

DNV TECHNICA



Our Reference : 823\C6413\1628.cr

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Dear Mr. Basham,

**BP Oil Hamble Terminal
Terminal Jetty Shot-Blasting Noise Impact Assessment**

1. Introduction

BP Oil are currently treating the external surface of the Hamble Jetty in order to eliminate any surface rust and erosion and to protect the jetty in the future. The works are the first major treatment to the jetty for at least 10 years; the aim of the project is to prepare the surface to prevent any further treatment for at least 12 years and to minimise surface repair after that.

The objective of this note is to predict the noise levels generated by the surface treatment of the jetty at the nearest dwellings and to assess the impact of the generated noise levels.

2. Description

The project will be carried out between July and October 1996. Work can only be carried out during good weather conditions to enable the paint to properly cure; to enable this, it is necessary to maximise the available day-time hours (i.e. 12 hour operation for 7 days per week).

Another further restriction that prevents a structured work time schedule is that the jetty piles must also be treated, these can only be achieved during low tide conditions.

The work consists of the following procedures: setting scaffolding, cleaning the steelwork and painting the structure. Of the three activities, it is considered that the significant noise will be generated by the cleaning process.

The steelwork is cleaned using a shot blasting technique. The shot is a natural compound which allows the uncollected waste to settle without adverse affect within the environment.

The mechanism for cleaning the steel is to fire the shot at high pressure from hoses carrying a mixture of shot and compressed air in order to remove the built up scale and rust. It is not possible to fit noise control measures to the hose discharge without affecting the hose pressure and, therefore, the effectiveness of the mechanism. There are 6 units that can be used, normally 4 are operated simultaneously.

The compressor units that provide the compressed mixture are located on a barge moored alongside the jetty, approximately 300 m from shore. Two compressors are located on the barge and they are housed in acoustic enclosures.

The work has started at the jetty head and will move towards the shore.

3. Noise Measurements

A noise survey was carried out on the 2 August 1996 by C Robinson. Four shot blasters were in operation at the end of the jetty route (Figure 1).

Measurements were made in a number of locations along the jetty and mooring buoys.

Instrumentation used for noise level measurements comprised:

- Rion Type NA-29E octave band analyser with Type UC-53 microphone (with windshield)
- Rion Type NC-73 precision acoustic calibrator

All equipment holds current manufacturer's calibration certificates and conforms to relevant parts of IEC 651:1079 for the requirements of Type 1 acoustic accuracy. Additionally, the sound measuring equipment conforms to the specifications contained within IEC 804: 1985 for integrating sound level meters.

Before commencing and at the completion of the survey, the sound level meter was calibrated. No change was noted over the duration of the survey.

The test procedure complied with procedures outlined in EEMUA Specification no. 140 "Noise Procedure Specification" for carrying out a sound power level survey.

The wind direction and speed during the survey was westerly at 1 to 3 m/s.

4. Survey Results

Noise measurements recorded along the jetty are summarised in Table 4.1 below, subjective comments for each measurement location are given in Table 4.2.

Table 4.1 Noise Measurements

LOCATION	dBA	OCTAVE BAND CENTRE FREQUENCY (Hz)							
		63	125	250	500	1k	2k	4k	8k
400 m from Shot-Blast	51	91	95	98	103	105	105	103	93
300 m from Shot-Blast	53	89	98	95	100	103	105	106	94
200 m from Shot-Blast	61	93	106	107	109	107	107	107	96
Adjacent to Compressor Barge	72	104	117	113	116	119	115	112	105
100 m from Shot Blast	65	84	92	94	102	104	109	109	100
5 m from Shot-Blast	100	72	78	92	104	110	116	119	116
15 m from Shot-Blast	91	82	82	91	103	111	117	119	115
5 m from Shot-Blast	101	72	75	87	98	106	116	120	115
Breasting Dolphin No. 1	83	90	90	94	105	110	117	121	115
Mooring Dolphin No. 2	77	95	95	96	107	110	116	119	111
Mooring Dolphin No. 1	70	100	100	101	107	109	114	117	110
Breasting Dolphin No. 2	76	94	95	98	107	109	114	117	111
Mooring Dolphin No. 3	74	97	97	97	108	112	116	117	110
Mooring Dolphin NO. 4	66	101	101	101	104	107	111	114	106

Table 4.2 Subjective Impressions of Noise

LOCATION	SUBJECTIVE IMPRESSION
400 m from Shot-Blast	Shot-blasting inaudible, terminal noise dominant
300 m from Shot-Blast	General water activity noise, shot faintly audible
200 m from Shot-Blast	Compressor barge audible, shot faint
Adjacent to Compressor Barge	Compressors, shot audible
100 m from Shot Blast	Shot-blasting dominant
5 m from Shot-Blast	Shot-blasting dominant
15 m from Shot-Blast	Shot-blasting dominant
5 m from Shot-Blast	Shot-blasting dominant
Breasting Dolphin No. 1	Shot-blasting dominant
Mooring Dolphin No. 2	Shot-blasting dominant
Mooring Dolphin No. 1	Shot-blasting dominant
Breasting Dolphin No. 2	Shot-blasting dominant
Mooring Dolphin No. 3	Shot-blasting dominant
Mooring Dolphin No. 4	Shot-blasting dominant

The measured background noise level when the equipment was not operating was fluctuating around 53 dBA. The shot-blasting equipment was not perceived to be significant until after the noise levels exceeded 65 dBA, which was at 100 m from the equipment. The highest noise level measured was 101 dBA at 5 m; this is equivalent to 115 dBA at 1 m (which is the operator's head position).

Shot-blast operators use hearing protectors to reduce their noise exposure generated during the blasting, however, no hearing protection signs were noted on the jetty to warn other workers carrying out activities on the jetty. Noise levels generated by the shot-blasting reduce to 80 dBA at approximately 50 m from the source. It is recommended that the area within a 50 m radius is marked as a Restricted Area and that "Hearing Protection" signs are posted at the boundary.

The frequency spectrum generated by the blasting was only significant over 1 kHz, with the centre frequency octave band 4 kHz being the most dominant.

The calculated sound power level from the recorded measurements was 121 +/-3 dBA. The frequency spectrum is given in Table 4.3.

Table 4.3 Sound Power Level

	dBA	OCTAVE BAND CENTRE FREQUENCY (Hz)							
		63	125	250	500	1k	2k	4k	8k
Shot-Blasting Sound Power Level	124	-	-	-	-	113	118	120	114

5. Noise Predictions at Nearest Dwellings

5.1 General

The nearest dwellings to the activity are group of houses off Sylvan Lane to the east of the oil terminal (Figure 2). These houses are located at approximately 750 m from the jetty head and 400 m from the foot of the jetty route.

Noise levels have been predicted at the nearest dwelling. Calculations were performed using procedures specified in EEMUA Specification No. 140 "Noise Procedure Specification". This describes in detail: methods for the calculation of sound power level, sound propagation with distance under free field conditions, summation of noise sources, etc.. Calculations were performed in octave bands from 63 Hz to 8 kHz and included the effects of source dimensions, screening, distance, atmospheric and ground attenuation.

5.2 Predicted Noise Levels

The predicted noise level at the dwellings when the blasting activity occurs at the jetty head was 35 dBA increasing to 42 dBA as the activity reaches the foot of the jetty route (shoreline). The predicted noise levels assume that 4 blasting units are operating and that a line of sight screening exists between source and receiver.

5.3 Assessment

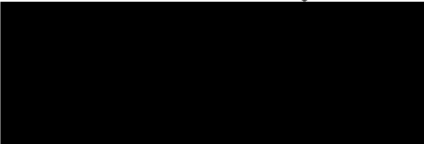
Construction activity carried out around the head of the jetty is not considered to cause an impact at the nearest dwellings. This is borne out by subjectively listening to the activities at the foot of the jetty route where it was considered to be barely audible and resembled an "offshore" breeze.

As the activities move towards the shoreline, the generated noise levels at the nearest dwellings will increase. The maximum predicted noise level, however, does not exceed 45 dBA and activities carried out at this stage will be within normal working hours as the tidal patterns will no longer affect the working period.

In addition BP has carried out environmental noise measurements during sand blasting of the tanks within the terminal. Noise level measurements were carried out by an Eastleigh Borough Council Environmental Health Officer on 7 May 1993. The conclusion from the survey was that at no time was any noise from the BP terminal considered to be audible. The blasting activity at that time was closer to the dwellings than the jetty activities. The prevailing background noise level during the survey was 40 to 43 dBA. It is not considered, therefore, that an activity level of 42 dBA would give rise to a significant impact at the dwellings.

It is considered, therefore, that the noise levels generated during the blasting activities at the nearest dwellings during all activities is acceptable.

Yours sincerely



Curt Robinson
Senior Engineer
London Technical Consultancy



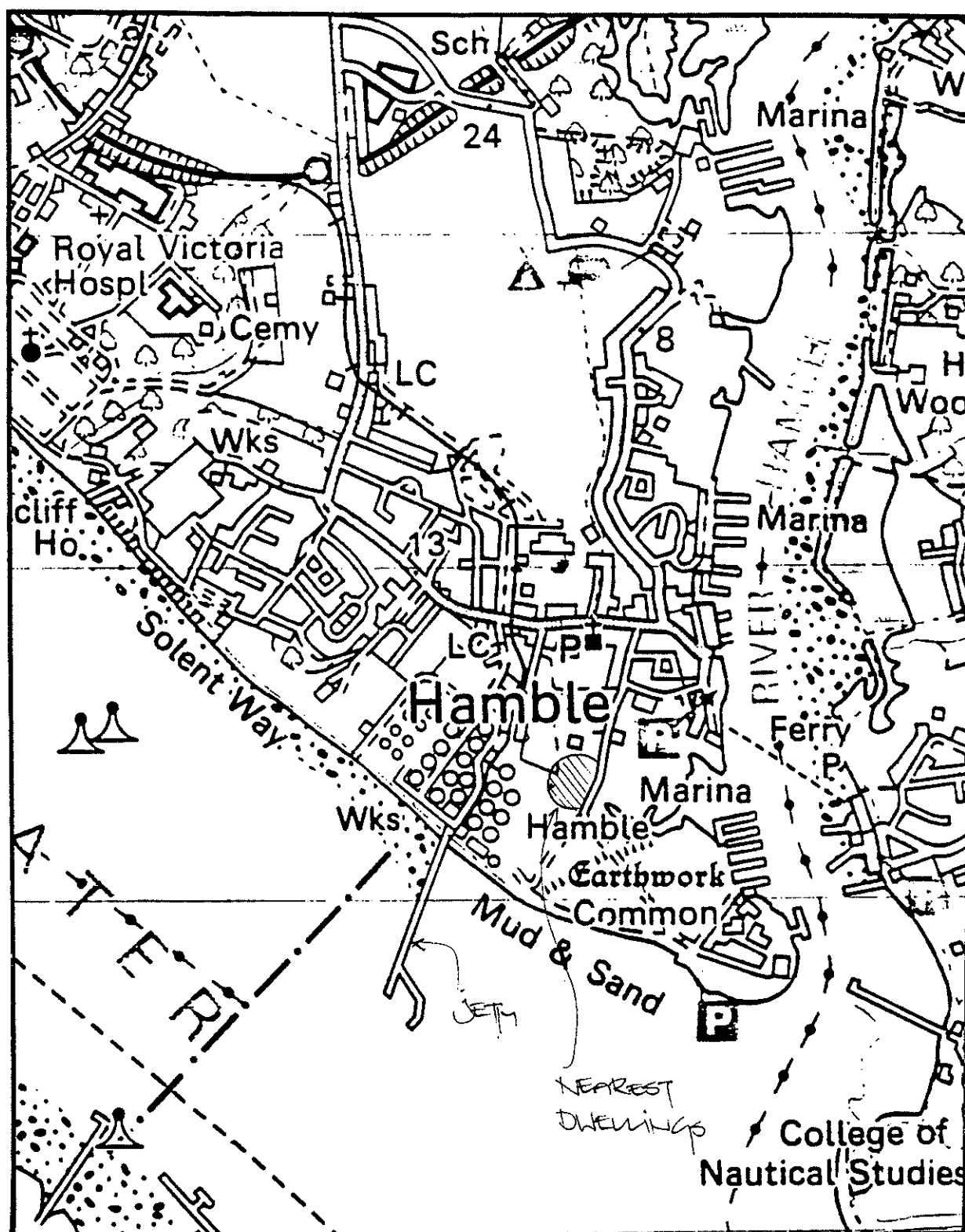


Figure 2
Location of Nearest Dwellings