYPE INDEX I_c 			
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 6.1$	$a_{max} = 0.46g$	
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c 	NORMALIZED CONE RESISTANCE q_{c1N} (MPa) 	CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ 	LIQUEFACTION SAFETY FACTOR FS_{liq} 
	LPI = 18.88	LSN = 30.49	S = 0.27 m	
Note:	Thickness of surface layer: 1.5 m (from 0 to 1.5 m) Thickness of liquefied layer: 5.7 m (from 1.5 to 7.2 m)			
Data from:	RER: ☒		INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Carlo, Municipality of Terre del Reno (FE) – “Tosatti 3”

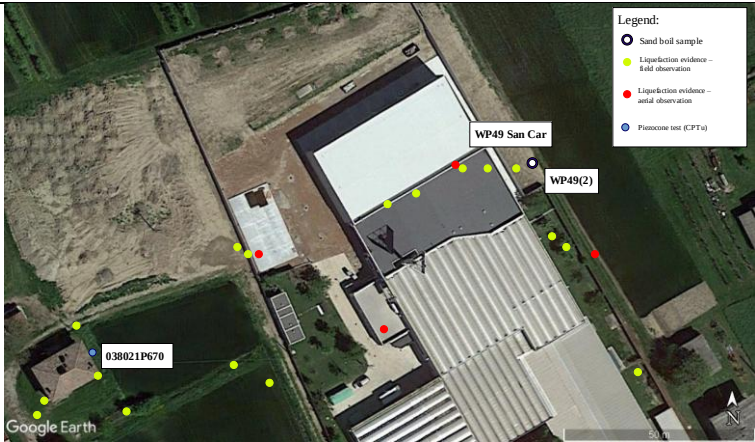
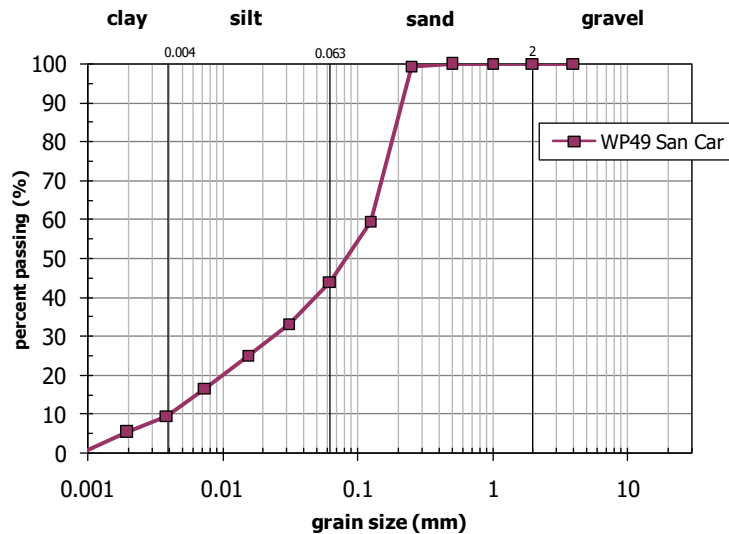
Site:	S. Carlo, Municipality of Terre del Reno (FE)			
Location map:				
Sand boil sample:	Tosatti 3			
Coordinates (WGS 84):	Latitude: 44°48'31.00"N		Longitude: 11°24'47.00"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	---			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: ---		Dip: ---	

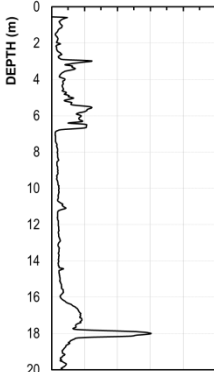
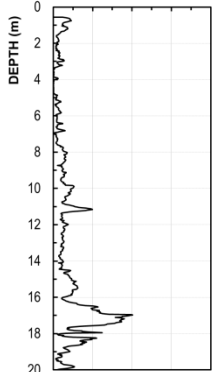
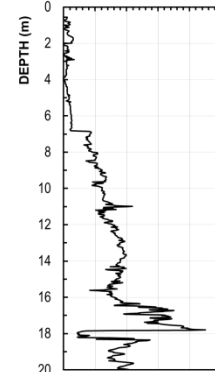
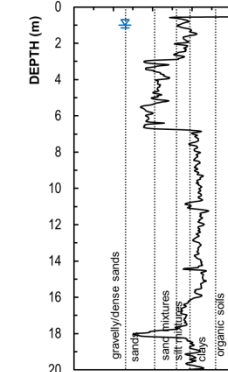
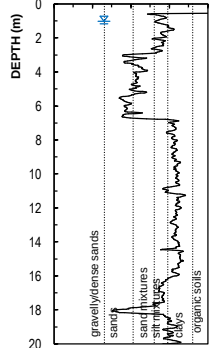
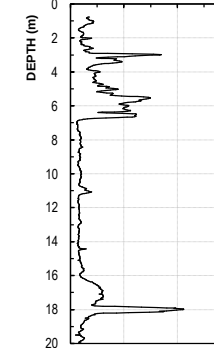
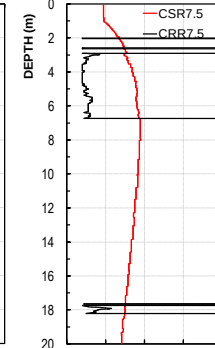
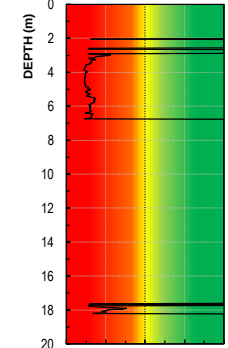
Liquefaction-induced land damage category:	3  No lateral spreading but minor to moderate quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 23%	U = ---	C = ---	σ = 1.781
Compositional information:	---			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	---			

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical

settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

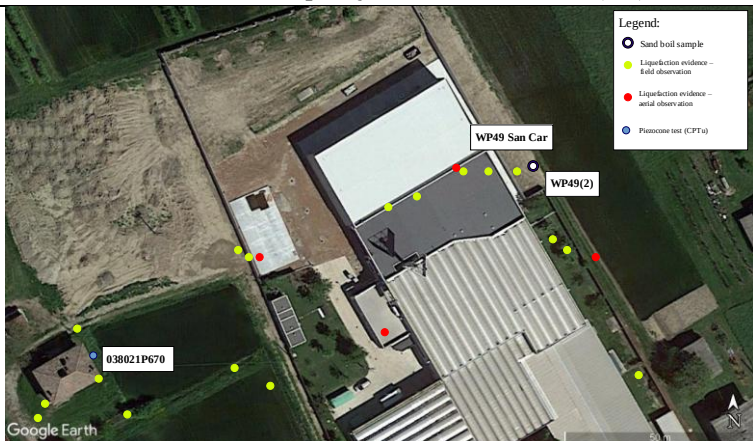
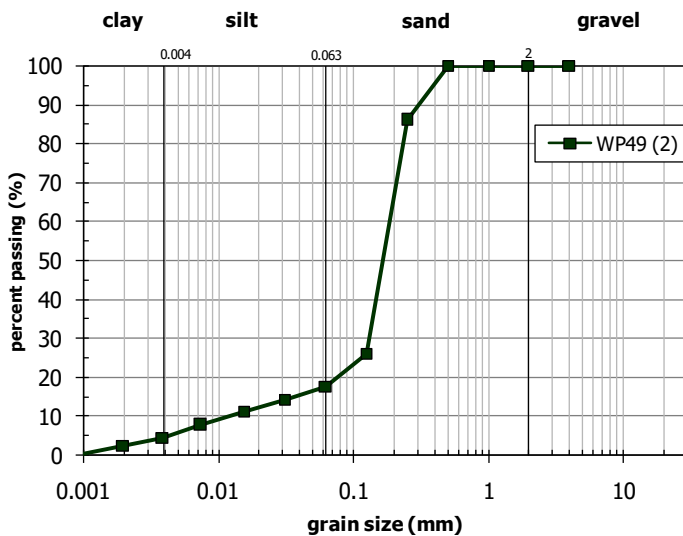
S. Carlo, Municipality of Terre del Reno (FE) – “WP49 San Car”

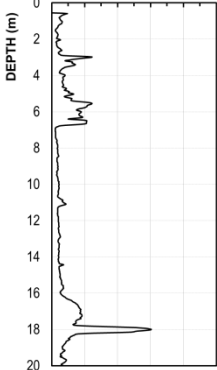
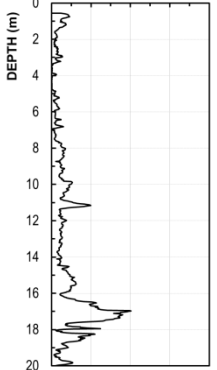
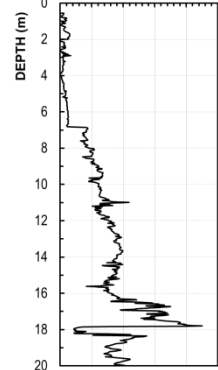
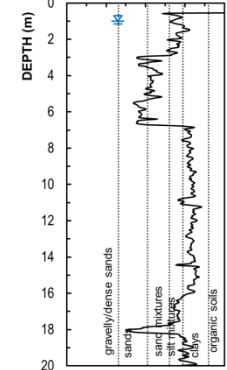
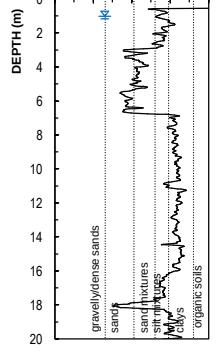
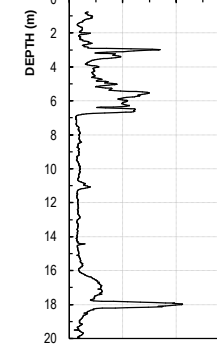
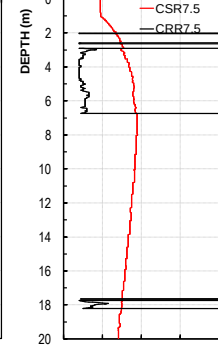
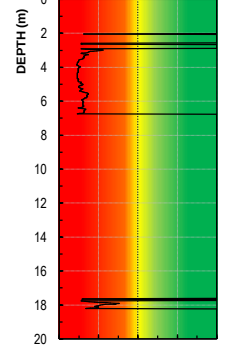
Site:	S. Carlo, Municipality of Terre del Reno (FE)			
Location map:				
Sand boil sample:	WP49 San Car			
Coordinates (WGS 84):	Latitude: 44°48'16.56"N		Longitude:11°25'5.95"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☒	
				
Date of sampling:	24/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 55°		Dip: 0°	
	Fracture with sand, length 50 m			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 48%	U = 32.5	C = 1.20	σ = 4.70
Compositional information:	---			

Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐		
Data from:	INGV: ☒	UNIMORE: ☐		
In situ test:	CPTuA: 038021P670			
Coordinates (WGS 84):	Latitude: 44°48'14.99"N	Longitude: 11°25'0.61"E		
Date:	18/06/2014			
Address:	Via Statale			
Depth to GWT during in situ test:	1.00m			
In situ test results:	CONE RESISTANCE q_t (MPa)  SLEEVE FRICTION f_s (kPa)  PORE PRESSURE u_2 (kPa)  SOIL BEHAVIOR TYPE INDEX I_c 			
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 6.1$	$a_{max} = 0.46g$	
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c 	NORMALIZED CONE RESISTANCE q_{c1N} (MPa) 	CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$ 	LIQUEFACTION SAFETY FACTOR FS_{liq} 
	LPI = 21.82	LSN = 30.49	S = 0.14 m	
Note:	Thickness of surface layer: 2.9 m (from 0 to 2.9 m) Thickness of liquefied layer: 3.8 m (from 2.9 to 6.7 m)			
Data from:	RER: ☒	INGV: ☐		

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Carlo, Municipality of Terre del Reno (FE) – “WP49(2)”, località “S.Carlo”

Site:	S. Carlo, Municipality of Terre del Reno (FE)			
Location map:				
Sand boil sample:	WP49(2)			
Coordinates (WGS 84):	Latitude: 44°48'16.56"N		Longitude: 11°25'5.95"E	
Sand boil image from:	Aerial photography: ☒		Field observations: ☒	
				
Date of sampling:	24/05/2012			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 55°		Dip: 0°	
	Fracture with liquefaction, length 50 m			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 20%	U = 15.83	C = 8.60	σ = 3.019
Compositional information:	---			

Paleoriver assignment:	Reno		
Morphological features:	Flat interfluvial depression: ☒	Fluvial ridge: ☐	
Data from:	INGV: ☒	UNIMORE: ☐	
In situ test:	CPTuA: 038021P670		
Coordinates (WGS 84):	Latitude: 44°48'14.99"N	Longitude: 11°25'0.61"E	
Date:	18/06/2014		
Address:	Via Statale		
Depth to GWT during in situ test:	1.00m		
In situ test results:	CONE RESISTANCE q_t (MPa)  SLEEVE FRICTION f_s (kPa)  PORE PRESSURE u_2 (kPa)  SOIL BEHAVIOR TYPE INDEX I_c 		
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 6.1$	$a_{max} = 0.46g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c  NORMALIZED CONE RESISTANCE q_{c1N} (MPa)  CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$, $CRR_{7.5}$  LIQUEFACTION SAFETY FACTOR FS_{liq} 		
	LPI = 21.82	LSN = 30.49	S = 0.14 m
Note:	Thickness of surface layer: 2.9 m (from 0 to 2.9 m) Thickness of liquefied layer: 3.8 m (from 2.9 to 6.7 m)		
Data from:	RER: ☒	INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

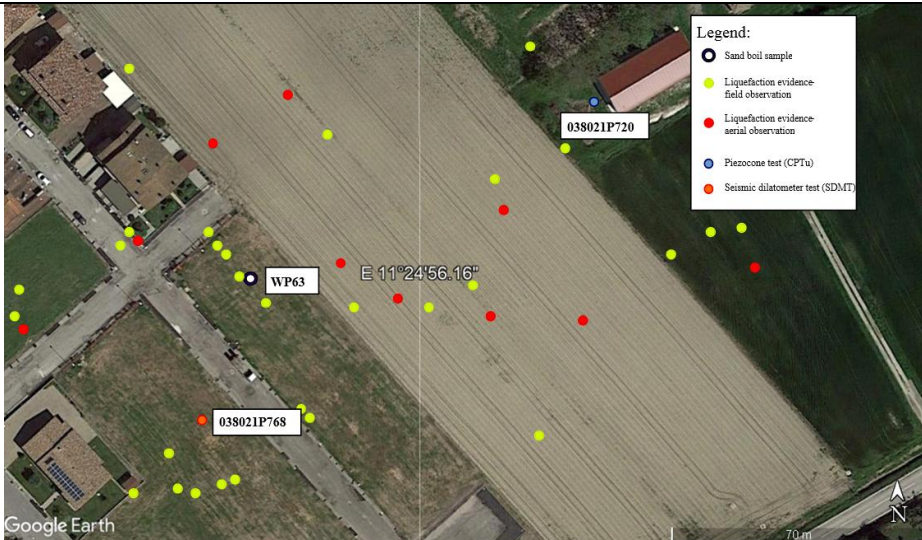
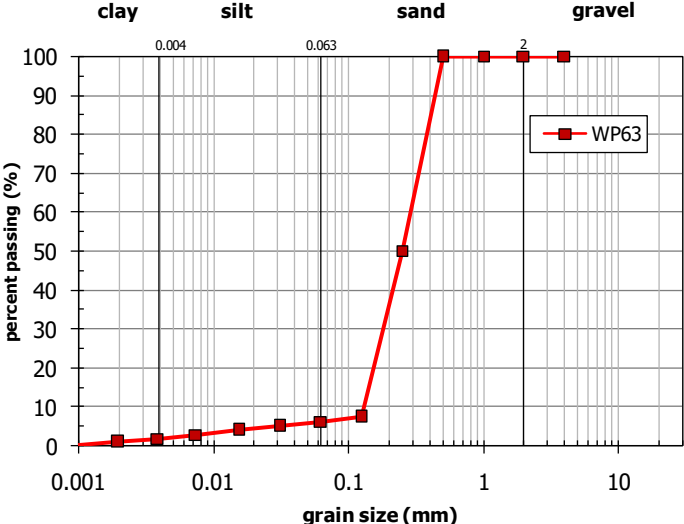
S. Carlo, Municipality of Terre del Reno (FE) – “WP57”

Site:	S. Carlo, Municipality of Terre del Reno (FE)	
Location map:		
Sand boil sample:	WP57	
Coordinates (WGS 84):	Latitude: 44°48'21.60"N	Longitude: 11°24'58.03"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☒
Date of sampling:	24/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 110°	Dip: 0°
	Fracture with sand, length 40 m	
Liquefaction-induced land damage category:	6 Several lateral spreading; ejected material often observed	

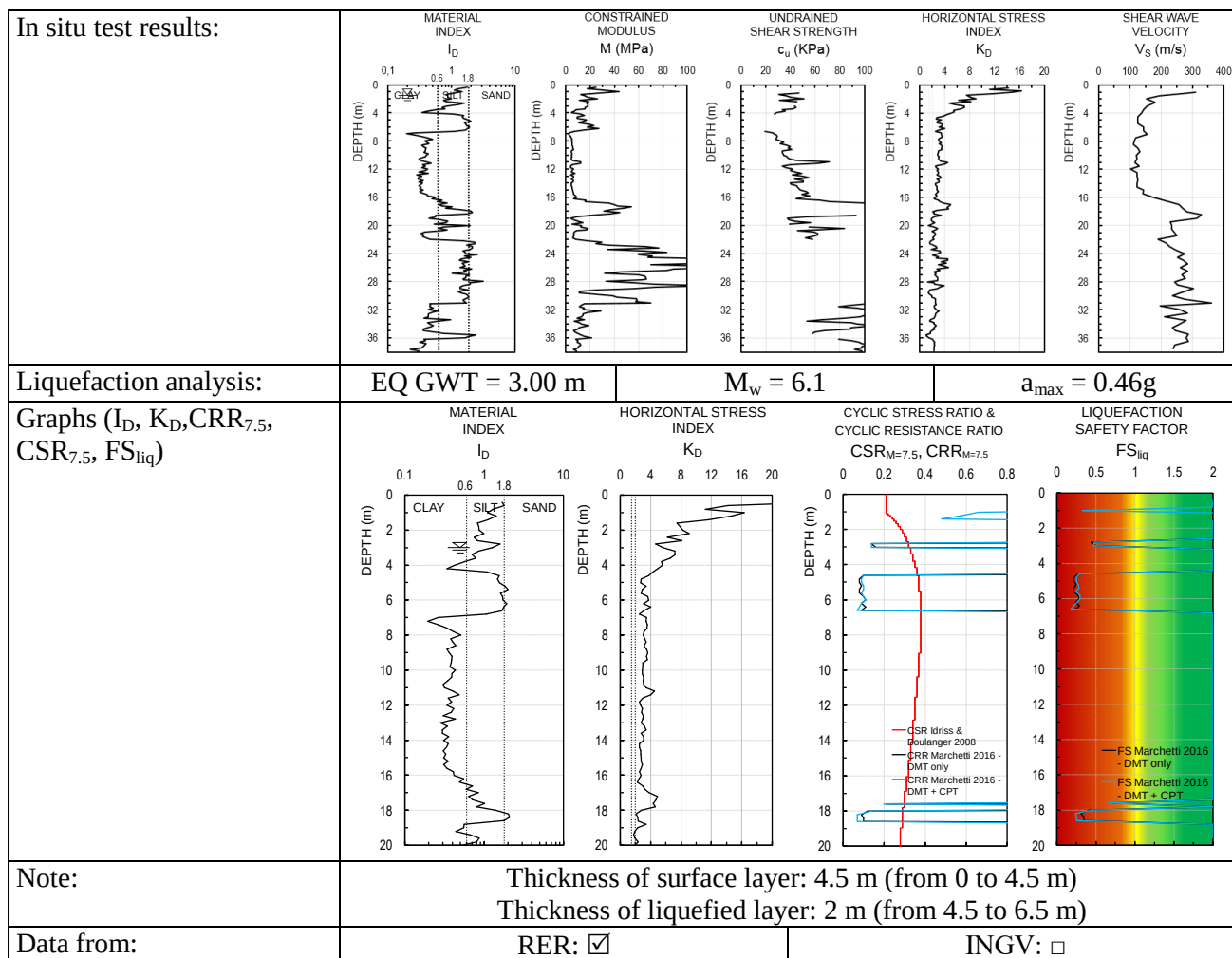
Grain size distribution curve:	clay silt sand gravel percent passing (%) grain size (mm) WP57			
Soil classification (USCS):	Silty Sand (SM)			
	FC = 29%	U = 22.67	C = 4.89	$\sigma = 3.64$
Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	CPTuA: 038021P200			
Coordinates (WGS 84):	Latitude: 44°48'22.76"N		Longitude: 11°24'52.45"E	
Date:	28/05/2012			
Address:	Via Rossini			
Depth to GWT during in situ test:	1.00m			
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Data from:	RER: ☒		INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Carlo, Municipality of Terre del Reno (FE) – “WP63”

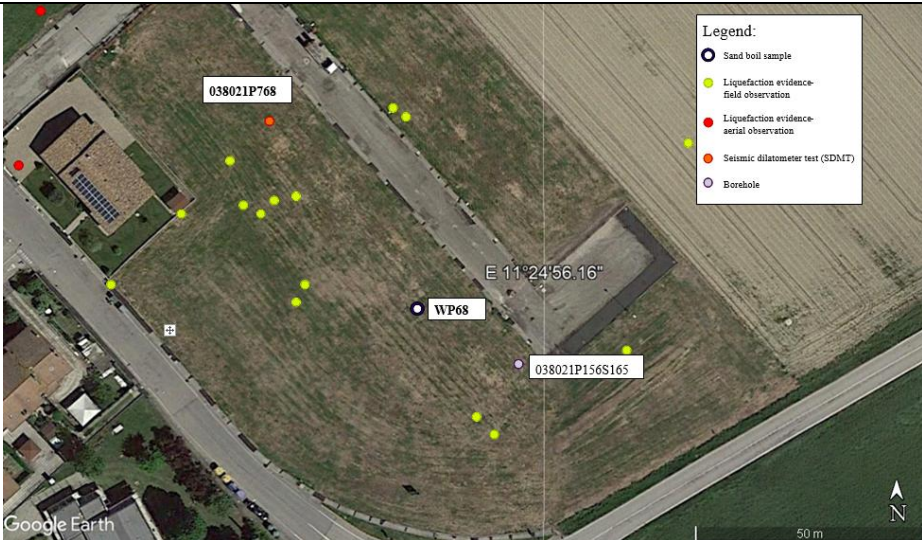
Site:	S. Carlo, Municipality of Terre del Reno (FE)	
Location map:		
Sand boil sample:	WP63	
Coordinates (WGS 84):	Latitude: 44°48'12.20"N	Longitude: 11°24'54.04"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☐
		
Date of sampling:	24/05/2012	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 0°	Dip: 0°
	Fracture, length 22 m	
Liquefaction-induced land damage category:	4 No lateral spreading but large quantities of ejected material	
Grain size distribution curve:		

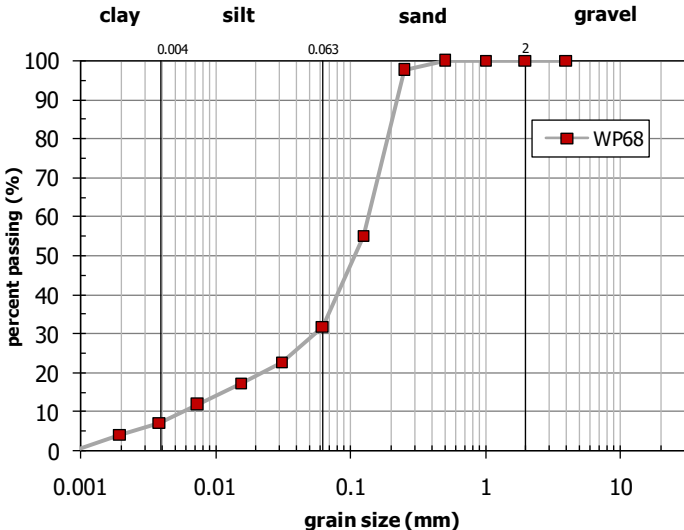
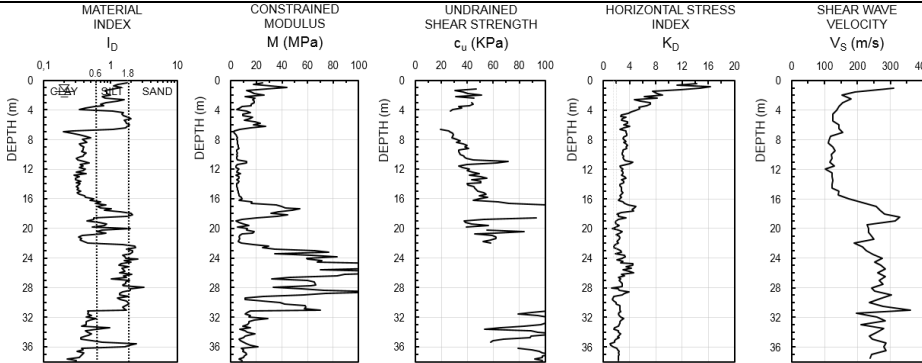
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)			
	FC = 6%	U = 2.30	C = 0.93	$\sigma = 1.94$
Compositional information:	---			
Paleoriver assignment:	Reno			
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐	
Data from:	INGV: ☒		UNIMORE: ☐	
In situ test:	CPTuA: 038021P720			
Coordinates (WGS 84):	Latitude: 44°48'13.76"N		Longitude: 11°24'58.37"E	
Date:	18/06/2014			
Address:	Via Statale			
Depth to GWT during in situ test:	1.00 m			
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u_2 (kPa) SOIL BEHAVIOR TYPE INDEX I_c			
Liquefaction analysis:	EQ GWT = 1.00 m	$M_w = 6.1$	$a_{max} = 0.46g$	
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})	SOIL BEHAVIOR TYPE INDEX I_c	NORMALIZED CONE RESISTANCE q_{c1N} (MPa)	CYCLIC STRESS RATIO & CYCLIC RESISTANCE RATIO $CSR_{7.5}$ $CRR_{7.5}$	LIQUEFACTION SAFETY FACTOR FS_{liq}
	LPI = 23.56	LSN = 42.39	S = 0.27 m	
Note:	Thickness of surface layer: 1 m (from 0 to 1 m) Thickness of liquefied layer: 5.3 m (from 1 to 6.3 m)			
Data from:	RER: ☒		INGV: ☐	
In situ test:	DMTa: 038021P768			
Coordinates (WGS 84):	Latitude: 44°48'10.97"N		Longitude: 11°24'53.42"E	
Date:	26/03/2013			
Address:	Via Dott. B. Lambertini			
Depth to GWT during in situ test:	1.00 m			



M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Carlo, Municipality of Terre del Reno (FE) – “WP68”

Site:	S. Carlo, Municipality of Terre del Reno (FE)	
Location map:		
Sand boil sample:	WP68	
Coordinates (WGS 84):	Latitude: 44°48'9.61"N	Longitude: 11°24'54.94"E
Sand boil image from:	Aerial photography: ☒	Field observations: ☒
		
Date of sampling:	---	
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒	May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 80°	Dip: 0°
	Fracture with sand liquefaction, length 22 m	
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material	

Grain size distribution curve:					
Soil classification (USCS):	Silty Sand (SM)				
	FC = 37%	U = 21.67	C = 3.88	$\sigma = 3.957$	
Compositional information:	---				
Paleoriver assignment:	Reno				
Morphological features:	Flat interfluvial depression: ☒		Fluvial ridge: ☐		
Data from:	INGV: ☒		UNIMORE: ☐		
In situ test:	DMTa: 038021P768				
Coordinates (WGS 84):	Latitude: 44°48'10.97"N		Longitude: 11°24'53.42"E		
Date:	26/03/2013				
Address:	Via Dott. B. Lambertini				
Depth to GWT during in situ test:	1.00 m				
In situ test results:					
Data from:	RER: ☒		INGV: ☐		
In situ test:	Borehole: 038021P156				
Coordinates (WGS 84):	Latitude: 44° 48' 9.288"N		Longitude: 11° 24' 55.872"E		
Data:	21/06/2012				
Address:	Via Statale				

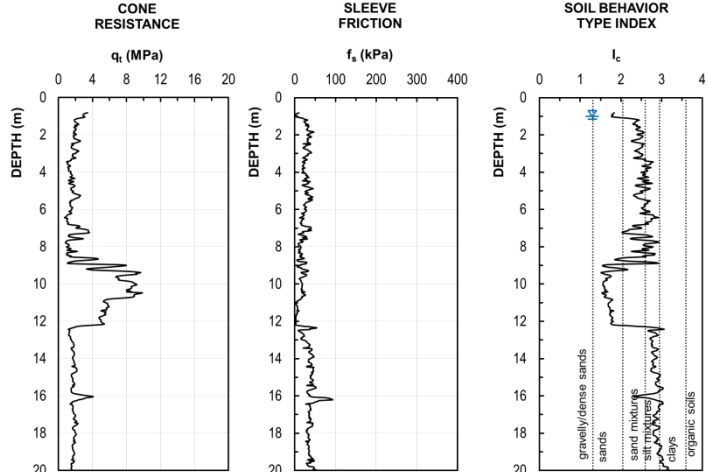
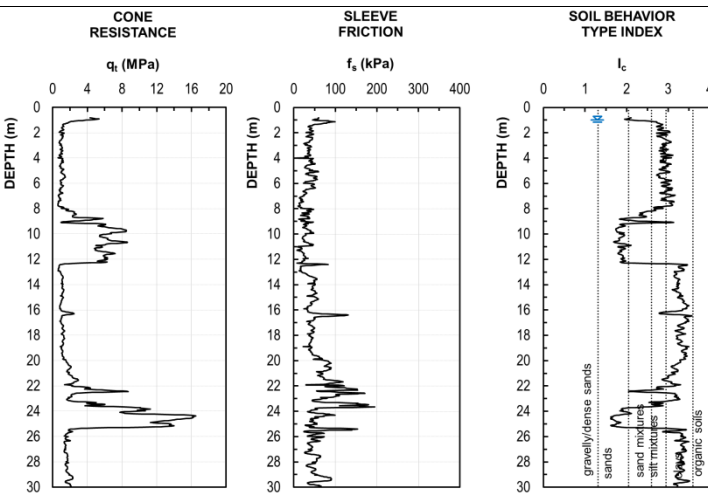
Graph:	Borehole log <table border="1"> <caption>Borehole Log Data</caption> <thead> <tr> <th>Depth (m)</th> <th>Soil Type</th> </tr> </thead> <tbody> <tr><td>0 - 1</td><td>Silty clay</td></tr> <tr><td>1 - 2</td><td>Sandy silt and silty sand</td></tr> <tr><td>2 - 4</td><td>Clayey silt and sandy silt</td></tr> <tr><td>4 - 6</td><td>Fine sand</td></tr> <tr><td>6 - 7</td><td>Sandy silt</td></tr> <tr><td>7 - 13</td><td>Silty clay</td></tr> </tbody> </table>		Depth (m)	Soil Type	0 - 1	Silty clay	1 - 2	Sandy silt and silty sand	2 - 4	Clayey silt and sandy silt	4 - 6	Fine sand	6 - 7	Sandy silt	7 - 13	Silty clay
Depth (m)	Soil Type															
0 - 1	Silty clay															
1 - 2	Sandy silt and silty sand															
2 - 4	Clayey silt and sandy silt															
4 - 6	Fine sand															
6 - 7	Sandy silt															
7 - 13	Silty clay															
Note:	---															
Data from:	RER: ☒	INGV: ☐														

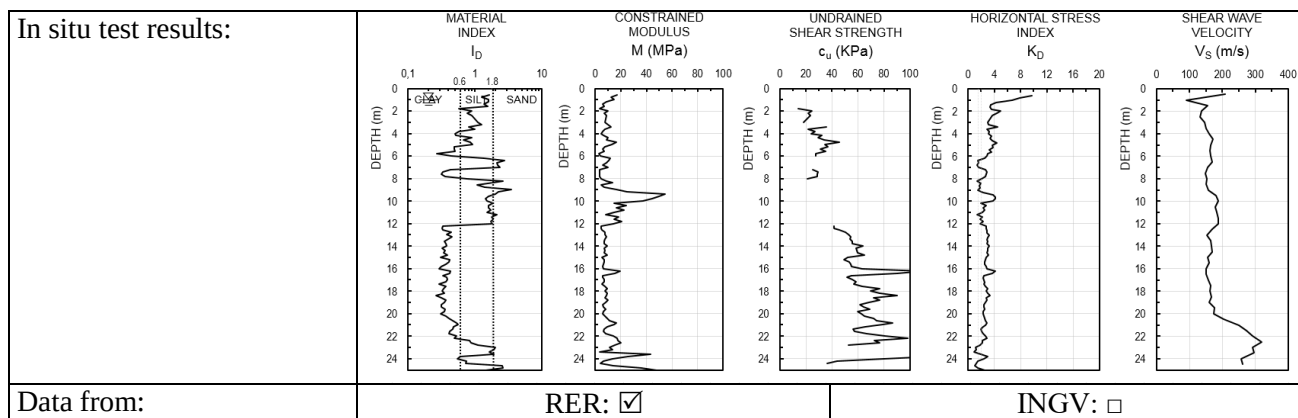
M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Carlo, Municipality of Terre del Reno (FE) – “WP79”

Site:	S. Carlo, Municipality of Terre del Reno (FE)																																																																																																				
Location map:	 Google Earth																																																																																																				
Sand boil sample:	WP79																																																																																																				
Coordinates (WGS 84):	Latitude: 44°48'11.27"N	Longitude: 11°24'28.69"E																																																																																																			
Sand boil image from:	Aerial photography: ☒	Field observations: ☐																																																																																																			

Date of sampling:	24/05/2012																																																																																																				
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒	May 29 th , 2012, M _w = 5.9: ☐																																																																																																			
Liquefaction features:	Strike: 80°	Dip: 0°																																																																																																			
	Garage filled with sand																																																																																																				
Liquefaction-induced land damage category:	5 Moderate to major lateral spreading; ejected material often observed																																																																																																				
Grain size distribution curve:	<table border="1"><caption>Grain Size Distribution Data for WP79</caption><thead><tr><th>Grain Size (mm)</th><th>Percent Passing (%)</th></tr></thead><tbody><tr><td>0.001</td><td>0</td></tr><tr><td>0.002</td><td>0</td></tr><tr><td>0.004</td><td>0</td></tr><tr><td>0.006</td><td>0</td></tr><tr><td>0.0075</td><td>0</td></tr><tr><td>0.0084</td><td>0</td></tr><tr><td>0.0095</td><td>0</td></tr><tr><td>0.0106</td><td>0</td></tr><tr><td>0.015</td><td>0</td></tr><tr><td>0.02</td><td>0</td></tr><tr><td>0.025</td><td>0</td></tr><tr><td>0.03</td><td>0</td></tr><tr><td>0.035</td><td>0</td></tr><tr><td>0.0425</td><td>0</td></tr><tr><td>0.0475</td><td>0</td></tr><tr><td>0.054</td><td>0</td></tr><tr><td>0.063</td><td>0</td></tr><tr><td>0.075</td><td>0</td></tr><tr><td>0.084</td><td>0</td></tr><tr><td>0.095</td><td>0</td></tr><tr><td>0.106</td><td>0</td></tr><tr><td>0.15</td><td>0</td></tr><tr><td>0.2</td><td>0</td></tr><tr><td>0.25</td><td>5</td></tr><tr><td>0.3</td><td>52</td></tr><tr><td>0.35</td><td>94</td></tr><tr><td>0.425</td><td>98</td></tr><tr><td>0.475</td><td>100</td></tr><tr><td>0.54</td><td>100</td></tr><tr><td>0.6</td><td>100</td></tr><tr><td>0.63</td><td>100</td></tr><tr><td>0.75</td><td>100</td></tr><tr><td>0.84</td><td>100</td></tr><tr><td>0.95</td><td>100</td></tr><tr><td>1.06</td><td>100</td></tr><tr><td>1.5</td><td>100</td></tr><tr><td>2</td><td>100</td></tr><tr><td>2.5</td><td>100</td></tr><tr><td>3</td><td>100</td></tr><tr><td>3.5</td><td>100</td></tr><tr><td>4.25</td><td>100</td></tr><tr><td>4.75</td><td>100</td></tr><tr><td>5.4</td><td>100</td></tr><tr><td>6.3</td><td>100</td></tr><tr><td>7.5</td><td>100</td></tr><tr><td>8.4</td><td>100</td></tr><tr><td>9.5</td><td>100</td></tr><tr><td>10.6</td><td>100</td></tr></tbody></table>			Grain Size (mm)	Percent Passing (%)	0.001	0	0.002	0	0.004	0	0.006	0	0.0075	0	0.0084	0	0.0095	0	0.0106	0	0.015	0	0.02	0	0.025	0	0.03	0	0.035	0	0.0425	0	0.0475	0	0.054	0	0.063	0	0.075	0	0.084	0	0.095	0	0.106	0	0.15	0	0.2	0	0.25	5	0.3	52	0.35	94	0.425	98	0.475	100	0.54	100	0.6	100	0.63	100	0.75	100	0.84	100	0.95	100	1.06	100	1.5	100	2	100	2.5	100	3	100	3.5	100	4.25	100	4.75	100	5.4	100	6.3	100	7.5	100	8.4	100	9.5	100	10.6	100
Grain Size (mm)	Percent Passing (%)																																																																																																				
0.001	0																																																																																																				
0.002	0																																																																																																				
0.004	0																																																																																																				
0.006	0																																																																																																				
0.0075	0																																																																																																				
0.0084	0																																																																																																				
0.0095	0																																																																																																				
0.0106	0																																																																																																				
0.015	0																																																																																																				
0.02	0																																																																																																				
0.025	0																																																																																																				
0.03	0																																																																																																				
0.035	0																																																																																																				
0.0425	0																																																																																																				
0.0475	0																																																																																																				
0.054	0																																																																																																				
0.063	0																																																																																																				
0.075	0																																																																																																				
0.084	0																																																																																																				
0.095	0																																																																																																				
0.106	0																																																																																																				
0.15	0																																																																																																				
0.2	0																																																																																																				
0.25	5																																																																																																				
0.3	52																																																																																																				
0.35	94																																																																																																				
0.425	98																																																																																																				
0.475	100																																																																																																				
0.54	100																																																																																																				
0.6	100																																																																																																				
0.63	100																																																																																																				
0.75	100																																																																																																				
0.84	100																																																																																																				
0.95	100																																																																																																				
1.06	100																																																																																																				
1.5	100																																																																																																				
2	100																																																																																																				
2.5	100																																																																																																				
3	100																																																																																																				
3.5	100																																																																																																				
4.25	100																																																																																																				
4.75	100																																																																																																				
5.4	100																																																																																																				
6.3	100																																																																																																				
7.5	100																																																																																																				
8.4	100																																																																																																				
9.5	100																																																																																																				
10.6	100																																																																																																				
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)																																																																																																				
	FC = 5%	U = 2.07	C = 0.80																																																																																																		
			σ = 1.78																																																																																																		

Compositional information:	---	
Paleoriver assignment:	Reno	
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒
Data from:	INGV: ☒	UNIMORE: ☐
In situ test:	CPTuA: 038021P664	
Coordinates (WGS 84):	Latitude: 44°48'11.97"N	Longitude: 11°24'29.09"E
Date:	23/07/2013	
Address:	Via Morandi	
Depth to GWT during in situ test:	1.00m	
In situ test results:		
Data from:	RER: ☒	INGV: ☐
In situ test:	CPTuB: 038021P716	
Coordinates (WGS 84):	Latitude: 44°48'11.39"N	Longitude: 11°24'29.79"E
Date:	18/07/2013	
Address:	Via Morandi	
Depth to GWT during in situ test):	1.00 m	
In situ test results:		
Data from:	RER: ☒	INGV: ☐
In situ test:	DMTa: 038021P764	
Coordinates (WGS 84):	Latitude: 44°48'11.19"N	Longitude: 11°24'28.57"E
Date:	28/02/2013	
Address:	Via Morandi	
Depth to GWT during in situ test:	1.00 m	



M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

S. Carlo, Municipality of Terre del Reno (FE) – “WP82”

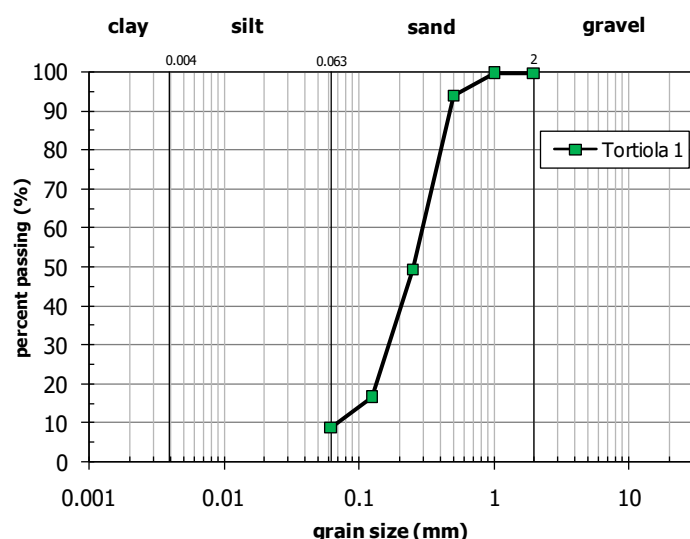
Site:	S. Carlo, Municipality of Terre del Reno (FE)		
Location map:			
Sand boil sample:	WP82		
Coordinates (WGS 84):	Latitude: 44°48'10.84"N		Longitude: 11°24'31.14"E
Sand boil image from:	Aerial photography: ☒		Field observations: ☐

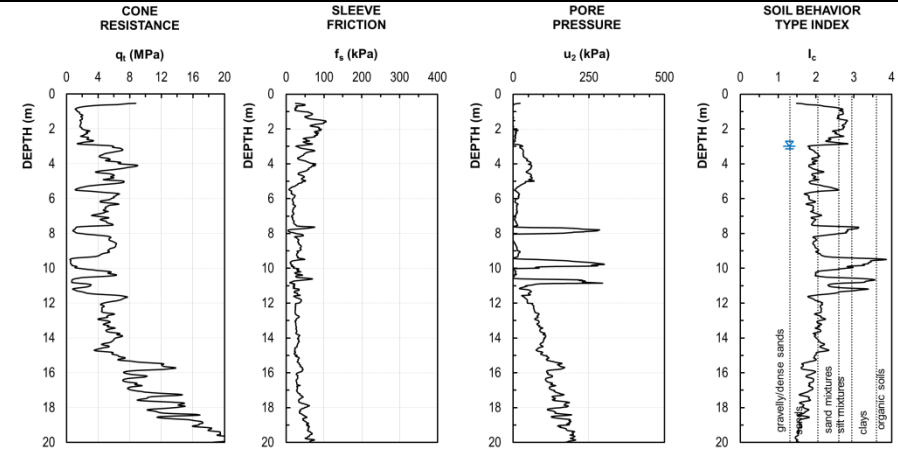
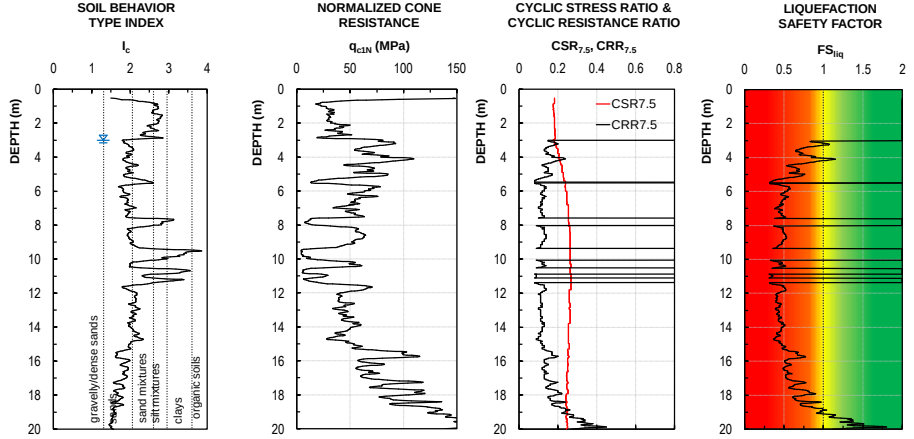
Date of sampling:	24/05/2012		
Seismic event:	May 20 th , 2012, $M_w = 6.1$: ☒		May 29 th , 2012, $M_w = 5.9$: ☐
Liquefaction features:	Strike: 70°		Dip: 0°
	2 sand boils		
Liquefaction-induced land damage category:	5 Moderate to major lateral spreading; ejected material often observed		
Grain size distribution curve:			
Soil classification (USCS):	Silty Sand (SM)		
	FC = 23%	U = 20.52	$\sigma = 3.657$

Compositional information:	---		
Paleoriver assignment:	Reno		
Morphological features:	Flat interfluvial depression: ☐	Fluvial ridge: ☒	
Data from:	INGV: ☒	UNIMORE: ☐	
In situ test:	CPTuA: 038021P823		
Coordinates (WGS 84):	Latitude: 44°48'11.54"N	Longitude: 11°24'32.76"E	
Date:	18/05/2015		
Address:	Via Risorgimento		
Depth to GWT during in situ test:	1.00m		
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u₂ (kPa) SOIL BEHAVIOR TYPE INDEX I_c		
Data from:	RER: ☒	INGV: ☐	
In situ test:	CPTuB: 038021P6		
Coordinates (WGS 84):	Latitude: 44°48'9.59"N	Longitude: 11°24'29.83"E	
Date:	05/06/2012		
Address:	Via Rossini		
Depth to GWT during in situ test:	1.00 m		
In situ test results:	CONE RESISTANCE q_t (MPa) SLEEVE FRICTION f_s (kPa) PORE PRESSURE u₂ (kPa) SOIL BEHAVIOR TYPE INDEX I_c		
Data from:	RER: ☒	INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Tortiola, Municipality of Viganaro Mainarda (FE) – “Tortiola 1”

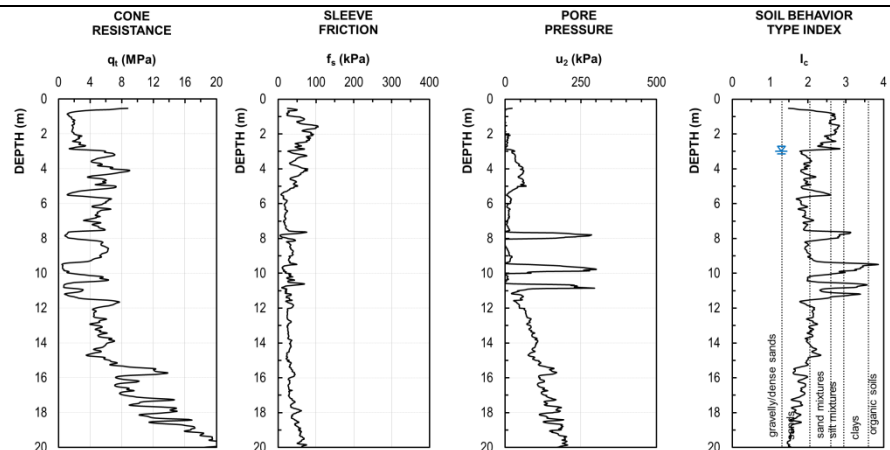
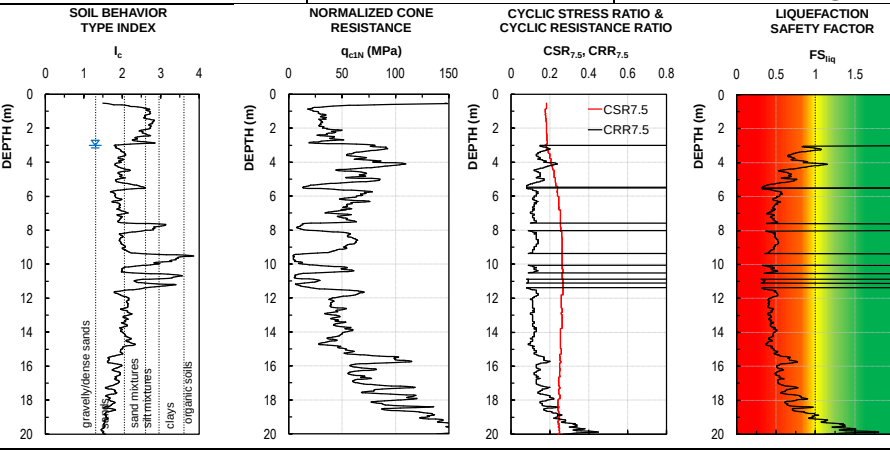
Site:	Tortiola, Municipality of Viganaro Mainarda (FE)			
Location map:				
Sand boil sample:	Tortiola 1			
Coordinates (WGS 84):	Latitude: 44°51'35.31"N		Longitude: 11°28'19.91"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	---			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 135°		Dip: 0°	
	Fracture with sand, length 30 m			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Silty Sand (SM)			
	FC = 11%	U = 4.29	C = 1.38	σ = 1.74
Compositional information:	---			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	CPTuA: 038022P280			
Coordinates (WGS 84):	Latitude: 44°51'50.81"N		Longitude: 11°27'40.41"E	
Date:	---			
Address:	---			

Depth to GWT during in situ test:	3.00 m		
In situ test results:			
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 6.1$	$a_{max} = 0.44g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})			
	LPI = 27.86	LSN = 39.43	S = 0.35 m
Note:	Thickness of surface layer: 3 m (from 0 to 3 m) Thickness of liquefied layer: 16 m (from 3 to 19 m)		
Data from:	RER: ☒	INGV: ☐	

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.

Tortiola, Municipality of Viganaro Mainarda (FE) – “Tortiola 2”

Site:	Tortiola, Municipality of Viganaro Mainarda (FE)			
Location map:				
Sand boil sample:	Tortiola 2			
Coordinates (WGS 84):	Latitude: 44°51'37.44"N		Longitude: 11°28'12.38"E	
Sand boil image from:	Aerial photography: ☐		Field observations: ☐	
	---		---	
Date of sampling:	---			
Seismic event:	May 20 th , 2012, M _w = 6.1: ☒		May 29 th , 2012, M _w = 5.9: ☐	
Liquefaction features:	Strike: 135°		Dip: 0°	
	Fracture with sand, length 30 m			
Liquefaction-induced land damage category:	4  No lateral spreading but large quantities of ejected material			
Grain size distribution curve:				
Soil classification (USCS):	Poorly graded sand with silt (SP-SM)			
	FC = 16%	U = ---	C = ---	σ = 1.617
Compositional information:	Q+F = 60.33 %; L = 15.67 %; C = 12.67 % Q + F = quartz + feldspars; L = siliclasticlithics; C = carbonates			
Paleoriver assignment:	Po			
Morphological features:	Flat interfluvial depression: ☐		Fluvial ridge: ☒	
Data from:	INGV: ☐		UNIMORE: ☒	
In situ test:	CPTuA: 038022P280			
Coordinates (WGS 84):	Latitude: 44°51'50.81"N		Latitude: 44°51'50.81"N	
Date:	---			

Address:	---		
Depth to GWT during in situ test:	3.00 m		
In situ test results:			
Liquefaction analysis:	EQ GWT = 3.00 m	$M_w = 6.1$	$a_{max} = 0.45g$
Graphs (I_c , q_{c1N} , $CRR_{7.5}$, $CSR_{7.5}$, FS_{liq})			
	LPI = 28.59	LSN = 40.00	S = 0.35 m
Note:	Thickness of surface layer: 3 m (from 0 to 3 m) Thickness of liquefied layer: 16 m (from 3 to 19 m)		
Data from:	RER: ☒		INGV: ☐

M_w = moment magnitude; FC = fines content; U = coefficient of uniformity; C = coefficient of curvature; σ = sorting; GWT = ground water table; EQ GWT = earthquake ground water table; a_{max} = peak ground acceleration; LPI = liquefaction potential index; LSN = liquefaction severity number; S = vertical settlements; INGV = Istituto Nazionale di Geofisica e Vulcanologia; UNIMORE = University of Modena and Reggio-Emilia; RER = Emilia-Romagna Region.