Cirrus Environmental

the Case Study

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Keeping you up-to-date with the world of **noise measurement**

Invictus on the right track

An international acoustic consultancy was engaged by contractor Balfour Beatty on behalf of the end client Network Rail in this landmark project that is revolutionising transport across London.

Network Rail

Balfour Beatty

The Project:

The new rail link will help cut journey times to the heart of the capital by two thirds in some cases, passing through 37 stations and running 118km from Maidenhead and Heathrow in the west, through new twin-bore 21km (13 miles) tunnels to Shenfield and Abbey Wood in the east. It will increase the overall Network capacity by 10%.

The Plumstead phase of the six year project is located in the far South East of the Capital. The construction is all surface work but on a linear project starting at the Plumstead Portal carrying through to Abbey Wood Station some 2kms away.

Balfour Beatty had been on-site some months before the Invictus units were required in situ. Work predominantly centred around the realignment of existing rail tracks and the installation of new ones, demolishing existing footbridges and reconstruction, as well as refurbishment of the Abbey Wood Station. Work is anticipated to be completed in 2018 and operational by 2019.

Why was noise monitoring necessary?

As with any surface or external construction project, Balfour Beatty had legal obligations to meet when it came to noise levels and to ensure that work did not exceed any permitted levels at variable times of the day.

The acoustic consultants had worked for some months on estimating and trying to gauge the locations and noise levels that would be reached over the course of the project. "We obviously try to be as accurate as possible but as with any construction project, timetables and work schedules change; delays inevitably creep in which affect our predicted data," said Acoustic Scientist Phillip Lu.

As well as the issues surrounding the linear and mobile nature of the works taking place, the construction elements were all concentrated in a predominantly residential area, where feelings were already sensitive over the long term disruption.

The site:

As the work site was following the line of the track it was imperative to have a noise monitoring system in place that was discreet but portable and easy to maintain. There were many constraints around the site due to its rigid location and contractors had to gain permission and access from several local residents to site the Invictus units in their gardens, adjacent to the site. "We were very fortunate that everyone we asked was very co-operative, but it was important that we spent the least amount of time possible in set up and kept future monitoring and maintenance to a minimum so not to inconvenience the householder." Said Lu.

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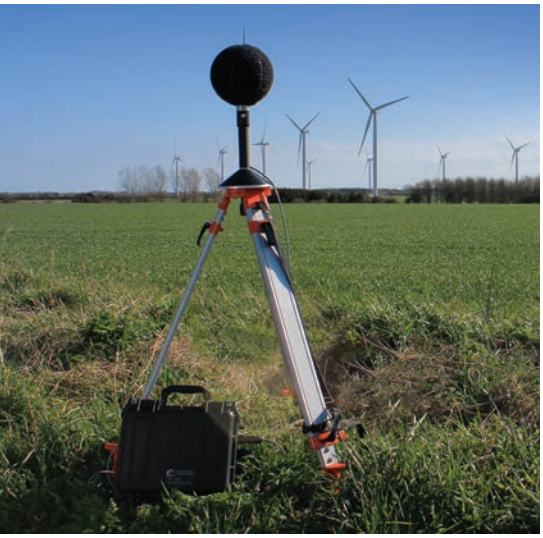

The Invictus Solution:

The Invictus is a purpose designed environmental noise measurement instrument designed for use in a wide range of applications from short term noise measurements to long term noise monitoring projects.

An Invictus can be used on its own as a portable environmental noise monitor or can be combined with other instruments and sensors to form part of a larger, more comprehensive noise measurement and management system. For medium and long term noise monitoring applications, the Invictus can be combined with a secure enclosure for wall or mast mounting.

Ease of use is key to the Invictus and the large, clear colour touch screen allows the instrument to be deployed quickly whilst allowing the user to see the exact status of the system.

The Invictus network on this project consisted of 6 separate units, 12 long term external batteries and a weather station. With one held in reserve, a primary unit was stationed permanent within the Balfour Beatty compound and further more units were situated in gardens and would move as work progressed.

Justin Barker, Sales Manager for Cirrus Environmental comments: "With rail projects like these being notorious for their complex noise conditions we knew that the calendar feature in Invictus would be invaluable to the customer as averaging times and trigger levels for different days of the week and different times of day would automatically be switched. This meant that measured results were in line with the noise condition with no physical interaction by the client required."

Reporting:

The Invictus is capable of producing daily noise reports and uses its NoiseHub2 software system to continually assess noise levels and issue alerts when a breach takes place. This enables the acoustics team to alert the contractors and take immediate action.

Noise Hub2 is recognised as the next generation reporting system for noise monitoring and can be run on a single PC, server or accessed through a web interface, allowing measurement data to be downloaded and reviewed, and reports created quickly and simply.

As well as its measurement capabilities Phillip also enjoyed the options of Acoustic Fingerprint Triggering, a live audio listen function of compressed audio.

It's predicted Leq triggers showed a % of dose and predicted exposure if a certain level was maintained, with up to 12 triggers available, based on Level or Tone. The team was also able to see the LAeq time history and Ln Values.

> They quickly got to grips with the new technology and were able to calibrate and maintain it with ease

Noise Challenges:

Fortunately the noise monitoring on site was not clouded by other nearby construction projects and, as it was largely residential, ambient noise was also at a minimum. Other factors such as traffic on the existing rail tracks could be scheduled and built into the monitoring timetable.

From the outset local residents were acutely aware of the works taking place and so were not averse to making complaints about noise levels if they felt it was intrusive. Fortunately the accuracy and detail of data available from the Invictus enabled the team to go back over their measurements and see if the reality of the data matched the perceived noise levels reported by the local home owners. They could then check this against what works was taking place at the time to see what may have been responsible and, if necessary, mitigate against.

As the work progresses it will be inevitable that noise measuring will follow the construction and so 4 out of the 5 Invictus units will be moved every few months over the course of the project.

The Benefits:

The Invictus offers a fully integrated system designed to take away the uncertainty from the construction team, both on-site and in logistics.

> The software integrated within the Acoustic Team's own in-house system

As acoustic experts on the project, Phillip and his team were responsible for the installation and day to day operations of the equipment. They quickly got to grips with the new technology and were able to calibrate and maintain it with ease, despite never having worked with the specific technology before.

Another benefit that quickly became evident was the Invictus' remote capabilities and multi trigger options that would record multiple noise levels as required. The software integrated within the Acoustic Team's own in-house system to ensure that any alerts of noise level breaches could be investigated immediately and any data produced could be easily transformed into suitable graphs and tables in reports to go back to the contractors, Network Rail and local council bodies. "We have been asked for noise level data on certain days and times and we have been able to supply that," said Lu. "If there were any breaches then we can assess the data from that time and look to see how we can ensure it doesn't happen again."

With the Invictus in situ and monitoring 24/7 Phillip has also been impressed with the external battery life, lasting up to 2 months on average, before the unit automatically - via an email and text - warns of a switch to the internal shorter term battery. This gives an engineer a further 7 days to get on site and swap the batteries – an ample time window to ensure monitoring is uninterrupted. Each Invictus unit was supplied with two external batteries for this purpose.

Daily data has helped the project team to engage noise issues and manage noise concerns with all external parties and stakeholders. It offers reassurance and clear evidence that legal obligations are being met and robust noise monitoring is at the heart of the project.

Facts:

The team were working to Cross Rail's own noise standards as set out in the Cross Rail D9 document. At the same time they also had to satisfy Greenwich Council's Section 61 requirements.

As well as 24/7 noise monitoring duties the Invictus supplied crucial data to help deal with any isolated complaints from local residents about night time noise levels.

Cirrus Products used in this case study

- Invictus CR:247 Portable Noise Monitor
- Noise-Hub2 Noise Monitoring System Software

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