INSTRUMENTATION CORNER

Instrumentation aspects of CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLANS

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"Here's one we made earlier". This is a phrase not only uttered by over-enthused children's television presenters, but often heard when plans for the management of noise, vibration and dust on construction sites are discussed. It is common for the critical aspects of these documents and their value to be misunderstood by contractors and the cost for production can often be a difficult sell for consultants.

The aim of the effective management of noise, vibration and dust (NVD) generated during construction and demolition activities is to minimise the potential impact of the works on people and property to an acceptable level, by implementing the best practicable means to do so. The contractor should allow sufficient scope in methodology to meet this requirement and undertake the works in a practicable, timely and cost-effective manner.

Main: Annex G of BS5228 Part 1 provides guidance on noise monitoring and the instrumentation criteria

Required actions

The standards for the management of noise, vibration and dust are set by the Local Authority in planning conditions or within a Code of Construction Practice (CoCP). Depending on the size, location, and the proposed demolition or construction methods there may be a number of required actions. The requirements for documentation can also vary significantly between Local Authorities – while most require a Section 61 application for noise and vibration under the Control of Pollution Act 1974, others may also require additional documentation which come in an array of acronyms: C/SEMP, NDVMP, DAQMP, CMP, DEMP, SoPWMP...

All these documents include elements of noise, dust and vibration management but may also cover the wider environmental management concerns such as waste management, ecology and fauna. P42

Bespoke solutions

Despite the array of acronyms, the goal of these documents is to provide bespoke solutions to the management of environmental impacts, including noise, vibration and dust, for each individual site. Individual projects will have differing construction methodologies which could involve the identification of a diverse number of sensitive receptors. As such, it is imperative that management methods need to be tailored to each unique site.

It is particularly important that site monitoring requirements are determined for each site within the management plans. Monitoring requirement should detail the type, quantity and locations of the monitoring instruments and form a key part of the total management system for each site. Through implementation of monitoring, a contractor can illustrate compliance with management plans, often with remote Local Authority oversight. Furthermore, monitoring can provide additional assurance to adjacent occupiers.

Noise and vibration construction criteria are set using the guidance set out in BS5228 Parts 1 and 2. For some sites it may also be necessary to consider the impact of vibration using BS6472-1, where the human exposure is a key concern.

Below left: Site monitoring requirements should be determined for each site within the management plans

Below right: Real-time monitoring instrumentation, when installed, managed and maintained appropriately can be a significant asset to any development

Often, a Local Authority's guidance document, or CoCP will suggest the most appropriate methods to use.

Noise change

For noise, BS5228 Part 1 Annex E provides guidance on the significance of noise effects. For non-commercial receptors of construction noise this is based upon noise change, rather than fixed limits and two methods are offered. Both methods require knowledge of the ambient noise environment. This can be established with baseline noise measurements, or potentially from a noise assessment undertaken at planning stage.

Once the ambient noise climate is known the threshold of significance can be determined:

1) **The ABC Method:**
   Ambient noise data is rounded to the nearest 5dB and threshold values are provided based on the level of ambient noise. This method is only applicable to residential receptors;
2) **The 5dB(A) Change Method:**
   Significance is determined if the total noise (pre-construction ambient plus site noise) exceeds pre-construction by 5dB or more, subject to lower cut-off values. This method is applicable to residential and some sensitive receptors (hotels, religious institutions and schools etc.)

For commercial and office receptors the 75dB(A) limit at the nearest window is often taken as the threshold of significance. The fixed nature of BS5228-1 can be partly to blame for some of the 'copy and paste' approach that is often taken by some contractors. It is important to note, however, that Annex E provides informative guidance on levels of significance, not noise limits.

Noise modelling on major sites

For major sites, a noise modelling exercise, either using spreadsheet or CAD based methods can be undertaken, using the standardised machine noise data and assessment methods from BS5228-1, to show the potential noise levels incident on nearby receptors. Using this data, along with the thresholds of significance, proposed noise limits can be proposed and agreed with the Local Authority.

Annex G of BS5228 Part 1 provides guidance on noise monitoring and the instrumentation criteria. Despite a trend in other sectors, the acoustics (and wider environmental) industry is working hard to avoid a race to the bottom, especially in regard to instrument quality – Class 1 (IEC 61672-1: 2013) instruments are preferred, but Class 2 instruments are the minimum requirement. P44

Typically, Class 1 instruments are installed on the majority of significant sites – and it remains key to consultants, environmental health professionals and contractors that the monitoring data measured is of the highest quality.

Short-term attended or standalone monitoring systems can be used to monitor construction projects and are used particularly in the rail sector. While attended monitoring is useful for short-term and specific events, the benefits of continuous, automated real-time monitoring over the whole development period in providing an uninterrupted time history are being increasingly understood.

Monitoring

Continuous, automated real-time monitoring allows web-based upload of data from site-based instruments with viewing and reporting of measured data available on computers or mobile devices. While short-term attended or standalone systems can be used, the modern expectation of 24/7 connectivity is becoming expected. Modern monitoring systems that can provide SMS and email-based alarms are widely used and can be issued to both site teams and the Local Authority in the event of trigger levels being exceeded. Long-term, continuous measurement also allows reporting of the complete time history for construction event, with many noise monitors providing audio clips when trigger levels are exceeded. This makes identification of exceedance events more straightforward and can be used as evidence to stakeholders to show measured levels were not a result of site activity.

Real-time monitoring instrumentation, when installed, managed and maintained appropriately can be a significant asset to any development. It allows site teams to be proactive in their management of noise, vibration and dust and respond to any issues that may arise before they become a problem. It also provides an opportunity for accountability to stakeholders, as the site team is alerted to levels of noise and vibration that occur and are empowered to take actions to reduce the impact with the best practicable means (BPM).

Below: Consultants are set to play a key and ever-increasing role in construction management

Vital specialist input

Lack of specialist input can be particularly damaging to a project when it comes to monitoring. Without expert and experienced guidance, poor choices relating to the quantity, specification and proposed location of monitoring can be made. These need to be made with care, based on the potential for impact and in liaison with the Local Authority. Care also needs to be taken to ensure the chosen locations; while being appropriate and representative of receptors, they also need to be located somewhere where it is possible to safely install, maintain and provide power to the instrument.

Consultants need to promote the management of noise and vibration at an early stage in a project. Efforts made at the start of the project can nurture a good working relationship with stakeholders and the Local Authority — management of the impact of construction noise is a 'hearts and minds' exercise, where the appropriate monitoring instrumentation is a key tool that provides accountability and reduces the likelihood of significant impacts.

Pre-project planning

Many main contractors have made significant efforts to develop their approach to environmental management, including their own internal specialist teams. Increasingly, the need for impartial technical advice is a key component of the pre-project planning for large contractors and specialist acoustic support is a major contributor to this process.

While few people are overjoyed to experience construction undertaken nearby, if managed and communicated well, the impacts can be reduced — alleviating concerns, preventing notices and delay which, in turn, decreases the overall project costs. Consultants are set to play a key and ever-increasing role in construction management.