

**Cross Solent Pipeline
Replacement
Subtidal Ecological Studies**

Initial Report

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1.0 Introduction

1.1 Background

Southern Water Services are evaluating options for the construction of a pipeline corridor for the supply of water between the mainland and the Isle of Wight. The new pipeline will replace the existing ones which cross the Solent between Lepe on the mainland and Gurnard Bay on the Isle of Wight. The ecological importance of the habitats within the area of the proposed corridor needs consideration to support planning application. As part of this process Halcrow commissioned Emu Ltd to undertake baseline subtidal surveys along the route of the proposed pipeline, between Lepe and Gurnard Bay.

1.2 Objectives

The aim of the present study was to carry out a biotope mapping survey of the subtidal area between the northern “break out” point of the proposed pipeline, adjacent Lepe and the same in the shallow subtidal in Gurnard Bay on the Isle of Wight. The study was designed to establish the current status of the biological communities within, and peripheral to, the proposed pipeline corridor with a view to evaluating the ecological significance of the area. The current report is an initial study based on the collection of data from diving activities and observational records made from grab samples. Subsequent analysis of the infaunal samples will be used to provide more detailed assessment of the particulate biotopes in the area and will be included in an addendum to this report.

1.3 Survey dates

The diving surveys were conducted on 17th and 18th of May, 2005. The grabbing survey was completed on the 29th and 30th of May, 2005.

2.0 Methodology

2.1 Diving Field methods

All the diver surveys were undertaken by the Emu Ltd dive team and were run in accordance with the Approved Code of Practice for Scientific and Archaeological Diving Projects, and Emu Ltd’s in-house Method Statement – Operating Procedures & Rules for Scientific Diving within Emu Ltd (No. 18, Issue 2, Jan 2003).

Survey Design

Four diving transects were identified based on sidescan sonar data provided by Justin Dix of the University of Southampton. These survey locations were those considered to be impractical to use grabbing techniques for the collection of data, due to the apparent roughness of seabed.

Survey and Site Positioning

The diver surveys were conducted over a period of two days (18th and 19th of May 2005). The details of the survey together with weather conditions for each day are presented within the format of survey logs within Appendix 1.

A total of four diver video transects were surveyed. The positions for each transect are presented in Figure 2.1.

Horizontal positioning was accomplished using a Leica MX412 Differential GPS unit, accurate to \pm 5m. The system was operated in accordance with Emu Ltd’s in-house method statement - Emu Ltd

Oceanographic Survey Methods and Procedures (No. 8, Issue 7, Aug 2000). The vessel position was calculated by the DGPS unit relative to the World Geodetic System (WGS84).

Diver Survey

A 100m lead weighted line (marked every 2m) was deployed from the surface. Once deployed the locations of the inshore and offshore end of the survey line were recorded. The inshore section end of the transect line was marked as 0m, whilst the offshore end of transect was marked as 100m on the video footage.

The divers swam along the 100m transect recording information for inclusion into MNCR detailed habitat recording forms. These data include conspicuous species and substrate descriptions. Fauna and flora were identified *in-situ* to the most specific level, wherever possible. The SACFOR scale (Table 2.1) was used to estimate species abundances to aid in the allocation of biotopes codes. In addition video footage along the entire length of the transect line was collected, with the distance measurements recorded every two metres in order to geo-reference the video footage. The video footage survey was based on JNCC Procedural Guidelines No.3.13 – *In-situ* surveys of sublittoral epibiota using hand held video.

The MNCR diving records are included in Appendix 2.

2.2 Grabbing Field Methods

Survey Design

The specifications of the survey, including the field sampling of bottom sediments for biological and physical analyses were determined based on the proposed pipeline route, information provided on seabed character from Sidescan data (provided by Justin Dix, Southampton University) and anticipated impact zones.

A total of 23 sample stations across the Solent were identified. Six of these were widely distributed, while the remaining samples were relatively closely grouped around the pipeline route. At each site four replicate samples were attempted. Three of these were to be retained for faunal analysis and one for PSA.

Provisional sample station coordinates for each location were calculated using a digitised Admiralty Chart as a Raster layer in MapInfo GIS format, and based on the sampling array which was derived from the Sidescan data. Some refinement of the final grab sample array was required due to the evidence of cables in sensitive areas which were not originally evident at the time of original survey planning.

Survey and Site Positioning

Sample positions (WGS84) are presented in Appendix 3. The sample station array is presented in Figure 2.1.

The survey at Mounts Bay was conducted over 2 days (29 and 30/05/05) from the Prince II operating out of Southampton. The navigation system was operated in accordance with the relevant Emu Ltd Survey Method Statement No.8 (Emu, 2000). The vessel position was calculated by the DGPS unit relative to the World Geodetic System (WGS84).

The final list of agreed station coordinates was used to guide the vessel to each of the intended sampling locations. Once on station, the actual sampling location was recorded for each sample at the moment the winch wire went slack, indicating that the grab sampling device was on the seabed.

Sampling

A 70kg Day grab (bite area 0.1m²) was used to obtain seabed samples for biological and physical analysis. The Day grab is particularly efficient for sampling sand and muddy sediments and returns an undisturbed seabed sample which is suitable for sub-sampling for chemical and microbiological testing.

22 of the 23 stations were successfully sampled with the Day grab for fauna, although a large proportion of these could not be sampled for all replicates, due to the coarse nature of the sediment. Only a small proportion of sites were successfully sampled for particle size analysis.

Upon recovery of the grab, the sample depth in the grab was measured to assess of the volume of the sediment, before the sample was released into a plastic hopper for initial on board processing via a 1.0mm aperture mesh sieve. A brief description of each sample was made including dominant faunal components and sediment character.

Samples for PSA and macro-invertebrate analysis were returned to the laboratory for full analysis.

2.3 Laboratory methods

Particle Size Analysis

Particle size analysis (PSA) was undertaken at Emu Ltd's UKAS accredited Laboratory, employing Emu Ltd's In House Methods (MET/01) for the Determination of Particle Size Distribution (based on BS1377, part two; 1990), and Emu Ltd's In house methods for the determination of particle size distribution by Malvern Microsizer Laser Diffraction (MET/02). The latter method does not fall under UKAS accreditation.

Macrobenthic analysis

The benthic faunal samples are currently undergoing analysis and data will be provided in subsequent reports.

2.4 Data Interpretation

Descriptions of the biotopes identified following completion of the survey techniques followed Marine Nature Conservation Review (MNCR) biotope classification methods. The biotope descriptions were based on qualitative data provided by *in-situ* recording and the video footage. Preliminary data from the grab samples were also recorded to provide both physical and biological description of the site. For each recognised habitat/species complex, the prevailing environment, habitat type and species data was considered and used in the biotope classification and the designation of biotope codes. Biotope classification and the designation of biotope codes follow Connor *et al*, (2004). The biotope, or combination of biotopes, that represent the 'best fit' with the habitat and species data collected have been used to classify the areas. Where these biotopes do not perfectly match those published, a description of the variation in the biotope has been provided.

%cover	Growth Form		Size of individuals/colonies				Density
	Crust /Meadow	Massive /Turf	<1c m	1-3cm	3-15cm	>15c m	
>80%	S		S				>1/0.001m ²
40-79%	A	S	A	S			1-9/0.001m ²
20-39%	C	A	C	A	S		1-9/0.01 m ²
10-19%	F	C	F	C	A	S	1-9/.0.1 m ²
5-9%	O	F	O	F	C	A	1-9/ m ²
1-5% or density	R	O	R	O	F	C	1-9/10 m ²
<1% density		R		R	O	F	1-9/100 m ²
					R	O	1-9/1000 m ²
						R	<1/1000 m ²

Table 2.1 Abundance Scales used for both Littoral and Sublittoral Taxa from 1990 Onwards (After: Hiscock, K ed. 1998)

Key: S = Superabundant, A = Abundant, C = Common, F = Frequent, O = Occasional, R = Rare, P = present (used when the abundance of an organism could not be estimated accurately).

3.0 RESULTS AND INTERPRETATION

3.1 Sediment Character

Data on sediment type is presented in Appendix 4 (PSA data) and 5 (sample observations).

The most widely spread sediment type encountered during the survey was small cobbles, with pebbles, gravel and coarse sand. These were the dominant sediment types along the line of the proposed pipeline route. Varying amounts of sand and, in some cases, muds and silt were found in some of the outlying sites. The very coarse nature of the sediment resulted in only a few samples (7) providing enough sediment for PSA analysis (Appendix 4). Of the samples where PSA was completed most comprised of pebbles and gravel, with only sites 19 and 20 containing significant quantities of sand.

Overlaying the sediment types onto the side-scan image of the pipeline route area several features are evident. These correspond to areas of predominantly cobbles, areas of sand waves (both gravel and sand), mixed sediment with mud and mixed coarse sediments. Fig. 3.1 illustrates these major divisions.

3.2 Faunal Character

A total of 84 species have been identified during the course of the survey. Most of these were identified in the diving study 57, while a reduced number (due to limited analysis of the samples) have been found in the grabs (44) (Appendix 6).

The most frequently occurring species were; *Pomatoceros* sp (generally *P. triqueter*), *Sabellaria spinulosa*, *Balanus* sp. and Bryozoa indet. Although the infauna have not been fully processed it was evident that the faunal communities present were largely epifaunal in character.

Of these species *Pomatoceros*, *Balanus* and *Sabellaria* were found as dominants or co-dominants at most sites (Fig 3.2). This was particularly evident in the central areas of the survey region. *Pomatoceros* occurred at an abundance of common or above at sites 7, 8, 9 and 11 as well as at the inshore site 23 and the dive sites 2 and 4. *Sabellaria* was similarly found in abundances of common or above at sites 5, 7, 8 and 10 in the centre of the survey area, with similarly high abundances in the peripheral sites of 14, 21 and 23. The greatest abundance of this species was found at site 21 in the form of clumps, although not thought to be forming part of a biogenic reef. *Balanus* was more widespread with sites ranging from 5, 7, 9 and 19 in the centre of the area and dive site 2 and grab sites 14, 18, and 22. The Bryozoa indet. did not occur above an abundance of Frequent. It was most abundant at the peripheral sites of 14, 18, 22 and 23. The only sites where the above species were not dominant were the sites from the northern coast, with the Ascidian *Dendrodoa grossularia* occurring as dominant at the muddy gravel area inshore, site 1 and the algal species dominating the shallow water site 20.

One other species occurred in significant numbers, *Lanice conchilega*, which was found as Abundant in site 11.

In terms of diversity, although based on observational data from grabs it was evident that several areas supported very low numbers of species, including sites 2, 6, 10, 12 and 17, with 5 or less species at each site. Peak diversity (>13 species) was found at sites 8, 9, 18 and 20. The latter was in the shallow waters and was dominated by algae. The dive sites, which included observations over a considerably larger sample area than the grabs clearly supported higher diversity with in excess of 25 species per site.

One of the most interesting observations of the survey was the large number of prosobranchs present. These were particularly evident during the diving studies, with 7 separate species observed, the co-

dominants being *Calliostoma zizyphenum* and *Buccinum undatum*. The former was the dominant species at dive site 3. The occurrence of these species may have been an artefact of seasonal movement, with many of the prosobranch species feeding on the egg masses of other prosobranch species, which were present in abundance across the area.

3.3 Biotopes

Based on the initial data several biotopes have been defined and are presented on Figures 3.3 and 3.4 with summarised data in Table 3.1

It is evident that **PomB** was the most widespread of the biotopes, several of these crossing over with **SspiMx** where more sand was found. In no case were true biogenic reef **SspiMx** found although high density *Sabellaria* were recorded, particularly at site 21. True estimates of abundance will not be known until the full faunal analysis is completed.

Along the line of the proposed pipeline route most biotopes were of **PomB** although several low diversity sites, which did not clearly fit into a specific biotope were noted and have been classified as **CCS** (circalittoral coarse sand), tending towards **SSh** or **PomB**. The peripheral biotopes showed a degree of variation, including **SpavSpAn** in the northern diving transect areas where the cobble/pebble outcrop occurred. This biotope is the best fit to that described although it lacks one of the dominant species, *Sabella pavonina* and may cross over with the mixed sediment biotope that commonly occurs in the Solent; **CreAsAn**, which was found closer inshore (site 10).

The diving transect no 1 illustrates the potential complexity of the shallower water particularly over the Gurnard ledge area. Over the 100m survey length four biotopes were found, although two of these were only evident as small patches. The two dominant biotopes occurred, including the **ScupHyd** found at site 17 and **FluHyd**, only found in the shallow water at this site.

All of the biotopes identified could reasonably be expected to occur in the Solent at this location, due to the high, tidally induced current speeds found in the area, which are clearly creating physically unstable conditions. These conditions have been exploited by opportunistic epifaunal species which include *Pomatoceros* and *Balanus*. Where temporary stability occurs, then more diverse communities exist, including encrusting sponge species, ascidians, hydroids and anemones.

The occurrence of *Sabellaria spinulosa* is probably corresponds with areas peripheral to mobile, current swept sand, which the *Sabellaria* are able to consolidate. These consolidated areas are also able to support more diverse communities of epifauna, including more cryptic crustacean species.

The presence of the numerous prosobranch species at some of the dive sites is likely to be due to seasonal mobility. It is apparent that for some species the area is favourable for egg laying and as a consequence is valuable as a scavenging area for other prosobranchs.

Table 3.1 List of Biotopes identified in the Solent in the vicinity of the Cross Solent pipeline.

Biotope Code (Connor <i>et al.</i> 2004)	Biotope Title	Importance From <i>MarLIN</i> (www.marlin.ac.uk) local records and (www.jncc.gov.uk/mermaid).
SS.SMx.IMx.CreAsAn.	Sublittoral mixed sediment. Infralittoral mixed sediment. <i>Crepidula fornicata</i> with ascidians and anemones on infralittoral coarse mixed sediment.	No data but historic equivalent found in Solent and in local shallow waters. Not considered rare.
SS.SCS.CCS.PomB	Sublittoral coarse sediment. Circalittoral coarse sediment. <i>Pomatoceros triqueter</i> with barnacles and bryozoan crusts on unstable cobbles and pebbles.	Frequently found in Solent associated with disturbance, either natural or anthropogenic
SS.SCS.ICS.SSh.	Sublittoral coarse sediment. Infralittoral coarse sediment. Sparse fauna on highly mobile sublittoral shingle (cobbles and pebbles).	Not available but at this level of definition found widely occurring throughout the UK
SS.SCS.ICS.SLan	Sublittoral coarse sediment. Infralittoral coarse sediment. Dense <i>Lanice conchilega</i> and other polychaetes in tide-swept infralittoral sand and mixed gravelly sand.	Not recorded as important, generally found in Solent area. May act as a sediment stabiliser.
SS.SSA.IFiSa.ScupHyd.	Sublittoral sands and muddy sands. Infralittoral fine sand. <i>Sertularia cupressina</i> and <i>Hydrallmania falcate</i> on tide-swept sublittoral sand with cobbles or pebbles.	Equivalent biotope previously recorded in Solent. (Mermaid)
SS.SBR.PoR.SspiMx	Sublittoral biogenic reef. Polychaete worm reef (on sublittoral sediment). <i>Sabellaria spinulosa</i> on stable circalittoral mixed sediment.	Species previously found in area (Mermaid) Listed under: UK Biodiversity Action Plan
SS.SMx.IMx.SpavSpAn.	Sublittoral mixed sediment. Infralittoral mixed sediment. <i>Sabella pavonina</i> with sponges and anemones on infralittoral mixed sediment.	Previously recorded in area (Mermaid). <i>Sabella</i> evident only in patches, closely linked to CreAsAn .
SS.SSa	Sublittoral sands and muddy sands.	Widespread and locally common
SS.SMX.FluHyd	Sublittoral sands. <i>Flustra foliacea</i> and <i>Hydrallmania falcate</i> on tide swept circalittoral mixed sediment.	No specific records but the higher level <i>Flustra</i> based biotope is widely present in the area.
CR.MCR.Sfr	Soft Rock Communities	Previously recorded around the Isle of Wight, associated with mud stone and chalk.

4.0 References

Connor DW, AllenJH, Golding N, Howell KL, Lieberknecht LM, Northern KO & Reker JB. 2004. The Marine Habitat Classification for Britain and Ireland, Version 04.05. Joint Nature Conservation Committee

MARLin *Marine Life Information network: Biology and Sensitivity key Information.* Plymouth: Marine Biological association of the United Kingdom. <<http://www.marlin.ac.uk>>

Figures

Appendices

AUDIT TRAIL

Title : Cross Solent Pipeline Replacement – Benthic and Diving Studies			
Report No	: 05/J/1/03/0807- DRAFT		
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