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**Environmental Baseline Survey Dogger Bank Area
2004**

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Intended for XXXXXX

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1. Introduction

(XXXXXX) is planning to carry out two exploration drillings in order to further develop the offshore production of gas in the DoggerBank area. At present an area description is undertaken within the framework of the European Bird and Habitats Directive, in order to indicate areas of special interest for conservation to an international network of such areas (NATURA 2000).

TNO-MEP was requested to prepare an alternative for a study in order to obtain approval for the exploration drilling activity from the competent authorities. The locations for drilling platforms are at X(m) XXXXXXXX, Y(m) XXXXXXXX (Area C) and at X(m) XXXXXXXX, Y(m) XXXXXXXX (Area B).

At present there are no guidelines for dealing with applications for offshore exploration drilling within areas that might be designated to the NATURA 2000 network. Because of this, the proposed options in this work plan are based on the guidance documents from OSPAR (e.g. OSPAR 03/17/1-E, Annex 7) and EU documents on the implementation of Special Areas of Conservation under NATURA 2000.

The tailor-made survey in 2004 has the objective to give the approval authority a basis of information on the present state of the environment for estimating the consequences that the proposed activity might have for the environment.

2. Tailor-made Survey

2.1 Choice of sampling stations

Figure 1 shows the layout of the sampling grid, which was used for benthos sampling and the video survey in this study. The main current direction (east-west) is taken into account.

The grid is based on OSPAR guidelines for environmental impact studies in the North Sea. Samples were taken at distances of 250, 500, 1000 and 1500 m from the two envisaged exploration drilling locations.

In the samples of locations P-13 per location one sample of the macrobenthos composition will be analysed along with one sample of the sediment samples. The four samples of the 1500 m radius will be stored for eventual future analysis. In addition to benthic samples a video survey has been undertaken at every station. Furthermore, a Side Scan Sonar survey has been carried out for an area of 1 km² around each location. During this survey 13 rays have been monitored parallel to the main current speed with a distance of 75 m between them.

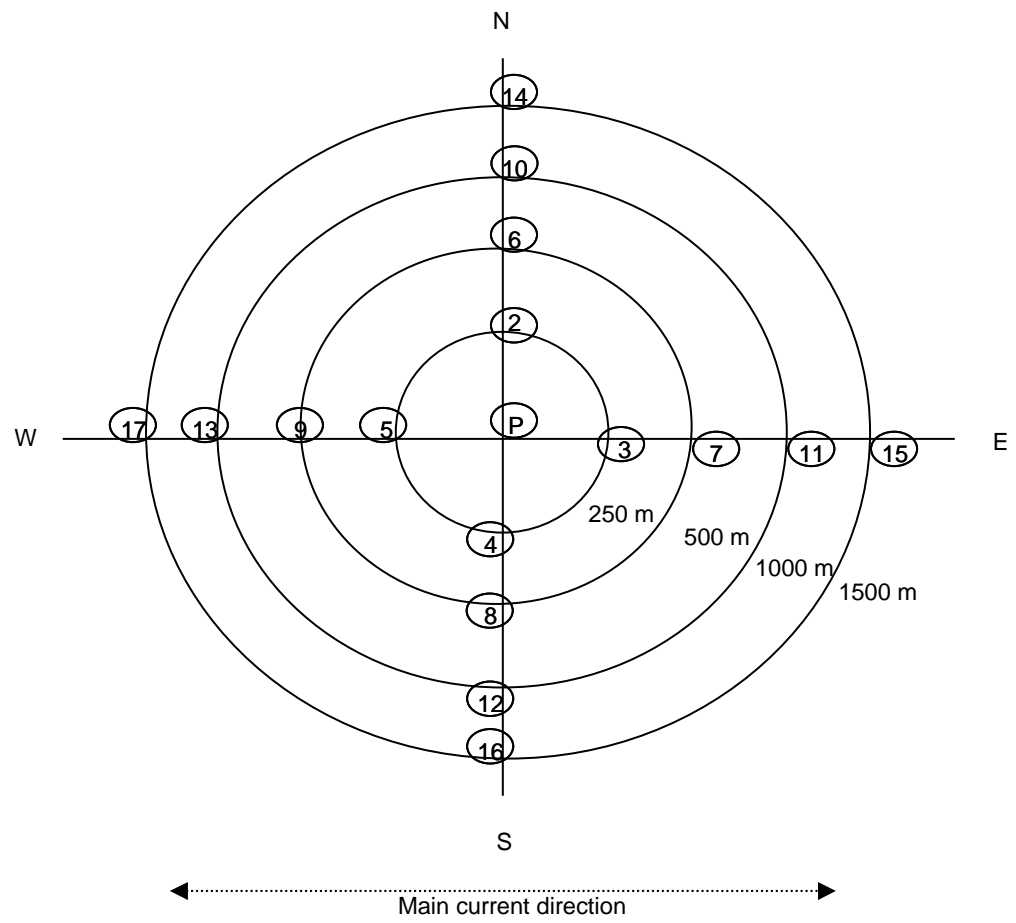


Figure 1. Overview of the sampling grid used in the tailor-made survey of locations C and B in 2004. Station P gives the position of the envisaged drill location.

2.2 Sampling and techniques

For the survey the ship ‘Oil Express’ was used which was equipped with a crane that could handle the boxcorer K4 very well and was equipped with a GPS navigation system for the positioning of the sediment samplers. At each sampling station general information on water depth, time of sampling and allocation of samples was recorded. Mr. J. de Jong (Geocom) surveyed the positioning of the ship. Macrofauna and sediment samples were all taken with a Reineck box corer.

The video recordings were carried out by Dutch Diving using a ROV system which was operated from a TMS.

The Side Scan Sonar work was carried out by TNO-NITG (Netherlands Institute of Applied Geoscience TNO).

At each station three (replicate) samples were be collected for macrobenthic analysis. The content of each of the three replicates was washed through a sieve with 1 mm diameter. From each core the material left behind on the sieve was collected separately into polyethylene containers and preserved with 4% buffered formaldehyde in seawater solution.

At all stations the positions of the 3 subsamples taken were within a range of circa 20 m meters.

From each of the macrofauna core samples 2 small subsamples were collected using a small corer of Ø2.6 cm ($\pm 5.3 \text{ cm}^2$) to a depth of 10 cm. These two subsamples were mixed to one sample for each station, resulting in three sediment samples for the analysis of grain size and TOM per station. The sediment samples were stored in a freezer at about 4° C. A visual inspection of the sediment was made on the colour and type of sediment for a description of the sediment.

At each sampling location approximately 4 min of video film was recorded to gain an idea about the undisturbed surface of the seabed.

The actual positions of the Side Scan Survey are shown in figure 2.

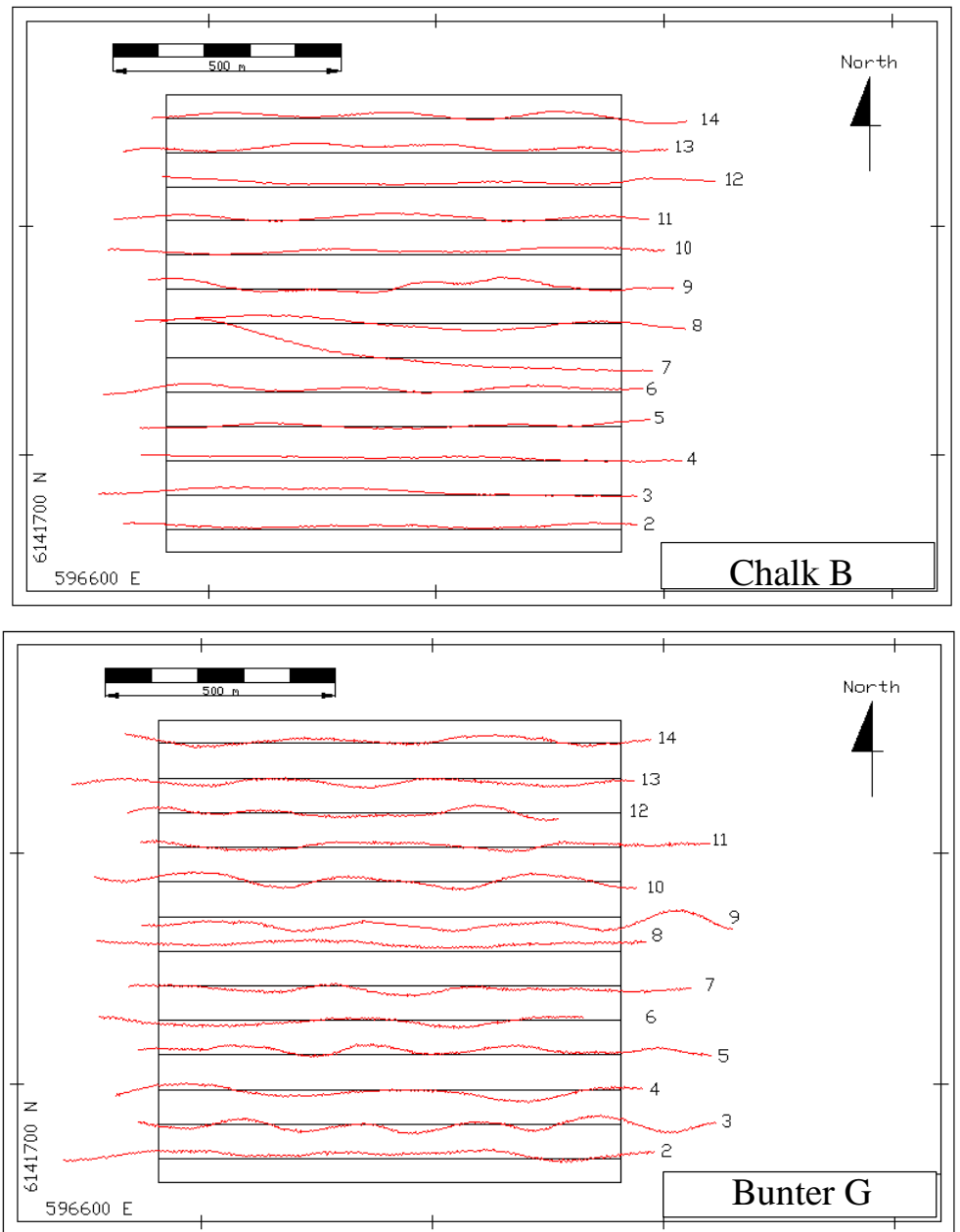


Figure 2. Side Scan Sonar: Actual sampling grid in 2004 in the regions area C and area B.

3. Daily Reports

Monday 22th March 2004

Start with mobilizing vessel at 8.30 hrs. During the afternoon and early evening the ROV and Sidescan Sonar apparatus is tested. Boarding vessel at 21:00 hrs, leaving port of Den Helder at 22:15 hrs. Transit to area C B.

Tuesday 23th March 2004

Transit to location C against the current. On location C in the evening. Immediate start of a dynamic positioning trial to become familiar with the vessel and crew. Dynamic positioning trial took 40min. Parallel to this trial the equipment required for macrofauna and video sampling was put into position. Directly after this we started the macrofauna work at this location, location P. The three grabs were finished at 20.55 hrs after which the ROV survey was run at this location. The work was finished before midnight

Wednesday 24th March 2004

Start at 08:00 hrs with Sidescan Sonar profile around location C. All equipment works well. Weather conditions are good, there is a relatively slight swell of this time of year, about 1.8 m. The Sidescan Sonar profile was completed at 16.00 hrs. Directly afterwards we started macrofauna and video sampling at the 250 m radius. The macrofauna sampling had to be interrupted due to a hydraulic problem with the crane. The rest of the day was spent recording the video survey at locations 2-9 of location C, covering the 250 m and the 500 m radius. The work was terminated at 21.00 hrs.

Thursday 25th March 2004

The weather is still bright and sunny, BF 2-4, northeast with a slight swell of about 1 m. The work started at 07:45 hrs with macrofauna sampling. By the end of the day macrofauna sampling and video recordings for stations 2-10 and 14 were finished. Additionally, die video recording for station 13 was carried out and 1 macrofauna sample was taken at this station. The work was terminated at 21.00 hrs. At location C 4 locations still need to be sampled tomorrow before we can start the transit to location B.

Friday 26th March 2004

The work started at 07:45 hrs with macrofauna sampling and video recordings of the remaining 4 locations, two on the 1000 m radius and two on the 1500 m radius. All sampling around location C was finished by 14.00 hrs and we started sailing toward location B. The weather is still bright and sunny, BF 2-4, northeast with a slight swell of about 1 m.

Arrival at location B at 16.45 hrs. Locations 0-4 have been sampled (video recordings and macrofauna samples) which makes the 250 m radius complete. The video recordings which showed 1 ray and 1 flatfish so far give the impression that his area is richer in fauna than C but for a definite judgment we need to wait for the full analysis of all data. The work was terminated at 21.30 hrs.

Saturday 27th March 2004

The weather is still good although today we have got no sun. The wind varies between BF 2-4 and temperatures have dropped slightly. The swell is still low, between 0.5 – 1.0 m, amazingly calm for this area at this time of year. The work started at 07:45 hrs with the Side Scan Sonar survey of station B. This survey was completed by 16.30 hrs. At this time the macrofauna sampling and video recording was started. The work is going smoothly. Today sampling at all 4 stations of the 500 m radius was completed plus stations 12 and 16 on the 1000 m and 1500 m radius, respectively. The work was terminated at 20.45 hrs.

Sunday, 28th March 2004

The weather is changing, the wind varies now between BF 5-6 and temperatures still drop. The swell has increased to 1.5m. The work started at 07:45 hrs with the sampling (macrofauna and video) of the last 6 stations around B. After the work was completed the journey back to the harbour Den Helder started. Estimated arrival time at Den Helder is Monday, 29th March at approximately noon.

Monday 29th March 2004

Transit back to the harbour Den Helder. The ship arrived in Den Helder at 13.00 hrs. Demobilization was undertaken immediately.

By 17.00 the samples were ashore and securely stalled. The work was finished at 17.00 hrs.

4. Appendix

Table 1. List of Stations, coordinates and sample information of location C.

Station number (theory)	Station number (at sea)	Positions (WGS 84)		Date	Time	Depth (m)	macrofauna (pot)	sediment (pot)	photo (number)	fauna	comments	sediment
		Easting	Northing									
Positioning remarks: Positioning without differential signal Projection: UTM31 (WGS '84)												
WH04-CB-0	WH04-CB-0											
1	1			23-mt-04	21:27	42.0	1	1	0-I		10 cm depth, sand, below 4cm anoxic/black, some clay	
2	2			23-mt-04	21:42	42.0	2	2	0-II		10 cm, bottomlayer black	
3	3			23-mt-04	21:52	42.0	3	3	0-III		9 cm, dark, sand & some clay	
WH04-CB-1	WH04-CB-1											
4	4			25-3-2004	14:26	42.2	22	22	1-I		sand, 25cm, anoxic below 3-4cm	
5	5			25-3-2004	14:48	42.2	23	23	1-II		sand, 25cm	
6	6			25-3-2004	14:57	42.2	24	24	1-III	1 dead Arctica	sand, 30cm	
WH04-CB-2	WH04-CB-2											
7	7			25-3-2004	13:28	42.7	4	4	2-I		sand, 25cm, dark below 3-4cm depth	
8	8			25-3-2004	13:39	42.7	5	5	2-II		sand, 20 cm	
9	9			25-3-2004	13:59	42.7	6	6	2-III		sand, 25cm, dark below 6-cm depth	
WH04-CB-3	WH04-CB-3											
10	10			25-3-2004	12:50	43.0	7	7	3-I	hearturchin	sand, 25cm	
11	11			25-3-2004	13:02	43.0	8	8	3-II	hearturchin	sand, 25cm	
12	12			25-3-2004	13:11	43.0	9	9	3-III	hearturchin	sand, 25cm	
WH04-CB-4	WH04-CB-4											
13	13			25-3-2004	11:22	42.5	10	10	4-I		sand, 20cm, bottom part black	
14	14			25-3-2004	11:33	42.5	11	11	4-II	1 hearturchin, 1 helmet crab	sand, 20cm, bottom part black, unpleasant smell	
15	15			25-3-2004	11:44	42.5	12	12	4-III	1 Astenias (?)	sand, 20cm, bottom part black	
WH04-CB-5	WH04-CB-5											
16	16			25-3-2004	10:20	42.1	13	13	5-I		20cm, top 7cm sand, below dark	
17	17			25-3-2004	10:31	42.1	14	14	5-II		25cm, top 10cm sand, below darker	
18	18			25-3-2004	10:43	42.1	15	15	5-III		20cm, top 3cm sand, below darker	
WH04-CB-6	WH04-CB-6											
19	19			25-3-2004	9:24	42.7	16	16	6-I		sandy, below 4cm black. Arm boxcore stuck	
20	20			25-3-2004	9:34	42.7	17	17	6-II	1 Arctica, hearturchins	sand, top 5cm oxic	
21	21			25-3-2004	9:42	42.7	18	18	6-III		sand, top 4 cm oxic	
WH04-CB-7	WH04-CB-7											
22	22			25-3-2004	8:20	43.8	19	19	7-I		box ca. 5cm open at bottom side. Sediment= sand, some anoxic parts	
23	23			25-3-2004	8:30	43.8	20	20	7-II	hearturchin	sand, below appr. 3cm black	
24	24			25-3-2004	8:45	43.8	21	21	7-III	1 Arctica, 1 Annemone(?)	box a little open again, but core still 20cm deep	
WH04-CB-8	WH04-CB-8											
25	25			25-3-2004	15:18	42.8	25	25	8-I		sand, 25 cm	
26	26			25-3-2004	15:28	42.8	26	26	8-II	4 small Arctica	sand, 30cm	
27	27			25-3-2004	15:39	42.8	27	27	8-III	1 Nereis	sand, 25 cm,	
WH04-CB-9	WH04-CB-9											
28	28			25-3-2004	16:11	41.0	28	28	9-I		sand, 25cm, dark below 6-7cm	
29	29			25-3-2004	16:20	41.0	29	29	9-II		sand, 25cm	
30	30			25-3-2004	16:30	41.0	30	30	9-III		sand, 25cm	
WH04-CB-10	WH04-CB-10											
34	34			25-3-2004	19:11	43.0	32	32	10-I		sand, 25cm	
35	35			25-3-2004	19:21	43.0	33	33	10-II		sand, 25cm, lots of dead shells	
36	36			25-3-2004	19:31	43.0	34	34	10-III	helmcab (ca. 3cm carapace, eggs)	sand, 25cm	
WH04-CB-11	WH04-CB-11											
46	46			26-3-2004	11:01	43.8	46	46	11-I		sand, 35cm	
47	47			26-3-2004	11:18	43.8	47	47	11-II		sand, 30cm	
48	48			26-3-2004	11:28	43.8	48	48	11-III		sand, 30cm	
WH04-CB-12	WH04-CB-12											
40	40			26-3-2004	9:10	41.9	40	40	12-I	many Nereis	sand, 25cm	
41	41			26-3-2004	9:18	41.9	41	41	12-II	many Nereis	sand, 25cm,	
42	42			26-3-2004	9:26	41.9	42	42	12-III		sand, 30cm	
WH04-CB-13	WH04-CB-13											
31	31			25-3-2004	17:17	39.5	31	31	13-I		sand, 25cm	
32	32			26-3-2004	8:21	39.5	38	38	13-II	seastar, Echiura	sand, 30cm	
33	33			26-3-2004	8:30	39.5	39	39	13-III	hearturchin	sand, 25cm deep, anoxic below 4-5cm	
WH04-CB-14	WH04-CB-14											
37	37			25-3-2004	19:43	43.1	35	35	14-I		sand, 25cm	
38	38			25-3-2004	19:52	43.1	36	36	14-II	Callianassa, hearturchin	sand, 25cm	
39	39			25-3-2004	20:01	43.1	37	37	14-III		sand, 25cm	
WH04-CB-15	WH04-CB-15											
49	49			26-3-2004	13:24	43.9	49	49	15-I	hearturchin, Nemertina	sand, 25cm	
50	50			26-3-2004	13:35	43.9	50	50	15-II	hearturchin	sand, 30cm	
51	51			26-3-2004	13:47	43.9	51	51	15-III		sand, 30cm	
WH04-CB-16	WH04-CB-16											
43	43			26-3-2004	10:04	42.3	43	43	16-I		sand, 35cm	
44	44			26-3-2004	10:14	42.3	44	44	16-II		sand, 30cm	
45	45			26-3-2004	10:22	42.3	45	45	16-III		sand, 30cm	

Table 2 List of Stations, coordinates and sample information of location B

Station number (at sea)	Positions (WGS84)		Date	Time	Depth (m)	Macrofauna (pot)	Sediment (pot)	Photo (number)	fauna	Comments	
	Easting	Northing								fauna	sediment
BG-P	568262	6171182									
1	568269	6171182	26-3-2004	16:45	40.4	1	1	0-I			sand, 25cm deep, shells
2	568268	6171200	26-3-2004	16:54		2	2	0-II			sand, 25cm deep, shells
3	568267	6171184	26-3-2004	17:08		3	3	0-III			sand, 25cm deep, shell layer at app. 12cm, below anoxic
BG-2	568262	6171432									
4	568271	6171420	26-3-2004	17:42	40.7	4	4	1-I			sand, 25cm, shells
5	568271	6171430	26-3-2004	17:52		5a+b	5	1-II			sand, 25cm, shells. Sediment sample unreliable because upside-down
6	568260	6171443	26-3-2004	18:03		6	6	1-III			sand, 25cm, shells
BG-3	568512	6171182									
7	568511	6171194	26-3-2004	18:28	40.5	7	7	2-I			sand, 25cm, shell layer
8	568506	6171195	26-3-2004	18:34		8	8	2-II			sand, 20cm, shell layer
9	568513	6171185	26-3-2004	18:45		9	9	2-III	2 hearturchins		sand, 25cm, shell layer
BG-4	568262	6170932									
10	568256	6170940	26-3-2004	19:32	40.3	10	10	3-I			sand, 25cm, shells
11	568273	6170923	26-3-2004	19:40		11	11	3-II			sand, 25cm, shells
12	568253	6170939	26-3-2004	19:47		12	12	3-III			sand, 20cm, shells
BG-5	568012	6171182									
13	568023	6171174	26-3-2004	20:23	40.5	13	13	4-I			sand, 30cm, shells
14	568026	6171183	26-3-2004	20:33		14	14	4-II			sand, 30cm, shells
15	568008	6171190	26-3-2004	20:42		15	15	4-III			sand, 25cm, shells
BG-6	568262	6171682									
16	568263	6171686	27-3-2004	15:53	40.5	16	16	5-I	helmet crab		sand, 25cm
17	568264	6171659	27-3-2004	10:02		17	17	5-II	hearturchin		sand, 25cm, shell layer
18	568267	6171669	27-3-2004	16:11		18	18	5-III	small shell		sand, 25cm
BG-7	568762	6171182									
19	568774	6171185	27-3-2004	16:38	40.1	19	19	6-I	2 hearturchins		sand, 25cm
20	568765	6171182	27-3-2004	16:45		20	20	6-II	1 hearturchin		snad, 20cm
21	568760	6171184	27-3-2004	16:52		21	21	6-III	helmet crab, worm		sand, 25cm
BG-8	568262	6170682									
22	568257	6170686	27-3-2004	17:18	39.6	22	22	7-I	shell, hearturchin		sand, 25cm
23	568261	6170683	27-3-2004	17:25		23	23	7-II			sand, 25cm, peat rests
24	568275	6170701	27-3-2004	17:34		24	24	7-III	worm		sand, 25cm
BG-9	567762	6171182									
25	567752	6171188	27-3-2004	18:36	40.2	25	25	8-I			sand, 25cm
26	567753	6171188	27-3-2004	18:44		26	26	8-II	helmet crab with eggs, app; 3cm carapace		sand, 25cm
27	567756	6171189	27-3-2004	18:53		27	27	8-III			sand, 25cm, lots of shells
BG-10	568262	6172182									
34	568273	6172176	28-3-2004	8:26	4107	34	34	9-I			sand, 25cm, below 3-4cm anoxic, shells
35	568260	6172176	28-3-2004	8:34		35	35	9-II			sand, 30cm, below 5-6cm anoxic, shells
36	568252	6172178	28-3-2004	8:42		36	36	9-III			sand, 20cm, some clay
BG-11	569262	6171182									
43	569264	6171195	28-3-2004	20:00	40.8	43	43	10-I			sand, 20cm
44	569261	6171180	28-3-2004	20:08		44	44	10-II			sand, 25cm
45	569260	6171192	28-3-2004	20:16		45	45	10-III			sand, 30cm
BG-12	568262	6170182									
46	568251	6170174	28-3-2004	12:37	39.6	46	46	11-I			sand, 30cm, shell layer at 12cm
47	568243	6170171	28-3-2004	12:55		47	47	11-II			sand, 30cm, many colours sand, at 10cm shell layer
48	568242	6170165	28-3-2004	13:29		48	48	11-III	1 big helmet crab		25cm, at 12cm shell layer
BG-13	567262	6171182									
28	567255	6171192	27-3-2004	19:19	40.7	28	28	12-I			sand, 25cm
29	567258	6171191	27-3-2004	19:29		29	29	12-II			sand, 25cm
30	567266	6171185	27-3-2004	19:34		30	30	12-III			sand, 25cm
BG-14	568262	6172682									
37	568265	6172680	28-3-2004	9:18	42.2	37	37	13-I			sand, 25cm, shell layer
38	568268	6172669	28-3-2004	9:25		38	38	13-II			sand, 230cm, anoxic below 5cm, much shells and clay
39	568264	6172681	28-3-2004	9:34		39	39	13-III			sand, 25cm
BG-15	569762	6171182									
40	569768	6171190	28-3-2004	10:20	41	40	40	14-I			sand, 25cm, below 4cm anoxic, at 15cm shell layer
41	569762	6171182	28-3-2004	10:28		41	41	14-II			sand, 25cm, peat rests
42	569762	6171184	28-3-2004	10:34		42	42	14-III			sand, 25cm
BG-16	568262	6169682									
49	568257	6169679	28-3-2004	14:11	39.1	49	49	15-I			sand, 30cm, at 10-12cm shell layer
50	568251	6169678	28-3-2004	14:25		50	50	15-II			sand, 20cm
51	568251	6169675	28-3-2004	14:32		51	51	15-III			sand, 30 cm
BG-17	566762	6171182									
31	566746	6171181	27-3-2004	20:00	40.7	31	31	16-I			sand, 30cm
32	566771	6171174	27-3-2004	20:08		32	32	16-II	hearturchin		sand, 20cm
33	566767	6171180	27-3-2004	20:16		33	33	16-III	3 hearturchins		sand, 25cm