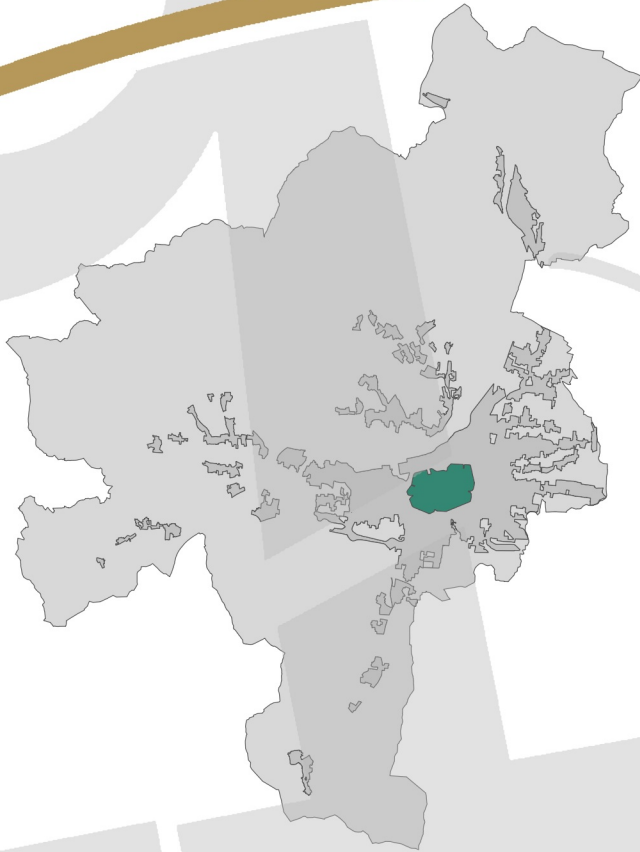




Città  
di Lucca

La casa  
della Città

# il Piano Operativo



## Quadro geologico - tecnico

### ALL. I6 - Idraulica - Simulazioni sul sistema del Rio Canabbia

Assessore all'Urbanistica

Serena Mammini

Sindaco

Alessandro Tambellini

**Adozione**

## MODELLI IDRAULICI MONODIMENSIONALI

Si riportano gli output forniti dal codice di calcolo Hec-Ras 5.0.6 sul reticolo idraulico con simulazione del deflusso trentennale e duecentennale. Si allegano

- I profili;
- Le sezioni dei corsi d'acqua;
- L'output tabellare con i risultati delle simulazioni svolte.

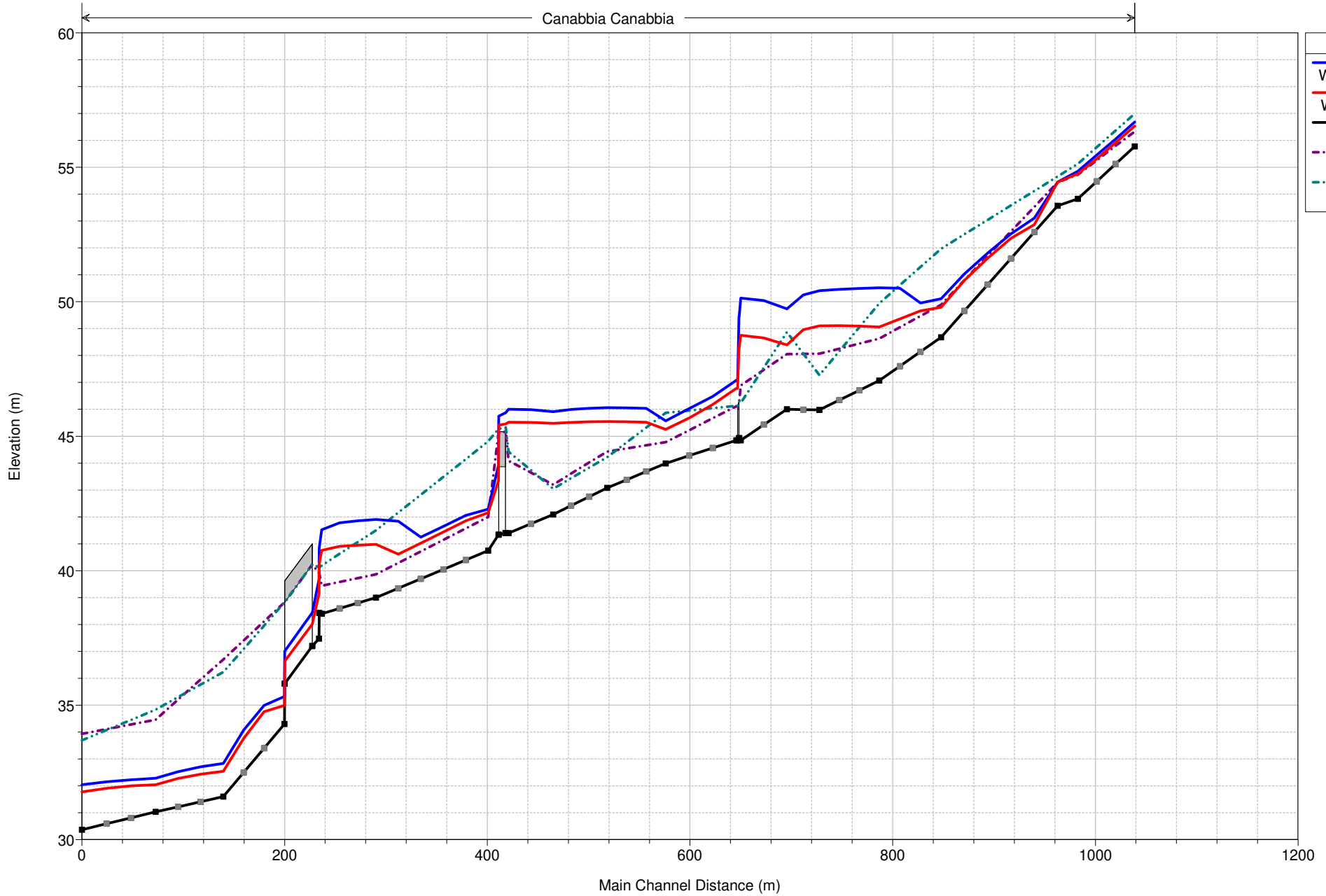
## LEGENDA DELLE TABELLE

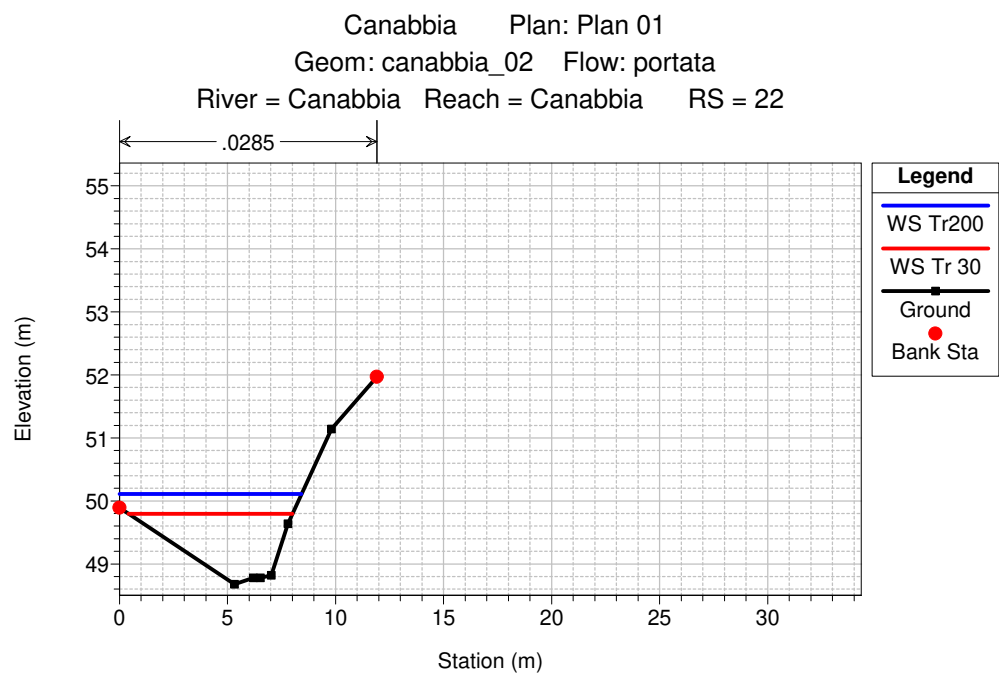
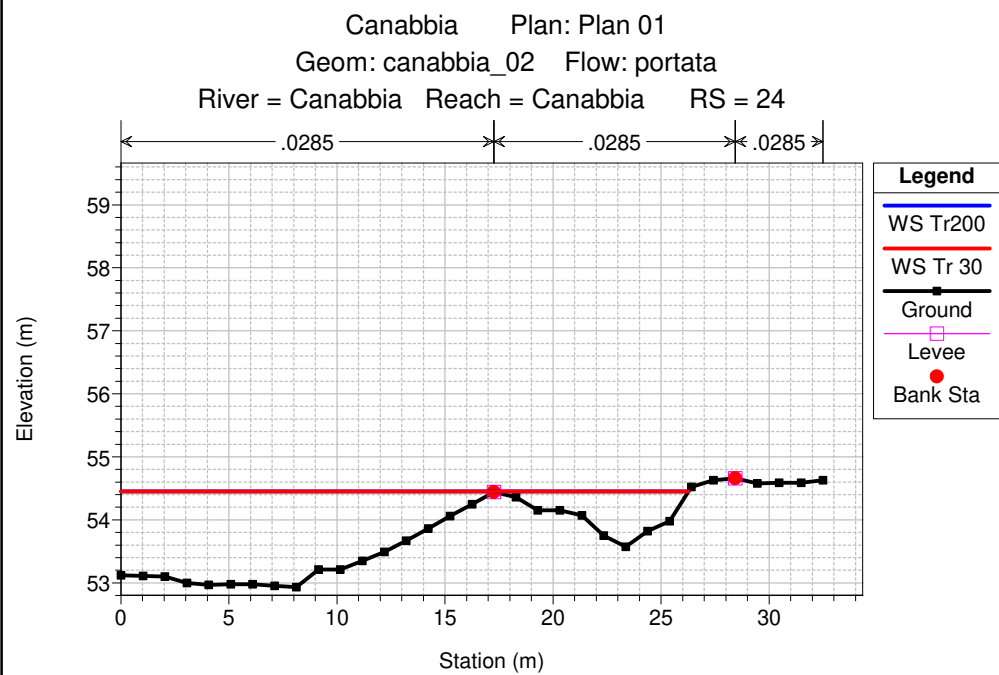
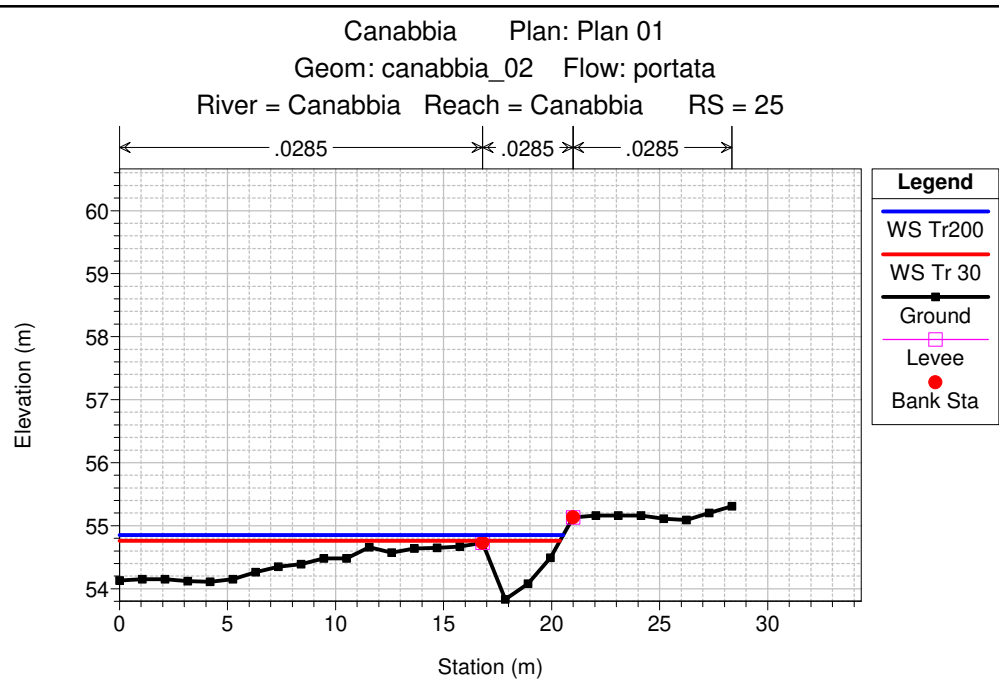
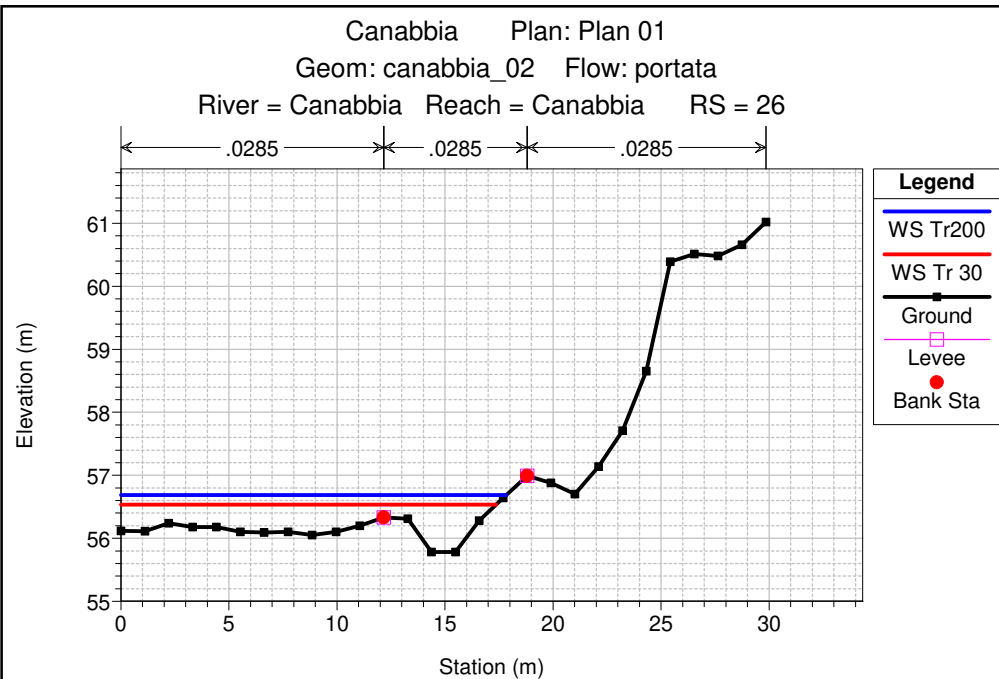
Le grandezze riportate in tabella hanno il seguente significato:

- **River station** Sezione trasversale del corso d'acqua
- **Q Total** Portata idraulica
- **Min Ch Elev** Quota del fondo rispetto al prescelto sistema di riferimento
- **W.S. Elev** Quota del pelo libero rispetto al prescelto sistema di riferimento
- **Max Chl Dpth** Tirante idraulico massimo (differenza dei termini W.S Elev e il termine Min Ch Elev)
- **LOB Elev** Quota della sommità arginale sinistra rispetto al prescelto sistema di riferimento
- **ROB Elev** Quota della sommità arginale destra rispetto al prescelto sistema di riferimento
- **L.Freeboard** Franco sinistro: differenza fra il termine LOB Elev e il termine W.S Elev
- **R.Freeboard** Franco destro: differenza fra il termine ROB Elev e il termine W.S Elev
- **Vel Chnl** Velocità media della corrente
- **Froude n.** Numero di Froude: se maggiore di 1 indica la presenza di corrente veloce, se inferiore a 1 segnala la presenza di corrente lenta

Canabbia Plan: Plan 01  
Geom: canabbia\_02 Flow: portata

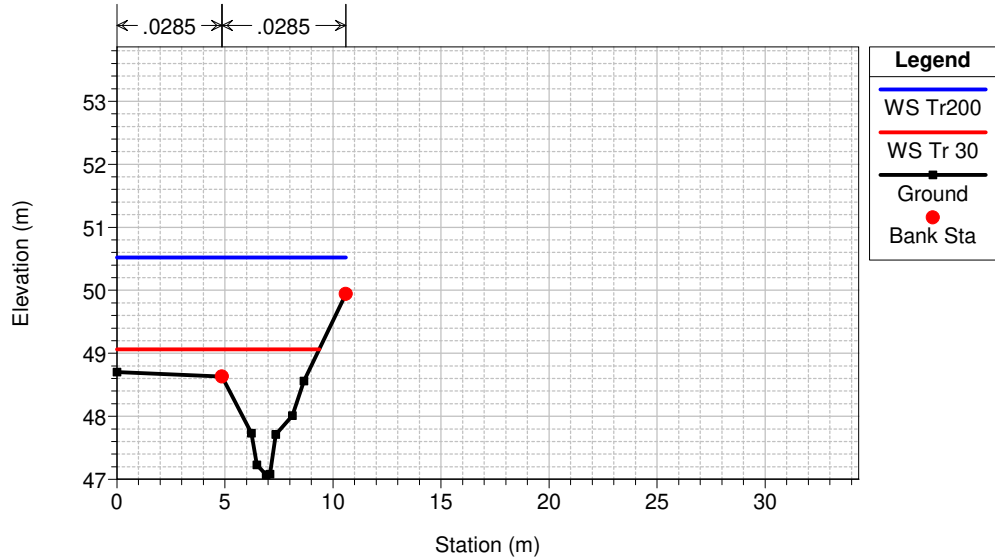
Canabbia Canabbia



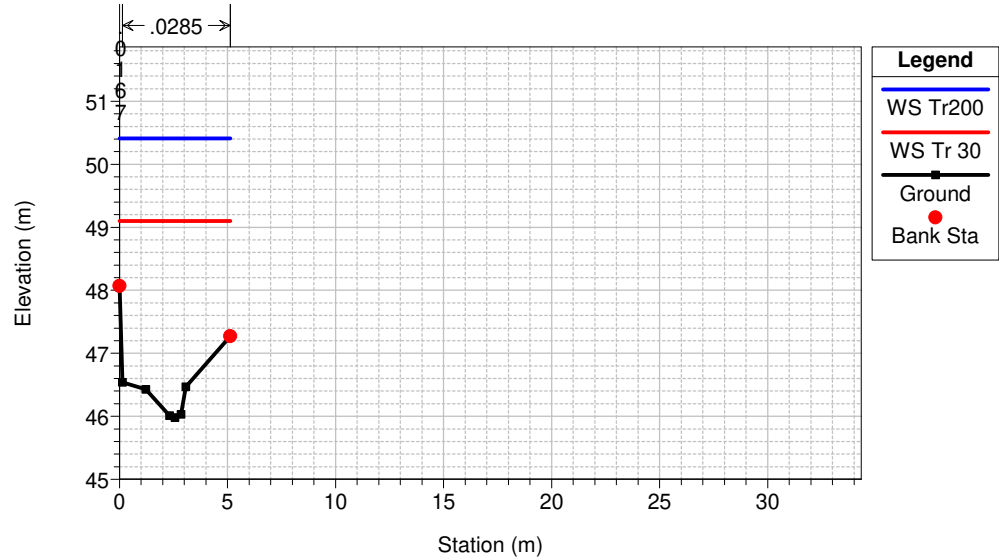


1 cm Horiz. = 3.5 m 1 cm Vert. = 1.2 m

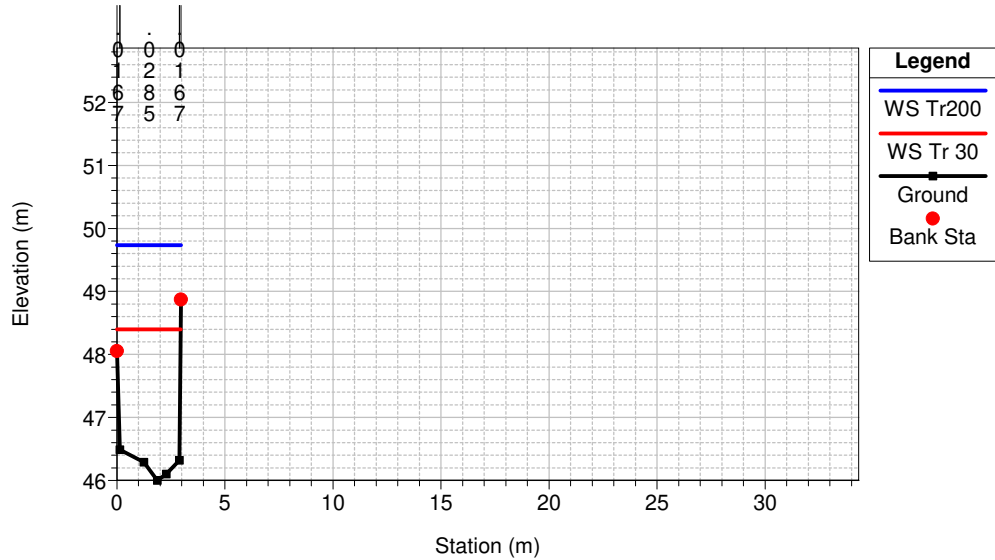
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 21



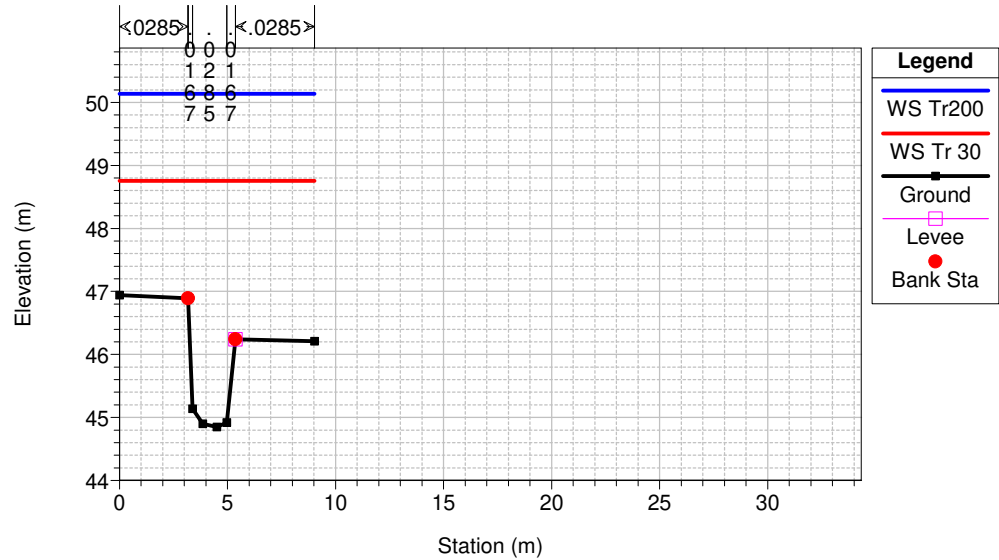
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 20



Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 19

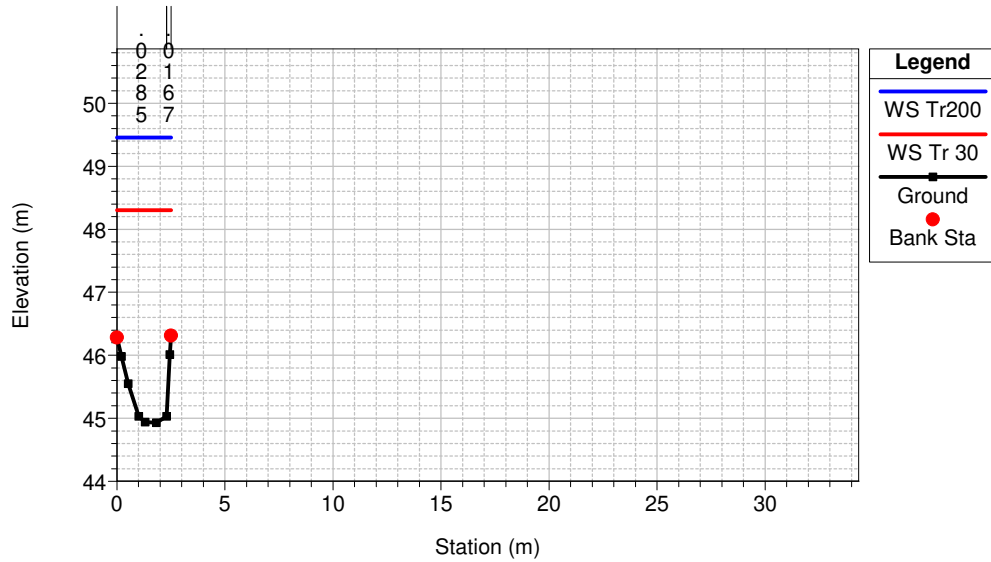


Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 18

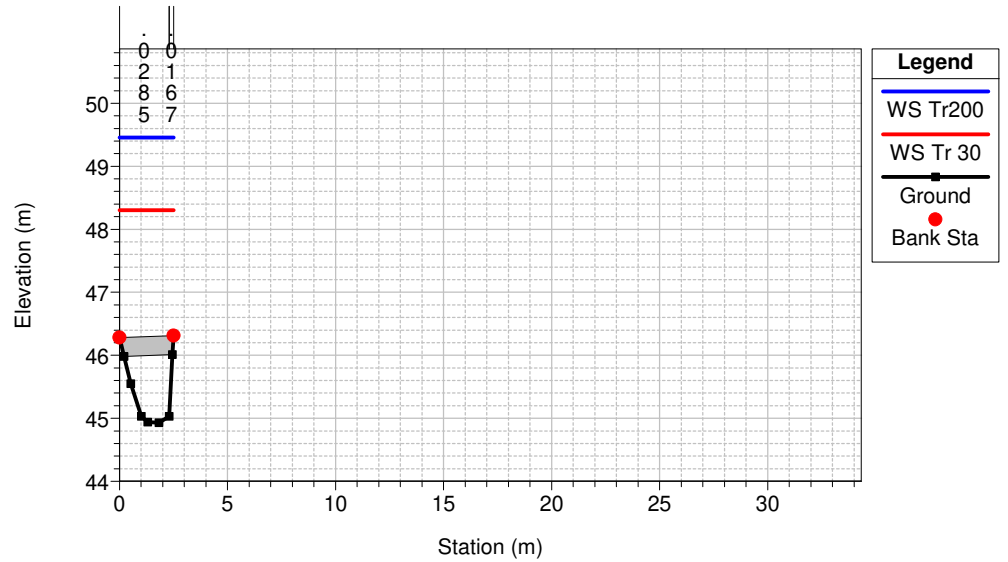


1 cm Horiz. = 3.5 m 1 cm Vert. = 1.2 m

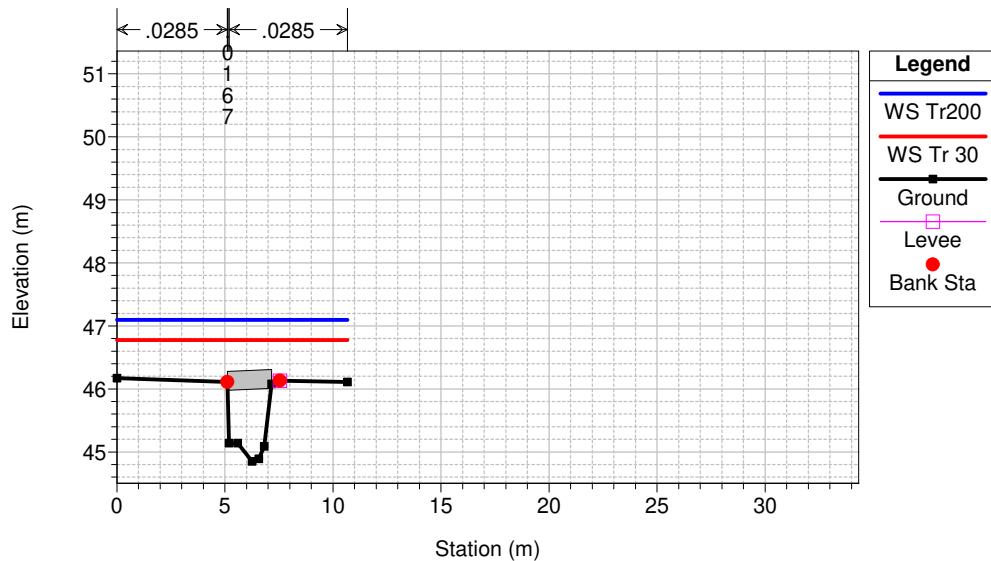
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 17



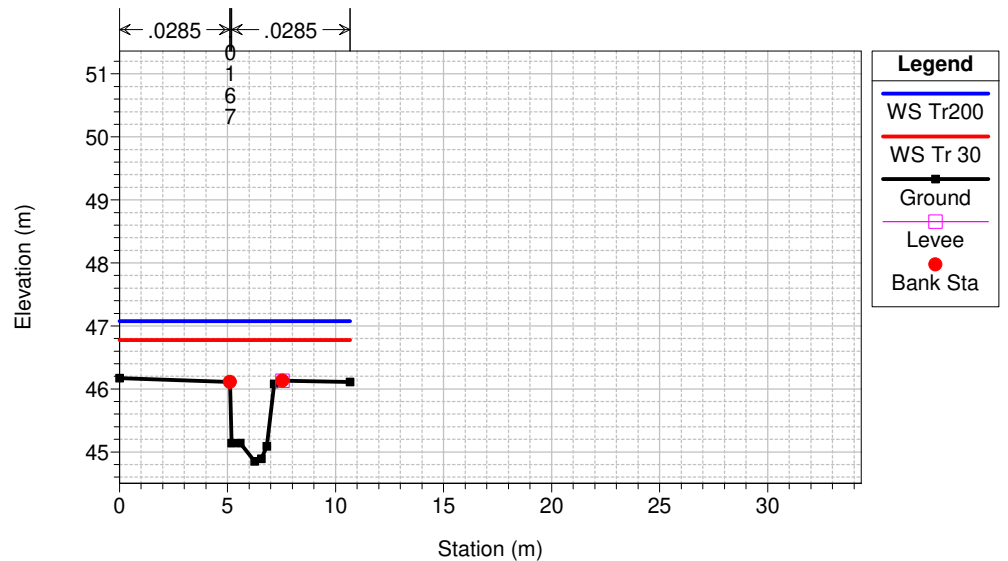
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 16.5 BR Ponte privato



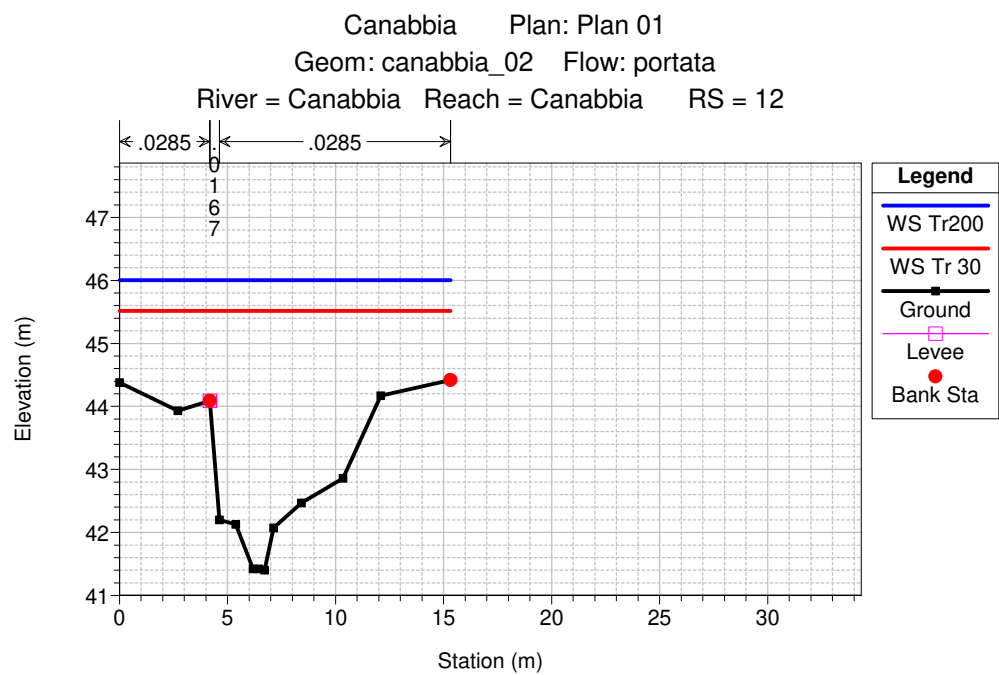
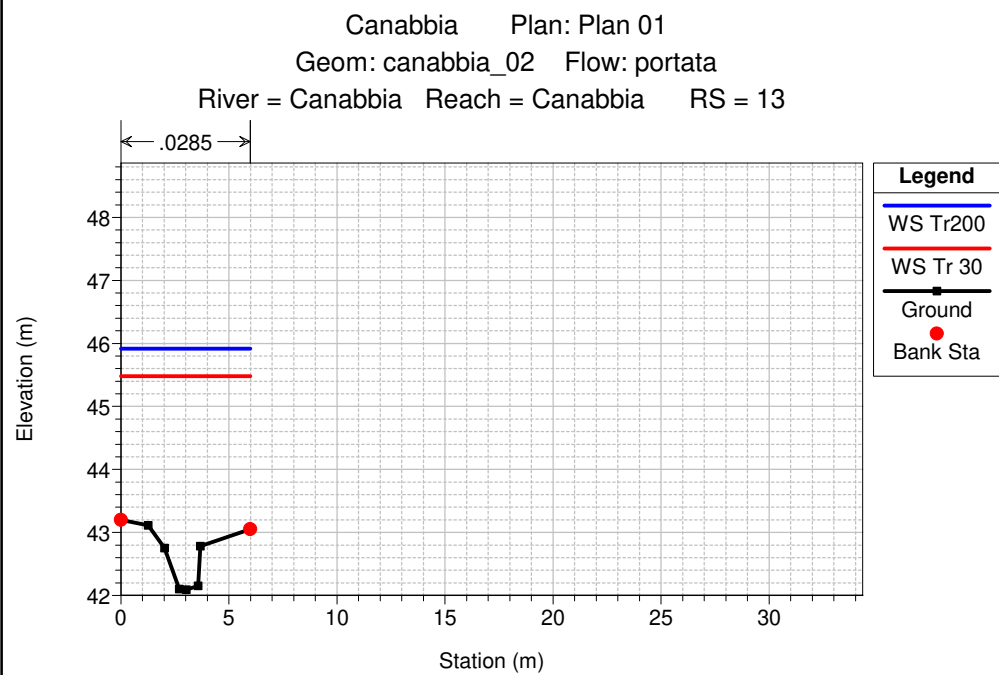
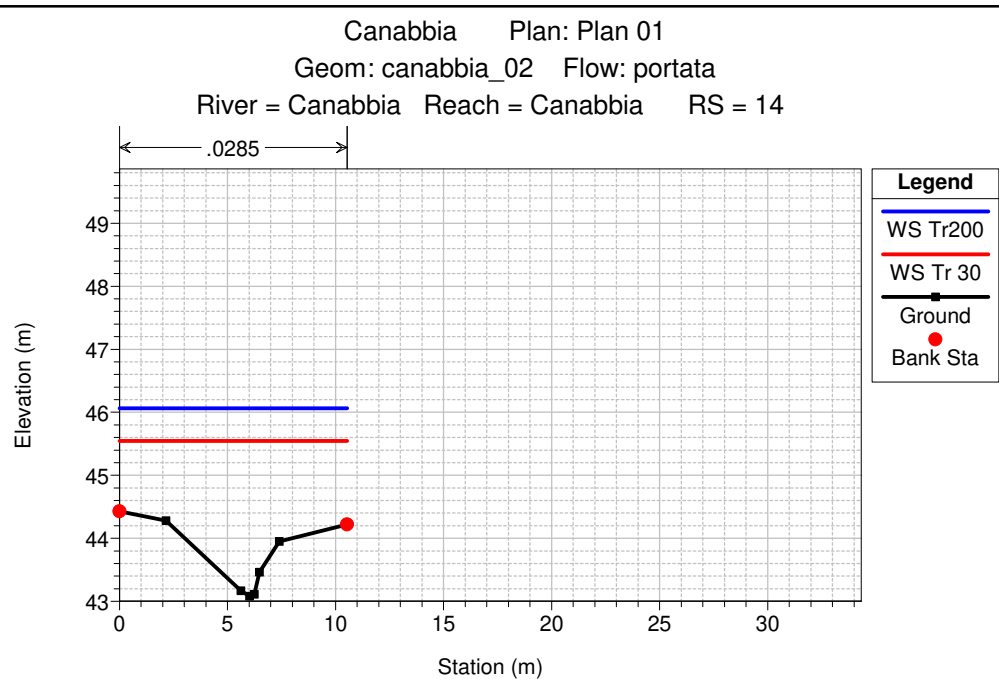
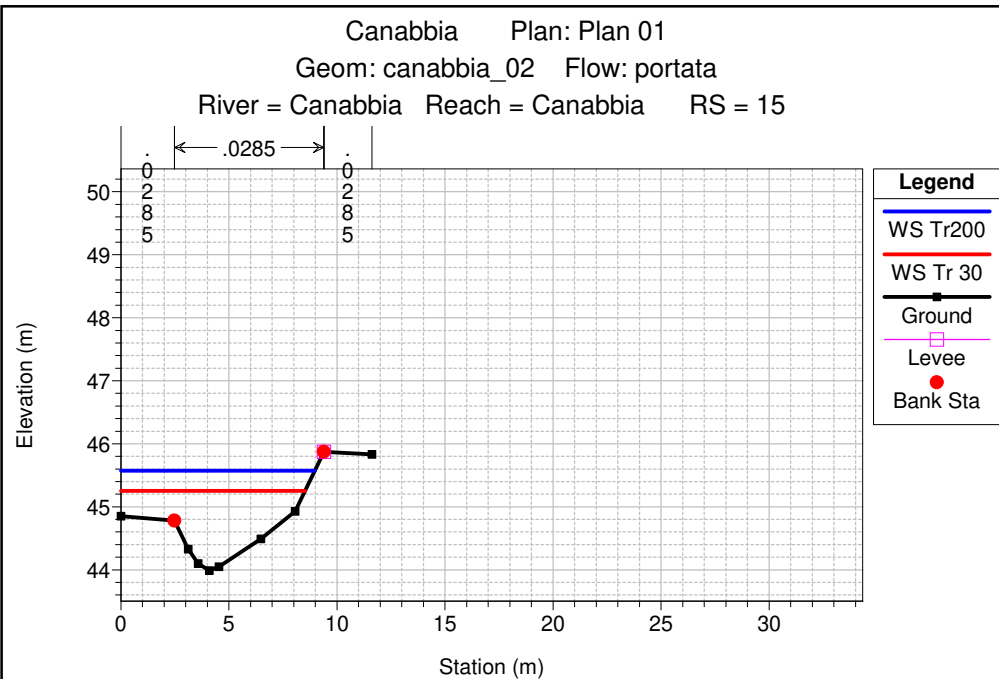
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 16.5 BR Ponte privato



Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 16



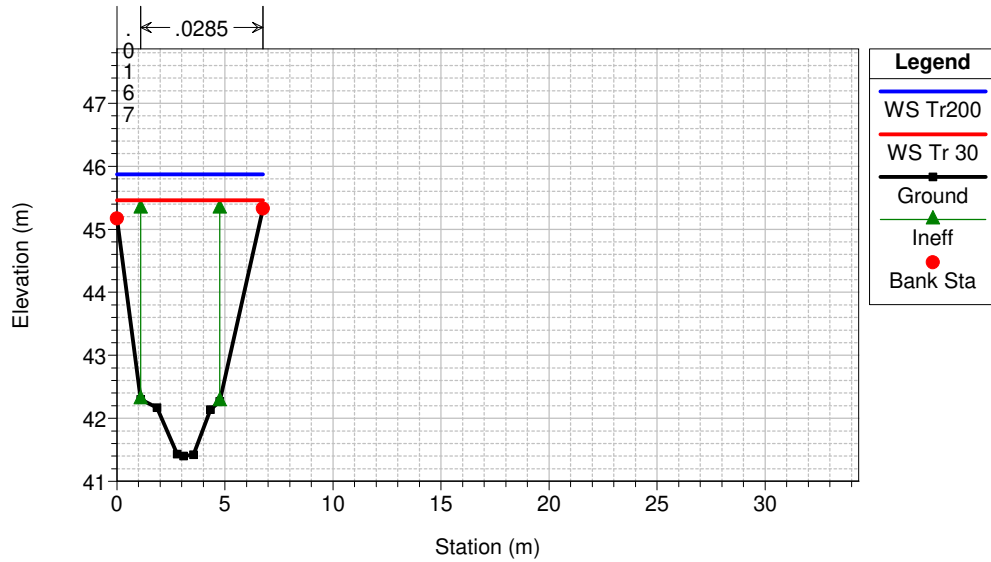
1 cm Horiz. = 3.5 m 1 cm Vert. = 1.2 m



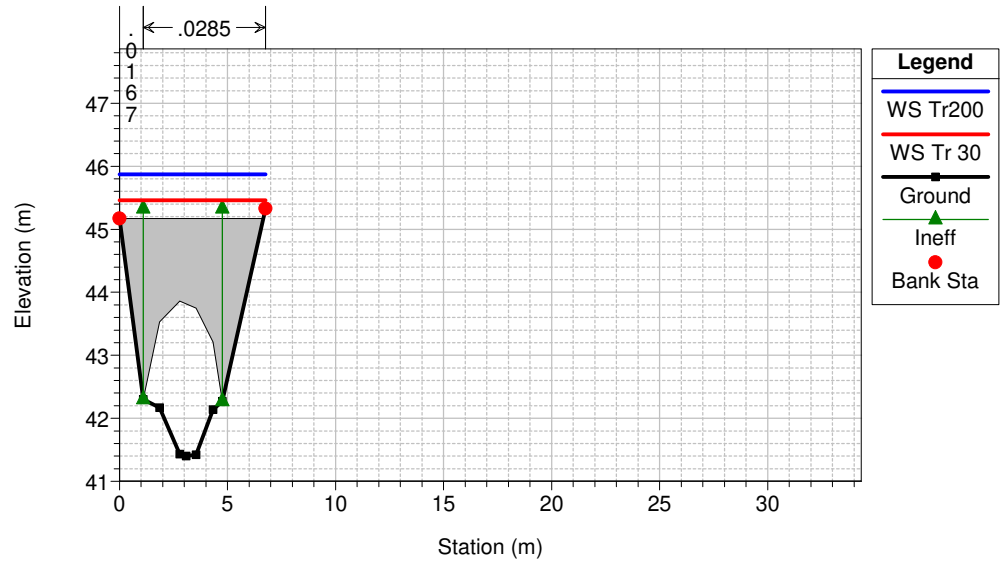
1 cm Horiz. = 3.5 m 1 cm Vert. = 1.2 m



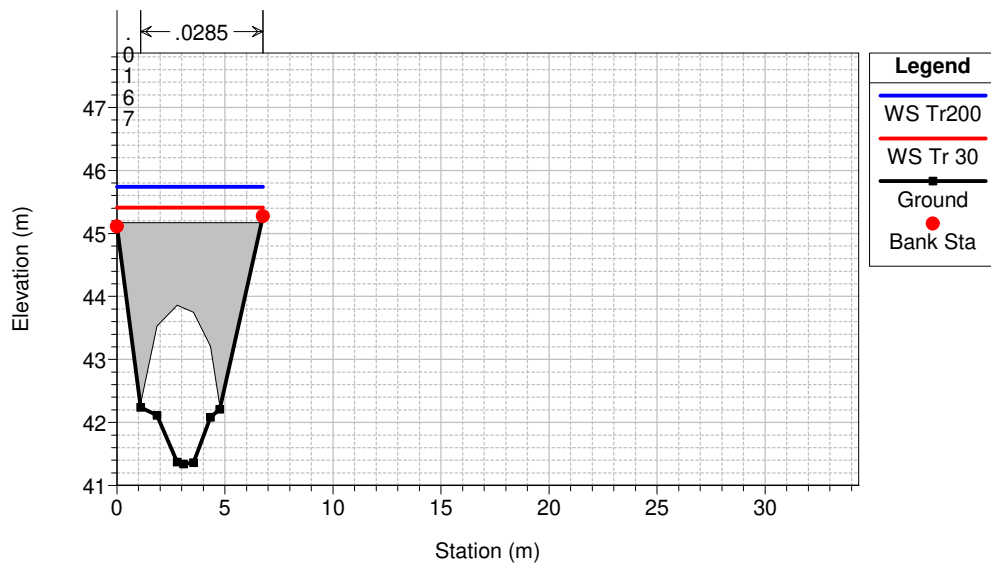
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 11



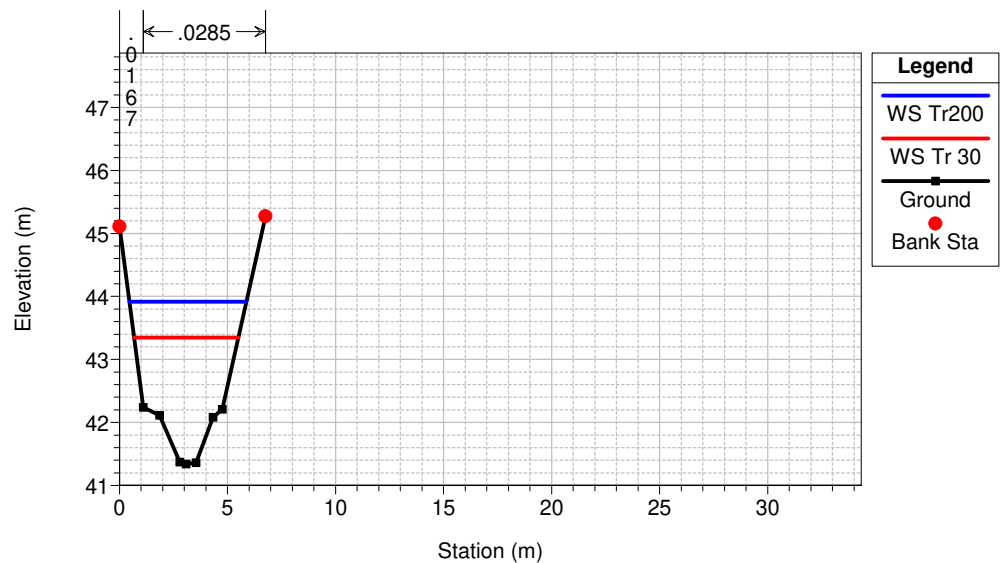
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 10.8 BR Ponte via Arliano



Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 10.8 BR Ponte via Arliano



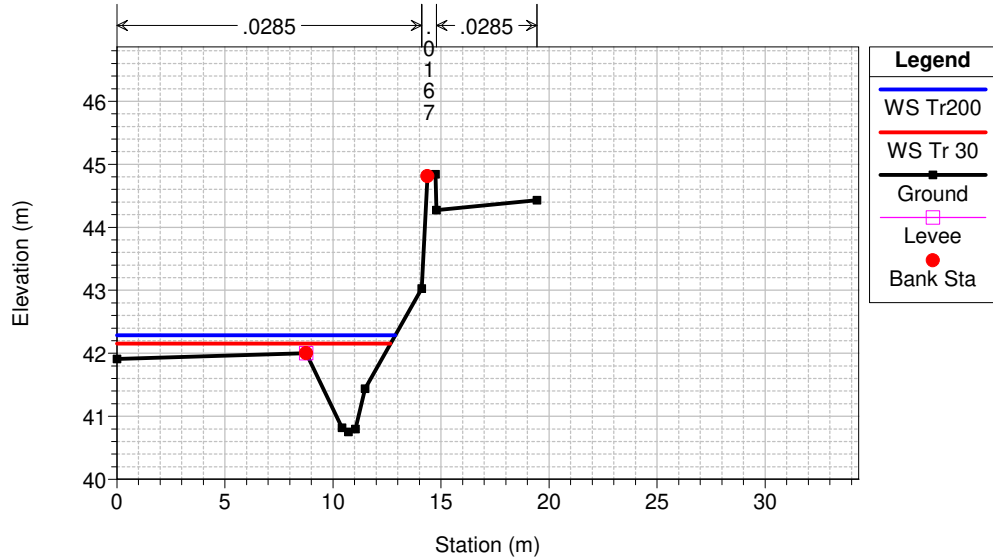
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 10.5



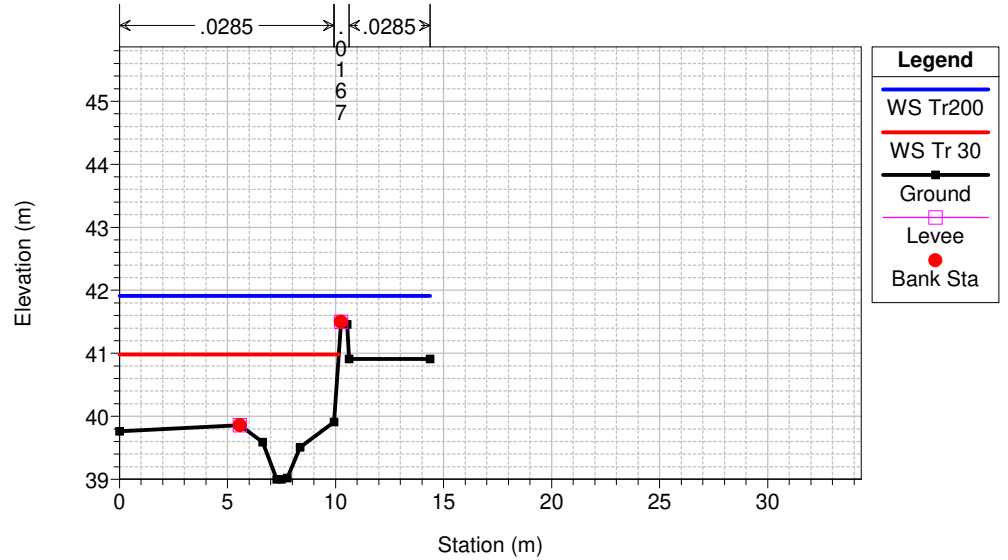
1 cm Horiz. = 3.5 m 1 cm Vert. = 1.2 m



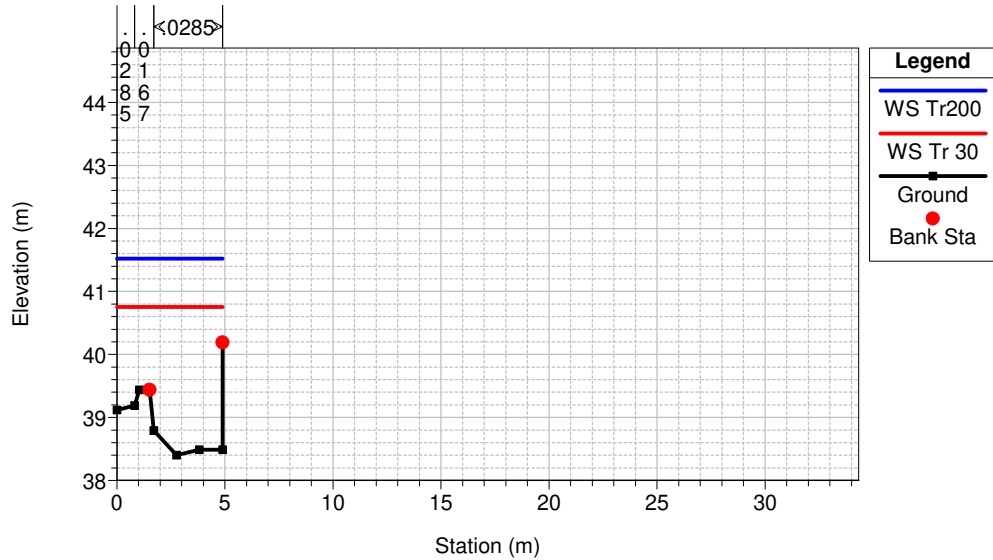
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 10



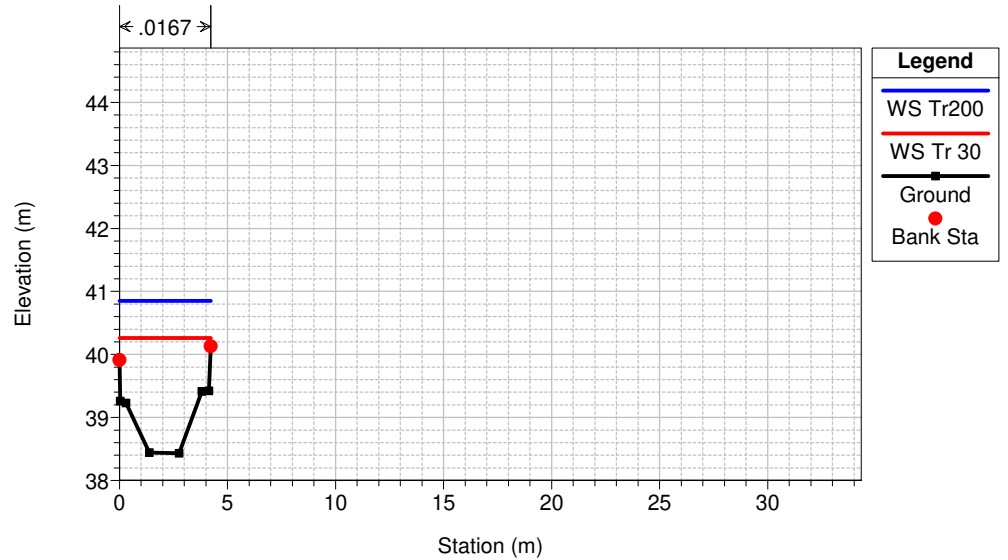
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 9



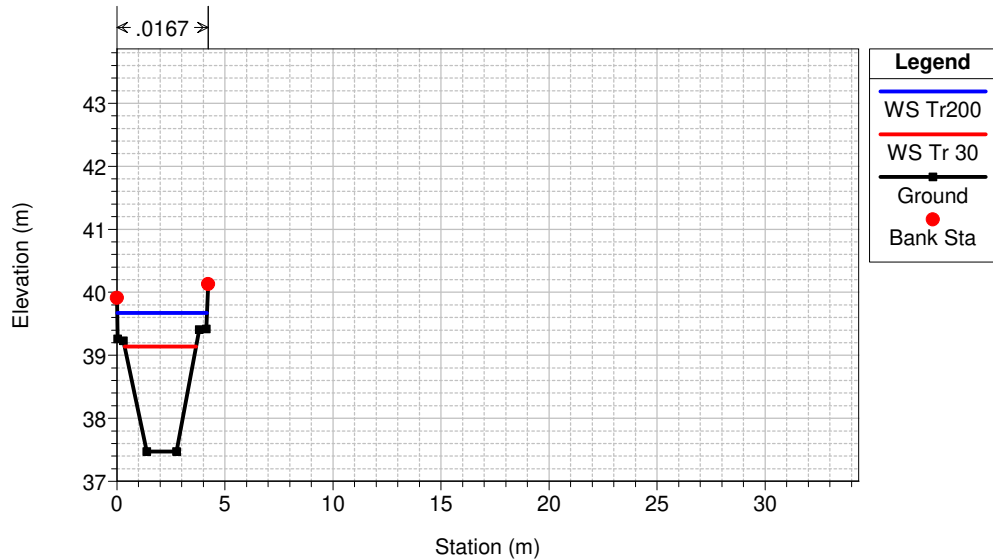
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 8



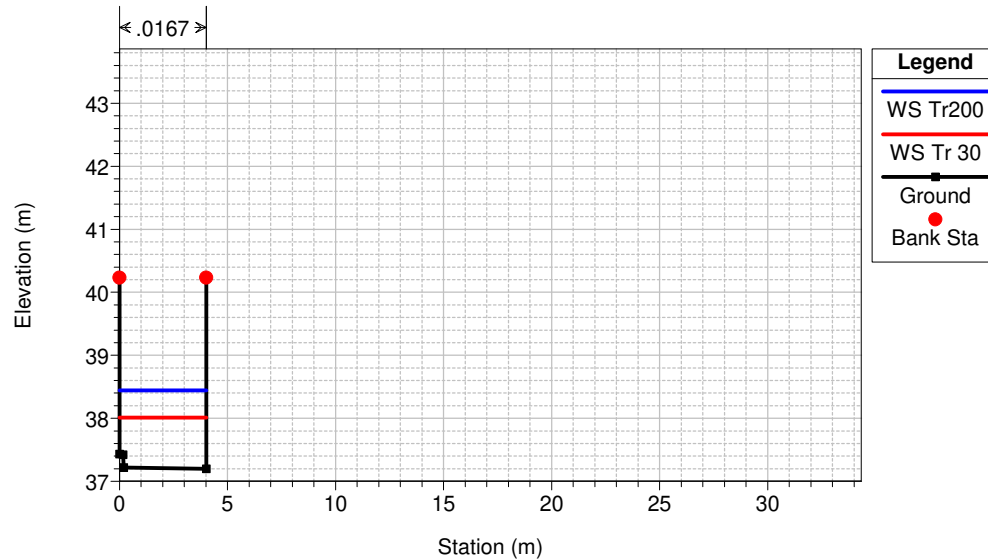
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 7



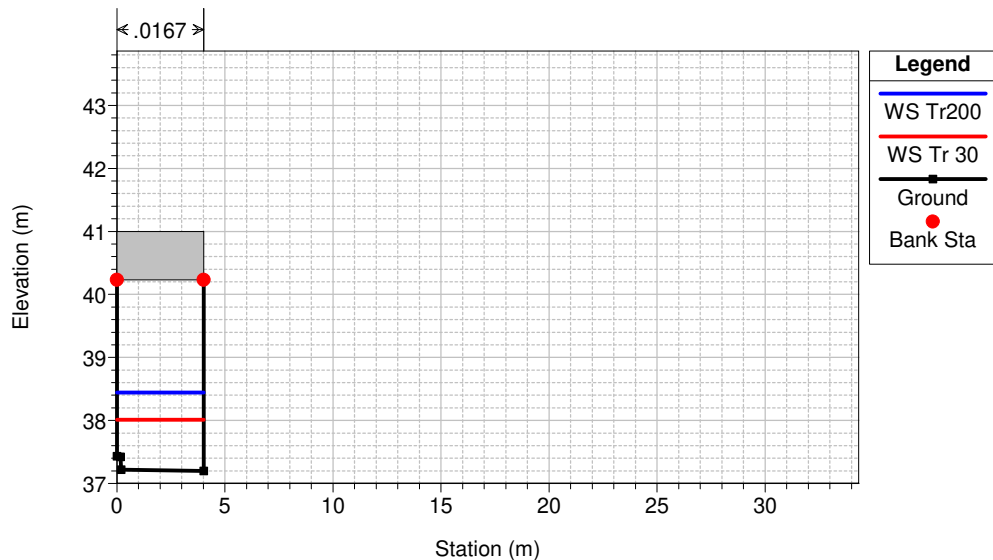
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 6.5



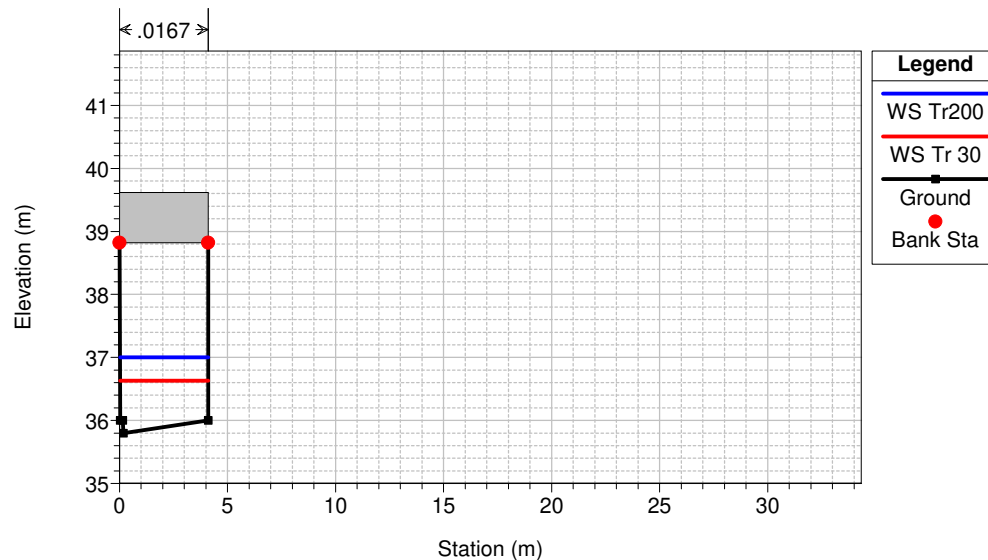
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 6



Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 5.5 BR ponte A11

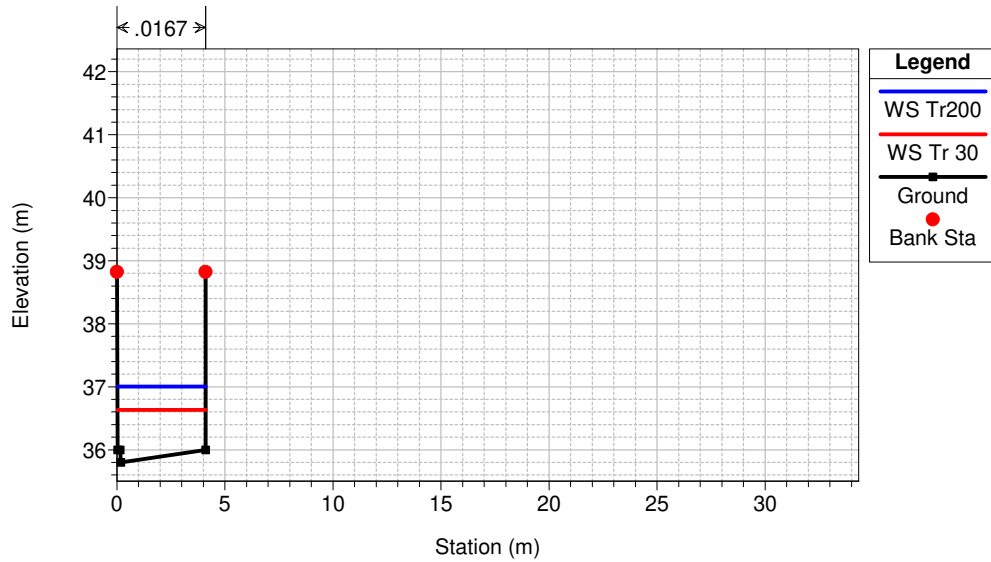


Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 5.5 BR ponte A11

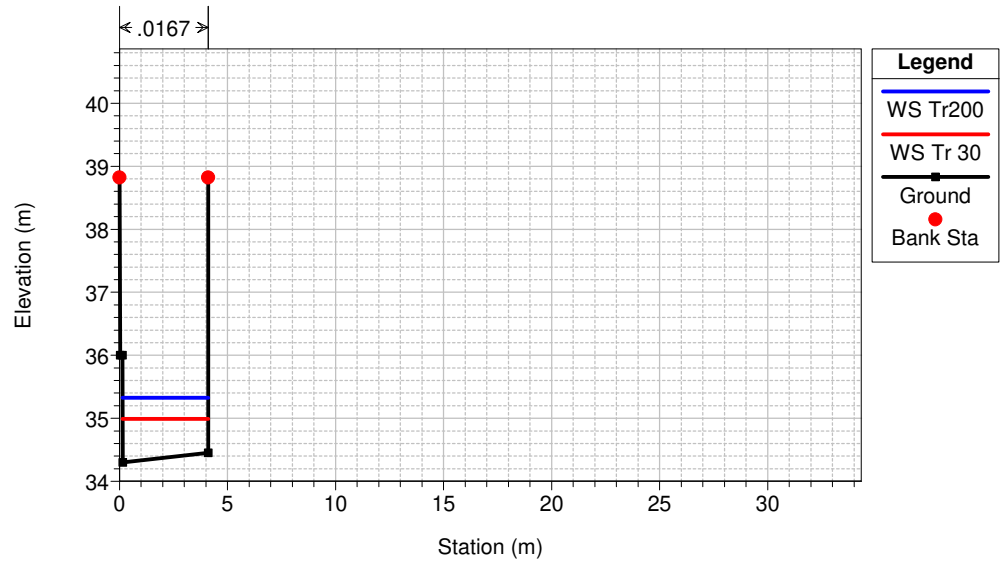


1 cm Horiz. = 3.5 m 1 cm Vert. = 1.2 m

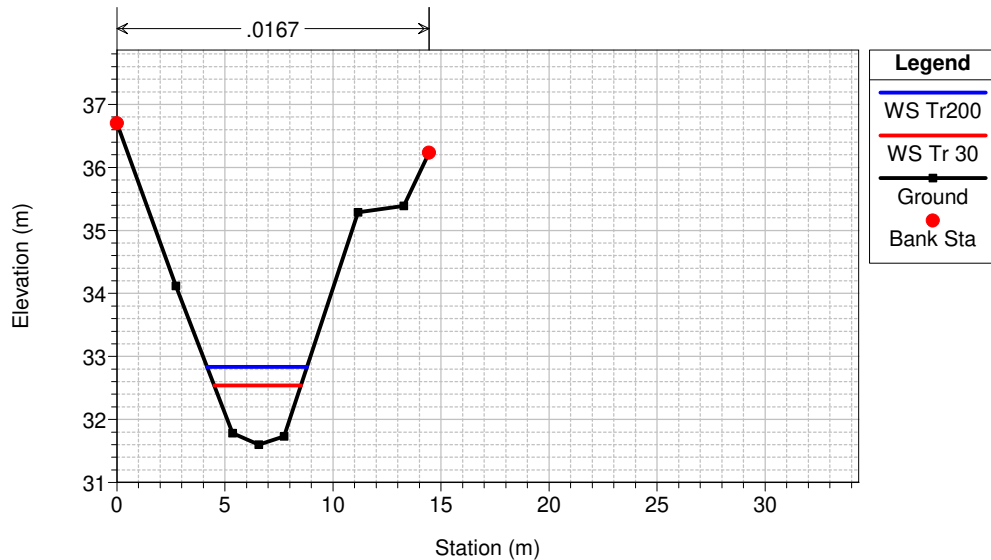
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 5



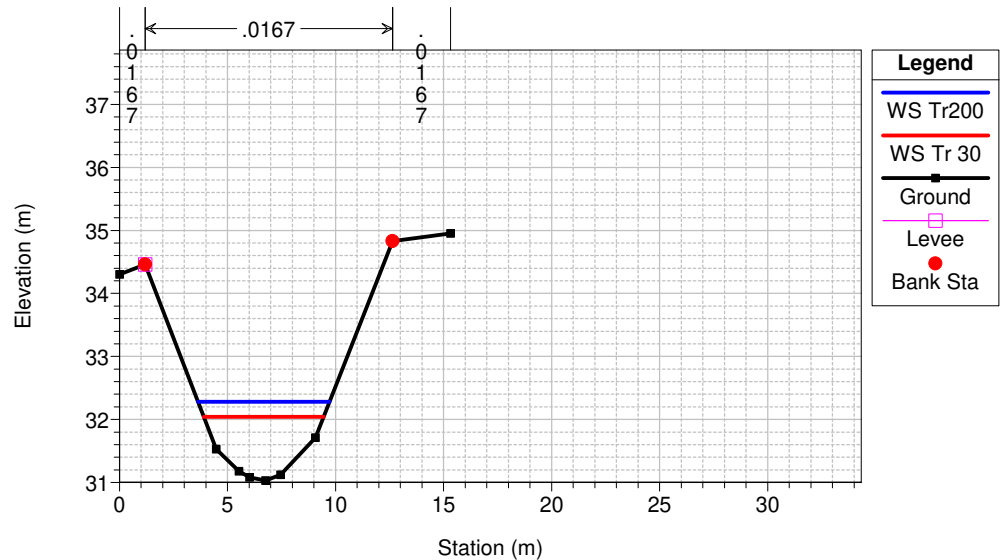
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 4



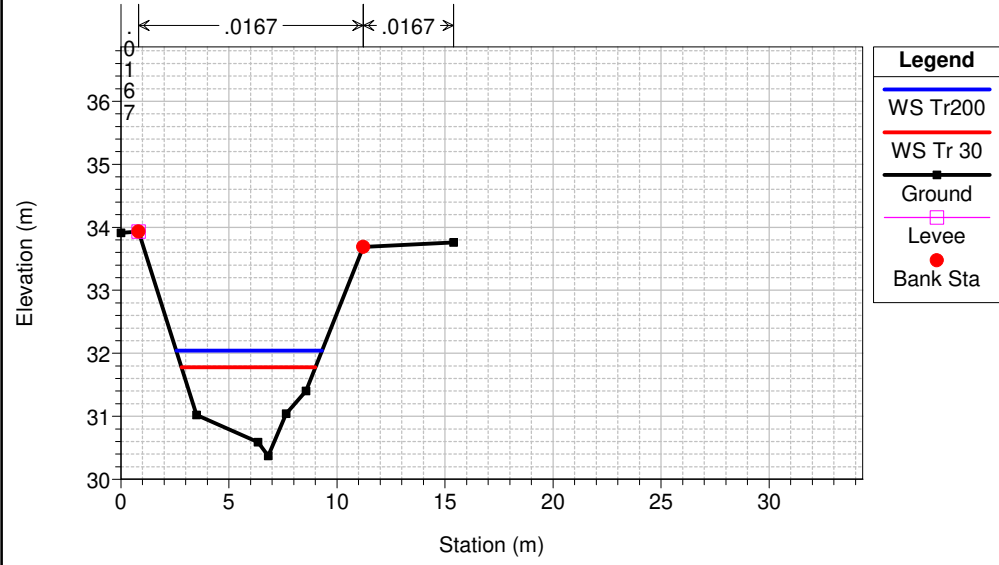
Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 3



Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 2



Canabbia Plan: Plan 01  
 Geom: canabbia\_02 Flow: portata  
 River = Canabbia Reach = Canabbia RS = 1



1 cm Horiz. = 3.5 m 1 cm Vert. = 1.2 m

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Max Chl Dpth (m)	LOB Elev (m)	ROB Elev (m)	L. Freeboard (m)	R. Freeboard (m)	Vel Chnl (m/s)	Froude # Chl	Length Chnl (m)
Canabba	26	Tr200	38.25	55.78	56.69	0.91	56.33	56.99	-0.36	0.30	3.93	1.70	18.67
Canabba	26	Tr 30	22.95	55.78	56.54	0.76	56.33	56.99	-0.21	0.45	3.39	1.64	18.67
Canabba	25	Tr200	38.25	53.83	54.85	1.02	54.73	55.13	-0.12	0.28	4.17	1.72	20.00
Canabba	25	Tr 30	22.95	53.83	54.76	0.93	54.73	55.13	-0.03	0.37	3.25	1.43	20.00
Canabba	24	Tr200	38.25	53.57	54.45	1.52	54.44	54.66	-0.01	0.21	0.99	0.49	23.00
Canabba	24	Tr 30	22.95	53.57	54.45	1.52	54.44	54.66	-0.01	0.21	0.59	0.29	23.00
Canabba	22	Tr200	38.25	48.68	50.11	1.43	49.89	51.97	-0.22	1.86	5.09	1.72	20.32
Canabba	22	Tr 30	22.95	48.68	49.80	1.12	49.89	51.97	0.09	2.17	4.64	1.83	20.32
Canabba	21	Tr200	38.25	47.07	50.52	3.45	48.63	49.94	-1.89	-0.58	1.84	0.40	19.67
Canabba	21	Tr 30	22.95	47.07	49.06	1.99	48.63	49.94	-0.43	0.88	3.88	1.21	19.67
Canabba	20	Tr200	38.25	45.98	50.41	4.43	48.07	47.27	-2.34	-3.14	1.93	0.31	16.00
Canabba	20	Tr 30	22.95	45.98	49.10	3.12	48.07	47.27	-1.03	-1.83	1.75	0.35	16.00
Canabba	19	Tr200	38.25	46.00	49.73	3.73	48.05	48.87	-1.68	-0.86	3.79	0.66	22.87
Canabba	19	Tr 30	22.95	46.00	48.40	2.40	48.05	48.87	-0.35	0.47	3.74	0.83	22.87
Canabba	18	Tr200	38.25	44.85	50.14	5.29	46.89	46.24	-3.25	-3.90	1.46	0.21	1.47
Canabba	18	Tr 30	22.95	44.85	48.76	3.91	46.89	46.24	-1.87	-2.52	1.29	0.22	1.47
Canabba	17	Tr200	38.25	44.93	49.46	4.53	46.28	46.31	-3.18	-3.15	3.66	0.57	0.10
Canabba	17	Tr 30	22.95	44.93	48.30	3.37	46.28	46.31	-2.02	-1.99	3.04	0.56	0.10
Canabba	16.5		Bridge										
Canabba	16	Tr200	38.25	44.85	47.08	2.23	46.11	46.13	-0.97	-0.95	3.77	0.90	23.23
Canabba	16	Tr 30	22.95	44.85	46.78	1.93	46.11	46.13	-0.67	-0.65	3.18	0.83	23.23
Canabba	15	Tr200	38.25	43.99	45.57	1.58	44.78	45.87	-0.79	0.30	4.62	1.43	19.23
Canabba	15	Tr 30	22.95	43.99	45.25	1.26	44.78	45.87	-0.47	0.62	4.09	1.45	19.23
Canabba	14	Tr200	38.25	43.08	46.06	2.98	44.43	44.22	-1.63	-1.84	1.69	0.37	17.76
Canabba	14	Tr 30	22.95	43.08	45.54	2.46	44.43	44.22	-1.11	-1.32	1.33	0.33	17.76
Canabba	13	Tr200	38.25	42.09	45.92	3.83	43.20	43.05	-2.72	-2.87	2.04	0.37	21.92
Canabba	13	Tr 30	22.95	42.09	45.48	3.39	43.20	43.05	-2.28	-2.43	1.42	0.28	21.92
Canabba	12	Tr200	38.25	41.40	46.01	4.61	44.09	44.42	-1.92	-1.59	0.99	0.18	3.00
Canabba	12	Tr 30	22.95	41.40	45.52	4.12	44.09	44.42	-1.43	-1.10	0.73	0.15	3.00
Canabba	11	Tr200	38.25	41.40	45.87	4.47	45.17	45.33	-0.70	-0.54	1.80	0.33	0.10
Canabba	11	Tr 30	22.95	41.40	45.46	4.06	45.17	45.33	-0.29	-0.13	1.25	0.24	0.10
Canabba	10.8		Bridge										
Canabba	10.5	Tr200	38.25	41.34	43.92	2.58	45.11	45.27	1.19	1.35	4.13	1.01	10.16
Canabba	10.5	Tr 30	22.95	41.34	43.35	2.01	45.11	45.27	1.76	1.92	3.62	1.01	10.16
Canabba	10	Tr200	38.25	40.75	42.28	1.53	42.00	44.81	-0.28	2.53	7.34	2.54	22.18
Canabba	10	Tr 30	22.95	40.75	42.15	1.40	42.00	44.81	-0.15	2.66	6.08	2.22	22.18
Canabba	9	Tr200	38.25	39.00	41.91	2.91	39.86	41.50	-2.05	-0.41	1.67	0.35	17.84
Canabba	9	Tr 30	22.95	39.00	40.98	1.98	39.86	41.50	-1.12	0.52	1.90	0.51	17.84
Canabba	8	Tr200	38.25	38.40	41.52	3.12	39.44	40.19	-2.08	-1.33	2.75	0.51	2.40
Canabba	8	Tr 30	22.95	38.40	40.76	2.36	39.44	40.19	-1.32	-0.57	2.36	0.51	2.40
Canabba	7	Tr200	38.25	38.43	40.85	2.42	39.91	40.13	-0.94	-0.72	4.46	1.00	0.20
Canabba	7	Tr 30	22.95	38.43	40.26	1.83	39.91	40.13	-0.35	-0.13	3.77	1.00	0.20
Canabba	6.5	Tr200	38.25	37.47	39.67	2.20	39.91	40.13	0.24	0.46	6.40	1.70	6.70
Canabba	6.5	Tr 30	22.95	37.47	39.14	1.67	39.91	40.13	0.77	0.99	5.85	1.71	6.70
Canabba	6	Tr200	38.25	37.20	38.44	1.24	40.23	40.23	1.79	1.79	7.80	2.25	0.03
Canabba	6	Tr 30	22.95	37.20	38.01	0.81	40.23	40.23	2.22	2.22	7.22	2.59	0.03
Canabba	5.5		Bridge										
Canabba	5	Tr200	38.25	35.80	37.00	1.20	38.82	38.82	1.82	1.82	8.54	2.60	0.03
Canabba	5	Tr 30	22.95	35.80	36.63	0.83	38.82	38.82	2.19	2.19	7.75	2.90	0.03
Canabba	4	Tr200	38.25	34.30	35.33	1.03	38.82	38.82	3.49	3.49	10.14	3.32	20.17
Canabba	4	Tr 30	22.95	34.30	34.99	0.69	38.82	38.82	3.83	3.83	9.45	3.86	20.17
Canabba	3	Tr200	38.25	31.60	32.83	1.23	36.70	36.23	3.87	3.40	9.64	3.32	22.26
Canabba	3	Tr 30	22.95	31.60	32.54	0.94	36.70	36.23	4.16	3.69	8.53	3.33	22.26
Canabba	2	Tr200	38.25	31.03	32.28	1.25	34.46	34.83	2.18	2.55	7.37	2.55	24.23
Canabba	2	Tr 30	22.95	31.03	32.04	1.01	34.46	34.83	2.42	2.79	6.04	2.33	24.23
Canabba	1	Tr200	38.25	30.37	32.04	1.67	33.93	33.69	1.89	1.65	5.59	1.77	
Canabba	1	Tr 30	22.95	30.37	31.78	1.41	33.93	33.69	2.15	1.91	4.47	1.57	

## MODELLI IDRAULICI BIDIMENSIONALI

Si riportano gli output forniti dal codice di calcolo Hec-Ras 5.0.6 relativi alle esondazioni. Si allegano:

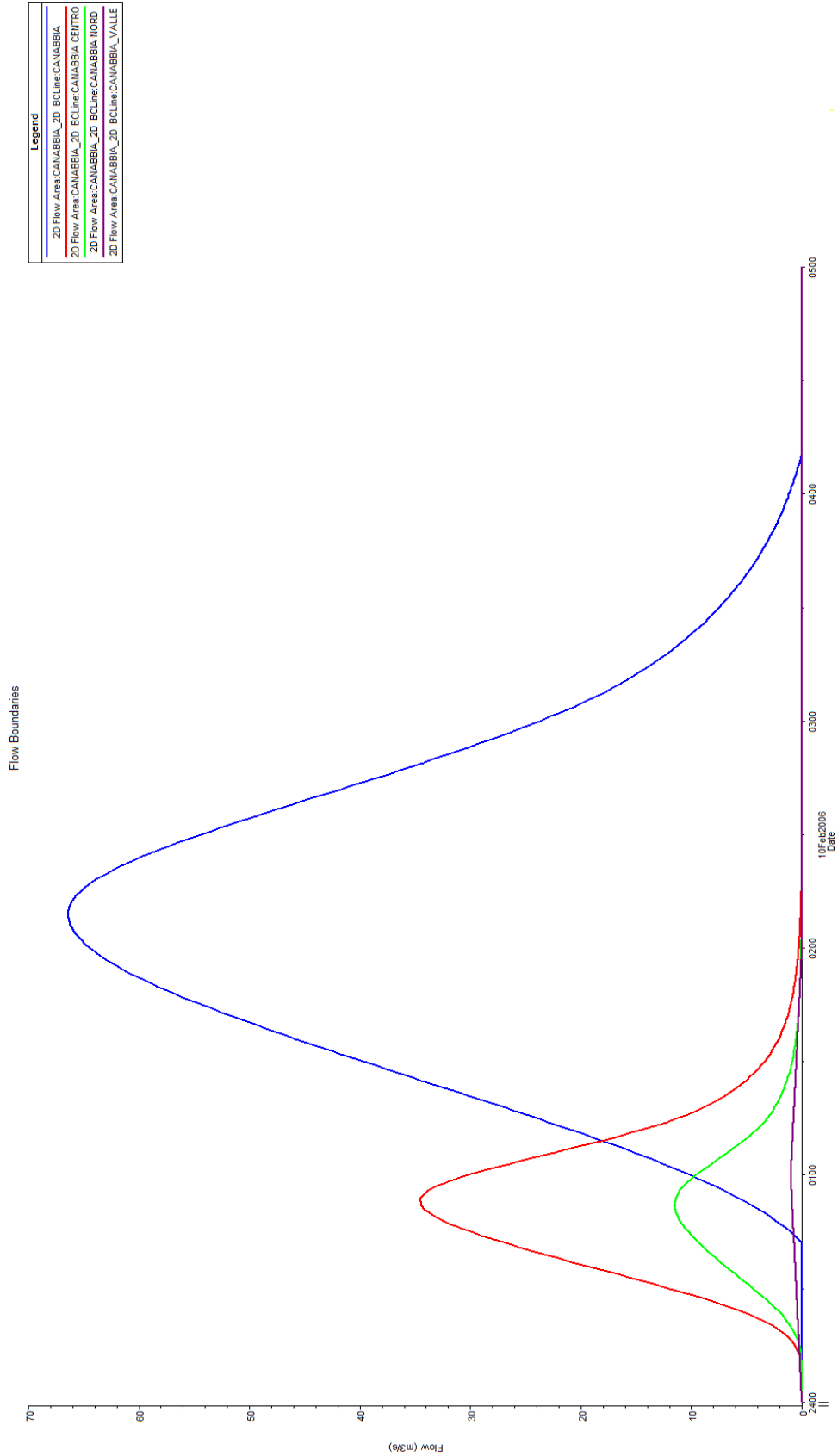
- Gli idrogrammi di ingresso nel modello;
- La planimetria dello schema di modello;
- Alcune sezioni indicative per la dinamica di esondazione;

Si fa presente che i risultati in termini di massimo battente idraulico e di massima velocità del flusso di corrente sono riportati negli appositi elaborati grafici (QG 12, QG 12a, QG 13 e QG 13a).

I fenomeni del presente allegato sono quelli indicati come quelli di massima portata all'interno della relazione idraulica (quelli maggiormente critici). Gli output dei fenomeni di massimo volume sono comunque inclusi all'interno della copia digitale consegnata unitamente al presente elaborato.

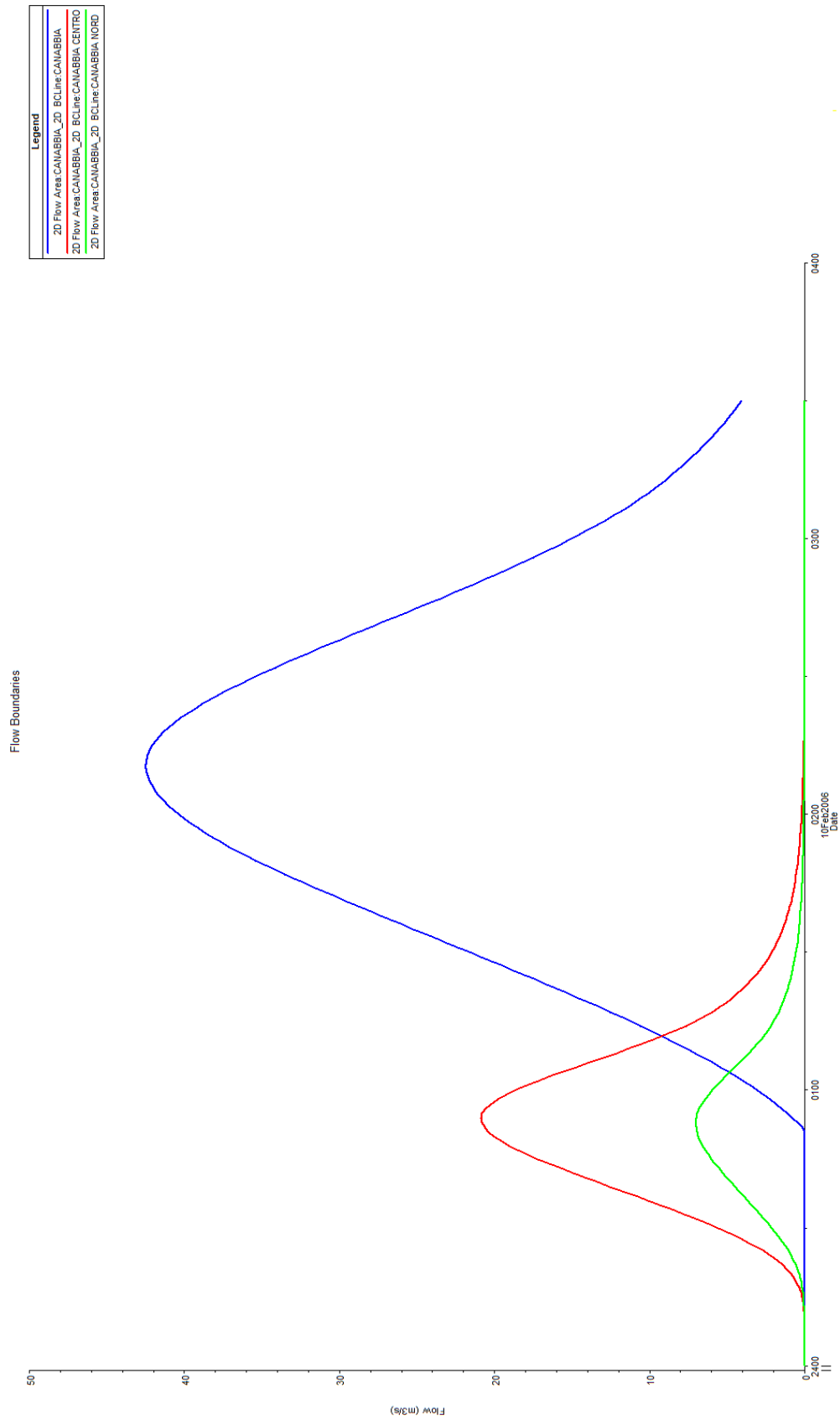
## IDROGRAMMI IN ENTRATA NEL MODELLO BIDIMENSIONALE

Tempi di ritorno 200 anni



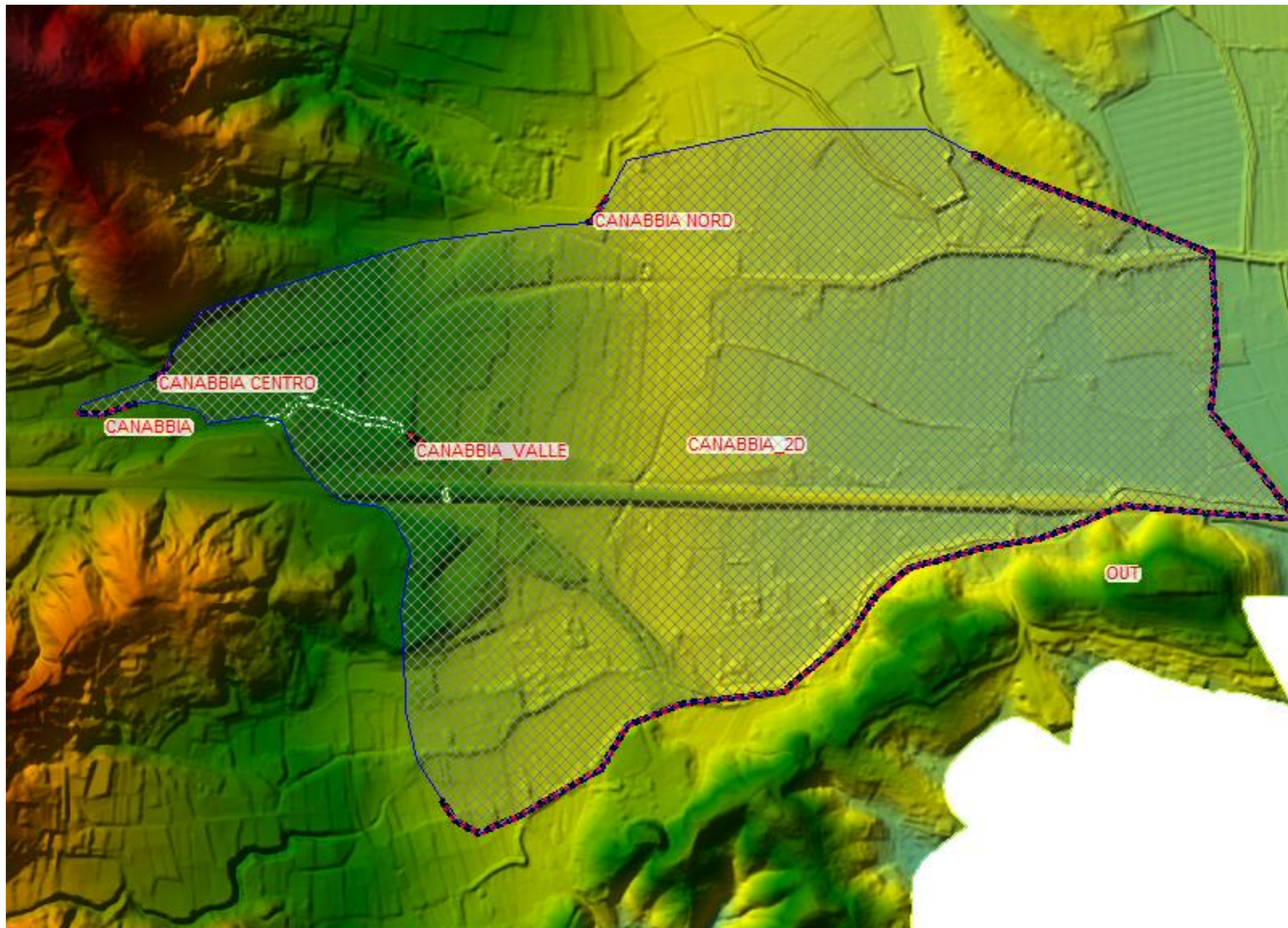


### Tempo di ritorno 30 anni



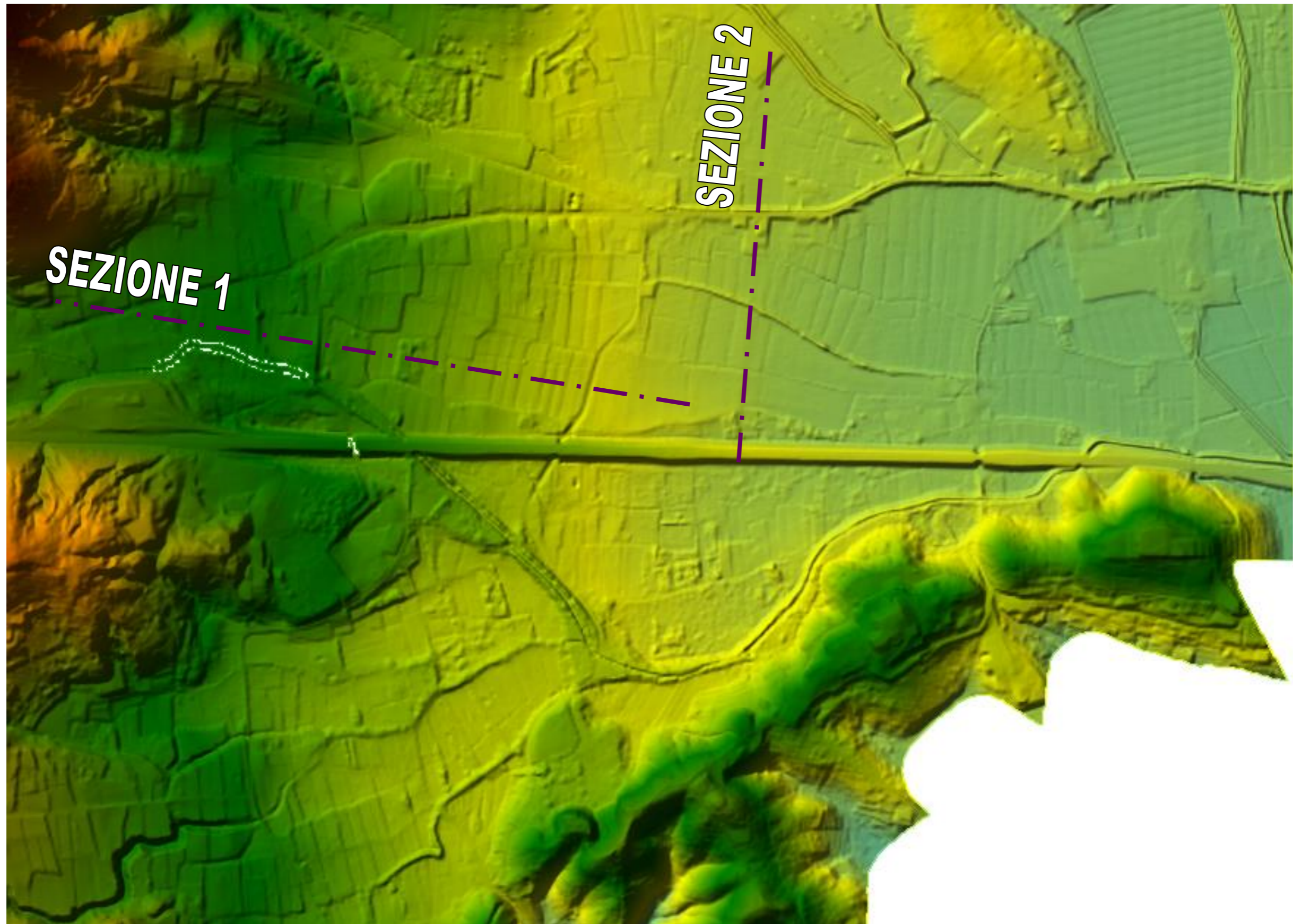


SCHEMA DEL MODELLO DI CALCOLO



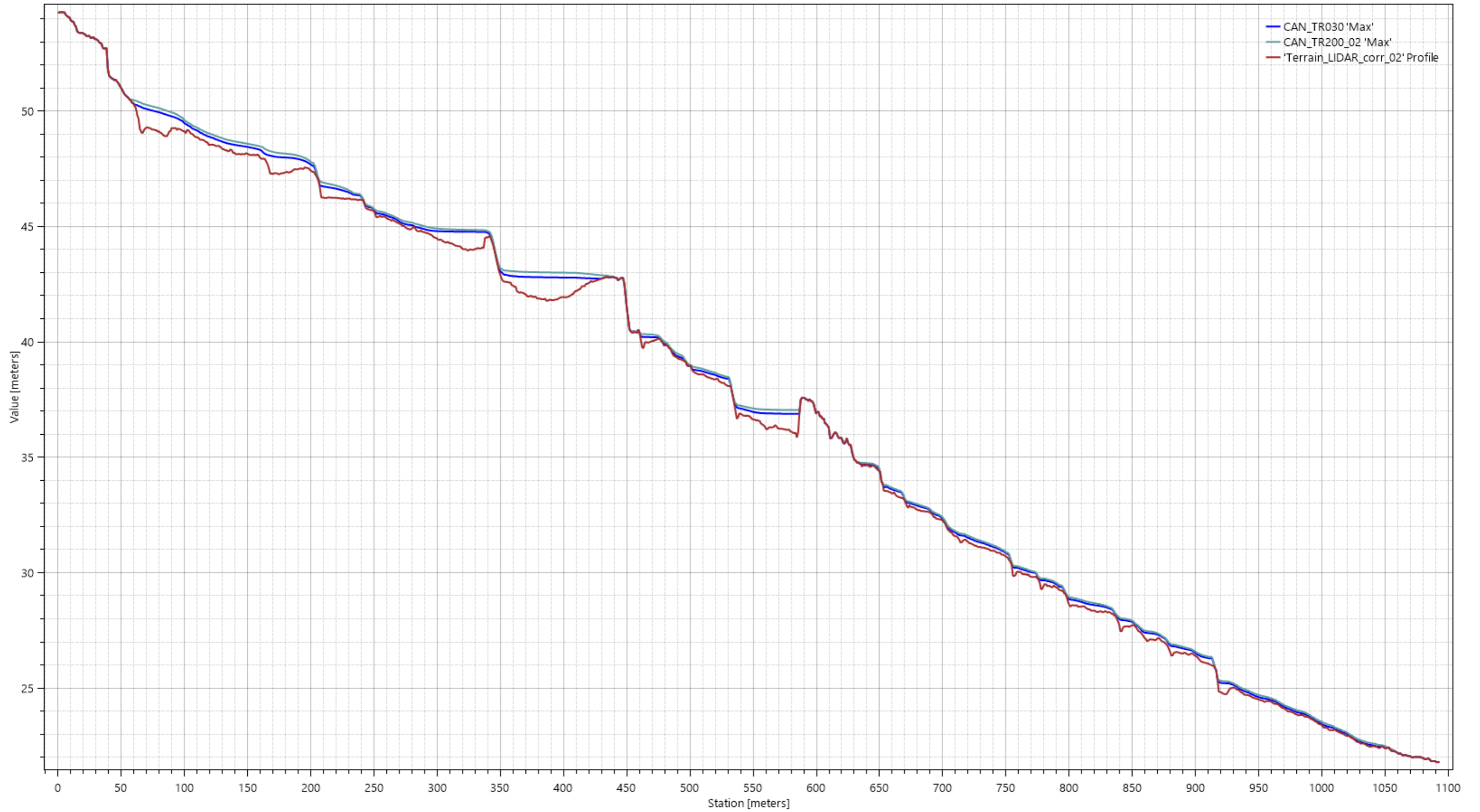


PLANIMETRIA CON INDICAZIONE DELLE SEZIONI DI CONTROLLO



SEZIONE 1

Water Surface Elevation on 'sez 1'





SEZIONE 2

Water Surface Elevation on 'sez 2'

