

Final Report

**FEHMARNBELT FIXED LINK
HYDROGRAPHIC SERVICES (FEHY)**

Marine Soil – Impact Assessment

**Sediment Spill during Construction of
the Fehmarnbelt Fixed Link**

E1TR0059 - Volume II

APPENDICES A-B-F-G-H-I-J-K-L-M



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Geodatastyrelsen (formerly Kort- og Matrikelstyrelsen), Kort10 and 25 Matrikelkort

GEUS (De Nationale Geologiske Undersøgelser for Danmark og Grønland)

HELCOM (Helsinki Commission – Baltic Marine Environment Protection Commission)

Landesamt für Vermessung und Geoinformation Schleswig-Holstein (formerly Landesvermessungsamt Schleswig-Holstein) GeoBasis-DE/LVermGeo SH

Model software geographic plots: Also data from Farvandsvæsenet and Bundesamt für Seeschifffahrt und Hydrographie

Photos:

Photos taken by consortium members unless otherwise stated

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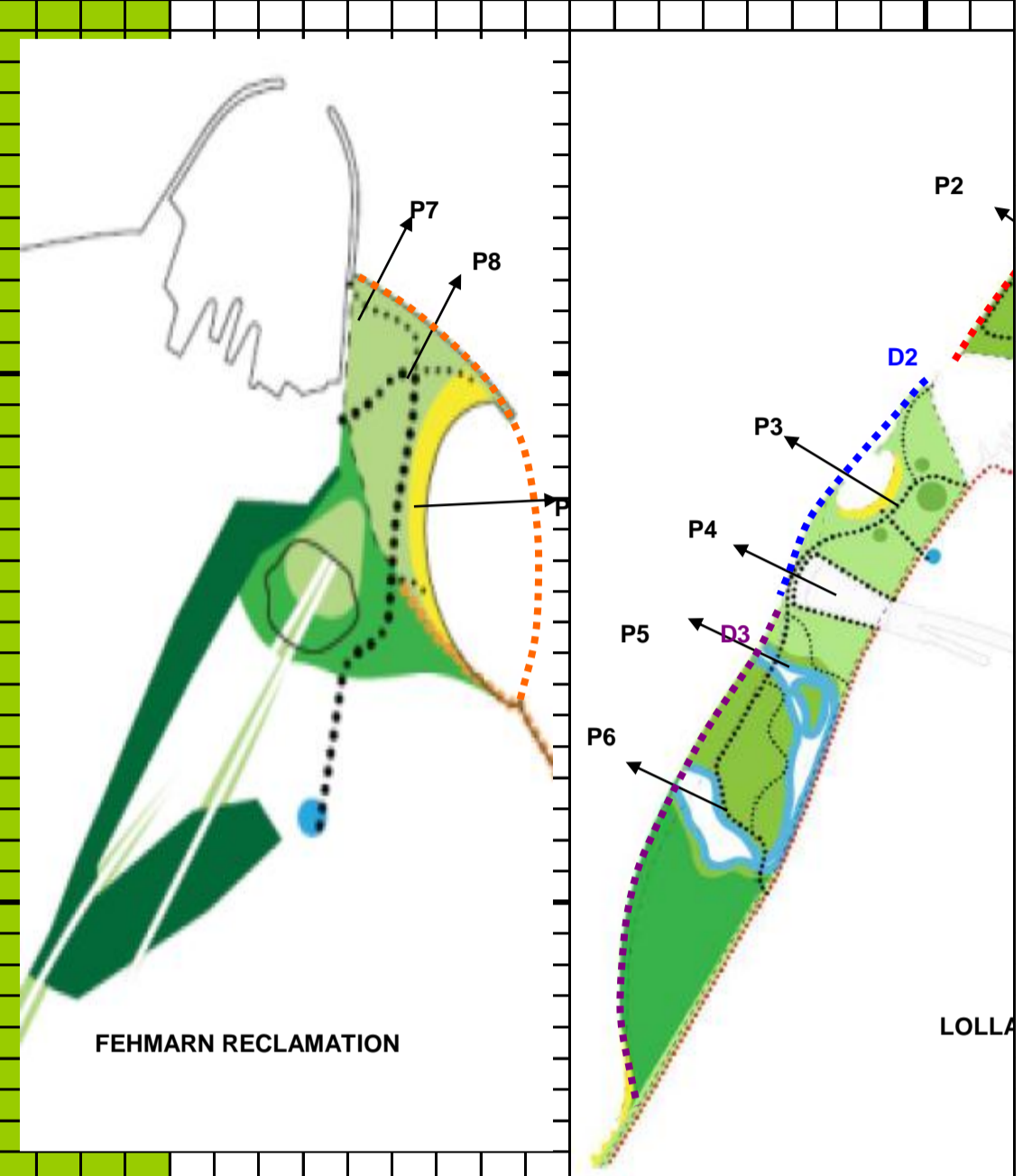
A P P E N D I X A

Earth Balance for Tunnel Solutions

B. CONSTRUCTION SPILLAGE/GENERAL APPROCH

Project Fehmarnbelt Fixed Link - Tunnel Design Services
 Prepared SPE/EVP/TWO
 Date 31/12/2010

WORK SECTIONS	Material		Equipment		Quantity [m ³]	Production [m ³ /week]	Time [weeks]	Spillage		1-juli ----- 1-August																																																																						
	Type	Source	Type	Cap.				Av [kg/m ³]	Av [%]	Point	In water column	2019																																																																				
	[-]	[-]		[m ³]						36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	1	2
Containment dikes (DC)																																																																																
Lolland - East - Section 1 (1,250m)	Sand	Kriegers Flak	BHD1	4	100,247	23,000	4.36	15.00	0.80	D1	Entire Water Column																																																																					
	Clay Till	Work Harbour	BHD2	4	123,194	23,000	5.36	15.00	0.70	D1	Entire Water Column																																																																					
	Armour	Quarry	GD1,2,3	2	64,136	7,500	8.55	2.00	0.10	D1	Entire Water Column																																																																					
Lolland - East - Section 2 (2,350m)	Sand	Kriegers Flak	BHD2	4	146,739	23,000	6.38	15.00	0.80	D2	Entire Water Column																																																																					
	Clay Till	Work Harbour	BHD1	4	191,962	23,000	8.35	15.00	0.70	D2	Entire Water Column																																																																					
	Armour	Quarry	GD1,2,3,4,5	2	98,380	12,500	7.87	2.00	0.10	D2	Entire Water Column																																																																					
Lolland -West (1700m)	Sand	Kriegers Flak	BHD1	4	107,370	23,000	4.67	15.00	0.80	D3	Entire Water Column																																																																					
	Clay Till	Work Harbour	BHD2	4	140,460	23,000	6.11	15.00	0.70	D3	Entire Water Column																																																																					
	Armour	Quarry	GD1,2,3,4,5	2	71,985	12,500	5.76	2.00	0.10	D3	Entire Water Column																																																																					
Fehmarn - East (650m)	Sand	Kriegers Flak	BHD5	4	44,535	23,000	1.94	15.00	0.80	D4	Entire Water Column																																																																					
	Clay Till	P&R	BHD6	4	53,585	23,000	2.33	15.00	0.70	D4	Entire Water Column																																																																					
	Armour	Quarry	GD4,5,6	2	28,590	7,600	3.76	2.00	0.10	D4	Entire Water Column																																																																					
Portal&Ramps (P&R)																																																																																
Lolland - Lateral dike	Pal. Clay	Trench (GE)	BHD2	4	23,910	29,502	0.81	5.00	0.40	P4	Entire Water Column																																																																					
	Clay Till	P&R	BHD1	4	116,340	29,502	3.94	15.00	0.70	P4	Entire Water Column																																																																					
- Front dike	Pal. Clay	Trench (GE)	BHD1	4	19,305	22,790	0.85	5.00	0.40	P4	Entire Water Column																																																																					
	Clay Till	P&R	BHD2	4	58,500	22,790	2.57	15.00	0.70	P4	Entire Water Column																																																																					
	Armour	Quarry	GD1,2,3	2	11,423	7,600	1.50	2.00	0.10	P4	Entire Water Column																																																																					
- Dredging ramp	Clay Till	P&R	BHD4	4	120,000	33,000	4.00	15.00	0.70	P4	Entire Water Column																																																																					
- Bedding layer ramp	Gravel	Quarry	GD1	2	10,000	10,000	1.00	2.00	0.20	P4	Entire Water Column																																																																					
Fehmarn - Lateral dike	Pal. Clay	Trench (GE)	BHD5	4	27,547	29,502	0.93	5.00	0.40	P8	Entire Water Column																																																																					
	Clay Till	P&R	BHD6	4	83,928	29,502	2.84	15.00	0.70	P8	Entire Water Column																																																																					
- Front dike	Pal. Clay	Trench (GE)	BHD6	4	17,325	23,000	0.75	5.00	0.40	P8	Entire Water Column																																																																					
	Clay Till	P&R	BHD5	4	49,088	23,000	2.13	15.00	0.70	P8	Entire Water Column																																																																					
	Armour	Quarry	GD4,5,6	2	9,009	7,600	1.19	2.00	0.10	P8	Entire Water Column																																																																					
- Dredging ramp	Clay Till	P&R	BHD4	4	125,000	33,000	4.00	15.00	0.70	P8	Entire Water Column																																																																					
- Bedding layer ramp	Gravel	Quarry	GD4	2	10,000	10,000	1.00	2.00	0.20	P8	Entire Water Column																																																																					
Working Harbour (WH)																																																																																
Lolland - Internal dikes (600m)	Sand	Kriegers Flak	BHD1	4	30,456	29,502	1.03	15.00	0.80	P3	Entire Water Column																																																																					
	Clay Till	Work Harbour	BHD2	4	39,144	29,502	1.33	15.00	0.70	P3	Entire Water Column																																																																					
	Armour	Quarry	GD1,2,3	2	6,467	7,600	0.85	2.00	0.10	P3	Entire Water Column																																																																					
- Dredging to MSL-7.5m	Clay Till	P&R	BHD4	4	520,000	33,000	16.00	12.00	0.60	P3	Entire Water Column																																																																					
- Add. Dredging Deeper Basins	All materials	above -25	BHD4	4	280,000	33,000	8.48	15.0	0.70	P3	Entire Water Column																																																																					
- Add. Dredging Work Harbour	All materials	above -25	BHD5,6	4	2,000,000	66,000	30.30	15.0	0.70	P3	Entire Water Column																																																																					
					3,480,000	2,800,000																																																																										
Fehmarn - Internal dikes (300m)	Sand	Kriegers Flak	BHD5	4	39,732	29,502	1.35	15.00	0.80	P7	Entire Water Column																																																																					
	Clay Till	Work Harbour	BHD6	4	48,813	29,502	1.65	15.00	0.70	P7	Entire Water Column																																																																					
	Armour	Quarry	GD4,5,6	2	21,165	7,600	2.78	2.00	0.10	P7	Entire Water Column																																																																					
Trench Dredging																																																																																
Trench					14,495,000	201,319	72.00	58.1	3.50%	T1/T2	(see other sheet)																																																																					
Access Channel	All materials	above -25	2*BHD	15	1,000,000	180,000	5.56	69.7	3.50	T3	Entire Water Column																																																																					
Reclamation/disposal (100% of total amount of material will be disposed of under MSL)																																																																																
Lolland - East - Section 1	All soils	Trench	BHD	4	4,270,000	59,306	72.00	5.00	0.50	P3/P4	Entire Water Column																																																																					
- Add. Lolland - East - Section 1	All soils	Trench	BHD	4	1,800,000	112,500	16.00	5.00	0.50	P3/P4	Entire Water Column																																																																					
Lolland - East - Section 2	All soils	Trench	BHD	4	7,810,000	130,167	60.00	5.00	0.50	P5/P6	Entire Water Column																																																																					
Lolland - West	All soils	Trench	BHD	4	4,730,000	70,597	67.00	5.00	0.50	P1	Entire Water Column																																																																					
Add. Lolland - West	All soils	Trench	BHD	4	2,000,000	59,306	21.00	5.00	0.50	P1	Entire Water Column																																																																					
Fehmarn - East	All soils	Trench	BHD	4	220,000	27,500	8.00	5.00	0.50	P8	Entire Water Column																																																																					
Trench Backfilling																																																																																
Lolland out (8.8km)																																																																																
- Foundation bed	Gravel	Quarry	Scrader		317,572	2,625	121.00	2.00	0.10	T1/T2	BL-0 to BL-3m																																																																					
- Locking Fill	Gravel/sand	Quarry	GD	10	405,235	3,349	121.00	2.00	0.10	T1/T2	Entire Water Column																																																																					
- General Fill	Clay Till	Lolland recl.	GD	10	1,608,913	13,297	121.00	15.00	0.80	T1/T2	Entire Water Column																																																																					
- Rock Protection	Rock	Quarry	GD	10	1,053,987	8,711	121.00	2.00	0.10	T1/T2	Entire Water Column																																																																					
Fehmarn out (8.8km)																																																																																
- Foundation bed	Gravel	Quarry	Scrader		327,318	2,705	121.00	2.00	0.10	T1/T2	BL-0 to BL-3m																																																																					
- Locking Fill	Gravel/sand	Quarry	GD	10	421,690	3,485	121.00	2.00	0.10	T1/T2	Entire Water Column																																																																					
- General Fill	Clay Till	Lolland recl.	GD	10	1,370,934	11,330	121.00	15.00	0.80	T1/T2	Entire Water Column																																																																					
- Rock Protection	Rock	Quarry	GD	10	900,045	7,438	121.00	2.00	0.10	T1/T2	Entire Water Column																																																																					
Restoring seabed Natura 2000																																																																																
- Filter Rock	Rock	Quarry	GD	10	145,000	11,000	13.18	2.00	0.10	T1/T2	Entire Water Column																																																																					
- Dredged material	All soils	Lolland recl.	GD	10	330,000	25,000	13.20	15.00	1.00	T1/T2	Entire Water Column																																																																					
Landscaping reclamation area (70% in Lolland and 50% in Fehmarn of total amount of material will be disposed of under MSL)																																																																																
Backfilling WH - Lolland	All soils	Lolland east	Dumpers		1,200,000	92,308	13.00	5.00	0.50	P3	Entire Water Column																																																																					
- Add. Backfilling WH+Deep Basin	All soils	Lolland east	Dumpers		2,600,000	200,000	13.00	5.00	0.50	P3	Entire Water Column																																																																					
Beach - Lolland East	Sand	Kriegers Flak	TSHD	6,200	70,000	34,000	2.06	30.00	2.00	P3	Entire Water Column																																																																					
Beach&Dunes - Lolland West	Sand	Kriegers Flak	TSHD	6,200	440,000	34,000	12.94	30.00	2.00	P1	Entire Water Column																																																																					



- P1 Lolland Reclamation West - Beach & Dunes
 - P2 Entrance to Lolland Reclamation West - Opening 1
 - P3 Entrance to Lolland WH
 - P4 Temporary entrance to Lolland P&R area
 - P5 Entrance to Lolland Reclamation East - Opening 1
 - P6 Entrance to Lolland Reclamation East - Opening 2
 - P7
 - P8
 - P9
- D1 Lolland Containment Dike East - Section 1
 - D2 Lolland containment Dike East - Section 2
 - D3 Lolland Containment Dike West - Section 3
 - D4 Fehmarn Containment Dike East
 - T1 Tunnel Trench, Lolland - centre of Fehmarn Belt
 - T2 Tunnel Trench, Fehmarn - centre of Fehmarn Belt

Without Production facility
 Production facility
 With Production facility



A P P E N D I X B

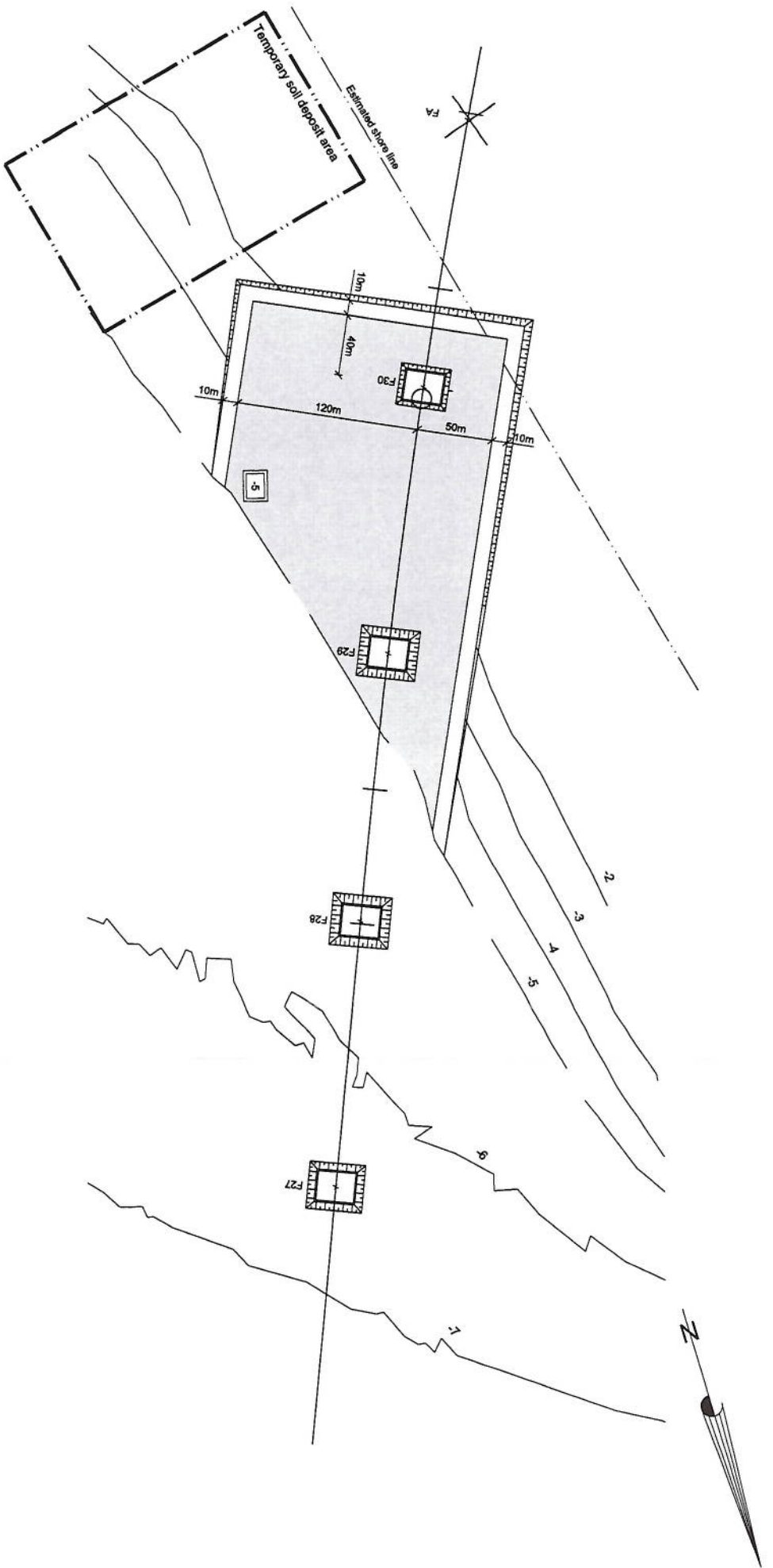
Earth Balance for Bridge Solution

Grid line ID	Chainage	EAST	NORTH	PHI
	[m]	[m]	[m]	[grades]
FA	2811	644601.712	6041347.391	29.458
F30	2992	644680.054	6041510.550	27.538
F29	3172	644753.048	6041675.078	25.628
F28	3352	644821.270	6041841.644	24.178
F27	3532	644887.999	6042008.818	24.178
F26	3712	644954.728	6042175.992	24.178
F25	3912	645029.425	6042361.519	24.657
F24	4112	645105.847	6042546.342	25.264
F23	4312	645184.026	6042730.428	25.870
F22	4512	645263.954	6042913.761	26.476
F21	4713	645346.037	6043097.236	27.086
F20	4914	645429.873	6043279.917	27.695
F19	5114	645515.023	6043460.884	28.301
F18	5314	645601.893	6043641.032	28.908
F17	5514	645690.475	6043820.345	29.514
F16	5714	645780.760	6043998.806	30.120
F15	5914	645872.741	6044176.398	30.727
F14	6114	645966.409	6044353.107	31.333
F13	6315	646062.236	6044529.793	31.942
F12	6516	646159.751	6044705.553	32.552
F11	6716	646258.445	6044879.504	33.158
F10	6916	646358.792	6045052.508	33.764
F9	7116	646460.782	6045224.548	34.370
F8	7316	646564.405	6045395.609	34.977
F7	7516	646669.653	6045565.675	35.583
F6	7716	646776.516	6045734.732	36.189
F5	7917	646885.530	6045903.600	36.799
F4	8118	646996.156	6046071.417	37.408
F3	8318	647107.821	6046237.341	38.014
F2	8518	647221.060	6046402.194	38.621
F1	8718	647335.858	6046565.966	39.168
STP	8919	647451.867	6046730.109	39.168
SAP	9120	647567.877	6046894.251	39.168
SOP	9500	647787.199	6047204.570	39.168
CP	10400	648306.646	6047939.536	39.168
NOP	11300	648826.092	6048674.502	39.168
NAP	11680	649045.414	6048984.821	39.168
NTP	11881	649161.424	6049148.964	39.168
L1	12082	649277.434	6049313.106	39.168
L2	12282	649392.316	6049476.819	38.701
L3	12482	649505.889	6049641.443	38.192
L4	12682	649618.142	6049806.969	37.682
L5	12883	649729.618	6049974.223	37.171
L6	13084	649839.746	6050142.368	36.659

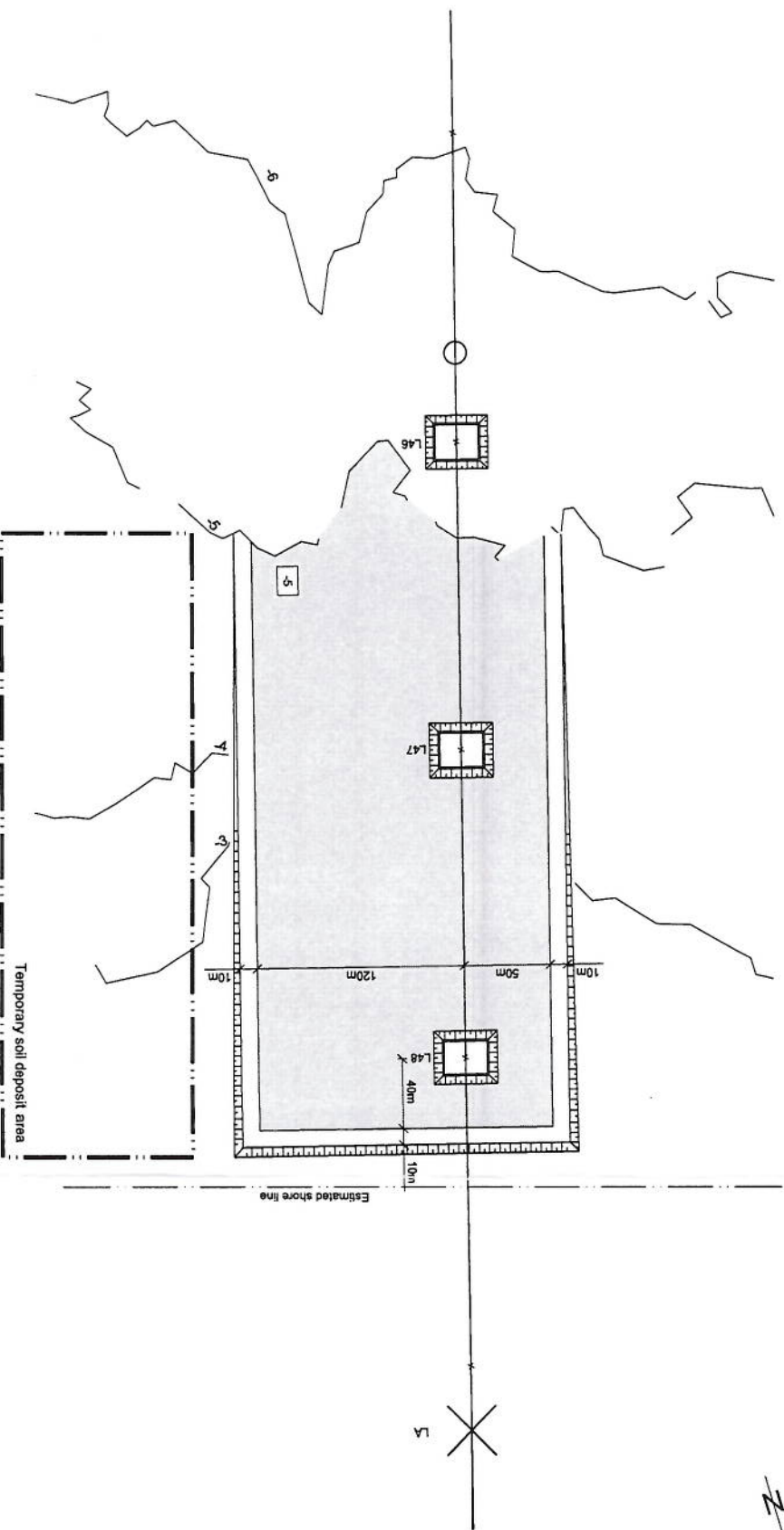
Grid line ID	Chainage	EAST	NORTH	PHI
	[m]	[m]	[m]	[grades]
L7	13284	649947.981	6050310.550	36.149
L8	13484	650054.866	6050479.592	35.640
L9	13684	650160.396	6050649.483	35.131
L10	13884	650264.564	6050820.214	34.622
L11	14084	650367.362	6050991.772	34.112
L12	14284	650468.785	6051164.148	33.603
L13	14485	650569.322	6051338.197	33.091
L14	14686	650668.456	6051513.048	32.579
L15	14886	650765.699	6051687.816	32.070
L16	15086	650861.541	6051863.355	31.561
L17	15286	650955.975	6052039.656	31.051
L18	15486	651048.996	6052216.707	30.542
L19	15686	651140.597	6052394.496	30.033
L20	15886	651230.773	6052573.012	29.523
L21	16087	651319.959	6052753.142	29.012
L22	16288	651407.693	6052933.983	28.500
L23	16488	651493.545	6053114.619	27.990
L24	16688	651577.949	6053295.935	27.481
L25	16888	651660.900	6053477.921	26.972
L26	17088	651742.392	6053660.565	26.463
L27	17288	651822.420	6053843.855	25.953
L28	17488	651900.980	6054027.780	25.444
L29	17689	651978.447	6054213.251	24.932
L30	17890	652054.421	6054399.339	24.420
L31	18090	652128.530	6054585.102	23.911
L32	18290	652201.150	6054771.451	23.402
L33	18490	652272.276	6054958.376	22.892
L34	18690	652341.906	6055145.863	22.383
L35	18890	652410.033	6055333.902	21.874
L36	19090	652476.653	6055522.479	21.365
L37	19291	652542.085	6055712.530	20.853
L38	19492	652605.986	6055903.102	20.341
L39	19692	652668.047	6056093.229	19.832
L40	19892	652728.585	6056283.846	19.322
L41	20092	652787.596	6056474.941	18.813
L42	20292	652845.076	6056666.503	18.304
L43	20492	652901.022	6056858.518	17.794
L44	20692	652955.446	6057050.970	17.359
L45	20872	653003.921	6057224.320	17.359
L46	21052	653052.395	6057397.670	17.359
L47	21232	653100.870	6057571.020	17.359
L48	21412	653149.344	6057744.370	17.359
LA	21593	653198.107	6057918.678	17.458

Activity Name	Start	Finish	Original Duration	Main Activity	2013	2014	2015	2016	2017	2018	2019
Construction Schedule ...					Q2	Q3	Q4	Q1	Q2	Q3	Q4
Lolland Approach Bridge	18-Sep-14	19-Sep-16	782d								
Design Activities			0d								
Mobilisation Activities			0d								
Span L49 - 181	18-Sep-14	09-Oct-14	22d								
Span L48 - 180	09-Oct-14	12-Oct-14	4d								
Span L47 - 180	13-Oct-14	16-Oct-14	4d								
Span L46 - 180	17-Oct-14	20-Oct-14	4d								
Span L45 - 180	21-Oct-14	24-Oct-14	4d								
Span L44 - 200	25-Oct-14	28-Oct-14	4d								
Span L43 - 200	29-Oct-14	01-Nov-14	4d								
Span L42 - 200	02-Nov-14	05-Nov-14	4d								
Span L41 - 200	06-Nov-14	09-Nov-14	4d								
Span L40 - 200	10-Nov-14	13-Nov-14	4d								
Span L39 - 200	14-Nov-14	17-Nov-14	4d								
Span L38 - 201	18-Nov-14	21-Nov-14	4d								
Span L37 - 201	23-Nov-14	27-May-15	4d								
Span L36 - 200	27-May-15	30-May-15	4d								
Span L35 - 200	31-May-15	03-Jun-15	4d								
Span L34 - 200	04-Jun-15	07-Jun-15	4d								
Span L33 - 200	08-Jun-15	11-Jun-15	4d								
Span L32 - 200	12-Jun-15	15-Jun-15	4d								
Span L31 - 200	16-Jun-15	19-Jun-15	4d								
Span L30 - 201	20-Jun-15	23-Jun-15	4d								
Span L29 - 201	24-Jun-15	27-Jun-15	4d								
Span L28 - 200	28-Jun-15	01-Jul-15	4d								
Span L27 - 200	02-Jul-15	05-Jul-15	4d								
Span L26 - 200	06-Jul-15	09-Jul-15	4d								
Span L25 - 200	25-Dec-15	29-Dec-15	4d								
Span L24 - 200	29-Dec-15	01-Jan-16	4d								
Span L23 - 200	02-Jan-16	05-Jan-16	4d								
Span L22 - 201	06-Jan-16	09-Jan-16	4d								
Span L21 - 201	10-Jan-16	13-Jan-16	4d								
Span L20 - 200	14-Jan-16	17-Jan-16	4d								
Span L19 - 200	18-Jan-16	21-Jan-16	4d								
Span L18 - 200	22-Jan-16	25-Jan-16	4d								
Span L17 - 200	26-Jan-16	29-Jan-16	4d								
Span L16 - 200	30-Jan-16	02-Feb-16	4d								
Span L15 - 200	03-Feb-16	06-Feb-16	4d								
Span L14 - 201	07-Feb-16	10-Feb-16	4d								
Span L13 - 201	03-Aug-16	07-Aug-16	4d								
Span L12 - 200	07-Aug-16	10-Aug-16	4d								
Span L11 - 200	11-Aug-16	14-Aug-16	4d								
Span L10 - 200	15-Aug-16	18-Aug-16	4d								
Span L09 - 200	19-Aug-16	22-Aug-16	4d								
Span L08 - 200	23-Aug-16	26-Aug-16	4d								
Span L07 - 200	27-Aug-16	30-Aug-16	4d								
Span L06 - 201	31-Aug-16	03-Sep-16	4d								
Span L05 - 201	04-Sep-16	07-Sep-16	4d								
Span L04 - 200	08-Sep-16	11-Sep-16	4d								
Span L03 - 200	12-Sep-16	15-Sep-16	4d								
Span L02 - 200	16-Sep-16	19-Sep-16	4d								
Span L01 - 200			0d								
Finish and Test			0d								
Construction Schedule ...					Q2	Q3	Q4	Q1	Q2	Q3	Q4
Main Bridge	30-Jun-14	06-Nov-14	138d								
Design Activities			0d								
Mobilisation Activities			0d								
North Outer Pylon	29-Aug-14	06-Nov-14	74d								
Center Pylon	30-Jun-14	07-Sep-14	74d								
South Outer Pylon	09-Aug-14	07-Oct-14	64d								
Finish Work			0d								
Runnability and Testing			0d								
Completion of the Bridge			0d								
Construction Schedule ...					Q2	Q3	Q4	Q1	Q2	Q3	Q4
Fehmarn Approach Bridge	04-Jun-14	23-Jun-16	801d								
Design Activities			0d								
Mobilisation Activities			0d								
Span F31 - 181	05-Oct-14	09-Oct-14	4d								

TASK filter: Dredging and Soil Improvement.



Plan - Fehmarn
Scale 1:2000



Plan - Lolland
Scale 1:2000

Fehmarn channel:
Excavation 150,000 m³
to spoil 150,000 m³

Lolland channel:
Excavation 200,000 m³
to deposit (and re-fill) 200,000 m³

Notes: Dimensions are in metres unless otherwise noted.

Legend:

References:
AA429-C-P-DWG-00-00101 General Notes

Information 2010.03.06

Rev.	Date	Designated	Checked	Approved	Subject

Fehmarnbelt Fixed Link
Bridge Design - Conceptual Design



COWI/OBERMEYER
Design/Winning
Lorenz, Anders und Partner
Partnership

Date: Designated: LJP/RRR Checked: TOFLHE Approved: Rev. Date: Scale: As noted Paper size: A1
Project no.: 71073
Approach Bridge: Temporary Channels

Drawing No.: AA429-C-P-DWG-33-32421 Rev.: 0.1

summary pier quantities - Side Fehmarn Pier F1 to F30																		
pier no.	pier-type	sandfill $V_{sandfill}$ [m ³]	excavation		scour		refill V_{REF} [m ³]	grout V_{GR} [m ³]	crushed stonebed V_{CS} [m ³]	soil improvem. V_{SI} [m ³]	SU1 (sand)	SU2a (gyttja)	SU2b2b (clay/silt)	Clay till	Palaeogene clay	To spoil V_{spoil} [m ³]	To deposit $V_{deposit}$ [m ³]	Sediment type to deposit
			H_{exc} [m]	V_{exc} [m ³]	H_{sc} [m]	V_{sc} [m ³]					H	H	H	H				
F1	I	4183	4,0	5636	1,2	2046	1238	286	624	9112	0,4		3,6			5636	0	
F2	II	3867	4,0	5636	1,2	2051	1238	286	624	9112	0,3		3,7			5636	0	
F3	II	3791	4,0	5636	1,2	2056	1238	286	624	9112	0,5		3,5			5636	0	
F4	II	3689	4,0	5636	1,2	2061	1238	286	624	9112			4,0			5636	0	
F5	II	3581	4,0	5636	1,2	2067	1238	286	624	9112			4,0			5636	0	
F6	II	3476	4,0	5636	1,2	2072	1238	286	624	9112			4,0			5636	0	
F7	II	3397	4,0	5636	1,2	2077	1238	286	624	9112	0,4		3,6			5636	0	
F8	II	3272	4,0	5636	1,2	2083	1238	286	624	9112	1,6		2,4			2349	3287	Sand
F9	II	3166	4,0	5636	1,2	2088	1238	286	624	9112	0,2		3,8			5636	0	
F10	II	3044	4,0	5636	1,2	2094	1238	286	624	9112			1,8			5636	0	
F11	II	2945	4,0	5636	1,2	2099	1238	286	624	9112	0,6		2,7			5636	0	
F12	II	2829	4,0	5636	1,2	2105	1238	286	624	9112	0,9		3,0			5636	0	
F13	III	2710	4,0	5636	1,2	2111	1238	286	624	9112	0,8		3,2			5636	0	
F14	III	2571	4,0	5636	1,2	2118	1238	286	624	9112	0,9		3,1			5636	0	
F15	III	2432	4,0	5636	1,2	2125	1238	286	624	9112	0,5		3,5			5636	0	
F16	III	2312	4,0	5636	1,2	2131	1238	286	624	9112	0,5		3,5			5636	0	
F17	III	2202	4,0	5636	1,2	2138	1238	286	624	9112	0,5		3,5			5636	0	
F18	III	2105	4,0	5636	1,2	2143	1238	286	624	9112	0,1		2,6			5636	0	
F19	III	2009	4,0	5636	1,2	2149	1238	286	624	9112		0,8	2,9			5636	0	
F20	III	1904	4,0	5636	1,2	2156	1238	286	624	9112	0,5		3,5			5636	0	
F21	III	1827	4,0	5636	1,2	2161	1238	286	624	9112	1,2		2,8			2814	2822	Sand
F22	IV	1202	4,0	4380	1,2	1722	1059	209	451	7035	1,9		1,9			1476	2904	Sand
F23	IV	1128	4,0	4380	1,2	1727	1059	209	451	7035			2,7			3522	858	Clay till
F24	IV	1042	4,0	4380	1,2	1733	1059	209	451	7035			2,2			4380	0	Sand
F25	IV	954	4,0	4380	1,2	1740	1059	209	451	7035			2,5			4380	0	Sand, clay till
F26	IV	906	4,0	4380	1,2	1745	1059	209	451	7035	0,4					1838	2542	Clay till
F27	IV	887	5,0	5719	1,2	1940	1705	209	451	5985	0,5					2983	2736	Clay till
F28	IV	876	6,0	7199	1,2	2145	2484	209	451	4935	2,0					0	7199	Sand, clay till
F29	IV	853	7,0	8829	1,2	2360	3401	209	451	3885	2,0					0	8829	Sand, clay till
F30	IV	763	7,0	8829	1,2	2368	3401	209	451	3885	1,3					0	8829	Sand, clay till
69925		170834		61612		42279		7877		17155		245217		Σ		130828	40006	



~ 40000 m³



summary pier quantities - Side Lolland Pier L1 to L48

pier no.	pier-type	sandfill		excavation		scour		refill	grout	crushed stonebed	SU1 (sand)	SU2a (gyttia)	SU2b/2b (clay/silt)	Clay till	To spoil	To deposit	Sediment type to deposit	
		V _{sandfill} [m³]	H _{exc} [m]	V _{exc} [m³]	H _{sc} [m]	V _{sc} [m³]	V _{REF} [m³]											V _{GR} [m³]
L1	I	4179	4.0	5636	1.2	2043	1238	286	624	624	0.6	0	3.4	0	5636	0		
L2	II	3876	4.0	5636	1.2	2046	1238	286	624	624	0.2	0	3.8	0	5636	0		
L3	II	3796	4.0	5636	1.2	2050	1238	286	624	624	0.5	0	3	0.5	5636	0		
L4	II	3712	4.0	5636	1.2	2054	1238	286	624	624	0.3	0	2.4	1.3	4453	1183	Clay till	
L5	II	3629	4.0	5636	1.2	2058	1238	286	624	624	0.1	0	2.6	1.3	4453	1183	Clay till	
L6	II	3529	4.0	5636	1.2	2062	1238	286	624	624	0	0	2.7	1.3	4453	1183	Clay till	
L7	II	3421	4.0	5636	1.2	2067	1238	286	624	624	0.7	0	2.4	0.9	5636	0		
L8	II	3350	4.0	5636	1.2	2071	1238	286	624	624	1	0	2.5	0.5	3054	2582	Sand	
L9	II	3281	4.0	5636	1.2	2074	1238	286	624	624	0.8	0	2.7	0.5	5636	0		
L10	II	3214	4.0	5636	1.2	2078	1238	286	624	624	0.4	0	2.2	1.4	4354	1282	Clay till	
L11	II	3119	4.0	5636	1.2	2082	1238	286	624	624	0.5	0	1.1	2.4	3287	2349	Clay till	
L12	II	2970	4.0	5636	1.2	2088	1238	286	624	624	0.5	0	1.1	2.4	3287	2349	Clay till	
L13	II	2850	4.0	5636	1.2	2093	1238	286	624	624	0.4	0	1.2	2.4	3287	2349	Clay till	
L14	II	2780	4.0	5636	1.2	2097	1238	286	624	624	0.5	0	0.5	3	2582	3054	Clay till	
L15	II	2614	4.0	5636	1.2	2104	1238	286	624	624	1.5	0	0	2.5	0	5636	5636	Sand, clay till
L16	II	2555	4.0	5636	1.2	2107	1238	286	624	624	0.9	0	0	3.1	0	5636	5636	Sand, clay till
L17	II	2526	4.0	5636	1.2	2110	1238	286	624	624	0.7	0	0	3.3	0	5636	5636	Sand, clay till
L18	II	2354	4.0	5636	1.2	2117	1238	286	624	624	3.6	0	0	0.4	0	5636	5636	Sand, clay till
L19	II	2253	4.0	5636	1.2	2122	1238	286	624	624	2.2	0	0	1.8	0	5636	5636	Sand, clay till
L20	II	2219	4.0	5636	1.2	2125	1238	286	624	624	1.5	0	0	2.5	0	5636	5636	Sand, clay till
L21	III	2206	4.0	5636	1.2	2127	1238	286	624	624	0.5	0	0	3.5	0	5636	5636	Sand, clay till
L22	III	2118	4.0	5636	1.2	2131	1238	286	624	624	1.6	0	0	2.4	0	5636	5636	Sand, clay till
L23	III	2097	4.0	5636	1.2	2134	1238	286	624	624	0.4	0	0	3.6	0	5636	5636	Sand, clay till
L24	III	2037	4.0	5636	1.2	2138	1238	286	624	624	0.6	0	0	3.4	0	5636	5636	Sand, clay till
L25	III	1996	4.0	5636	1.2	2141	1238	286	624	624	0.2	0	0	3.8	0	5636	5636	Clay till
L26	III	1977	4.0	5636	1.2	2143	1238	286	624	624	0.2	0	0	3.8	0	5636	5636	Clay till
L27	III	1901	4.0	5636	1.2	2148	1238	286	624	624	0	0	0	4	0	5636	5636	Clay till
L28	III	1818	4.0	5636	1.2	2153	1238	286	624	624	0.8	0	0	3.2	0	5636	5636	Sand, clay till
L29	III	1818	4.0	5636	1.2	2154	1238	286	624	624	0.2	0	0	3.8	0	5636	5636	Clay till
L30	IV	1226	4.0	4380	1.2	1712	1059	209	451	451	0.2	0	0	3.8	0	4380	4380	Clay till
L31	IV	1189	4.0	4380	1.2	1715	1059	209	451	451	0.1	0	0	3.9	0	4380	4380	Clay till
L32	IV	1161	4.0	4380	1.2	1718	1059	209	451	451	0.2	0	0	3.8	0	4380	4380	Clay till
L33	IV	1157	4.0	4380	1.2	1719	1059	209	451	451	0	0	0	4	0	4380	4380	Clay till
L34	IV	1103	4.0	4380	1.2	1724	1059	209	451	451	0.1	0	0	3.9	0	4380	4380	Clay till
L35	IV	1053	4.0	4380	1.2	1727	1059	209	451	451	0.2	0	0	3.8	0	4380	4380	Clay till
L36	IV	1024	4.0	4380	1.2	1730	1059	209	451	451	0.1	0	0	3.9	0	4380	4380	Clay till
L37	IV	993	4.0	4380	1.2	1733	1059	209	451	451	0.1	0	0	3.9	0	4380	4380	Clay till
L38	IV	962	4.0	4380	1.2	1736	1059	209	451	451	0.1	0	0	3.9	0	4380	4380	Clay till
L39	IV	942	4.0	4380	1.2	1739	1059	209	451	451	0.2	0	0	3.8	0	4380	4380	Clay till
L40	IV	927	4.0	4380	1.2	1741	1059	209	451	451	0.8	0	0	3.2	0	4380	4380	Clay till
L41	IV	910	4.0	4380	1.2	1744	1059	209	451	451	0.1	0	0	3.9	0	4380	4380	Clay till
L42	IV	892	4.0	4380	1.2	1746	1059	209	451	451	1.8	0	0	2.2	0	4380	4380	Sand, clay till
L43	IV	874	4.0	4380	1.2	1748	1059	209	451	451	1.6	0	0	2.4	0	4380	4380	Sand, clay till
L44	IV	855	4.0	4380	1.2	1751	1059	209	451	451	1.9	0	0	2.1	0	4380	4380	Sand, clay till
L45	IV	838	4.0	4380	1.2	1753	1059	209	451	451	2	0	0	2	0	4380	4380	Sand, clay till
L46	IV	835	5.0	5719	1.2	1947	1705	209	451	451	2	0	0	2	0	5719	5719	Sand, clay till
L47	IV	826	6.0	7199	1.2	2150	2484	209	451	451	2	0	0	2	0	7199	7199	Sand, clay till
L48	IV	825	7.0	8829	1.2	2361	3401	209	451	451	2	0	0	2	0	8829	8829	Sand, clay till
		98788		255276		95111	60430	12250	26653		Σ				61391	193881		



~ 60,000 m³



~ 134000 m³ to Fehmarn channel.

Project Name: Fehmarn Belt Fixed Link
 Project Ref: A004429 / 209-1274 / 209-1404
 Version: 1.0
 Version Date: 22nd January 2010
 Sheet: Quantities Input Sheet

QC - Cable Stay Bridge

Ref	Description	Qty	Unit	Providing Quantities
C6100 Pylon Foundations up to Elevation +20m				
C6101	Dredging Navigable Channel	Outer(N) (centre Outer(S))	m3	Bent Madsen
C6102	Dredging Caisson Formation	17500 25000 17500	60000 m3	Flemming Pedersen
C6103	Soil Improvement to Caisson Formation		m3	Jorgen Steinfeld
C6104	Precast Concrete Caissons - Fabrication and Installation	18200 32900 18200	69300 m3	Flemming Pedersen
C6105	In-situ Concrete Slab (Caisson Plinth)	6800 18700 6800	32500 m3	Flemming Pedersen
C6106	In-situ Concrete Walls (Pylon Base)	8100 12100 8100	28300 m3	Flemming Pedersen
C6107	Underwater Grouting to Caisson Base	2200 3400 2200	7800 m3	Flemming Pedersen
C6108	Levelling and Compaction Caisson Base		0 m2	Flemming Pedersen
C6109	Imported Rock Fill to Caisson		0 m3	Flemming Pedersen
C6110	Imported Rock Armour Protection to Caissons	7200 9000 7200	23400 m3	Flemming Pedersen
C6200 Anchor, Transition and First Approach Pier Foundations				
C6201	Dredging Navigable Channel	* Anchor Transit. First	m3	Bent Madsen
C6202	Dredging Caisson Formation	1667 1667 1667	10000 m3	Flemming Pedersen
C6203	Soil Improvement to Caisson Formation		m3	Jorgen Steinfeld
C6204	Precast Concrete Caissons - Fabrication and Installation	2533 2533 2533	15200 m3	Flemming Pedersen
C6205	In-situ Sand Filling to Caissons	4983 4983 4983	29900 m3	Flemming Pedersen
C6206	Underwater Grouting to Caisson Base	500 500 500	3000 m3	Flemming Pedersen
C6207	Imported Rock Fill to Caisson Base Formation		0 m3	Flemming Pedersen
C6208	Levelling and Compaction Caisson Base		0 m2	Flemming Pedersen
C6209	Imported Rock Fill to Caisson		0 m3	Flemming Pedersen
C6210	Imported Rock Armour Protection to Caissons		0 m3	Flemming Pedersen
<i>* Quantities are for one pier only</i>				
C6300 Pylons (above El. 20m)				
C6302	Pylon In-situ Concrete C45/55		140000 m3	Peter Walser
	Reinforcement $f_{yk}=500N/mm^2$		25200 tonne	Peter Walser
	Shear Studs $f_{yk}=450N/mm^2$		75 tonne	Peter Walser
	Prestressing Steel for crossbeams $f_{yk}=1860N/mm^2$		750 tonne	Peter Walser
C6303	Pylon Cable Stay Anchorages (size from 73 to 140 strands)		252 Nr	Peter Walser
	Fabrication and Installation of Cable Anchor Box-Grade S420NL - Plate Thickness:12-40mm		2500 tonne	Peter Walser
C6304	Pylon Internal Access Provisions		2370 lm	Peter Walser
C6305	Horizontal Bridge Bearings		10 see email Nr	Peter Walser
<i>Anchor Transit First</i>				
C6400 Anchor, Transition and First Approach Piers				
C6401	Pre-cast Concrete Pier Fabrication and Installation	2350 1750 1700	11600 m3	Flemming Pedersen
C6402	In-situ Concrete Works to Pier and Caisson Joint	83 83 83	500 m3	Flemming Pedersen
C6403	Bearings		see email nr	Peter Walser
C6404	Deck Anchorage Stressing		tonne	Peter Walser
C6500 Cable Stay Bridge Deck				
C65011	Fabrication and Installation of Orthotropic Deck Sections - Grade S355NL - Plate Thickness:		tonne	Peter Walser
C65012	Fabrication and Installation of Orthotropic Deck Sections - Grade S355NL - Plate Thickness:		tonne	Peter Walser
C65013	Fabrication and Installation of Orthotropic Deck Sections - Grade S355NL - Plate Thickness:		tonne	Peter Walser
C65014	Fabrication and Installation of Orthotropic Deck Sections - Grade S355NL - Plate Thickness:		tonne	Peter Walser
C65015	Fabrication and Installation of Orthotropic Deck Sections - Grade S460NL - Plate Thickness:		tonne	Peter Walser
C65016	Fabrication and Installation of Orthotropic Deck Sections - Grade S460NL - Plate Thickness:		tonne	Peter Walser
C65017	Fabrication and Installation of Orthotropic Deck Sections - Grade S460NL - Plate Thickness:		tonne	Peter Walser
C65018	Fabrication and Installation of Orthotropic Deck Sections - Grade S460NL - Plate Thickness:		tonne	Peter Walser
C6505	External Access Stairs Between Upper and Lower Deck		4 nr	Peter Walser
C6506	Access and Emergency Walkway to Railway Deck		5920 lm	Peter Walser
C6507	Safety Barriers to Railway Deck		none lm	Peter Walser
C6700 Cable Stay Bridge Pavements				
C6701	Cable Stay Carriageway Surfacing		68080 m2	Peter Walser
C6702	Cable Stay Carriageway Ancillaries		8880 lm	Peter Walser
C6703	Cable Stay Windshield Windshield		5920 lm	Peter Walser
<i>Anchor Transit. First</i>				
C6800 Protection Rings for Anchor, Transition and First Approach Piers				
C6801	Dredging Caisson Formation	3000 3000 3000	48000 m3	Flemming Pedersen
C6802	Precast Concrete Caissons - Fabrication and Installation	4350 4350 4350	26100 m3	Flemming Pedersen
C6803	In-situ Concrete Top Slab and Wall	1067 1067 1067	6400 m3	Flemming Pedersen
C6804	Underwater Concrete	1800 1800 1800	10800 m3	Flemming Pedersen
C6805	Grout Intruded Aggregate	13500 13500 13500	81000 m3	Flemming Pedersen
C6806	Crushed Stone Fill	80000 80000 80000	480000 m3	Flemming Pedersen
C6807	Scour Protection	18000 18000 18000	108000 m3	Flemming Pedersen
C6808	Soil Improvement to Caisson Foundation		m3	Jorgen Steinfeld

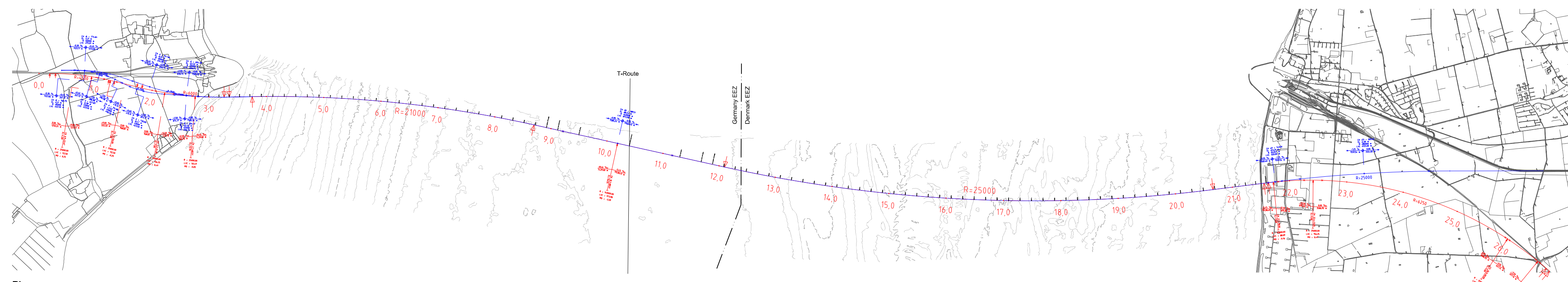
Inspection gantry (purpose made for main bridge)
 Traffic signal bridges / sign ??
 rail way ballast ???
 rail way tracks
 Design fee ??
 Bearings see my previous email, the bearings should be split into sizes, same for expansion joints

1 pcs Peter Walser

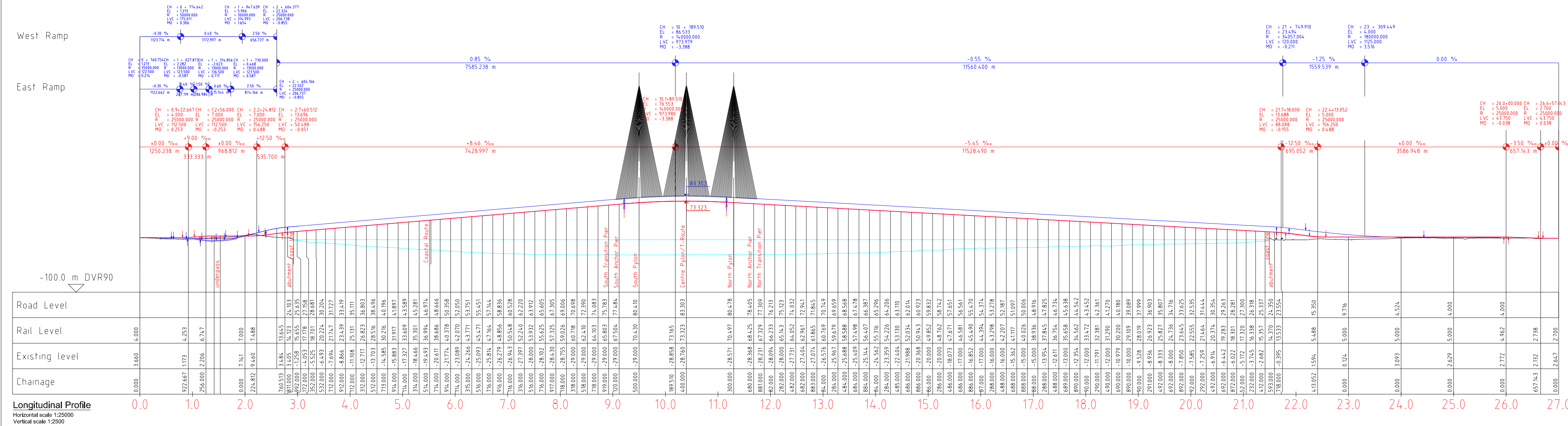
Dredging methods

	Material	Source	Method	Transport	Recipient	Unloading	
Channels	Dredging	"Spoil"	Channels	Cutter suction	Split barge	Spoil	Unloading Dumping
		Reuseable	Channels	Cutter suction	Pipe line	Local deposit	Sedimentation within temporary reefs
	Backfill	Material Reuseable	Source Local deposit	Loading Cutter suction	Transport Pipe line	Recipient Channels	Unloading Submerged vertical pipe within silt curtains
	Imported	Off-shore quarry	-	Split barge	Channels	Dumping and screeding	

	Material	Source	Method	Transport	Recipient	Unloading	
Foundations	Dredging	"Spoil"	Foundation	Cutter suction	Split barge	Spoil	Unloading Dumping
		Reuseable	Foundation	Cutter suction	Barge	Deposit	Sedimentation
	Backfill	Material Reuseable	Source Deposit	Loading Grabbing	Transport Barge	Recipient Foundation	Unloading Filling through tremie pipes
Scour protection		Imported	Quarry	-	Barge	Foundation	Filling through tremie pipes
		Material Filter stones	Source Quarry	Loading Grabbing	Transport Barge	Recipient Foundation	Unloading Filling through tremie pipes
		Cover stones	Quarry	Grabbing	Barge	Foundation	Grabbing



Plan
Scale 1:25000



Longitudinal Profile
Horizontal scale 1:25000
Vertical scale 1:2500

Notes:
Dimension: Dimensions are in millimetres unless otherwise noted. Levels are in metres (DVR 80). Chainage are in metres. Coordinate system in EUROREF89, UTM, zone 32N. Existing level is ground and seabed level.

Legend:
CH Chainage
EL Levels
R Radius
LVC Length of tangent
MO Middle ordinate (curve pitch of vertical curve)
EEZ Exclusive economical zone

References:
A4429-C-P-DWG-00-00101 General Note
A4429-C-P-DWG-35-10101 Fehmarn - Overview
A4429-C-P-DWG-35-10102 Lolland - Overview

Rev.	Date	Design/Drawn	Checked	Approved	Subject
0.2	2010-01-29	TREX / LHLH	ULHX	EVA / LHE	

Fehmarnbelt Fixed Link
Bridge Design - Conceptual Design

Femern
Sund & Bock

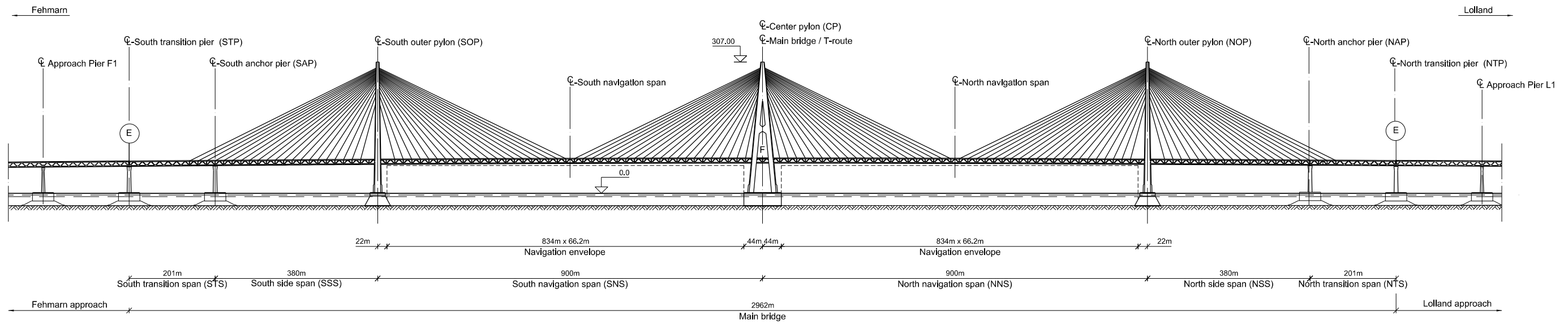
Date: 2009.10.30
Design/Drawn: TREX / TRMA
Checked: ULHX
Approved: EYA / LHE
Rev. Date: 2010-01-29

COWI OBERMEYER
Design/Drawn: Lennart Andersson
Checked: EYA / LHE
Approved: EYA / LHE
Rev. Date: 2010-01-29

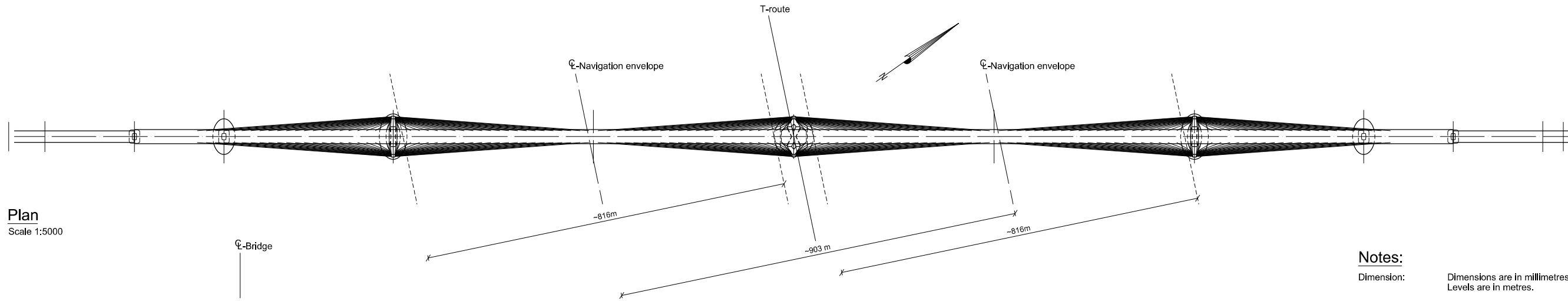
Project no. 71073
Scale: As noted
Paper size: 594x1470mm
Print & Nail Limited

Project Basis:
Horizontal and Vertical Alignment
Plan and Longitudinal Profile

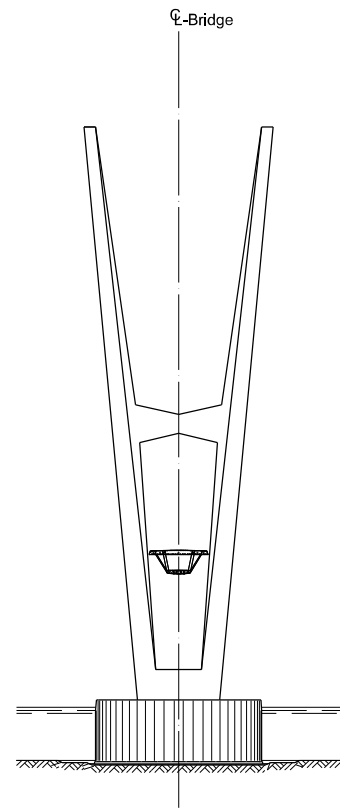
Drawing No. A4429-C-P-DWG-20-11201
Rev. 0.2



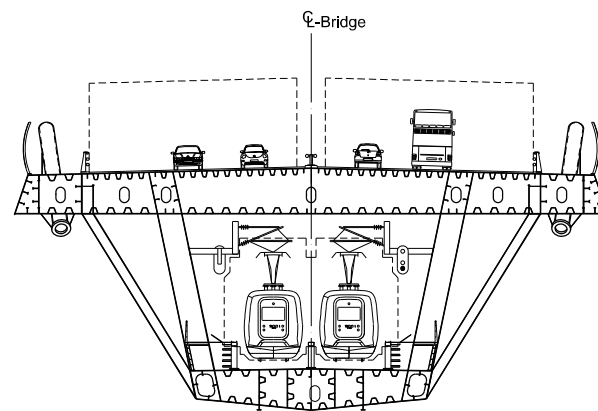
Elevation
Scale 1:5000
Main bridge



Plan
Scale 1:5000



Cross Section
Scale 1:2000



Cross Section
Scale 1:200

Notes:

Dimension: Dimensions are in millimetres unless otherwise noted.
Levels are in metres.

Legend:

- (E) Expansion joint
- F Longitudinal Fixing

References:

A4429-C-P-DWG-00-00101 General Notes

Work in progress

Rev.	Date	Design/draft	Checked	Approved	Subject

Fehmarnbelt Fixed Link
Bridge Design - Conceptual Design

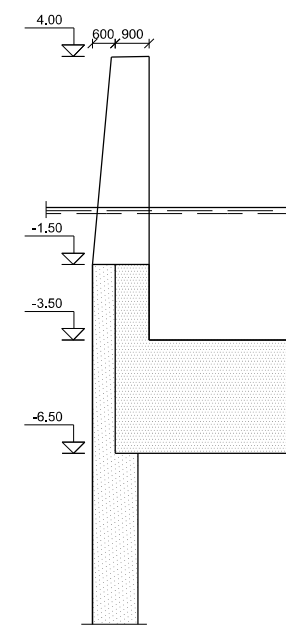
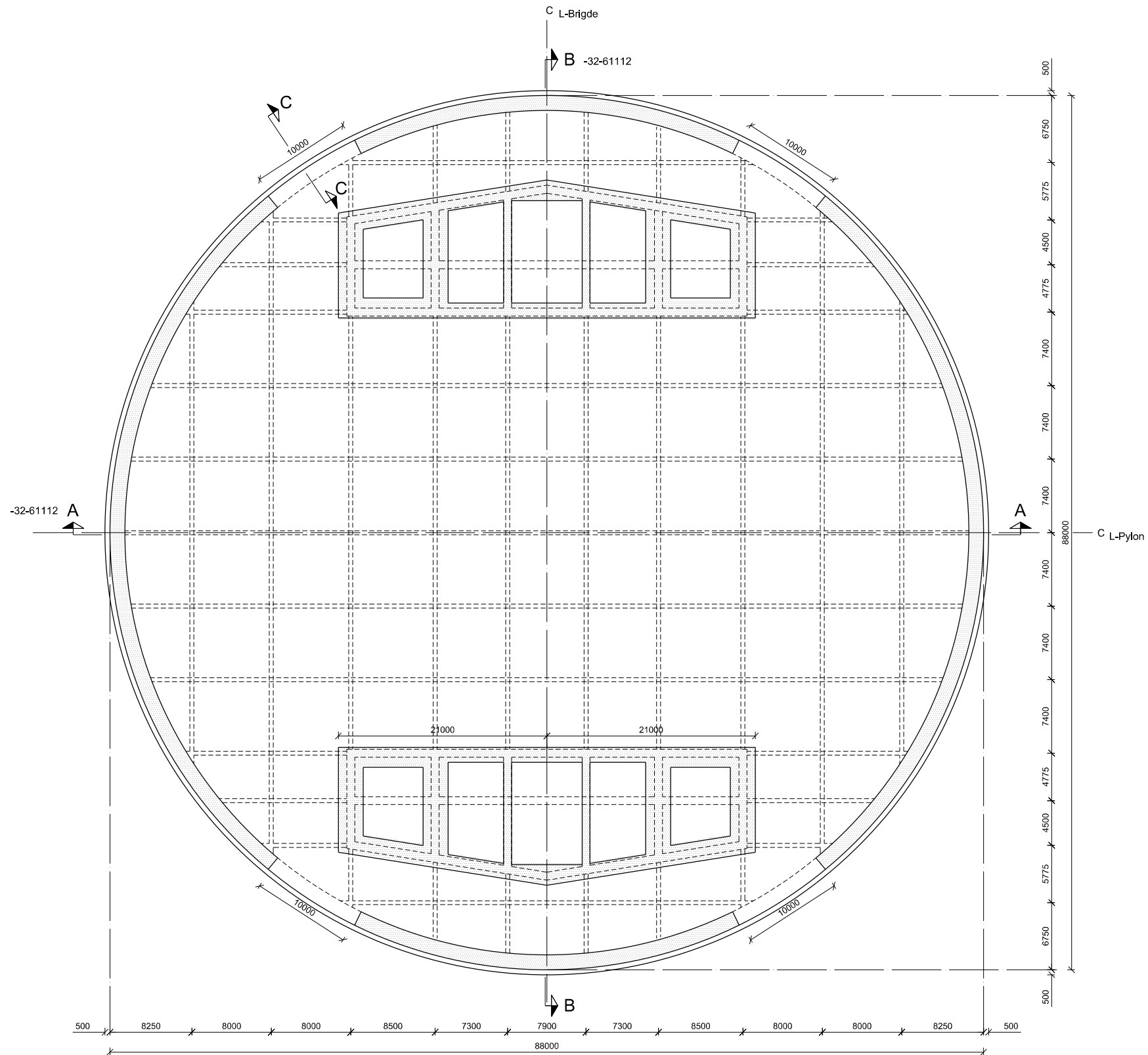


Date: 2010-01-29
Design/draft: MTRX/PRKR
Checked: PWRX
Approved: SHX/LHE
Rev. Date:

COWI OBERMEYER
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Leonhardt, Andrä und Partner
Flint & Neill Limited

Main Bridge - Cable Stayed Bridge
General Arrangement

Drawing No. A4429-C-P-DWG-32-60101
Rev. 0.2



Section C-C
Scale 1:100

Notes:

Dimension: Dimensions are in millimetres unless otherwise noted.
Levels are in metres.

Legend:

- In-situ concrete
- Prefabricated concrete
- Mean sea level

References:

- A4429-C-P-DWG-00-00101 General Notes
- A4429-C-P-DWG-32-61102 Pylon - Centre Pylon Geometry
- A4429-C-P-DWG-32-61112 Pylon - Centre Pylon Caisson Geometry, Sections

Work in progress

Rev.	Date	Design/draft	Checked	Approved	Subject

Fehmarnbelt Fixed Link
Bridge Design - Conceptual Design



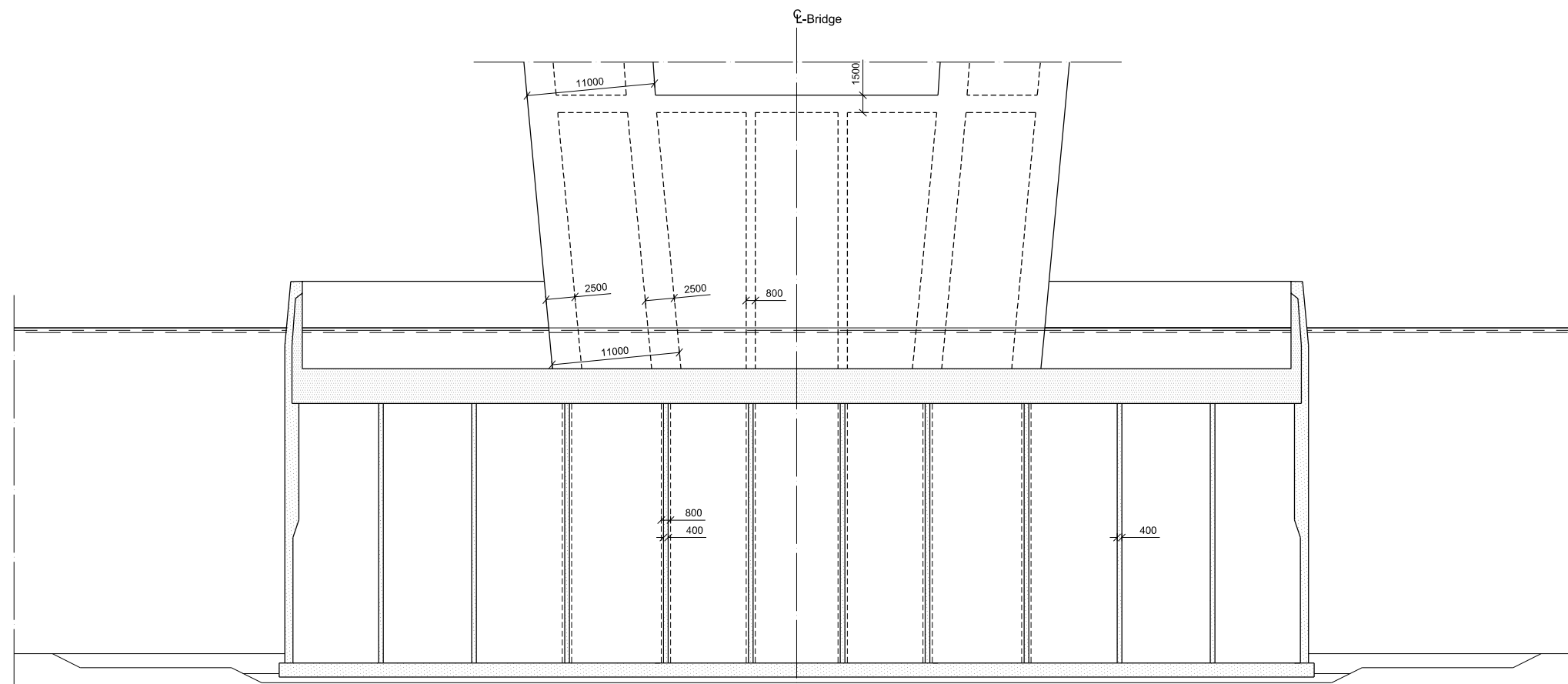
Date: 2010-01-29
Design/draft: FP/PRKR
Checked: PWRX
Approved: SHX/LHE
Rev. Date:

COWI OBERMEYER
Dissing+Walting
Leonhardt, Andr s und Partner
Flint & Neill Limited

Project no. 71073
Scale: AS noted
Paper size: A1
Main Bridge- Cable Stayed Bridge
Pylon
Centre Pylon Caisson
Geometry, Plan

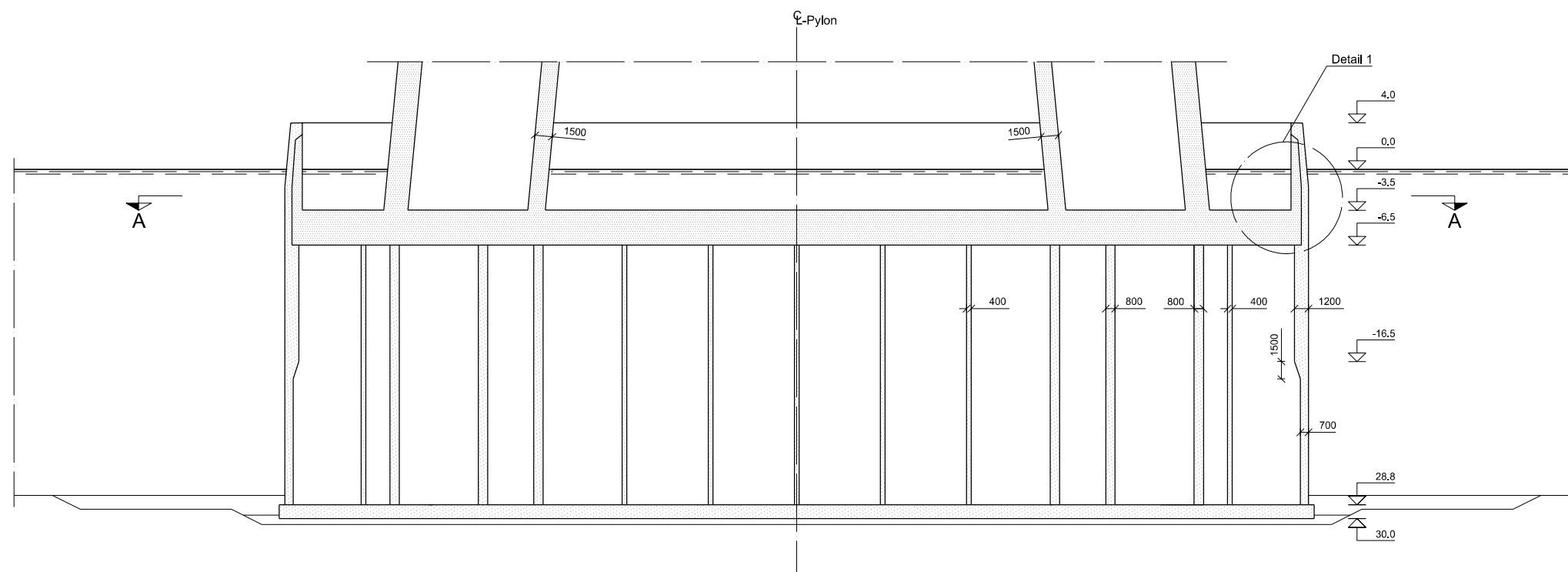
Drawing No. A4429-C-P-DWG-32-61111
Rev. 0.2

Plan
Scale 1:250



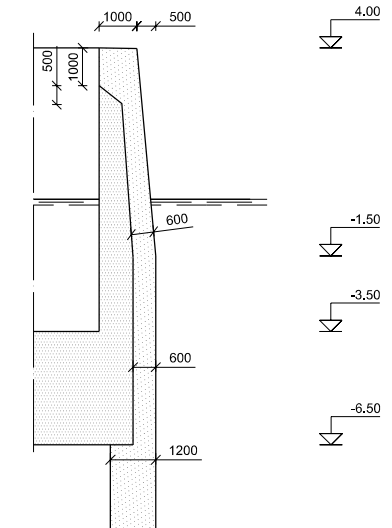
Section A-A

Scale 1:250
For location of section, see dwg. no. A4429-C-P-DWG-32-61111



Section B-B

Scale 1:250
For location of section, see dwg. no. A4429-C-P-DWG-32-61111



Detail 1
Scale 1:100

Notes:

Dimension: Dimensions are in millimetres unless otherwise noted.
Levels are in metres.

Legend:

- In-situ concrete
- Prefabricated concrete
- Mean sea level

References:

- A4429-C-P-DWG-00-00101 General Notes
- A4429-C-P-DWG-32-61111 Pylon - Centre Pylon Caisson Geometry, Plan

Work in progress

Rev.	Date	Design/draft	Checked	Approved	Subject

Fehmarnbelt Fixed Link
Bridge Design - Conceptual Design

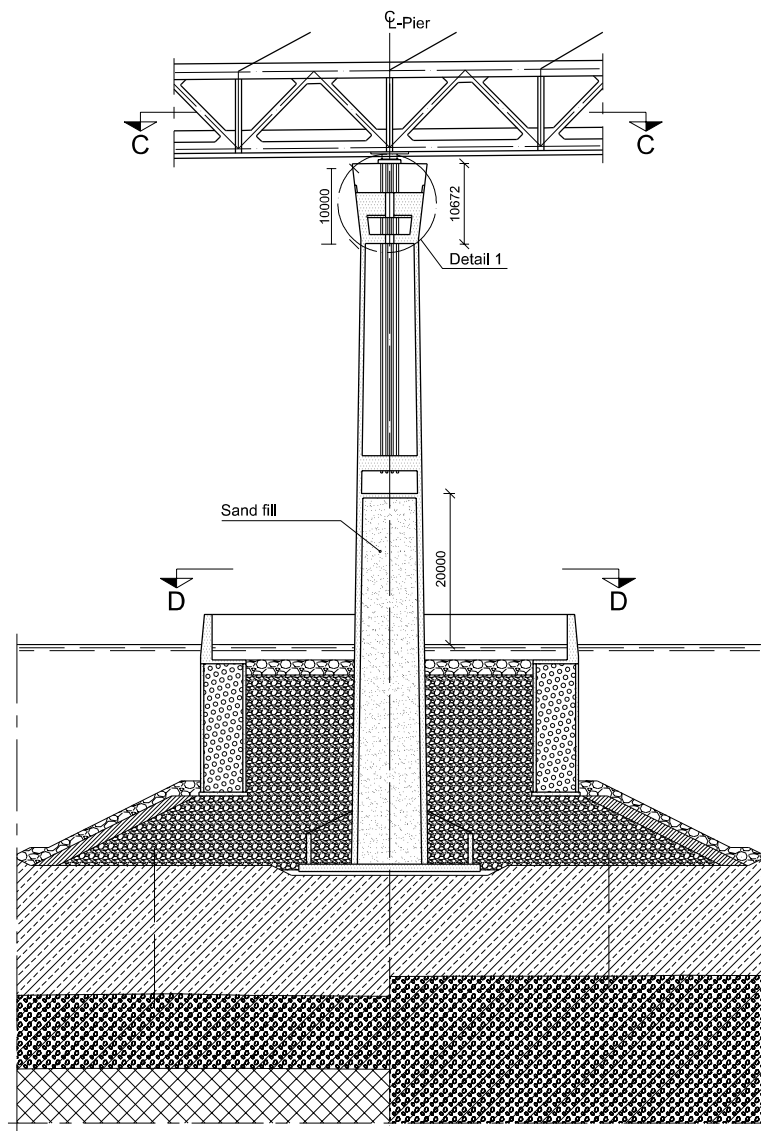


Date	Design/draft	Checked	Approved	Rev. Date	COWI OBERMEYER
2010-01-29	FP/MTRX/PRKR	PWRX	SIH/LHE		

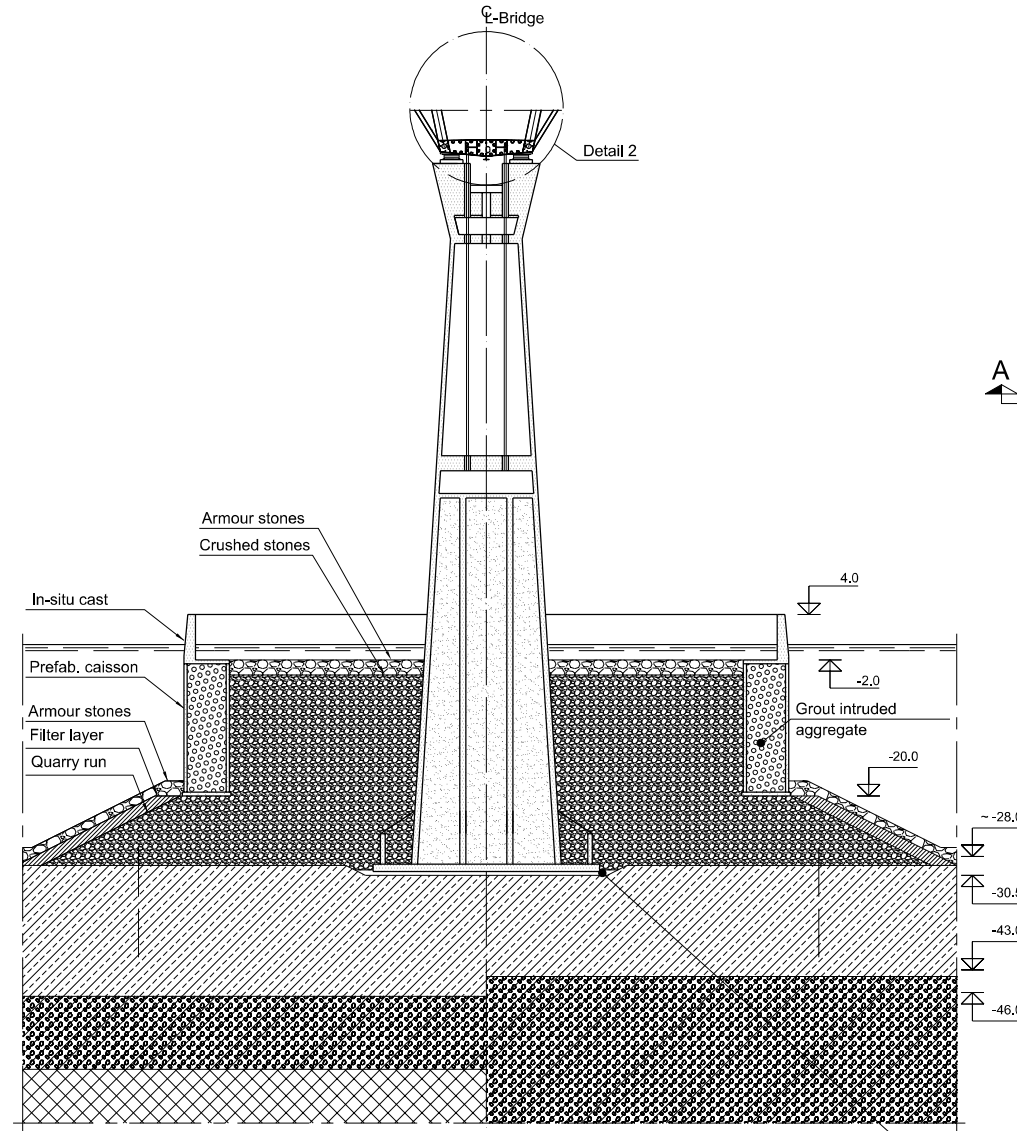
Project no. 71073 Scale AS noted Paper size A1

Main Bridge - Cable Stayed Bridge
Pylon
Centre Pylon Caisson
Geometry, Sections

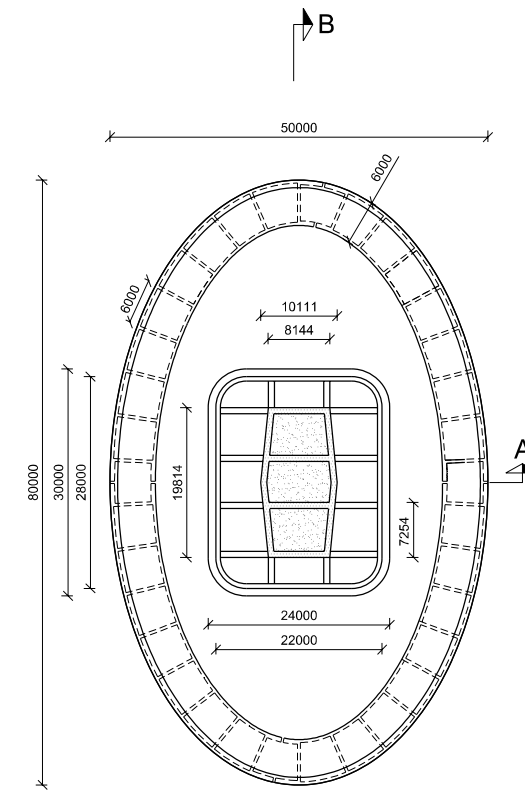
Drawing No. A4429-C-P-DWG-32-61112 Rev. 0.2



Section A-A
Scale 1:500



Section B-B
Scale 1:500



Plan D-D
Scale 1:500

Notes:

Dimension
Dimensions are in millimetres unless otherwise noted.
Levels are in metres.

Legend:

- Concrete
- Concrete in-situ.
- Sandfill
- Armour stones
- Crushed stones
- Lower quaternary unit
- Upper quaternary unit
- Chalk
- Crushed stone filling
- Paleogene clay unit
- Mean sea level

References:

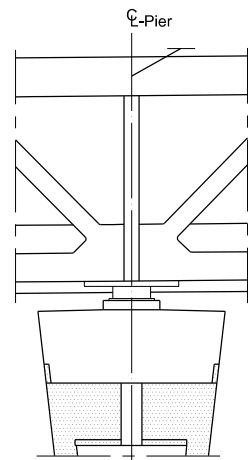
- A4429-C-P-DWG-00-00101 General Notes
- A4429-C-P-DWG-32-62111 Pier - Anchor Pier and Caisson Geometry
- A4429-C-P-DWG-32-67101 Articulation

South anchor pier North anchor pier

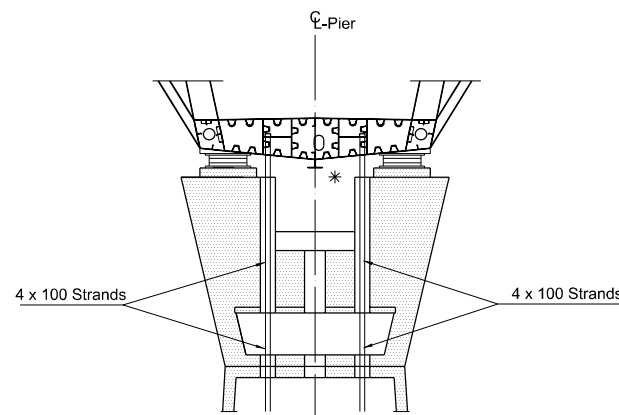
Soil improvement of upper quaternary unit for an area extending 6.0 m around the caisson base
Depth of soil improvement 12 m

Soil improvement of upper quaternary unit for an area extending 4.0 m around the caisson base
Depth of soil improvement 8 m

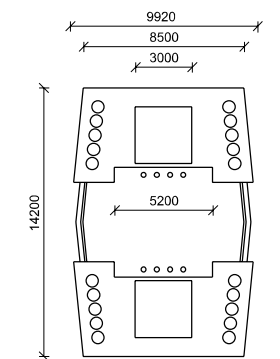
South anchor pier North anchor pier



Detail 1
Scale 1:200



Detail 2
Scale 1:200



Section C-C
Scale 1:100

Work in progress

Rev.	Date	Design/draft	Checked	Approved	Subject

Fehmarnbelt Fixed Link
Bridge Design - Conceptual Design

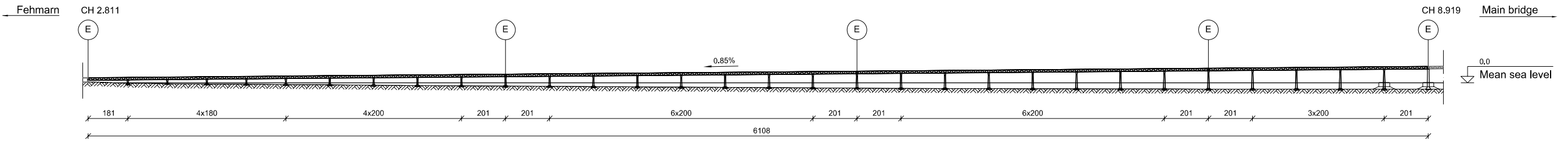


Date 2010-01-29 Design/draft FP/SHX/PRKR Checked PWRX Approved SHX/LHE Rev. Date
Project no. 71073 Scale AS noted Paper size A1

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Dissing+Weitling
Leonhardt, André und Partner
Flint & Neill Limited

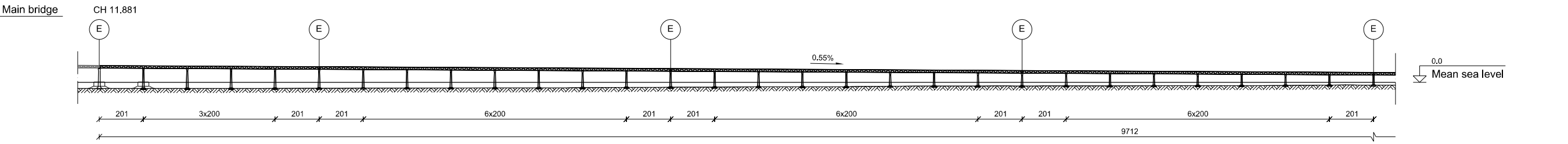
Main Bridge - Cable Stayed Bridge
Pier
Anchor Pier
General Arrangement

Drawing No. A4429-C-P-DWG-32-62101 Rev. 0.2



Elevation
Scale 1:10000
Fehmarn approach bridge

Bridge girder id	F31	F30	F29	F28	F27	F26	F25	F24	F23	F22	F21	F20	F19	F18	F17	F16	F15	F14	F13	F12	F11	F10	F9	F8	F7	F6	F5	F4	F3	F2	F1	F0
Pier id/grid line no.	FA	F30	F29	F28	F27	F26	F25	F24	F23	F22	F21	F20	F19	F18	F17	F16	F15	F14	F13	F12	F11	F10	F9	F8	F7	F6	F5	F4	F3	F2	F1	F0
ROL	24.103	25.635	27.158	28.681	30.204	31.727	33.419	35.112	36.804	38.496	40.197	41.897	43.590	45.282	46.974	48.666	50.358	52.051	53.751	55.452	57.144	58.836	60.528	62.221	63.913	65.605	67.306	69.006	70.699	72.391	74.083	75.789
RAL	14.123	15.655	17.178	18.701	20.224	21.747	23.439	25.132	26.824	28.516	30.217	31.917	33.610	35.302	36.994	38.686	40.378	42.071	43.771	45.472	47.164	48.856	50.548	52.241	53.933	55.625	57.326	59.026	60.719	62.411	64.103	65.804
Top of pier	10.673	12.205	13.728	15.251	16.774	18.297	19.989	21.682	23.374	25.066	26.767	28.467	30.160	31.852	33.544	35.236	36.928	38.621	40.321	42.022	43.714	45.406	47.098	48.791	50.483	52.175	53.876	55.576	57.269	58.961	60.653	60.653
Seabed level	-	-1.258	-4.053	-5.525	-6.493	-7.694	-8.866	-11.108	-12.717	-13.703	-14.585	-15.883	-17.327	-18.466	-19.493	-20.611	-21.774	-23.089	-24.266	-25.093	-25.814	-26.279	-26.943	-27.397	28.000	-28.102	-28.430	-28.755	-29.000	-29.000	-29.000	-
Foundation level	-	-8.258	-11.053	-11.525	-11.493	-11.694	-12.866	-15.108	-16.717	-17.703	-18.585	-19.883	-21.327	-22.466	-23.493	-24.611	-25.774	-27.089	-28.266	-29.093	-29.814	-30.279	-30.943	-31.397	-32.000	-32.102	-32.430	-32.755	-33.000	-33.000	-33.000	-
Pier type	-	IV	IV	IV	IV	IV	IV	IV	IV	IV	III	III	III	III	III	III	III	III	III	III	II	II	II	II	II	II	II	II	II	II	I*	-



Elevation
Scale 1:10000
Lolland approach bridge

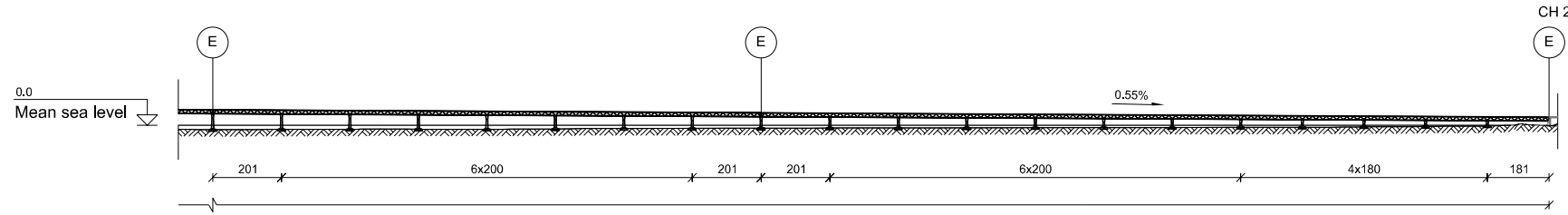
Bridge girder id	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18	L19	L20	L21	L22	L23	L24	L25	L26	L27	L28	L29		
Pier id/grid line no.	L0	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18	L19	L20	L21	L22	L23	L24	L25	L26	L27	L28	L29	
ROL	77.309	76.213	75.122	74.032	72.941	71.845	70.749	69.658	68.568	67.477	66.386	65.296	64.205	63.109	62.013	60.923	59.832	58.741	57.651	56.560	55.470	54.373	53.277	52.187	51.096	50.006	48.915	47.824	46.734	45.638	
RAL	67.329	66.233	65.142	64.052	62.961	61.865	60.769	59.678	58.588	57.497	56.406	55.316	54.225	53.129	52.033	50.943	49.852	48.761	47.671	46.580	45.490	44.393	43.297	42.207	41.116	40.026	38.935	37.844	36.754	35.658	
Top of pier	63.879	62.783	61.692	60.602	59.511	58.415	57.319	56.228	55.138	54.047	52.956	51.866	50.775	49.679	48.583	47.493	46.402	45.311	44.221	43.130	42.040	40.943	39.847	38.757	37.666	36.576	35.485	34.394	33.304	32.208	
Seabed level	-	-28.094	-28.000	-27.731	-27.404	-27.074	-26.576	-25.967	-25.688	-25.409	-25.144	-24.562	-23.359	-22.404	-21.988	-20.368	-20.000	-20.000	-18.073	-17.000	-16.852	-17.000	-16.000	-16.000	-15.362	-15.000	-15.000	-13.954	-12.611	-13.000	
Foundation level	-	-32.094	-32.000	-31.731	-31.404	-31.074	-30.576	-29.967	-29.688	-29.409	-29.144	-28.562	-27.359	-26.404	-25.988	-24.368	-24.000	-24.000	-22.073	-21.000	-20.852	-21.000	-20.000	-20.000	-19.362	-19.000	-19.000	-17.954	-16.611	-17.000	
Pier type	-	I*	II	II	II	II	II	II	II	II	II	II	II	II	II	II	II	II	II	II	II	III	III	III	III	III	III	III	III	III	III

Notes:
Dimensions: Dimensions are in metres unless otherwise noted. Levels are in metres. Chainage (CH) is in kilometres. Refer to ship collision design loads.
Pier type:

Pier type	Collision class (DWT)
I*	120.000
II	20.000
III	20.000
IV	10.000

* For pier type I see Main Bridge drawings.

Legend:
 Expansion joint
 ROL Roadway reference line
 RAL Railway reference line



Elevation
Scale 1:10000
Lolland approach bridge

Bridge girder id	L30	L31	L32	L33	L34	L35	L36	L37	L38	L39	L40	L41	L42	L43	L44	L45	L46	L47	L48	L49	LA
Pier id/grid line no.	L29	L30	L31	L32	L33	L34	L35	L36	L37	L38	L39	L40	L41	L42	L43	L44	L45	L46	L47	L48	LA
ROL	45.638	44.542	43.451	42.361	41.270	40.179	39.089	37.998	36.902	35.806	34.715	33.625	32.534	31.444	30.353	29.262	28.171	27.081	25.990	24.900	23.810
RAL	35.658	34.562	33.471	32.381	31.290	30.199	29.109	28.018	26.922	25.826	24.735	23.645	22.554	21.464	20.373	19.282	18.191	17.101	16.010	14.920	13.830
Top of pier	32.208	31.117	30.021	28.931	27.840	26.749	25.659	24.568	23.472	22.381	21.285	20.195	19.104	18.014	16.923	15.832	14.741	13.651	12.560	11.470	10.380
Seabed level	-13.000	-12.354	-12.000	-11.791	-12.000	-10.979	-10.000	-9.528	-8.936	-8.333	-8.000	-7.850	-7.585	-7.259	-6.914	-6.442	-6.022	-5.172	-3.745	-2.682	-
Foundation level	-17.000	-16.354	-16.000	-15.791	-16.000	-14.979	-14.000	-13.528	-12.936	-12.333	-12.000	-11.850	-11.585	-11.259	-10.914	-10.442	-10.022	-10.172	-9.745	-9.682	-
Pier type	III	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	IV	-

- References:**
 A4429-C-P-DWG-00-00101 General Notes
 A4429-C-P-DWG-33-30081 Fehmarn Approach Bridge
 A4429-C-P-DWG-33-32051 Pier - Type I (Piers F1 and L1) General Arrangement
 A4429-C-P-DWG-33-32061 Pier - Type II General Arrangement
 A4429-C-P-DWG-33-32062 Pier - Type III General Arrangement
 A4429-C-P-DWG-33-32071 Pier - Type IV General Arrangement - Tall Piers
 A4429-C-P-DWG-33-32072 Pier - Type IV General Arrangement - Short Piers
 A4429-C-P-DWG-33-35001 Bridge Girder - Truss Arrangement Typical Span
 A4429-C-P-DWG-33-35051 Bridge Girder Typical Cross Section

Rev.	Date	Design/draft	Checked	Approved	Subject

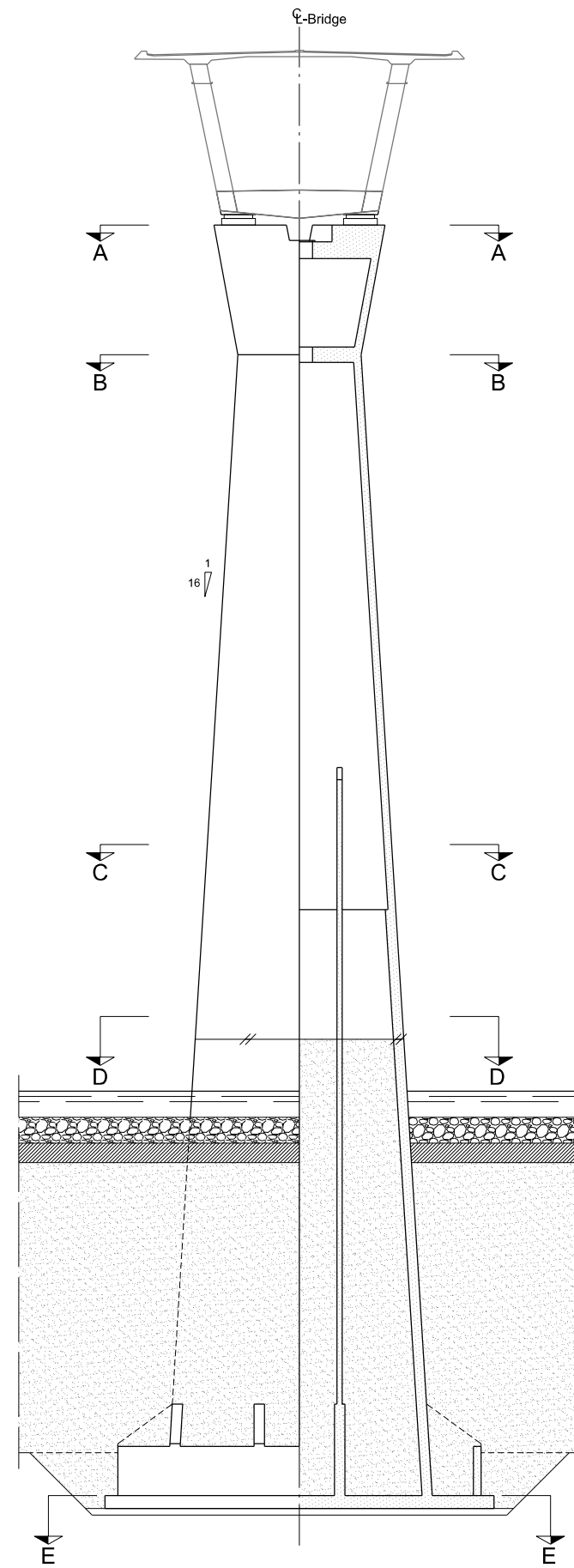
Fehmarnbelt Fixed Link
Bridge Design - Conceptual Design

Date: 2010-01-29 Design/draft: IJKWLE/TRMA Checked: TOF Approved: TOF/LHE Rev. Date: **COWI OBERMEYER**
 Disising+Waiblinger Leonhardt, Andrä und Partner Flint & Neill Limited

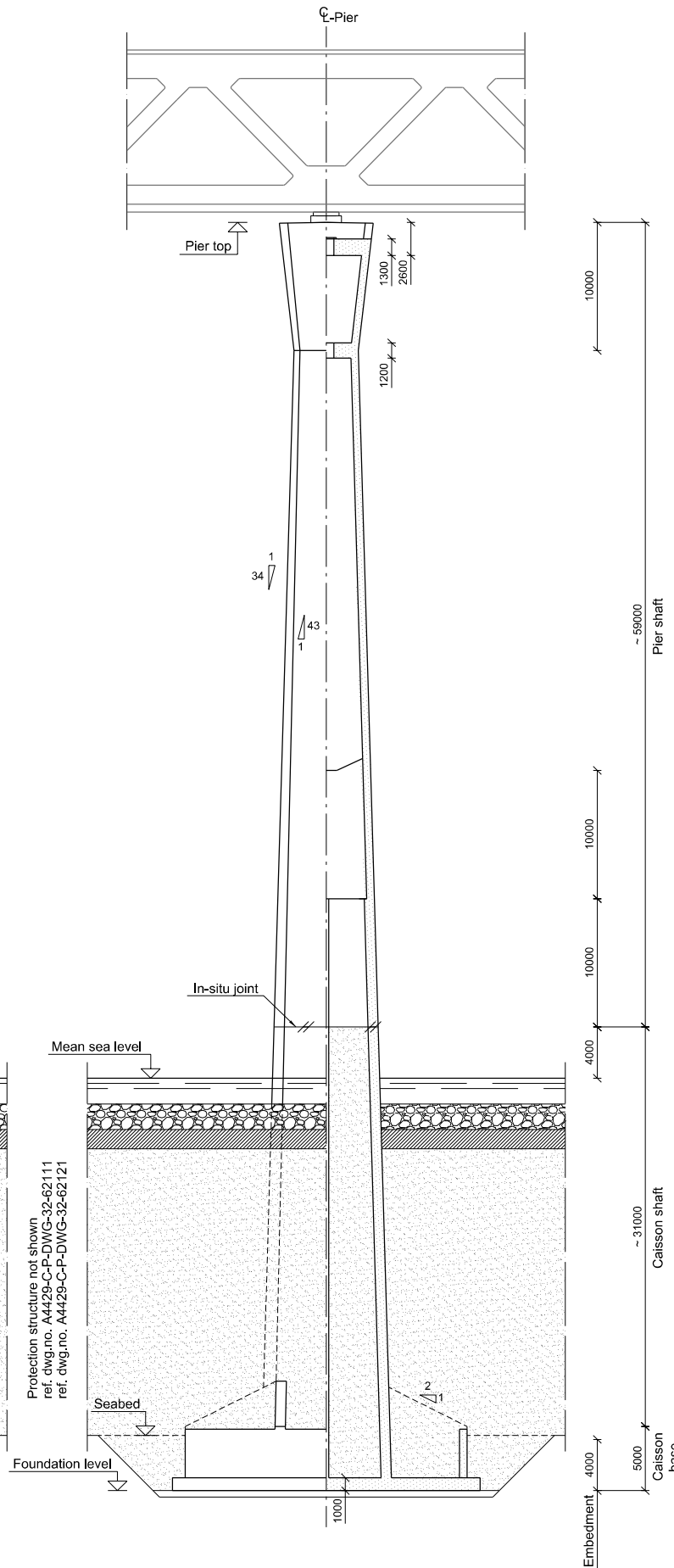
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Approach Bridge
 General Arrangement

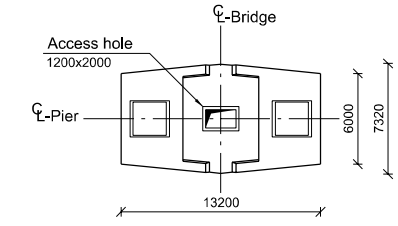




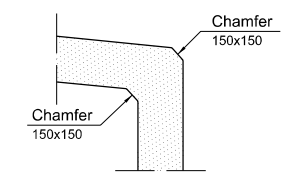
Transverse Profile and Section
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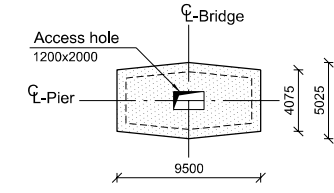
Longitudinal Profile and Section
Scale 1:250



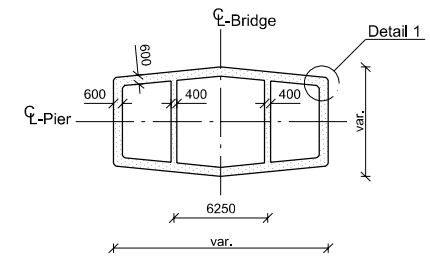
Section A-A
Scale 1:250



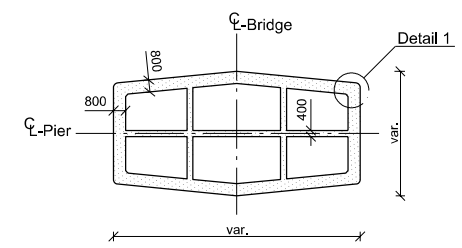
Detail 1
Scale 1:50



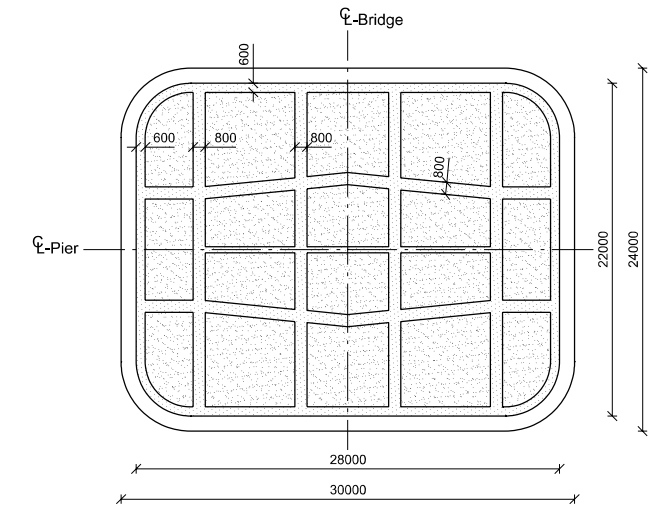
Section B-B
Scale 1:250



Section C-C
Scale 1:250



Section D-D
Scale 1:250



Section E-E
Scale 1:250

Notes:

Dimensions: Dimensions are in millimetres unless otherwise noted.
Scour protection: Scour protection is indicative.

Legend:

- Concrete
- Sandfill
- Filter layer
- Scour protection
- Construction joint

References:

- A4429-C-P-DWG-00-00101 General Notes
- A4429-C-P-DWG-32-62111 Pier - Anchor Pier and Caisson Geometry
- A4429-C-P-DWG-32-62121 Pier - Anchor Pier Protection Ring Geometry
- A4429-C-P-DWG-33-32101 Pier Dredging and Foundation
- A4429-C-P-DWG-33-32301 Pier Pier Top
- A4429-C-P-DWG-33-32321 Pier In-situ Joint

Work in progress

Rev.	Date	Design/draft	Checked	Approved	Subject

Fehmarnbelt Fixed Link
Bridge Design - Conceptual Design

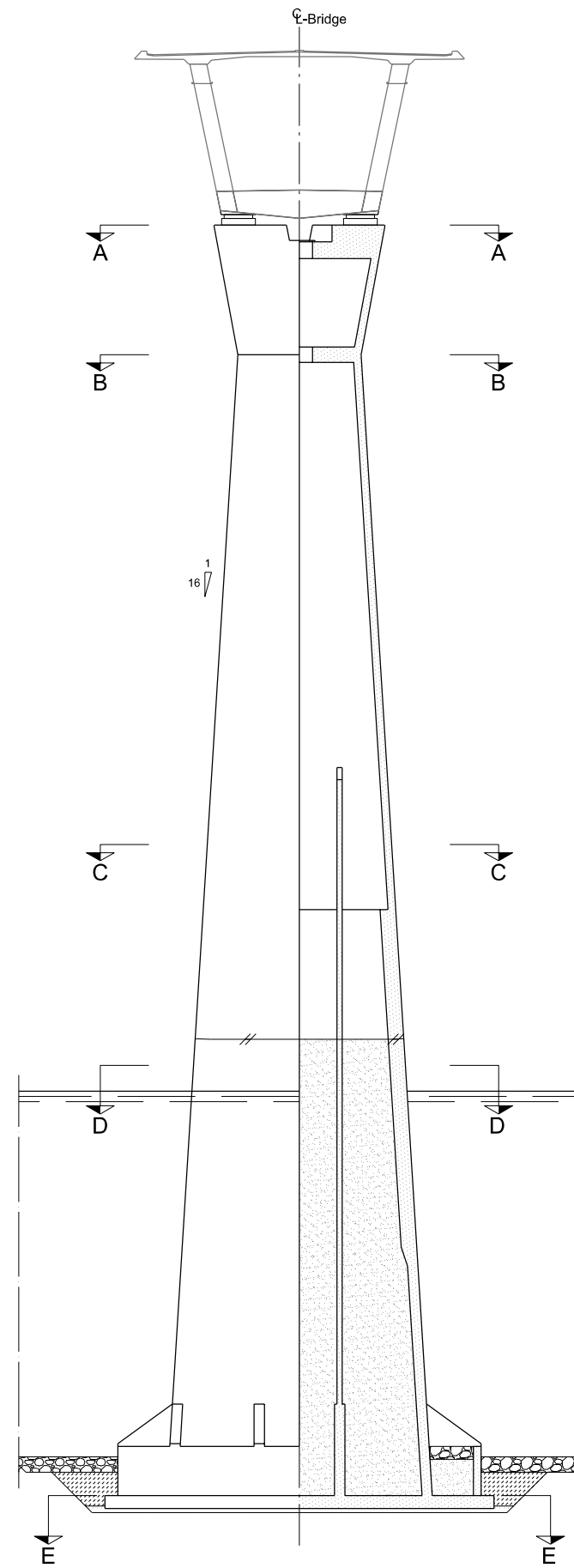


Date	Design/draft	Checked	Approved	Rev. Date
2010-01-29	IJ/TRMA	KWLE	TOF/LHE	

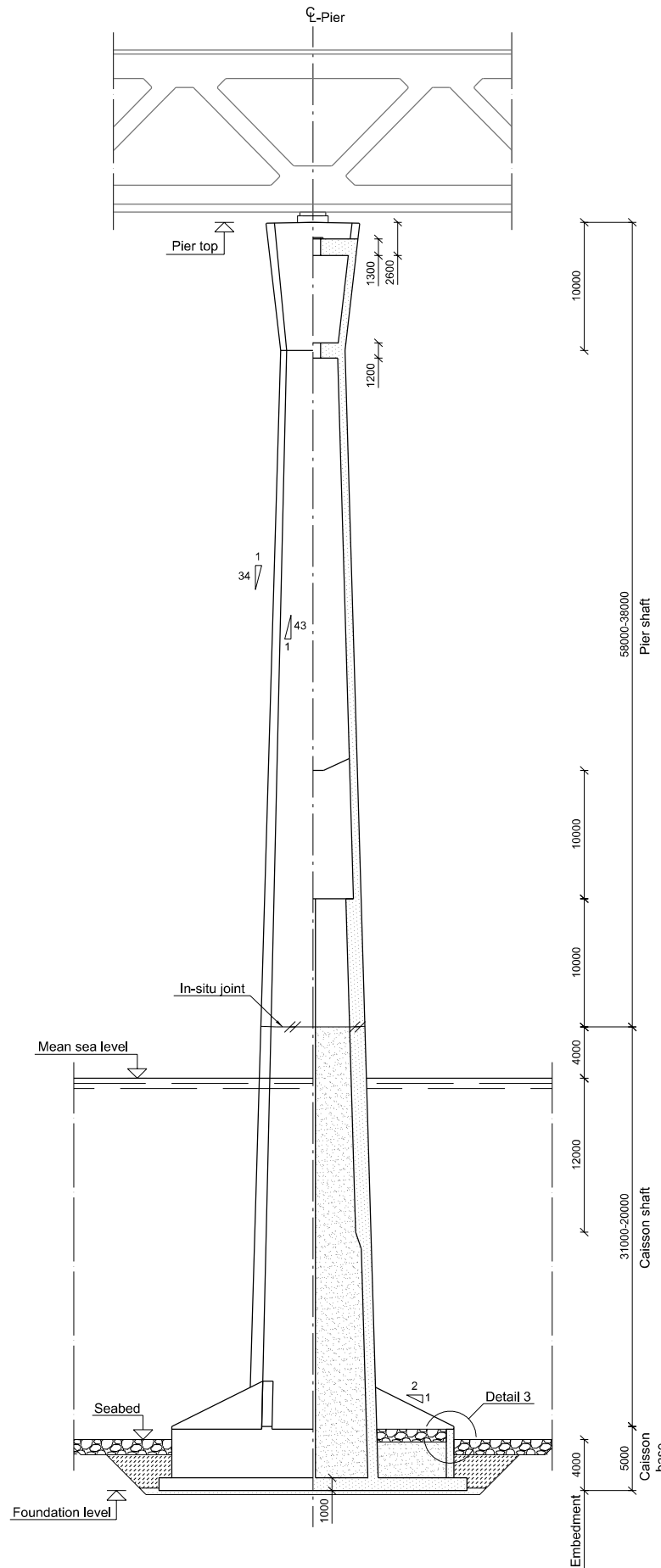
COWI OBERMEYER
Dissing+Weitling
Leonhardt, André und Partner
Flint & Neill Limited

Approach Bridge
Pier
Type I (Piers F1 and L1)
General Arrangement

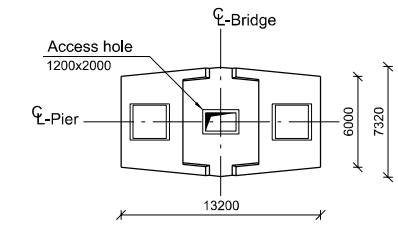
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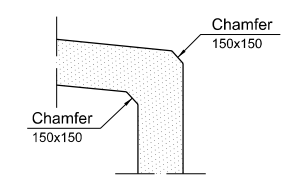
Transverse Profile and Section
Scale 1:250
Tall pier shown



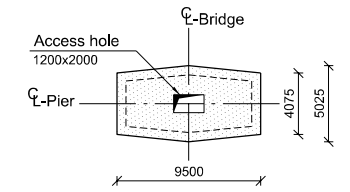
Longitudinal Profile and Section
Scale 1:250
Tall pier shown



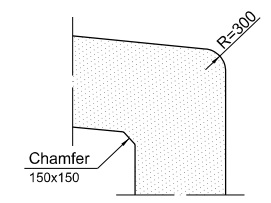
Section A-A
Scale 1:250



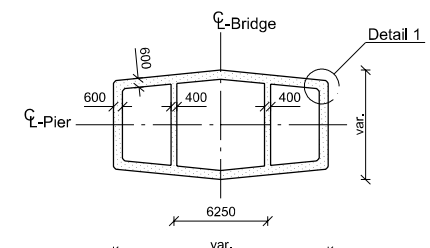
Detail 1
Scale 1:50



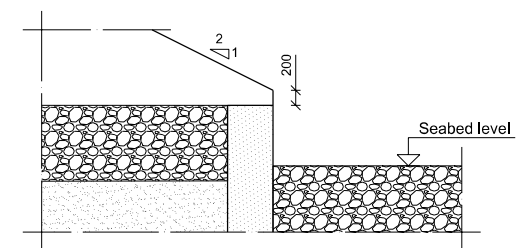
Section B-B
Scale 1:250



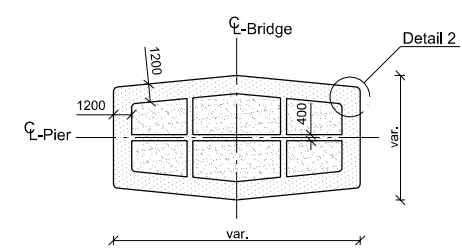
Detail 2
Scale 1:50



Section C-C
Scale 1:250



Detail 3
Scale 1:50



Section D-D
Scale 1:250

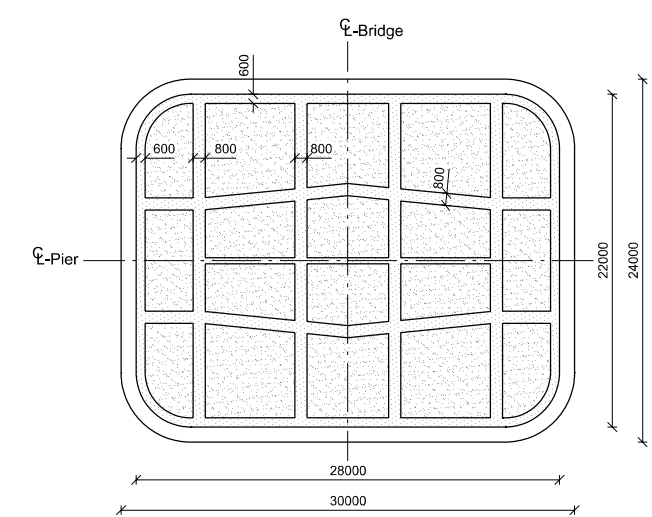
Notes:
Dimensions: Dimensions are in millimetres unless otherwise noted.
Scour protection: Scour protection is indicative.

- Legend:**
- Concrete
 - Sandfill
 - Backfill
 - Scour protection
 - Grout
 - Construction joint

References:

- A4429-C-P-DWG-00-00101 General Notes
- A4429-C-P-DWG-33-32101 Pier Dredging and Foundation
- A4429-C-P-DWG-33-32301 Pier Pier Top
- A4429-C-P-DWG-33-32321 Pier In-situ Joint

Work in progress



Section E-E
Scale 1:250
Tall pier shown

Rev.	Date	Design/draft	Checked	Approved	Subject

Fehmarnbelt Fixed Link
Bridge Design - Conceptual Design



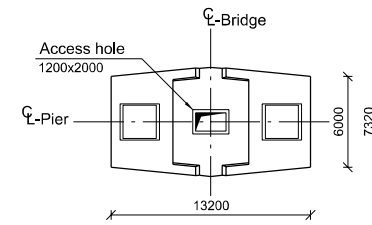
Date: 2010-01-29
Design/draft: IJ/TRMA
Checked: KWLE
Approved: TOF/LHE

COWI OBERMEYER
Disising+Walting
Leonhardt, Andrä und Partner
Flint & Neill Limited

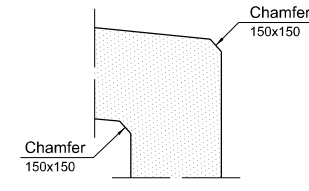
Project no. 71073
Scale: AS noted
Paper size: A1

Approach Bridge
Pier
Type II
General Arrangement

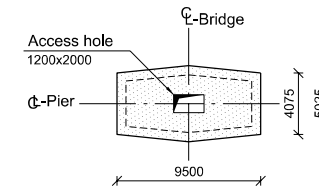
Drawing No. A4429-C-P-DWG-33-32061
Rev. 0.2



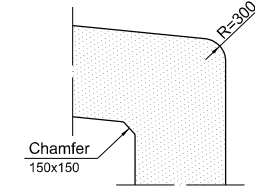
Section A-A
Scale 1:250



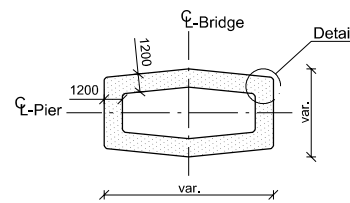
Detail 1
Scale 1:50



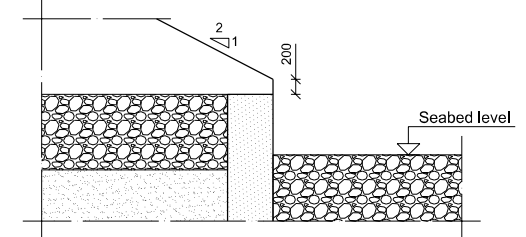
Section B-B
Scale 1:250



Detail 2
Scale 1:50



Section C-C
Scale 1:250



Detail 3
Scale 1:50

Notes:

Dimensions: Dimensions are in millimetres unless otherwise noted.
Scour protection: Scour protection is indicative.

Legend:

- Concrete
- Sandfill
- Backfill
- Scour protection
- Grout
- Construction joint

References:

- A4429-C-P-DWG-00-00101 General Notes
- A4429-C-P-DWG-33-32101 Pier Dredging and Foundation
- A4429-C-P-DWG-33-32301 Pier Pier Top
- A4429-C-P-DWG-33-32321 Pier In-situ Joint

Work in progress

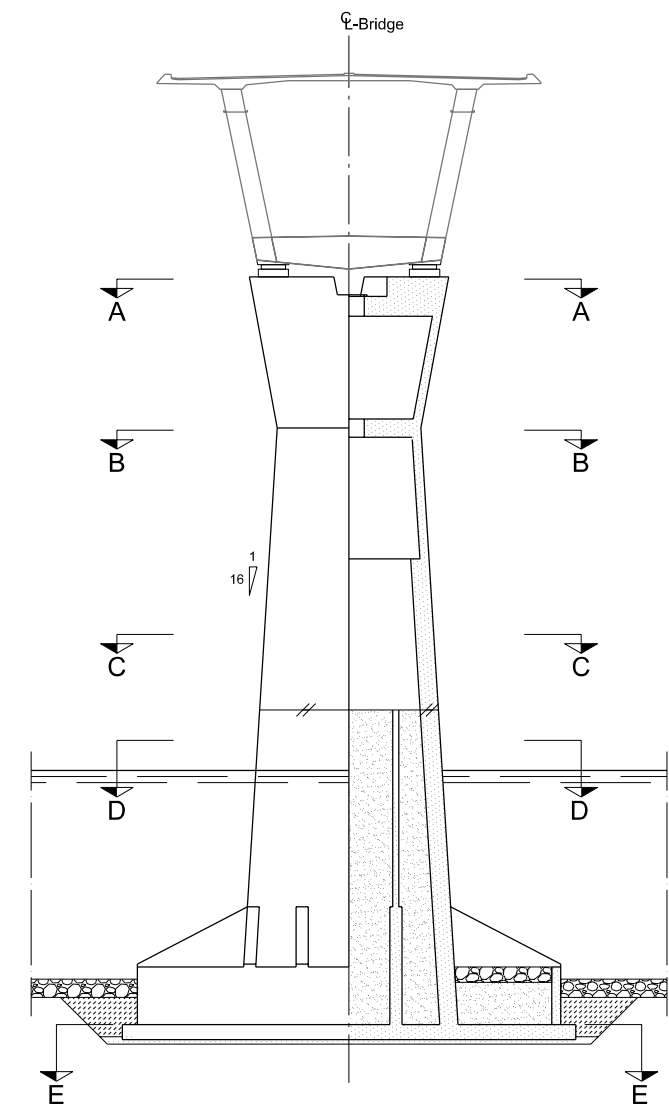
Rev.	Date	Design/draft	Checked	Approved	Subject

Fehmarnbelt Fixed Link
Bridge Design - Conceptual Design

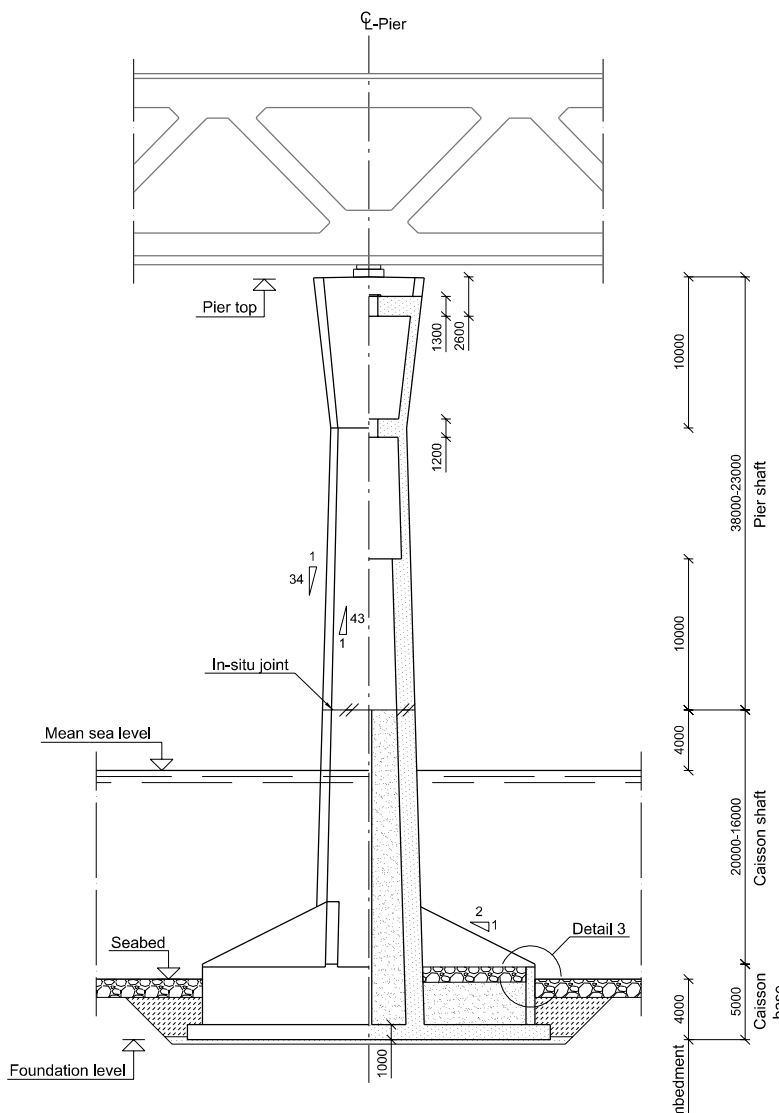


Date	Design/draft	Checked	Approved	Rev. Date	COWI OBERMEYER
2010-01-29	IJ/TRMA	KWLE	TOP/LHE		

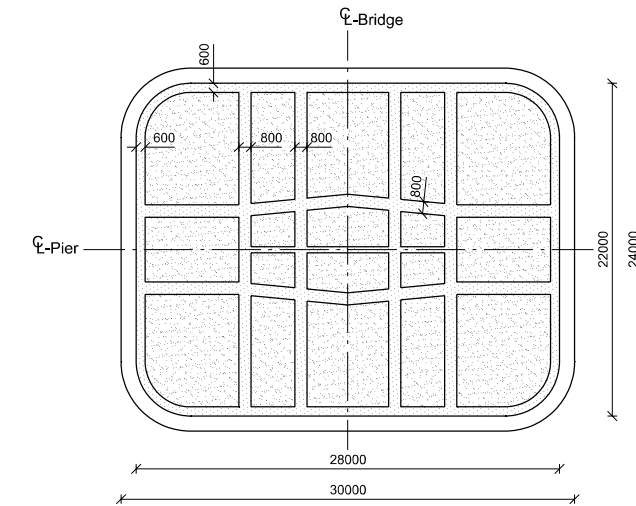
Project no. 71073 Scale AS noted Paper size A1
 Approach Bridge
 Pier
 Type III
 General Arrangement
 Drawing No. A4429-C-P-DWG-33-32062 Rev. 0.2



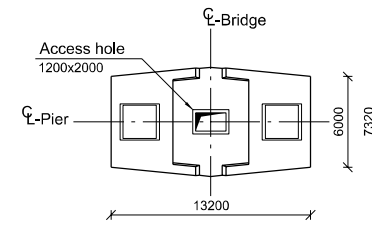
Transverse Profile and Section
Scale 1:250
Short pier shown



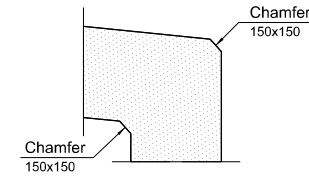
Longitudinal Profile and Section
Scale 1:250
Short pier shown



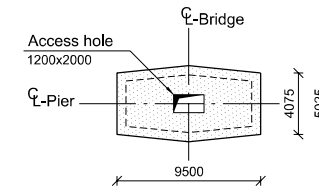
Section E-E
Scale 1:250
Short pier shown



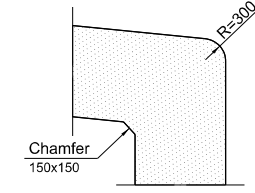
Section A-A
Scale 1:250



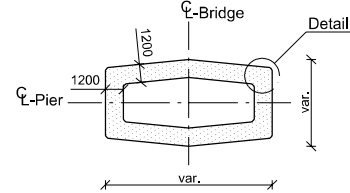
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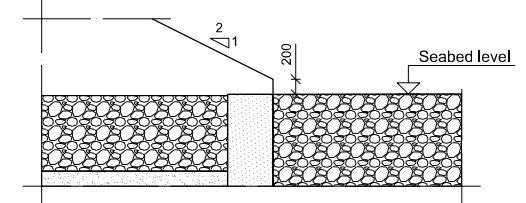
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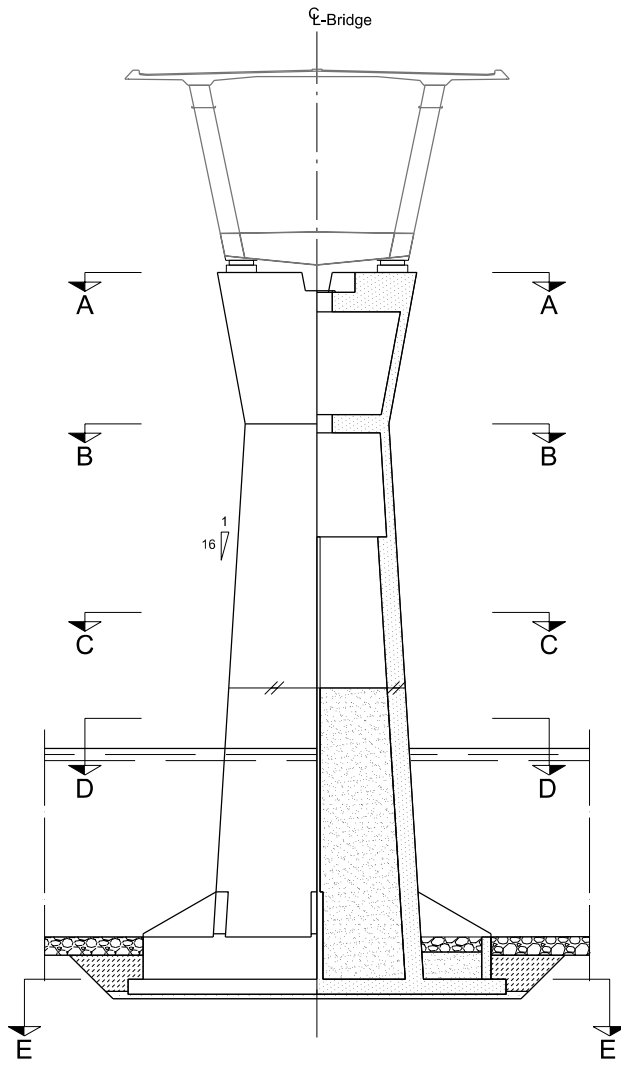
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Scale 1:50



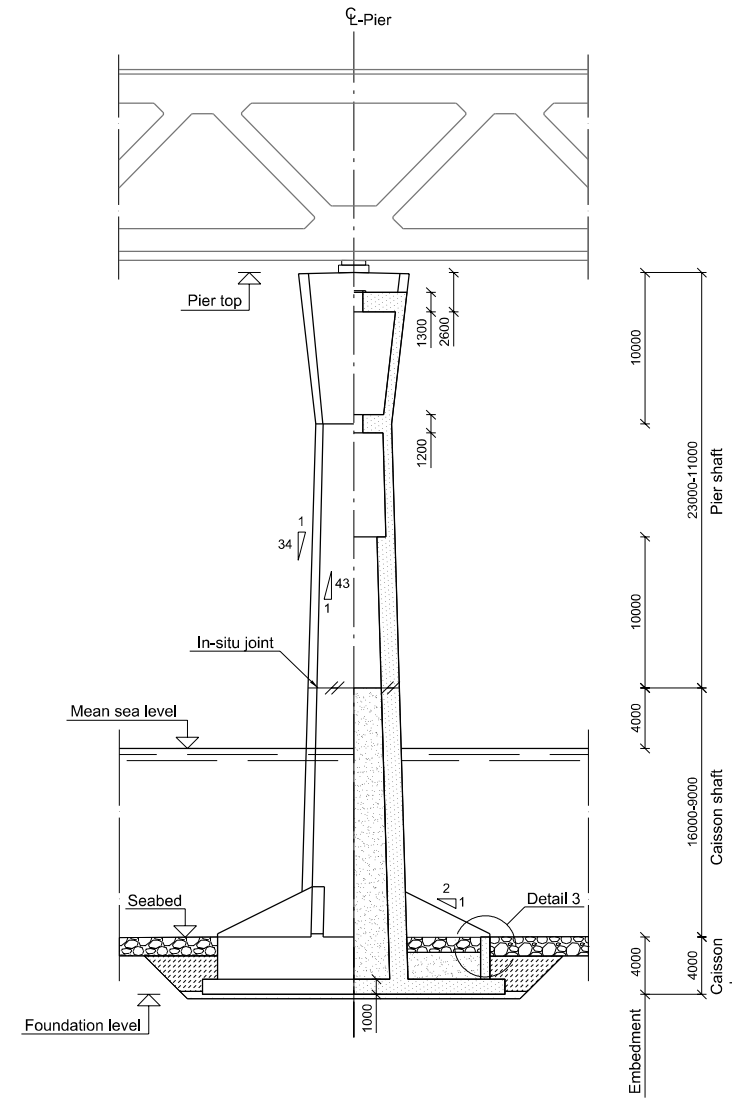
Section C-C
Scale 1:250



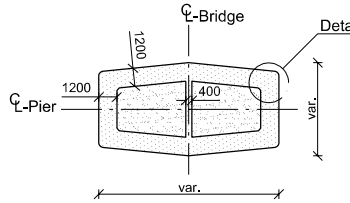
Detail 3
Scale 1:50



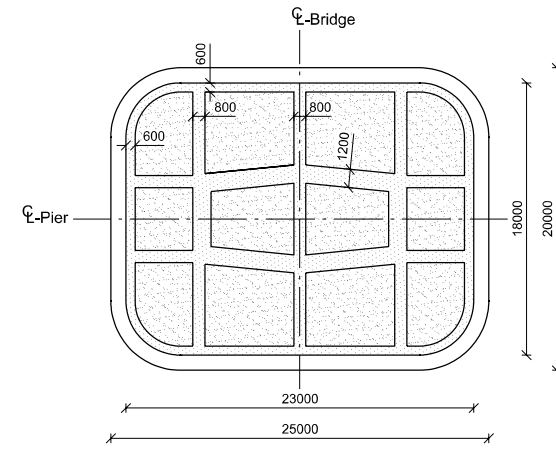
Transverse Profile and Section
Scale 1:250
Tall pier shown



Longitudinal Profile and Section
Scale 1:250
Tall pier shown



Section D-D
Scale 1:250



Section E-E
Scale 1:250
Tall pier shown

Notes:
Dimensions: Dimensions are in millimetres unless otherwise noted.
Scour protection: Scour protection is indicative.

- Legend:**
- Concrete
 - Sandfill
 - Backfill
 - Scour protection
 - Grout
 - Construction joint

- References:**
- A4429-C-P-DWG-00-00101 General Notes
 - A4429-C-P-DWG-33-32101 Pier Dredging and Foundation
 - A4429-C-P-DWG-33-32301 Pier Pier Top
 - A4429-C-P-DWG-33-32321 Pier In-situ Joint

Work in progress

Rev.	Date	Design/draft	Checked	Approved	Subject

Fehmarnbelt Fixed Link
Bridge Design - Conceptual Design

Femern
Sund Belt

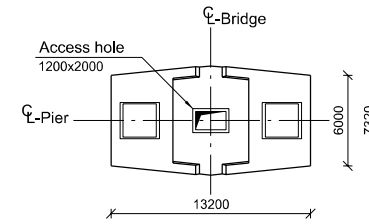
Date: 2010-01-29 Design/draft: IJ/TRMA Checked: KWLE Approved: TOF/LHE Rev. Date: **COWI** OBERMEYER

Project no. 71073 Scale AS noted Paper size A1

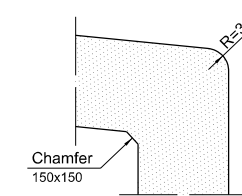
Disising+Walting
Leonhardt, Andrä und Partner
Flint & Neill Limited

Approach Bridge
Pier
Type IV
General Arrangement - Tall Piers

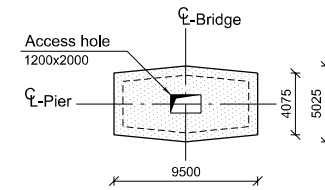
Drawing No. A4429-C-P-DWG-33-32071 Rev. 0.2



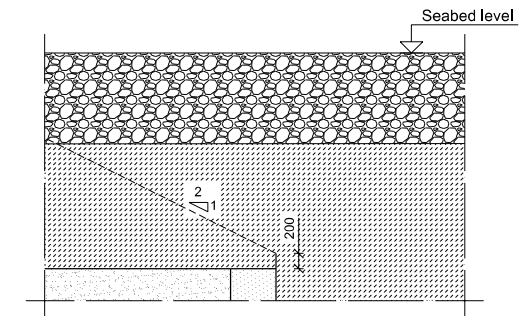
Section A-A
Scale 1:250



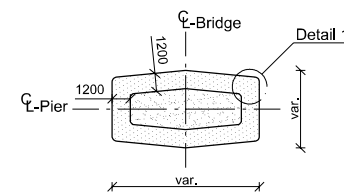
Detail 1
Scale 1:50



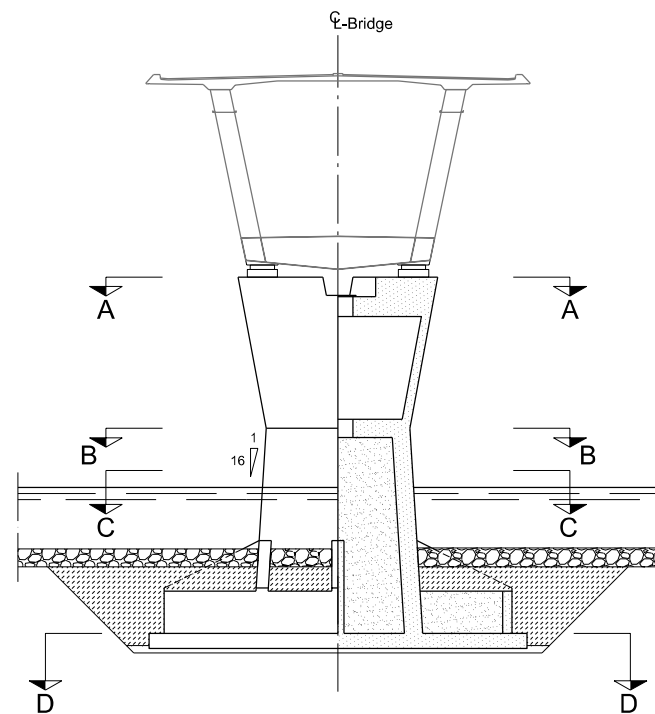
Section B-B
Scale 1:250



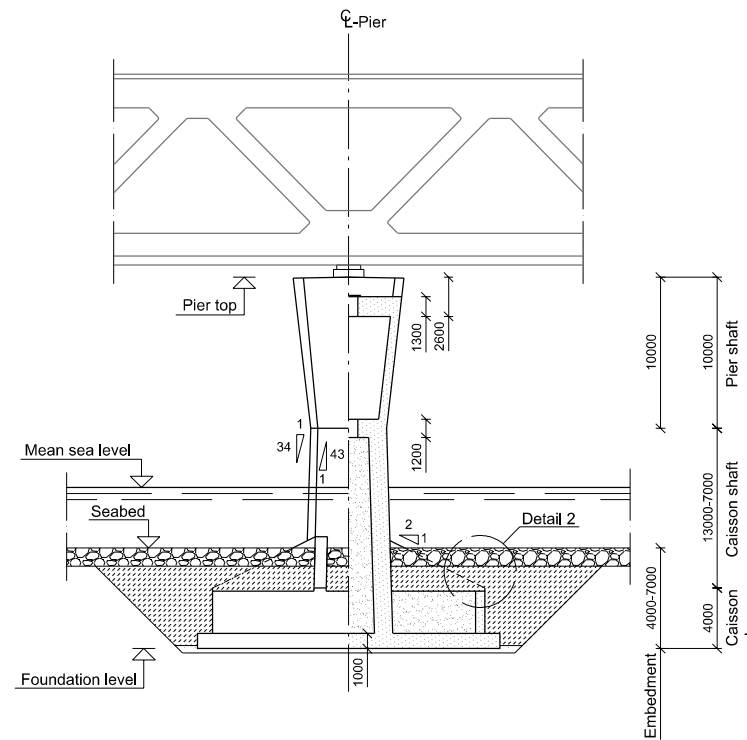
Detail 2
Scale 1:50



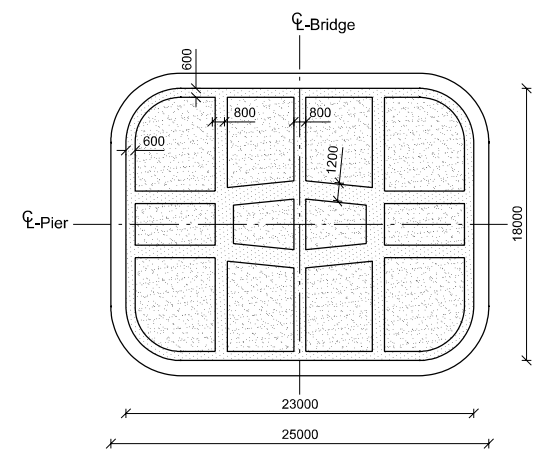
Section C-C
Scale 1:250



Transverse Profile and Section
Scale 1:250
Short pier shown



Longitudinal Profile and Section
Scale 1:250
Short pier shown



Section D-D
Scale 1:250
Short pier shown

Notes:

Dimensions: Dimensions are in millimetres unless otherwise noted.
Scour protection: Scour protection is indicative.

Legend:

- Concrete
- Sandfill
- Backfill
- Scour protection
- Grout
- Construction joint

References:

- A4429-C-P-DWG-00-00101 General Notes
- A4429-C-P-DWG-33-32101 Pier Dredging and Foundation
- A4429-C-P-DWG-33-32301 Pier Pier Top

Work in progress

Rev.	Date	Design/draft	Checked	Approved	Subject

Fehmarnbelt Fixed Link
Bridge Design - Conceptual Design



Date	Design/draft	Checked	Approved	Rev. Date	COWI OBERMEYER
2010-01-29	IJ/TRMA	KWLE	TOF/LHE		

Project no. 71073 Scale AS noted Paper size A1

Approach Bridge
Pier
Type IV
General Arrangement - Short Piers

Drawing No. A4429-C-P-DWG-33-32072 Rev. 0.2



1. Spill description

The bridge consists of 83 piers and pylons in the water. The shapes, location and size of the individual piers are taken into account when generating the spill files.

Table 1-1 gives an overview of the applied equipment and the corresponding spill profiles.

Table 1-1 Overview of equipment and spill profiles

Activity	Equipment	Spill profile	Spill percentage
Dredging for piers	Cutter suction	Spill at the drag head near the bottom and at the surface due to overflow	Bottom: 2% Overflow: 10%
Backfilling around piers	Barge with fall pipe	Spill 2m above seabed	1%
Placement of scour protection	Barge with fall pipe	Spill 2m above seabed	1%
Dredging for access channels	Backhoe	Equally distributed over the water column with additional spill at the barge	Water column: 2% Barge: 3%
Backfilling of access channels	Backhoe	Equally distributed over the water column with additional spill at the barge	Water column: 2% Barge: 3%
Construction of work harbour	Various	Equally distributed over the water column	1%
Disposal	Barge with fall pipe	Spill 2m above the bed	3%

The spill percentages are based on the experiences from the Øresund project, see for instance John et. al. 2000. The spill from the work harbours are based on the specifications in the tunnel project.



A P P E N D I X F

Local Wave Conditions

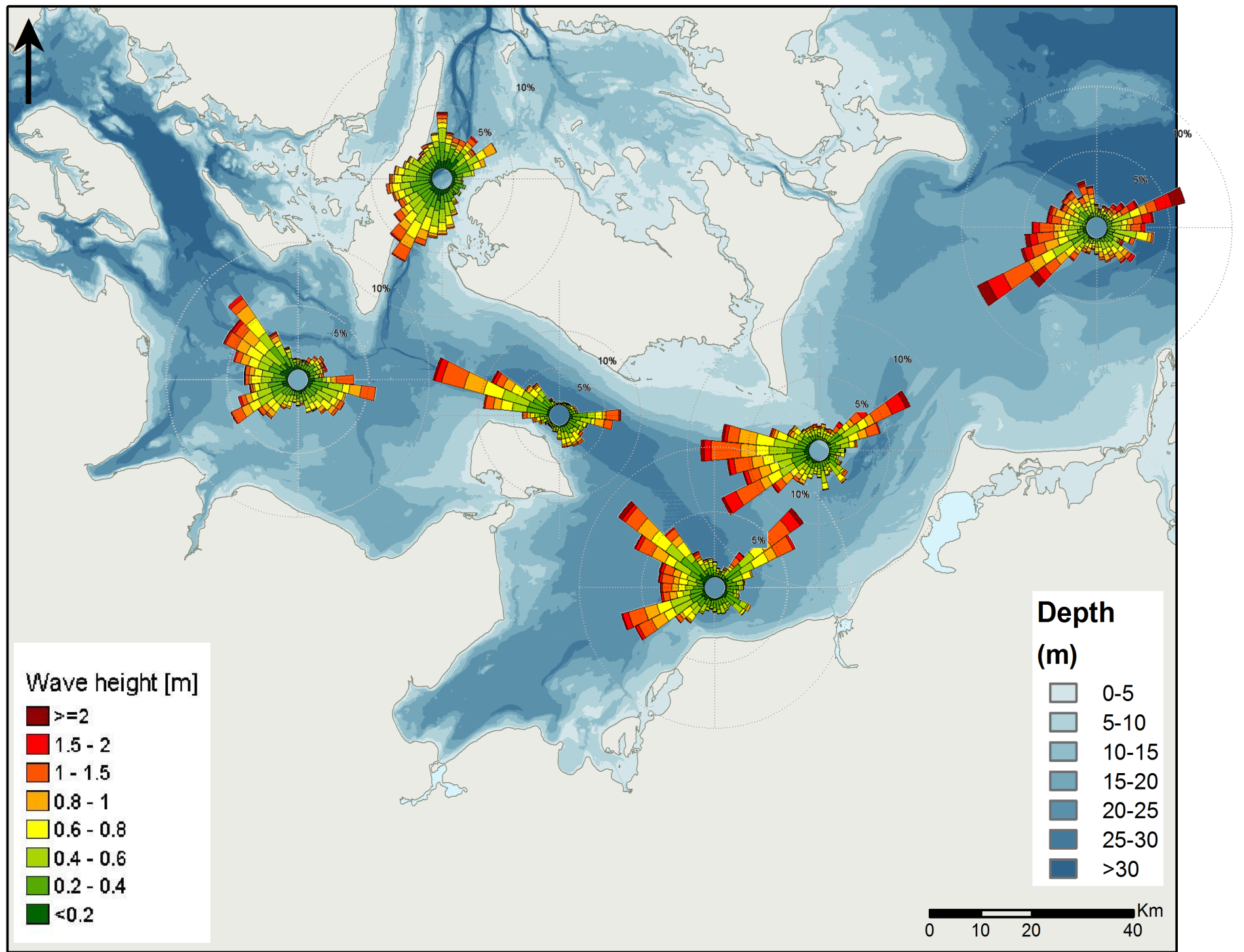


Figure F1 Modelled wave roses at selected locations. Global zoom

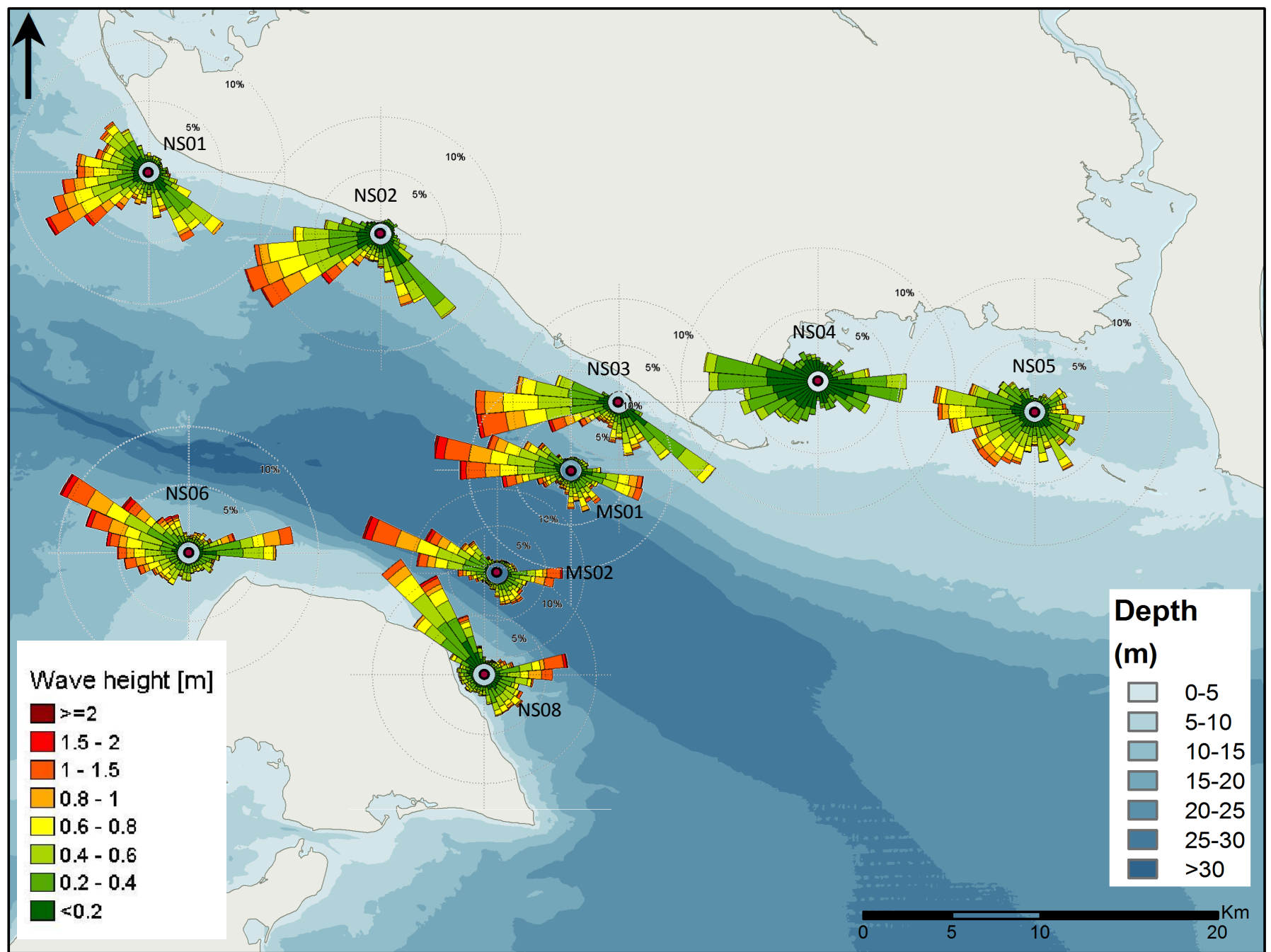


Figure F2 Modelled wave roses at selected locations. Local zoom



A P P E N D I X G

Exceedance Plots from Tunnel Solutions

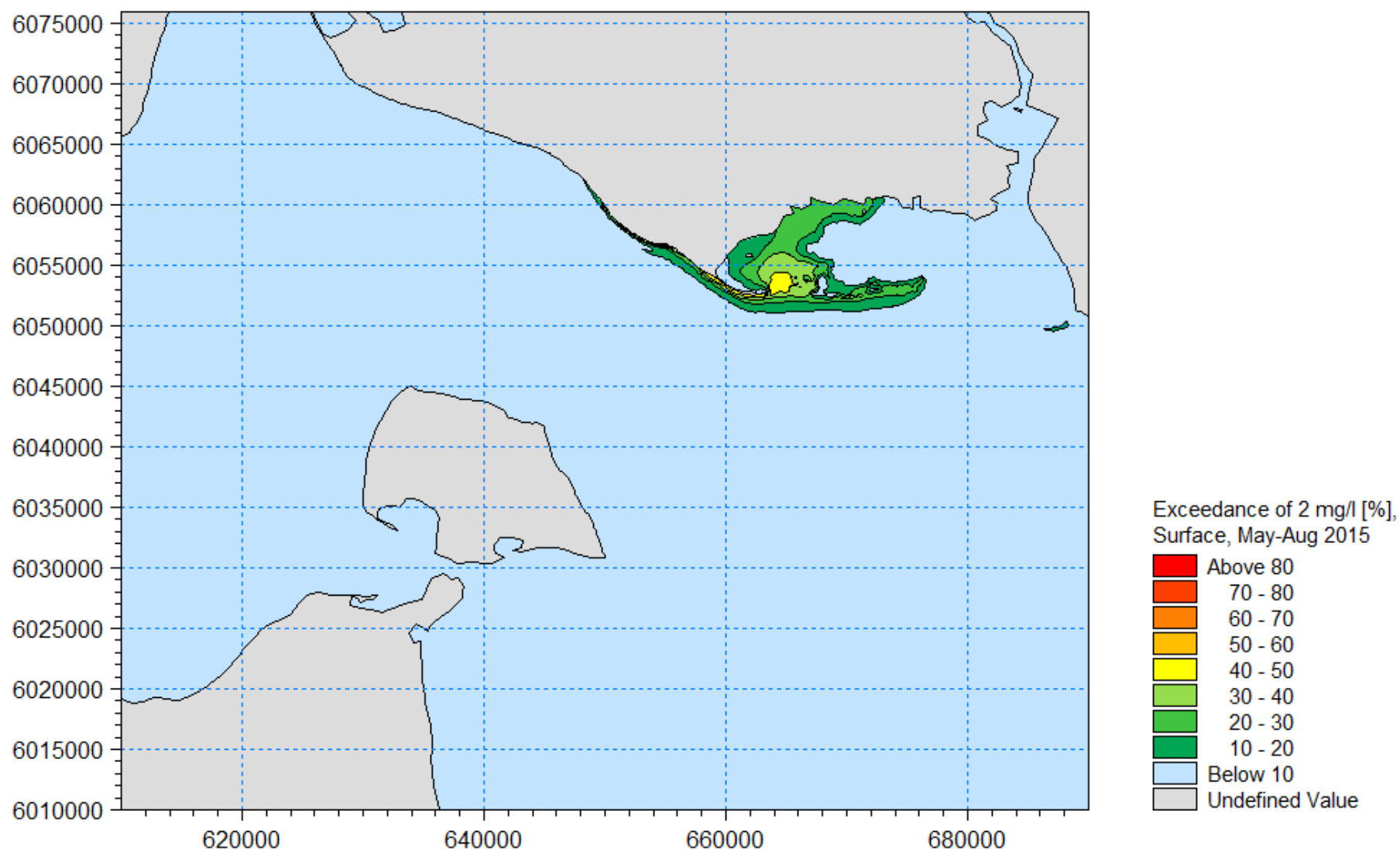


Figure G1 Exceedance time of 2 mg/l. Tunnel solution. May – August 2015. Surface

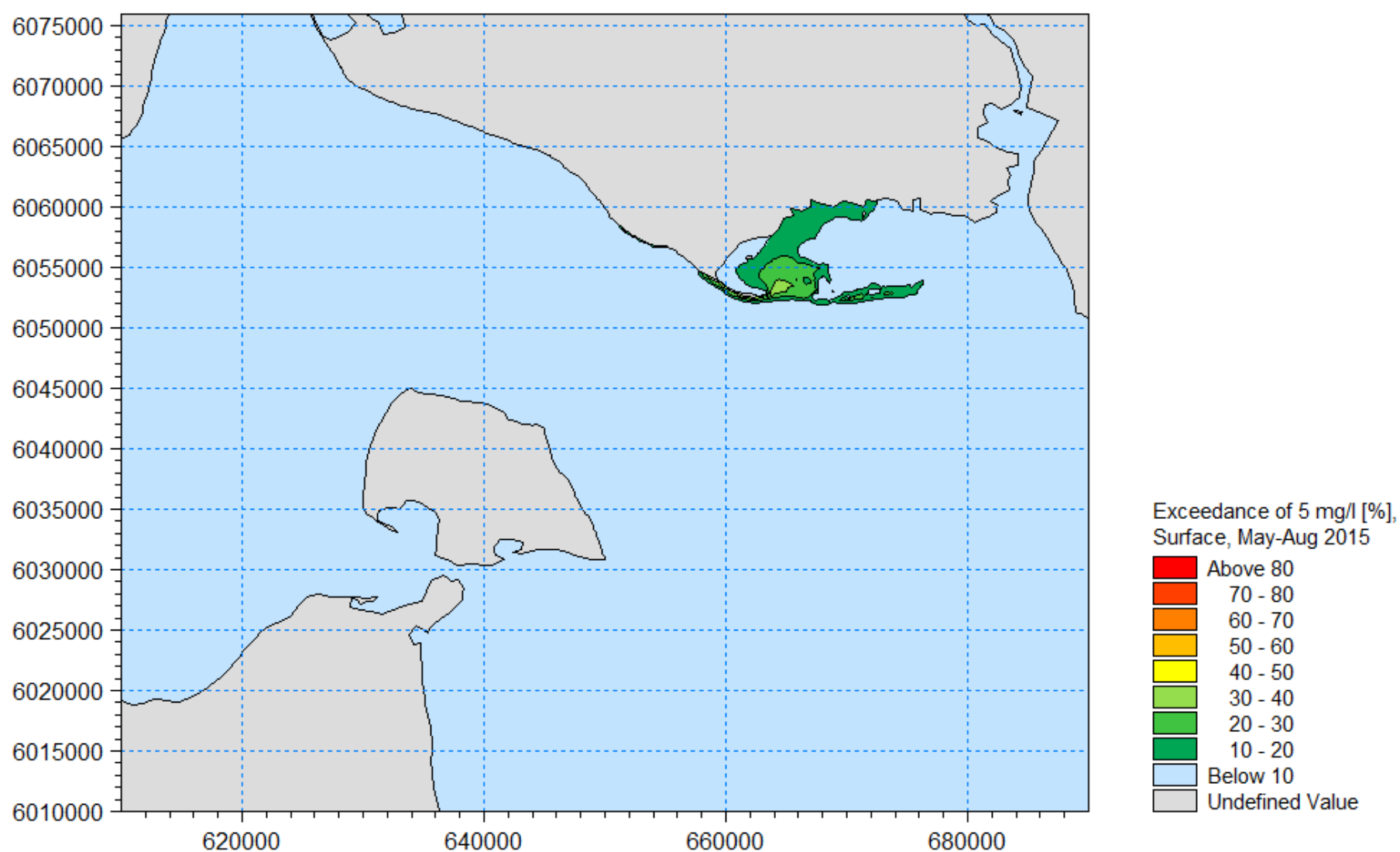


Figure G2 Exceedance time of 5 mg/l. Tunnel solution. May – August 2015. Surface

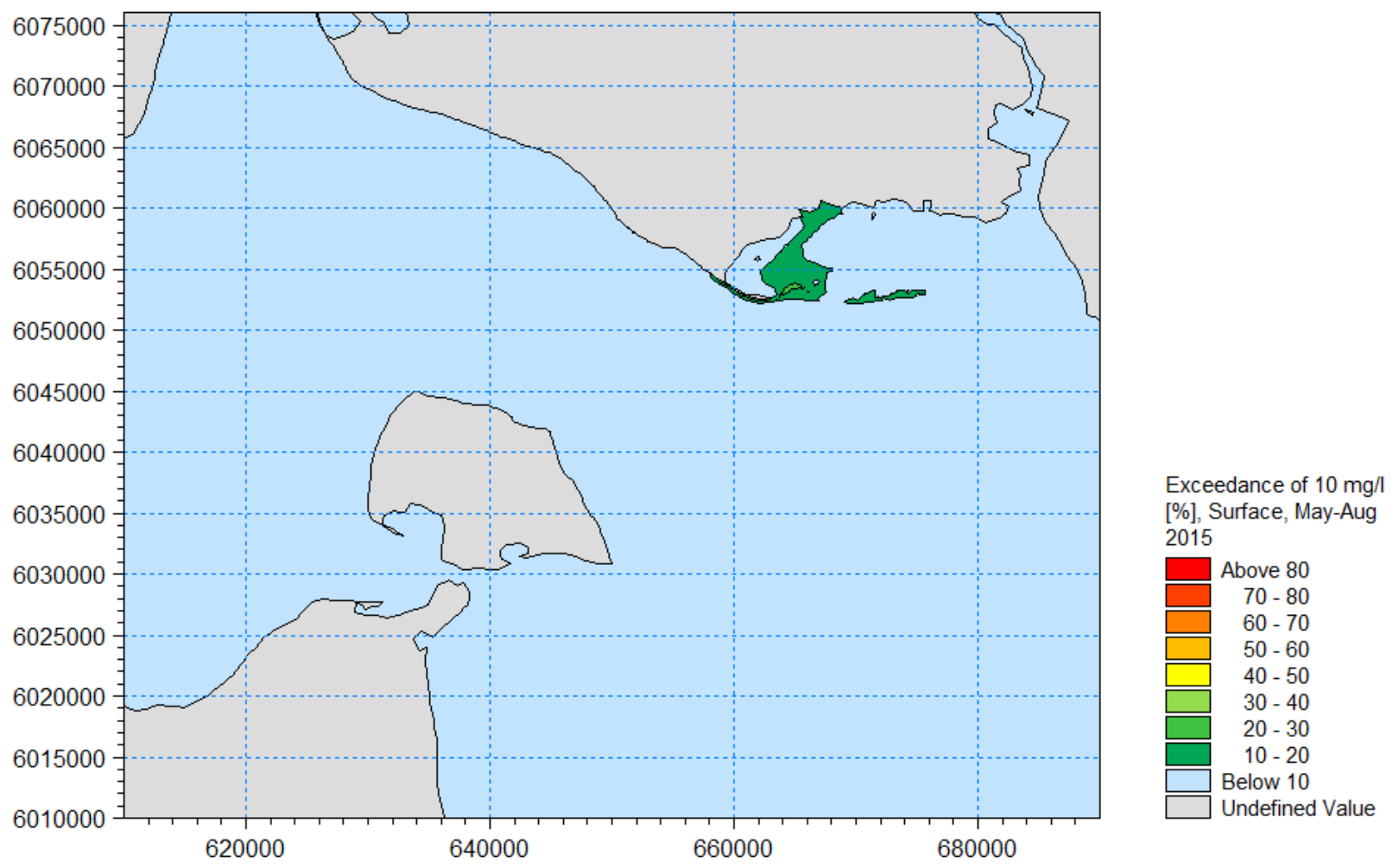


Figure G3 Exceedance time of 10 mg/l. Tunnel solution. May – August 2015. Surface

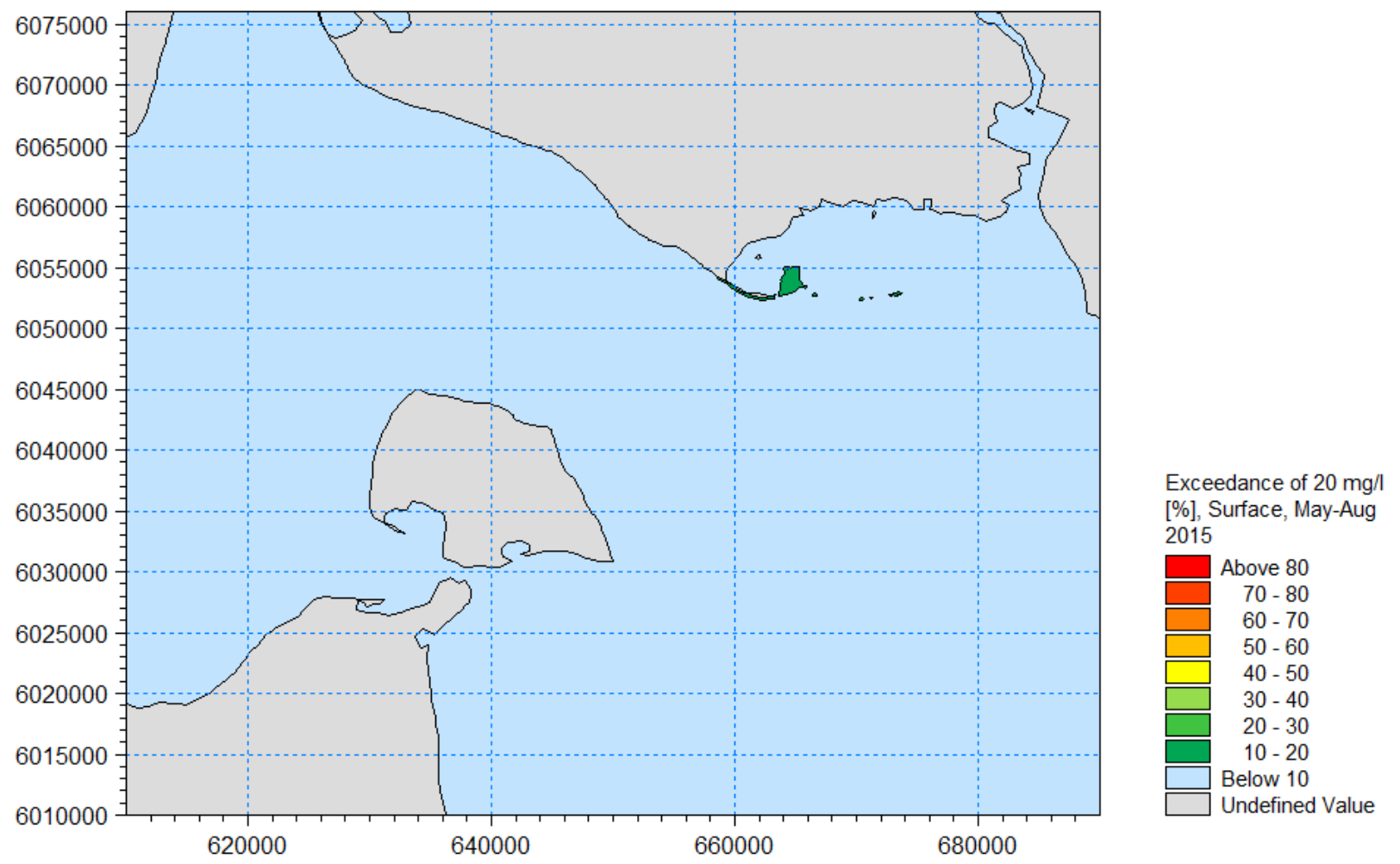


Figure G4 Exceedance time of 20 mg/l. Tunnel solution. May – August 2015. Surface

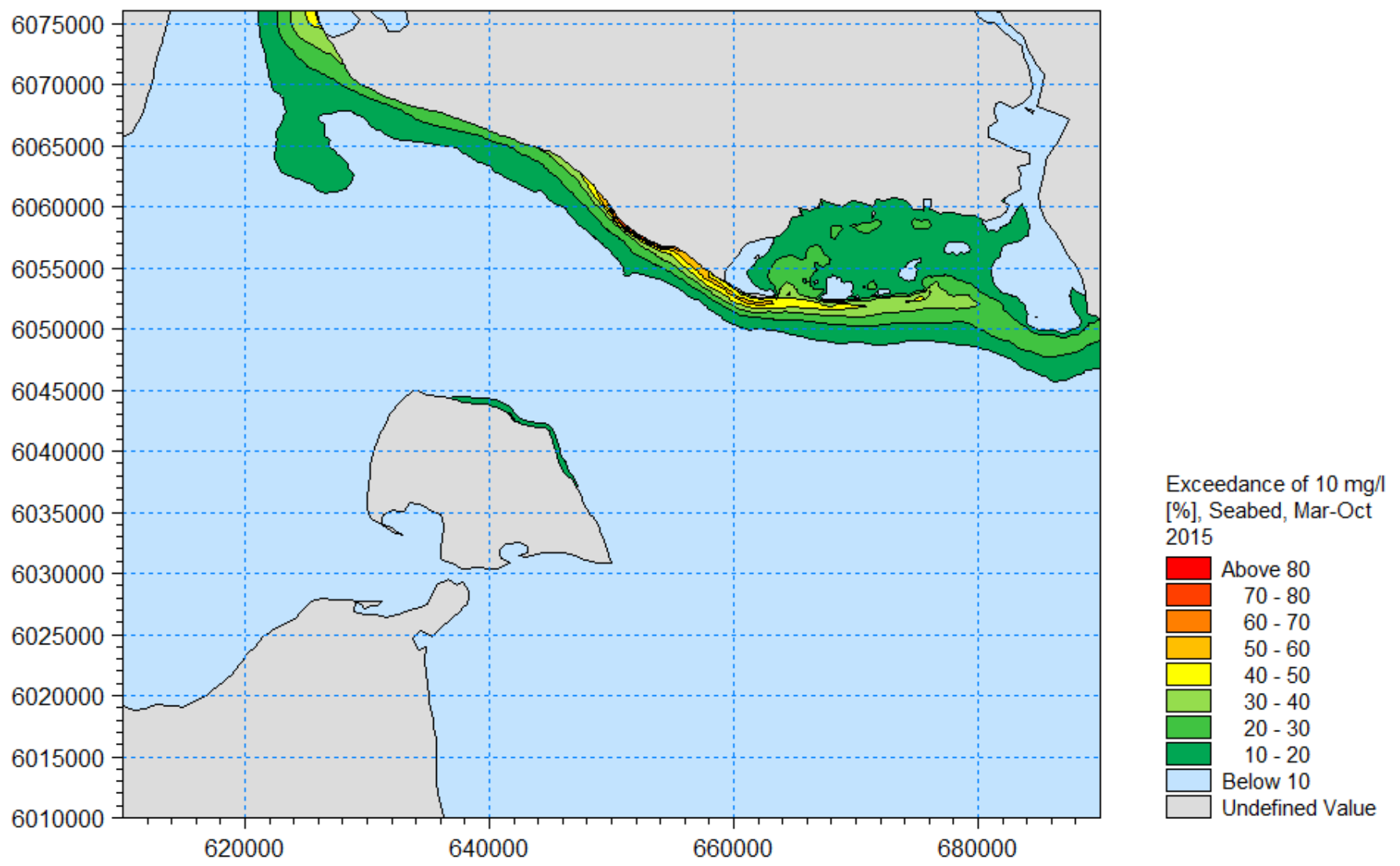


Figure G5 Exceedance time of 10 mg/l. Tunnel solution. March – October 2015. Seabed

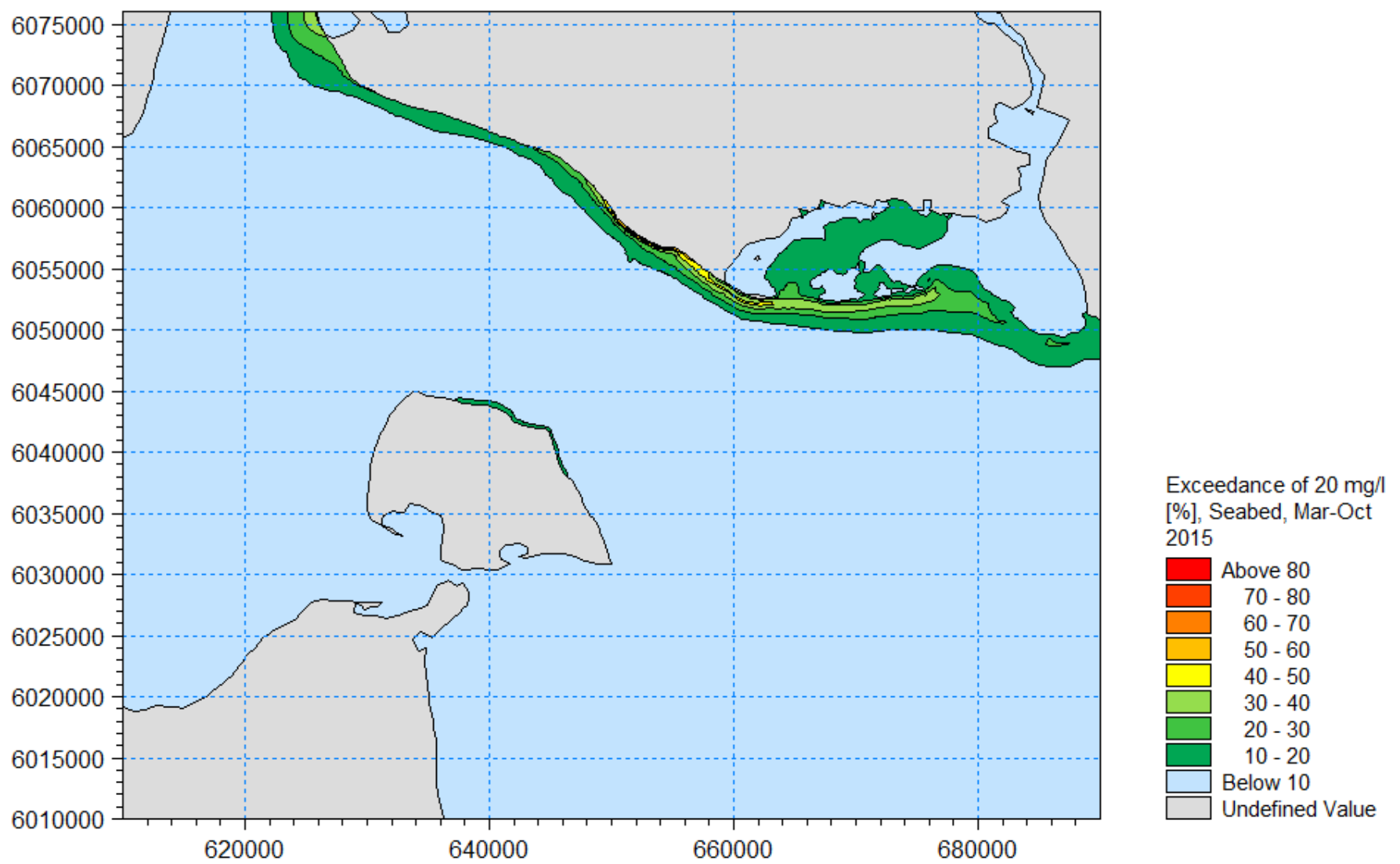


Figure G6 Exceedance time of 20 mg/l. Tunnel solution. March – October 2015. Seabed

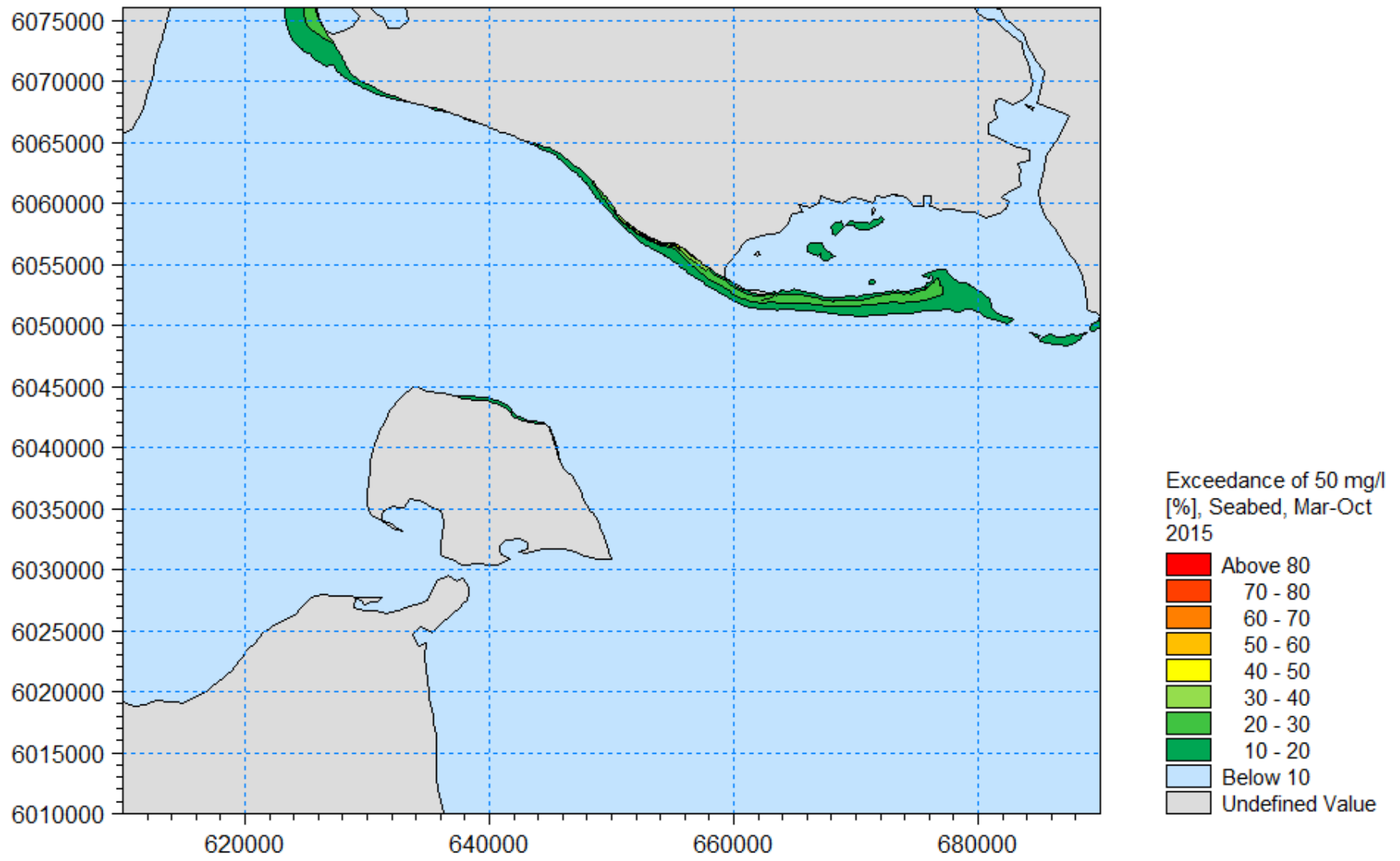


Figure G7 Exceedance time of 50 mg/l. Tunnel solution. March – October 2015. Seabed

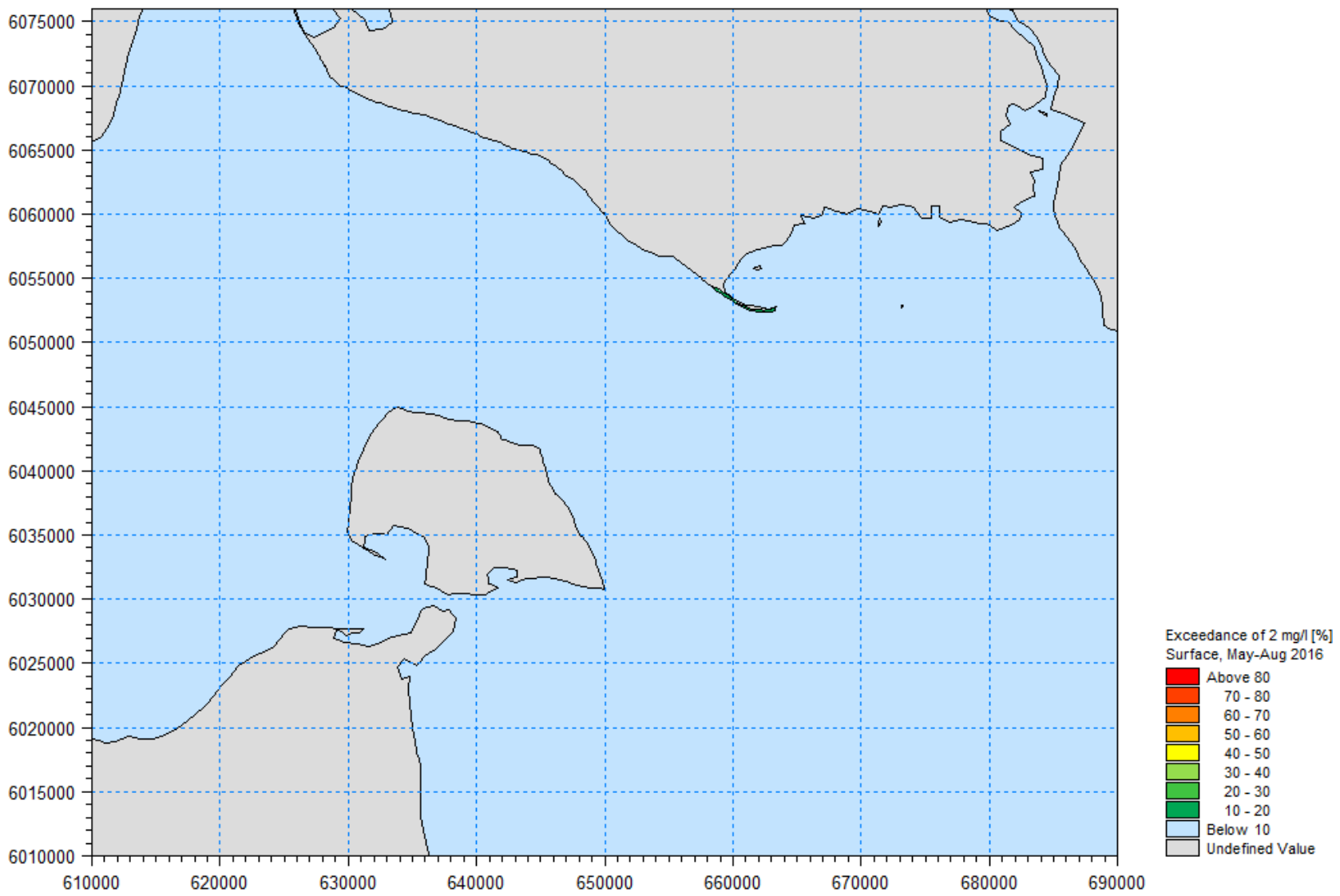


Figure G8 Exceedance time of 2 mg/l. Tunnel solution. May – August 2016. Surface

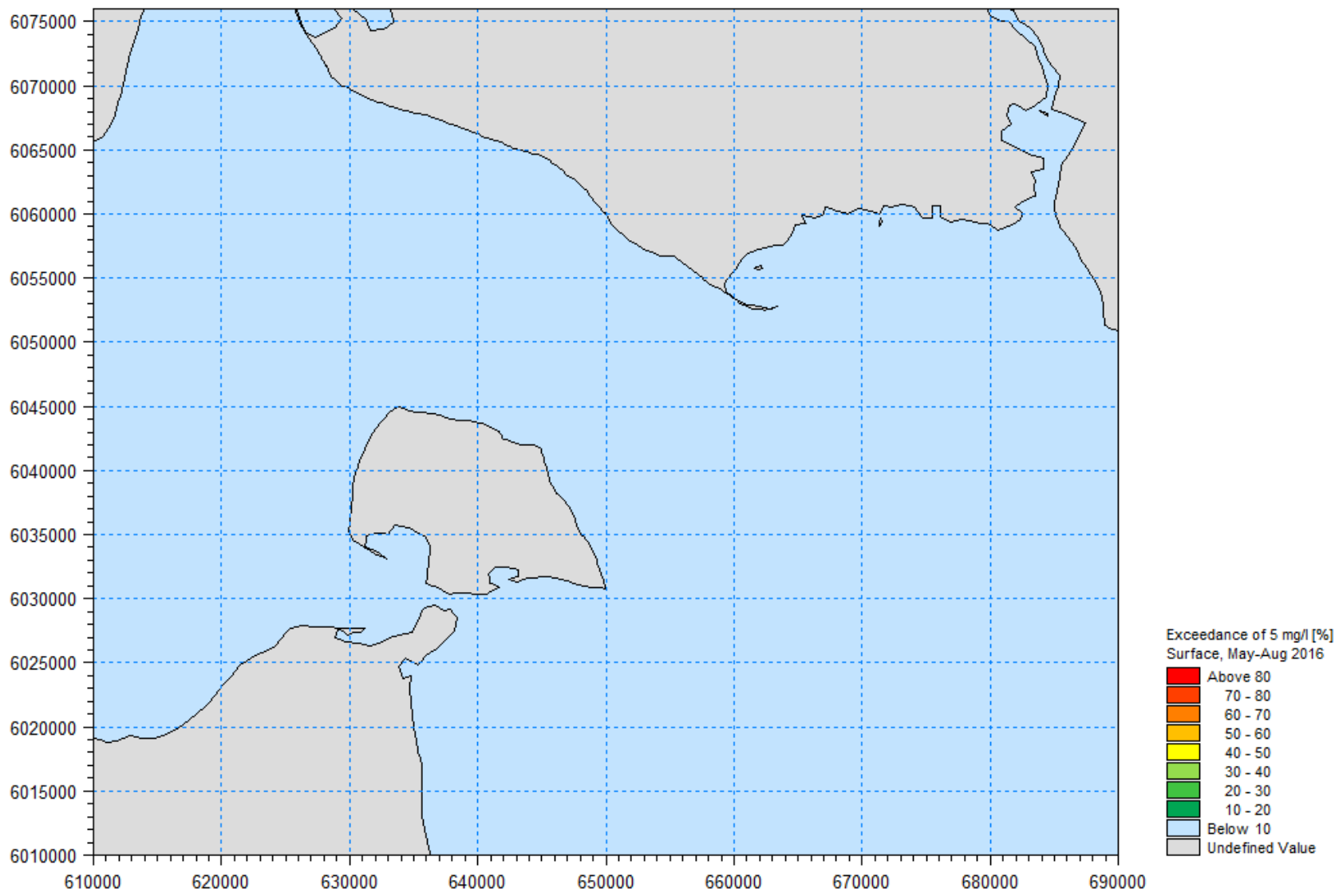


Figure G9 Exceedance time of 5 mg/l. Tunnel solution. May – August 2016. Surface.

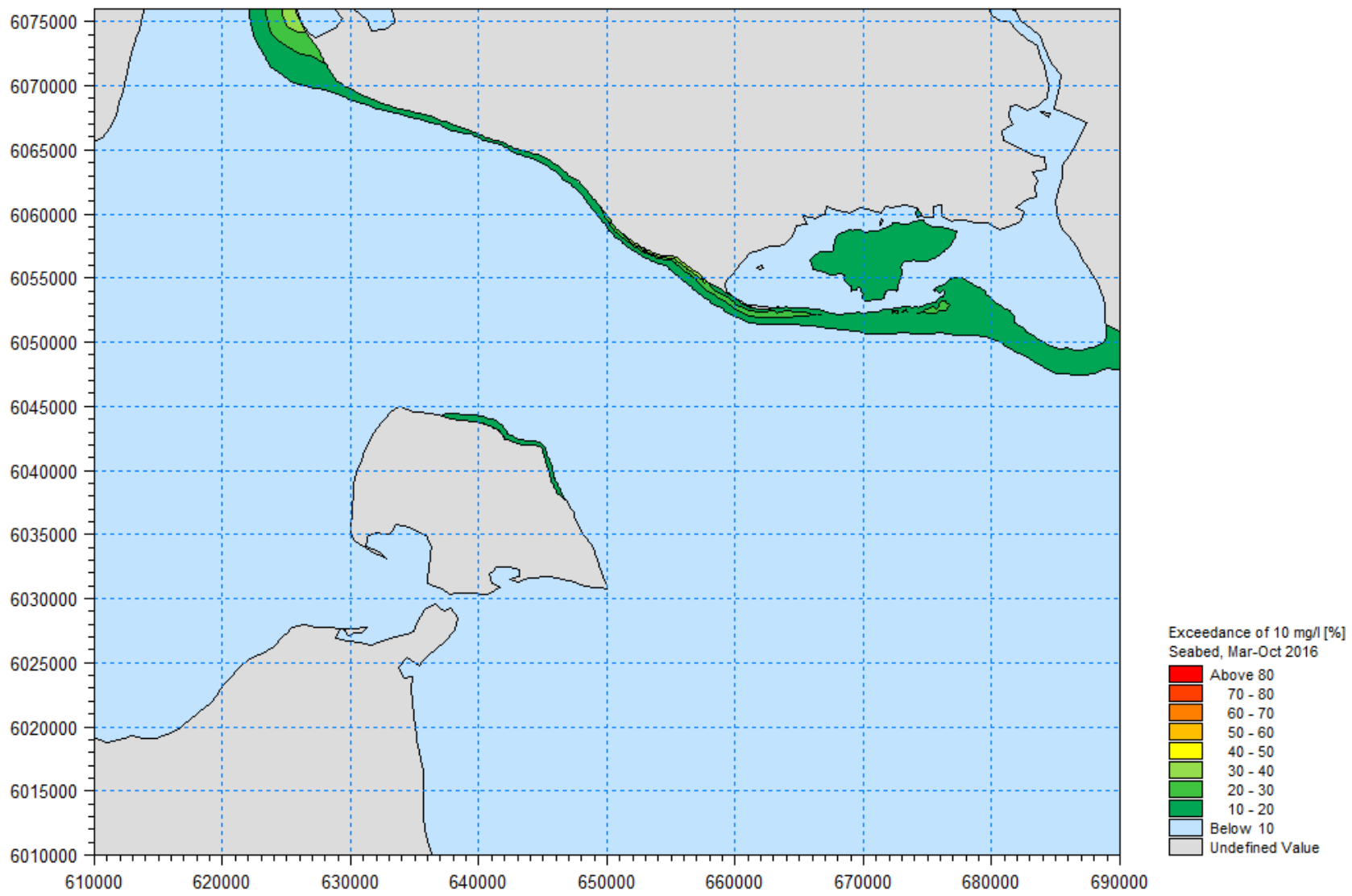


Figure G10 Exceedance time of 10 mg/l. Tunnel solution. March – October 2016. Seabed

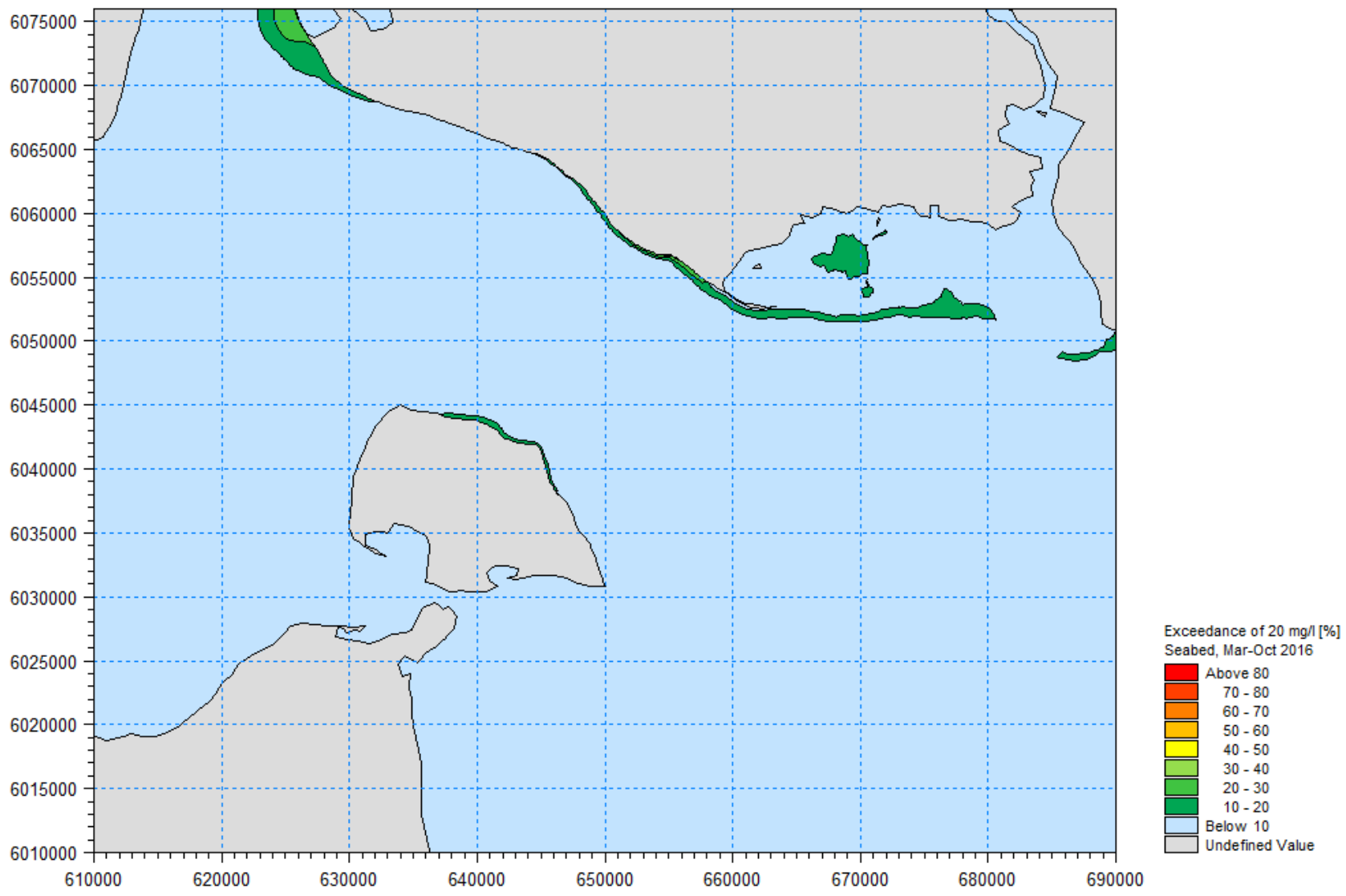


Figure G11 Exceedance time of 20 mg/l. Tunnel solution. March – October 2016. Seabed

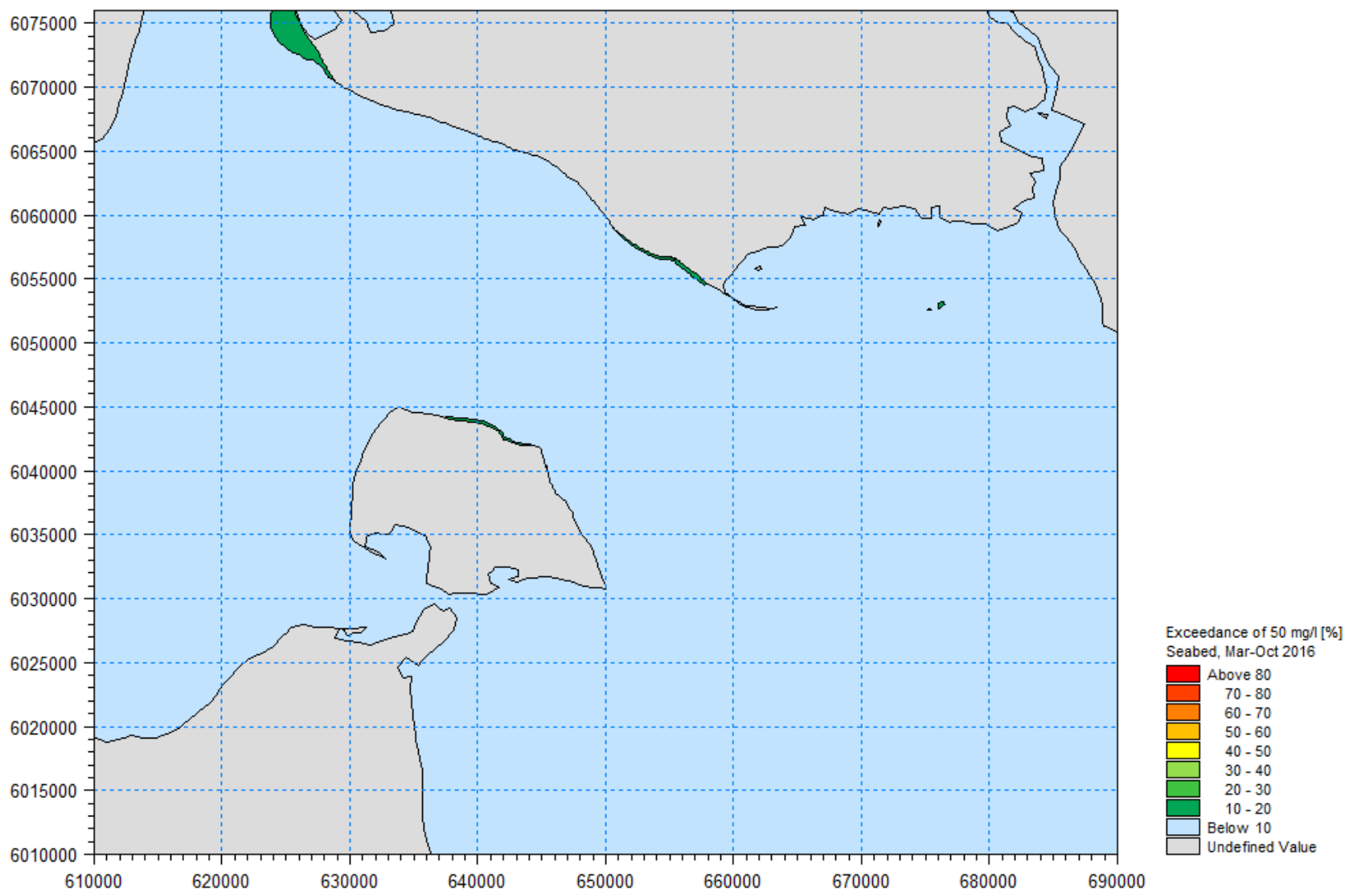


Figure G12 Exceedance time of 50 mg/l. Tunnel solution. March – October 2016. Seabed

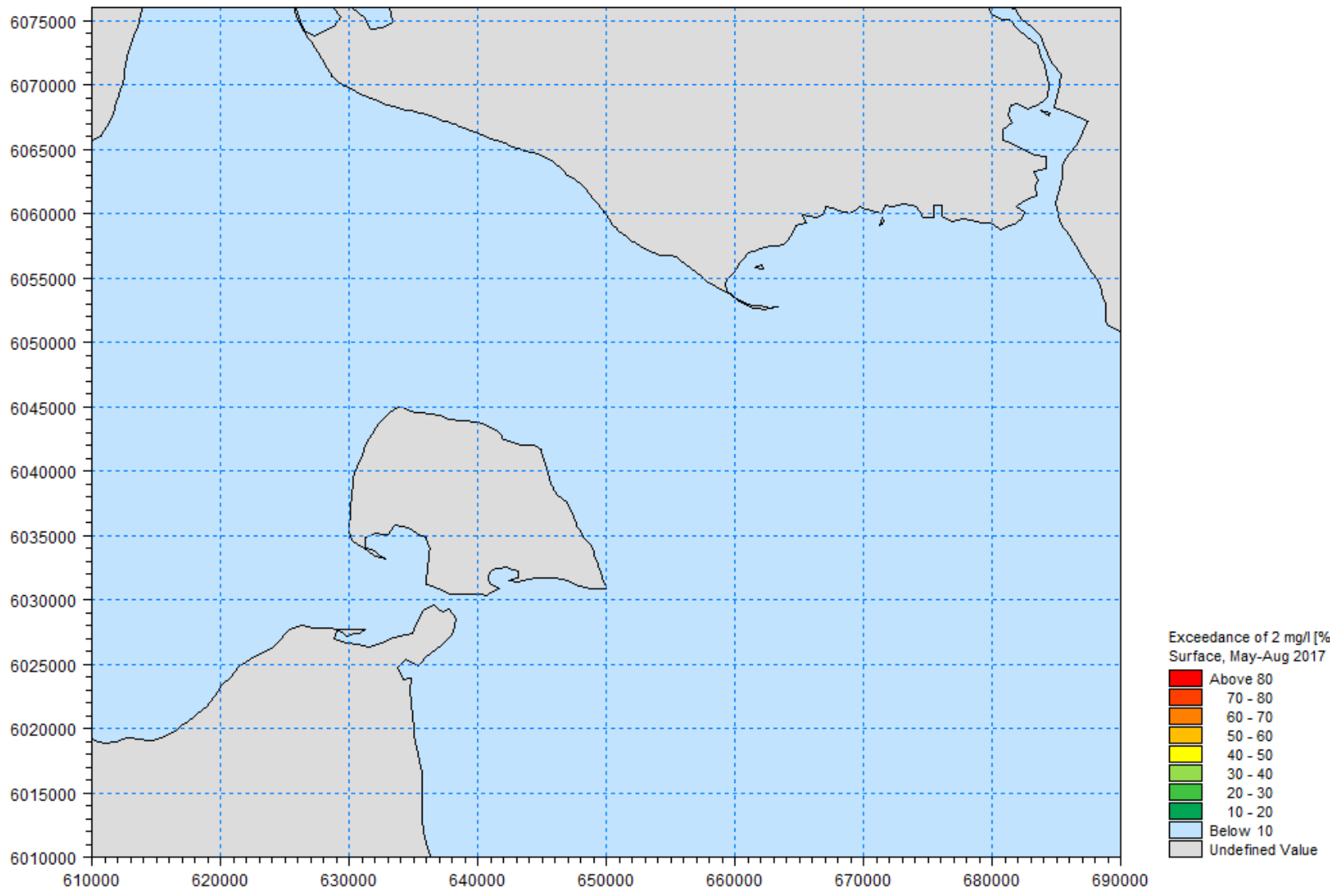


Figure G13 Exceedance time of 2 mg/l. Tunnel solution. May – August 2017. Surface.

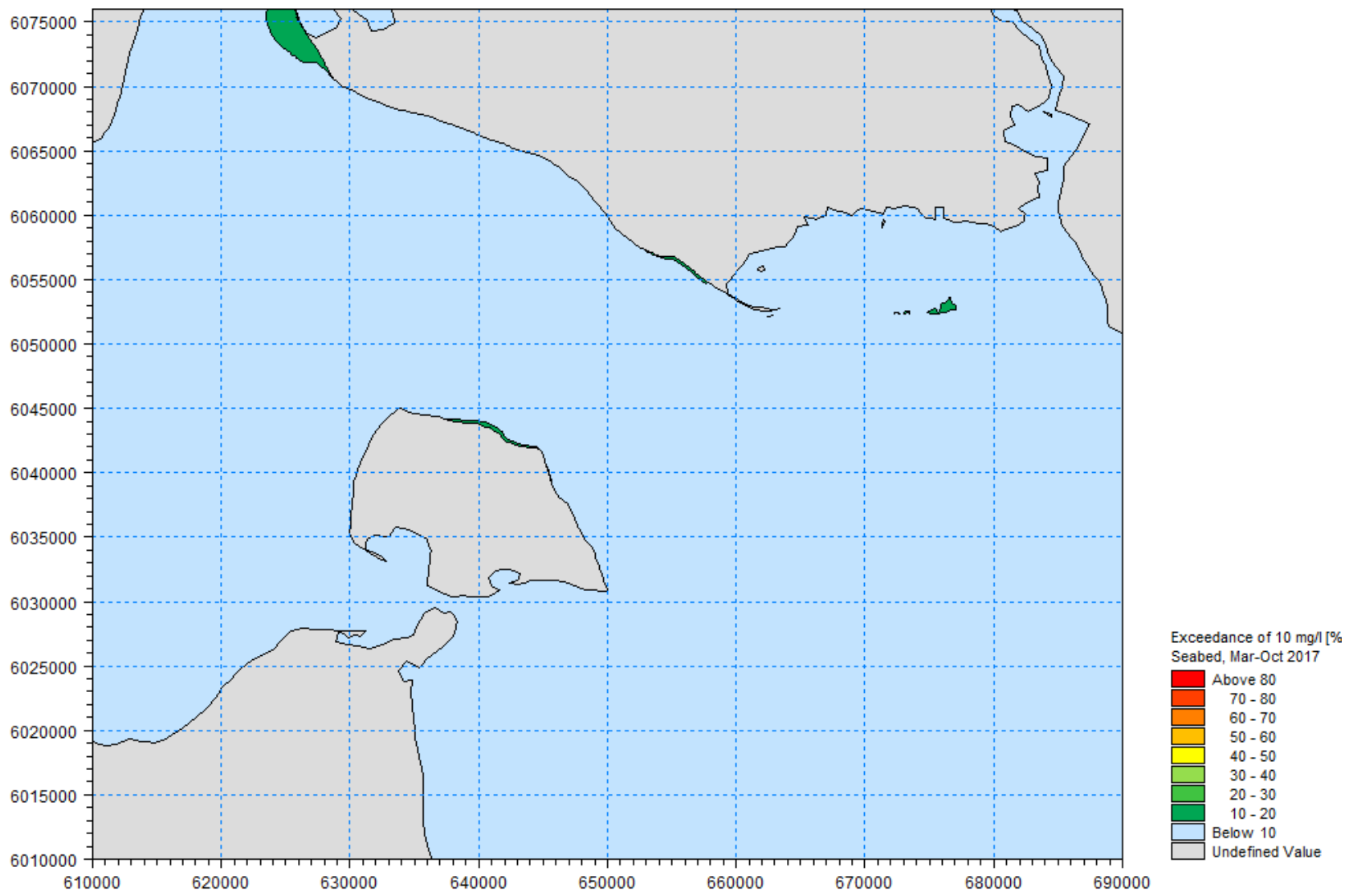


Figure G14 Exceedance time of 10 mg/l. Tunnel solution. March – October 2017. Seabed.

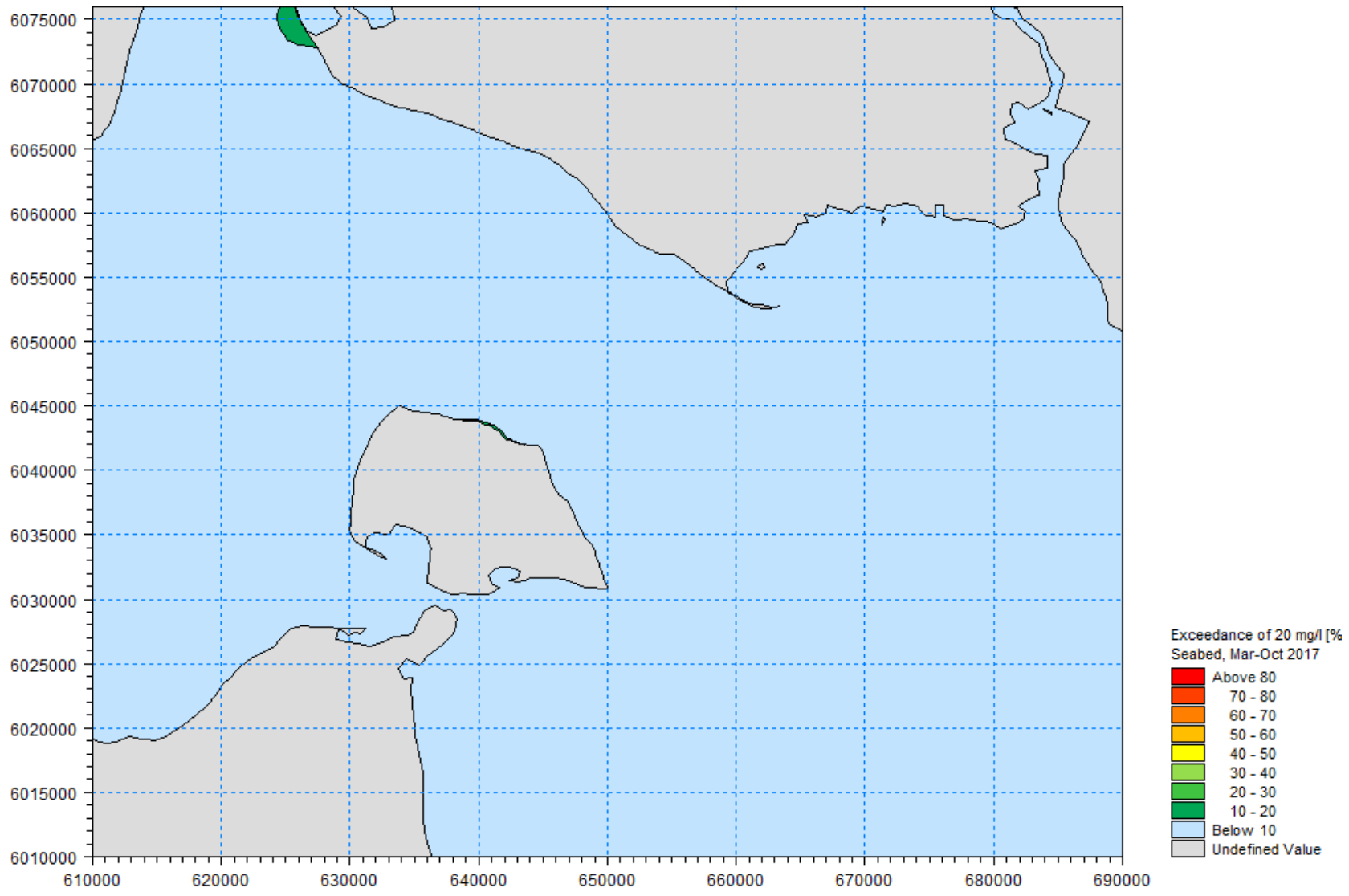


Figure G15 Exceedance time of 20 mg/l. Tunnel solution. March – October 2017. Seabed

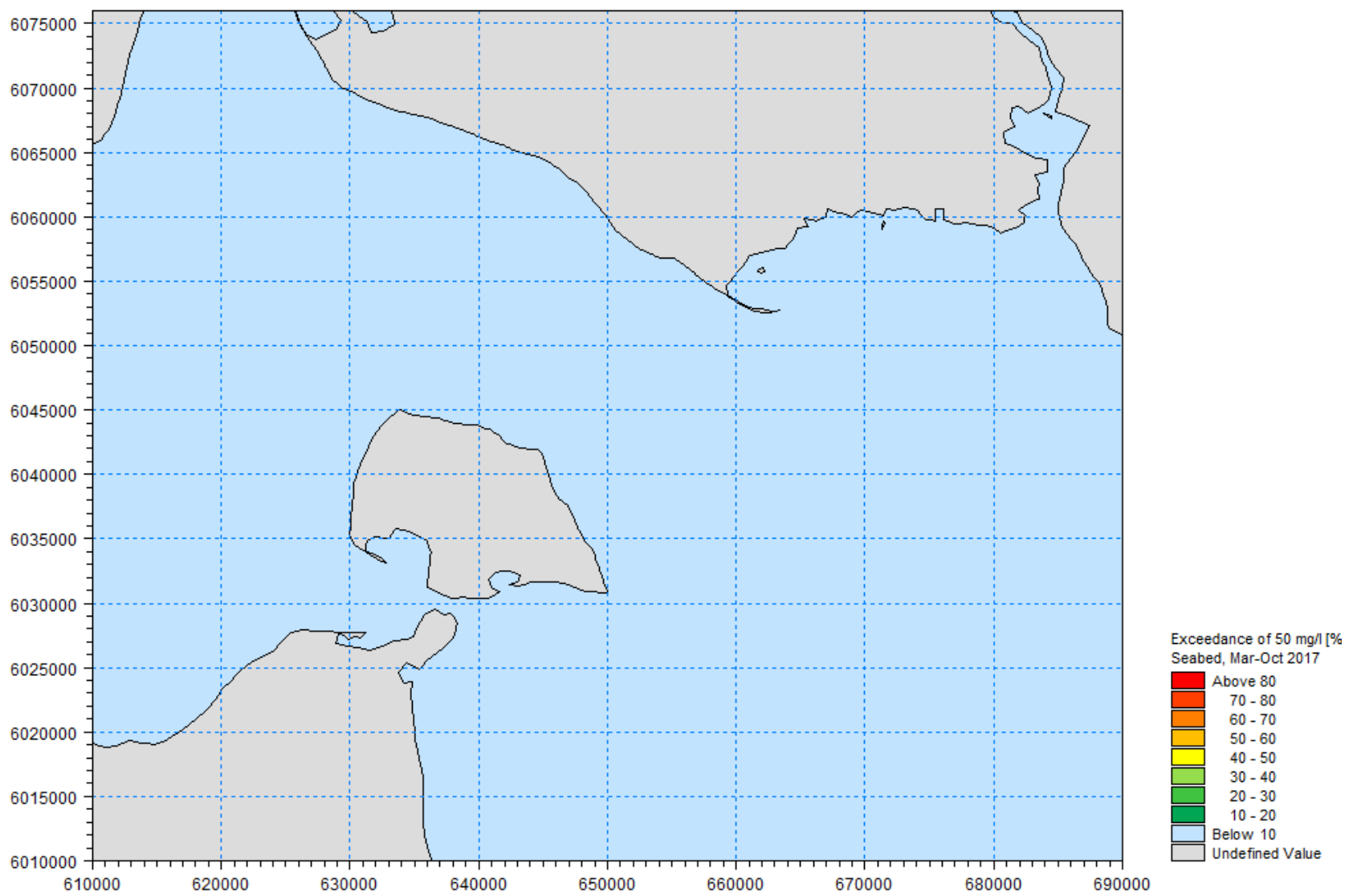


Figure G16 Exceedance time of 50 mg/l. Tunnel solution. March – October 2017. Seabed

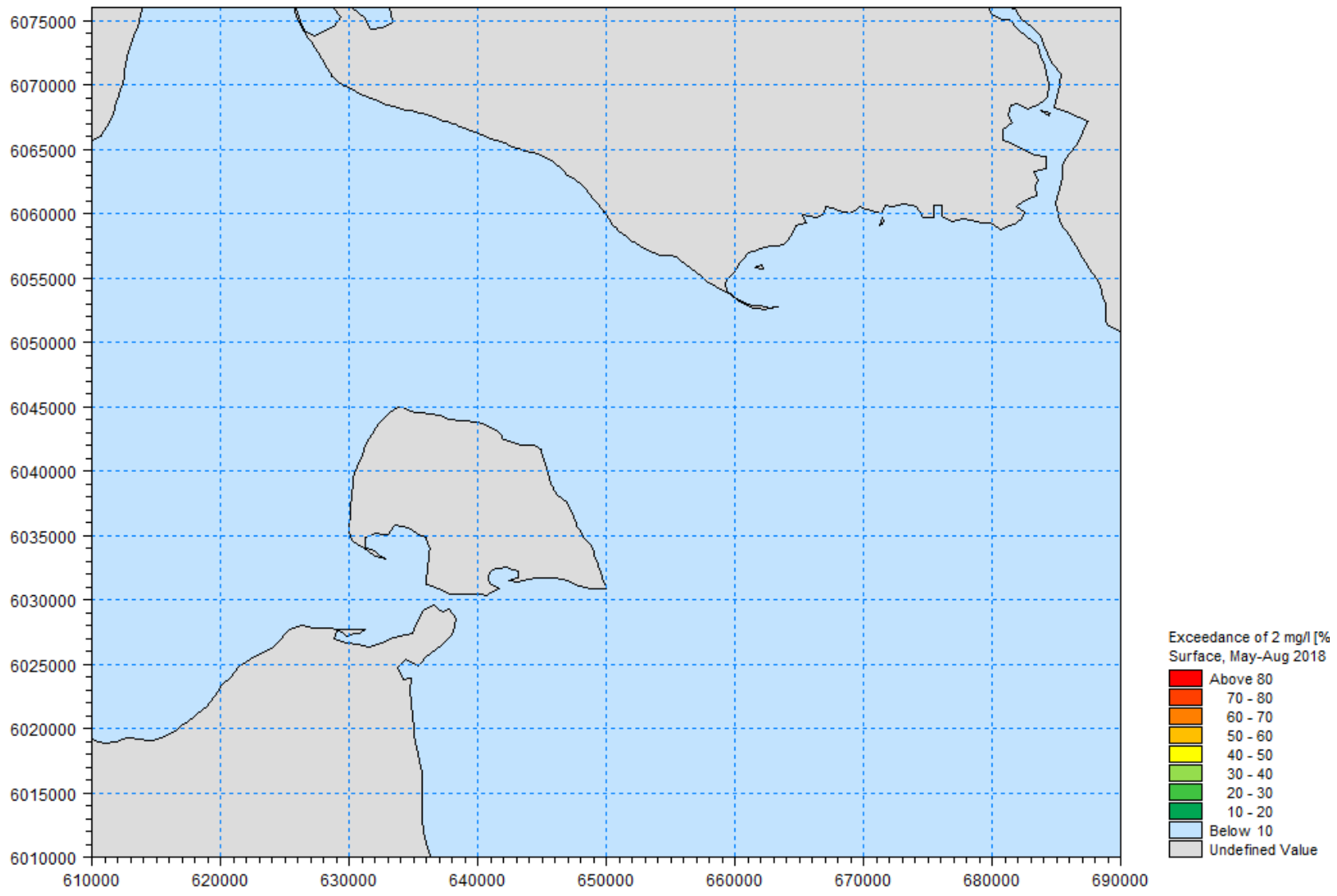


Figure G17 Exceedance time of 2 mg/l. Tunnel solution. May – August 2018. Surface

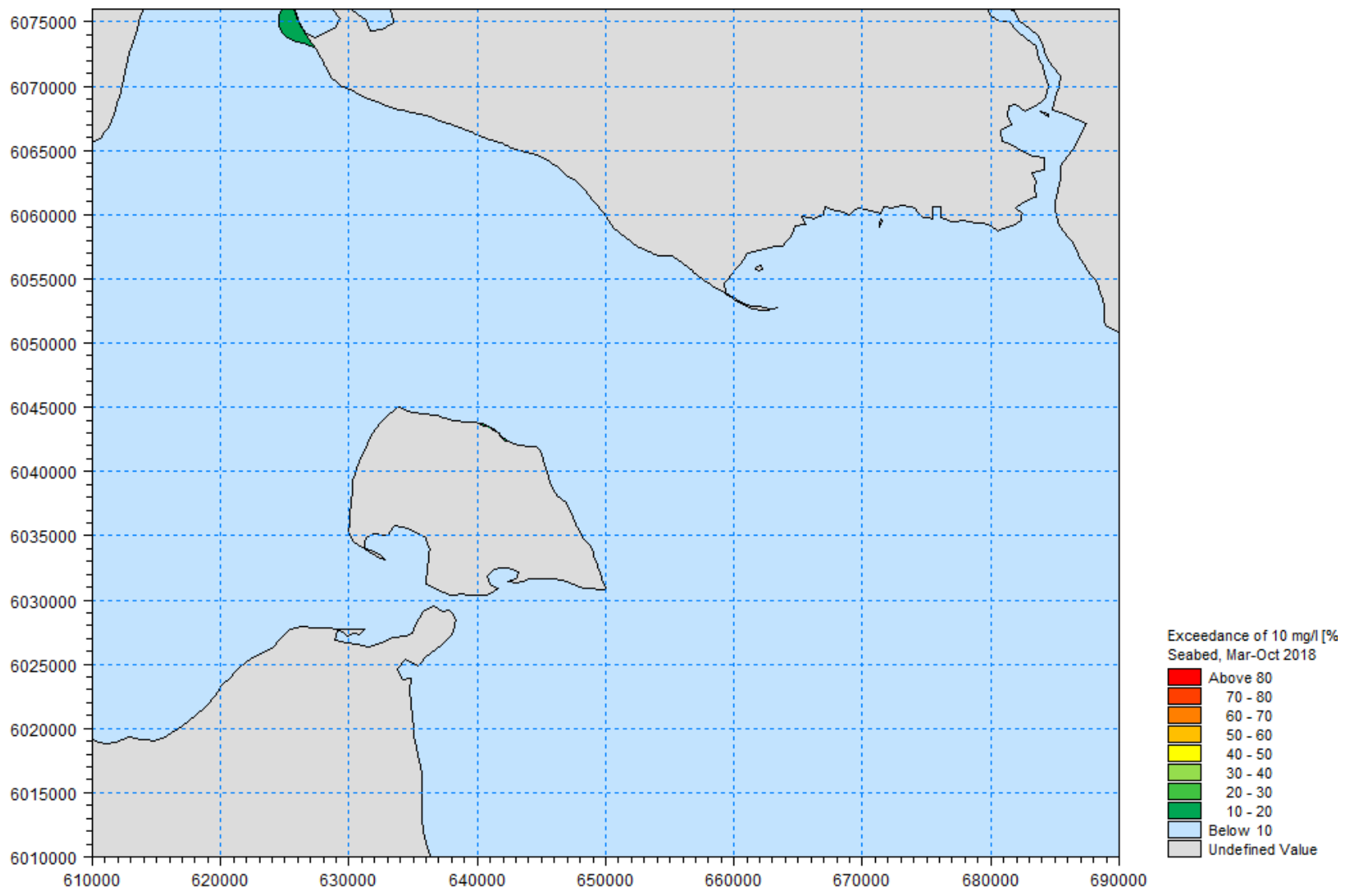


Figure G18 Exceedance time of 10 mg/l. Tunnel solution. March – October 2018. Seabed

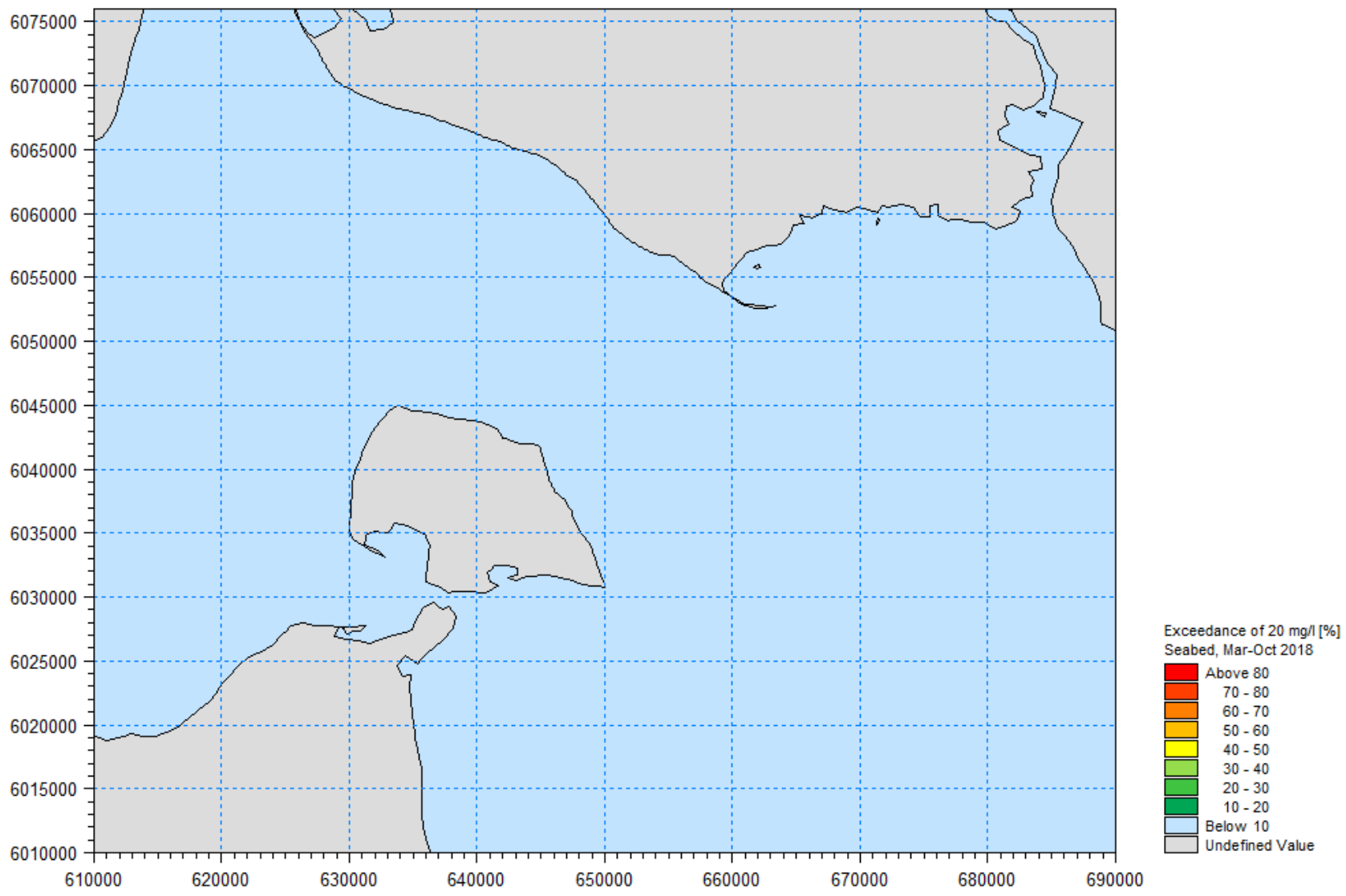


Figure G19 Exceedance time of 20 mg/l. Tunnel solution. March – October 2018. Seabed

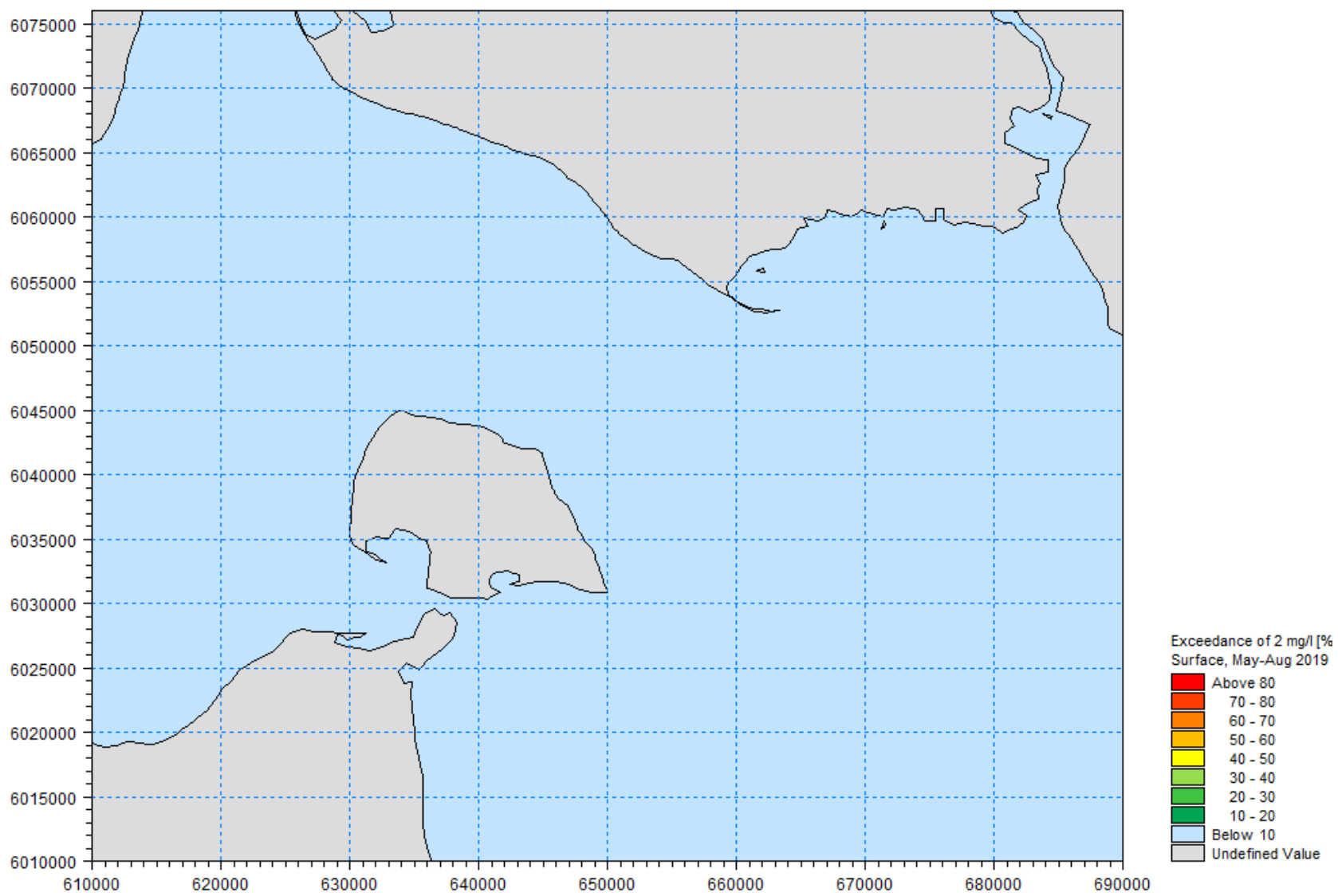


Figure G20 Exceedance time of 2 mg/l. Tunnel solution. May – August 2019. Surface

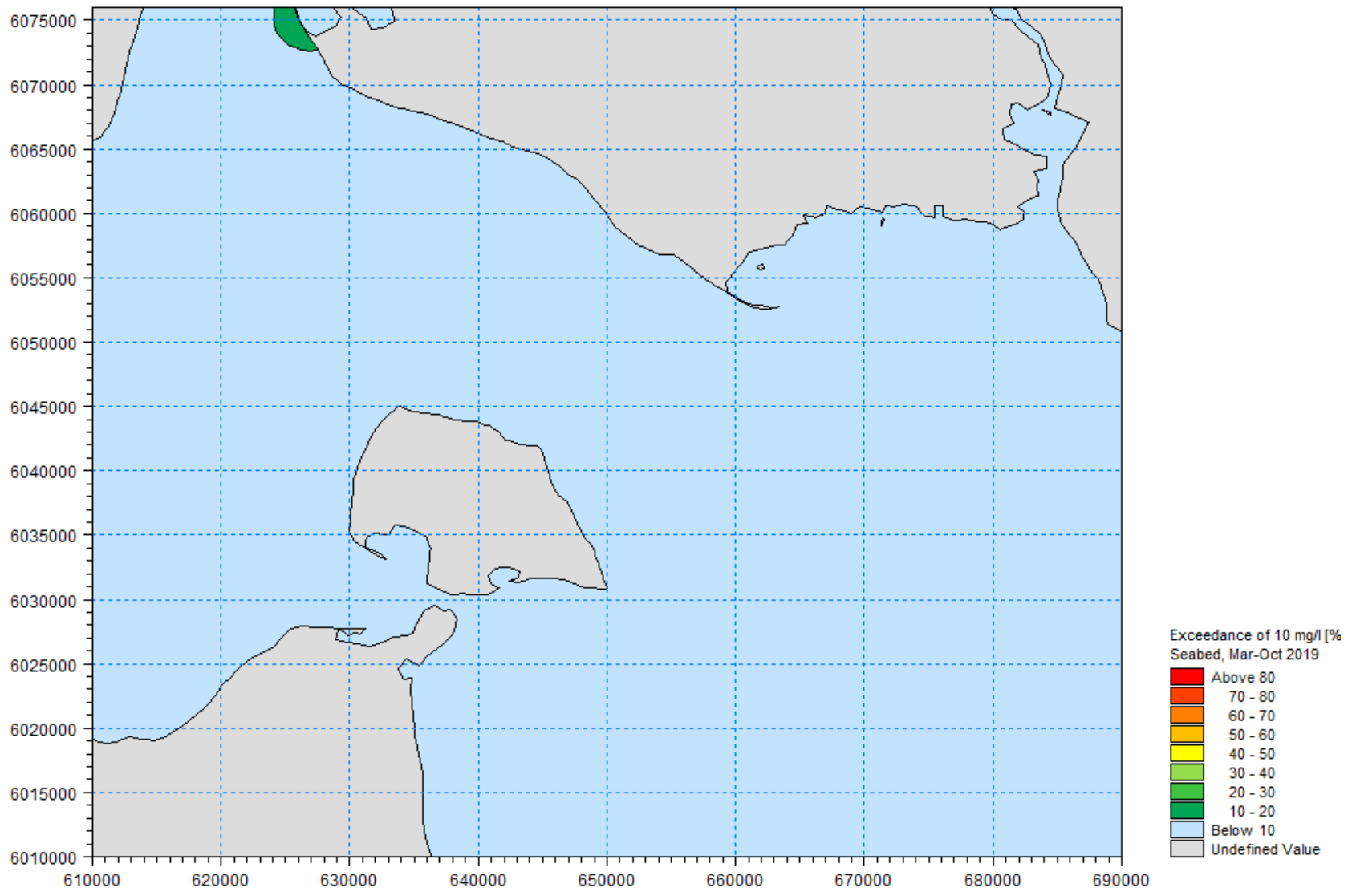


Figure G21 Exceedance time of 10 mg/l. Tunnel solution. March – October 2019. Seabed

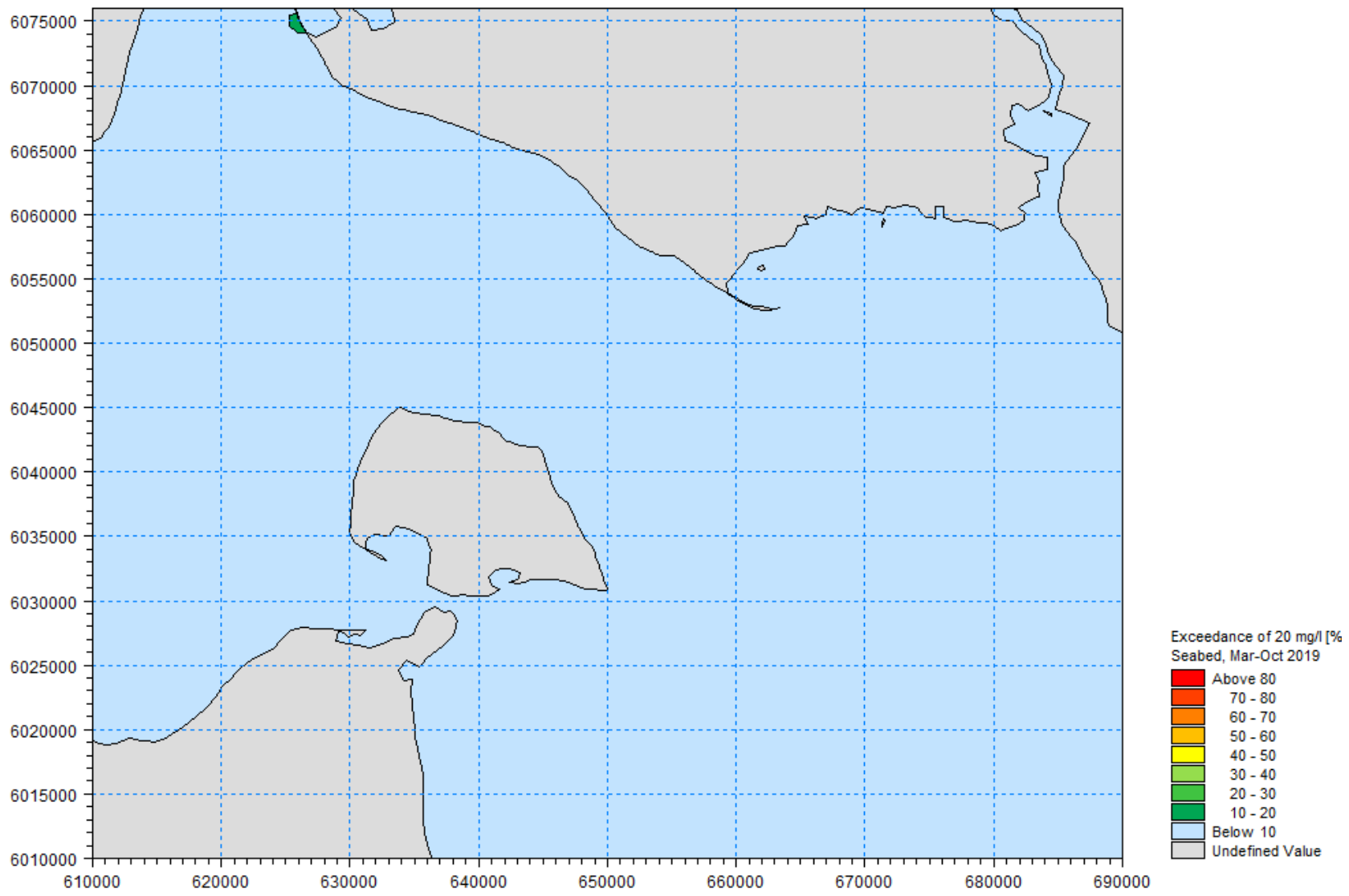


Figure G22 Exceedance time of 20 mg/l. Tunnel solution. March – October 2019. Seabed

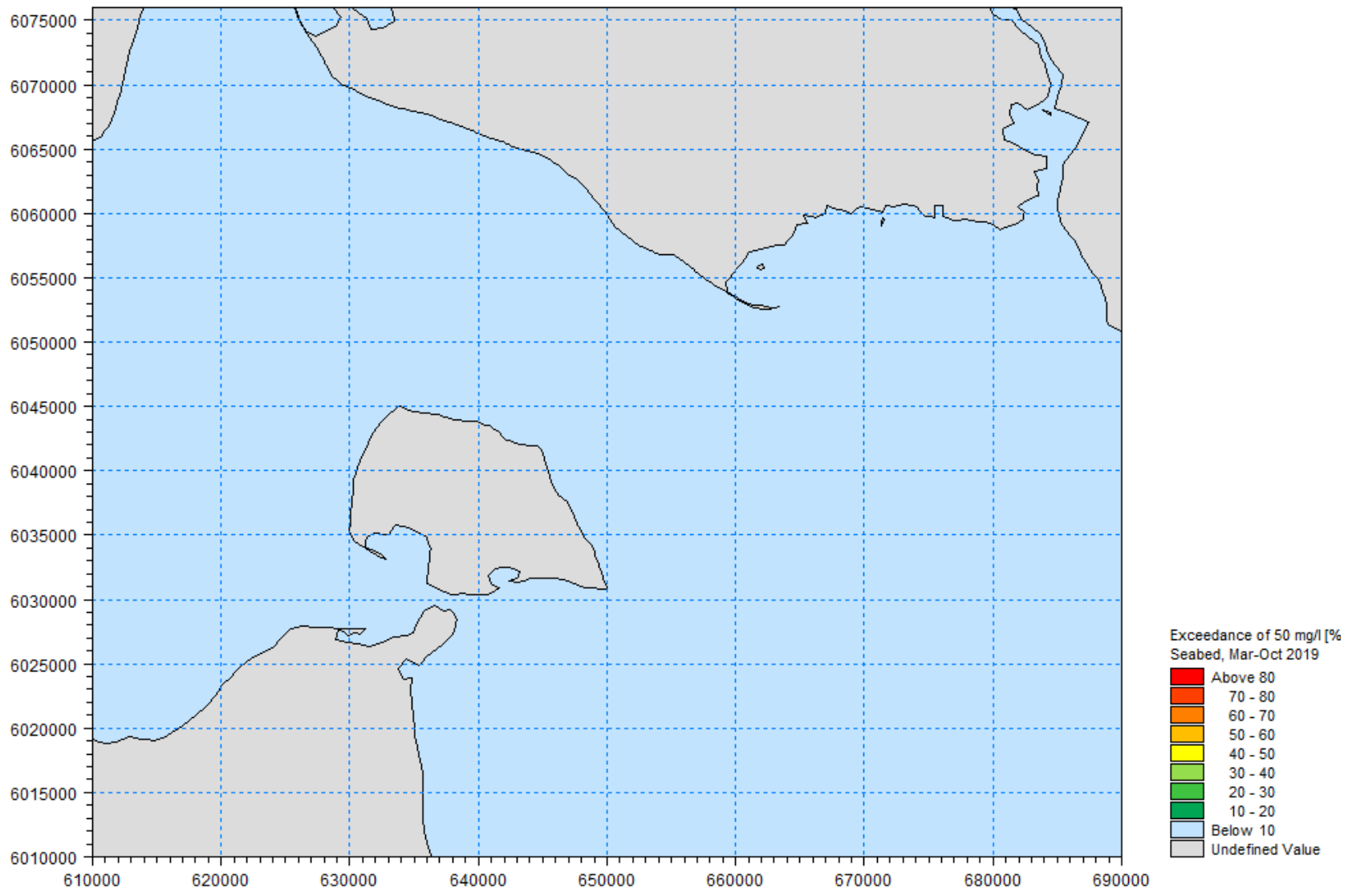


Figure G23 Exceedance time of 50 mg/l. Tunnel solution. March – October 2019. Seabed



A P P E N D I X H

Exceedance Plots from Bridge Solution

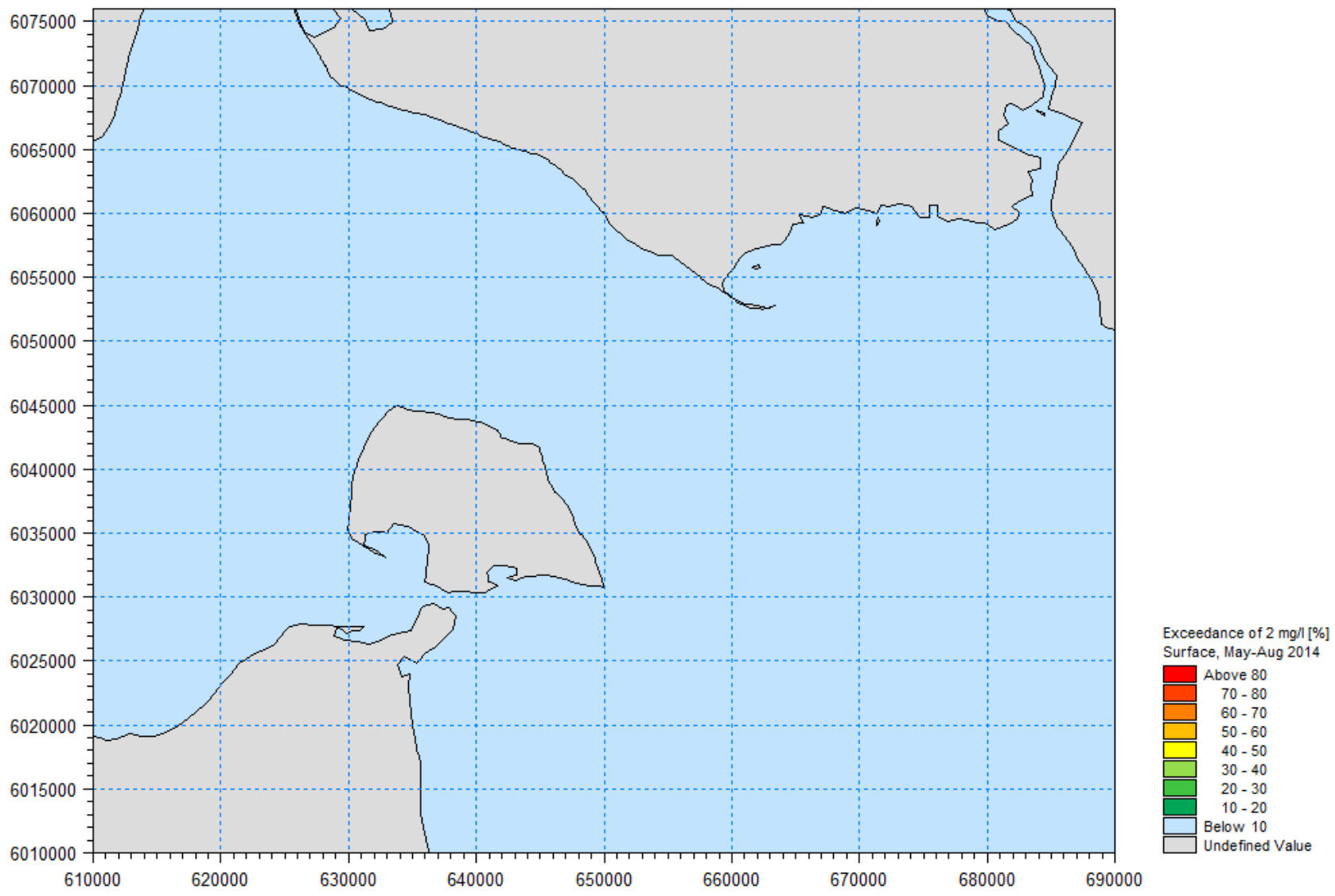


Figure H1 Exceedance time of 2 mg/l. Bridge solution. May – August 2014. Surface

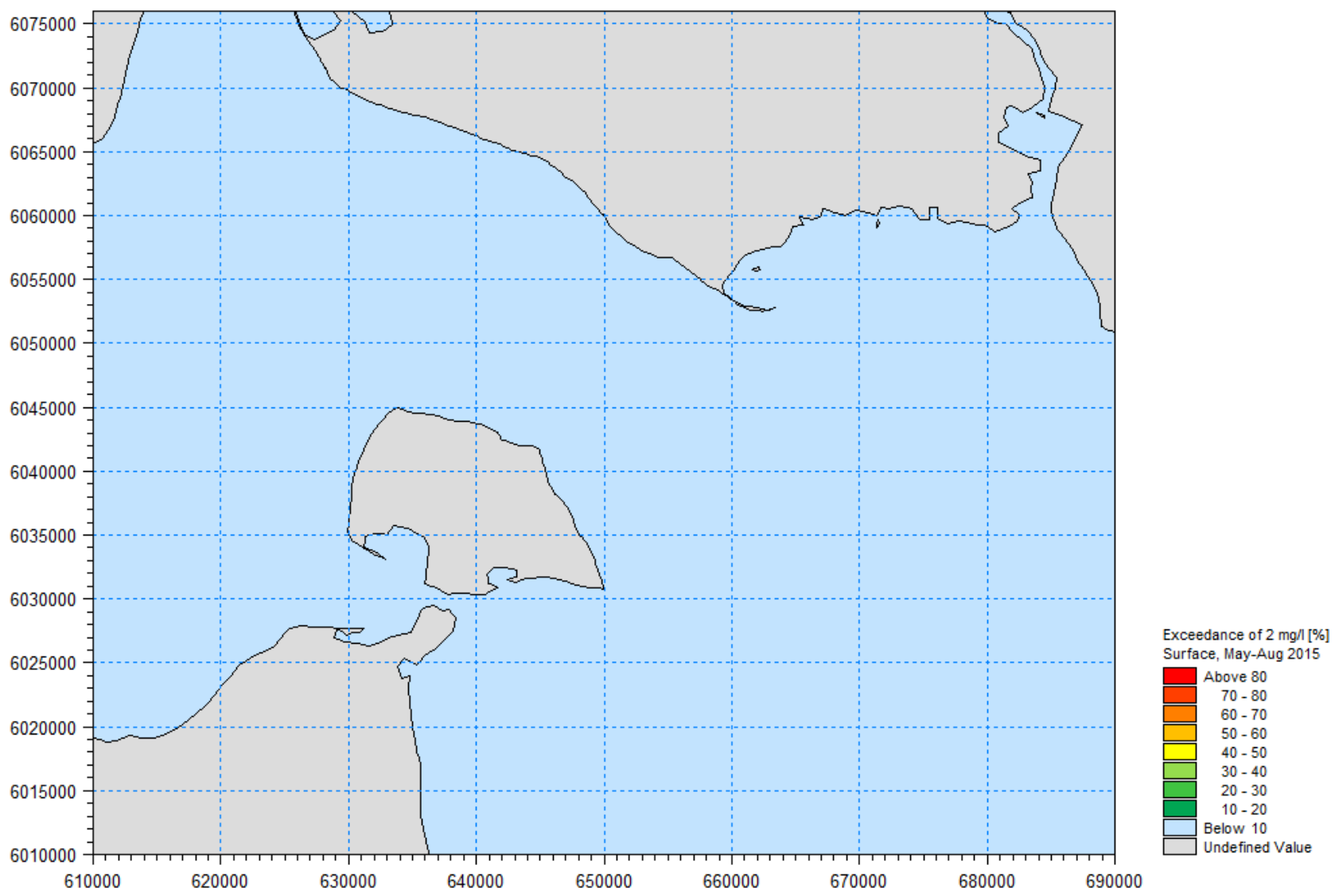


Figure H2 Exceedance time of 2 mg/l. Bridge solution. May – August 2015. Surface

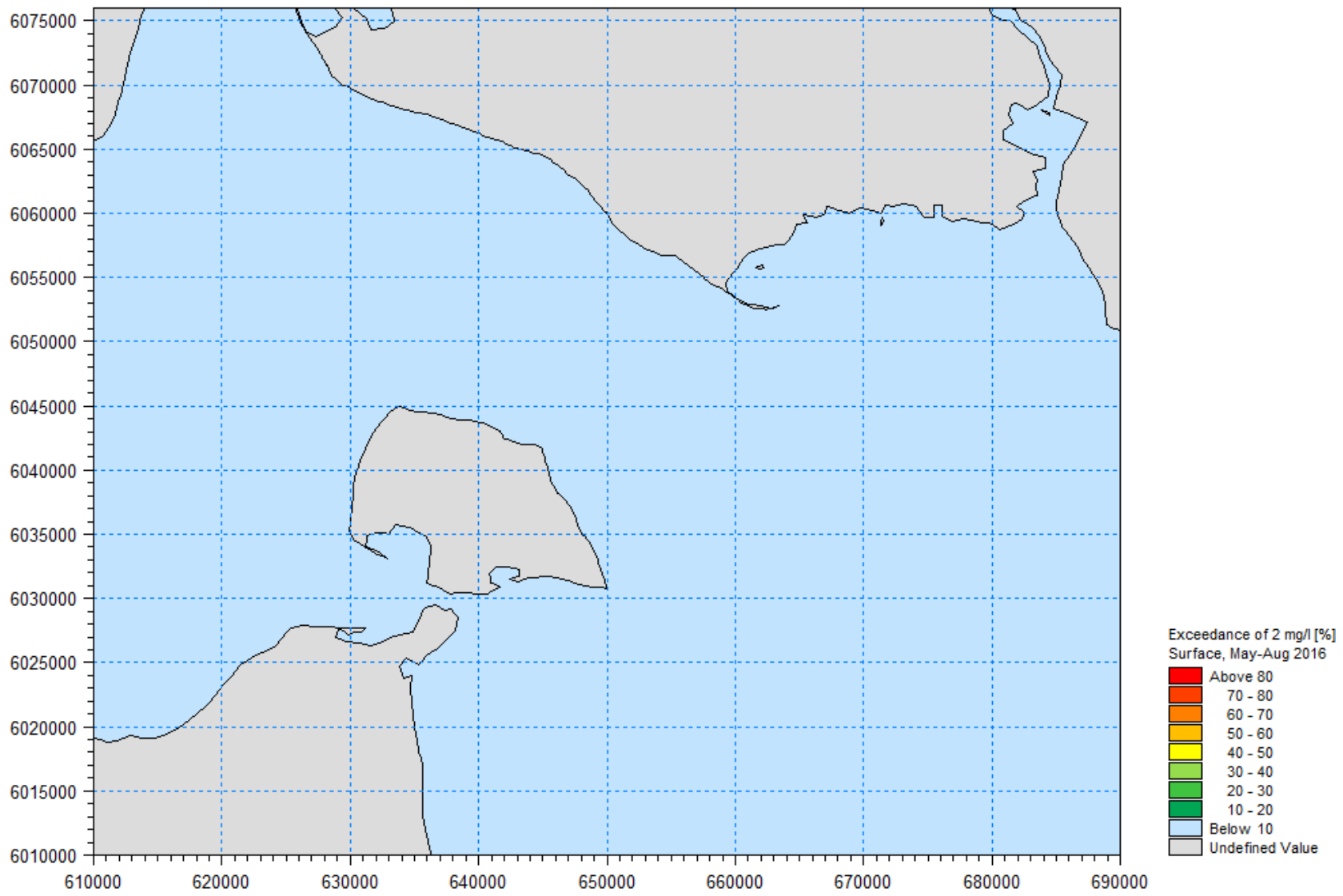


Figure H3 Exceedance time of 2 mg/l. Bridge solution. May – August 2016. Surface

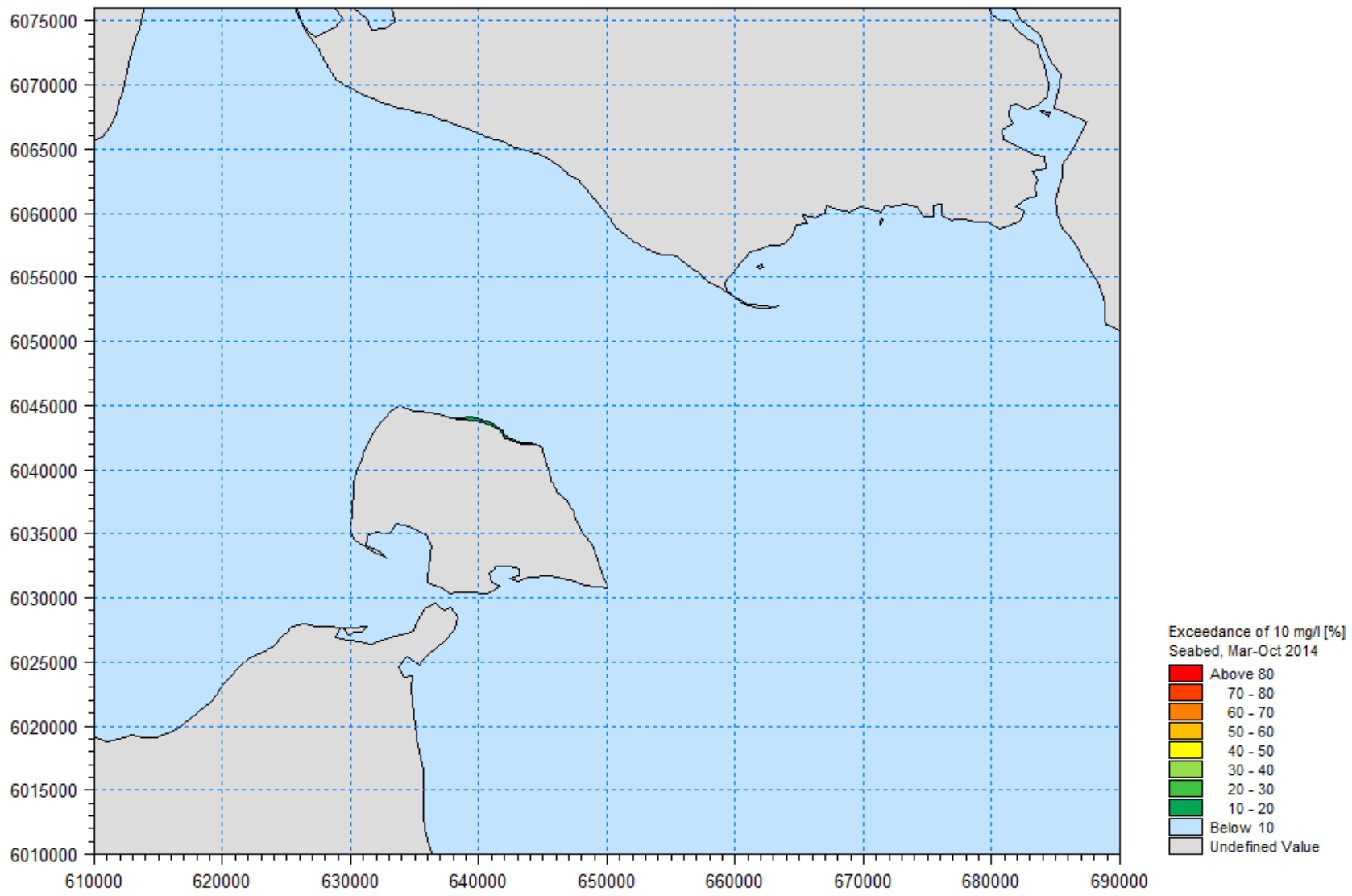


Figure H4 Exceedance time of 10 mg/l. Bridge solution. May – August 2014. Seabed

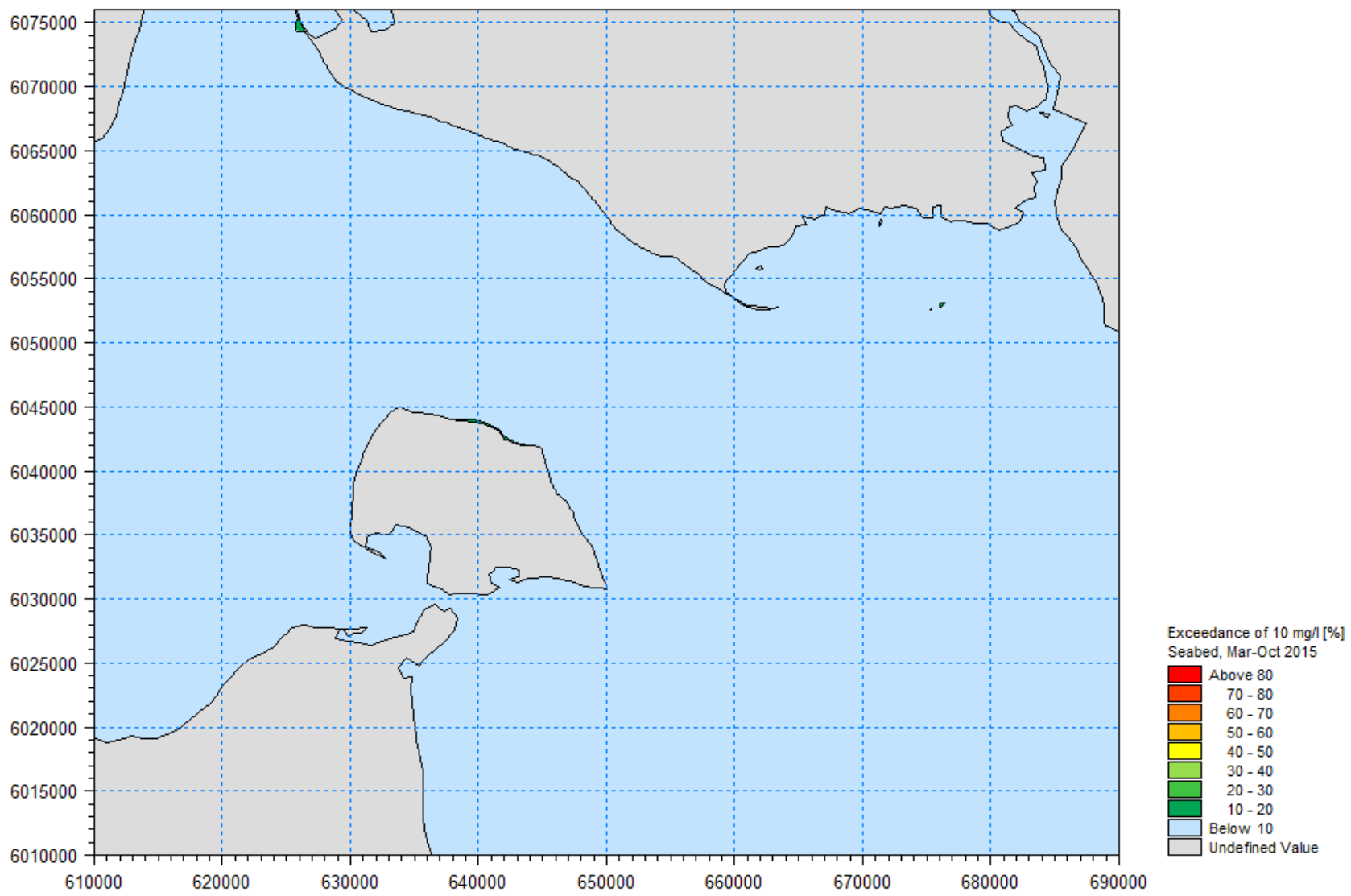


Figure H5 Exceedance time of 10 mg/l. Bridge solution. May – August 2015. Seabed

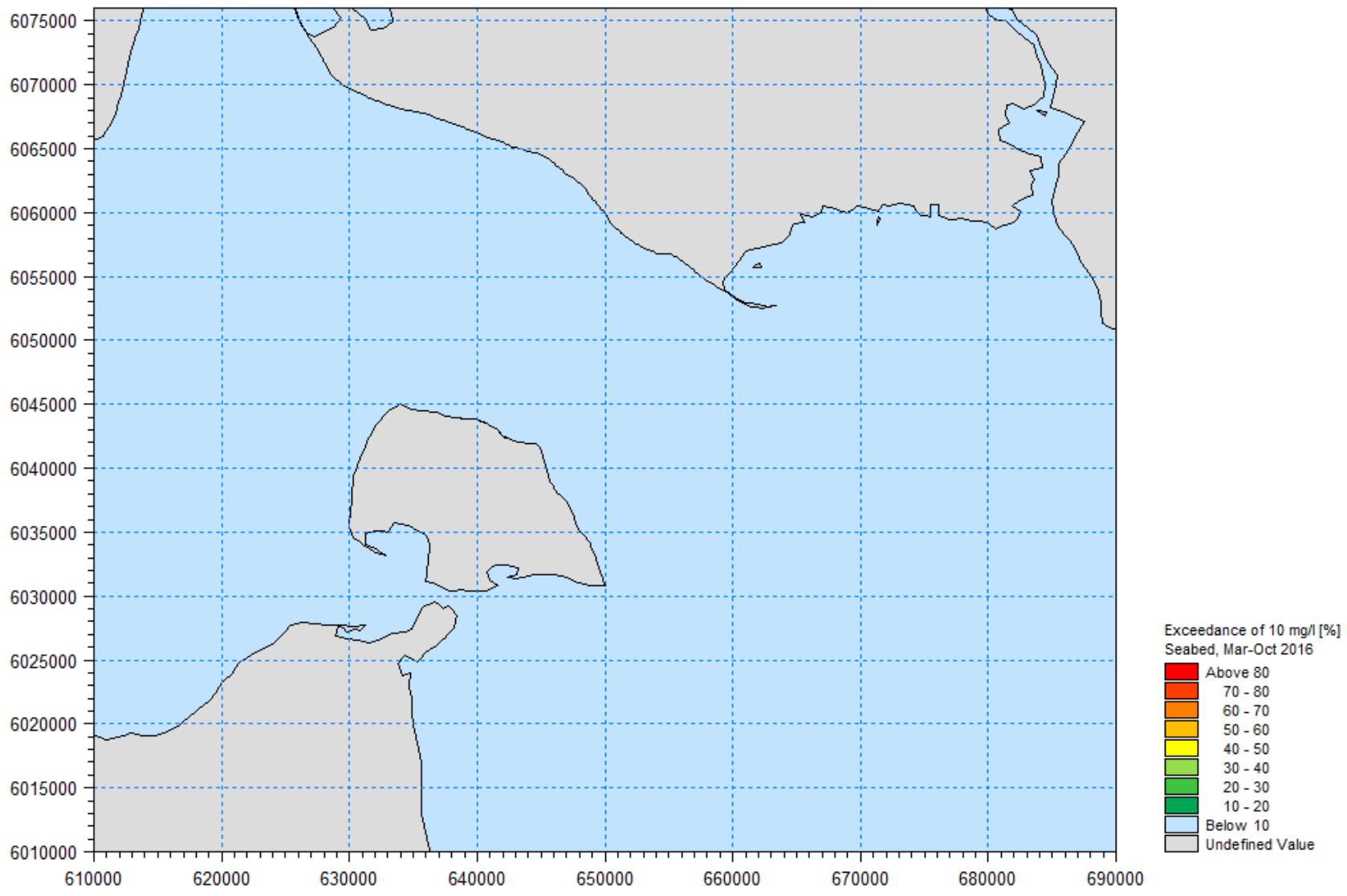


Figure H6 Exceedance time of 10 mg/l. Bridge solution. May – August 2016. Seabed

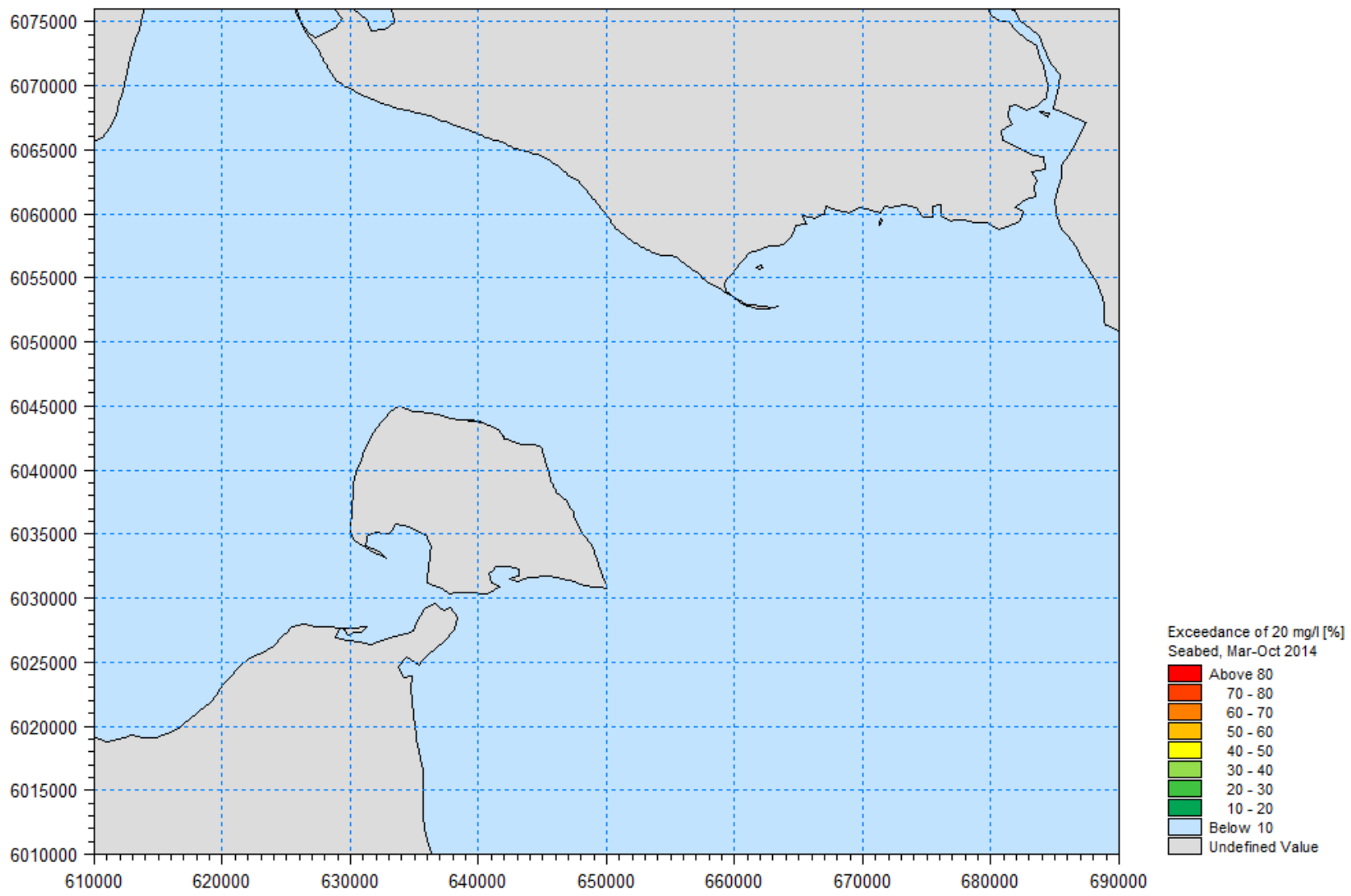


Figure H7 Exceedance time of 20 mg/l. Bridge solution. May – August 2014. Seabed

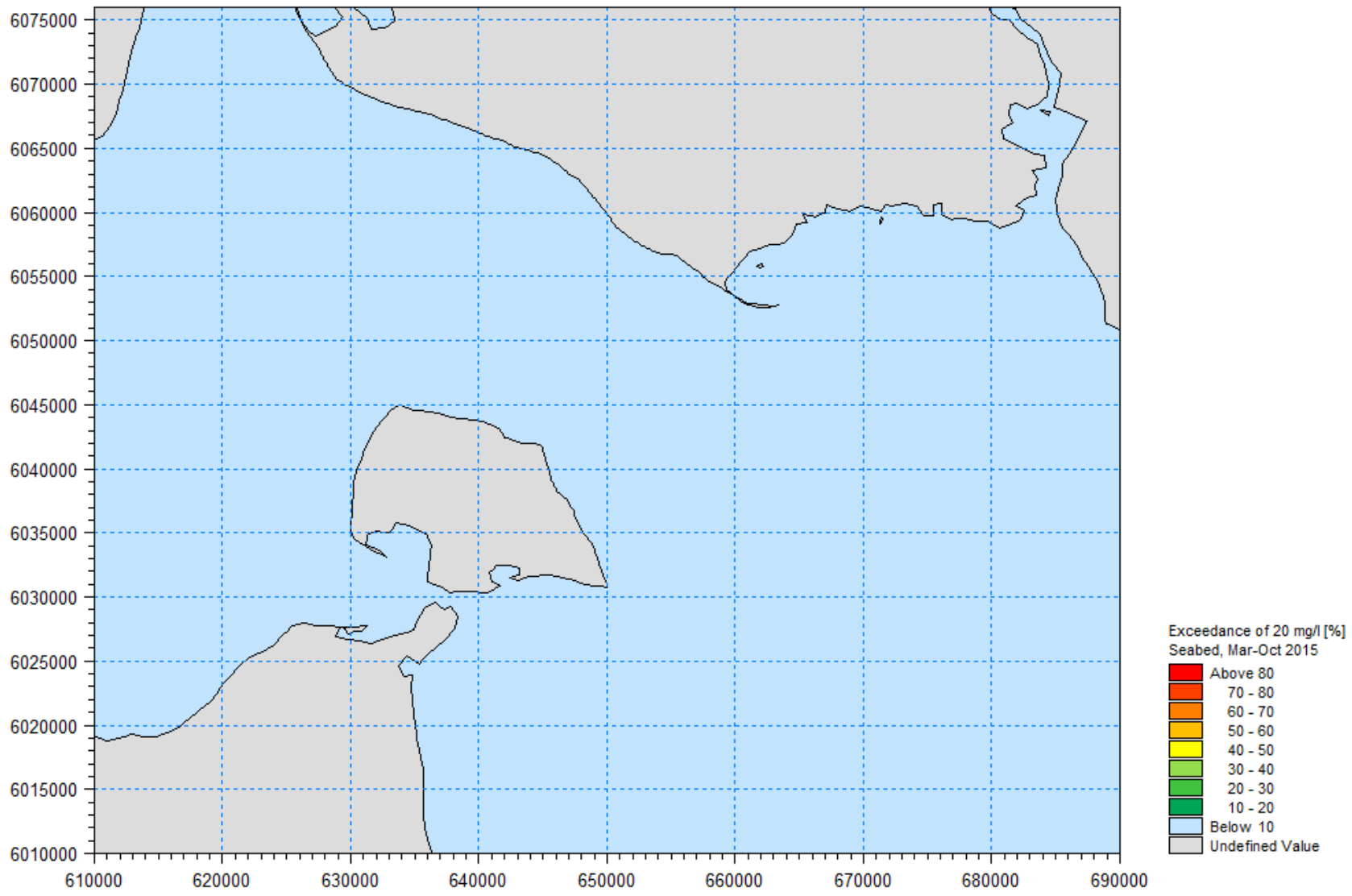


Figure H8 Exceedance time of 20 mg/l. Bridge solution. May – August 2015. Seabed



A P P E N D I X I

Time Series from Tunnel Solutions

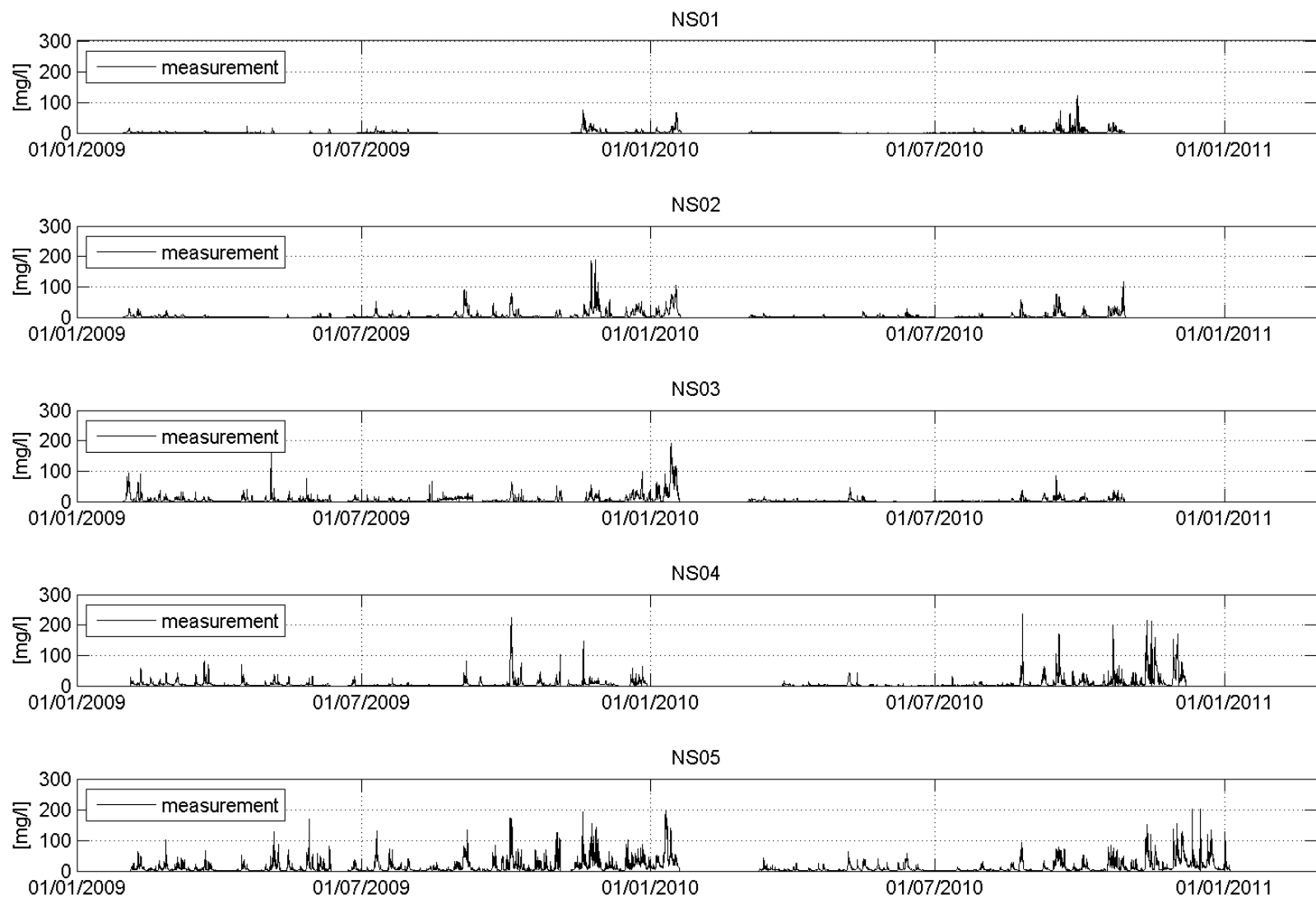


Figure I1 Measurements at Danish nearshore stations. Measurements taken near midwater

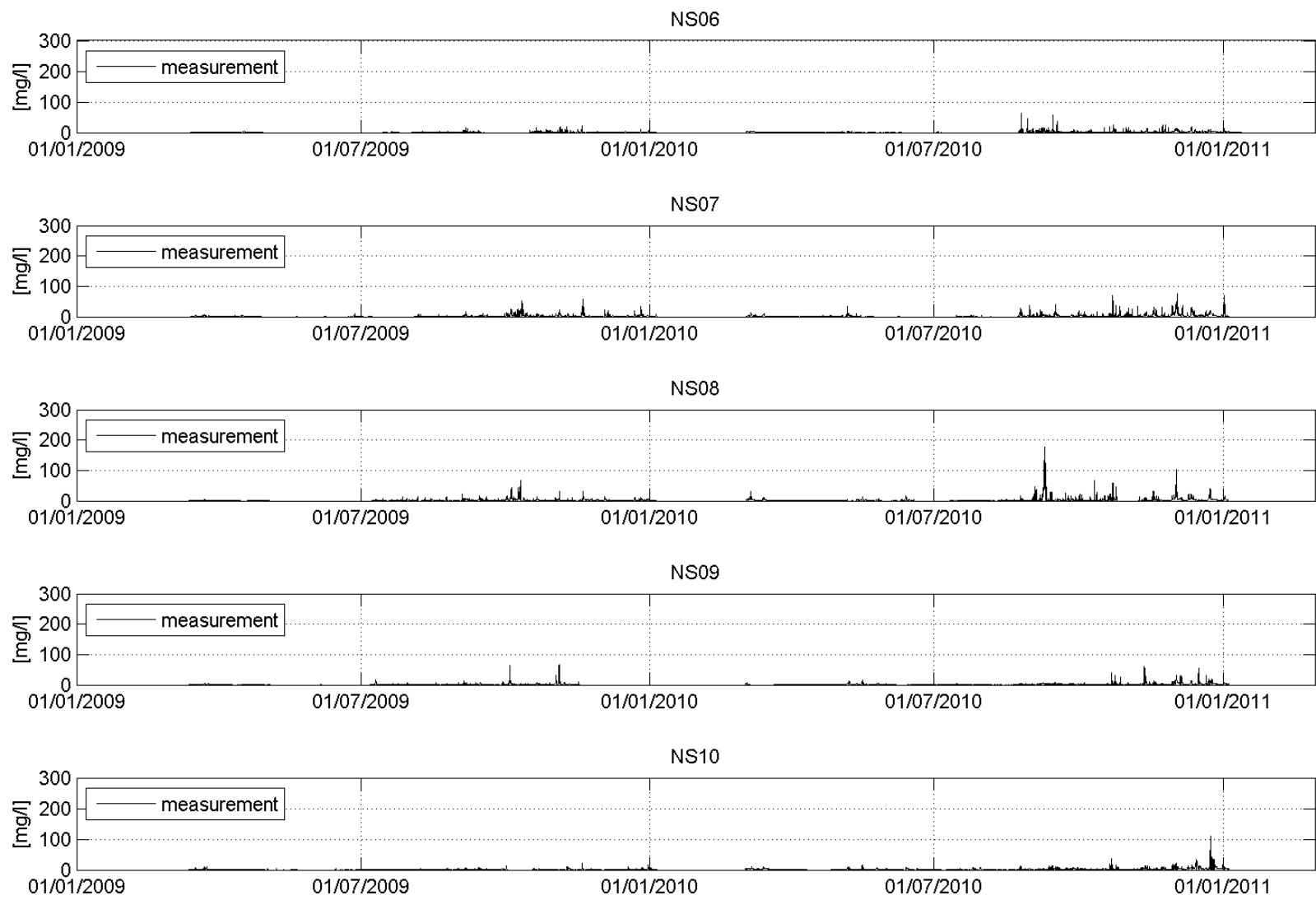


Figure I2 Measurements at German nearshore stations. Measurements taken near midwater

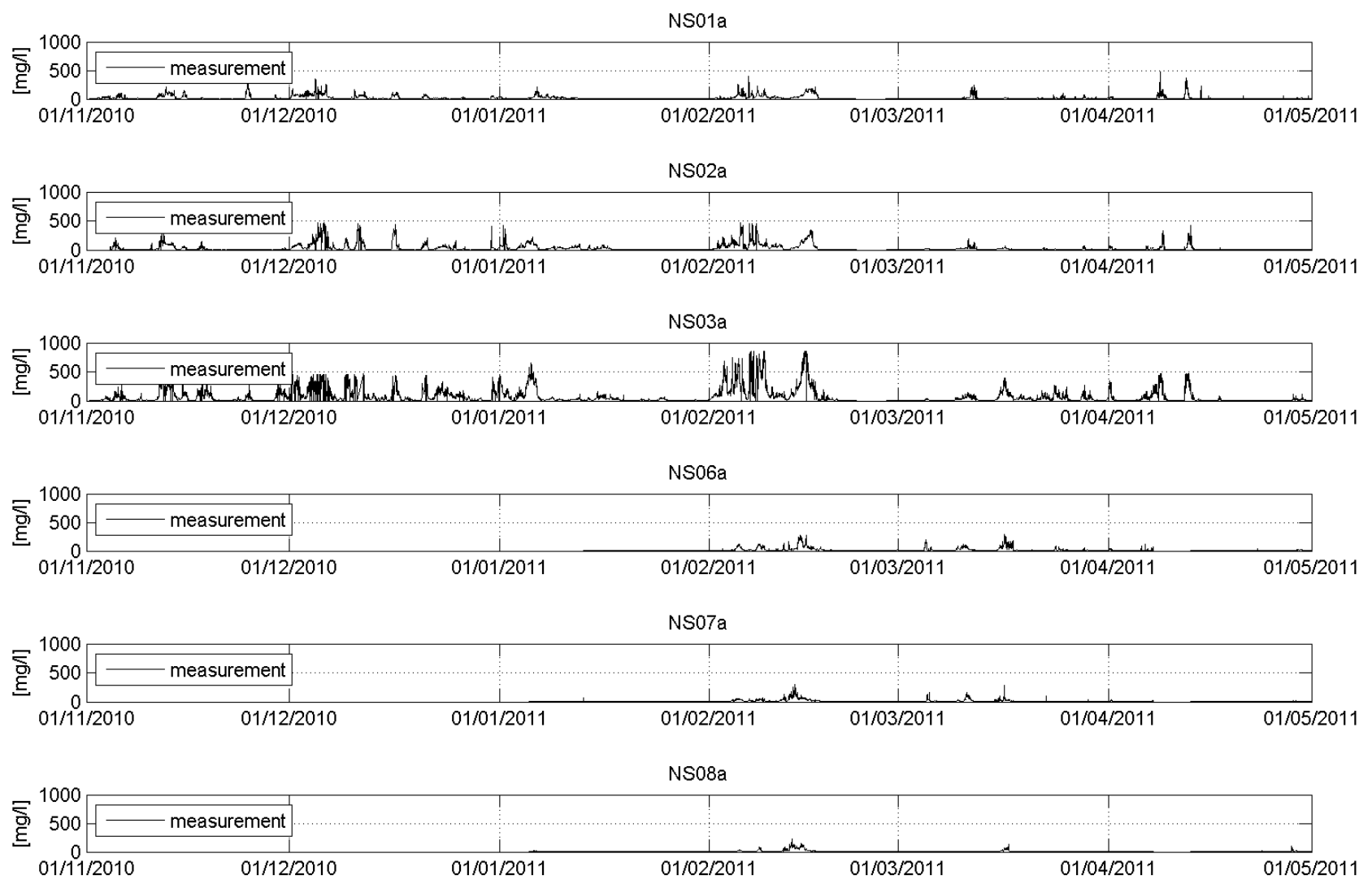


Figure I3 Measurements at nearshore stations (a). Measurements taken near midwater

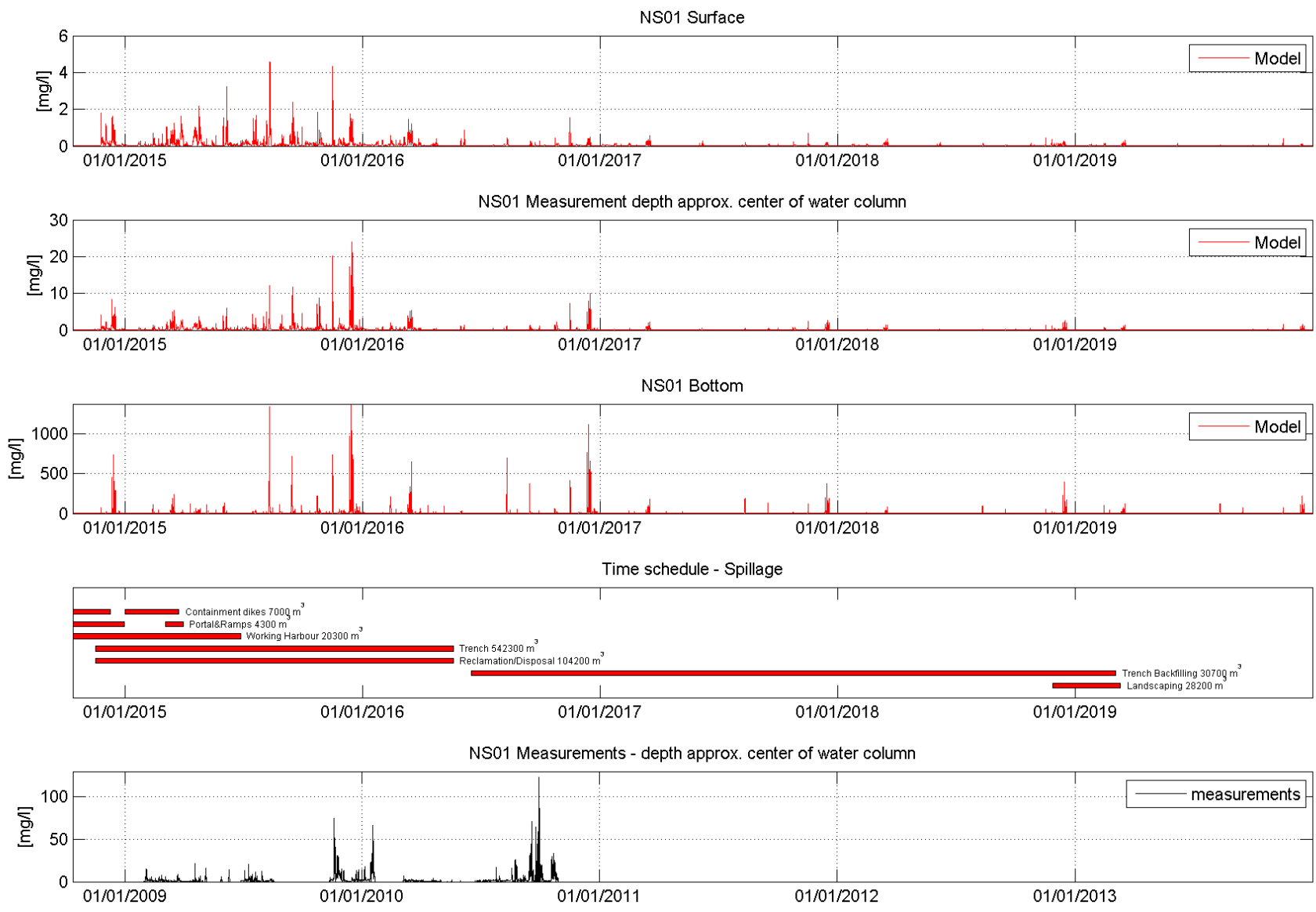


Figure I4 Simulation results from NS01. Tunnel solution

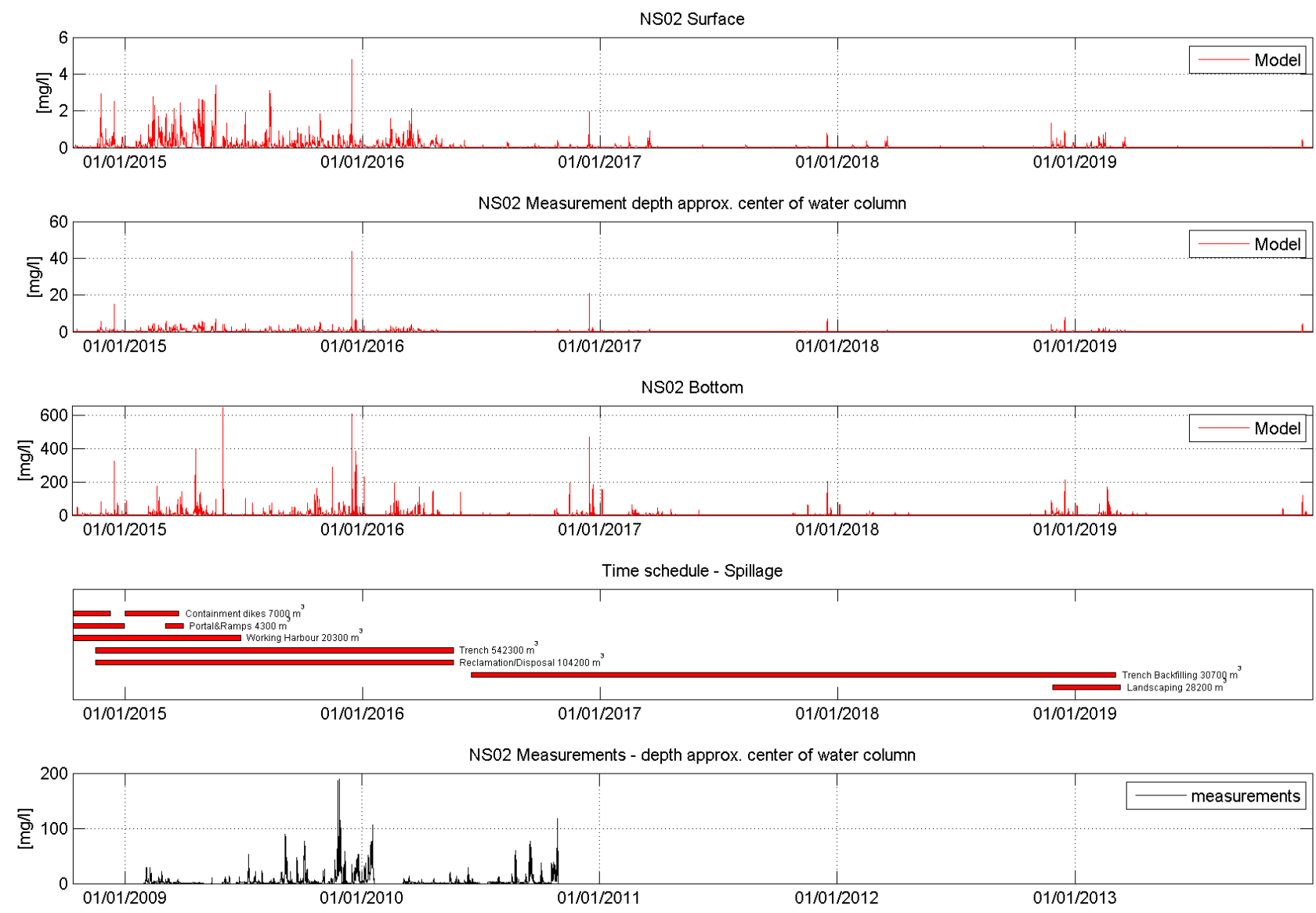


Figure I5 Simulation results from NS02. Tunnel solution

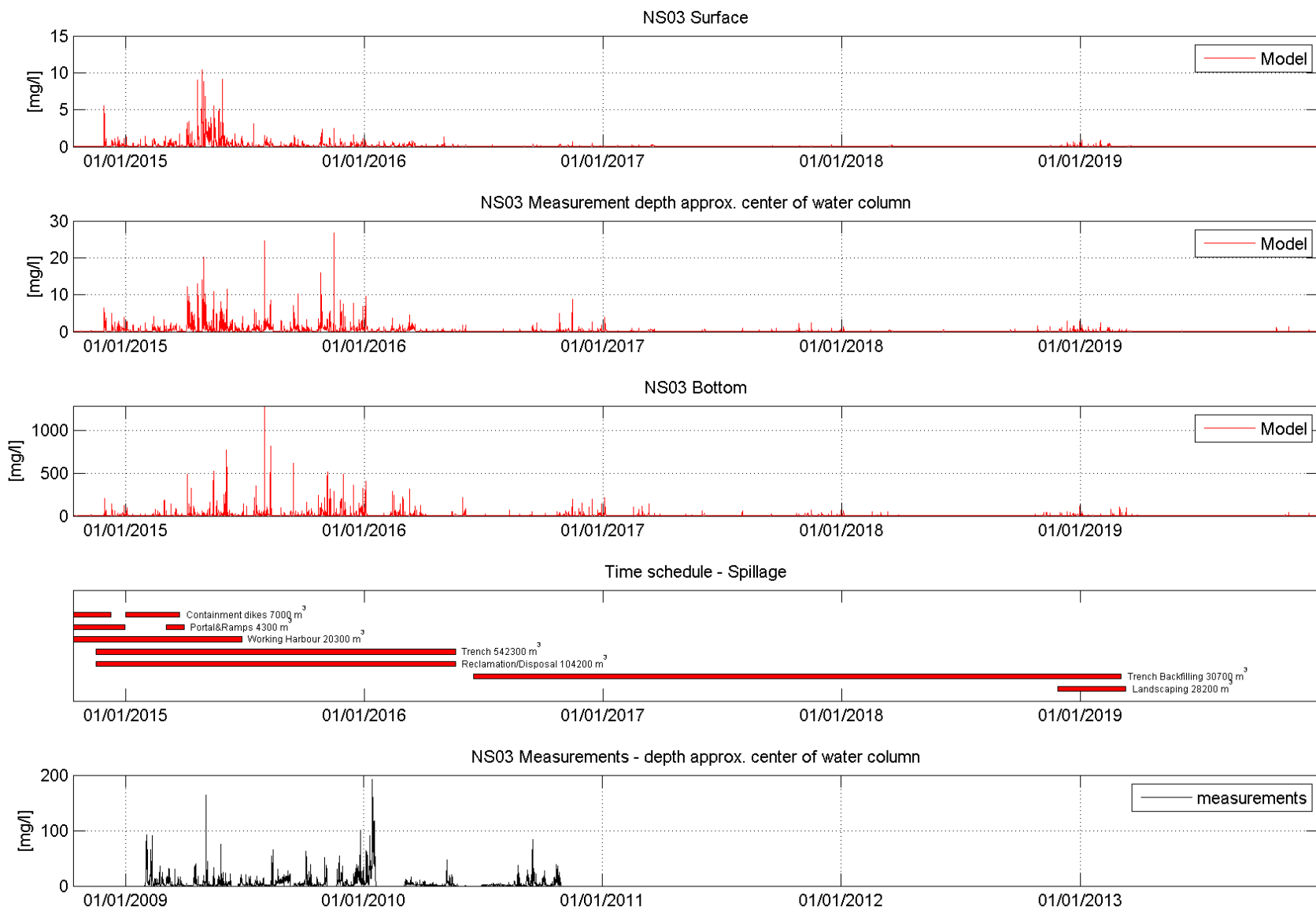


Figure I6 Simulation results from NS03. Tunnel solution

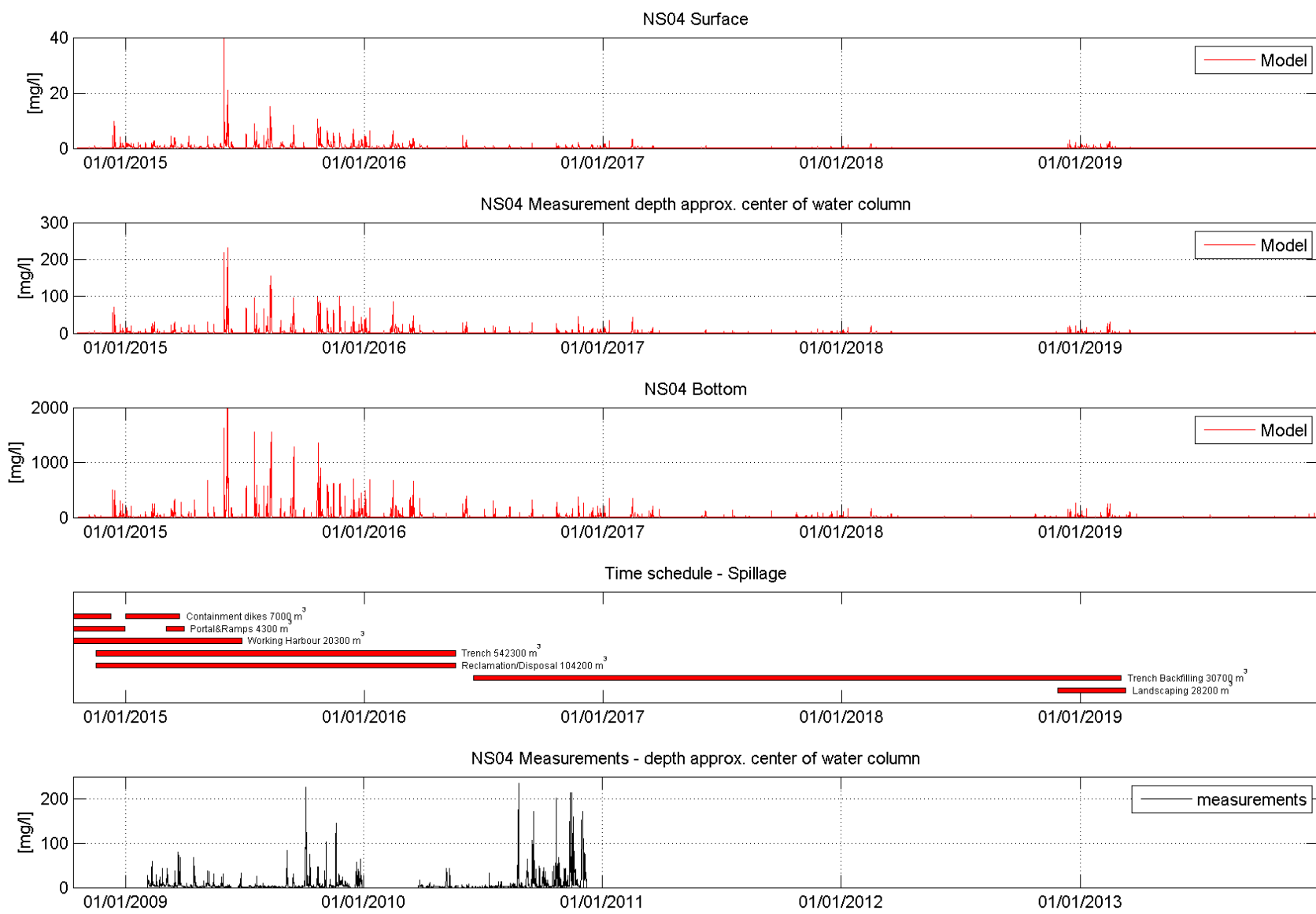


Figure I7 Simulation results from NS04. Tunnel solution

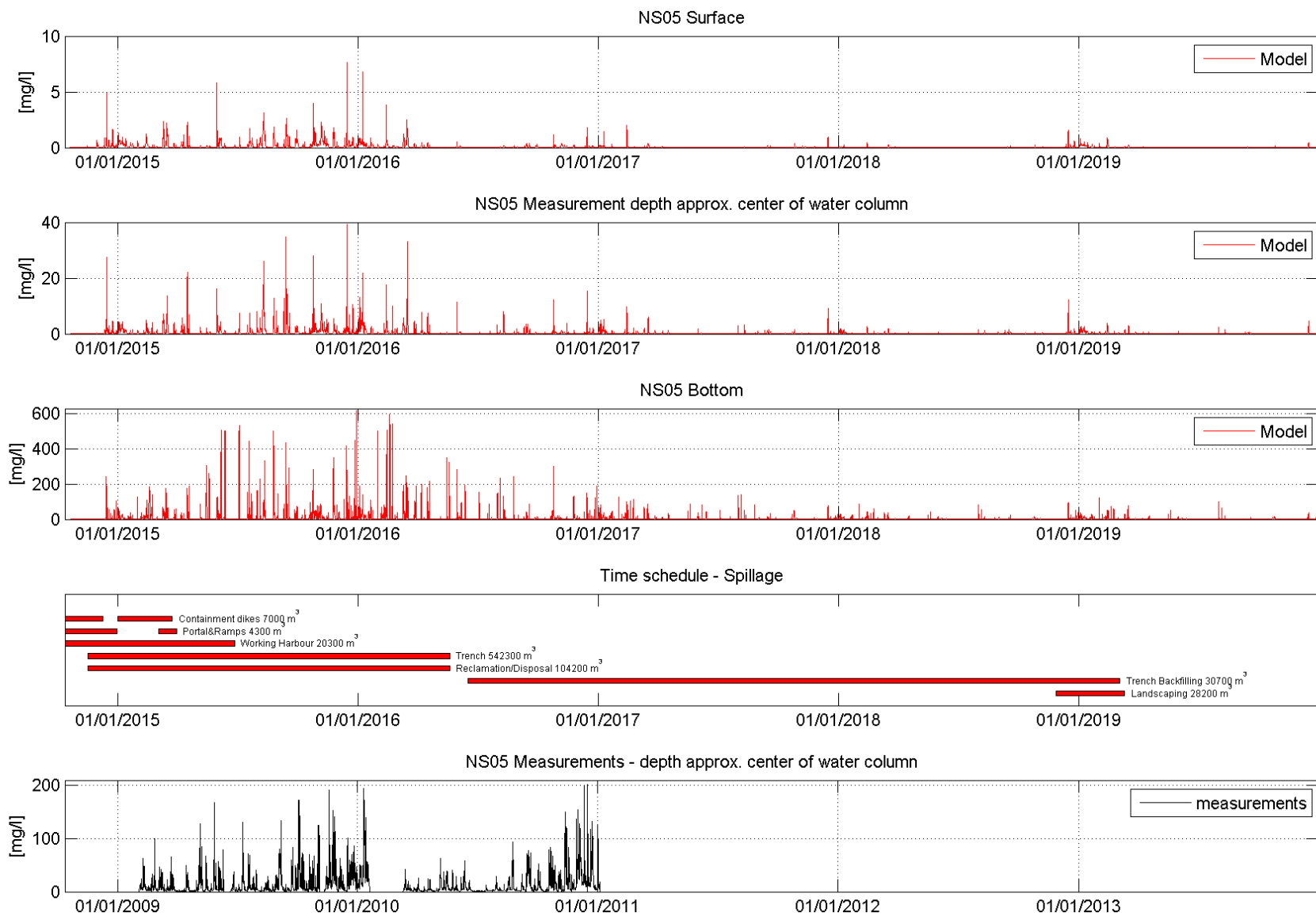


Figure I8 Simulation results from NS05. Tunnel solution

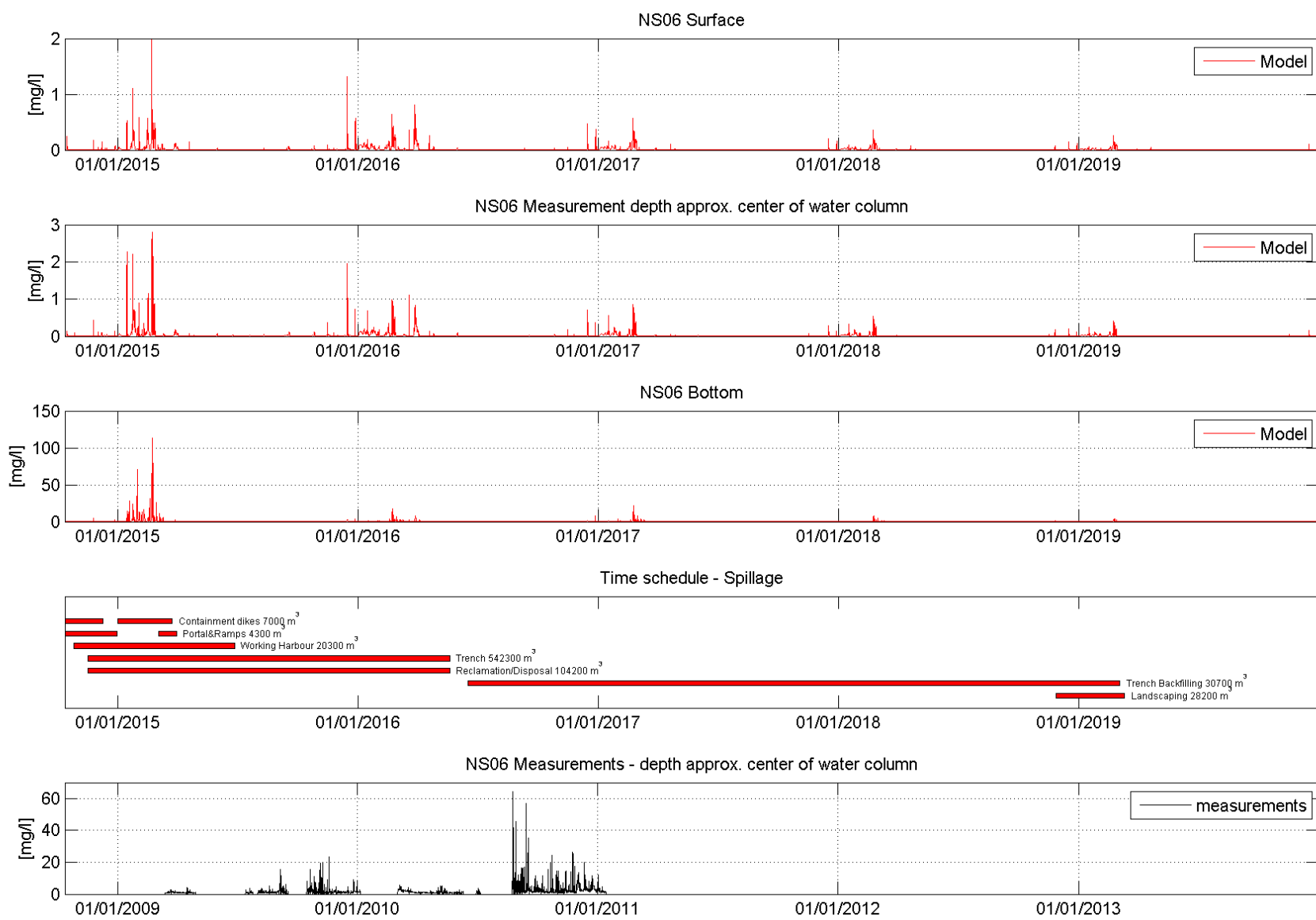


Figure I9 Simulation results from NS06. Tunnel solution

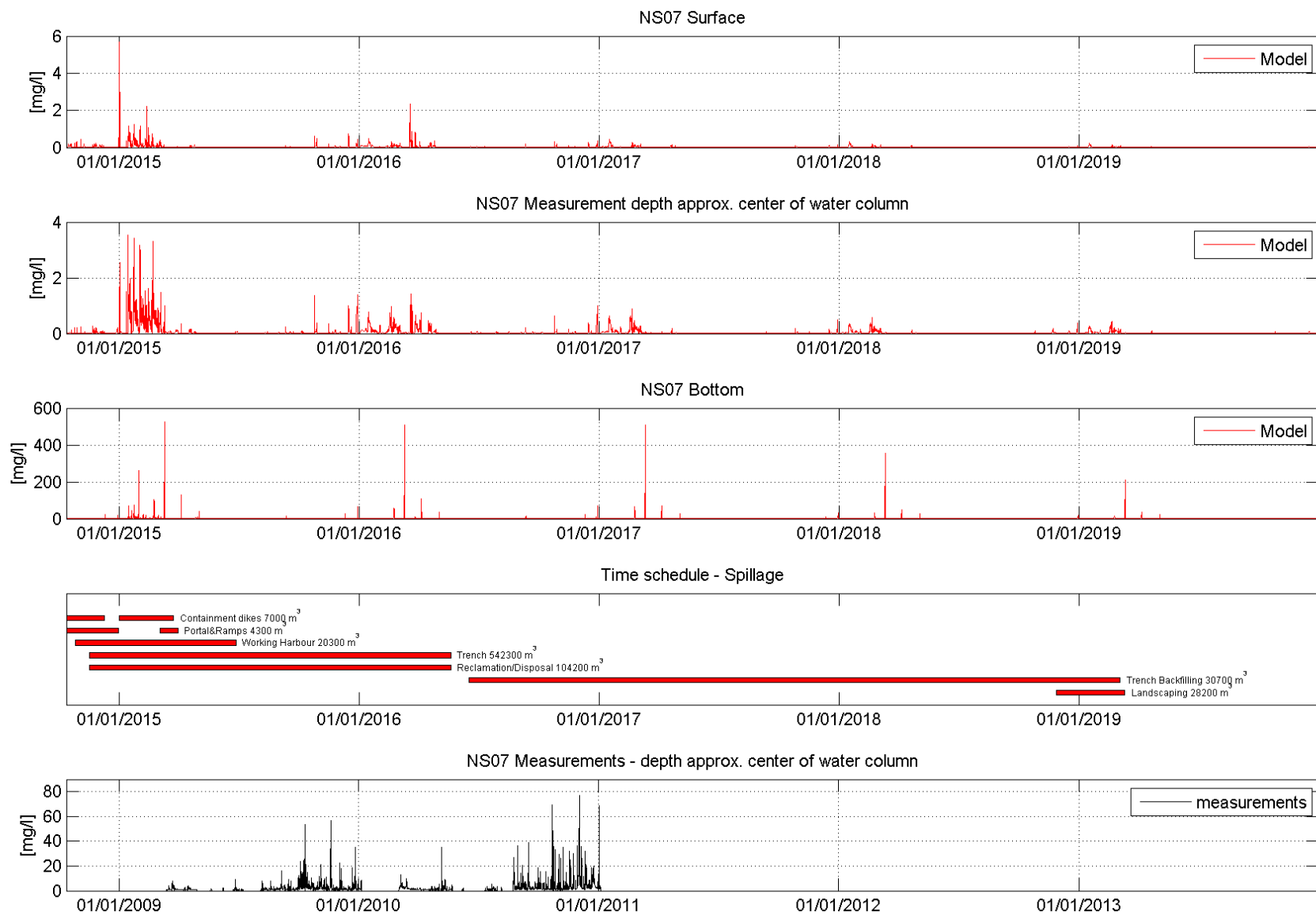


Figure I10. Simulation results from NS07. Tunnel solution.

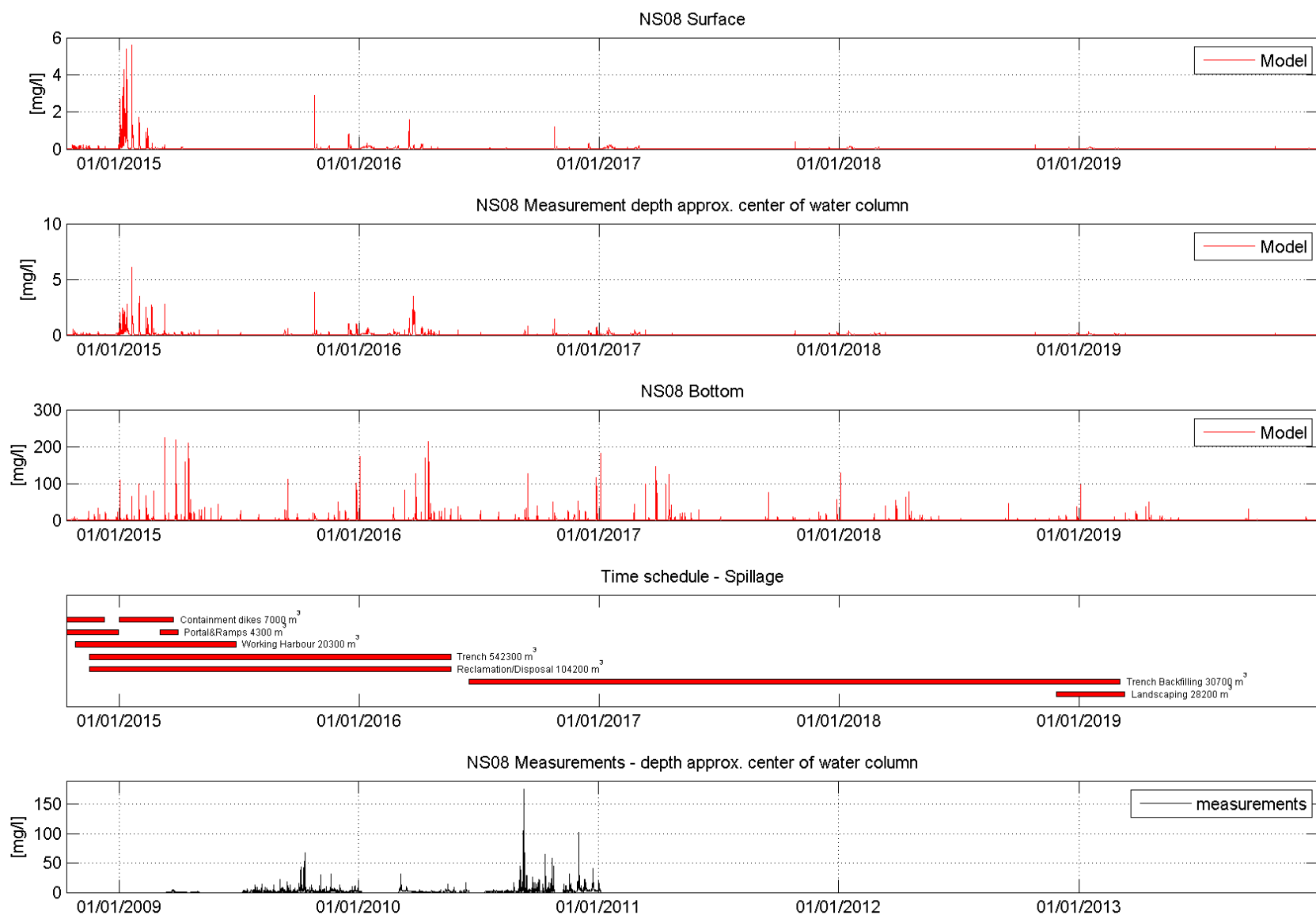


Figure I11 Simulation results from NS08. Tunnel solution

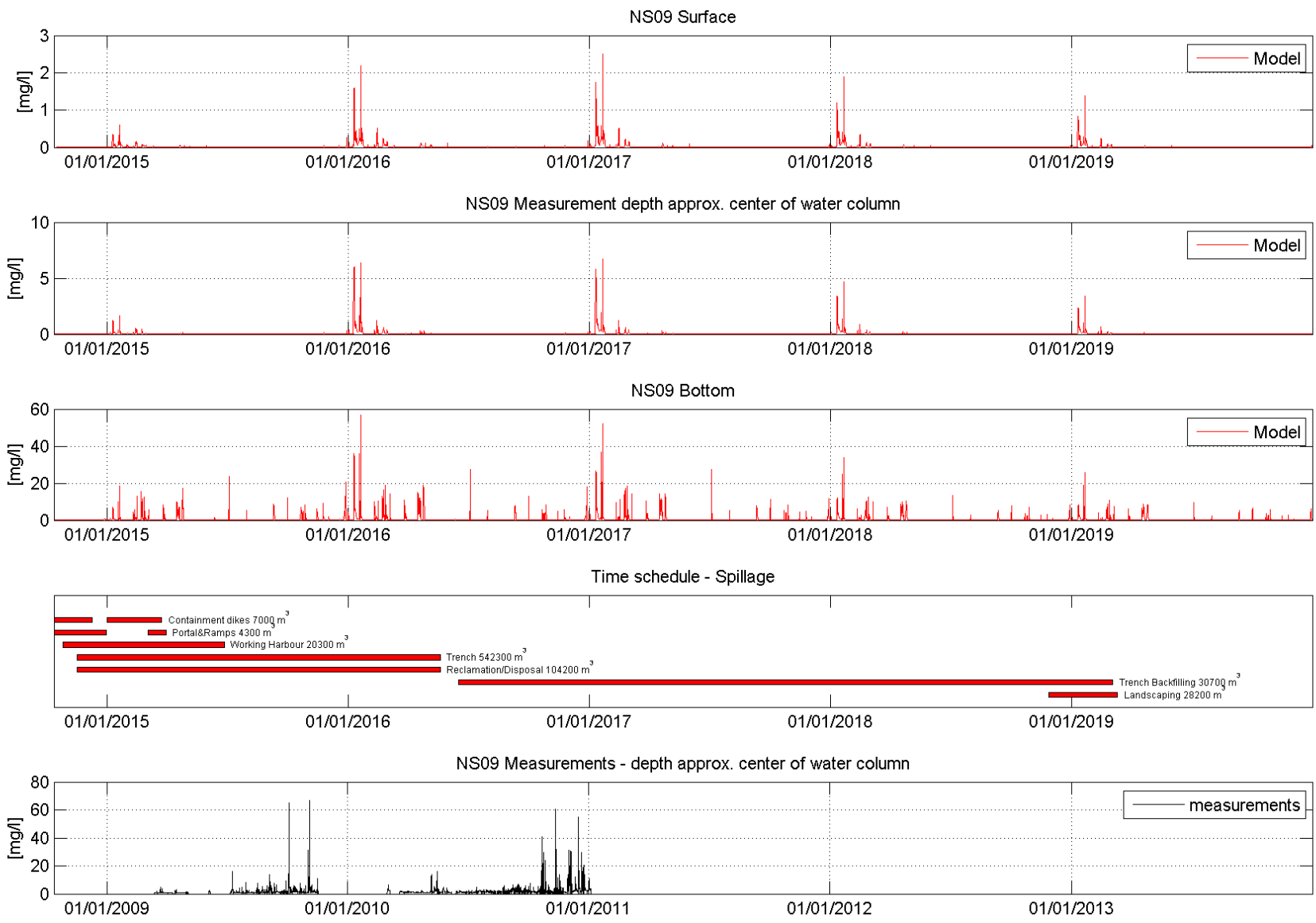


Figure I12 Simulation results from NS09. Tunnel solution

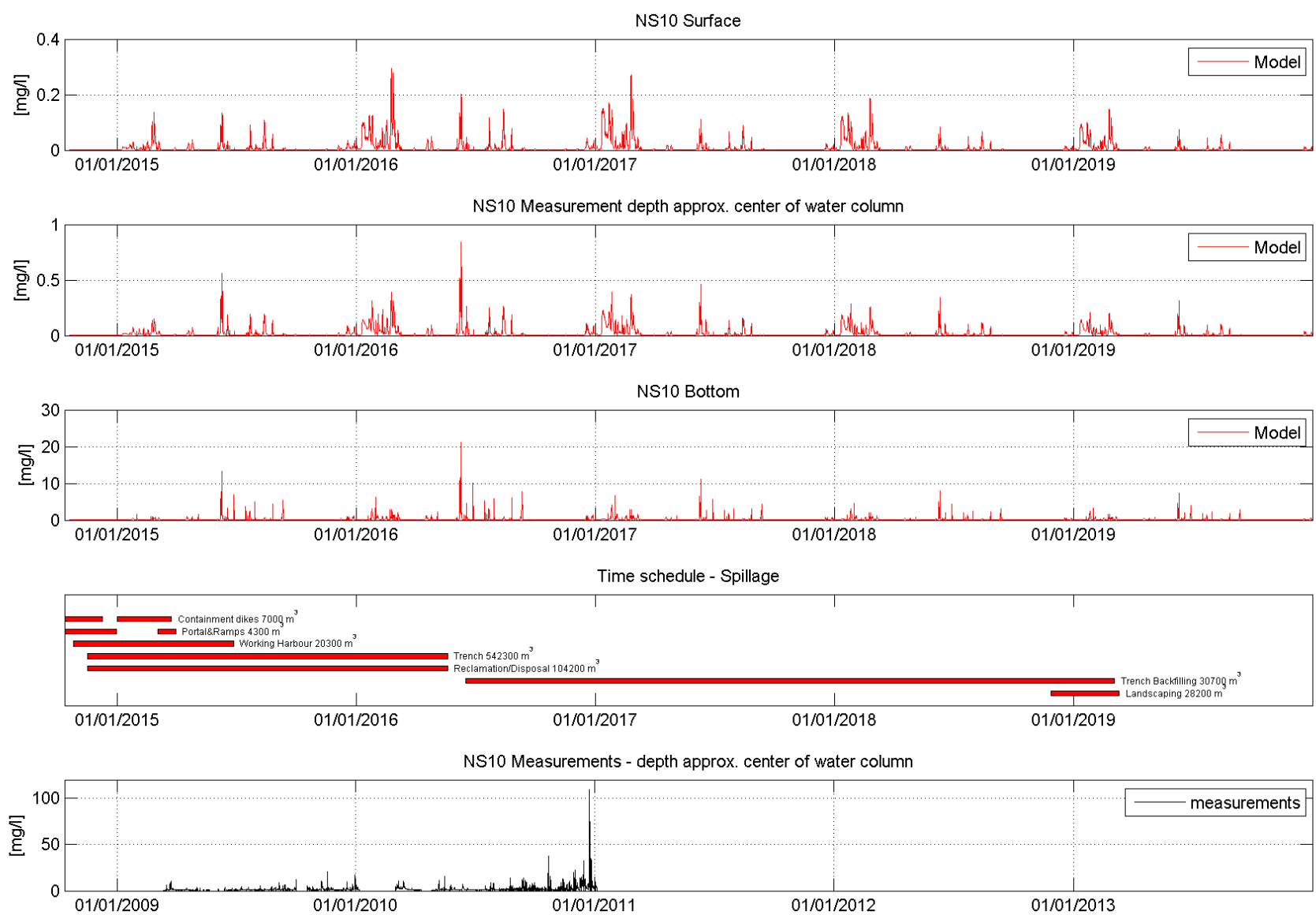


Figure I13 Simulation results from NS10. Tunnel solution

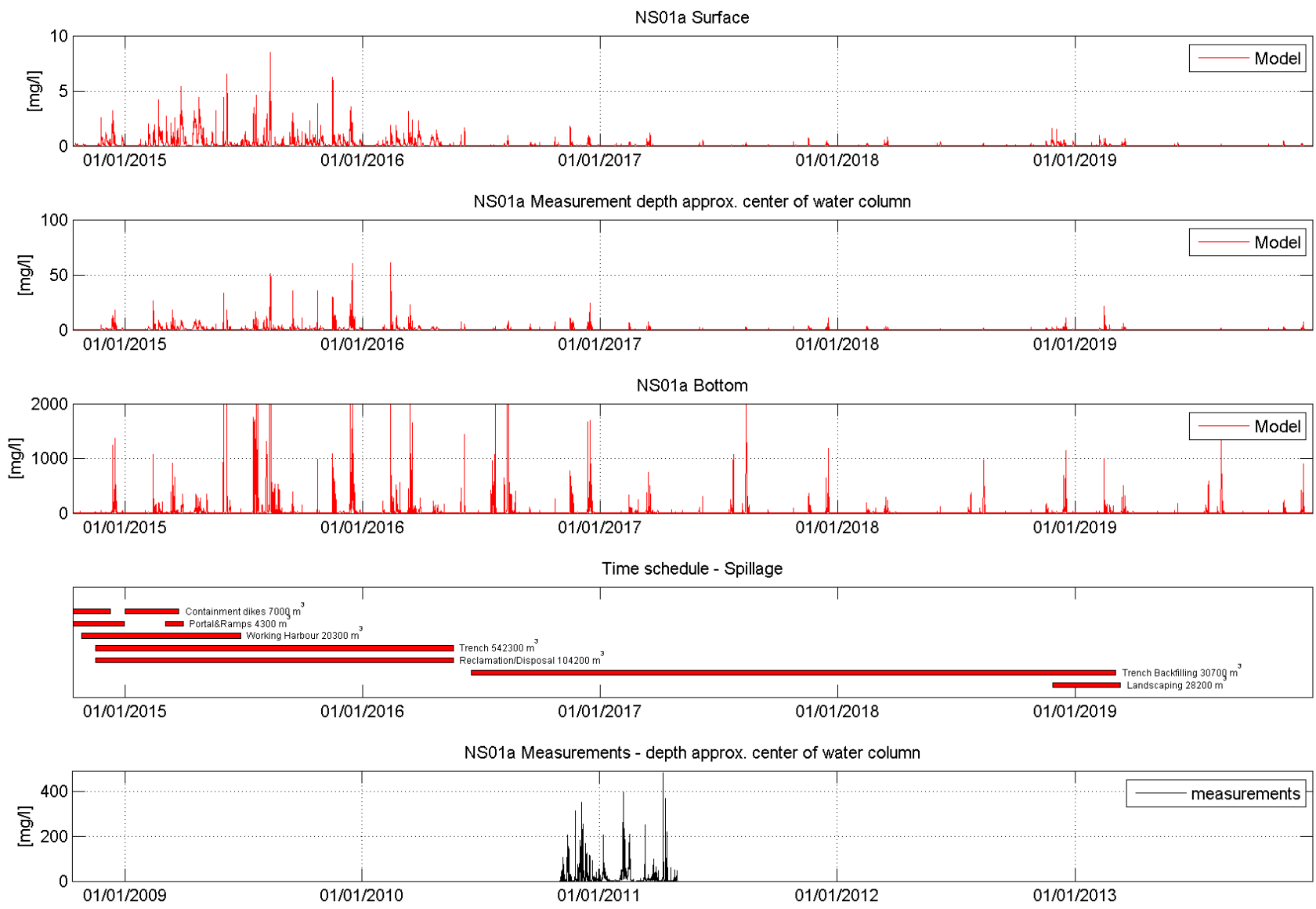


Figure I14 Simulation results from NS01a. Tunnel solution

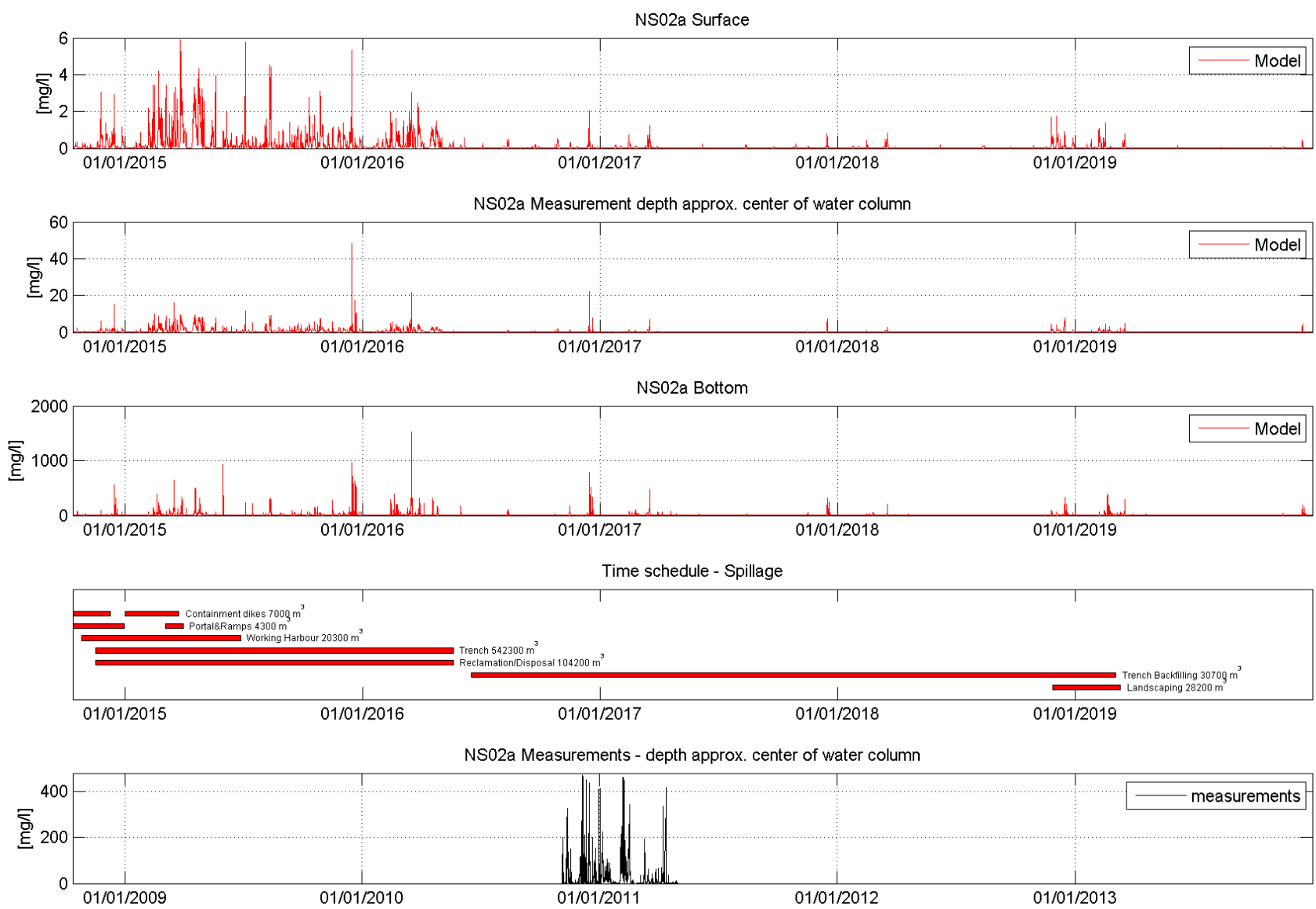


Figure I15 Simulation results from NS02a. Tunnel solution

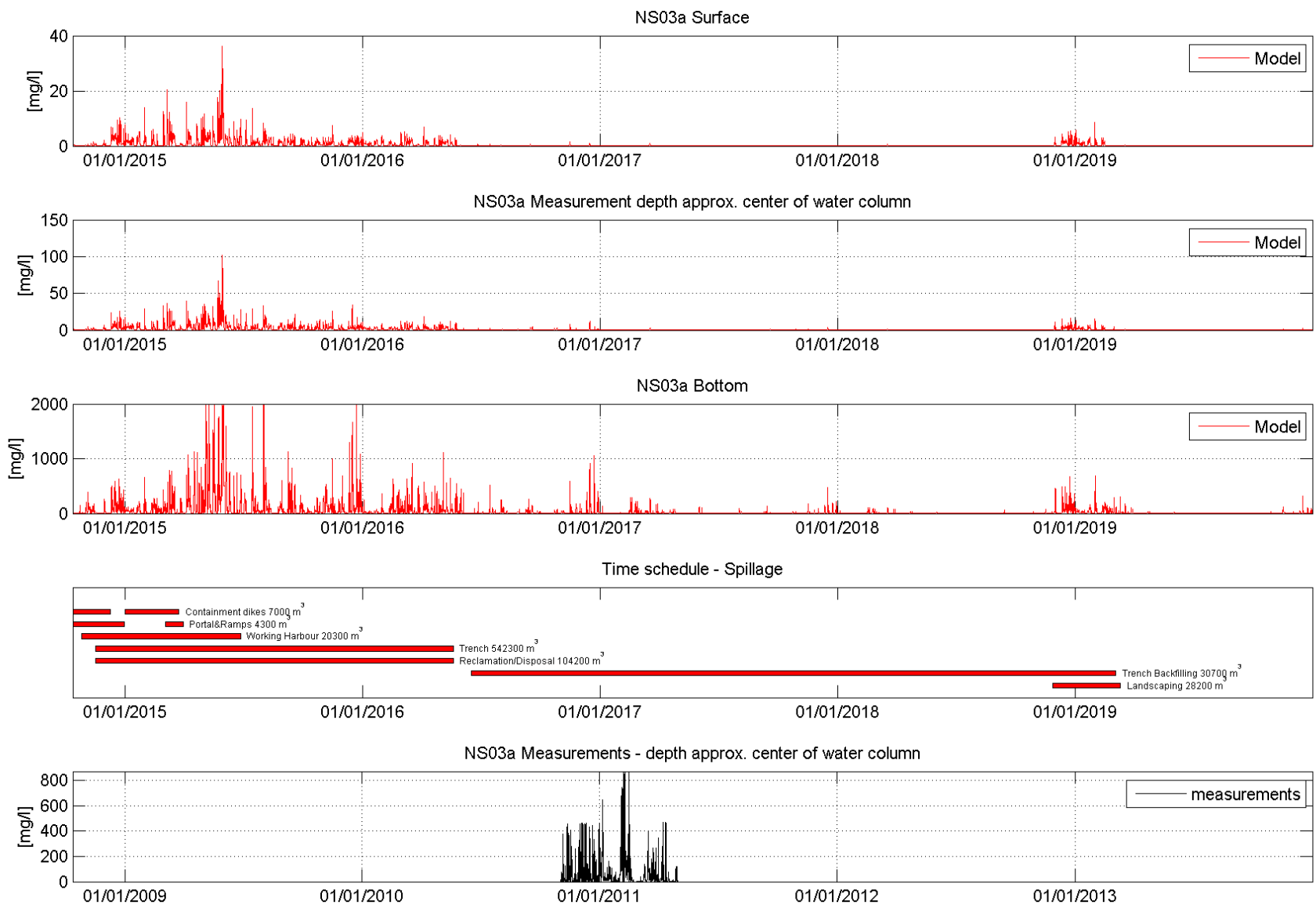


Figure I16 Simulation results from NS03a. Tunnel solution

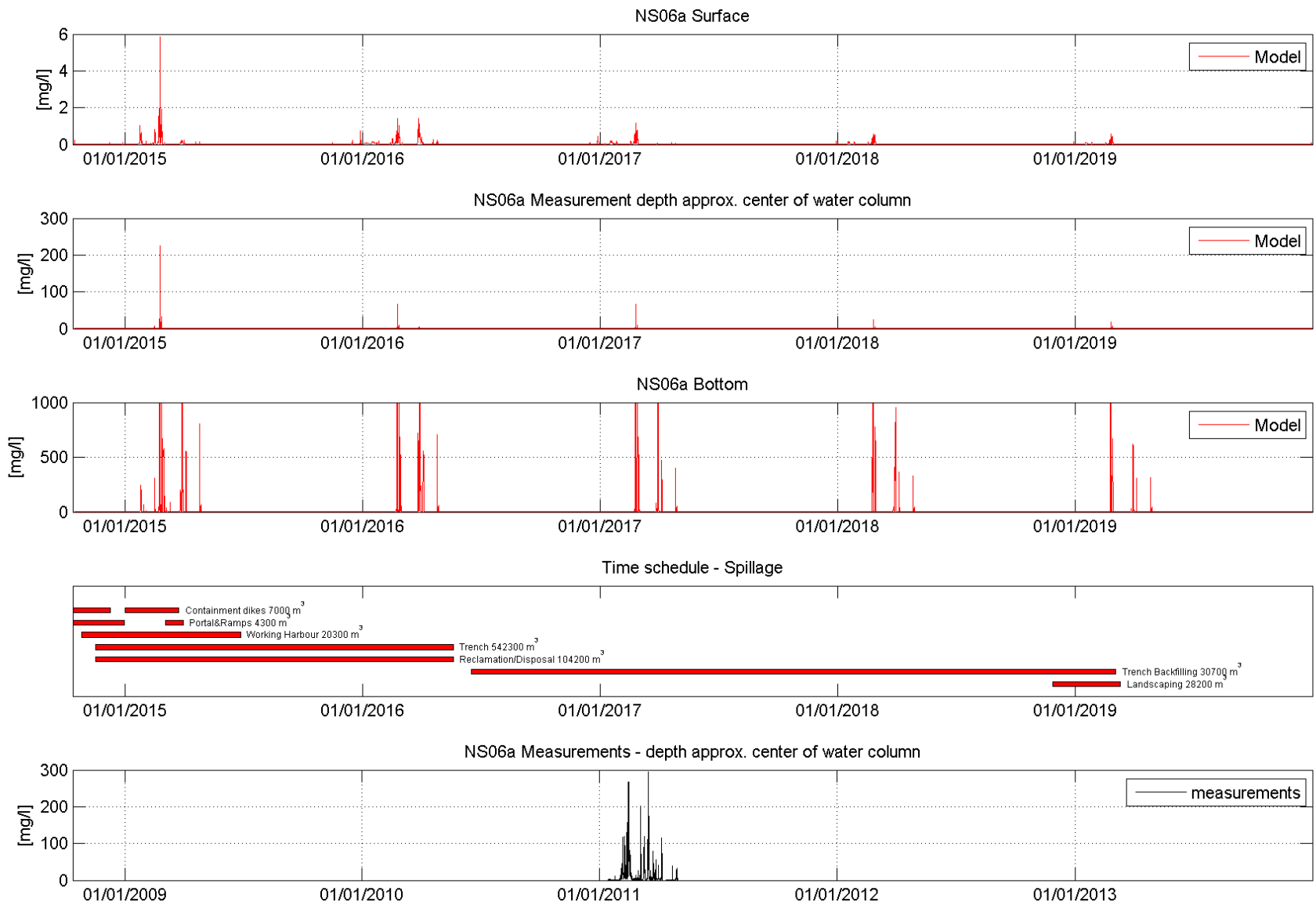


Figure I17 Simulation results from NS06a. Tunnel solution

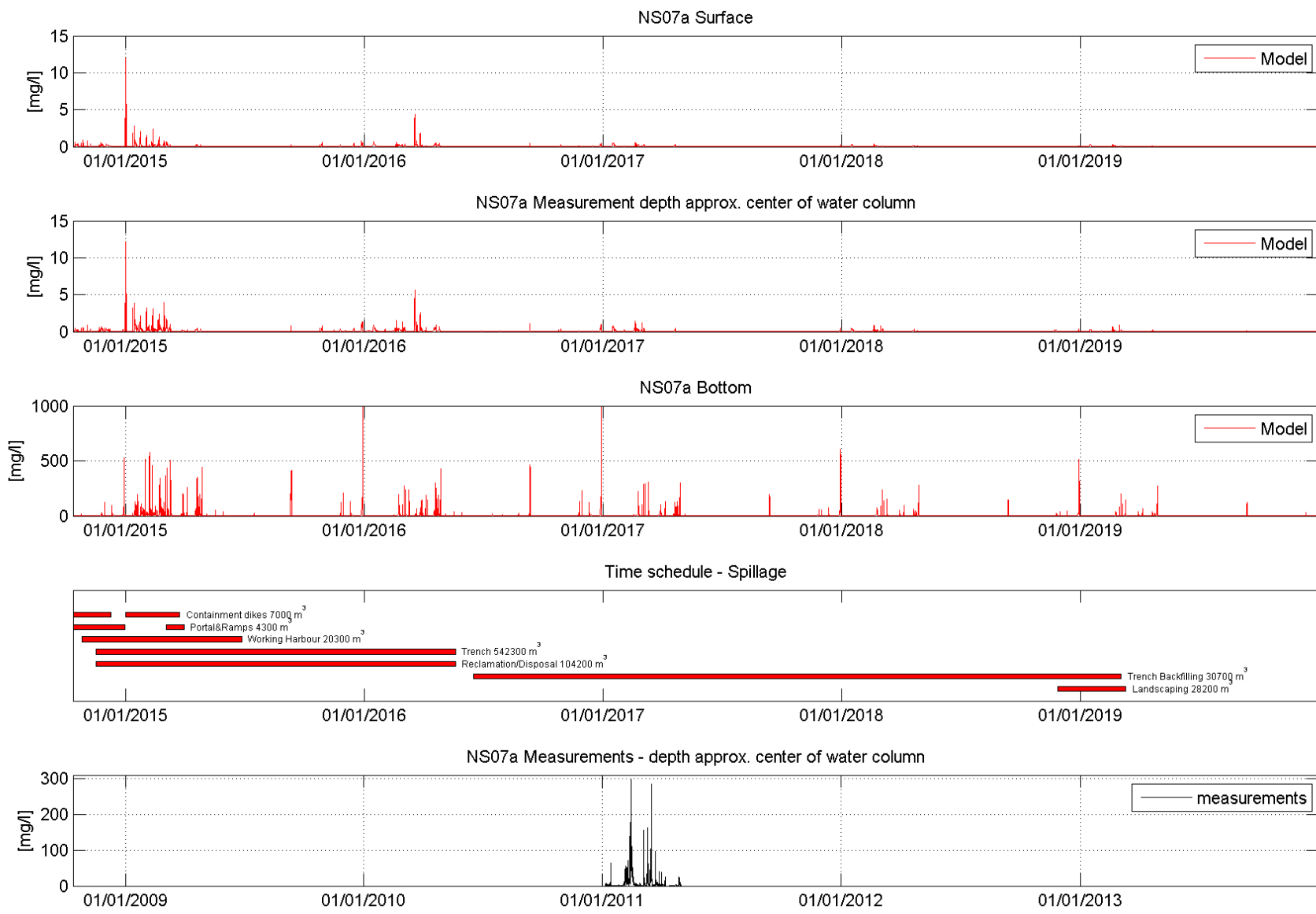


Figure I18 Simulation results from NS07a. Tunnel solution

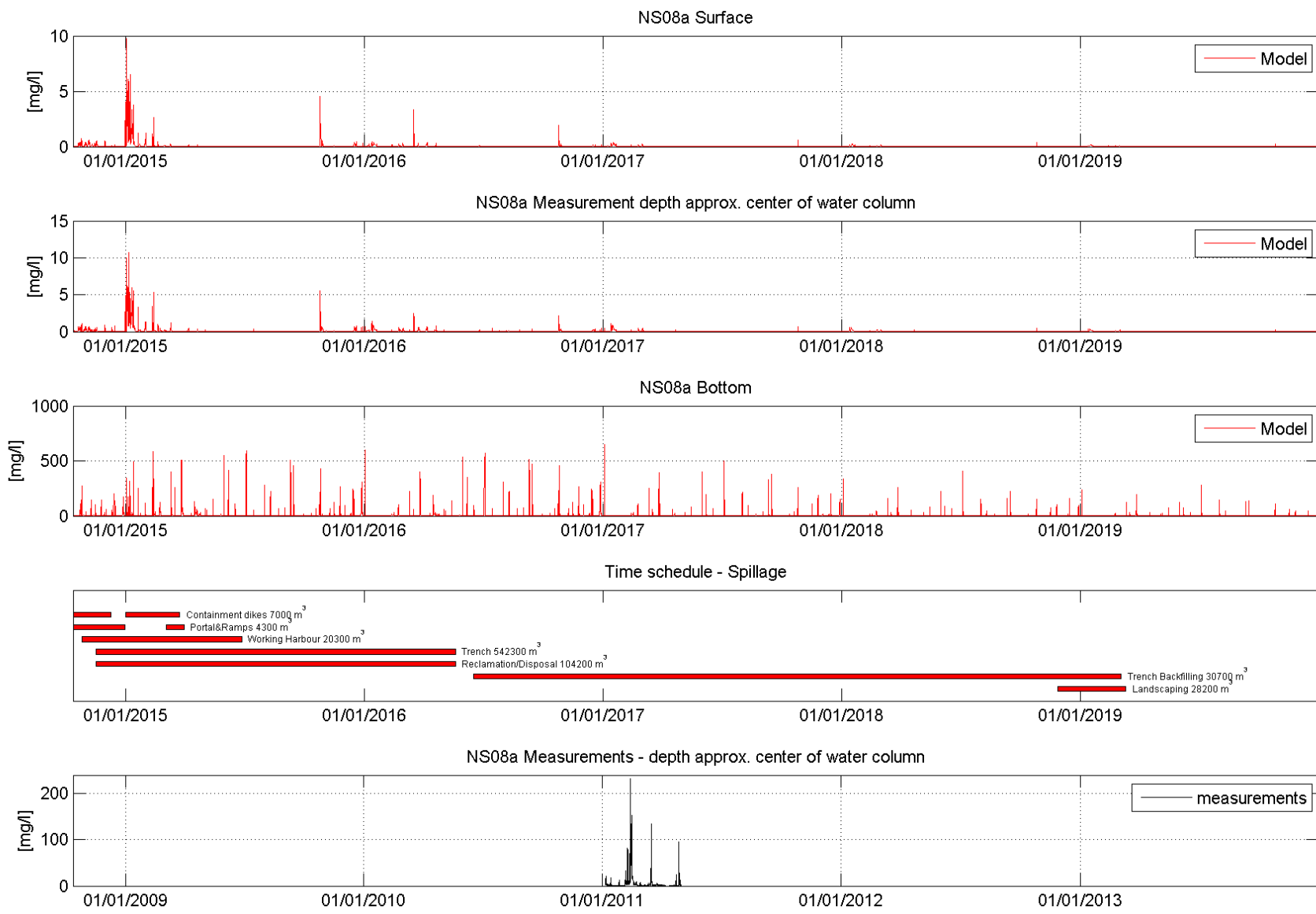


Figure I19 Simulation results from NS08a. Tunnel solution.



A P P E N D I X J

Time Series from Bridge Solution

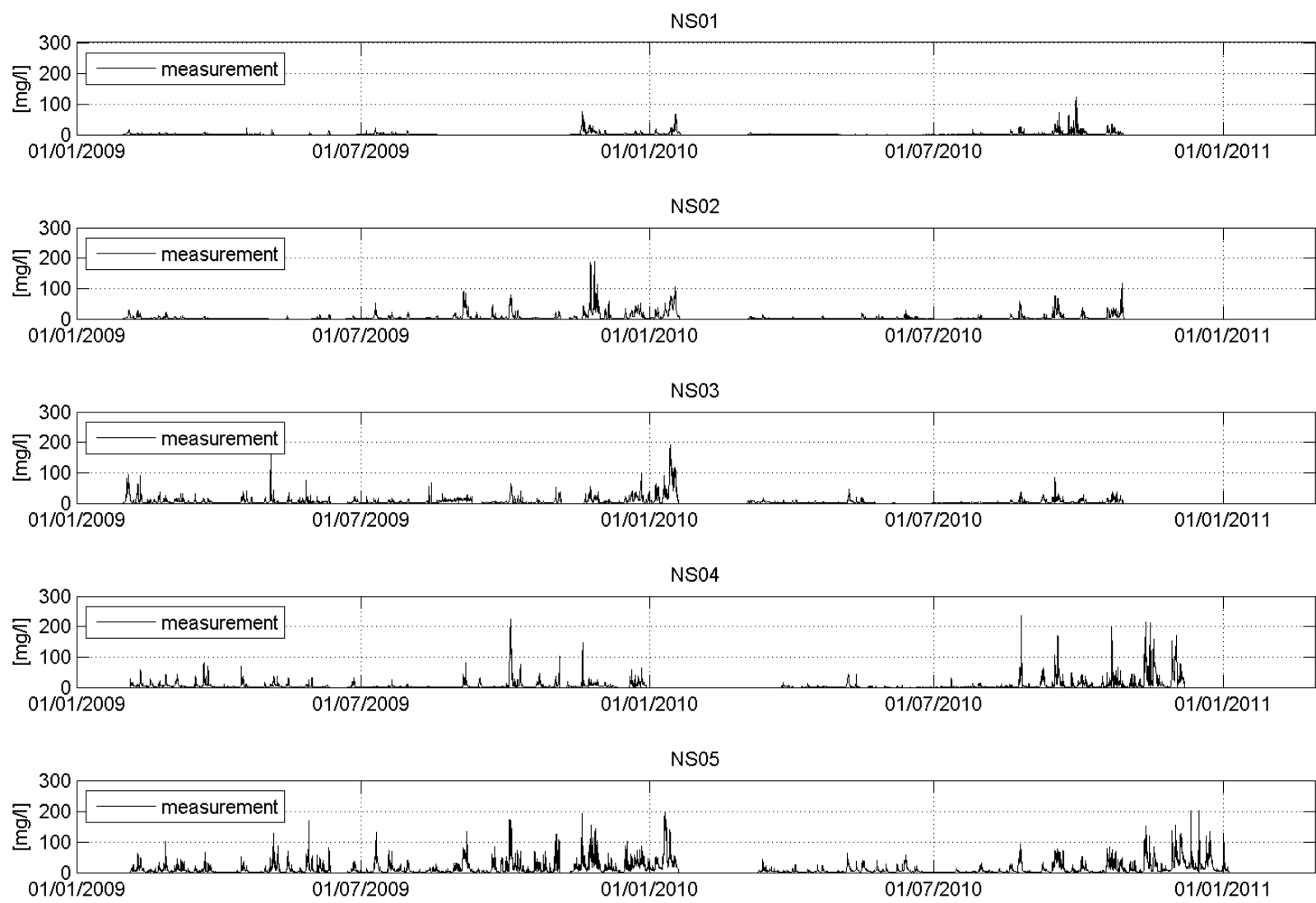


Figure J1 Measurements at Danish nearshore stations. Measurements at midwater

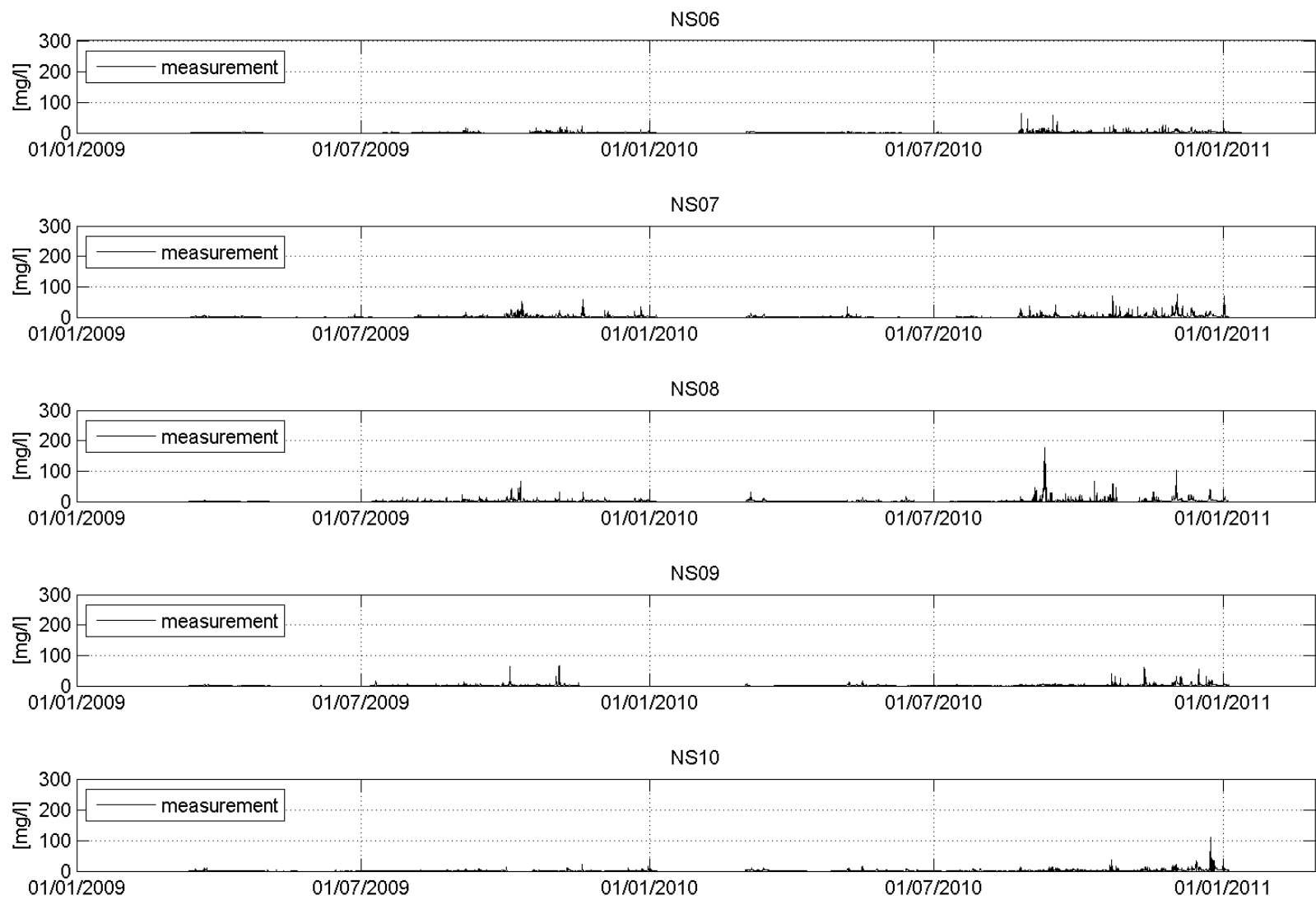


Figure J2 Measurements at German nearshore stations. Measurements at midwater

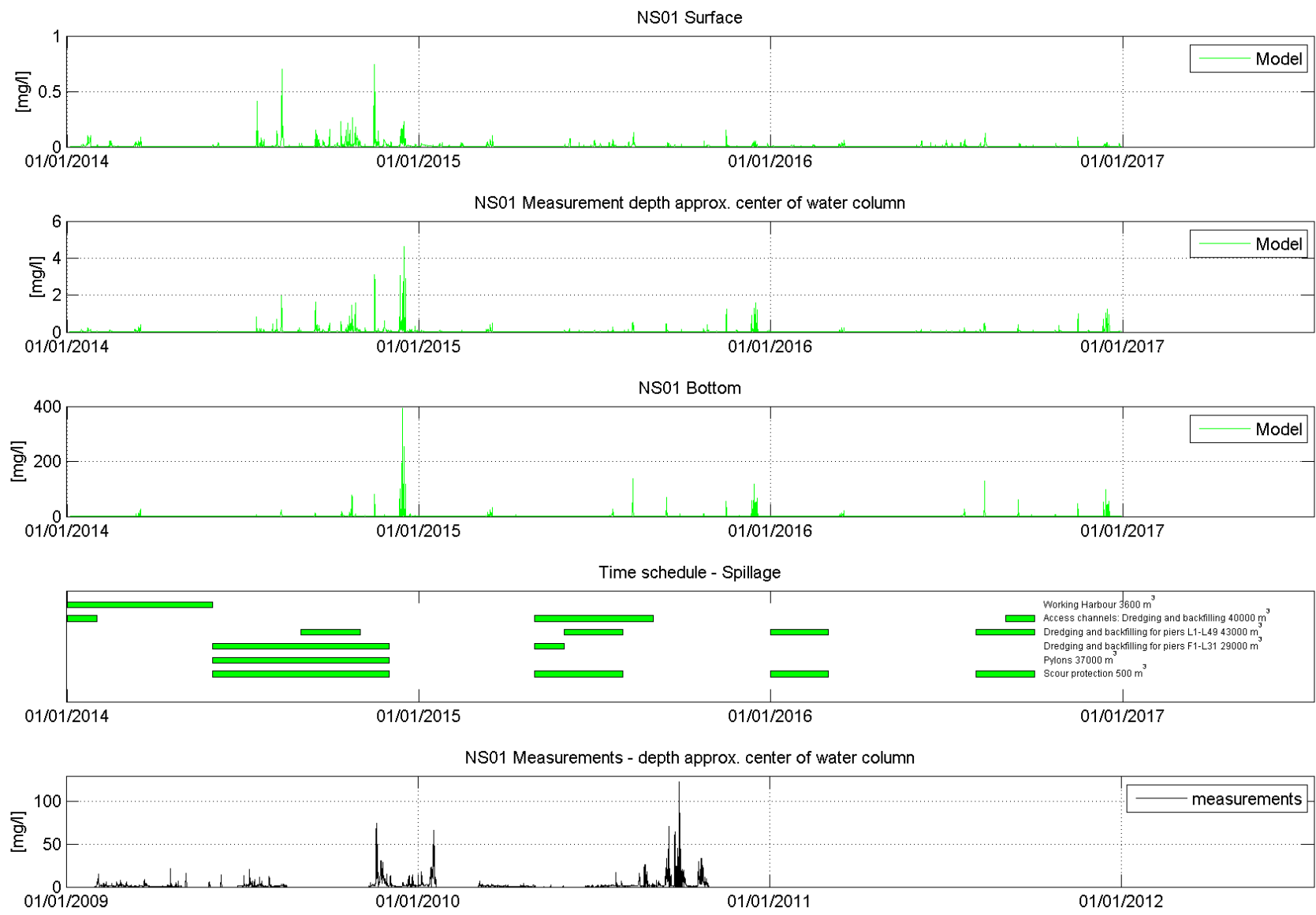


Figure J3 Simulation results at NS01. Bridge solution

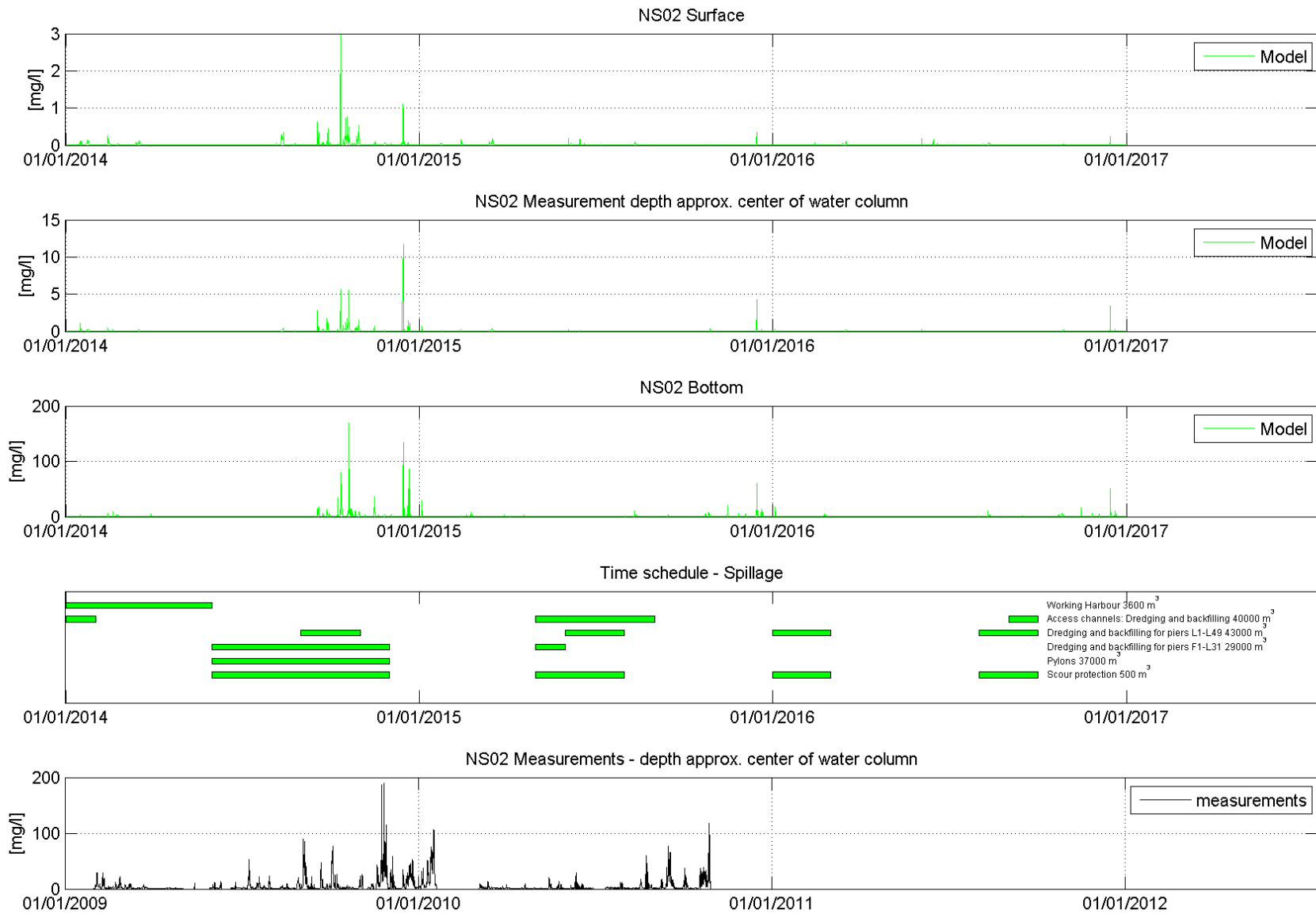


Figure J4 Simulation results at NS02. Bridge solution

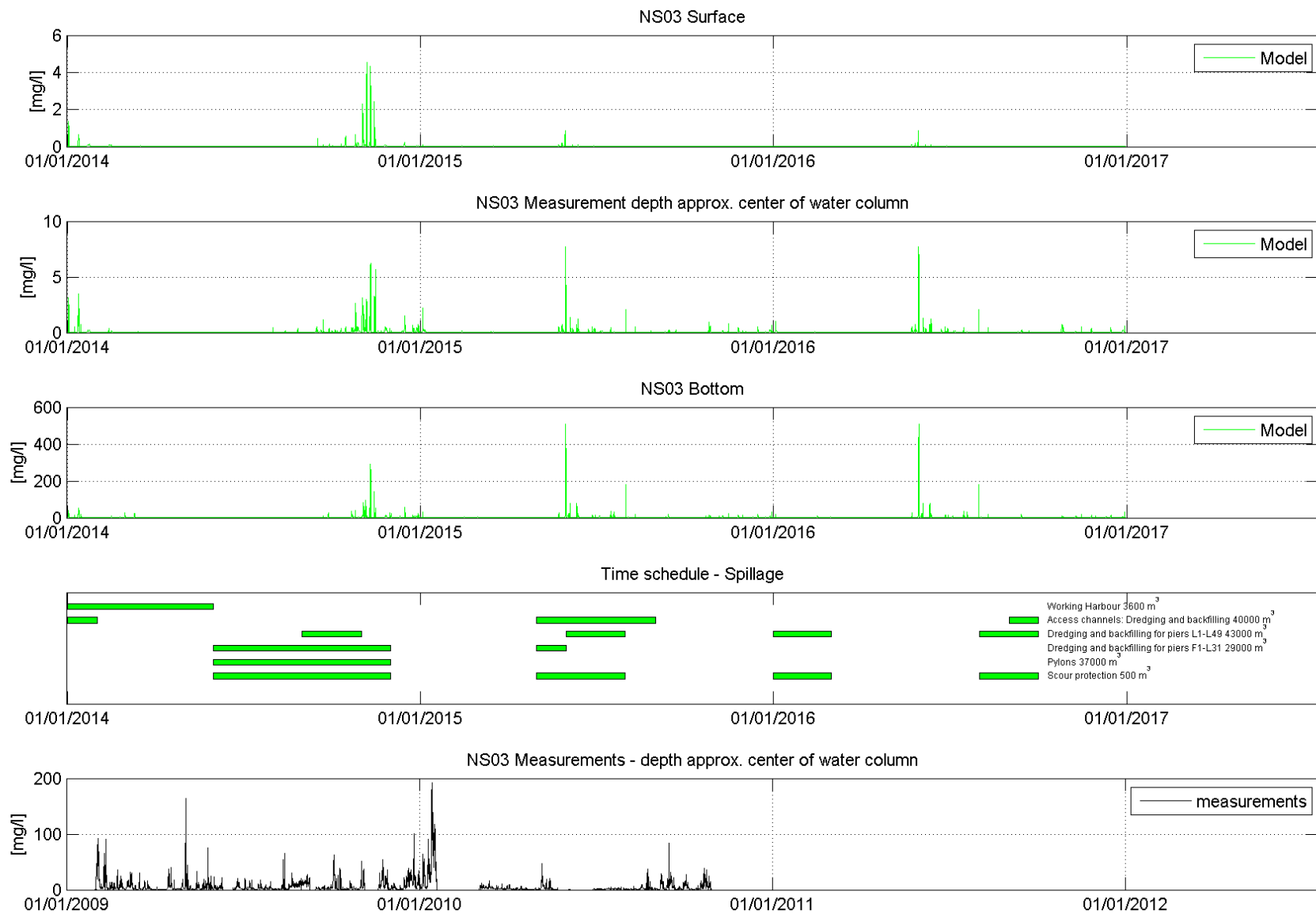


Figure J5 Simulation results at NS03. Bridge solution

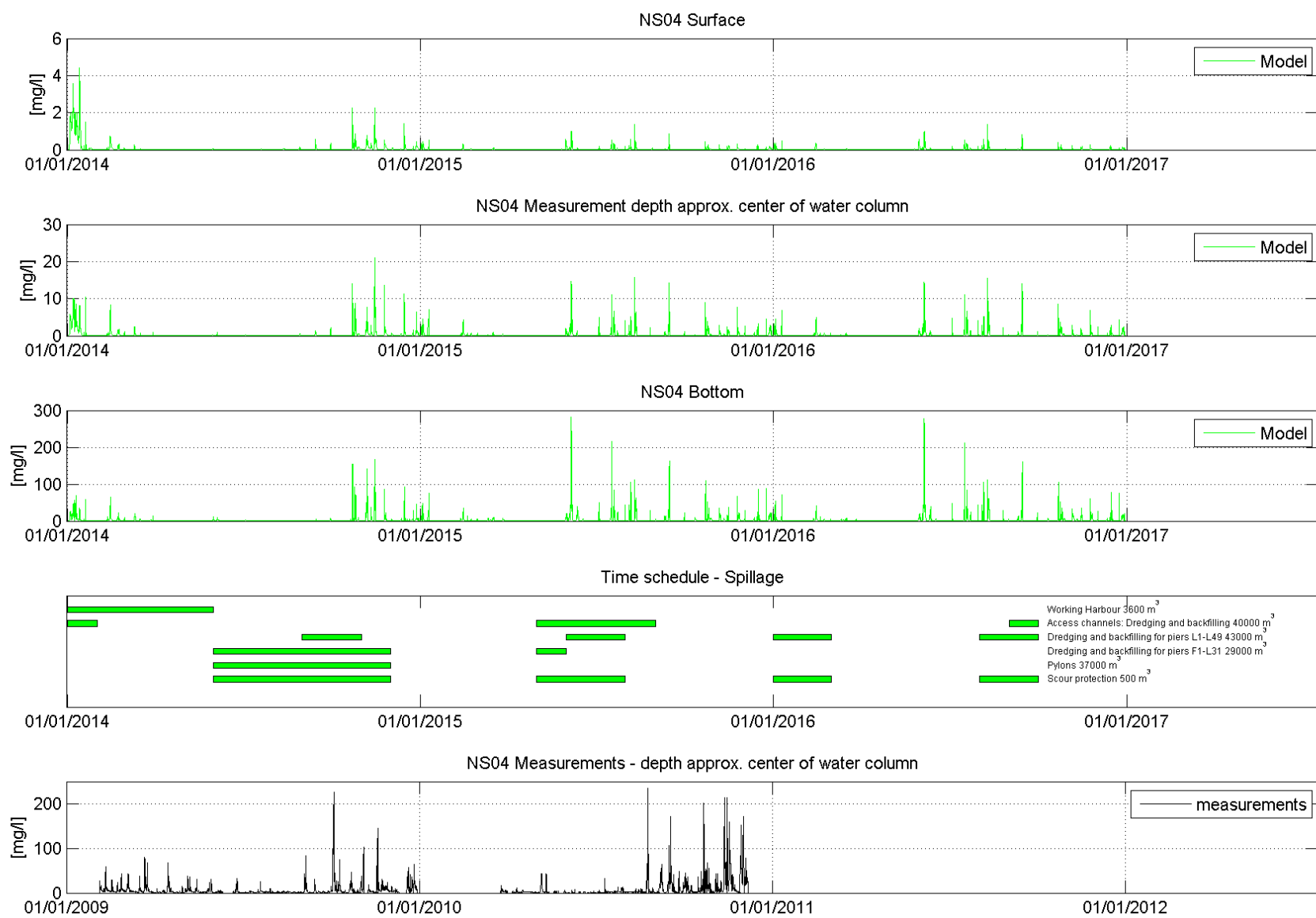


Figure J6 Simulation results at NS04. Bridge solution

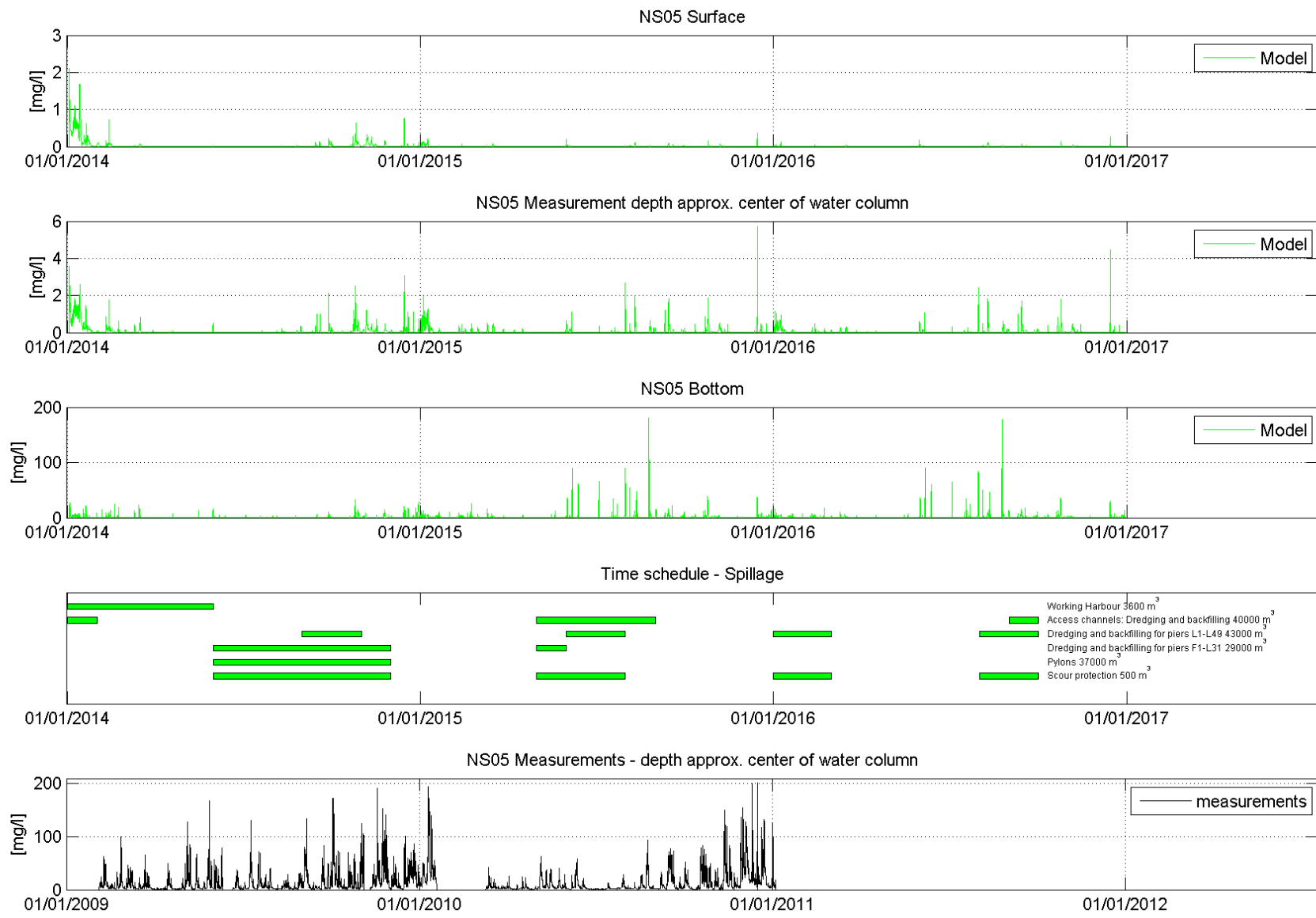


Figure J7 Simulation results at NS05. Bridge solution

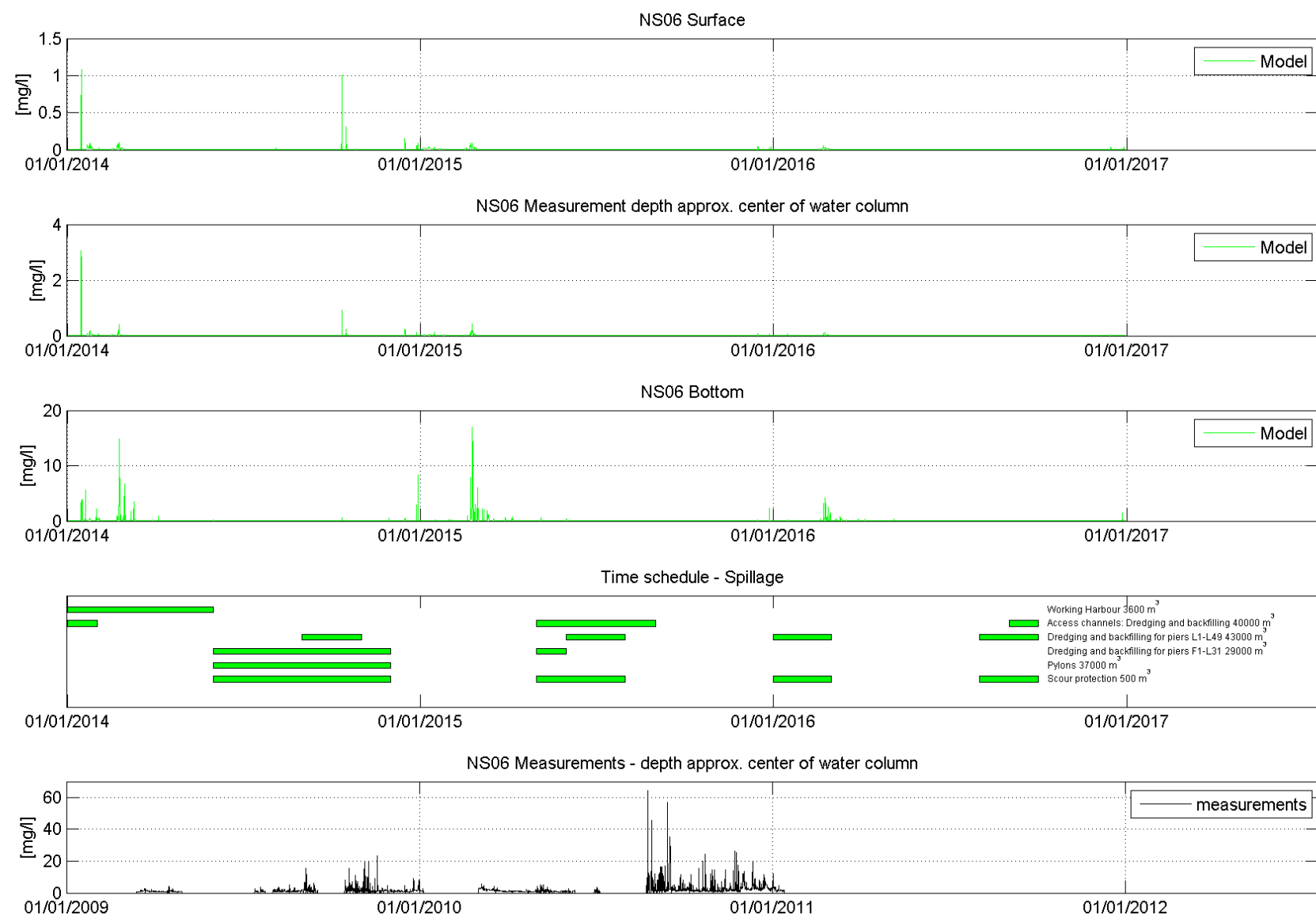


Figure J8 Simulation results at NS06. Bridge solution

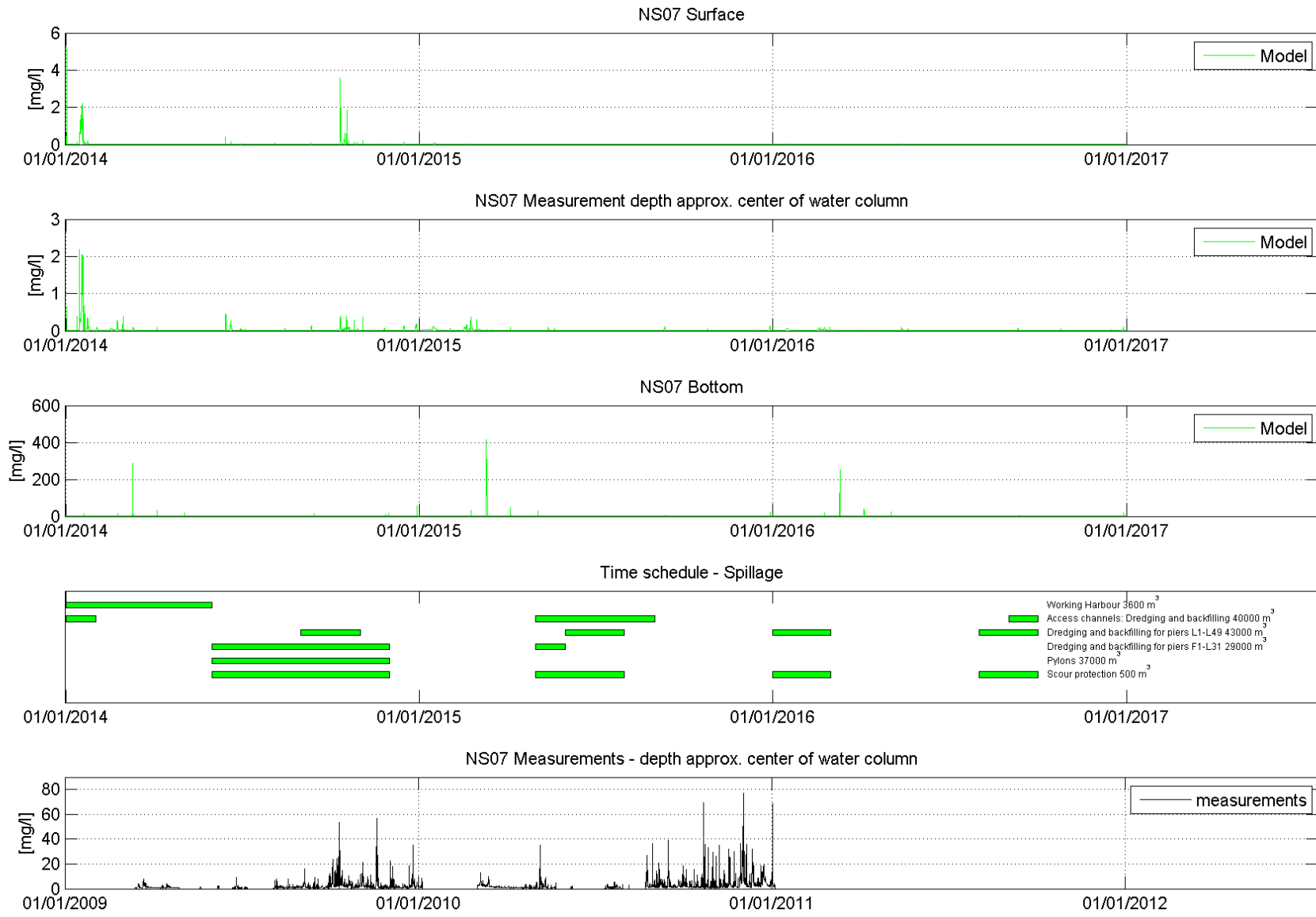


Figure J9 Simulation results at NS07. Bridge solution

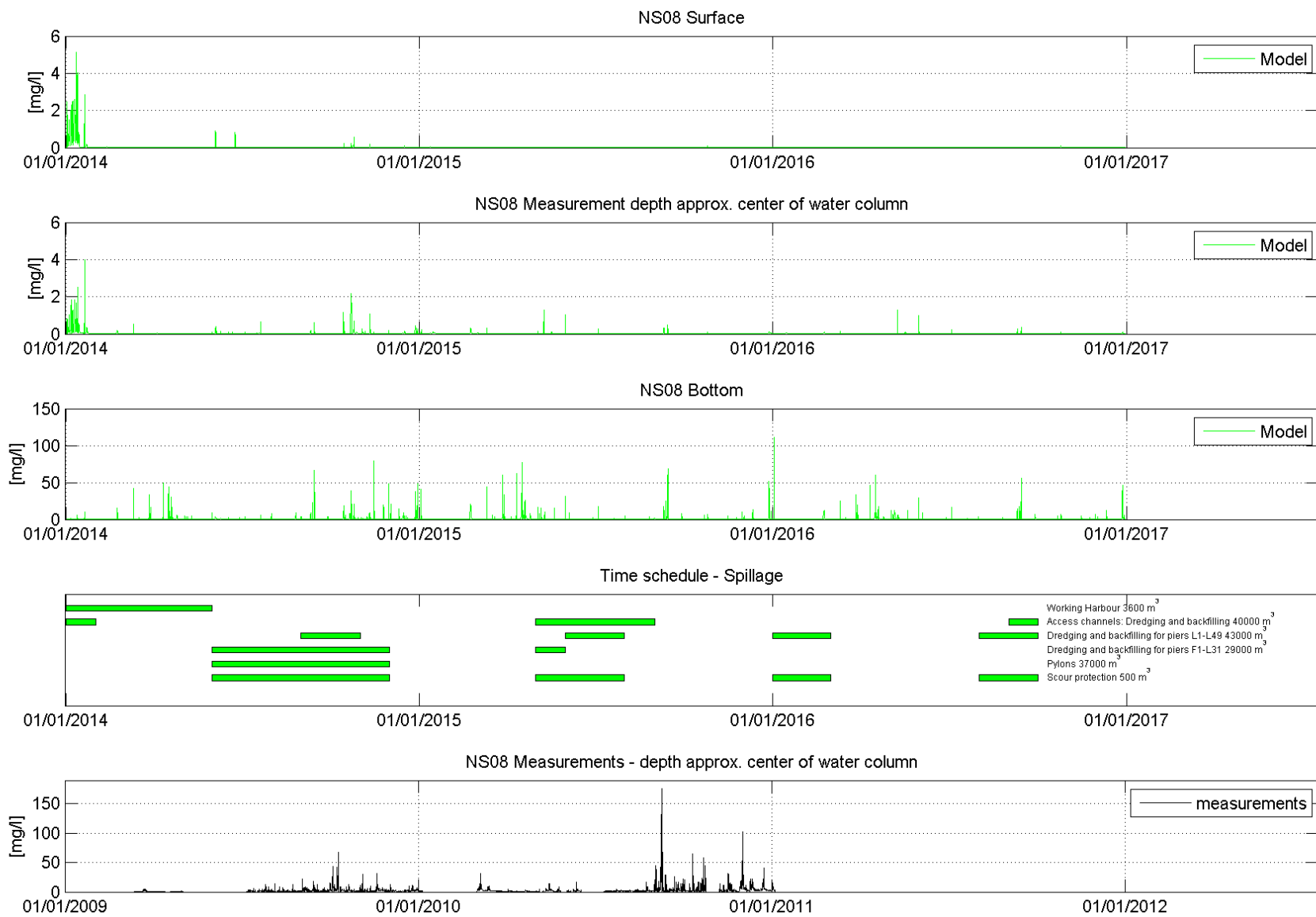


Figure J10 Simulation results at NS08. Bridge solution

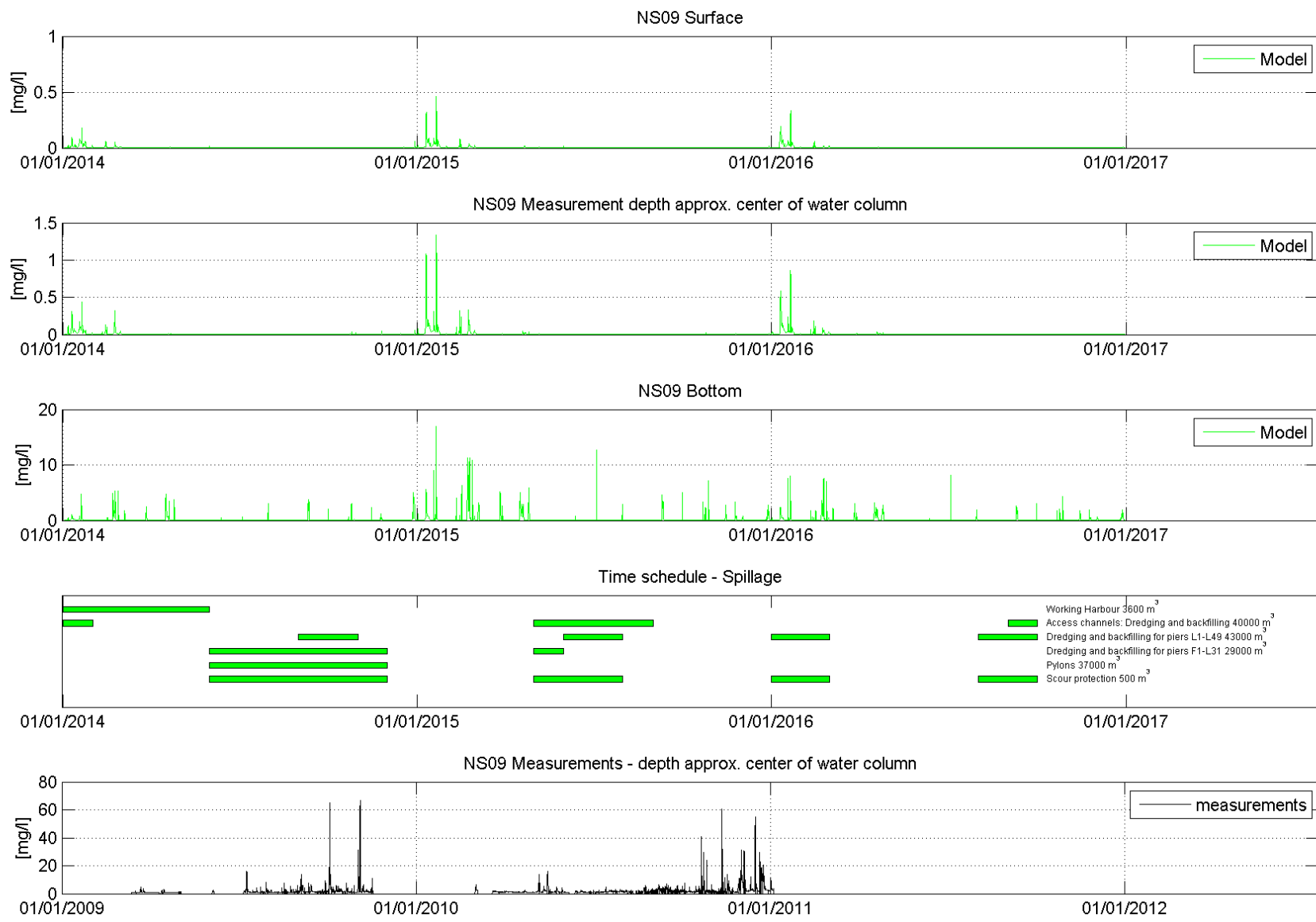


Figure J11 Simulation results at NS09. Bridge solution

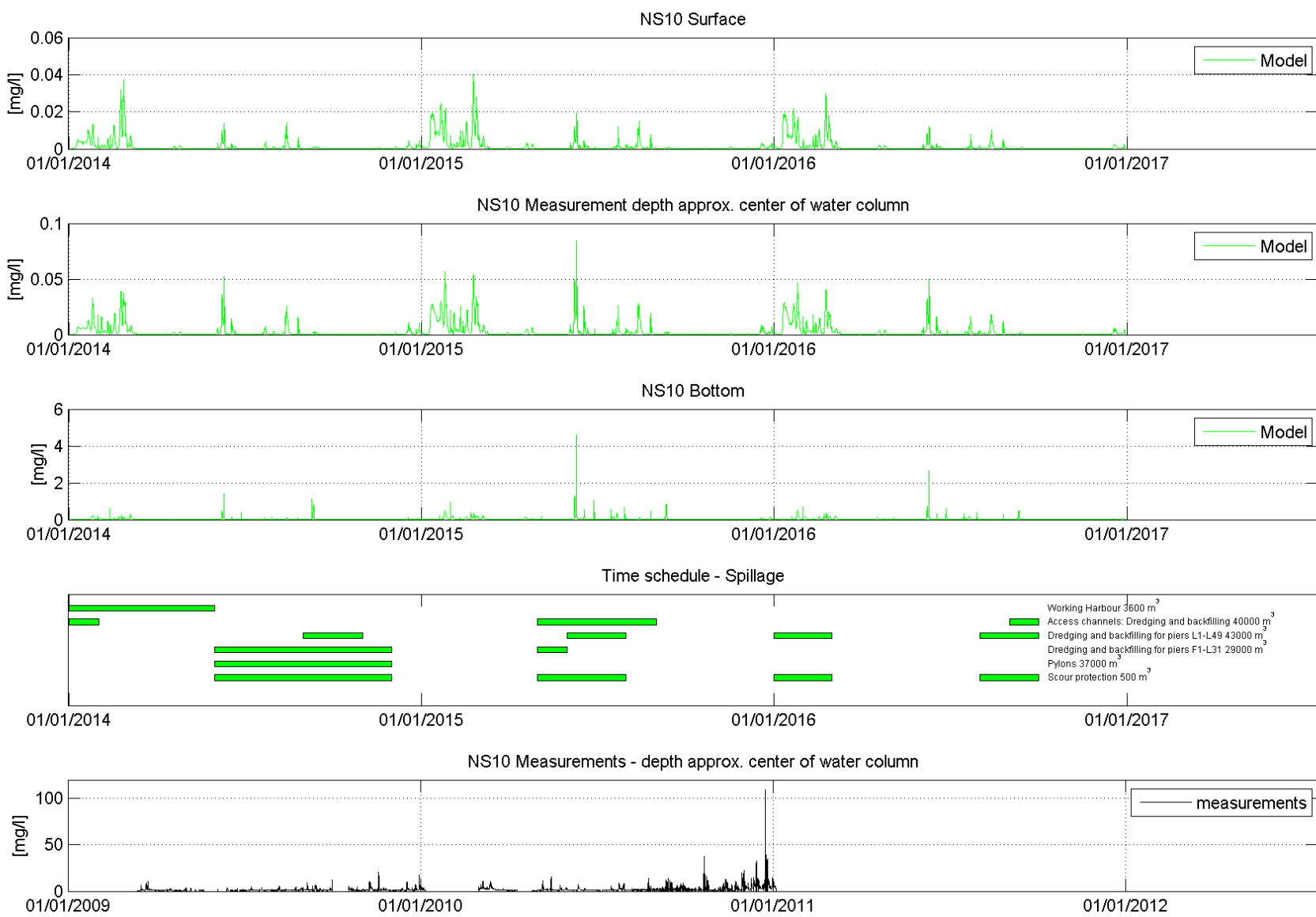


Figure J12 Simulation results at NS10. Bridge solution

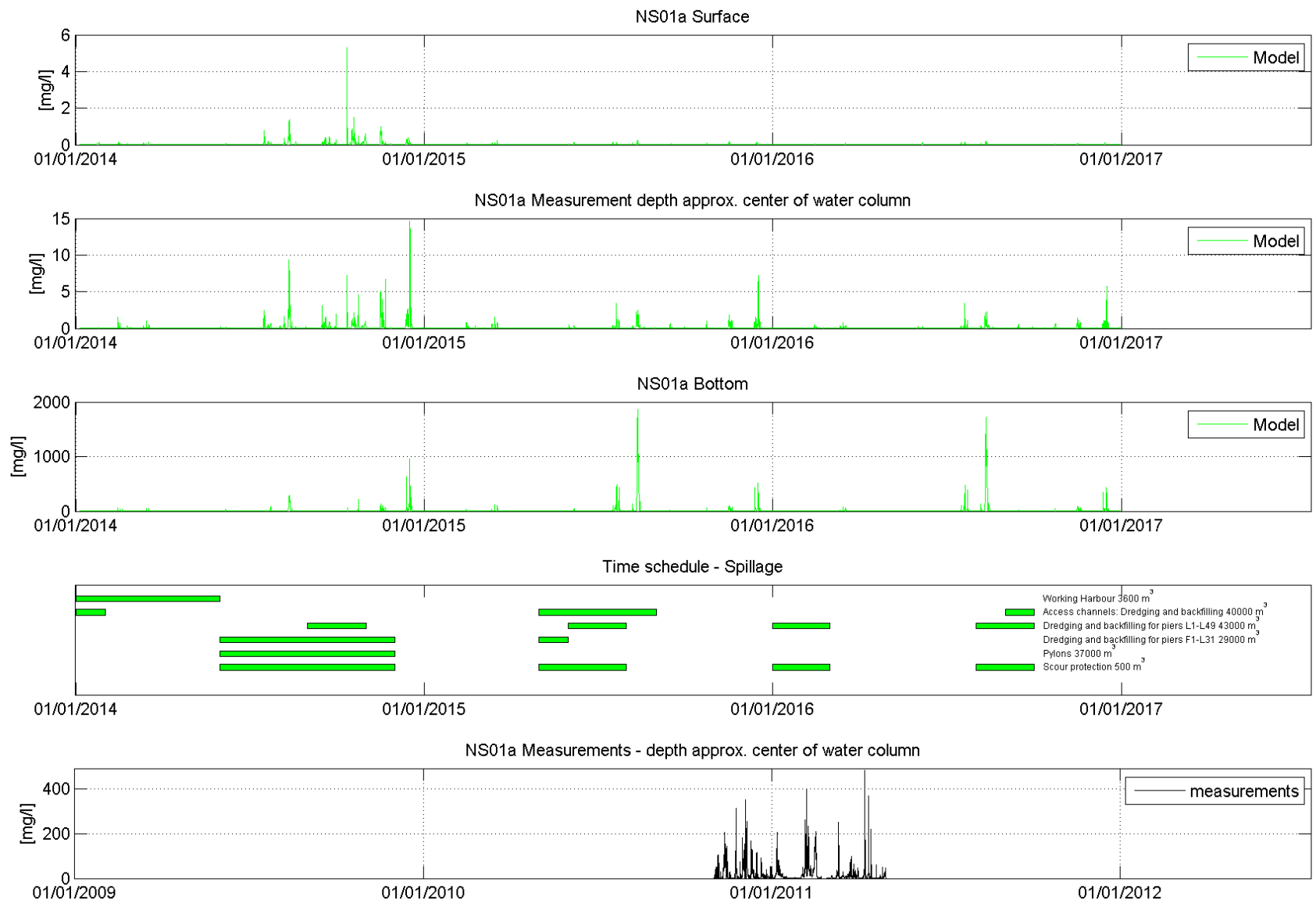


Figure J13 Simulation results at NS01a. Bridge solution

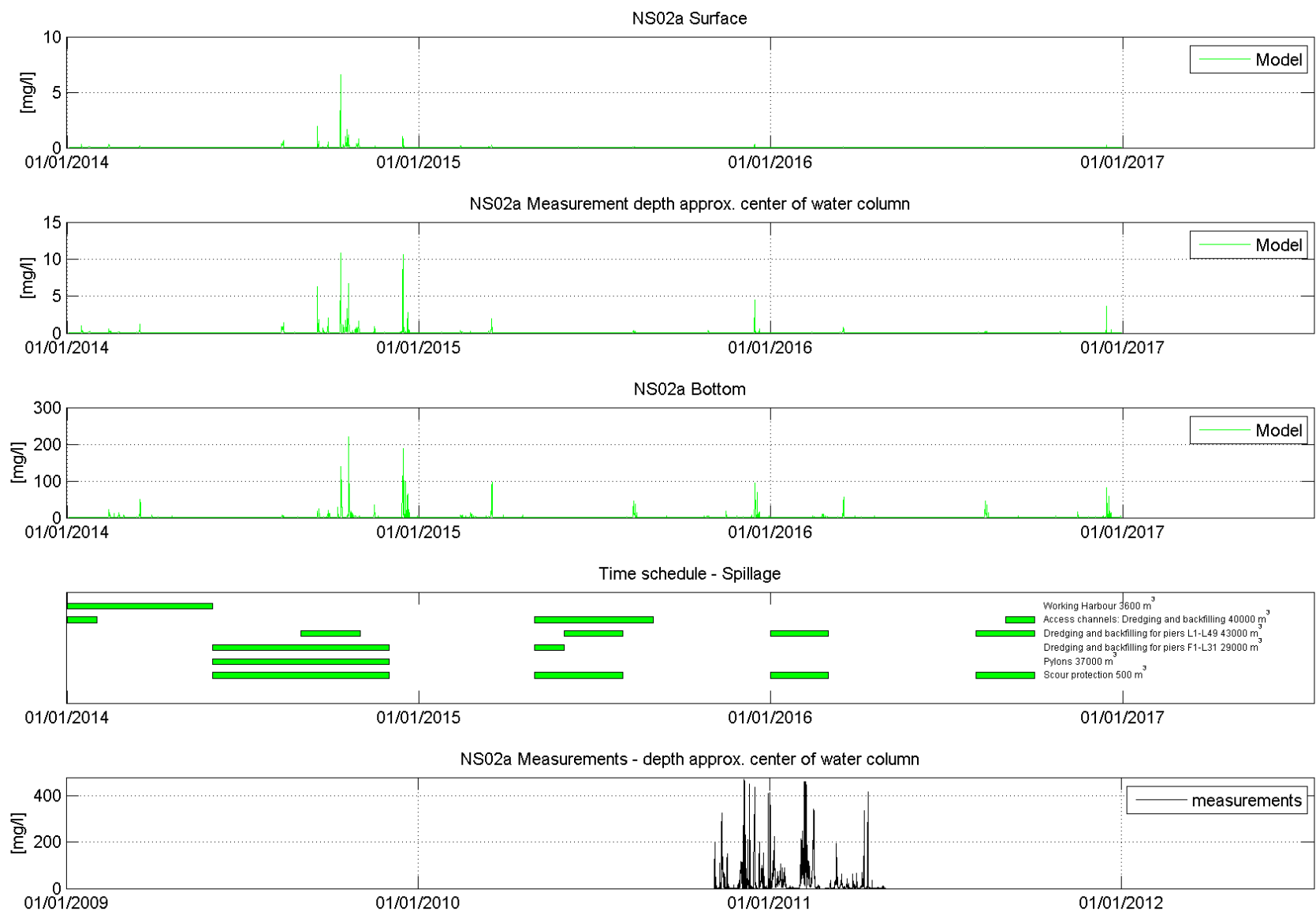


Figure J14 Simulation results at NS02a. Bridge solution

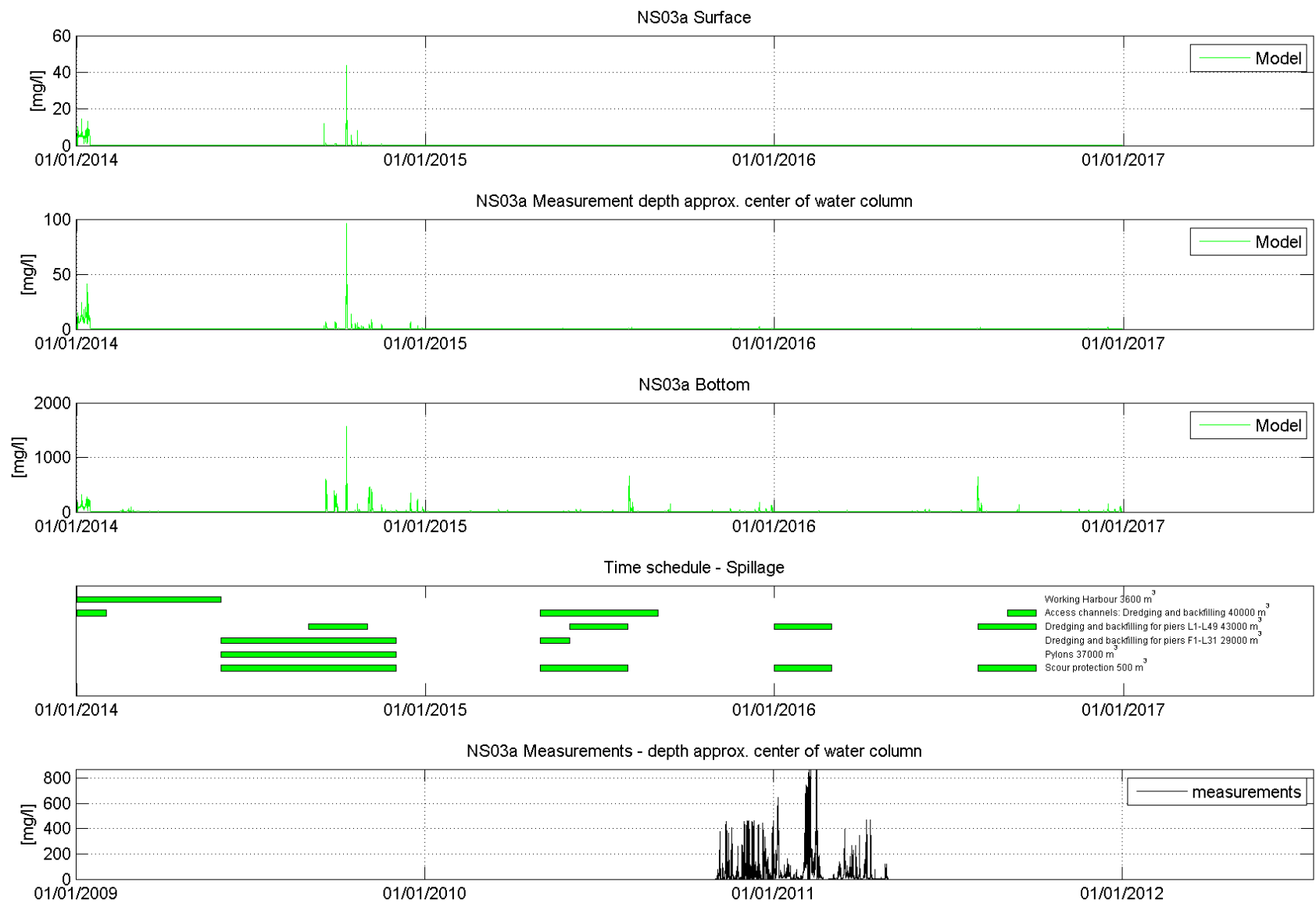


Figure J15 Simulation results at NS03a. Bridge solution

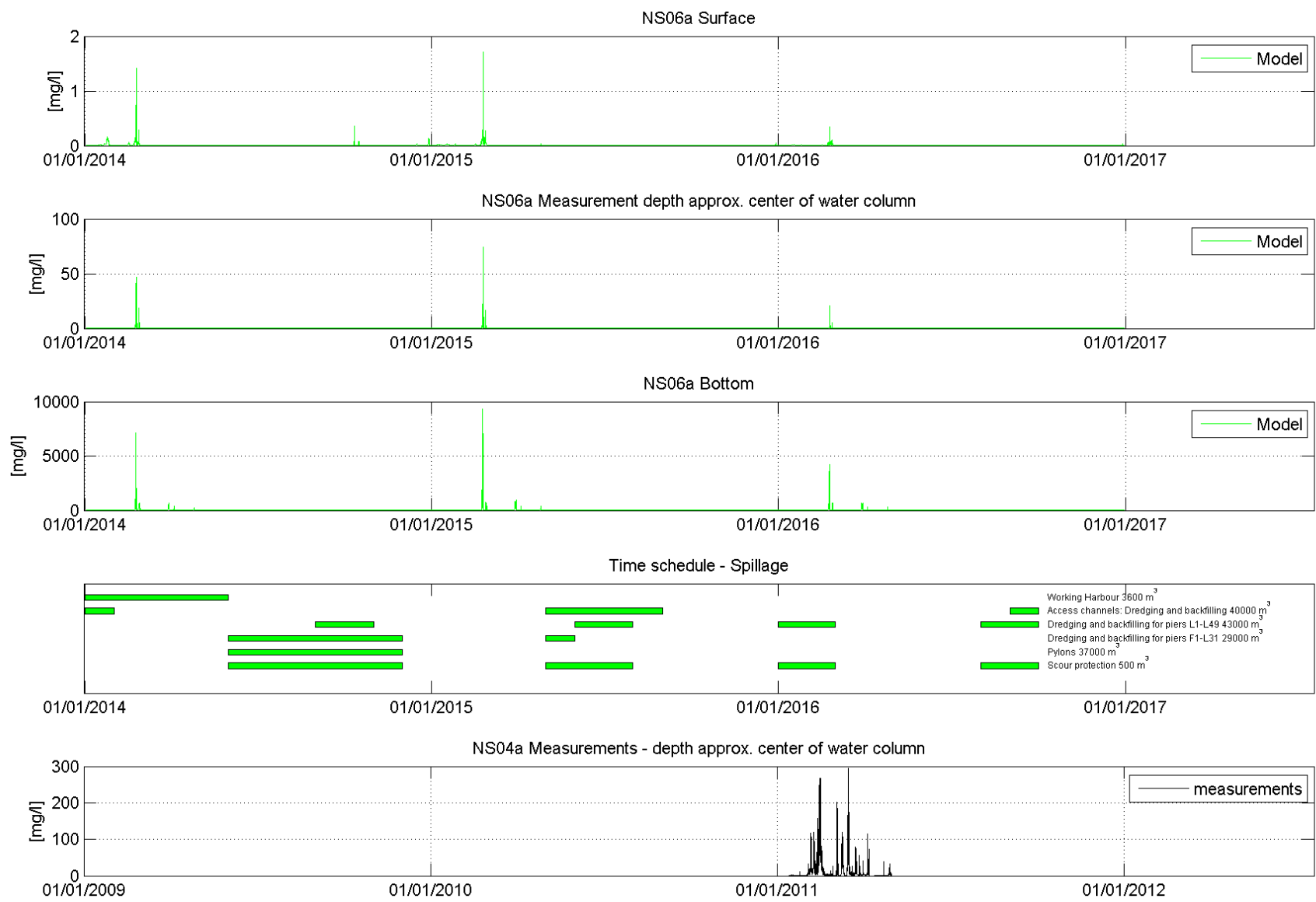


Figure J15 Simulation results at NS06a. Bridge solution

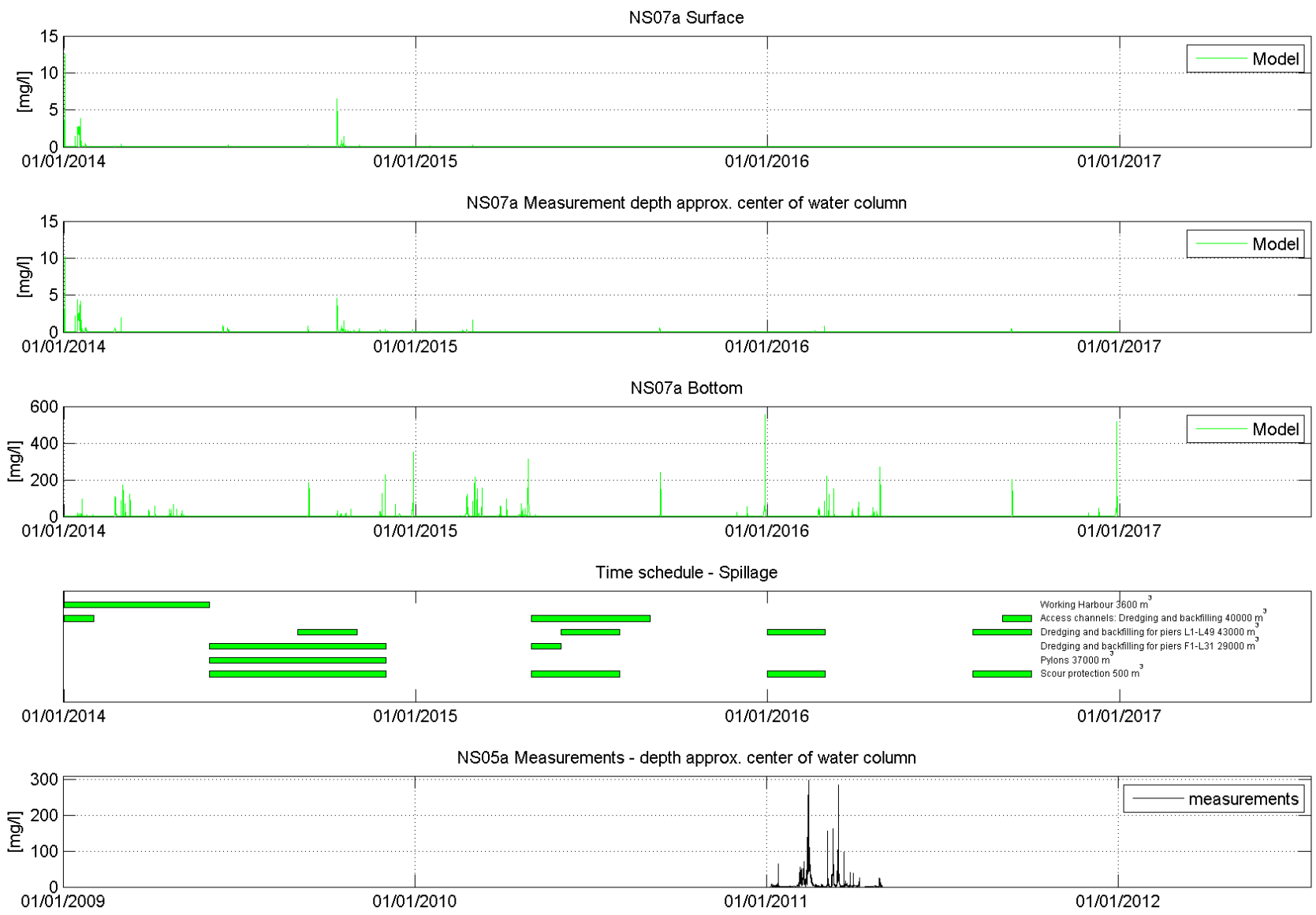


Figure J16 Simulation results at NS07a. Bridge solution

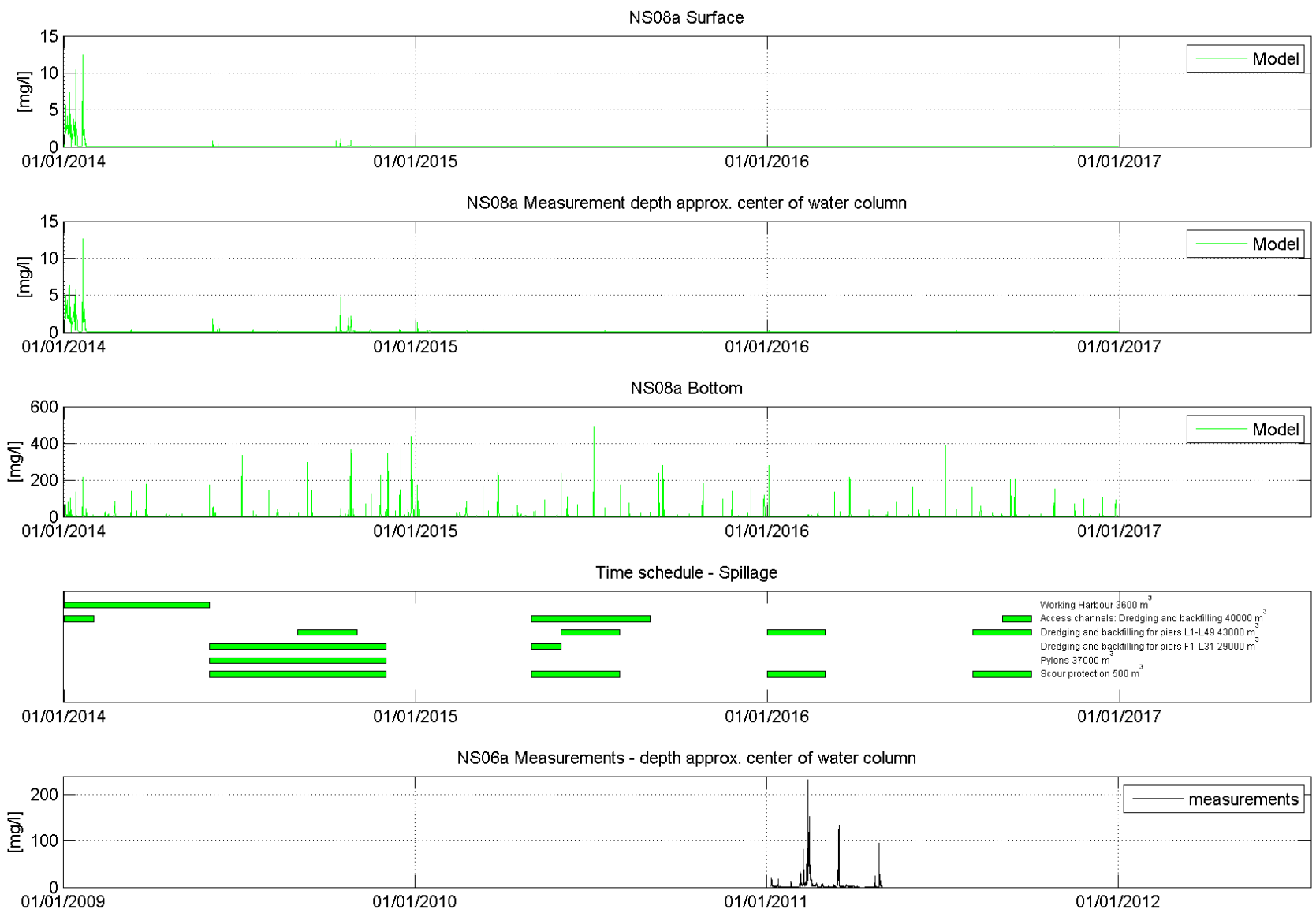


Figure J17 Simulation results at NS08a. Bridge solution



A P P E N D I X K
Sediment Flow Patterns

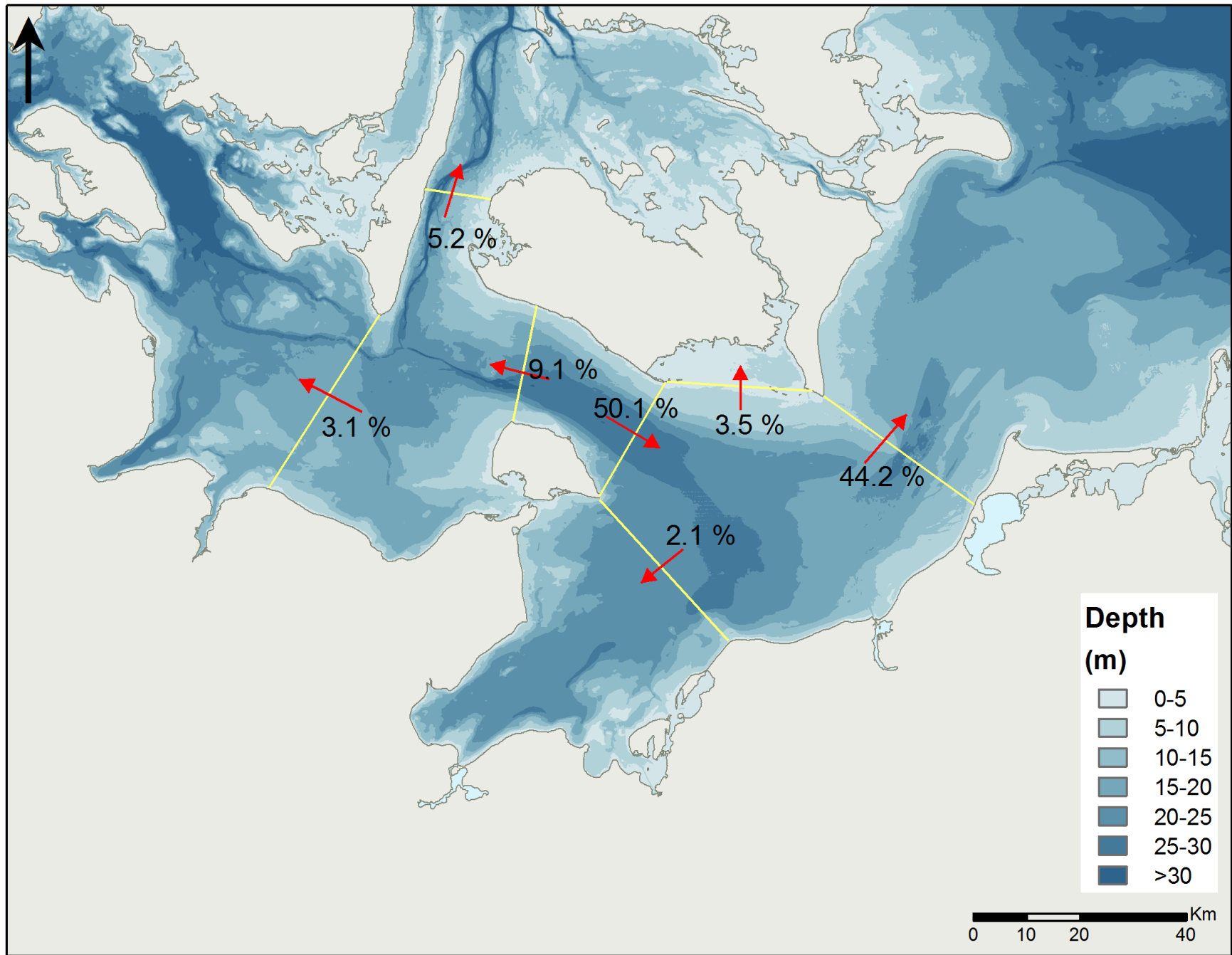


Figure K1 Sediment flows for tunnel solution



A P P E N D I X L

Deposition Patterns for Tunnel Solutions

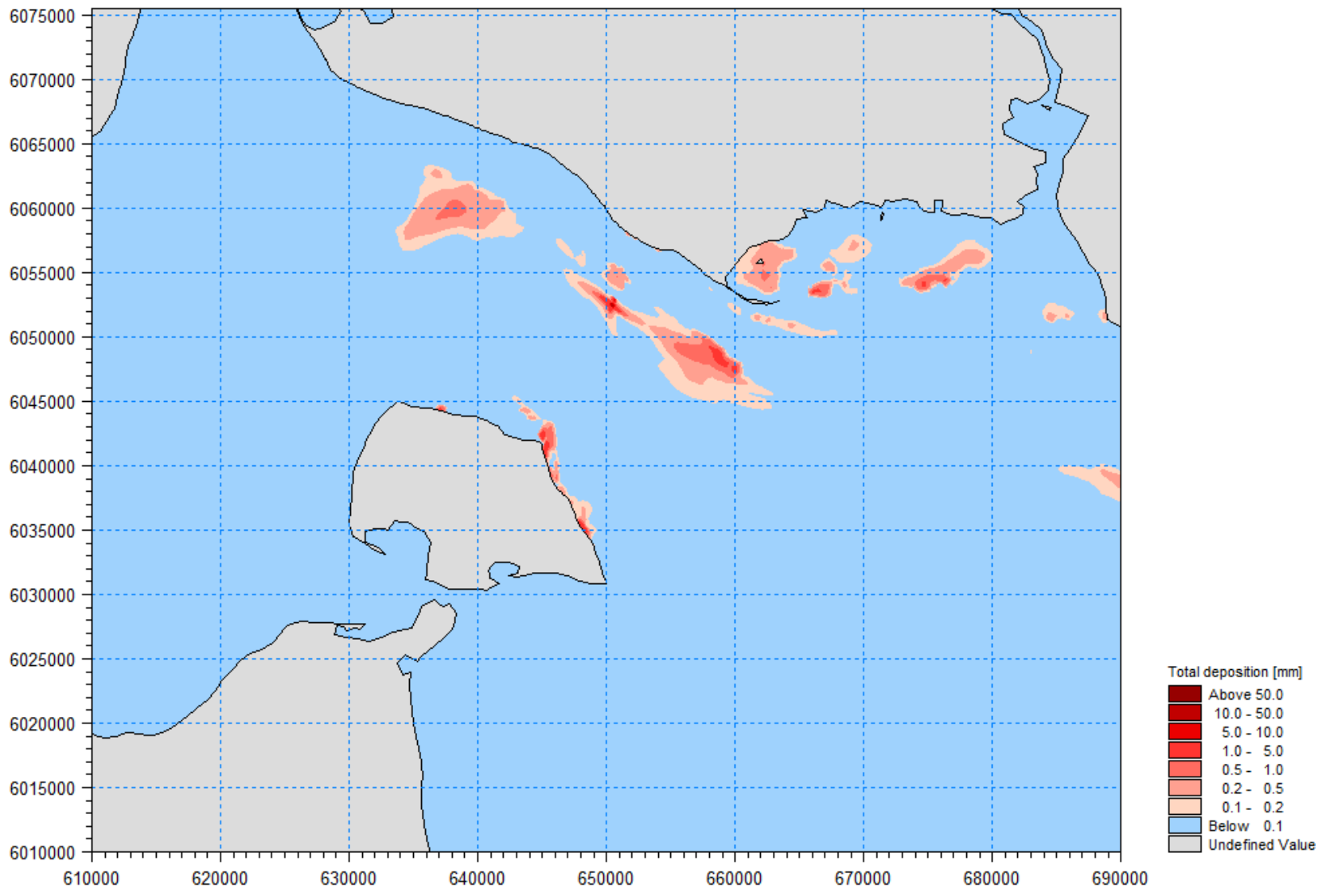


Figure L1 Deposition at the end of 2014. Tunnel solution

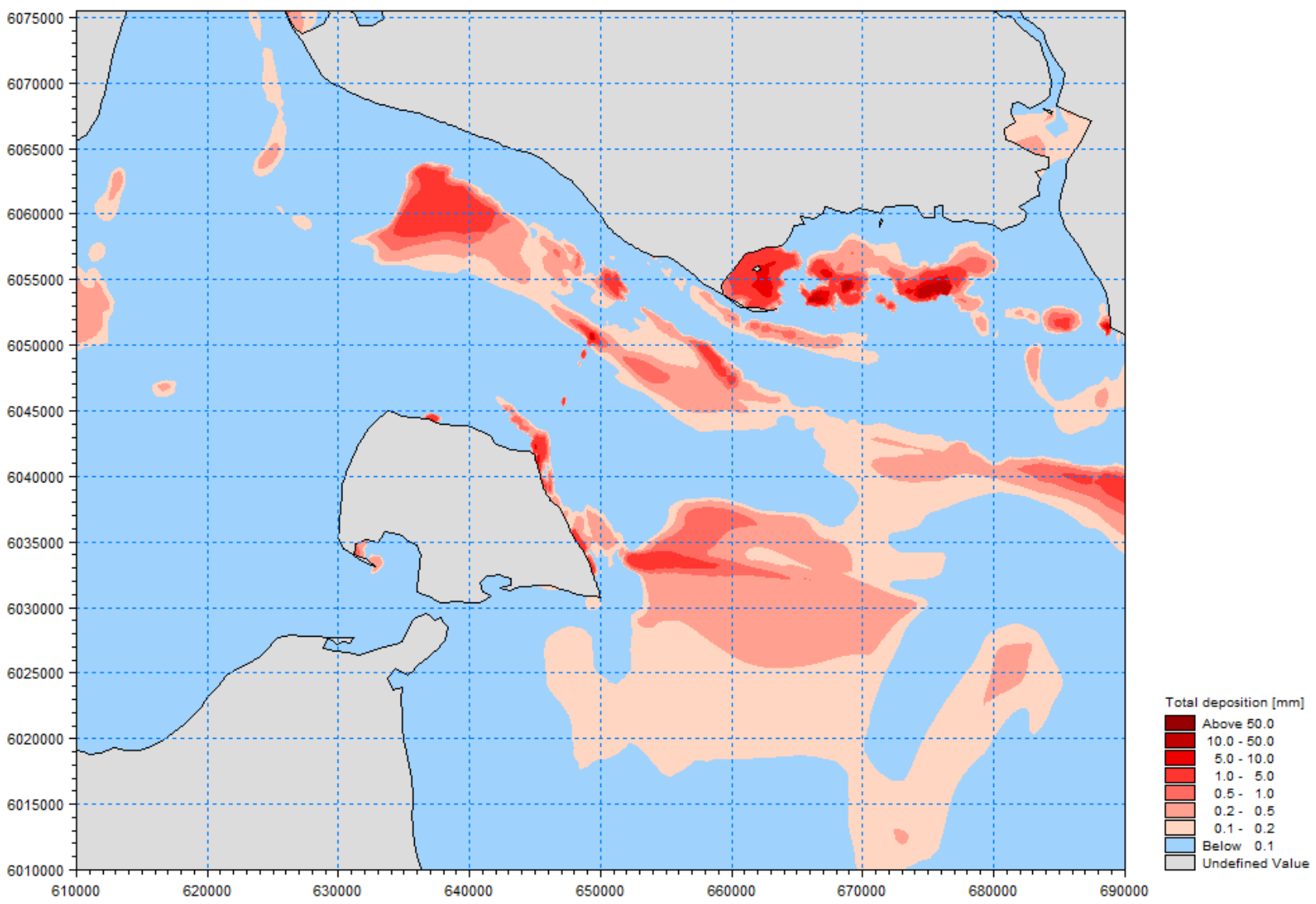


Figure L2 Deposition at the end of 2015. Tunnel solution

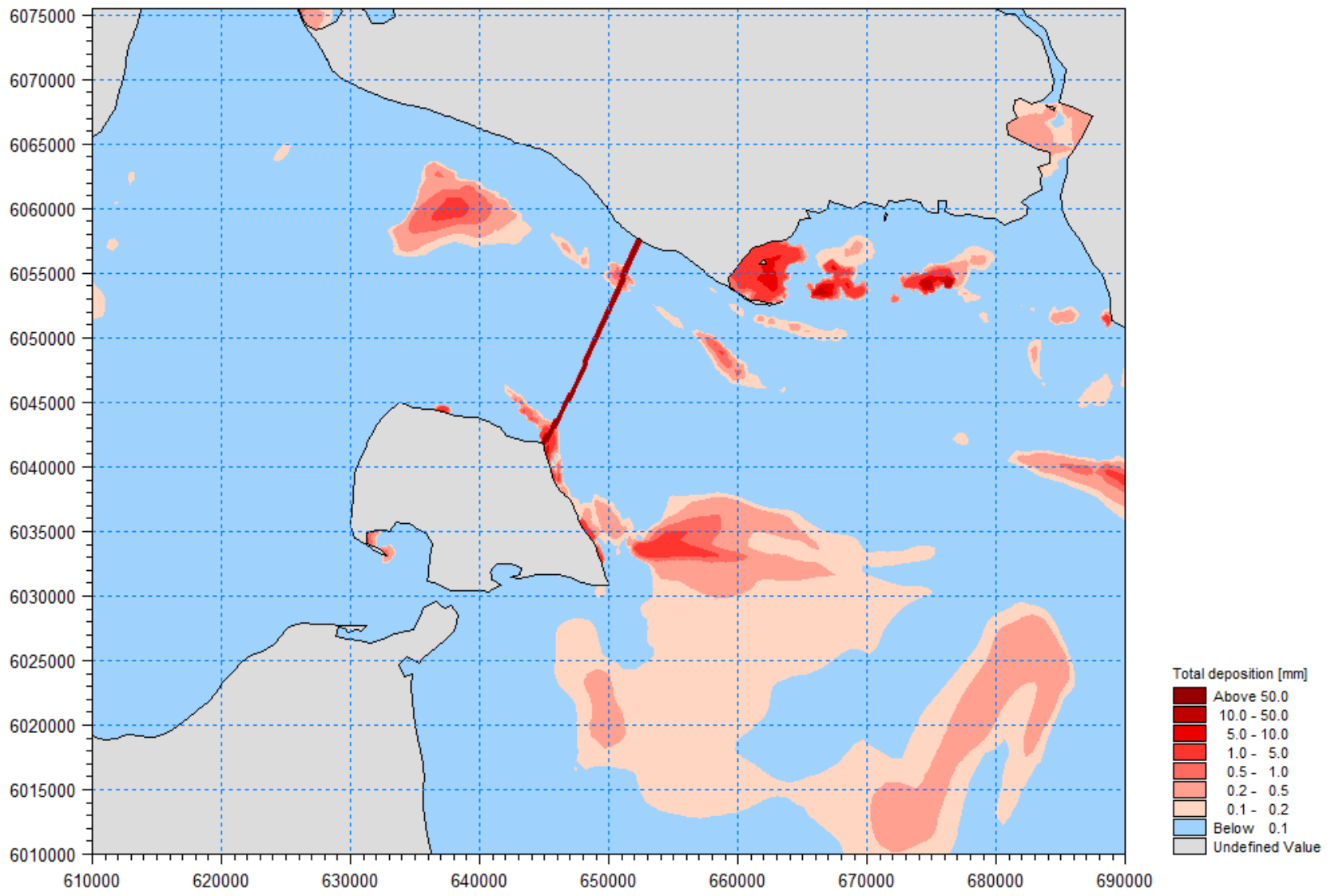


Figure L3 Deposition at the end of 2016. Tunnel solution

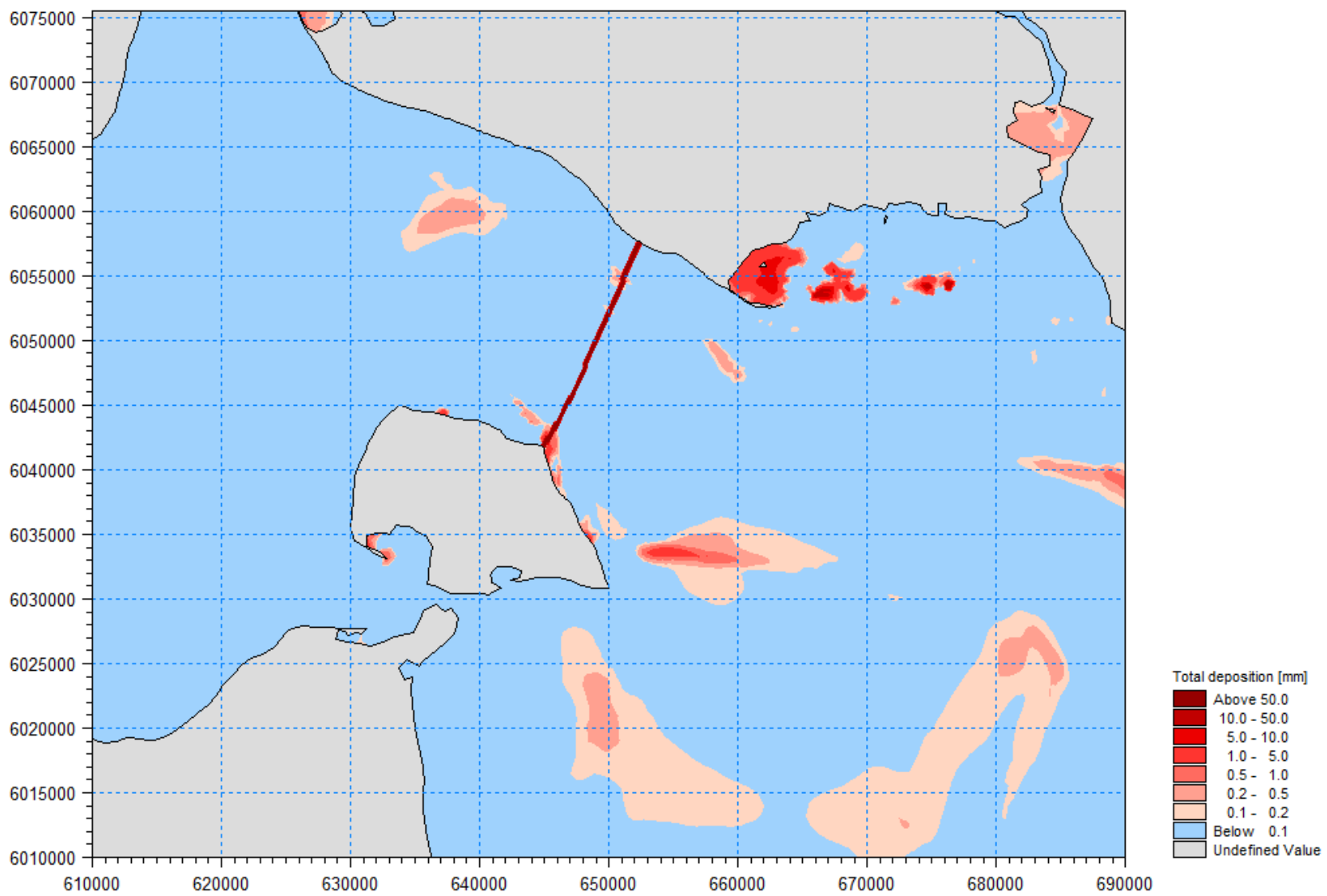


Figure L4 Deposition at the end of 2017. Tunnel solution

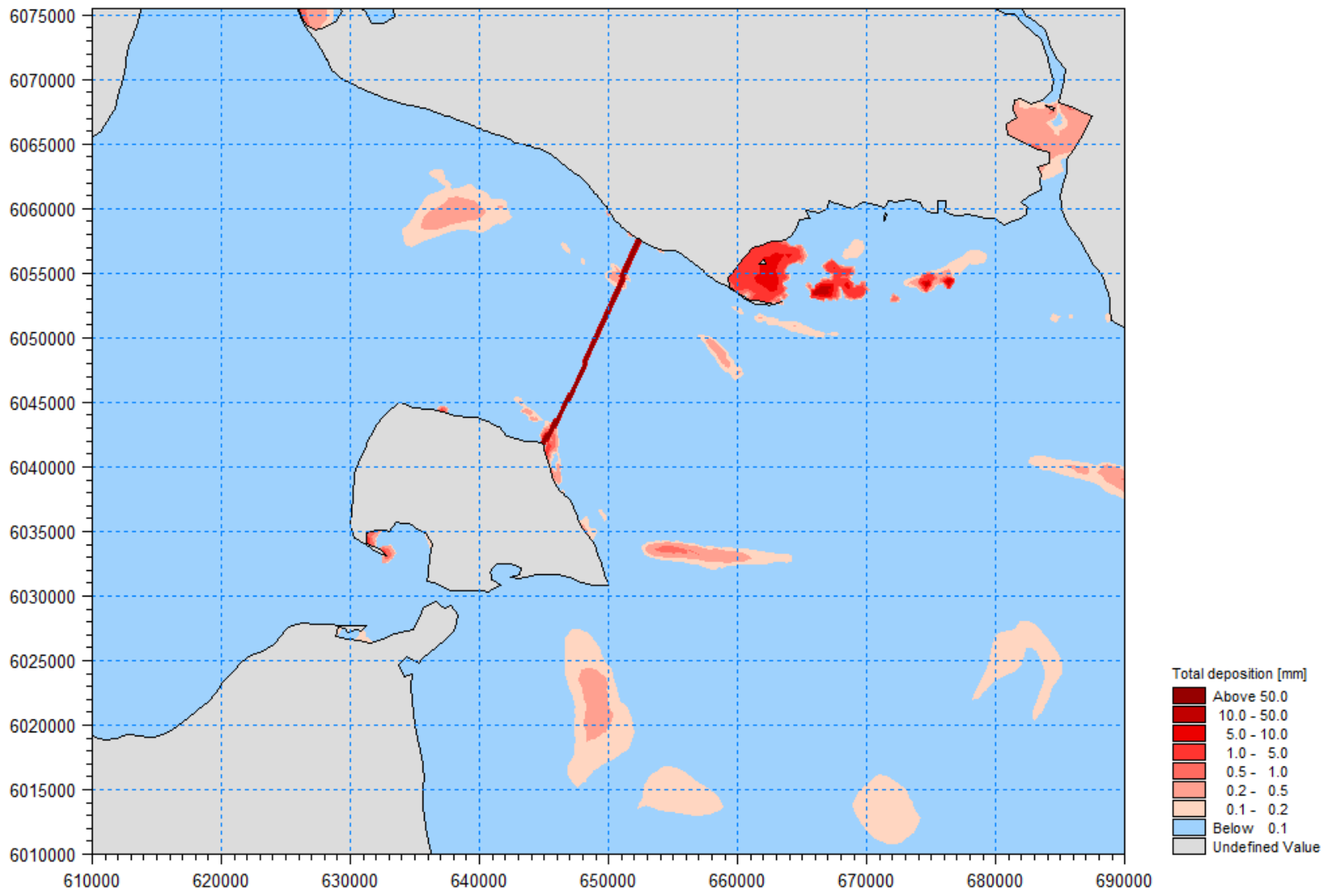


Figure L5 Deposition at the end of 2018. Tunnel solution

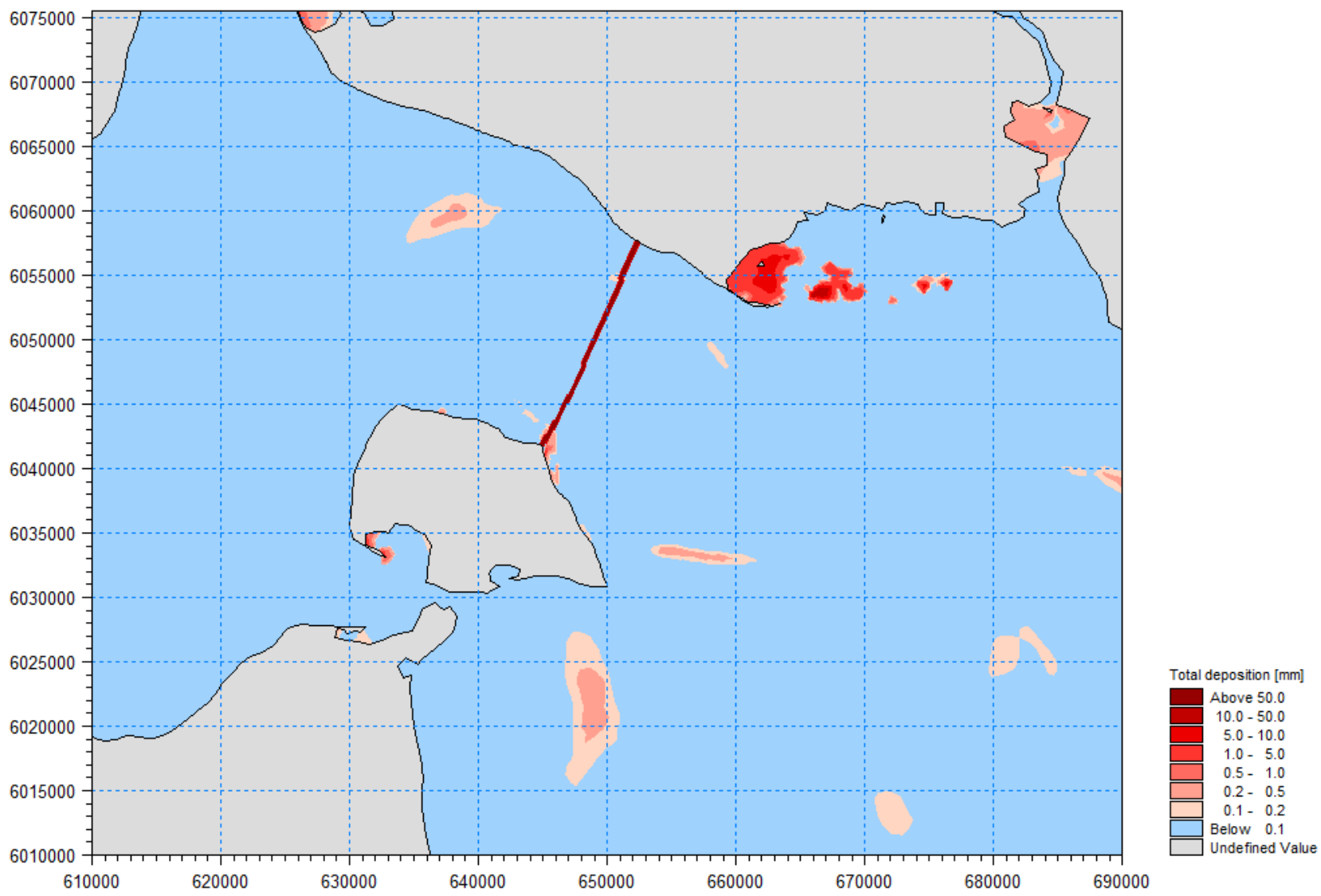


Figure L6 Deposition at the end of 2019. Tunnel solution

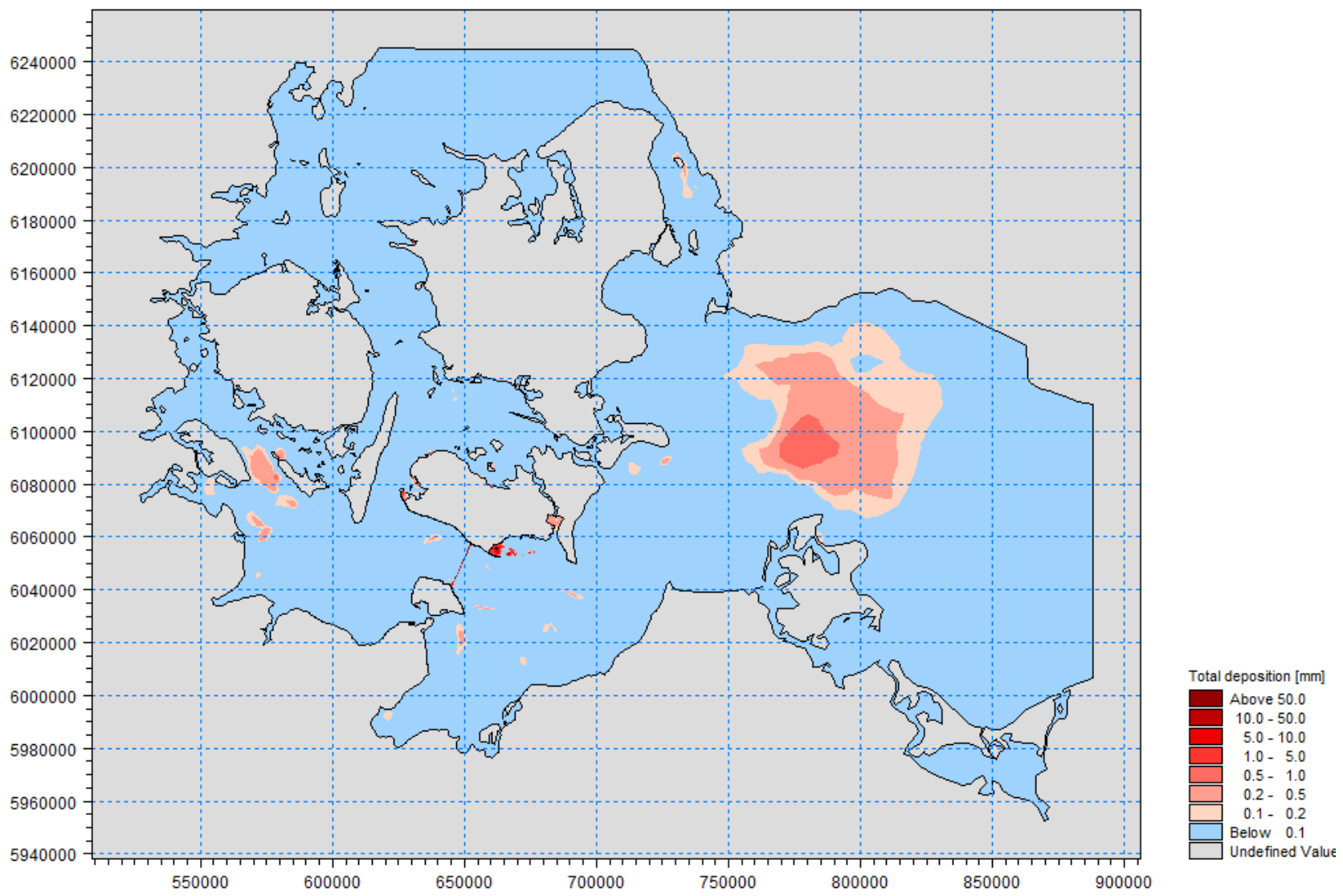


Figure L7 Deposition at the end of 2019. Tunnel solution. Entire domain

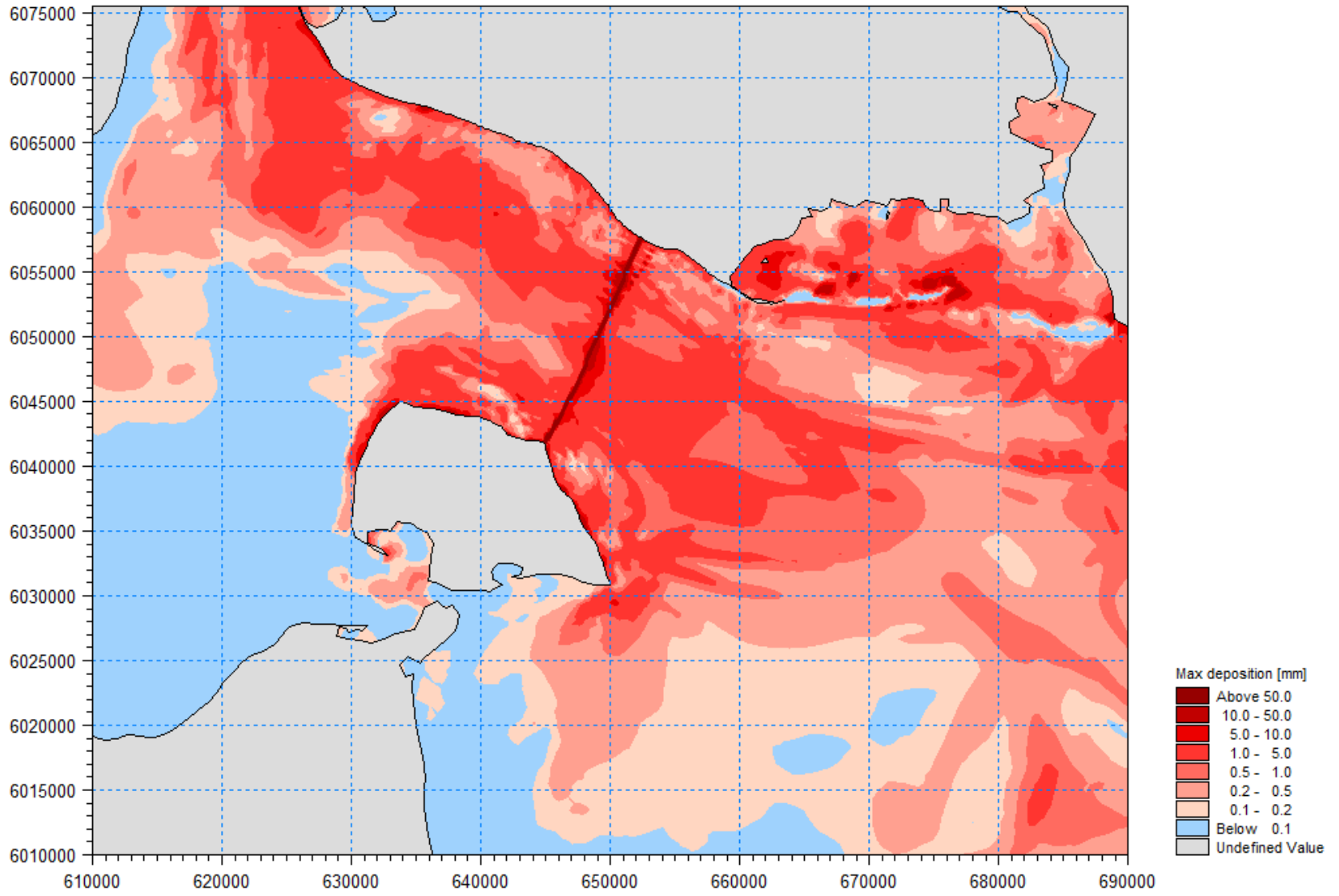


Figure L8 Maximum deposition 13.10.2014 - 01.01.2020. Tunnel solution

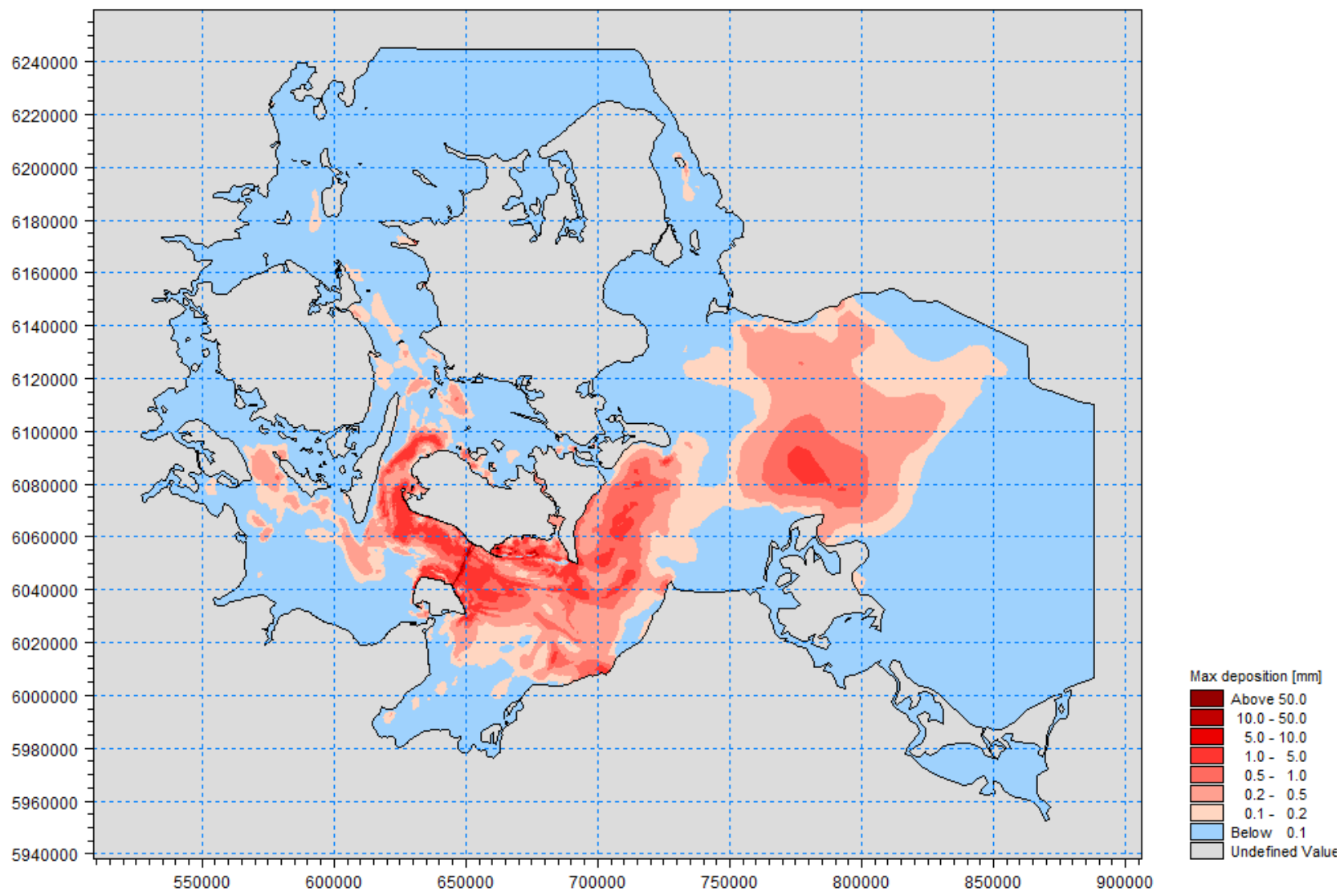


Figure L9 Maximum deposition 13.10.2014 – 01.01.2020. Tunnel solution. Entire domain



A P P E N D I X M

Deposition Patterns for Bridge Solution

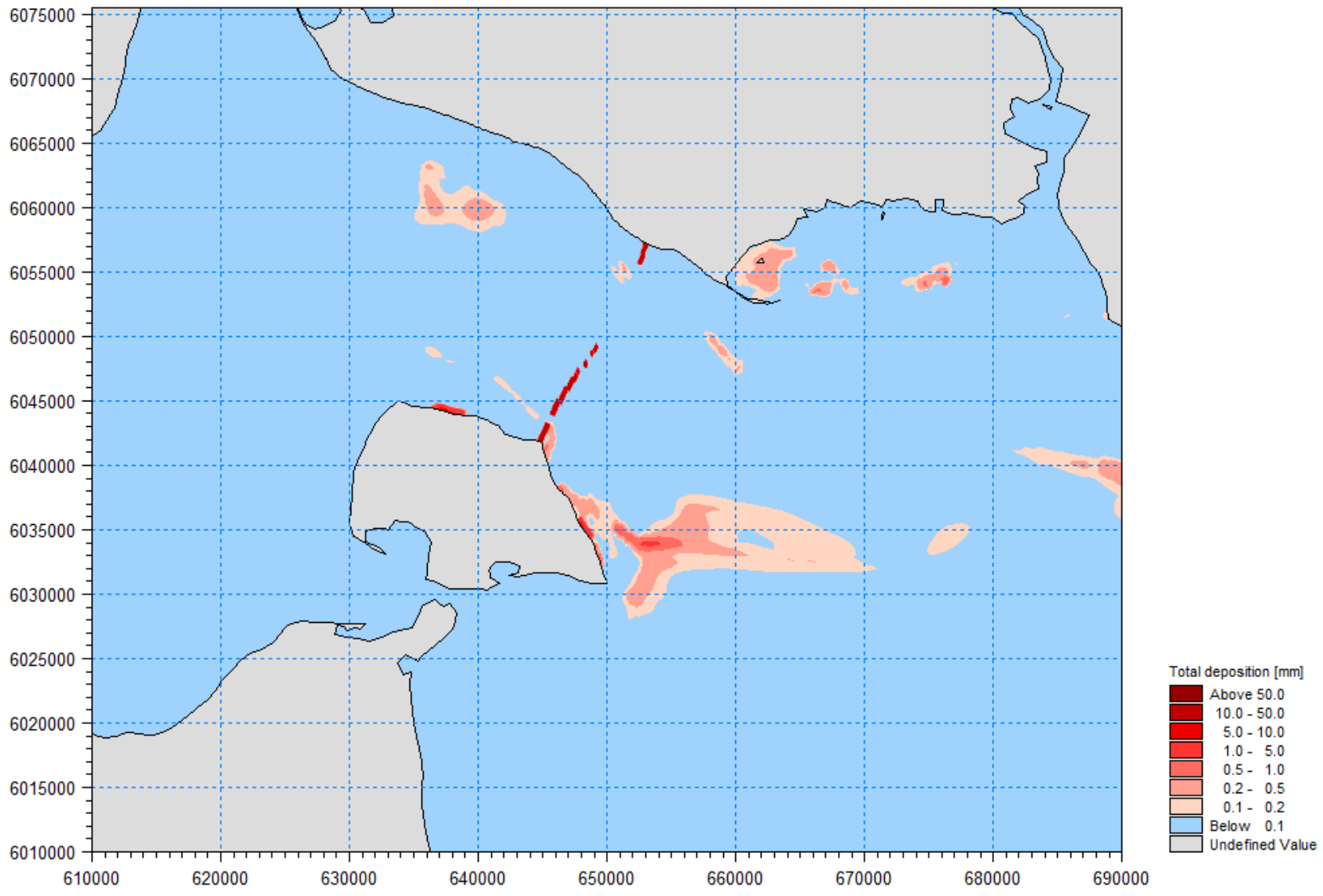


Figure M1 Deposition at the end of 2014

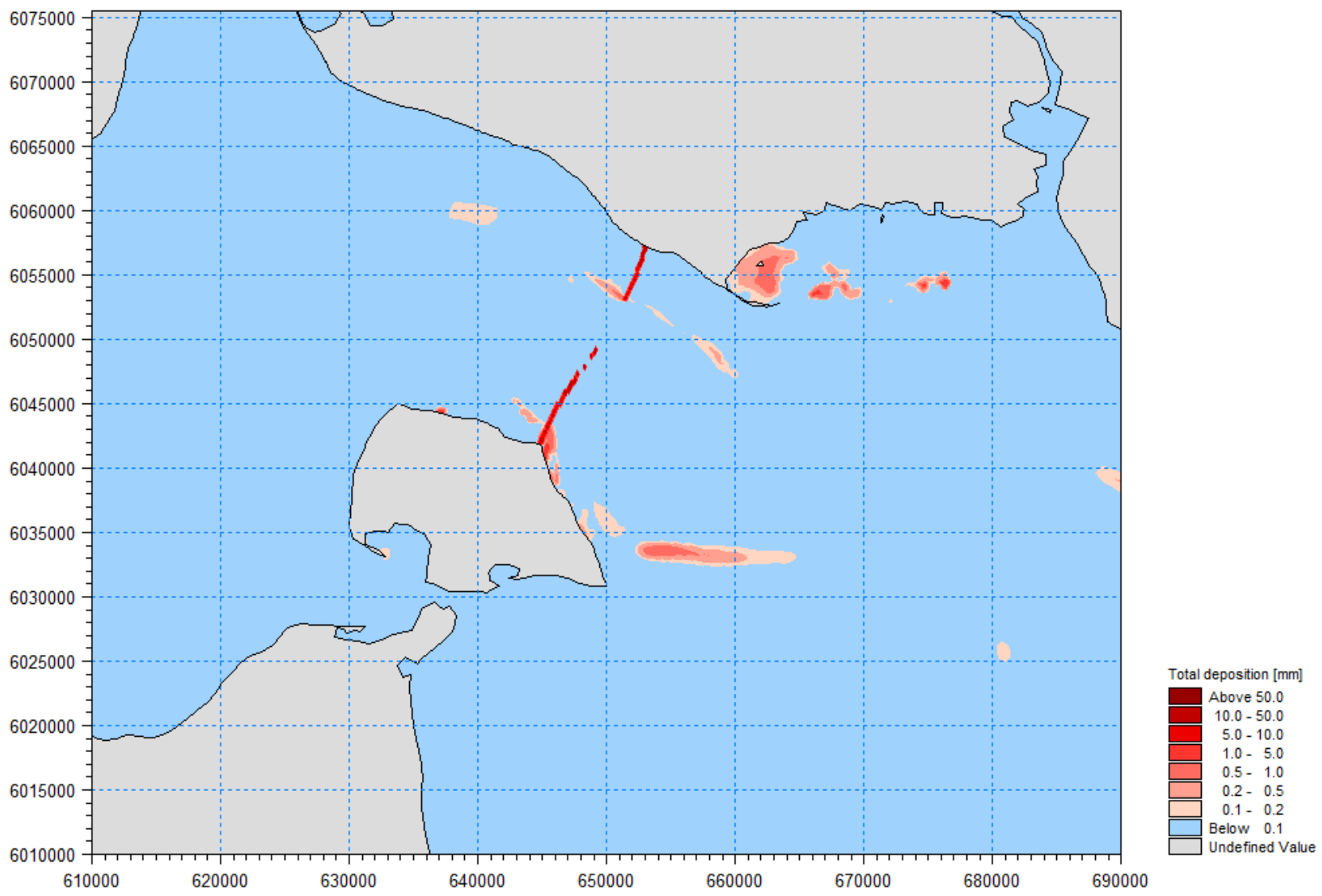


Figure M2 Deposition at the end of 2015

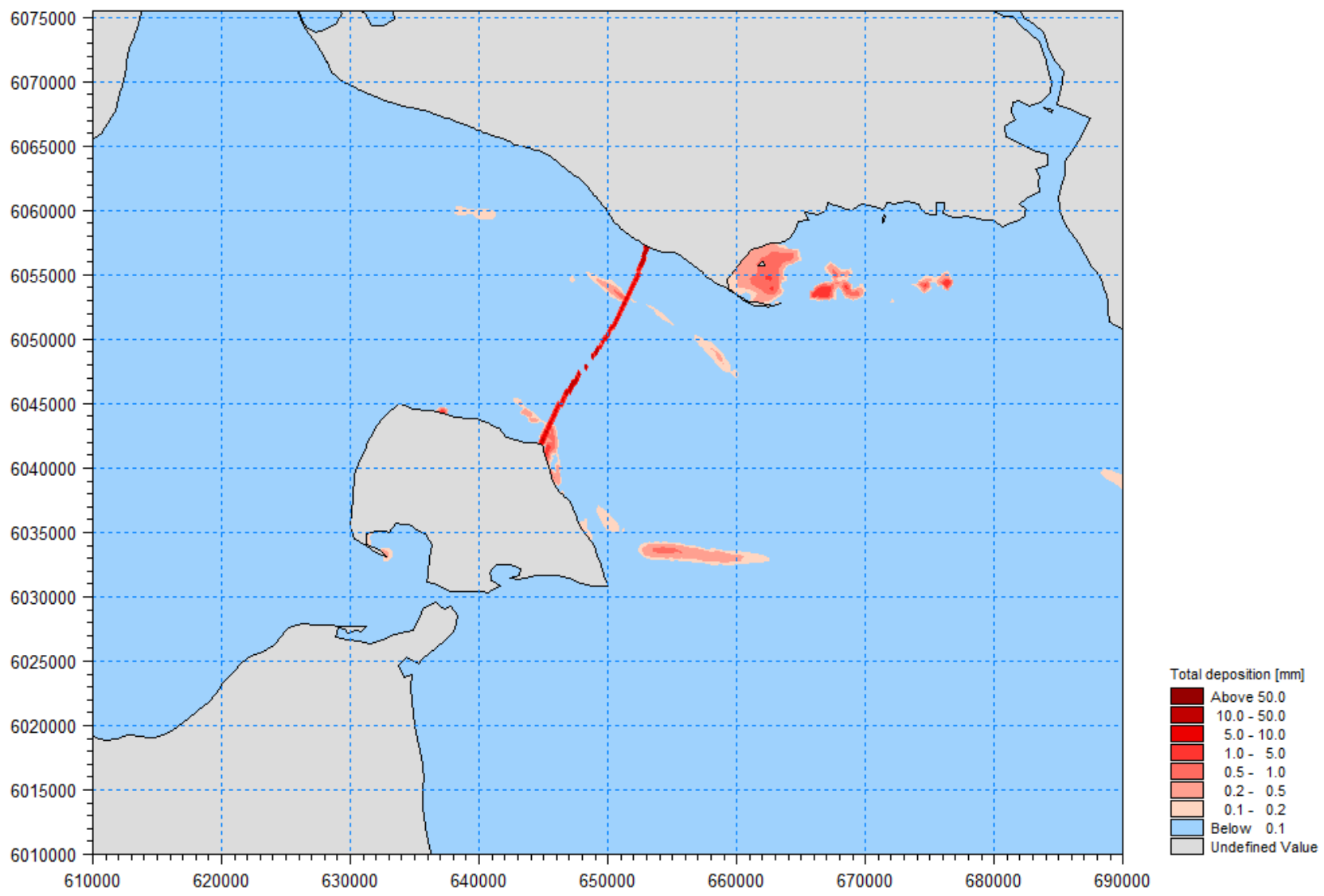


Figure M3 Deposition at the end of 2016

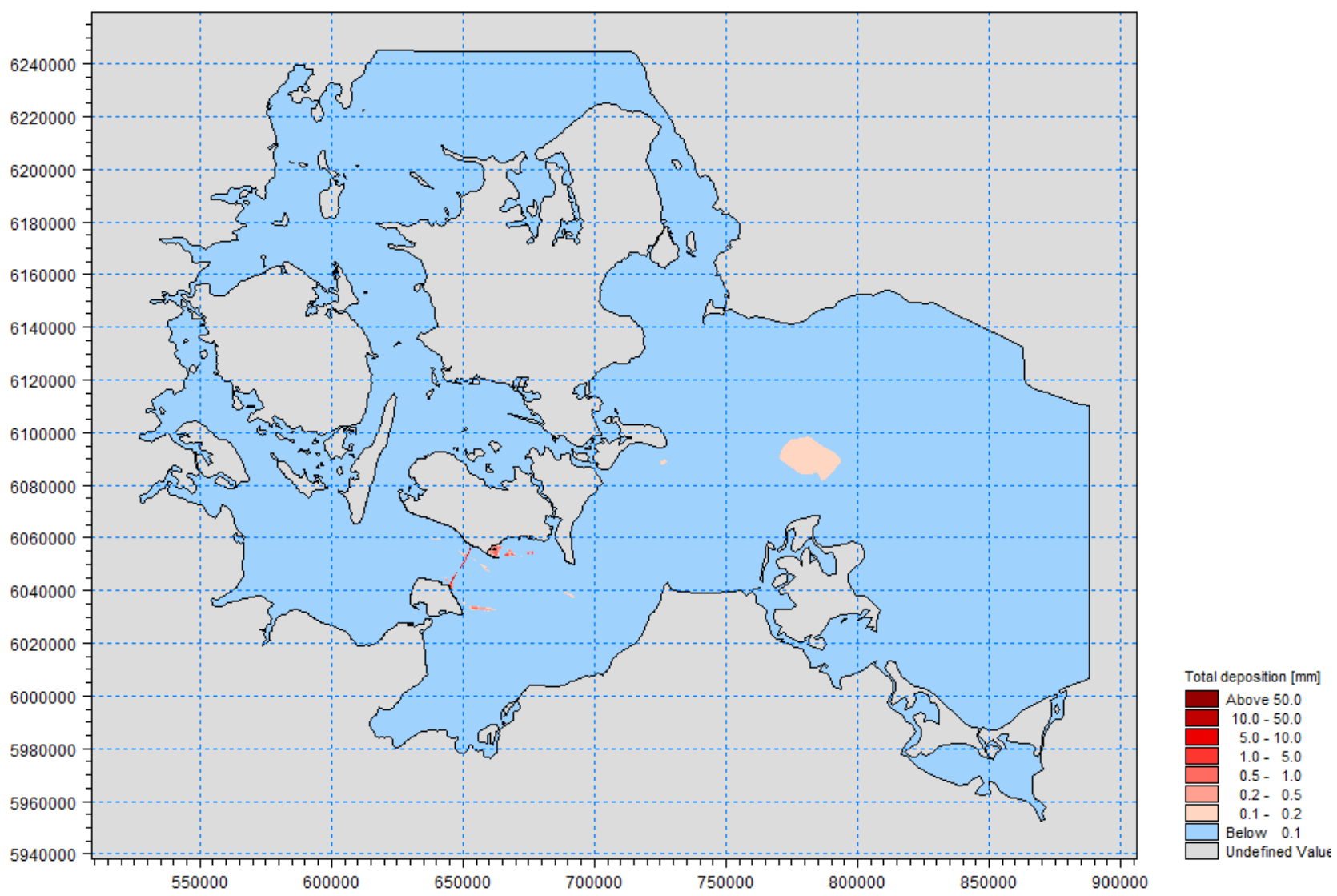


Figure M4 Deposition at the end of 2016. Entire domain.