Figures KP4-KP5 (2014-05-15) to KP6 (2015-01-08) needs considered to be Rev. 02

SOILS ASSESSMENT

Geotechnical Description

Summary of available geotechnical data, shown at 0.5m increments in metres (m) below seabed
Refer to Legend (Geotechnical) for colour coding.

KP (projected)	KP 24.582	KP 25.585	KP 22.140	KP 22.141	KP 23.774	KP 23.776	KP 24.228	KP 24.230	KP 24.800	KP 25.451	KP 25.451	KP 26.281	KP 26.284	KP 26.9	KP 27.087	KP 27.089	KP 28.272	KP 28.274	KP 29.142	KP 29.143	KP 30.776	KP 30.777	KP 31.414	KP 31.416	KP 32.614	KP 32.616	KP 33.411	KP 33.411	KP 34.358	KP 34.359	KP 35.412	KP 35.413	KP 36.406	KP 36.408	KP 37.399	KP 37.401	KP 38.269	KP 38.270	KP 39.314	KP 39.316	KP 40.175	KP 40.178	KP 41.269	KP 41.273	KP 41.981	KP 41.983	KP 42.178	KP 42.223	KP 42.228	KP 42.385	KP 42.385	KP 43.063	KP 43.064	KP 43.151	KP 44.225	KP 44.227	KP 44.845	KP 45.098
KP (projected) Latitude (°)																																																											
IPO (ACTUAL) Water Level (LAT) using IHO Method 1 or 2 (IHO-B1)	1.07	1.823	2.288	1.66	75.655	75.806	85.89	87.446		5	4.271	0.98	0.379		-0.165	0.599	-6.496	-5.007	-4.308	-2.856	-0.636	-1.691	0.501	-0.61	-0.946	-1.059	1.234	0.236	0.031	-1.024	-2.675	-1.732	-0.543	0.344	-1.325	-1.282	-2.773	2.881	2.662	-0.205	-0.84	-0.929	-1.535	0.473	-0.05	-2.238	25.52	-0.997	-0.052	-0.086	1.327	-0.376	-3.38	2.615	2.077	-1.022	-0.5	0.106	0.106	2.87
Water Depth (LAT) at Survey position (m)	11	8.5	5.0	4.9	6.9	7.0	5.4	5.3		8	8.1	14.1	14.2		13.6	13.7	11.5	11.4	13.6	13.7	6.6	6.6	7.8	7.9	11.1	11.1	11.7	11.7	12.2	12.1	13.2	13.2	11.1	11.0	7.0	7.1	6.0	6.0	5.5	5.4	5.3	5.3	10.8	10.8	13.8	13.8	16.1	14.8	14.9	13.6	13.6	11.9	11.9	13.0	13.0	17.8	17.8	15.9	15.9	16.4
Investigation Type	PT	VC	CPT	VC	VC	CPT	CPT	VC		CPT	VC	CPT	VC		VC	CPT	CPT	VC	VC	CPT	CPT	VC	VC	CPT	CPT	VC	CPT	VC	CPT	VC	CPT	VC	VC	CPT	CPT	VC	CPT	VC	CPT	VC	CPT	VC	VC	CPT	VC	CPT	VC	CPT	VC	CPT	VC	CPT	VC	CPT	VC	CPT	VC	CPT
Source	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]		[1]	[1]	[1]	[1]		[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
Ref	CPT-027	VC-027	101810-CPT-028	101810-VC-028	101810-VC-029	101810-CPT-029	101810-CPT-030	101810-VC-030		101810-CPT-031	101810-VC-031	101810-CPT-032C	101810-VC-032		101810-VC-033A	101810-CPT-033	101810-CPT-034	101810-VC-034	101810-VC-035	101810-CPT-035	101810-CPT-036	101810-VC-036	101810-VC-037	101810-CPT-037	101810-CPT-038	101810-VC-038	101810-CPT-039	101810-VC-039	101810-CPT-040	101810-VC-040	101810-CPT-041	101810-VC-041	101810-VC-042	101810-CPT-042	101810-CPT-043A	101810-VC-043	101810-CPT-044A	101810-VC-044	101810-VC-045	101810-CPT-045	101810-VC-046	101810-CPT-046A	101810-VC-047A	101810-CPT-047	101810-VC-048	101810-CPT-048	100751-VC-0452	CPT_CS_01	VC_CS_01	VC_CS_01	101810-VC-049	101810-CPT-049	101810-VC-050	101810-CPT-050	CPT_CS_02	VC_CS_02	CPT_CS_03	VC_CS_03	101810-VC-051	CPT_CS_04
Target Drill Grid	0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.5	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.5	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5

Depth Grid (m)

KP range	0.0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0-4.5	4.5-5.0	5.0-7.5	7.5-10
KP 24.582–KP 25.585	dense SAND	Grey and brownish grey mottled sandy SILT	Grey to M SAND w. occ F gravel size dark grey sandy silt pockets	Brownish grey locally grey/olive SAND w. occ F gravel size dark grey silty sand pockets	Brownish grey locally grey/olive SAND w. occ F gravel size dark grey silty sand pockets	Brownish grey locally grey/olive SAND w. occ F gravel size dark grey silty sand pockets	Brownish grey locally grey/olive SAND w. occ F gravel size dark grey silty sand pockets	Brownish grey locally grey/olive SAND w. occ F gravel size dark grey silty sand pockets				
KP 25.451–KP 26.284	Grey/olive SAND	Grey/olive SAND	Grey locally brownish grey F to M SAND	Firm dark brown silty Clay/F sa. (Kreuzb Brown/ SAND	Dark brown cl. silty F SAND	Dark brown cl. silty F SAND	Dark brown cl. silty F SAND					
KP 26.9–KP 27.089	Brown locally grey/olive SAND w. occ F gravel size dark grey silty sand pockets	Grey and brownish grey very clayey F to M SAND locally very sandy clay	Grey locally brownish grey F to M SAND	Soft brown silty Clay/F sa. (Kreuzb brown/ to M SAND	Brown cl. silty F SAND	Brown cl. silty F SAND	Brown cl. silty F SAND					
KP 27.089–KP 28.274	Brown locally grey/olive SAND w. sh lam.	Brown locally grey/olive SAND w. sh lam.	Soft to firm grey sandy locally very sandy CLAY w. occ F gravel size dark grey silty sand pockets / fragments of decaying veg. matter	Soft to firm grey CLAY w. frequent F gravel size dark grey silty sand pockets / fragments of decaying veg. matter	Soft to firm grey CLAY w. frequent F gravel size dark grey silty sand pockets / fragments of decaying veg. matter	Soft to firm grey CLAY w. frequent F gravel size dark grey silty sand pockets / fragments of decaying veg. matter	Soft to firm grey CLAY w. frequent F gravel size dark grey silty sand pockets / fragments of decaying veg. matter					
KP 28.274–KP 29.143	Brown locally grey/olive SAND w. sh lam.	Brown locally grey/olive SAND w. sh lam.	Soft to firm grey CLAY w. frequent F gravel size dark grey silty sand pockets / fragments of decaying veg. matter	Soft to firm grey CLAY w. frequent F gravel size dark grey silty sand pockets / fragments of decaying veg. matter	Soft to firm grey CLAY w. frequent F gravel size dark grey silty sand pockets / fragments of decaying veg. matter	Soft to firm grey CLAY w. frequent F gravel size dark grey silty sand pockets / fragments of decaying veg. matter	Soft to firm grey CLAY w. frequent F gravel size dark grey silty sand pockets / fragments of decaying veg. matter					
KP 29.143–KP 30.776	Brown locally grey/olive SAND w. sh lam.	Brown locally grey/olive SAND w. sh lam.	Brown locally grey/olive SAND w. occ F gravel size dark grey silty sand pockets	Brown locally grey/olive SAND w. occ F gravel size dark grey silty sand pockets	Brown locally grey/olive SAND w. occ F gravel size dark grey silty sand pockets	Brown locally grey/olive SAND w. occ F gravel size dark grey silty sand pockets	Brown locally grey/olive SAND w. occ F gravel size dark grey silty sand pockets					
KP 30.777–KP 31.414	Very loose to loose SAND	Very loose to loose SAND	M dense SAND	Very loose to loose SAND	M dense to very dense SAND	M dense to very dense SAND	M dense to very dense SAND					
KP 31.416–KP 32.616	Very loose to loose cl. silty SAND	Very loose to loose SAND	Grey locally brownish grey F to M SAND	Grey locally brownish grey F to M SAND	Grey locally brownish grey F to M SAND	Grey locally brownish grey F to M SAND	Grey locally brownish grey F to M SAND					
KP 32.616–KP 33.411	Very loose to loose SAND	Very loose to loose SAND	Grey to M SAND	Grey to M SAND	Grey to M SAND	Grey to M SAND	Grey to M SAND					
KP 33.411–KP 34.359	Very loose to loose SAND	Very loose to loose SAND	M dense to dense SAND	M dense to dense SAND	M dense to dense SAND	M dense to dense SAND	M dense to dense SAND					
KP 34.358–KP 35.412	Very loose to loose SAND	Very loose to loose SAND	M dense SAND	M dense to dense SAND	Brownish grey F to M SAND	Brownish grey F to M SAND	Brownish grey F to M SAND					
KP 35.413–KP 36.408	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND					
KP 36.406–KP 37.399	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND					
KP 37.401–KP 38.270	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND					
KP 38.269–KP 39.314	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND					
KP 39.316–KP 40.178	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND					
KP 40.175–KP 41.269	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND					
KP 40.178–KP 41.273	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND					
KP 41.269–KP 41.981	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND					
KP 41.273–KP 41.983	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND	Very loose to loose SAND					
KP 41.981–KP 42.178	M dense SAND	M dense SAND	M dense SAND	M dense SAND	M dense SAND	M dense SAND	M dense SAND					
KP 41.983–KP 42.223	M dense uniform grey cl. silty F SAND pockets of clay	M dense uniform grey cl. silty F SAND pockets of clay	Dense silty F to M SAND	F SAND, sandy (M), grey, M dense to dense	F SAND, sandy (M), grey, M dense to dense	F SAND, sandy (M), grey, M dense to dense	F SAND, sandy (M), grey, M dense to dense					
KP 42.178–KP 42.228	M grey cl. dense SAND	F SAND, sandy (F), moderately sandy (F) brown, dense	F SAND, sandy (M), grey, M dense	Brownish grey F to M SAND	Brownish grey F to M SAND	Brownish grey F to M SAND	Brownish grey F to M SAND					
KP 42.223–KP 42.385	F SAND, sandy (M), grey, M dense	F SAND, sandy (M), grey, M dense	F SAND, sandy (M), grey, M dense	Brownish grey F to M SAND	Brownish grey F to M SAND	Brownish grey F to M SAND	Brownish grey F to M SAND					
KP 42.228–KP 42.385	Very loose sand	M dense SAND	M dense SAND	M dense SAND	M dense SAND	M dense SAND	M dense SAND					
KP 42.385–KP 43.063	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND					
KP 43.063–KP 43.151	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND					
KP 43.151–KP 44.225	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND					
KP 44.225–KP 44.227	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND					
KP 44.227–KP 44.845	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND					
KP 44.845–KP 45.098	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND	Very loose SAND					

Hubertgat/Horsborngat KP 24.8-25.4:
Base case TDoB = 2.5m.
Option Ba TDoB = 6.0m
Option Bb: burial below NAP -15.0m.
(NAP -19.0m at Hubertgat/Horsborngat = LAT -17.3 m)

Dutch and German Waddenzee KP 14.9-26.9:
Base case TDoB = 2.0m.
Option Ba TDoB = 6.0m

This optional TDoBline (option Bb) is actually located around 12-18 m below seabed, depending on local water depth

Westereems KP 35.1-35.6 :
Base case TDoB = 2.5m
Option Bb: burial below NAP -15.0m.
(NAP -19.0m at Westereems = LAT- 17.4 m)

Dutch and German Waddenzee KP 14.9-26.9:
Base case TDoB = 2.0m.
Option Ba TDoB = 6.0m

Clay: Su-DPd (kPa)												140	65					120	142	60																																								100
Clay: Su-DPd (kPa)												70						32	20	33																																								23
Clay: Test for shear strength (S)												CR	TV					CR	CR	TV																																								CR
Sand: ENE-Sand (I)					170										320								290								250						240								490				590						330		480			
Thermal Resistivity: Meas. Depth (m) (3)	0.9		1.4		1.4			1.4			1.4		1.4					1.4	1.4			1.4		1.4			1.4			1.4		1.4		1.4		1.4		1.4		1.4		1.4		0.9		1.8		1.5	1.4		1.4				1.5		1.5		1.4	
Thermal Resistivity: Res. (K.m/W)	0.5		0.37		0.37			0.4			0.37		0.55		0.32			0.36	0.31			0.42	0.31			0.36		0.38		0.36		0.36	0.42		0.39		0.42	0.36		0.44		0.41		0.37		0.4		0.44	0.57		0.34				0.76		0.47		0.35	

Geophysical Description

Shallow geology (summary)	KP range	20.0-22.141																																																											
		With occasional pockets of soft clay or gravel contents																																																												
															AREA TOO shallow for survey																																															
Seabed Features (height in metre)	KP range	20.0-22.141																																																												
															Ripples / NF From: [1] (7 Area not surveyed)																																															
Seabed Features (height in metre)	KP range	20.0-22.141																																																												
															Ripples / NF From: [1] (7 Area not surveyed)																																																
Angle of sea bed feature w.r.t. Route (degrees)	KP range	20.0-22.141																																																												
															Undefined																																																
Slope Class	KP range	20.0-22.141																																																												
		Virtually flat													AREA TOO shallow for survey																																																
Boulder field / wreck	KP range																																																													
# of objects within 500m from KP1																																																														
Average distance nearest neighbour																																																														
Objects per km2																																																														
Comments																																																														
Survey Coverage	KP range																																																													
		wide [1]			CORA EAST: Survey corridor 1000 m wide. Full corridor width was not achieved between KP 8.6 – 26.9. [1]										TOO SHALLOW FOR SURVEY Not possible to survey along the supplied KP1 centre line between KP 20.900 to KP 25.225 [1]																																																
Survey Coverage	KP range																																																													
		wide [1]			CORA EAST: Survey corridor 1000 m wide. Full corridor width was not achieved between KP 8.6 – 26.9. [1]										TOO SHALLOW FOR SURVEY Not possible to survey along the supplied KP1 centre line between KP 20.900 to KP 25.225 [1]																																																

Other Events

Crossings (IS now or IS before Cobra) and special areas (R).	KP range																																																												
				KP 21.777: German Dutch Economic Zone		KP 22.404: CX Telecom (ID: Dankjeldetelekom)		KP 23.378: DNZ Restricted zone					KP 24.518: Future Hubertgat Channel in	KP 25.142: Future Horsborngat Channel Out			KP 25.27: DNZ Restricted Zone - out									KP 30.511: Treaty area - out			KP 31.199: Treaty area - in																															
Challenging Areas	KP range																																																													
Reduced Lay Tolerance	KP range																																																													

SOIL RISKS

Soils Risks	KP range	20.0-22.141																																																											
		11																																																												

SOILS ASSESSMENT

Geotechnical Description — Summary of available geotechnical data, shown at 0.5m increments in metres (m) below seabed. Refer to Legend (Geotechnical) for colour coding.

KP (projected)	KP45.104	KP45.373	KP45.373	KP46.471	KP46.471	KP47.223	KP47.229	KP47.236	KP47.237	KP48.468	KP48.528	KP48.531	KP48.596	KP49.224	KP49.227	KP50.493	KP50.498	KP51.356	KP52.129	KP52.642	KP52.735	KP53.141	KP53.640	KP54.132	KP54.632	KP55.132	KP55.632	KP56.132	KP56.632	KP57.132	KP57.632	KP58.132	KP58.632	KP59.132	KP59.632	KP60.132	KP60.632	KP61.132	KP61.632	KP62.644	KP63.140	KP63.639	KP64.139	KP64.638	KP65.138	KP65.643	KP66.143	KP66.642	KP67.133	KP67.904	KP68.731	KP68.736	KP69.097	KP70.030	KP70.034	KP71.153	KP71.156	KP71.530	KP71.535	KP72
KP (projected) - Variance (+/-)																																																															
Average Shear Wave Velocity (m/s) - Vs (m/s)	2.243	-0.426	-0.426	-1.749	-1.749	1.055	-0.416	0.051	0.011	20.387	0.945	0.513	0.933	0.293	0.368	4	2.357	85.719	230.72	227.735	201.772	175.801	152.435	152.71	152.996	153.271	153.556	153.831	154.116	154.39	154.674	154.945	155.223	155.484	155.755	156.016	156.313	156.624	57.627	32.91	9.257	-14.386	-38.038	-61.681	-87.81	-26.433	-5.864	84.55	9.774	9.43	12.241	11.142	487.439	4.283	4.573	1.813	0.491	-0.162	-0.974	171.
Water Depth (LAT) at Control point (m)	16.5	17.7	17.7	18.2	18.2	19.1	19.1	18.8	18.8	#N/A	18.2	18.1	18.1	19.3	19.3	21.7	21.6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	23.4	23.4	23.9	24.0	#N/A	24.7	24.8	25.7	25.7	25.7	25.7	#N
Investigation Type	VC	CPT	VC	CPT	VC	CPT	VC	CPT	VC	VC	VC	CPT	CPT	CPT	CPT	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	VC	V
Source	[2]	[1]	[1]	[1]	[2]	[1]	[2]	[1]	[2]	[1]	[1]	[1]	[1]	[2]	[2]	[2]	[2]	[8]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[2]	VC	VC	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[
Ref	VC_CD_04	101810-CPT-052	101810-VC-052	101810-CPT-053	101810-VC-053	CPT_CD_10	VC_CD_10	101810-CPT-090	101810-VC-090	VC0-82	VC_CD_09	CPT_CD_09	CPT_CD_09A	CPT_CD_09A	CPT_CD_11	VC_CD_11	CPT_CD_12	VC_CD_12	MP CPT 52	VC0-54	VC0-53	VC0-52	VC0-51	VC0-50	VC0-49	VC0-48	VC0-47	VC0-46	VC0-45	VC0-44	VC0-43	VC0-42	VC0-41	VC0-40	VC0-39	VC0-38	VC0-37	VC0-36	VC0-35	VC0-33	VC0-32	VC0-31	VC0-30	VC0-29	VC0-28	VC0-27	VC0-26	VC0-25	VC0-24	CPT_CD_58	VC_CD_59	VC_CD_60A	CPT_CD_60A	VC0-20	CPT_CD_61	VC_CD_61	CPT_CD_62	VC_CD_62	CPT_CD_63	VC_CD_63	VC0
Target Drill Grid	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.

Summary of available geotechnical data, shown at 0.5m increments in metres (m) below seabed (KP 45.104 – KP 71.535):

Depth	Summary
0.0-0.5	M SAND, sandy (F), moderately shelly, brown, grey, M dense
0.5-1.0	M SAND, sandy (F), grey, M dense
1.0-1.5	M SAND, sandy (F), grey, M dense
1.5-2.0	SILT, sandy (F), moderately shelly, grey, firm
2.0-2.5	M SAND, sandy (F), grey, M dense
2.5-3.0	M SAND, sandy (F), grey, M dense
3.0-3.5	F to M SAND, sandy (M), very dark depth, dense
3.5-4.0	F SAND, sandy (M), grey and depth, dense
4.0-4.5	Ends 3.62m
4.5-5.0	F SAND, sandy (M), grey and depth, dense
5.0-7.5	F SAND, sandy (M), grey and depth, dense
7.5-10	Ends 4.80m

Clay
- Max. Su (kPa) (4)
- Min. Su (kPa) (5)
- Test for shear strength (6)

Sand
- Grid (µm) (2): 320 | 630 | 510 | 340 | 360 | 330 | 600 | 390 | 100 | 150 | 390 | 430 | 420 | 380 | 390 | 2500 | 350 | 410 | 420 | 330 | 380 | 380 | 200 | 330 | 390 | 510 | 970 | 650 | 400 | 380 | 3

Thermal Resistivity
- Meas. Depth (m) (3): 1.5 | 1.4 | 1.4 | 1.5 | 1.4 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.
- Res. (K.m/W): 0.96 | 0.43 | 0.3 | 0.55 | 0.32 | 0.33 | 0.42 | 0.42 | 0.51 | 0.65 | 0.45 | 0.42 | 0.39 | 0.54

Geophysical Description

	KP range	Description
Shallow geology (summary)	45.104-71.535	SAND and GRAVEL in top layer (0-2m). Below SAND; Channel infill with SAND at surface (0-4m); Channel infill with SAND (below 2 metres); Channel infill with SAND (below 2 metres); Channel infill with SAND (below 2 metres); SAND and GRAVEL in top layer (0-2m). Below SAND; SAND and GRAVEL in top layer (0-2m). Below Channel infill with SAND; SAND and GRAVEL in top layer (0-2m). Below Channel infill with UNKNOWN; SAND and GRAVEL in top layer (0-2m). Below SAND; SAND and GRAVEL in top layer (0-2m). Below SAND; Layered CLAY with SAND in top layer. Below SAND; SAND in top layer (0-2m), below layered CLAY with SAND; SAND in top layer (0-2m), below SAND or channel infills with SAND
Seabed Features (height in metre)	45.104-71.535	Various small depressions (0.1 - 0.3 m in depth). [2]; Sandwave feature (Relict waves) (up to 0.5m) [2]; NF; Ripples (up to 0.3m) [2]; Megaripples (up to 0.6m) and Flow marks [2]; Ripples and Sand ridges up to 0.6 m.; Flowmarks; NF; Flowmarks; Ripples (H=0.2-1.0m) [3]
Angle of sea bed feature w.r.t. Route (degrees)	45.104-71.535	90; 0; 30
Slope Class	45.104-71.535	Gentle
Boulder field / wreck	45.104-71.535	Boulder field (KP 45 - 46.5); WRECK at offset 125m; Boulder field (KP 47.4 - 48.3); Boulder field (KP 49.8-51.1)
# of objects within 500m from BOL		37; 1; 62; 238
Average distance nearest neighbour		72; 50; 24
Objects per km2		51; 126; 377
Comments		
Survey Coverage		

Other Events

	KP range	Description
Crossings (IS now or IS before Cobra) and special areas (9).		KP 47.236: AC, Intersection 2 routes; KP 49.8: CX T47 (AS-I); KP 51.986: TSS, Tranquillo Fg, German Bight - IN; KP 57.543: Inter T&E; KP 58.262: Boundary Helgoland Fg, Helgoland - NTS; KP 58.589: CZ ext. Boundary; KP 61.25: Exit T&E; KP 65.824: TSS, Tranquillo Fg, German Bight - OUT; KP 70.271: CX Sea Mic West B
Challenging Areas	45.104-71.535	Boulder field; Boulder field; Boulder field
Reduced Lay Tolerance	45.104-71.535	Reduced lay tolerance @ boulder field; Reduced lay tolerance @ boulder field; Reduced lay tolerance @ boulder field
Required Cut (m) — Target Cut (m)		1.5 throughout
Comment		

SOIL RISKS

KP range	Soils Risks	Comment
45 - 46.471	5, 6 , 9, 11	Boulder field, Stiff clay. Coarse sediments. Highly mobile area according to [9]
46.471 - 46.5	6, 9, 11	
46.5 - 47.236	1, 6, 11	Highly mobile area according to [9]
47.236 - 48.15	11	Highly mobile area according to [9]
48.15-49.224	9, 11	Megaripples, Boulder field Highly mobile area according to [9]; Megaripples with GRAVEL found in top layer (Boulder field). Highly mobile area according to [9]
49.224 - 51.1	1, 6 , 9, 11	Boulder field, very coarse material found. Highly mobile area according to [9]
51.1 - 52.129	-	
52.129-65.9	6	
65.9-66.8	3/4/5 ? 6	Layered SAND and CLAY in top layer. Strength unknown.
66.8-67.9	6	
67.9 - 68.731	1, 6	
67.900 - 70.030	6	
70.030 - 71.153	1, 6	

TOOLS SELECTION

Tool
- Pre-trenching (10)
- Pre-sweeping
- Pre-dredging
- Boulder avoidance / Route engineering: Boulder avoidance / Route engineering; Boulder avoidance / Route engineering; Boulder avoidance / Route engineering
- Primary burial tool: Jet trencher; Jet trencher; Jet trencher
- Secondary burial tool: Cutter trencher or plough
- MFE / CFE
- Other Protection

TOOL CAPABILITY ASSESSMENT

Burial Estimation — Probability of achieving target DOB (Refer to SoR for guidance) (Refer to SoR for guidance)

Depth	KP range	Tool 1	Tool 2	Tool 3
0.0-0.5	45 - 46.471	5	1	2
0.5-1.0		5	1	2
1.0-1.5		5	1	2
1.5-2.0				
2.0-6.0				

Burial Estimation — Depth of trenching confidence of achieving target DOB

Depth	KP range	Tool 1	Tool 2	Tool 3
0.0-0.5	45 - 46.471	8	8	8
0.5-1.0		8	8	8
1.0-1.5		9	8	8
1.5-2.0				
2.0-6.0				

Tool Performance

		Tool 1	Tool 2	Tool 3
Expected Depth of Lowering (m)		DEPENDING ON SELECTED TOOL(S)	DEPENDING ON SELECTED TOOL(S)	DEPENDING ON SELECTED TOOL(S)
Anticipated Trenching Speed (m / operational hr)	1st Pass	DEPENDING ON SELECTED TOOL(S)	DEPENDING ON SELECTED TOOL(S)	DEPENDING ON SELECTED TOOL(S)
	2nd Pass	DEPENDING ON SELECTED TOOL(S)	DEPENDING ON SELECTED TOOL(S)	DEPENDING ON SELECTED TOOL(S)
	Other	DEPENDING ON SELECTED TOOL(S)	DEPENDING ON SELECTED TOOL(S)	DEPENDING ON SELECTED TOOL(S)
Comment / Residual Risks				

Against RPF Revision 2010-09-01 (DTS_IN_04_2_2015-01-09), which is considered to be Rev A(1).

		KP (projected)	8,683	KP289.536	KP289.536	KP289.530	KP290.531	KP291.515	KP291.516	KP292.520	KP292.522	KP293.472	KP293.472	KP294.084	KP294.085	KP294.436	KP294.436	KP295.467	KP295.468	KP296.241	KP296.242	KP297.344	KP297.844	KP303.769	KP304.496	KP304.928	KP305.364	KP306.313	KP306.943	KP307.106	KP307.998	KP308.986	KP310.064
		KP (projected) (all KPs in 1)																															
		DCC (km) (all KPs in 1) (Distance Along Centre Line Offshore) (+ KP 289.536 = 0 (0+0.0))	133	-3.062	-1.677	-4.144	-4.43	-9.886	-7.952	-2.437	-3.558	-2.687	-4.072	-2.158	-2.994	-1.907	-3.292	-4.054	-6.56	8.443	8.977	NO DATA	ISLE OF FANØ		1	0.205	-0.643	-0.858	0.06	7.716	0.495	1.506	
		Water Depth (LAT) (all values given as +ve)	13	11.7	11.7	10.6	10.6	9.3	9.4	7.5	7.4	6.2	6.2	5.7	5.7	5.5	5.5	4.4	4.4	3.4	3.5	NO DATA			0.5	0.0	2.5	0.8	3.8	2.9	1.1	0.1	JUTLAND
		Investigation Type	VT	VC	CPT	CPT	VC	VC	CPT	VC	CPT	VC	CPT	VC	CPT	VC	CPT	VC	CPT	CPT	VC				VC	VC	VC	VC	VC	VC	VC	VC	
		Source	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]				[6]	[6]	[6]	[6]	[6]	[6]	[6]	[6]	
		Ref	KP7-288	101810-VC-289A	101810-CPT-289	101810-CPT-290	101810-VC-290A	101810-VC-291	101810-CPT-291	101810-VC-292	101810-CPT-292	101810-VC-293	101810-CPT-293	101810-VC-294	101810-CPT-294	101810-VC-295	101810-CPT-295	101810-VC-296A	101810-CPT-296	101810-CPT-297	101810-VC-297	NO DATA			B1	B2	B3	B4	B5	B6	B7	B8	
		Target Soil unit	0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	

Geotechnical Description — Summary of available geotechnical data, shown at 0.5m increments in metres (m) below seabed. Refer to Legend (Geotechnical) for colour coding.

		KP 289.536	KP289.536	KP289.530	KP290.530	KP290.531	KP291.515	KP291.516	KP292.520	KP292.522	KP293.472	KP293.472	KP294.084	KP294.085	KP294.436	KP294.436	KP295.467	KP295.468	KP296.241	KP296.242	KP297.344	KP297.844	KP303.769	KP304.496	KP304.928	KP305.364	KP306.313	KP306.943	KP307.106	KP307.998	KP308.986	KP310.064
0.0-0.5		soft SAND	Very locally dark brownish grey Gravelly SAND; Gravel is 100% angular to subrounded F to M shell fragments	Very loose SAND	Very loose locally loose SAND	Dark grey to greyish V to M gravelly SAND; Gravel is 100% angular to subrounded F to M shell fragments	Dark brown to grey V to M gravelly F to M SAND; Gravel is 100% subangular to subrounded F to M shell fragments	Very loose to loose SAND	Dark grey gravelly F to M SAND; Gravel is 50% subangular to rounded F to C shell fragments	Very loose to loose SAND	Dark grey to V dark grey V to M gravelly SAND; Gravel is 100% subangular to rounded F to C shell fragments	Very loose to loose SAND	Brownish grey locally V to M gravelly F to M SAND; Gravel is 100% subangular to rounded F to M shell fragments	Loose to M dense SAND	Grey locally brownish grey V gravelly F SAND; Gravel is 100% angular to subrounded F to M shell fragments	Very loose to dense SAND	Brownish grey locally V to M gravelly F SAND; Gravel is 100% angular to subrounded F to M shell fragments	Very loose to M dense SAND	Very loose to dense SAND	Brownish grey locally V to M gravelly F SAND; Gravel is 100% subangular to subrounded F to M shell fragments	NO DATA			GYTTJA, very loose, very silty; or shells, dark grey	GYTTJA, very sandy, V loose, or shells, dark grey	GYTTJA, very sandy, very loose, or shells, fragments, clay grey	SAND, F, sorted, very org., shell fragments, very dark grey	PEAT, M, gyttja layers, M sand layers, shell fragments, dark olive brown	GYTTJA, very sandy, very loose, or shells, dark grey	GYTTJA, very loose, or shells, shell pieces	GYTTJA, clayey, or shells, pieces, dark grey	GYTTJA, clayey, or shells, dark olive
0.5-1.0		soft SAND	Brownish grey V. gravelly F to M SAND; Gravel is 100% angular to subangular F shell fragments	Very loose to loose V. silty SAND	Very loose SAND	Grey V. gravelly F to M SAND; Gravel is 100% angular to subangular F shell fragments	Dark brownish grey V. gravelly F to M SAND; Gravel is 100% angular to subangular F shell fragments	Very loose to loose SAND	Dark grey locally V. gravelly F to M SAND; Gravel is 100% angular to subrounded F to C shell fragments	Loose SAND	Dark brownish grey V. gravelly F to M SAND; Gravel is 100% angular to subrounded F to M shell fragments	M dense SAND	Grey F to M SAND	Loose SAND to dense SAND	Brownish grey F to M SAND	M dense to dense SAND	Dense to very dense SAND	M dense to very dense SAND	Dense to very dense SAND	Grey F to C SAND	NO DATA			GYTTJA, very loose, or shells, dark grey	SAND, F, silty, sorted, very org., plant remains, shell fragments, very dark grey	SAND, F, silty, sorted, many shell fragments, plant remains, olive gray	SAND, F, sorted, very org., shell fragments, very dark grey	GYTTJA, very sandy, many shell fragments, dark olive brown	PEAT, thin sandy layers, M. shell fragments, dark olive gray	GYTTJA, very clayey, or shells, dark olive brown	GYTTJA, clayey, or shells, pieces, dark olive gray	GYTTJA, clayey, or shells, dark olive
1.0-1.5		soft SAND	Brownish grey V. gravelly F to M SAND; Gravel is 100% angular to subangular F shell fragments	Very loose SAND	Very soft sandy SILT or sand lens	Brownish grey V. gravelly F to M SAND; Gravel is 100% angular to subrounded F shell fragments	Grey V. gravelly F to M SAND; Gravel is 100% angular to subrounded F to M shell fragments	M dense to dense SAND	Brownish grey F to M locally V. gravelly SAND; Gravel is 100% angular to subrounded F to M shell fragments	M dense to dense SAND	Light grey locally V. gravelly F SAND; Gravel is 100% angular to subangular F to M shell fragments	Dense to very dense SAND	light grayish brown F to M SAND; Brownish grey F to M SAND; 81.2-81.3 (LV) chalk gravels (Cretaceous), belemnites,	M dense to dense SAND	Brownish grey F to M SAND	M dense to very dense SAND	Brownish grey F to C SAND	Dense to very dense SAND	Dense to very dense SAND	Light grayish brown locally gray F to C SAND	NO DATA			GYTTJA, M gravelly, very loose, silty, gyttja; or shells, dark grey	SAND, F, silty, sorted, many shell fragments, very dark grey	SAND, F, very silty, sorted, many shell fragments, very dark grey	SAND, F, sorted, very org., shell fragments, very dark grey	SAND, F, C, V. silty, V. gravelly, sorted, many shell fragments, very dark brown	LAYER, high plasticity, very silty, lam., org. lamina, light gray - grey	GYTTJA, very clayey, or shells, pieces, dark brown	GYTTJA, clayey, or sands, dark olive gray	GYTTJA, clayey, or sands, dark olive
1.5-2.0		soft SAND	Brownish grey V. gravelly (clayey) F to M SAND; Gravel is 100% angular to subangular F shell fragments	Very loose SAND	Very soft sandy SILT or sand lens	Brownish grey V. gravelly F to M SAND; Gravel is 100% angular to subangular F shell fragments	Grey gravelly F to M SAND; Gravel is 100% angular to subrounded F to M shell fragments	M dense to dense SAND	Brownish grey F to M locally V. gravelly SAND; Gravel is 100% angular to subrounded F to M shell fragments	M dense to dense SAND	Light grey locally V. gravelly F SAND; Gravel is 100% angular to subangular F to M shell fragments	Dense to very dense SAND	Grey F to C SAND	Loose SAND to dense SAND	Grey F to C SAND	Dense to very dense SAND	Brownish grey F to C SAND; or soft CLAY	Dense to very dense SAND	Dense to very dense SAND	Brownish grey F to M SAND	NO DATA			GYTTJA, M gravelly, very loose, silty, gyttja; or shells, dark grey	SAND, F, silty, sorted, many shell fragments, very dark grey	SAND, F, silty, sorted, shell fragments, olive gray	SAND, F, org, sorted, very dark grey	SAND, F, org, sorted, very dark grey	PEAT, Land layers in. shell fragments, olive gray, dark olive brown	PEAT, M, gyttja layers, or clayey, olive brown	GYTTJA, clayey, or sands, dark olive gray	
2.0-2.5		soft SAND	Ends 1.83m	Very loose V. silty SAND	Very soft sandy SILT or sand lens	Ends 1.72m	Grey locally V. gravelly F M SAND; Gravel is 100% angular to subrounded F to M shell fragments	Loose becoming very loose silty SAND	Brownish grey F to M locally V. gravelly SAND; Gravel is 100% angular to subangular F to M shell fragments	M dense to dense SAND	Grey F to M SAND	M dense SAND	Grey F to C SAND	Dense locally M dense SAND	Grey F to C SAND	Dense to very dense SAND	Soft dark grayish brown silty CLAY or SAND	Dense to very dense SAND	Dense to very dense SAND	Light gray locally grayish brown F to C SAND	NO DATA			GYTTJA, M gravelly, very loose, silty, gyttja; or shells, dark grey	SAND, F, silty, sorted, many shell fragments, very dark grey	SAND, F, very silty, sorted, many shell fragments, olive gray	GYTTJA, very clayey, V. silty, V. gravelly, or organic matter, dark grey	GYTTJA, very clayey, V. silty, V. gravelly, or organic matter, dark grey	SAND, F, M, few gravel layers, org., shell fragments, olive brown	SAND, F, M, sorted, org., shell fragments, olive brown	PEAT, M, gyttja layers, or clayey, dark olive brown	CLAY TILL, SAND TILL, very sandy, clay, few gravel grains, olive gray, dark grayish brown
2.5-3.0		soft SAND		Very loose to M dense or silty SAND	Very soft sandy SILT or sand lens		Ends 2.22m	Loose becoming very loose silty SAND	Ends 2.50m		Ends 2.50m	Loose to M dense becoming dense SAND	Ends 2.35m	Dense locally M dense SAND	Ends 2.45m	Dense to very dense SAND	Grey locally V. gravelly F M SAND; Gravel is 100% subangular to subrounded F to M shell fragments	Dense to very dense SAND	Dense to very dense SAND	light grey locally grayish brown F to C SAND	NO DATA			Ends 3.00m	Ends 3.00m	Ends 3.00m	Ends 2.98m	Ends 3.00m	SAND, M, sorted, org., plant remains, shell fragments, olive		Ends 3.00m	Ends 3.00m
3.0-3.5		soft SAND		M dense to dense SAND; Gravel is 100% angular to subrounded F to M sandy clay lens	M dense SAND or SILT			Loose becoming very loose silty SAND; sand		M dense to dense SAND		M dense becoming dense SAND		Dense locally M dense SAND		Dense to very dense SAND	Ends 2.65m	Dense to very dense SAND	Ends 2.67m	Ends 2.80m	NO DATA											
3.5-4.0		3.40m	Ends 3.40m		Ends 3.45m			Ends 3.48m		Ends 3.11m		Ends 3.28m		Ends 3.39m		Ends 3.45m		Ends 3.45m			NO DATA								SAND, M, sorted, org., plant remains, shell fragments, olive				
4.0-4.5																					NO DATA								SAND, M, sorted, org., plant remains, shell fragments, olive				
4.5-5.0																					NO DATA								SAND, M, sorted, org., plant remains, shell fragments, olive				
5.0-7.5																					NO DATA								CLAY TILL, very sandy, silty, few gravel grains, very dark grayish brown				
7.5-10																					NO DATA								Ends 5.00m			

		KP 289.536	KP289.536	KP289.530	KP290.530	KP290.531	KP291.515	KP291.516	KP292.520	KP292.522	KP293.472	KP293.472	KP294.084	KP294.085	KP294.436	KP294.436	KP295.467	KP295.468	KP296.241	KP296.242	KP297.344	KP297.844	KP303.769	KP304.496	KP304.928	KP305.364	KP306.313	KP306.943	KP307.106	KP307.998	KP308.986	KP310.064
Clay	Max. Su (kPa) (4)																							23		29		50	24	19	8	
	Min. Su (kPa) (4)																							7		20			15	10	8	
	Test for shear strength (5)																							TV		TV		TV	TV	TV	TV	
Sand	Vhl (µm) (2)		110								100									190				10	90	160	130	120	60	50	20	
Thermal Resistivity	Meas. Depth (m) (3)		0.9			0.9	0.9		0.9		0.9		0.9		0.9		0.9			0.9				1	1	1	1	1	1	1	1	
	Res. (K.m/W)		0.41			0.39	0.34		0.39		0.37		0.39		0.4		0.43			0.39				0.98	0.39	0.37	0.39	0.56	1.43	0.87	1.39	

		KP 289.536	KP289.536	KP289.530	KP290.530	KP290.531	KP291.515	KP291.516	KP292.520	KP292.522	KP293.472	KP293.472	KP294.084	KP294.085	KP294.436	KP294.436	KP295.467	KP295.468	KP296.241	KP296.242	KP297.344	KP297.844	KP303.769	KP304.496	KP304.928	KP305.364	KP306.313	KP306.943	KP307.106	KP307.998	KP308.986	KP310.064
Geophysical Description	KP range																				297.344-297.844	ISLE OF FANØ		304.496-305.25		305.25-306.35		306.35-307.15		307.15-308.05		308.05-309.85
Shallow geology (summary)																					NO DATA			Top layer of GYTTJA (0-3m). Below unknown.	Top layer of GYTTJA (0-1m). Below SAND.	Top layer of SAND (0-3m). Below GYTTJA (1m).	Top layer of SAND (0-1m). Below GYTTJA (1m). Below SAND.	Top layer of GYTTJA (0-1m). Below unknown.	Top layer of SAND (0-4m). Below GYTTJA (1m) and PEAT	Layered SAND and PEAT	Top layer of GYTTJA (0-2m). Below PEAT	Top layer of GYTTJA (0-4m). Below unknown
Seabed Features (height in metre)	KP range																				297.344-297.844	ISLE OF FANØ		304.496-305.25	305.25-305.35	305.35-305.45	305.45-305.55	305.55-305.65	305.65-305.75	305.75-306.05	306.05-307.05	307.05-307.45	307.45-310	JUTLAND
																					NO DATA			NF	Small ripples [6]	Large ripples [6]	NF	Small ripples [6]	NF	Large ripples [6]	NF	Large ripples [6]	NF	Small ripples [6]	NF
Angle of sea bed feature w.r.t. Route (degrees)	KP range																				297.344-297.844	ISLE OF FANØ												
																					NO DATA			Undefined								
Slope Class	KP range																				297.344-297.844	ISLE OF FANØ		297.344-305.25		305.25-306.5		306.5	306.5-307.1	307.1	307.1-310			
																					NO DATA			Virtually flat		Gentle	Virtually flat		Moderate	Virtually flat	Moderate	Virtually flat		
Boulder field / wreck	KP range																				297.344-297.844	ISLE OF FANØ		303.7-304.5								308.9-310.1		
																					NO DATA			Boulders								Boulders 2 km wide offset 150m	
	# of objects within 500m from KP5																															
	Average distance nearest neighbour																															
	Objects per km2																															
	Comments																															
Survey Coverage		DANISH EEZ nearshore section (291.7 - 297.8). Survey corridor 1000m wide.																			NO DATA	ISLE OF FANØ		DANISH Waddensea section (KP 303.769-310.064). Survey corridor 200m wide.								JUTLAND

		KP 289.536	KP289.536	KP289.530	KP290.530	KP290.531	KP291.515	KP291.516	KP292.520	KP292.522	KP293.472	KP293.472	KP294.084	KP294.085	KP294.436	KP294.436	KP295.467	KP295.468	KP296.241	KP296.242	KP297.344	KP297.844	KP303.769	KP304.496	KP304.928	KP305.364	KP306.313	KP306.943	KP307.106	KP307.998	KP308.986	KP310.064
Other Events	Crossings (S new or S before Cobra) and special areas (6).			KP 289.891 Danish Southern Coastal area					KP 292.481 Elbe Lake LAT				KP 294.312 CX OK-GERI S						KP 297.240 500m wide 1km long in ICZ 2m		NO DATA	KP 297.844 - MMR Fanø	KP 299.266 - Fanø Outlaw	KP 301.716 - Fanø Outlaw	KP 303.769 - MMR Fanø East								KP 310.064. MMR Jutland
	KP range																				297.344-297.844	ISLE OF FANØ										JUTLAND
	Challenging Areas																				NO DATA											
	KP range																					ISLE OF FANØ										
	Reduced Lay Tolerance																				NO DATA											
Required Soil Data	Target DoB (m)	0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	ISLE OF FANØ		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	JUTLAND
	Comment																															

		KP 289.536	KP289.536	KP289.530	KP290.530	KP290.531	KP291.515	KP291.516	KP292.520	KP292.522	KP293.472	KP293.472	KP294.084	KP294.085	KP294.436	KP294.436	KP295.467	KP295.468	KP296.241	KP296.242	KP297.344	KP297.844	KP303.769	KP304.496	KP304.928	KP305.364	KP306.313	KP306.943	KP307.106	KP307.998	KP308.986	KP310.064
SOIL RISKS	KP range	287.639-294.384											294.0 - 295.467						295.467 - 297.344		297.344-297.844	ISLE OF FANØ		304.496-305.25		305.25-306.35		306.35-307.15		307.15-309.85		JUTLAND
	Soils Risks				0										12?				1, 6, 12?					3		3		2		3		
	Comment												Several acoustic shadows, indicating presence of GAS					Several acoustic shadows, indicating presence of GAS				ISLE OF FANØ		GYTTJA		GYTTJA and SAND		PEAT and GYTTJA		GYTTJA		

		KP 289.536	KP289.536	KP289.530	KP290.530	KP290.531	KP291.515	KP291.516	KP292.520	KP292.522	KP293.472	KP293.472	KP294.084	KP294.085	KP294.436	KP294.436	KP295.467	KP295.468	KP296.241	KP296.242	KP297.344	KP297.844	KP303.769	KP304.496	KP304.928	KP305.364	KP306.313	KP306.943	KP307.106	KP307.998	KP308.986	KP310.064
Tool	Pre trenching (1)																															
	Pre-cutting																															
	Pre-dredging																															
	Boulder avoidance / Route engineering																															
	Primary burial tool				Jet trencher																			Jet trencher								
	Secondary burial tool																															
	MFE / CFE																															
	Other Protection																															

		KP 289.536	KP289.536	KP289.530	KP290.530	KP290.531	KP291.515	KP291.516	KP292.520	KP292.522	KP293.472	KP293.472	KP294.084	KP294.085	KP294.436	KP294.436	KP295.467	KP295.468	KP296.241	KP296.242	KP297.344	KP297.844	KP303.769	KP304.496	KP304.928	KP305.364	KP306.313	KP306.943	KP307.106	KP307.998	KP308.986	KP310.064
Burial Estimation	KP range	287.639-294.384											294.0 - 295.467						295.467 - 297.344		297.344-297.844	ISLE OF FANØ		304.496-305.25		305.25-306.35		306.35-307.15		307.15-309.85		JUTLAND
Assessment of potential burial depth (Refer to Legend for colour coding)	0.0-0.5				1										6				2, 6					6		6		5, 6		6		
	0.5-1.0				1										6				2, 6					6		6		5, 6		6		
	1.0-1.5																															
	1.5-2.0																															
	2.0-6.0																															
Depth of burial confidence of assessment	0.0-0.5				7										7				8			ISLE OF FANØ		7		7		9		7		
	0.5-1.0				7										7				8					7		7		9		7		
	1.0-1.5																															
	1.5-2.0																															
	2.0-6.0																															

		KP 289.536	KP289.536	KP289.530	KP290.530	KP290.531	KP291.515	KP291.516	KP292.520	KP292.522	KP293.472	KP293.472	KP294.084	KP294.085	KP294.436	KP294.436	KP295.467	KP295.468	KP296.241	KP296.242	KP297.344	KP297.844	KP303.769	KP304.496	KP304.928	KP305.364	KP306.313	KP306.943	KP307.106	KP307.998	KP308.986	KP310.064
Tool Performance	Expected Depth of Lowering (m)				DEPENDING ON SELECTED TOOL(S)																			DEPENDING ON SELECTED TOOL(S)								
	Anticipated Trenching Speed (m / operational hr) — 1st Pass				DEPENDING ON SELECTED TOOL(S)																			DEPENDING ON SELECTED TOOL(S)								
	2nd Pass				DEPENDING ON SELECTED TOOL(S)																			DEPENDING ON SELECTED TOOL(S)								
	Other				DEPENDING ON SELECTED TOOL(S)																			DEPENDING ON SELECTED TOOL(S)								
	Comment / Residual Risks																															

DATA SOURCES:

Ref	Contractor / Date of Report	Document Title / External Document Number
(1)	MMT, 2014 / Nov 2014	Cobra-MMT-SUR-REP-070(Rev.A.pdf) Cobra-MMT-SUR-REP-071(Rev.A.pdf) Cobra-MMT-SUR-REP-072(Rev.A.pdf)
(2)	FUGRO, 2014 / 28 Aug 2014	207-14-018_Survey Report-COBRA_Rev1.pdf
(3)	NIVOZ, 2010 / 13 Apr 2011	Final_Report_Diables ulche_in_Affaqar_Opt_2_Rev0.pdf
(4)	DAMS, 2011 / March 2012	C11025 - Survey DK-FAN3-rev01.pdf
(5)	MMT, 2010 / Jan 2011	100710-MMT-SUR-REP-02-Vol2-01.pdf 100710-MMT-SUR-REP-02-Vol2_02.pdf 100710-MMT-SUR-REP-02-Vol2_03.pdf
(6)	COWI, 2014 / 26 Nov 2014	Cobra Cable Route Survey Report 2_0.pdf
(7)	FUGRO, 2012 / March 2012	207-12-018_Final Survey Report_Sites Survey.pdf 217-12-018_Final Survey Report Shelf_Rev0.pdf
(8)	NATESO, 2015 / 24 Nov 2015	Final Survey Report Rev02.pdf
(9)	SHADA, 2014	1750_U14001_MM_C_COBRA_HVDC_Cable_Route_Assessment.pdf
(10)	MMT, 2014	COBRA-Presentation_Results_MMT.pptx

NOTES:

(1)	Translated from German to English
(2)	D50 taken from cumulat ysed in Sieve/Sedimentation profile. Green: D50<100 µm, orange: 200 µm<D50<400 µm, red: D50>400 µm
(3)	Thermal Resistivity taken at level closest to TDoB
(4)	Shear strength taken from shiffman clay, in transit profile – Green: Su >40 kPa, orange: 40 > Su > 10 kPa, red: Su < 10 kPa
(5)	CPT Shear strength determined based on formula with CPT cone factor Nkt. TV: Shear strength determined based on Torvane Test
(6)	All B Crossings updated with crossing list as in RPL ADS. RPL are however calculated back to RPL ACL
(7)	Pre-trenching required up to 10 m LAT. However: the proposed tools are based on a situation without pre-trenching.

SYMBOLS

Target DoB (m, approximate)	
Optional Target DoB (m, approximate)	

GEOTECHNICAL:

Relative Density Description (%)		Undrained Shear Strength (kPa)	
Very loose	0-15	Very soft	<25
Loose	15-35	Soft	25-40
Medium Dense	35-65	Firm	40-75
Dense	65-85	Stiff	75-150
Very dense	>85	Very stiff	150-300
		Hard	>300

Other	
Sand (no B2 dies-cussion available)	Clay (no kPa dies-cussion available)
Gravel	No data
Peat	Unclassified
Silt	Glacial till
	Gyttja

GEOMORPHOLOGY:

Slope Class	Slope (see Note 6)
Virtually flat	< 1°
Gentle	1 - 4.8°
Moderate	5 - 9.8°
Steep	10-14.8°
Very Steep	> 15°

SOIL2 ROAD (list in order of severity)

0	No identified issues
1	Very dense sand
2	Peat / peat pockets
3	Very soft clay or gyttja. Risk of sinkage of a negotiably buoyant trenching vehicle / reduced forward traction of a tracked trenching vehicle / uncontrolled sinkage of the cable
4	Firm clays
5	Stiff or very stiff clays
6	Coarse material restricting effective cable lowering when jet trenching
7	Adverse soils (other than above, such as glacial till, blocks and bedrock)
8	Gas cemented hard ground (GCHG)
9	Obstructions (including boulders)
10	Steep gradients
11	Irregular seabed (including passive pockmarks, scalleg scars and highly mobile seabeds such as megapedes)
12	Active pockmarks and / or gas charged seabeds.
13	Risk of trench collapse / repair in sedimentation prior to cable installing required (for A trenchless trencher (or open cut trench) without depressor is used
14	Stamping

ABBREVIATIONS:

Term	Definition
AC	Alternating current
BWH	Beach Man Hole
BSF	Below Sea Floor
C / F / M	Coarse / Fine / Medium
CR	Core Resistance test for shear strength
CX	Cable crossing
DC	Direct Current
DCC	Distance Cross Course
DK	Denmark
DNZ	Directional Reamber
DoB / DoL	Depth of Burial / Depth of Lowering
DTS	Germany
HVAC / HVDC	High Voltage Alternating Current / High Voltage Direct Current
IS	In Service
KP	Kilometre Point
Lam.	Laminations / Laminated
LAT	Lowest Astronomical Tide
MFE / CFE	Mass Flow Excavation / Controlled Flow Excavation
MSL	Mean Sea Level
N/A	Not Available
NAP	Normaal Amsterdams Peil (Dutch level height reference level)
NL	The Netherlands
NF	No Features
OC	Occasional
Org.	Organic
OOS	Out Of Service
PX	Pipeline crossing
RPL	Route Position List
S	Slightly
su	Shear strength (for cohesive soils)
TSS	Traffic Separation Scheme
TSZ	Traffic Separation Zone
TV	Torvane Test for shear strength
UK	United Kingdom
w.	With
WD	Water Depth

LOCATION MAP:

RURAL ESTIMATION - SOIL2 ROAD (list in order of severity)

1	Penetration should be achievable.
2	Penetration should be achievable. Very dense SAND may reduce speed.
3	Penetration should be achievable. Stiff-very stiff CLAY may reduce speed.
4	Penetration should be achievable. Very stiff-hard CLAY may reduce speed significantly.
5	Penetration may be achievable but if encountered stiff CLAY or PEAT at depth could limit penetration of trencher.
6	Penetration should be achievable, assuming mitigation of risk of trencher sinkage / loss of traction.

RURAL ESTIMATION - SOIL2 ROAD (list in order of severity)

7	DoB should be achievable.
8	DoB should be achievable, secondary pass with jetting tool may be required.
9	DoB may be achievable but where penetration is reduced due to encountering adverse soils, the DoB may be reduced accordingly.

PROPOSED TOOL:

Pre-trenching		Pre-cutting	
Boulder avoidance / Route engineering		Pre-dredging	
Primary burial tool		Dredging / Mechanical excavation / Jetting	
Secondary burial tool		MFE/CFE	
		Other Protection Measures	

RURAL ESTIMATION - CONFIDENCE LEVEL:

Considered likely to be achievable		Not graded	
May be possible but with concerns		Unknown due to lack of data / information	
Considered unlikely to be achievable		Working against concerns (subject to mitigation)	

SPEED PREDICTION:

Predicted Speed (m/hr)				
>150 - 300				
>100 - >150				
>50 - >100				
>0 - >50				
0				
Unknown due to lack of information				

Rev	Date	Description	Drn	Chk
R1_00	07/05/2015	Data comments incorporated	MAT	DMS
R1_00	22/04/2015	Draft issue to client	MAT	DMS
R1_00	08/04/2015	Draft for workshop 8 April 2015	MAT	DMS
R1_C1	31/03/2015	Internal issue for peer review	MAT