Brüel & Kjær [B K]

BEYOND MEASURE

CREATING AN ENTIRE
COUNTRY'S NOISE MAP

The European Union's Environmental Noise Directive 2002/49/EC requires member states to create new noise maps every five years for large urban areas and major transportation sources. The English government decided to meet the requirements for the second round of noise maps by commissioning a single project to calculate sound levels across England. This resulted in the world's largest noise map.

HEPWORTH
A C O U S T I C S
Noise and Vibration Consultants

CHALLENGE
To calculate noise maps for 26,000 km of roads, 5,000 km of railways and 65 urban areas within a very restricted timescale and budget.

SOLUTION
Predictor-LimA noise mapping and prediction software efficiently processed the massive amount of data.

RESULTS
Consultants cost-effectively created EU-compliant maps that provided a country-wide noise footprint.

BACKGROUND

Environmental Noise Directive (END) 2002/49/EC focuses on how noise from major metropolitan areas, transportation and industrial sites impacts the public. It requires EU members to create noise maps every five years and develop subsequent action plans to manage noise issues identified.

England's Department for Environment, Food and Rural Affairs (DEFRA) is responsible for developing these compulsory maps. For the second round of noise mapping, the EU expanded the remit of the mapping to include modelling additional urban areas, roads and railways across most of England.

Hepworth Acoustics, a consultancy specialising in providing high-quality acoustics, noise and vibration advice, was appointed by DEFRA to calculate this extensive map collection. Hepworth collaborated with Acustica, DARH2, Extrium and Stapelfeldt Ingenieurgesellschaft.

THE CHALLENGE

DEFRA decided to commission the world's largest noise mapping project, calculating sound levels across all of England's major transportation and urban areas.

The huge project included mapping 26,000 km of roads, 5,000 km of railways and 65 cities. There were approximately 950 million

assessment locations, with up to seven noise indices (including L_{DEN} and L_{Night}) to be calculated for each location, and a default resolution of 10 metres.

DEFRA also sought a more economical way to create the noise maps than for those it produced five years earlier. Despite having an expanded scope, the department's budget was one fifth of its first round of mapping.

Because of the project's enormity and six-month deadline, quickly and efficiently computing the noise map was critical.

Hepworth Acoustics' team from four countries were utilised to provide the manpower to meet the demanding deadline for the project.

THE SOLUTION

Hepworth Acoustics used Brüel & Kjær's Predictor-LimA noise mapping software to calculate the noise maps for England.

Fast calculations – Predictor-LimA's state-of-the-art calculation cores have been independently proven as the fastest available

"TO COMPLETE THE REQUIRED NOISE MAPS WE CARRIED OUT OVER 15 BILLION CALCULATIONS. PREDICTOR-LIMA GAVE US THE CAPACITY TO CARRY OUT ALL OF THE CALCULATIONS AND EFFECTIVELY HANDLE THE DATA WITHIN THE ALLOCATED SIX MONTHS."

Peter Hepworth
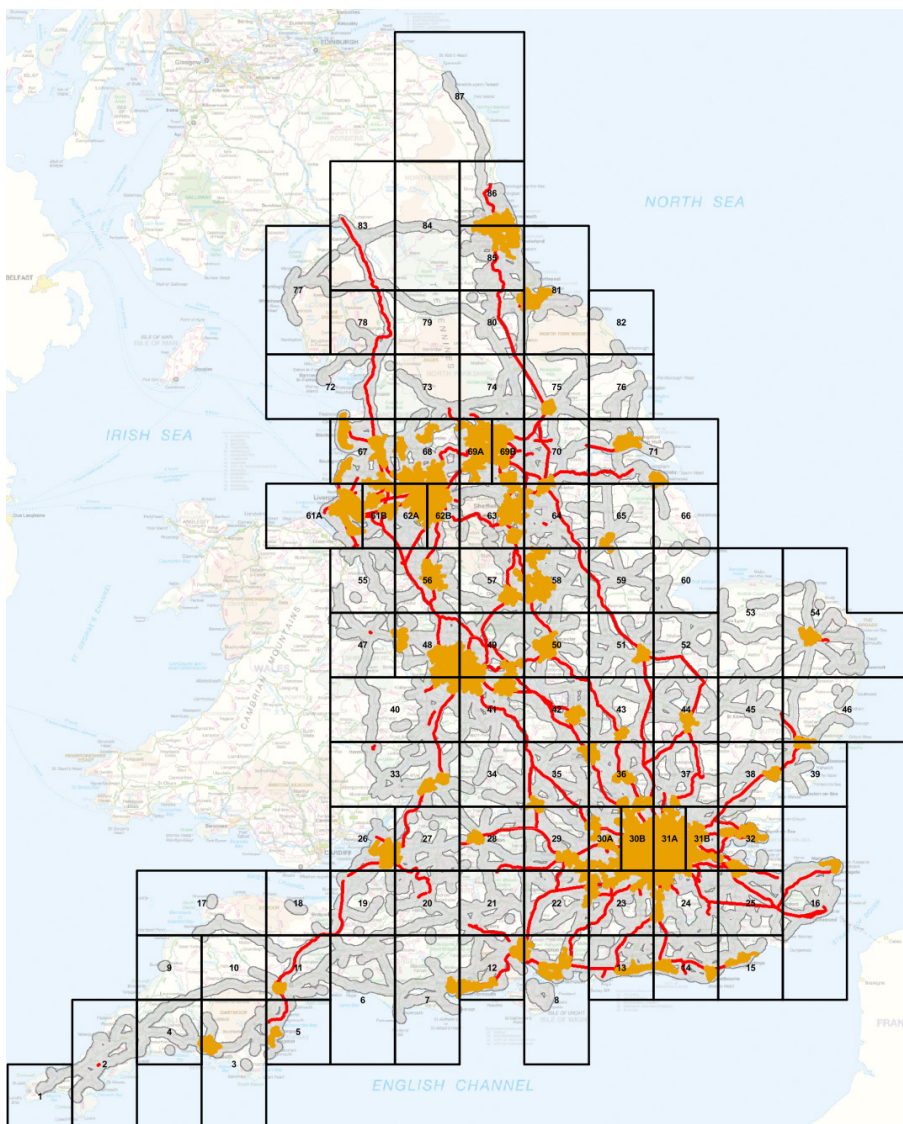
for the UK's Calculation of Road Traffic Noise (CRTN) method.

The software's huge capacity and high calculation speed gave Hepworth quick results while minimising investment in computing power. This enabled the team to complete the calculations within the required timeframe.

Integration with external systems – Predictor-LimA is built on an open structure that's highly intuitive and customisable.

Its modules interface seamlessly with external geographic information systems (GIS), facilitating efficient transfer of model vectors to Predictor-LimA's calculation cores.

From an integrated database of topography and traffic information, Predictor-LimA selected only the relevant data needed to calculate a defined area. For the DEFRA project, this was done region by region using identical criteria.

Integration flexibility allowed work on the project to be carried out by staff located in different regions across Europe.

RESULTS

Hepworth Acoustics employed Predictor-LimA to create the noise maps required for Environmental Noise Directive compliance.

It did this for one-fifth of the cost of the previous set of maps required five years earlier.

"The second round of noise mapping required more areas and noise sources to be mapped but had only 20% of the budget used in the first round of mapping," said Peter Hepworth, director of Hepworth Acoustics.

> "THE SIZE AND TIGHT DEADLINE FOR THE PROJECT MEANT THAT THE FIRST DECISION WE HAD TO MAKE WAS WHETHER WE WERE ABLE TO MEET THE REQUIREMENTS IN THE TENDER DOCUMENTS. WITHOUT PREDICTOR-LIMA, WE WOULD NOT HAVE BID FOR THE PROJECT."
>
> *Peter Hepworth*

Predictor-LimA's speed and integration with other tools employed helped the consultancy deliver its results within the calculation project's six-month time frame.

"Noise Mapping was carried out within budget, and cost approximately 1 pence (€0.013) per resident," added Hepworth.

(Note: To obtain the total noise level at each receptor, separate calculations are made for each source object e.g. road or railway section with the same source noise levels, and the results are then summed.)

CONCLUSION

Predictor-LimA quickly and cost-effectively helped Hepworth Acoustics map noise for the main urban centres and transportation corridors in England to fulfil DEFRA's Environmental Noise Directive requirements.

The government gained a better understanding of the exposure of English residents to noise.

The project demonstrated that Predictor-LimA can easily handle massive-scale noise map calculations for projects of any size, including the largest noise map ever made.

"The English Noise Map project was extremely demanding not only because of the size of the mapped area, but also because of the timescale and budget available," concluded Hepworth.

"The capability of Predictor-LimA gave us the confidence to win the tender, and the tools required to deliver the world's largest noise map on time and to budget."

> "PREDICTOR-LIMA'S CAPABILITIES GAVE US THE TOOLS REQUIRED TO DELIVER THE WORLD'S LARGEST NOISE MAP ON TIME AND TO BUDGET."
>
> *Peter Hepworth*

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