

Deal Sea Defences – Noise and Vibration Assessment

Summary

This Technical Note provides the results from a noise and vibration survey undertaken at a property in Beach Street, Deal. The survey was undertaken to determine the impact from the beach revetment works that are currently being undertaken for the Deal Sea Defences scheme.

During the works, the highest measured level of vibration over the survey period was 1.03 mm/s. This is below the level of 5mm/s that would be considered an acceptable limit value. Given this, the vibration levels measured at the property are not in the order that is likely to cause damage to the property.

A sample noise measurement was undertaken over a 30 minute period during the works. The measured noise level of 72.7 dB L_{Aeq} is less than the level of 75 dB L_{Aeq} that is commonly used as a limit from construction activities.

1. Introduction

- 1.1 This Technical Note provides the results from a noise and vibration survey undertaken at a property in Beach Street, Deal. This property was considered to be one of a group of the closest sensitive receptors to the work being undertaken. The survey was undertaken to determine the impact from the beach revetment works that are currently being undertaken for the Deal Sea Defences scheme.

2. Vibration Limits

- 2.1 BS5228-2:2009 provides guide values for cosmetic damage due to transient vibration. This table is reproduced in Table 1 with the values reduced to provide a conservative approach to limits.

Type of Building	Peak component particle velocity in frequency range of predominant pulse	
	4Hz to 15Hz	15Hz and above
Reinforced or framed structures Industrial and heavy Commercial type buildings	25mm/s at 4Hz and above	
Un-reinforced or light framed structures Residential or light Commercial type buildings	5mm/s	10mm/s at 15Hz Increasing to 25mm/s at 40Hz and above
NOTE. Values referred to are at the base of the building.		
NOTE. For un-reinforced or light framed structures at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded.		

Table 1. Target vibration limits at sensitive properties, PPV (mm/s)

- 2.2 The values in Table 1 relate to the maximum Peak Particle Velocity (PPV) measured in any of the three orthogonal components. The above values should be reduced by 50% when the vibration is continuous, or if the building exhibits existing significant defects of a structural nature (such as a result of settlement). For the buildings in close proximity to the works in Deal a limit of 5mm/s PPV (50% of 10mm/s due to the works being predominantly above 15Hz) is therefore considered applicable due to the continuous nature of the works.

- 2.3 Minor damage is possible at vibration magnitudes which are greater than twice those given in Table 1, and major damage to a building structure can occur at values greater than four times the tabulated values. These, as well as other effects caused by vibration levels on buildings and humans where appropriate, are summarised in Table 2.

Vibration Level	Effect
0.14mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction.
0.3mm/s	Vibration might be just perceptible in residential environments.
1.0mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
5.0mm/s	Possible cosmetic damage to a building structure may occur from continuous works.
10mm/s	Vibration is likely to be intolerable to humans for any more than a very brief exposure to this level. Minor damage to a building structure may occur from continuous works.
20mm/s	Major damage to a building structure can occur from continuous works.

Table 2. Guidance on effects of vibration levels

3. Construction Vibration Levels

- 3.1 The vibration equipment, consisting of a Vibrock V901 Seismograph (Serial Number: 1180), was installed in the cellar of a property along Beach Street, and was left in situ from 13:10 on the 9th October until 14:10 on the 17th October 2013. During this period there were some other works being undertaken in the Deal area but these were considered to be of sufficient distance to not be measurable.
- 3.2 The measured levels are provided in graphical format in Figure 1a and Figure 1b. The upper value of the y-axis is set to the value where there is possible cosmetic damage from continuous works (i.e. 5mm/s). This upper value has been selected to provide an illustration of how far the measured levels are from the limit value. The graphs also indicate the normal hours of work and also the level of the tide (note: this tide information relates to Dover, approximately 14km around the coast).

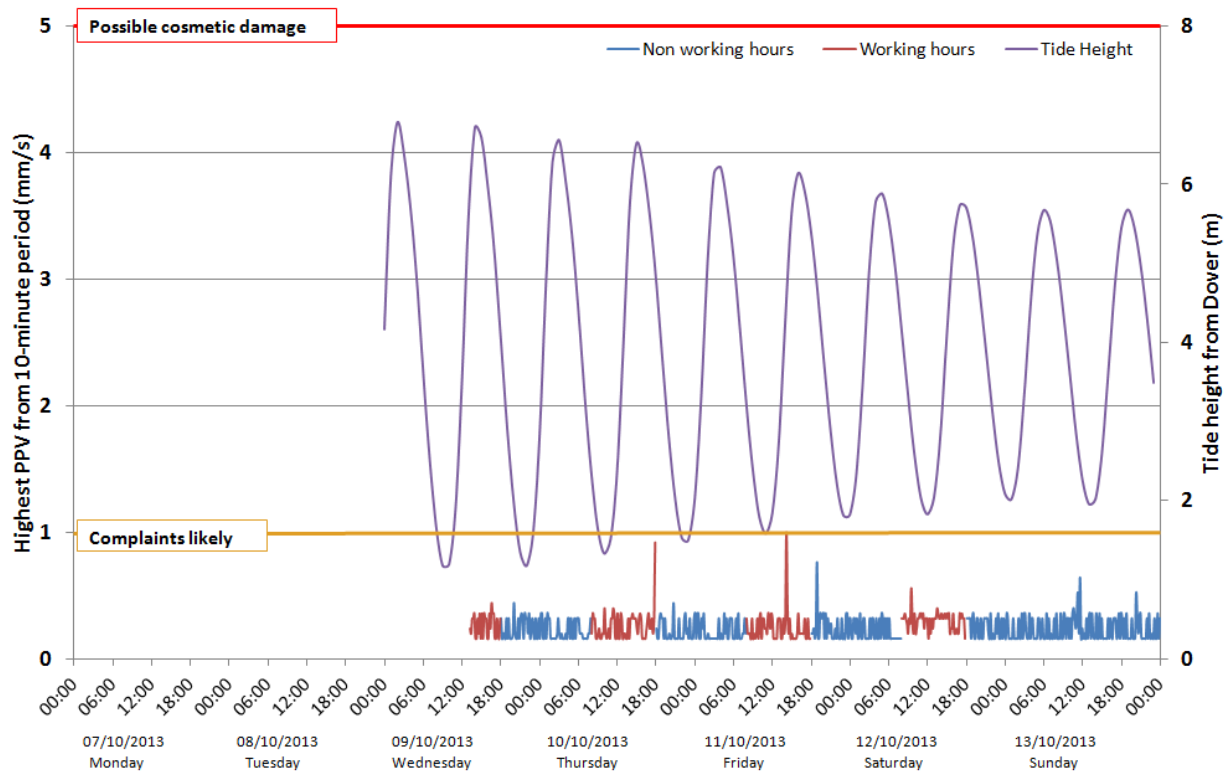


Figure 1a. Measured vibration levels – 9th to 13th October

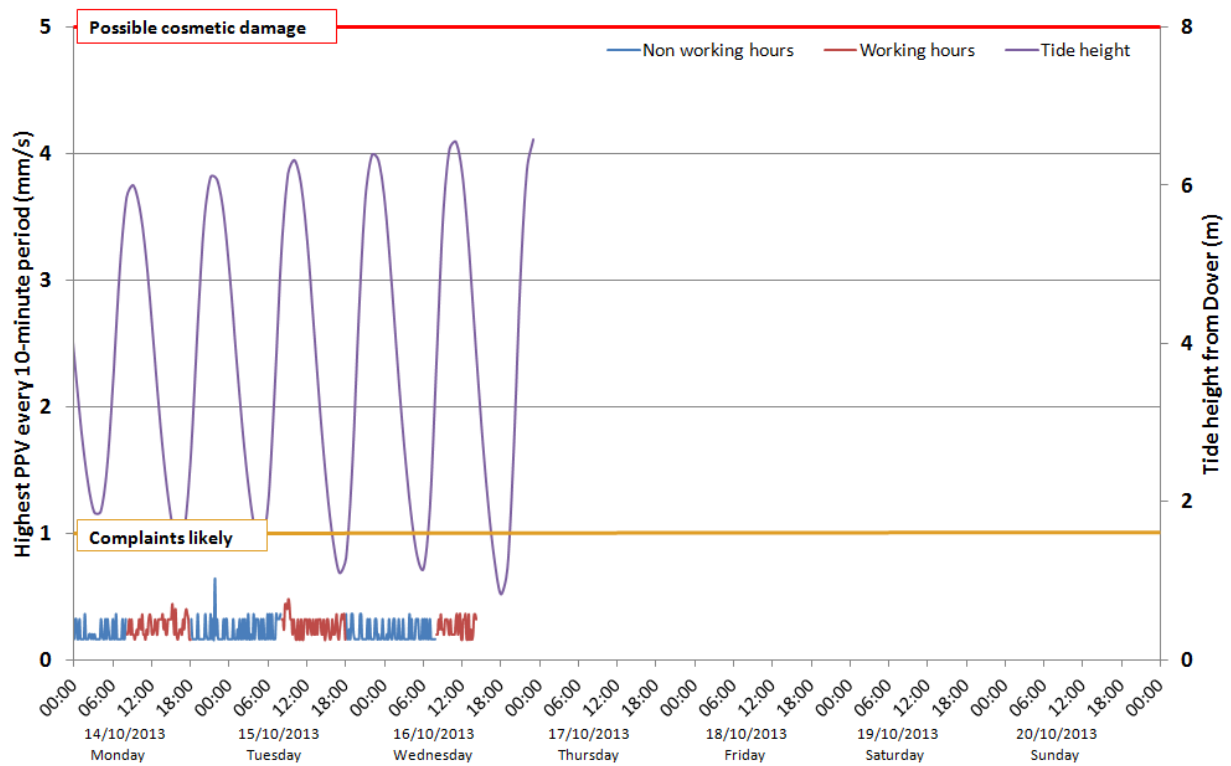


Figure 1b. Measured vibration levels – 14th to 17th October

4. Construction Noise Levels

- 4.1 A 30-minute attended noise measurement was also undertaken outside of the property. This was undertaken on 24th October 2013 between 13:02 and 13:32. During the measurement, observations were made while construction works were being conducted at the beach (recovery, removal and segregation of non-compliant material). The works being undertaken during this measurement period were considered to be typical of the everyday activities.
- 4.2 Other noise sources noted during the measurement period included regular road traffic along Beach Street and adjacent roads, and seagulls. This was considered typical of the everyday noise climate.
- 4.3 The noise measurement was undertaken by a consultant certified as competent in environmental noise monitoring and in accordance with the principles of British Standard 7445:2003: Description and measurement of environmental noise. During the survey the weather was dry and partly cloudy with a light breeze.
- 4.4 All acoustic equipment used during the noise survey conformed to Type 1 specification of British Standard 61672:2003: *Electroacoustics. Sound level meters. Part 1: Specifications*. Table 3 lists the equipment used for the noise survey.

Item	Make & Model	Serial Number
Sound Level Meter	01dB Blue Solo	61083
Calibrator	01dB Cal 21	50441914 (2004)

Table 3: Acoustic measurement equipment used during the noise survey

- 4.5 The sound level meter was mounted on a tripod at a height of approximately 1.5m above ground level and at approximately 1.5m from the front facade of the property. The measured levels are presented in Table 4. The noise level of 72.7 dB(A) is less than the level of 75 dB(A) that is commonly used as a limit from construction activities.

Date	Start Time	Duration, T (hh:mm:ss)	L _{Aeq, T} dB	L _{AFmax} dB	L _{A10, T} dB	L _{A90, T} dB
24/10/2013	13:02:53	00:30:00	72.7	86.8	76.0	66.8

Table 4: Noise survey results

5. Discussion

Vibration Survey

- 5.1 The vibration measurements described have been undertaken in a property on Beach Street that is considered representative of the closest sensitive receptors to the works being undertaken during this period.
- 5.2 Given the continuous nature of the works the target vibration level of 5mm/s is considered as an appropriate and conservative level to ensure there is no cosmetic damage to the building.
- 5.3 The highest measured level was 1.03 mm/s and this is below the acceptable level. Given this, **none of the vibration levels measured during the survey are likely to have caused any cosmetic damage to the property.**
- 5.4 Vibration levels of a similar scale to those measured during working hours also occurred outside of the normal working hours. For example, although no construction works took place on 13th October 2013, PPV levels of up to 0.675 mm/s (higher than those maximum levels registered in most of the working hours) were recorded on that day.

- 5.5 **Given the above evidence, the building is not being exposed to vibration levels from the construction works any higher than those experienced by the building from other sources when the construction works are not taking place.**

Noise Survey

- 5.6 An attended 30-minute noise measurement was undertaken outside of the property on 24th October 2013 between 13:02 and 13:32 while works were taking place.
- 5.7 The measured noise level of 72.7 dB(A) is less than the level of 75 dB(A) that is commonly used as a limit from construction activities.