

**Cross Solent Pipeline Background
Turbidity Monitoring**

Halcrow Group

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SUMMARY

Emu Ltd was commissioned by Halcrow Ltd, on behalf of Southern Water, to carry out a survey programme to provide background measurements of turbidity levels in the region of potential bentonite discharge locations, on either side of the proposed Cross Solent Pipeline. The data gained will assist with sediment dispersion modelling, to illustrate to the consultees the likely degree of impact of the bentonite discharge and jetting for pipe embedment, on the SAC and designated shellfisheries. Subsequent monitoring is proposed to be undertaken during the pipeline works, to monitor levels of turbidity during specific activities

The survey programme was designed to collect measurements during a range of tidal/sea state conditions, in order to provide background data representative of typical conditions. Surveys were undertaken on Spring tide (26th May 2005), Intermediate (8th and 23rd June 2005) and Neap (17th June 2005) tidal ranges. The survey carried out on 26th May 2005, coincided with immediately post storm conditions, following several days of windspeed conditions up to Beaufort Scale Force 7.

Monitoring sites were selected to represent the areas approximately 250 m either side of the proposed break out points, approximately 650 metres offshore of mainland (Sites 1 and 2) and Isle of Wight (Sites 3 and 4). Sites were located approximately on the respective SAC boundaries.

During each survey, hourly turbidity measurements were taken at the surface, mid-depth and bottom, at all four locations, throughout a tidal cycle. Turbidity measurements were made using a YSI 6600 water quality sonde fitted with Optical Turbidity Sensor. During the programme, water samples were taken at each site, with concurrent turbidity measurement, to be analysed for suspended solids. This enabled turbidity measurements to be presented as suspended solids mg/l.

For the survey period, mean suspended solids levels at the four sites were typically in the range 0 – 18 mg/l, with maximum levels of up to 45 mg/l recorded at Site 1 (bottom depth). Turbidity levels generally were higher during surveys coinciding with a Spring tidal range and most variable at Site 1, the western site on the mainland side of the crossing.

The background turbidity data presented was collected under a range of tidal conditions and represents a baseline to define thresholds, which may be applied as mitigation for monitoring turbidity levels during the proposed pipeline construction works.

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1.0 INTRODUCTION

- 1.1 Emu Ltd was commissioned by Halcrow Ltd, on behalf of Southern Water, to carry out a water quality survey relating to the proposed Cross Solent Pipeline. A survey programme was implemented to provide background measurements of turbidity levels in the region of potential bentonite discharge locations, approximately 650 metres offshore on either side of the proposed Cross Solent Pipeline. The data gained will assist with sediment dispersion modelling, to illustrate to the consultees the likely degree of impact of the bentonite discharge and jetting for pipe embedment, on the SAC and designated shellfisheries. Subsequent monitoring is proposed to be undertaken during the pipeline works, to monitor levels of turbidity during specific activities.
- 1.2 The survey programme was designed to collect measurements during a range of tidal/sea state conditions, in order to provide background data representative of typical conditions.
- 1.3 Surveys were undertaken on Spring tide (26th May 2005), Intermediate (8th and 23rd June 2005) and Neap (17th June 2005) tidal ranges. The survey carried out on the 26th May 2005 coincided with immediately post storm conditions, following several days of windspeed conditions up to Beaufort Scale Force 7.
- 1.4 The monitoring sites were selected to represent the areas approximately 250 m either side of the proposed break out points (approximately 650 metres offshore of mainland and Isle of Wight). Sites were located approximately on the SAC boundary.
- 1.5 During each survey, hourly turbidity measurements were taken at the surface (0.5 metre below surface), mid-depth and bottom (1 metre above seabed), at four locations, throughout a full tidal cycle. Turbidity measurements were made using a YSI 6600 water quality sonde fitted with Optical Turbidity Sensor.
- 1.6 During each survey, one sample per hour was taken from bottom depth (1 metre above seabed) at one location, concurrently with in situ turbidity measurement. Samples were tested for suspended solids and data used to derive suspended solids (mg/l) results for *in situ* turbidity measurements (NTU).
- 1.7 This report presents the suspended solids data collected during the survey work completed to date, representing background turbidity data for the proposed Cross Solent Pipeline..

2.0 SITE LOCATIONS, WEATHER AND TIDAL CONDITIONS

- 2.1 Samples and *in-situ* readings were taken from four sites, two on the mainland side of the crossing and two on the Isle of Wight side.
- 2.2 Table 2.1 presents the sampling locations in OSGB36 (Easting and Northing). The vessel was directed towards the sample locations. Actual vessel positioning was logged at each site using a Leica DGPS system.
- 2.3 During each hour, weather and sea state conditions were recorded and area presented in Appendix I.

Table 2.1: The Location of Sample Sites

Site	Position (OSGB36)	
	Easting	Northing
Site 1	445550E	097637N
Site 2	446003E	097794N
Site 3	446566E	095706N
Site 4	446958E	095994N

3.0 METHODOLOGY

3.1 Survey Regime

- 3.1.1 A total of five survey days were scheduled to be undertaken during May – July 2005. To date, four days have been completed, with one further day of survey scheduled for the next suitable weather window.
- 3.1.2 The survey programme was designed to collect measurements during a range of tidal/sea state conditions, in order to provide background data representative of the range of typical conditions.
- 3.1.3 Surveys were undertaken on Spring tide (26th May 2005), Intermediate (8th and 23rd June 2005) and Neap tide (17th June 2005) tidal ranges. The survey carried out on the 26th May 2005 coincided with immediately post storm conditions, following several days of windspeed conditions up to Beaufort Scale Force 7.

3.2 Vessel Positioning and Meteorological Records

- 3.2.1 Vessel position was logged throughout the survey with position fixing carried out using a Leica MX400 DGPS navigation system. Where possible, the bottom measurement was made within 10 metres of the identified sample point; the vessel was then allowed to drift with the tide to complete mid-depth and surface measurements, thus providing a profile representative of the same water column. During mid-ebb and mid-flood, tidal currents were up to 5 knots and on these occasions, measurements were taken more than 10 metres from the site.
- 3.2.2 The position was recorded at each site as measurement/sampling commenced. The set up and use of positioning equipment was carried out in accordance with Emu UKAS accredited procedures (EMU MET/10).
- 3.2.3 Sampling was undertaken from the survey vessel ‘CeeJay’ on all occasions.
- 3.2.4 Meteorological records were taken in accordance with Emu UKAS accredited procedures documented in EMU MET/10.

3.3 *In-situ* Measurements

- 3.3.1 *In-situ* data was collected from surface (0.5 metres below surface), mid-depth and bottom depth (1 metre above seabed) at each of the 4 monitoring sites. Measurements of the following parameters were recorded using a YSI water quality sonde, fitted with Optical Turbidity Sensor.
- 3.3.2 A multi-parameter YSI 6600 Sonde fitted with optical turbidity sensor (with mechanical cleaning) was used to make *in-situ* turbidity measurements. The turbidity sensor was calibrated using a 2-point calibration (0 NTU and 100 NTU) with a Turbidity standard, prior to the survey and checked following the survey.
- 3.3.3 The survey vessel was positioned within 10 metres of the proposed site position and the probe was deployed over the side of the vessel to the required depth (1 m below surface, mid-depth and 1 m above bottom. Readings were allowed to stabilise before being recorded and logged at the required depth.

- 3.3.4 Procedures undertaken were in accordance with Emu Ltd.'s Oceanographic, Hydrographic and Geophysical Surveys, Methods and Procedures (EMU MET/08 and MET/09, 1998), in conjunction with the manufacturer's methods.

3.4 Water Quality Sampling

- 3.4.1 On each survey day, samples were taken from one site, at bottom depth, each hour. During the survey programme, samples were taken at all four sites.
- 3.4.2 Water samples were taken at bottom depth (1 metre above surface) using a Casella water sampler. Water samples were taken concurrently with *in-situ* turbidity measurements, in accordance with sampling methodology (EMU MET/10, 1998).
- 3.4.3 At each site, one litre sample containers were filled from the Casella water sampler. Samples were stored in a cool box and delivered to Emu Ltd Hayling Island Laboratory.
- 3.4.4 Samples were analysed for Total Suspended Solids, as saline (105°C) and reported as mg/l.
- 3.4.5 The suspended solids test results were used to provide a means of conversion of turbidity measurements recorded by the YSI turbidity sensor in NTU, to mg/l suspended solids.

4.0 RESULTS

- 4.1 Data collected during the four survey days are presented in Tables 4.1, 4.4, 4.7 and 4.10.
- 4.2 Results presented as suspended solids (mg/l) are derived from the conversion of turbidity (NTU) measurements to suspended solids mg/l, based on a calibration of measurements with suspended solids test results for samples taken at each site, during each survey.
- 4.3 Data presented includes B (1 metre above bottom), M (Mid-depth) and S (0.5 metres below surface).
- 4.4 Summary statistics for each site position on each survey day are presented in Tables 4.2, 4.3, 4.5, 4.6, 4.8, 4.9, 4.11 and 4.12.
- 4.5 Summary statistics for the survey period for each site position are presented in Table 4.13 and 4.14.

Table 4.1: Suspended Solids (mg/l) derived for turbidity measurements taken on 26th May 2005

Date d/m/y	Depth	Suspended Solids (mg/l)			
		Site 1	Site 2	Site 3	Site 4
26/05/2005	B	12.7	7.2	14.4	16.9
26/05/2005	B	16.7	10.8	13.7	15.8
26/05/2005	B	17.9	11.8	10.8	13.8
26/05/2005	B	11.2	9.0	11.4	11.1
26/05/2005	B	11.8	4.0	2.9	7.7
26/05/2005	B	9.2	11.2	15.3	7.7
26/05/2005	B	20.7	7.6	14.4	14.1
26/05/2005	B	18.7	8.2	13.0	20.7
26/05/2005	B	8.1	5.8	16.2	18.5
26/05/2005	B	14.7	12.0	14.1	15.8
26/05/2005	B	10.4	10.0	12.8	12.4
26/05/2005	B	4.6	3.4	16.2	23.8
26/05/2005	B	24.2	11.8	16.8	20.7
26/05/2005	M	10.1	9.2	12.6	15.5
26/05/2005	M	13.8	9.4	13.7	16.9
26/05/2005	M	13.5	10.2	8.1	10.8
26/05/2005	M	12.4	8.4	9.7	11.3
26/05/2005	M	7.5	4.6	2.5	5.0
26/05/2005	M	8.4	5.4	8.8	8.0
26/05/2005	M	15.3	7.8	13.9	13.5
26/05/2005	M	14.1	8.6	11.9	16.6
26/05/2005	M	7.5	5.0	15.7	18.5
26/05/2005	M	8.9	6.4	13.7	16.0
26/05/2005	M	19.3	4.8	12.1	13.0
26/05/2005	M	4.9	3.2	10.5	17.7
26/05/2005	M	13.5	11.8	14.6	17.1
26/05/2005	S	8.6	6.6	17.7	13.8
26/05/2005	S	11.5	8.2	13.7	16.3
26/05/2005	S	12.1	7.8	8.3	10.2
26/05/2005	S	10.4	7.8	7.0	10.0
26/05/2005	S	5.8	3.4	1.8	3.9
26/05/2005	S	6.1	4.8	2.7	5.5
26/05/2005	S	11.5	7.0	11.4	13.8
26/05/2005	S	11.2	7.8	11.9	16.3
26/05/2005	S	6.9	4.6	14.6	15.8
26/05/2005	S	6.1	4.6	12.6	15.5
26/05/2005	S	29.4	4.4	9.7	11.6
26/05/2005	S	4.3	3.6	5.8	12.4
26/05/2005	S	9.2	4.2	10.8	15.5

Table 4.2: Summary Statistics for measurements at Site 1 and 2 on 26th May 2005

	1B	1M	1S	2B	2M	2S
Mean	13.9	11.5	10.2	8.7	7.3	5.8
Min	4.6	4.9	4.3	3.4	3.2	3.4
Max	24.2	19.3	29.4	12.0	11.8	8.2
SD	5.5	4.0	6.3	3.0	2.6	1.8
95%ile	22.1	16.9	19.0	11.9	10.8	8.0
99%ile	23.8	18.8	27.3	12.0	11.6	8.2

Table 4.3: Summary Statistics for measurements at Site 3 and 4 on 26th May 2005

	3B	3M	3S	4B	4M	4S
Mean	13.2	11.4	9.8	15.3	13.8	12.4
Min	2.9	2.5	1.8	7.7	5.0	3.9
Max	16.2	15.7	17.7	23.8	18.5	16.3
SD	4.0	3.5	4.6	4.9	4.1	4.0
95%ile	15.8	15.0	15.8	22.0	18.0	16.3
99%ile	16.1	15.6	17.4	23.4	18.4	16.3

Table 4.4: Suspended Solids (mg/l) derived for turbidity measurements taken on 8th June 2005

Date d/m/y	Depth	Suspended Solids (mg/l)			
		Site 1	Site 2	Site 3	Site 4
08/06/2005	B	1.2	5.0	7.0	6.9
08/06/2005	B	16.7	9.4	7.6	7.7
08/06/2005	B	14.4	5.2	1.6	4.7
08/06/2005	B	19.3	11.8	4.5	5.0
08/06/2005	B	28.2	10.2	6.5	6.9
08/06/2005	B	19.0	2.0	9.4	7.2
08/06/2005	B	13.0	9.0	8.3	14.1
08/06/2005	B	5.5	11.8	12.1	10.2
08/06/2005	B	25.1	13.6	10.8	16.3
08/06/2005	B	1.7	8.0	15.0	28.8
08/06/2005	B	3.7	3.4	5.4	17.7
08/06/2005	B	45.0	2.0	6.5	8.6
08/06/2005	B	1.4	1.0	17.5	18.5
08/06/2005	M	1.4	2.4	7.0	6.9
08/06/2005	M	7.5	3.6	6.5	7.5
08/06/2005	M	5.8	4.0	3.4	5.3
08/06/2005	M	6.3	4.4	2.2	2.5
08/06/2005	M	8.6	3.6	5.8	2.5
08/06/2005	M	7.2	1.0	7.0	8.0
08/06/2005	M	7.5	4.2	5.6	8.3
08/06/2005	M	3.5	5.6	10.8	9.4
08/06/2005	M	14.4	5.6	10.1	11.9
08/06/2005	M	2.6	3.0	9.0	14.9
08/06/2005	M	1.7	3.2	4.9	9.1
08/06/2005	M	10.7	1.4	6.7	7.7
08/06/2005	M	1.2	0.8	5.8	11.1
08/06/2005	S	1.4	1.4	7.2	7.7
08/06/2005	S	4.3	1.6	5.8	7.7
08/06/2005	S	11.8	1.8	3.1	3.6
08/06/2005	S	3.2	2.0	2.2	1.4
08/06/2005	S	3.7	1.2	2.9	0.8
08/06/2005	S	3.2	0.6	6.7	6.6
08/06/2005	S	5.5	2.6	5.2	8.0
08/06/2005	S	2.9	4.0	8.8	8.6
08/06/2005	S	7.2	2.8	9.2	10.5
08/06/2005	S	1.4	2.0	5.6	8.8
08/06/2005	S	3.2	5.4	3.4	5.3
08/06/2005	S	5.8	1.8	6.3	6.4
08/06/2005	S	1.2	0.8	4.0	7.7

Table 4.5: Summary Statistics for measurements at Site 1 and 2 on 8th June 2005

	1B	1M	1S	2B	2M	2S
Mean	14.9	6.0	4.2	7.1	3.3	2.2
Min	1.2	1.2	1.2	1.0	0.8	0.6
Max	45.0	14.4	11.8	13.6	5.6	5.4
SD	12.9	3.9	2.9	4.3	1.6	1.3
95%ile	34.9	12.2	9.0	12.5	5.6	4.6
99%ile	43.0	14.0	11.3	13.4	5.6	5.2

Table 4.6: Summary Statistics for measurements at Site 3 and 4 on 8th June 2005

	3B	3M	3S	4B	4M	4S
Mean	8.6	6.5	5.4	11.7	8.1	6.4
Min	1.6	2.2	2.2	4.7	2.5	0.8
Max	12.1	10.8	9.2	28.8	14.9	10.5
SD	3.2	2.4	2.2	7.0	3.5	2.9
95%ile	11.6	10.4	8.9	22.6	13.1	9.5
99%ile	12.0	10.7	9.1	27.5	14.6	10.3

Table 4.7: Suspended Solids (mg/l) derived for turbidity measurements taken on 17th June 2005

Date d/m/y	Depth	Suspended Solids (mg/l)			
		Site 1	Site 2	Site 3	Site 4
17/06/2005	B	6.1	0.2	12.6	3.9
17/06/2005	B	0.3	3.0	2.7	5.5
17/06/2005	B	1.2	1.2	2.2	0.8
17/06/2005	B	3.5	2.4	5.2	5.0
17/06/2005	B	0.3	3.0	0.2	1.4
17/06/2005	B	1.2	0.2	0.9	1.9
17/06/2005	B	2.0	0.6	1.6	1.7
17/06/2005	B	0.0	2.0	2.2	0.8
17/06/2005	B	0.9	6.2	0.2	3.9
17/06/2005	B	2.0	0.2	0.4	0.3
17/06/2005	B	3.5	0.0	1.1	1.1
17/06/2005	B	2.6	1.8	1.8	5.0
17/06/2005	B	9.5	0.8	0.9	6.9
17/06/2005	M	0.6	0.6	3.1	1.7
17/06/2005	M	0.6	0.4	0.9	2.5
17/06/2005	M	1.2	0.8	0.2	0.3
17/06/2005	M	3.5	2.2	5.6	4.4
17/06/2005	M	0.0	0.0	0.0	0.6
17/06/2005	M	1.2	0.2	0.4	0.6
17/06/2005	M	2.3	1.4	0.7	0.8
17/06/2005	M	0.9	0.4	0.2	0.6
17/06/2005	M	1.2	0.0	0.0	0.8
17/06/2005	M	1.7	1.0	0.4	1.1
17/06/2005	M	3.2	1.8	1.8	1.9
17/06/2005	M	2.6	1.8	1.8	3.9
17/06/2005	M	1.2	1.6	0.0	1.4
17/06/2005	S	1.2	0.4	8.1	1.1
17/06/2005	S	0.6	0.4	0.2	0.8
17/06/2005	S	0.9	1.0	0.7	1.7
17/06/2005	S	3.7	2.4	9.0	3.9
17/06/2005	S	0.9	0.0	0.9	0.8
17/06/2005	S	1.2	0.8	1.1	1.4
17/06/2005	S	2.3	5.0	0.0	0.8
17/06/2005	S	1.2	0.8	0.2	0.0
17/06/2005	S	1.4	0.8	0.0	0.6
17/06/2005	S	1.7	1.0	0.9	1.1
17/06/2005	S	3.2	1.8	1.6	2.5
17/06/2005	S	2.0	1.6	1.8	1.1
17/06/2005	S	0.9	1.6	0.9	1.7

Table 4.8: Summary Statistics for measurements at Site 1 and 2 on 17th June 2005

	1B	1M	1S	2B	2M	2S
Mean	2.5	1.5	1.6	1.7	0.9	1.4
Min	0.0	0.0	0.6	0.0	0.0	0.0
Max	9.5	3.5	3.7	6.2	2.2	5.0
SD	2.7	1.1	1.0	1.7	0.8	1.3
95%ile	7.4	3.3	3.4	4.3	2.0	3.4
99%ile	9.1	3.4	3.7	5.8	2.2	4.7

Table 4.9: Summary Statistics for measurements at Site 3 and 4 on 17th June 2005

	3B	3M	3S	4B	4M	4S
Mean	2.5	1.2	2.0	2.9	1.6	1.3
Min	0.2	0.0	0.0	0.3	0.3	0.0
Max	12.6	5.6	9.0	6.9	4.4	3.9
SD	3.9	1.6	3.0	2.2	1.3	1.0
95%ile	9.6	4.1	8.4	6.1	4.1	3.0
99%ile	12.0	5.3	8.9	6.7	4.4	3.7

Table 4.10: Suspended Solids (mg/l) derived for turbidity measurements taken on 23rd June 2005

Date d/m/y	Depth	Suspended Solids (mg/l)			
		Site 1	Site 2	Site 3	Site 4
23/06/2005	B	1.7	1.6	12.8	13.0
23/06/2005	B	0.9	11.8	8.5	10.2
23/06/2005	B	0.3	0.2	5.8	6.9
23/06/2005	B	0.0	1.6	3.4	4.1
23/06/2005	B	8.4	0.0	9.7	7.7
23/06/2005	B	4.9	2.8	9.0	11.1
23/06/2005	B	6.1	14.6	9.0	10.8
23/06/2005	B	4.0	6.6	21.8	21.8
23/06/2005	B	5.8	9.4	11.4	14.4
23/06/2005	B	0.9	7.8	23.6	20.2
23/06/2005	B	16.4	9.6	12.8	17.7
23/06/2005	B	14.1	2.2	12.6	17.7
23/06/2005	B	1.7	7.0	15.7	14.1
23/06/2005	M	1.7	1.2	11.2	12.2
23/06/2005	M	0.0	4.8	7.6	8.8
23/06/2005	M	0.9	0.4	4.7	8.8
23/06/2005	M	0.0	1.2	4.7	4.7
23/06/2005	M	6.6	0.6	4.3	5.0
23/06/2005	M	3.5	2.0	8.1	10.5
23/06/2005	M	5.2	7.8	8.3	9.4
23/06/2005	M	3.2	3.0	13.2	15.5
23/06/2005	M	3.5	2.8	10.3	13.8
23/06/2005	M	0.9	2.8	16.4	23.0
23/06/2005	M	11.2	6.0	13.7	13.8
23/06/2005	M	8.1	1.6	10.5	13.8
23/06/2005	M	2.0	4.2	10.8	13.0
23/06/2005	S	19.3	1.8	9.9	9.4
23/06/2005	S	0.3	1.4	7.2	8.6
23/06/2005	S	0.3	0.6	4.5	4.7
23/06/2005	S	0.6	0.6	4.3	5.0
23/06/2005	S	1.4	0.4	2.0	3.9
23/06/2005	S	2.9	1.8	7.9	10.2
23/06/2005	S	5.2	5.6	7.4	9.1
23/06/2005	S	2.3	1.8	10.5	14.4
23/06/2005	S	2.6	1.2	10.8	11.1
23/06/2005	S	0.9	1.4	10.5	16.3
23/06/2005	S	8.4	11.2	7.4	7.7
23/06/2005	S	4.0	1.2	10.1	12.2
23/06/2005	S	2.0	2.2	9.0	13.3

Table 4.11: Summary Statistics for measurements at Site 1 and 2 on 23rd June 2005

	1B	1M	1S	2B	2M	2S
Mean	5.0	3.6	3.9	5.8	3.0	2.4
Min	0.0	0.0	0.3	0.0	0.4	0.4
Max	16.4	11.2	19.3	14.6	7.8	11.2
SD	5.2	3.4	5.2	4.7	2.2	2.9
95%ile	15.0	9.3	12.7	12.9	6.7	7.8
99%ile	16.1	10.9	18.0	14.3	7.6	10.5

Table 4.12: Summary Statistics for measurements at Site 3 and 4 on 23rd June 2005

	3B	3M	3S	4B	4M	4S
Mean	12.0	9.5	7.8	13.1	11.7	9.7
Min	3.4	4.3	2.0	4.1	4.7	3.9
Max	21.8	16.4	10.8	21.8	23.0	16.3
SD	5.2	3.7	2.8	5.3	4.8	3.8
95%ile	18.2	14.8	10.6	20.8	18.5	15.2
99%ile	21.1	16.1	10.7	21.6	22.1	16.1

Table 4.13: Summary Statistics for measurements at Site 1 and 2 for the survey period

	1B	1M	1S	2B	2M	2S
Mean	9.1	5.7	5.0	5.8	3.6	2.9
Min	0.0	0.0	0.3	0.0	0.0	0.0
Max	45.0	19.3	29.4	14.6	11.8	11.2
SD	9.2	4.9	5.3	4.4	3.0	2.5
95%ile	24.6	14.3	11.9	11.9	9.3	7.8
99%ile	36.4	17.3	24.3	14.1	11.0	9.7

Table 4.14: Summary Statistics for measurements at Site 3 and 4 for the survey period

	3B	3M	3S	4B	4M	4S
Mean	9.1	7.1	6.3	10.8	8.8	7.4
Min	0.2	0.0	0.0	0.3	0.3	0.0
Max	23.6	16.4	17.7	28.8	23.0	16.3
SD	6.0	4.8	4.3	6.9	5.9	5.2
95%ile	17.1	14.2	13.1	21.2	17.4	16.0
99%ile	22.7	16.0	16.1	26.2	20.7	16.3

REFERENCES

Emu Ltd Oceanographic, Hydrographic and Geophysical Surveys – Methods and Procedures (DocRef No: Emu Met/08)

Emu Ltd Oceanographic, Hydrographic and Geophysical Surveys – Data Analysis (Doc. Ref. No: Emu Met/09)

Emu Ltd Bacteriological Sampling Methods and Procedures - (Doc. Ref. No: Emu Met/10)

Emu Ltd Procedures for Determination of Suspended Solids – (Doc Ref. Emu MET/17).

AUDIT TRAIL

Title : Cross Solent Pipeline Background Turbidity Monitoring			
Draft Final Report No: 05/J/1/04/0821/0516			
Job No: J/1/04/0821			
Client Name: Halcrow Group			
Client Contact: Rob Elvery			
Project Manager	Dr Andy Addleton		
Report written by	Clare Smith Dr Andy Addleton		
Report checked by	Dr Andy Addleton		
Fieldwork/analysis by	Andy Addleton Gordon Bates Andrew Gowland Sam Stanton Maxine Parker Tamsin Gamble		
Report Authorised by	Mr Simon Shaw		

APPENDICES

APPENDIX I

Sampling & Weather Observations

**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X-SOLENT PIPELINE
Date: 26.05.05

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Scientist: SAS

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	1b	07:37	97640.5	445543.8	4	SW	0.5	NE/E	2	N	6	2	4.4
	1m	07:38	97650.5	445559.0									3.5
	1s	07:38	97658.8	445571.8									3
	2b	07:44	97809.0	446011.0									3.6
	2m	07:44	97817.0	446037.1									4.6
	2s	07:44	97821.4	446049.0									3.3
	3b	07:57	97821.4	446572.3									6.4 tide 4.5 knott
	3m	07:57	95715.6	446609.5									5.6
	3s	07:58	95741.6	446635.0									7.9
	4b	08:01	95761.5	446967.7	4	SW							6.1
	4m	08:01	96046.2	446998.5									5.6
	4s	08:01	96074.1	447031.6									5
	1b	08:37	96101.9	445549	3.9	SW				N	6	5	5.8 tide 2.1 knott
	1m	08:37	97636.0	445560.6									4.8
	1s	08:38	97647.3	445578.8									4
	2b	08:44	97808.1	446036.7									5.4
	2m	08:44	97816.2	446057.6									4.7
	2s	08:44	97822.0	446074.1									4.1

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
4 = Moderate, waves (0.6-1.2m) 2-4ft fairly frequent white horses 5 = Rough, waves (1.2m - 2.4m) 4-8ft, many white horses 6 = Very rough, waves exceeding (2.4m) 8ft

Cloud: Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X-SOLENT PIPELINE
Date: 26.05.05

Job No.: J/1/04/0821
Site/Boat: SEEJAY

Scientist: SAS

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	3b	08:57	95744.5	446625.3	3.5	SW	0.5	NE	2	N	6	6	6.1 tide
	3m	08:57	95768.8	446652.4					2	N	6	6	6.1
	3t	08:58	95793.8	446681.2					2	N	6	6	6.1
	4b	09:00	96025.6	446999.5					2	N	6	6	6.1
	4m	09:00	96042.4	447020.5					2	N	6	6	6.1
	4t	09:00	96062.3	44745.7					2	N	5	6	5.9
	1b	09:24	97646.6	445545.9					2 - 3	N	5	6	6.2
	1m	09:25	97655.9	445557.6					2 - 3				4.7
	1t	09:25	97664.4	445570.3									4.2
	2b	09:30	97795.5	446025.8									5.9
	2m	09:30	97801.1	446043.9									5.1
	2t	09:30	97811.6	446079.5									3.9
	3b	09:41	95731.0	446598.2	4	SW			2	N	6	5	4.8
	3m	09:41	95760.3	446627.9									3.6
	3t	09:42	95767.1	446657.3									3.7
	4b	09:45	96010.0	446962.8									5
	4m	09:46	96044.0	446993.5									3.9
	4t	09:46	96066.4	447016.3									3.7

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
4 = Moderate, waves (0.6-1.2m) 2-4ft fairly frequent white horses 5 = Rough, waves (1.2m - 2.4m) 4-8ft, many white horses 6 = Very rough, waves exceeding (2.4m) 8ft

Cloud: Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X Solemt Pipeline
Date: 26/05/2005

Job No.: J/1/04/0821
Site/Boat: Cee Jay

Scientist: SAS

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	1b	10:32	97677.5	444570.9			0.5	NE/E					3.9
	1m	10:32	97684.8	445580.8									4.3
	1s	10:32	97690.0	445589.9									3.6
	2b	10:38	97808.0	446036.9									4.5
	2m	10:38	97814.6	446057.9									4.2
	2s	10:39	97824.9	446077.3					3	N	7		3.9
	3b	10:50	95726.1	446571.5	6.2	SW			2/3	N	7		5.1
	3m	10:50	95749.0	446591.1									4.3
	3s	10:51	95772.6	445615.6									3.1
	4b	10:55	96014.0	44695.6									4.0
	4m	10:56	96027.2	446971.4									4.1
	4s	10:56	96046.9	446993.4									3.6
	1b	11:32	97626.4	445545.7									4.1
	1m	11:32	97630.3	445551.1									2.6
	1s	11:32	97633.4	445553.3									2.0
	2b	11:38	97800.9	445998.0									2.0
	2m	11:38	97803.7	446002.3									2.3
	2s	11:39	97808.9	446007.6									1.7

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
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Cloud: Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

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**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X Solent Pipeline
Date: 26/05/2005

Job No.: J/1/04/0821
Site/Boat: Cee Jay

Scientist: SAS

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	3b	11:50	95723.9	446586.9	3.9	W	0.5	NE/E	3	N	6	5	1.3
	3m	11:50	95729.0	446594.1									1.1
	3s	11:50	95735.1	446601.4									0.8
	4b	11:54	95993.9	446946.1									2.8
	4m	11:54	95998.2	446949.6									1.8
	4s	11:55	96002.0	446949.8									1.4
	1b	12:30	97648.0	445544.6									3.2
	1m	12:31	97651.0	445539.5									2.9
	1s	12:31	97650.3	445534.3									2.1
	2b	12:38	97796.0	445994.0									5.6
	2m	12:38	97792.6	445976.4									2.7
	2s	12:39	97789.8	445966.0									2.4
	3b	12:52	95696.0	446556.2									6.8
	3m	12:52	95686.3	446545.8									3.9
	3s	12:53	95672.1	446532.1									1.2
	4b	12:58	95977.0	446935.6									2.8
	4m	12:58	95961.9	446918.6									2.9
	4s	12:59	95941.8	446897.2	5.3	SW	0.7	NE/E	4	N	5	6	2.0

Sea State: 0 = Calm,glassy 1 = Calm,rippled 2 = Smooth,wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight,waves (30-60cm) 1-2ft, perhaps scattered white horses
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Emu Ltd
Sampling & Weather Record Sheet

Job Name: X Solent Pipeline
Date: 26/05/2005

Job No.: J/1/04/0821
Site/Boat: Cee Jay

Scientist: SAS

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	1b	13:27	97643.8	445531.8					4	N	5	6	7.2
	1m	13:27	97642.7	445526.7									5.3
	1s	13:28	97641.9	445522.0									4.0
	2b	13:33	97784.0	446006.7									3.8
	2m	13:33	97769.0	445988.8									3.9
	2s	13:34	97752.4	445965.9									3.5
	3b	13:44	95694.5	446568.5									6.4
	3m	13:44	95641.5	446578.3									6.2
	3s	13:45	95616.8	446498.1									5.1
	4b	13:51	95970.1	446959.2									5.1
	4m	13:51	95938.9	446930.6									4.9
	4s	13:52	95916.5	446808.5	3.0	W			4	N	5	6	5.0
	1b	14:30	97615.7	445535.5									6.5
	1m	14:30	97610.2	445522.5									4.9
	1s	14:31	97605.4	445512.4									3.9
	2b	14:38	97785.1	445993.5									4.1
	2m	14:38	97771.4	445966.8									4.3
	2s	14:39	97765.6	445954.1	4.0	W							3.9

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
4 = Moderate, waves (0.6-1.2m) 2-4ft fairly frequent white horses 5 = Rough, waves (1.2m - 2.4m) 4-8ft, many white horses 6 = Very rough, waves exceeding (2.4m) 8ft

Cloud: Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X Solent Pipeline
Date: 26/05/2005

Job No.: J/1/04/0821
Site/Boat: Cee Jay

Scientist: SAS

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	3b	14:51	95673.6	446527.7	4	W	0.5	SE	3	N	5	6	5.8
	3m	14:52	95651.7	446509.9									5.3
	3s	14:52	95637.5	446416.3									5.3
	4b	14:57	95985.8	446929.8									7.5
	4m	14:58	95964.0	446903.6									6.0
	4s	13:55	95948.2	446887.0									5.9
	1b	15:30	97616.4	445570.1									2.8
	1m	15:31	97611.0	445562.3									2.6
	1s	15:31	97606.9	445554.8									2.4
	2b	15:34	97792.8	445997.8									2.9
	2m	15:34	97789.2	445983.7									2.5
	2s	15:40	97784.2	445966.6									2.3
	3b	15:52	95670.1	446581.1	3.5	SW			3	N	5	6	7.2
	3m	15:53	95651.1	446564.0									7.0
	3s	15:53	95637.8	446551.7									6.5
	4b	15:59	95991.8	446941.6									6.7
	4m	15:59	95983.2	446929.7									6.7
	4s	00:00	95972.4	446916.1									5.7

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
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Cloud: Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X Solent Pipeline
Date: 26/05/2005

Job No.: J/1/04/0821
Site/Boat: Cee Jay

Scientist: SAS

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	1b	16:28	97640.3	445558.5									5.1
	1m	16:28	97643.1	445564.1									3.1
	1s	16:29	96743.3	445567.2									2.1
	2b	16:37	97790.1	446010.1									6.0
	2m	16:37	97791.8	446012.2									3.2
	2s	16:37	97793.8	446013.3									2.3
	3b	16:47	95696.8	446554.0									6.3
	3m	16:47	95691.4	446546.1									6.1
	3s	16:47	95685.8	446539.3									5.6
	4b	16:51	95996.2	446960.0									5.7
	4m	16:51	95993.5	446953.5									5.8
	4s	16:52	95989.6	446947.3	4.1	SW	0.4		3	N	5	6	5.6
	1b	17:27	97642.6	445556.8									3.6
	1m	17:27	97645.9	445562.2									6.7
	1s	17:27	97647.0	445565.7									10.2
	2b	17:34	97798.4	446006.7									5.0
	2m	17:34	97803.0	446009.9									2.4
	2s	17:34	97806.6	446013.3	4.9	SW	0.3-4		3	N	5	6	2.2

Sea State: 0 = Calm,glassy 1 = Calm,rippled 2 = Smooth,wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight,waves (30-60cm) 1-2ft, perhaps scattered white horses
4 = Moderate,waves (0.6-1.2m) 2-4ft fairly frequent white horses 5 = Rough, waves (1.2m - 2.4m) 4-8ft, many white horses 6 = Very rough, waves exceeding (2.4m) 8ft

Cloud: Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

Emu Ltd
Sampling & Weather Record Sheet

Job Name: X Solent Pipeline
Date: 26/05/2005

Job No.: J/1/04/0821
Site/Boat: Cee Jay

Scientist: SAS

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	3b	17:46	95713.8	446568.4					3	N	5	6	5.7
	3m	17:46	95717.5	446571.9									5.4
	3s	17:46	95721.7	446578.0									4.3
	4b	17:50	96015.2	446977.7									4.5
	4m	17:50	96022.1	446984.0									4.7
	4s	17:50	96027.4	446991.0									4.2
	1b	18:29	97639.4	445541.6									1.6
	1m	18:29	97643.9	445551.8									1.7
	1s	18:29	97647.6	445555.6									1.5
	2b	18:34	97803.4	446001.4									1.7
	2m	18:35	97808.9	446017.0									1.6
	2s	18:35	97815.3	446026.9	2.0	SW							1.8
	3b	18:48	95714.7	446575.3									7.2
	3m	18:48	95738.1	446596.2									4.7
	3s	18:49	95748.2	446614.2									2.6
	4b	18:51	96009.0	446980.6									8.6
	4m	18:52	96025.3	447003.0									6.4
	4s	18:52	96041.3	447027.9					3	N	4	7	4.5

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
4 = Moderate, waves (0.6-1.2m) 2-4ft fairly frequent white horses 5 = Rough, waves (1.2m - 2.4m) 4-8ft, many white horses 6 = Very rough, waves exceeding (2.4m) 8ft

Cloud: Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X-Solent
Date: 08/06/2005

Job No.: J/1/04/0821
Site/Boat: Cee Jay

Scientist: SAS

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	1b	07:25	97646.7	445542.5	4.0	E	0.5		2	N	8	2	0.4
	1m	07:25	97651.0	446544.3									0.5
	1s	07:26	97653.1	445545.8									0.5
	2b	07:29	97802.0	446028.7									2.5
	2m	07:29	97806.2	446039.4									1.2
	2s	07:30	97809.9	446047.6									0.7
	3b	07:44	95726.7	446592.8									3.1
	3m	07:44	95741.6	446609.8									3.1
	3s	07:45	95761.4	446630.5									3.2
	4b	07:47	96016.6	446977.2									2.5
	4m	07:48	96053.0	446996.2									2.5
	4s	07:48	96049.8	447016.0									2.8
	1b	08:19	97629.2	445551.1	5.1	SE	0.5		2	N	8	2	5.8
	1m	08:19	97630.4	445556.8									2.6
	1s	08:19	97630.9	445561.0									1.5
	2b	08:23	97810.1	446012.7									4.7
	2m	08:23	97816.4	446022.1									1.8
	2s	08:23	97827.4	446029.1									0.8

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
4 = Moderate, waves (0.6-1.2m) 2-4ft fairly frequent white horses 5 = Rough, waves (1.2m - 2.4m) 4-8ft, many white horses 6 = Very rough, waves exceeding (2.4m) 8ft

Cloud: Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

**Emu Ltd
Sampling & Weather Record Sheet**

X-SOLENT PIPELINE
26.05.05

Job No.: J/1/04/0821
Site/Boat: SEEJAY

Scientist: SAS

Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
		Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
3b	08:57	95744.5	446625.3	3.5	SW	0.5	NE	2	N	6	6	6.1 tide
3m	08:57	95768.8	446652.4					2	N	6	6	6.1
3s	08:58	95793.8	446681.2					2	N	6	6	6.1
4b	09:00	96025.6	446999.5					2	N	6	6	6.1
4m	09:00	96042.4	447020.5					2	N	6	6	6.1
4s	09:00	96062.3	44745.7					2	N	5	6	5.9
1b	09:24	97646.6	445545.9					2 - 3	N	5	6	6.2
1m	09:25	97655.9	445557.6					2 - 3				4.7
1s	09:25	97664.4	445570.3									4.2
2b	09:30	97795.5	446025.8									5.9
2m	09:30	97801.1	446043.9									5.1
2s	09:30	97811.6	446079.5									3.9
3b	09:41	95731.0	446598.2	4	SW			2	N	6	5	4.8
3m	09:41	95760.3	446627.9									3.6
3s	09:42	95767.1	446657.3									3.7
4b	09:45	96010.0	446962.8									5
4m	09:46	96044.0	446993.5									3.9
4s	09:46	96066.4	447016.3									3.7

0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
4 = Moderate, waves (0.6-1.2m) 2-4ft fairly frequent white horses 5 = Rough, waves (1.2m - 2.4m) 4-8ft, many white horses 6 = Very rough, waves exceeding (2.4m) 8ft

Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: x-solent
Date: 08/06/2005

Job No.: J/1/04/0821
Site/Boat: ceejay

Scientist: SAS

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	1b	10:19	97642.0	445549.0	4.0	SE	0.2	SE	2	N	8	1	6.7
	1m	10:19	97645.6	445550.1									2.2
	1s	10:19	97647.1	445549.8									1.1
	2b	10:23	97801.6	446014.5									5.9
	2m	10:24	97604.3	446015.3									2.2
	2s	10:38	97807.3	446015.8									1.0
	3b	10:39	95721.2	446563.3									2.0
	3m	10:39	95728.5	446566.3									1.0
	3s	10:42	95736.5	446570.7									1.0
	4b	10:42	96002.5	446964.8									1.8
	4m	10:42	96005.2	446958.8									0.9
	4s	11:22	96011.2	446976.2									0.5
	1b	11:22	97631.9	445545.7	3.7	SE	0.1		1	N	10	0	9.8
	1m	11:22	97622.1	445534.6									3.0
	1s	11:22	97620.2	445529.5									1.9
	2b	11:27	97794.4	445992.3									5.1
	2m	11:28	97794.2	445981.9									1.8
	2s	11:43	97794.2	445972.8									0.6

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
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Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X Solent Pipeline
Date: 08/06/2005

Job No.: J/1/04/0821
Site/Boat: Cee Jay

Scientist: SAS

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	3b	11:43	95676.1	446554.2			0.3		1	N	10	0	2.9
	3m	11:43	95666.4	446546.5									2.6
	3s	11:43	95654.3	446536.3									1.3
	4b	11:48	95996.0	446959.6									2.5
	4m	11:48	95987.9	446949.7									0.9
	4s	11:48	95978.3	446938.9	3.1	E	0.2		1	N	10	0	0.3
	1b	12:19	97630.0	445557.5									6.6
	1m	12:19	97623.6	445545.3									2.5
	1s	12:19	97619.8	445536.7									1.1
	2b	12:27	97791.1	446060.5									1.0
	2m	12:27	97783.7	445985.3									0.5
	2s	12:27	977789.9	445967.4									0.3
	3b	12:42	95703.0	446529.9									4.2
	3m	12:42	95682.0	446561.8									3.1
	3s	12:43	95663.3	446477.8									3.0
	4b	12:49	95996.3	446962.4									2.6
	4m	12:49	95979.9	446939.2									2.9
	4s	12:49	95966.5	446919.4									2.4

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
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Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X-SOLENT
Date: 08.06.05

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Scientist: SAS

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	subdisy
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	1b	13:16	97635.0	445559.1	5.6	SW	0.5		2	N	10	0	4.5
	1m	13:16	97632.9	445552.5									2.6
	1s	13:16	97631.1	445544.4									1.9
	2b	13:20	97790.8	446000.0									4.5
	2m	13:20	97784.9	445986.7									2.1
	2s	13:21	97780.3	445974.2									1.3
	3b	13:31	95702.9	44652.1									3.4
	3m	13:31	95686.7	446542.1									2.5
	3s	13:32	95668.4	446521.0									2.3
	4b	13:36	95988.7	446955.3									5.1
	4m	13:36	95972.8	446936.3									3.0
	4s	13:36	95957.0	446915.4									2.9
	1b	14:18	97629.7	445540.3	4.0	SW	0.5		2	N	10	1	1.9
	1m	14:18	97625.10	445530.3									1.2
	1s	14:18	97620.0	445516.2									1.0
	2b	14:22	97781.1	445997.7									5.9
	2m	14:22	97773.3	445980.8									2.8
	2s	14:22	97768.4	445966.3									2.0

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
4 = Moderate, waves (0.6-1.2m) 2-4ft fairly frequent white horses 5 = Rough, waves (1.2m - 2.4m) 4-8ft, many white horses 6 = Very rough, waves exceeding (2.4m) 8ft

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**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X-SOLENT
Date: 08.06.05

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Scientist: SAS

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	3b	14:37	95676.4	445966.3					1	N	10	1	5.4
	3m	14:38	95636.8	446571.6									4.8
	3s	14:38	95636.8	446549.2									3.9
	4b	14:42	95989.4	446531.0									3.7
	4m	14:43	95978.2	446954.8									3.4
	4s	14:43	95967.6	446938.1									3.1
	1b	15:16	97657.0	446922.8									8.7
	1m	15:16	97658.4	445554.5	4.3	E	0.3		2	N	10	1	5.0
	1s	15:16	97658.6	445551.4									2.5
	2b	15:21	97797.2	445548.5									6.8
	2m	15:21	97795.2	446004.7									2.8
	2s	15:21	97793.8	445993.7									1.4
	3b	15:32	95709.3	445982.1									4.8
	3m	15:32	95700.0	446571.3									4.5
	3s	15:32	95691.9	446557.7									4.1
	4b	15:37	96001.0	446546.8									5.9
	4m	15:37	95992.5	446944.6									4.3
	4s	15:37	95986.7	446935.2									3.8

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
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**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X-SOLENT
Date: 08.06.05

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Scientist: SAS

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	lb	16:17	97638.8	445552.4	5.3	E			1	N	10	0	0.6
	1m	16:17	97640.3	445537.7									0.9
	1s	16:17	97641.3	445550.6									0.5
	2b	16:21	97786.4	446015.7									4
	2m	16:21	97783.3	446015.3									1.5
	2s	16:22	97780.9	446013.8									1
	3b	16:31	95707.0	446573.0									6.7
	3m	16:31	95700.1	446568.3									4
	3s	16:32	95689.2	446563.3									25
	4b	16:36	95997.1	446961.4									10.4
	4m	16:36	95995.1	44697.6									5.4
	4s	16:36	95993.0	446953.5									3.2
	1b	17:14	97636.7	445547.1	6.3	NE	0.5		2	N	10	0	0.6
	1m	17:14	97636.8	445546.2									1.1
	1s	17:14	97636.8	445545.9									1.7
	2b	17:18	977870.1	446014.5									1.7
	2m	17:18	97778.8	446017.6									1.6
	2s	17:18	97778.6	446019.4									2.7

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
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Cloud: Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

**Emu Ltd
Sampling & Weather Record Sheet**

X-SOLENT
08.06.05

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Scientist: SAS

Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
		Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
3b	17:33	95712.9	446572.5									2.4
3m	17:33	95721.7	446578.6									2.2
3s	17:33	95732.3	446585.7									1.5
4b	17:37	96019.7	446975.3									6.4
4m	17:37	96077.7	446981.5									3.5
4s	17:37	96035.3	446989.5									1.9
1b	18:13	97640.2	445557.5	3.6	NE	0.3		2	N	10	0	15.6
1m	18:13	97642.2	445561.8									3.7
1s	18:13	97643.8	445565.4									2
2b	18:18	97798.8	446002.8									1
2m	18:18	97804.2	446007.6									0.7
2s	18:19	97808.1	446013.1									0.9
3b	18:34	95727.8	446575.9									2.9
3m	18:34	95745.2	446593.5									3
3s	18:35	95760.3	446608.6									2.8
4b	18:39	96005.1	446980.3									3.1
4m	18:40	96018.0	446699.1									2.8
4s	18:40	96028.6	447011.8									2.3

0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
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Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

Emu Ltd
Sampling & Weather Record Sheet

Job Name: X-SOLENT PIPELINE
Date: 17.06.05

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Equip. ID: YSI
Scientist: AMA/AEG

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	1s	07:10	97618.3	445550.9	6.8	235	0.3	E-W=1 KN	3	N	6	6	0.4
	1m	07:11	97606.9	445536.5									0.2
	1b	07:12	97595.0	445516.0									2.1
	2s	07:17	97800.6	446033.9									0.2
	2m	07:17	97799.7	446028.3									0.3
	2b	07:17	97796.9	446019.7									0.1
	3s	07:25	95686.1	446593.9			0.1		2				3.6
	3m	07:26	95673.6	446591.6									1.4
	3b	07:27	95639.4	446564.7									5.6 sample taken
	4b	07:38	95990.0	446973.9									1.4
	4m	07:38	95966.3	446954.8									0.6
	4s	07:39	95946.6	446937.4									0.4
	1b	08:10	97646.7	445562.1	4.8	215	0.3	E-W=2 KN	3	N	4	8	0.1
	1m	08:11	97642.7	445557.2									0.2
	1s	08:12	97641.0	445554.7									0.2
	2b	08:16	97796.7	446005.1									1.5
	2m	08:16	97790.6	445987.3									0.2
	2s	08:17	97787.9	445978.0									0.2

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
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Cloud: Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

Emu Ltd
Sampling & Weather Record Sheet

Job Name: X-SOLENT PIPELINE
Date: 17.06.05

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Equip. ID: YSI
Scientist: AMA/AEG

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	3b	08:28	95625.4	446521.8									1.2 sample taken
	3m	08:28	95612.3	446508.4									0.4
	3s	08:29	95590.1	446489.8									0.1
	4b	08:34	95998.8	446964.6									2
	4m	08:35	95983.8	446942.9									0.9
	4s	08:35	95970.1	446927.4	5.4	240	<0.1	E-W 2km	1	N	4 - 5	8	0.3
	1b	09:13	97639.3	445564.7									0.4
	1m	09:13	97641.5	445563.7									0.4
	1s	09:13	97642.9	445562.9									0.3
	2b	09:17	97792.0	446014.2									0.6
	2m	09:17	97782.8	446003.1									0.4
	2s	09:18	97777.3	445995.7									0.5
	3b	09:28	95666.6	446541.8									1
	3m	09:29	95655.4	446520.7									0.1
	3s	09:29	95644.7	446505.7									0.3
	4b	09:35	96007.5	44694.1									0.3
	4m	09:35	95996.9	446946.1									0.1
	4s	09:35	95988.9	446934.6	3.2	225	<0.1	E-W	1	N	5	8	0.6

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
4 = Moderate, waves (0.6-1.2m) 2-4ft fairly frequent white horses 5 = Rough, waves (1.2m - 2.4m) 4-8ft, many white horses 6 = Very rough, waves exceeding (2.4m) 8ft

Cloud: Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X-SOLENT PIPELINE
Date: 17.06.05

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Equip. ID: _____
Scientist: AMA/AEG

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	1b	10:10	97642.6	445546.8	4.9	290	0.3	E-W	2	N	4	8	1.2 slackish
	1m	10:10	97646.7	445548.2									4.2
	1s	10:10	97649.7	445550.1									1.3
	2b	10:14	97808.2	446023.8									1.2
	2m	10:14	97812.8	446029.8									1.1
	2s	10:14	97813.8	446033.2									1.2
	3b	10:23	95687.5	446569.1									2.3 sample taken
	3m	10:23	95678.6	446563.5									2.5
	3s	10:24	95664.8	446556.5									4
	4b	10:27	96000.0	446963.7									1.8
	4m	10:28	95993.8	446953.4									1.6
	4s	10:28	95985.9	446944.2									1.4
	1b	11:10	97657.6	445563.9	5.5	270	0.3	E-W	3	N	4	8	0.1
	1m	11:11	97662.6	445573.9									0
	1s	11:11	97665.1	445581.0									0.3
	2b	11:14	97798.7	446020.4									1.5
	2m	11:15	97805.6	446039.1									0
	2s	11:15	97808.5	446049.0									0

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
4 = Moderate, waves (0.6-1.2m) 2-4ft fairly frequent white horses 5 = Rough, waves (1.2m - 2.4m) 4-8ft, many white horses 6 = Very rough, waves exceeding (2.4m) 8ft

Cloud: Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X-SOLENT PIPELINE
Date: 17.06.05

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Equip. ID: YSI
Scientist: AMA/AEG

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	3b	11:26	95702.0	446574.8									0.1
	3m	11:27	95699.6	446577.1									0
	3s	11:27	9596.2	446581.8									0.4
	4b	11:32	95996.6	446962.9									0.5
	4m	11:32	95997.0	446965.8									0.2
	4s	11:32	95996.7	446969.9									0.3
	1b	12:12	97645.4	445579.8	5.5	270	0.3	W-E =1 kn	2	N	4	8	0.4
	1m	12:13	97660.3	445618.6									0.4
	1s	12:13	97671.2	445641.0									0.4
	2b	12:19	97800.2	446027.4									0.1
	2m	12:19	97805.4	446044.4									0.1
	2s	12:20	97810.7	446058.3									0.4
	3b	12:31	95699.8	446560.2									0.4 sample taken
	3m	12:32	95716.9	446588.5									0.2
	3s	12:32	95736.5	446623.0									0.5
	4b	12:36	95997.4	446968.7									0.7
	4m	12:37	96015.4	446995.4									0.2
	4s	12:37	96034.7	4467024.8	6.0	260	0.1	W-E =1 kn	1	N	4	8	0.5

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
4 = Moderate, waves (0.6-1.2m) 2-4ft fairly frequent white horses 5 = Rough, waves (1.2m - 2.4m) 4-8ft, many white horses 6 = Very rough, waves exceeding (2.4m) 8ft

Cloud: Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

Emu Ltd
Sampling & Weather Record Sheet

Job Name: X-SOLENT PIPELINE
Date: 17.06.05

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Equip. ID: _____
Scientist: AMA/AEG

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	1b	13:13	97643.0	445562.9	5.6	260	0.2	W-E	2	N	5	7	0.7
	1m	13:13	97646.8	445578.1									0.8
	1s	13:14	97651.9	445592.3									0.6
	2b	13:17	97809.7	446032.1									0.3
	2m	13:18	97827.6	446081.4									0.7
	2s	13:18	97843.2	446115.2									2.5
	3b	13:31	95709.5	446576.2									0.7 sample taken
	3m	13:32	95731.3	446604.3									0.3
	3s	13:32	95747.3	446626.6									0
	4b	13:36	96004.0	446970.7									0.6
	4m	13:36	96023.0	446999.5									0.3
	4s	13:36	96038.4	447021.8									0.3
	1b	14:13	97641.4	445554.7	2.4	225	<0.1	W-E	1	N	6	8	0
	1m	14:13	97645.2	445563									0.3
	1s	14:13	97652.1	445576.4									0.4
	2b	14:17	97809.3	446047.2									1
	2m	14:17	97815.5	446066.9									0.2
	2s	14:18	97822.3	446083.8									0.4

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
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Cloud: Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X-SOLENT PIPELINE
Date: 17.06.05

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Equip. ID: _____
Scientist: AMA/AEG

Reference	Site	Time GMT	Position (WGS84) Northings	Eastings	Speed m/s	Wind Direction TRUE (degrees)	Wave Height (m)	Direction TRUE	Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity NOTES/COMMENTS
	3b	14:31	95717.9	446581.4									1.0 sample
	3m	14:31	95740.6	446611.0									0.1
	3s	14:32	975767.7	446641.1									0.1
	4b	14:35	96006.0	446966.0									0.3
	4m	14:35	96033.0	447001.6									0.2
	4s	14:36	96054.2	447027.6									0
	1b	15:12	97646.3	445565.3	3.6	225	0.1	W->E	1	N	5	8	0.3
	1m	15:12	97652.6	445580.3									0.1
	1s	15:13	97660.8	445599.5									0.5
	2b	15:16	97791.1	445996.9									3.1
	2m	15:16	97799.2	446023.7									0
	2s	15:17	97804.8	446045.1									0.4
	3b	15:32	95724.3	446592.3									0.1 sample
	3m	15:32	95752.5	446625.7									0
	3s	15:33	95778.5	446656.6									0
	4b	15:37	95999.8	446958.9									1.4
	4m	15:38	96016.8	446983.4									0.3
	4s	15:38	96035.1	447010.5	1.9	215	<0.1	W-E	1	N	5	8	0.2

Sea State: 0 = Calm/glassy 1 = Calm/rippled 2 = Smooth,wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight,waves (30-60cm) 1-2ft, perhaps scattered white horses
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Cloud: Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X-SOLENT PIPELINE
Date: 17.06.05

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Equip. ID: _____
Scientist: AMA/AEG

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	1b	16:11	97634.4	445559.0	4.6	215	0.1	W->E	1	N	5	8	0.7
	1m	16:11	97637.6	445568.7									0.6
	1s	16:12	97641.1	445578.5									0.6
	2b	16:15	97798.9	446011.3									0.1
	2m	16:16	97809.0	446037.7									0.5
	2s	16:16	97817.6	446055.7									0.5
	3b	16:30	95717.5	446580.8									0.2
	3m	16:30	95733.5	446600.5									0.2
	3s	16:31	95751.2	446624.6									0.4
	4b	16:35	95985.4	446939.6									0.1
	4m	16:36	96004.3	446962.8									0.4
	4s	16:36	96017.0	446978.8									0.4
	1b	17:12	97647.0	445574.3	3.5	200	<0.1	W->E	1	N	5	8	1.2
	1m	17:13	97658.9	445589.1									1.1
	1s	17:13	97665.2	445595.9									1.1
	2b	17:17	97802.7	446009.7									0.0
	2m	17:18	97810.7	446018.7									0.9
	2s	17:18	97810.9	446027.2									0.9

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
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Emu Ltd
Sampling & Weather Record Sheet

Job Name: X-SOLENT PIPELINE
Date: 17.06.05

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Equip. ID: _____
Scientist: AMA/AEG

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	3b	17:30	95717.1	446579.1									0.5 Sample
	3m	17:31	95723.8	446593.7									0.8
	3s	17:31	95729.4	446603.6									0.7
	4b	17:36	96005.4	446968.9									0.4
	4m	17:36	96020.3	446991.2									0.7
	4s	17:37	96025.1	446997.3	3.8	225	0.1	W->E	1	N	5	8	0.9
	1b	18:10	97644.9	445544.7	6.0	225	0.2	W->E					0.9 Slack
	1m	18:10	97646.3	445545.0									0.9
	1s	18:11	97646.1	445542.1									0.7
	2b	18:16	97789.6	446006.6									0.9
	2m	18:17	97785.6	446006.1									0.9
	2s	18:17	97782.3	446005.1									0.8
	3b	18:25	95688.5	446559.6									0.8 Sample
	3m	18:26	95680.4	44556.3									0.8
	3s	18:26	95674.8	446553.4									0.8
	4b	18:32	95984.2	446945.5									11.8
	4m	18:33	95980.8	446935.7									1.4
	4s	18:33	95974.6	446028.0									0.4

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
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Emu Ltd
Sampling & Weather Record Sheet

Job Name: X-SOLENT PIPELINE
 Date: 23/06/2005

Job No.: J/1/04/0821
 Site/Boat: CEEJAY

Equip. ID: _____
 Scientist: SAS/AEG

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	1b	07:26	97638.5	445539.0	1.2	SW	/	/	1	N	10	1	0.6
	1m	07:26	97639.4	445542.3									0.6
	1s	07:26	97640.8	445548.1									6.7
	2b	07:29	97796.6	446012.3									0.8
	2m	07:30	97801.1	446027.4									0.6
	2s	07:30	97804.5	446037.8									0.9
	3b	07:42	95720.8	446583.9									5.7
	3m	07:43	95740.7	446605.1									5.0
	3s	07:43	95764.2	446631.7									4.4
	4b	07:48	96016.8	446983.9									4.7
	4m	07:48	96038.0	447012.9									4.4
	4s	07:48	96061.8	447044.2									3.4
	1b	08:16	97629.3	445554.3	1.0	SW	/	/	1	N	10	1	0.3
	1m	08:17	97637.3	445562.4									0.0
	1s	08:17	97635.3	445570.8									0.1
	2b	08:20	97797.0	446010.1									5.9
	2m	08:20	97798.8	446016.7									2.4
	2s	08:21	97802.4	446028.0									0.7

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
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**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X-SOLENT PIPELINE
Date: 23/06/2005

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Equip. ID: _____
Scientist: SAS/AEG

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	3b	08:35	95719.1	446574.0	1.8	NE							3.8
	3m	08:35	95744.2	446600.0									3.4
	3s	08:35	95759.6	446616.4									3.2
	4b	08:39	95995.1	446954.4									3.7
	4m	08:40	96012.2	446973.9									3.2
	4s	08:40	96029.2	446994.0									3.1
	1b	09:17	97636.6	445557.3	2.0	S							0.1
	1m	09:17	97637.5	445559.6									0.3
	1s	09:17	97638.9	445563.0									0.1
	2b	09:21	97798.8	445011.6									0.1
	2m	09:21	97803.2	446021.6									0.2
	2s	09:21	97808.8	446033.5									0.3
	3b	09:39	95707.8	446595.2									2.6
	3m	09:40	95738.1	446621.5									2.1
	3s	09:40	95723.6	446627.8									2.0
	4b	09:44	95970.9	446935.6	2.1	NE							2.5
	4m	09:44	95989.3	446951.2									3.2
	4s	09:44	95995.3	446965.1									1.7

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
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Emu Ltd
Sampling & Weather Record Sheet

Job Name: X-SOLENT PIPELINE
Date: 23/06/2005

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Equip. ID: _____
Scientist: SAS/AEG

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	1b	10:13	97637.8	445553.7	0.0	N/A			1	N	10	0	0.0
	1m	10:14	97639.3	445559.4									0.0
	1s	10:14	97640.3	445562.6									0.2
	2b	10:19	97794.8	4456003.2									0.8
	2m	10:19	97796.7	446007.3									0.6
	2s	10:19	97798.3	446010.5									0.3
	3b	10:32	95704.8	446557.1									1.5
	3m	10:32	95709.1	446559.6									2.1
	3s	10:32	95715.4	446564.2									1.9
	4b	10:39	95996.6	446950.3									1.5
	4m	10:39	98001.4	446953.8									1.7
	4s	10:39	96005.1	446956.4									1.8
	1b	11:12	97647.1	445557.4	1.0	W/SW			1	N	10	3	2.8
	1m	11:12	97643.1	445555.7									9.0
	1s	11:12	97643.6	445552.0									8.9
	2b	11:18	97789.9	446000.1									7.5
	2m	11:18	97787.3	445993.9									7.4
	2s	11:18	97783.6	445985.1									7.3

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
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Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X-SOLENT PIPELINE
Date: 23/06/2005

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Equip. ID: _____
Scientist: SAS/AEG

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	3b	11:28	95698.9	446578.0									6.5
	3m	11:29	95688.1	44654.7									6.5
	3s	11:29	95678.4	446551.2									6.4
	4b	11:36	95991.6	446951.9									6.2
	4m	11:37	95982.1	44639.6									6.1
	4s	11:37	95971.4	446925.4									6.1
	1b	12:13	97604.9	445520.0									1.7
	1m	12:13	97600.9	445509.8									1.2
	1s	12:13	97595.2	445497.4									1.0
	2b	12:19	97791.0	445998.5	0.8	W/SW							1.4
	2m	12:19	97786.5	445987.2									1.0
	2s	12:19	97779.1	445973.5									0.9
	3b	12:32	95677.5	446557.6									4.0
	3m	12:32	95658.9	446540.0									3.6
	3s	12:32	95642.0	446522.0									3.5
	4b	12:42	95993.7	446947.0									4.0
	4m	12:42	95979.6	446923.7									3.8
	4s	12:43	95965.8	446904.6									3.7

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
4 = Moderate, waves (0.6-1.2m) 2-4ft fairly frequent white horses 5 = Rough, waves (1.2m - 2.4m) 4-8ft, many white horses 6 = Very rough, waves exceeding (2.4m) 8ft

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Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

**Emu Ltd
Sampling & Weather Record Sheet**

Job Name: X-SOLENT PIPELINE
Date: 23/06/2005

Job No.: J/1/04/0821
Site/Boat: CEEJAY

Equip. ID: _____
Scientist: SAS/AEG

Reference	Site	Time GMT	Position (WGS84)		Wind		Wave		Sea State 0 - 6	Rain Y/N	Visibility miles	Cloud Cover 0-8	Turbidity
			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	1b	13:13	97639.5	445551.9	0.7	SW			1	N	7	6	2.1
	1m	13:13	9763.6	445546.1									1.8
	1s	13:13	97634.3	445540.9									1.8
	2b	13:18	97788.4	44600.3									7.3
	2m	13:18	97781.4	445987.0									3.9
	2s	13:18	97774.2	445974.1									2.8
	3b	13:25	95677.2	446547.6									4.0
	3m	13:26	95650.5	446516.3									3.7
	3s	13:26	95627.5	446487.2									3.3
	4b	13:30	95988.1	446949.1									3.9
	4m	13:31	95971.3	446951.6									3.4
	4s	13:31	95958.2	446916.3									3.3
	1b	14:20	97632.6	445532.7	0.4	SW	0.1	NW	1	N	5	7	1.4
	1m	14:21	97629.7	445524.0									1.1
	1s	14:21	97627.3	445517.7									0.8
	2b	14:28	97787.9	445988.5									3.3
	2m	14:28	97781.0	445973.2									1.5
	2s	14:28	97775.6	445959.7									0.9

Sea State: 0 = Calm, glassy 1 = Calm, rippled 2 = Smooth, wavelets (15-30cm) 0.5-1ft from crest to trough 3 = Slight, waves (30-60cm) 1-2ft, perhaps scattered white horses
4 = Moderate, waves (0.6-1.2m) 2-4ft fairly frequent white horses 5 = Rough, waves (1.2m - 2.4m) 4-8ft, many white horses 6 = Very rough, waves exceeding (2.4m) 8ft

Cloud: Cloud amount is expressed in eighths of the sky covered by cloud, a clear sky thus being recorded as 0 and completely overcast conditions by 8.

Rainfall: 0 = No precipitation 1 = Mist 2 = Drizzle 3 = Light rain 4 = Moderate Rain 5 = Heavy Rain 6 = Cloudburst H = Hail S = Snow

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			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	3b	14:37	95691.6	446563.9									9.7
	3m	14:37	95676.5	446546.7									5.9
	3s	14:37	95657.5	446526.7									4.7
	4b	14:42	95991.8	446960.4									7.9
	4m	14:42	95974.7	446940.7									5.6
	4s	14:43	95961.9	446925.6									5.2
	1b	15:13	97632.2	445547.5	0.0	SW			1	N	8	6	2.0
	1m	15:13	97631.6	445544.6									1.2
	1s	15:13	97630.8	445541.7									0.9
	2b	15:18	97792.9	446003.4									4.7
	2m	15:18	97791.2	446000.0									1.4
	2s	15:19	97789.6	445997.0									0.6
	3b	15:30	95696.9	446568.2									5.1
	3m	15:30	95685.1	446554.6									4.6
	3s	15:30	95675.4	446542.3									4.8
	4b	15:35	95997.4	446955.1									5.2
	4m	15:36	95986.2	446936.7									5.0
	4s	15:36	95976.7	446924.2									4.0

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			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	1b	16:12	97641.7	445549.4	0.0	N			0	N	8	4	0.3
	1m	16:12	97642.1	445550.2									0.3
	1s	16:12	97647.5	445550.6									0.3
	2b	16:16	97796.8	446017.8									3.9
	2m	16:17	97794.0	446018.4									1.4
	2s	16:17	97792.7	446019.8									0.7
	3b	16:28	95683.1	446555.2									10.5
	3m	16:28	95680.3	446551.9									7.3
	3s	16:28	95677.7	446549.0									4.7
	4b	16:33	96001.7	446962.5									7.3
	4m	16:33	96003.1	446962.6									8.3
	4s	16:33	96003.3	446961.6									5.9
	1b	17:13	97646.7	445558.3	2.6	SW	0.2		1	N	7	4	5.7
	1m	17:13	97649.2	445562.8									3.9
	1s	17:13	97651.9	445568.2									2.9
	2b	17:17	97793.9	446016.9									4.8
	2m	17:17	97795.4	446026.5									3.0
	2s	17:17	97796.9	446031.9									5.6

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			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	3b	17:29	95710.6	446565.4									5.7
	3m	17:30	95726.6	446579.7									6.1
	3s	17:30	95735.5	446588.1									3.3
	4b	17:33	95995.8	446958.6									6.4
	4m	17:34	96014.1	446984.4									5.0
	4s	17:34	96025.6	446999.1									2.8
	1b	18:10	97633.1	445540.3	1.6	SW	0.0	NW	0	N	6	7	4.9
	1m	18:10	97633.9	445542.3									2.8
	1s	18:11	97636.1	445548.2									1.4
	2b	18:14	97797.4	446022.7									1.1
	2m	18:14	97800.7	446030.8									0.8
	2s	18:14	97805.3	446042.5									0.6
	3b	18:30	95710.8	446577.9									5.6
	3m	18:30	95731.6	446518.8									4.7
	3s	18:31	95752.9	446620.9									4.5
	4b	18:33	95999.1	446944.7									6.4
	4m	18:34	96018.0	445964.3									5.0
	4s	18:34	96039.1	445986.9									4.4

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			Northings	Eastings	Speed m/s	Direction TRUE (degrees)	Height (m)	Direction TRUE					NOTES/COMMENTS
	1b	19:03	97638.9	445550.6	1.5	W/SW			1	N	10	2	0.6
	1m	19:03	97640.5	445554.0									0.7
	1s	19:03	97642.9	445560.3									3.5
	2b	19:06	97798.9	446022.2									2.1
	2m	19:06	97801.9	446032.1									1.1
	2s	19:07	97806.1	446044.6									7.0
	3b	19:14	95713.1	446593.9									4.8
	3m	19:15	95740.0	446619.6									4.0
	3s	19:15	95763.3	446642.4									5.1
	4b	19:18	95969.4	446932.5									4.7
	4m	19:18	95986.6	446953.2									4.8
	4s	19:18	96008.4	446980.4									

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Report No. 05/J/1/04/0821/0516Draft
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