



TREVOR BASIN

PLANT NOISE ASSESSMENT

Acoustics Report A1893 R01B

7th July 2022

Report for:

Canal and River Trust

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Issue/Revision number
A1893 R01B

Date
07/07/2022

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1 Introduction

Ion Acoustics is appointed by the Canal & River Trust to carry out a noise assessment of a new café and boat hire facility to be built on land at the Trevor Basin, near Llangollen. The project has planning permission, but the local authority (Wrexham) has identified two draft pre-commencement conditions relating to noise as follows:

- 9) *No part of the development shall commence until a noise survey in order to determine noise levels for both day and night has been carried out, and a detailed report of the survey findings together with a detailed scheme of noise attenuation and / or noise insulation measures has been submitted to and approved in writing by the Local Planning Authority. The measures as are approved shall be fully implemented prior to the first occupation / use of the development.*
- 10) *The rating level of any noise generated by reason of this development shall not exceed the pre-existing background level at any time. The noise levels shall [be] determined at nearby noise sensitive premises, and measurements and assessment shall be made in accordance with BS4142:2014 Method for rating and assessing industrial and commercial sound.*

This report provides details of the noise survey and information on the proposed plant and sound attenuation measures. A BS 4142 noise assessment of the proposed plant is provided which demonstrates there will be no impact on residential amenity in respect of noise. This report can therefore be submitted to the local authority to discharge the conditions relating to noise.

2 Scheme Details

The scheme involves a new café to be built in the location of a former boat trip operator, Jones the Boats who also operated an informal café on the site. The site plan and surrounding area is shown below in Figure 1.

The nearest residential properties to the café are housing on Station Road and Rose Cottage by the entrance to the basin. Rose Cottage is some 79 metres to the café building while the rear gardens of the nearest properties on Station Road are around 52 metres from the café. There are also the Chapel Tea Rooms and a pub, the Telford Inn, which are at a similar distance to those residential locations.

The boat hire facility will obviously result in the operation of narrow boats at the basin but as the basin is already used by narrow boats for mooring this would not result in a significant change in this type of noise. However, a BS 4142 assessment is made in respect of new building services plant associated with the facility as required by the draft planning conditions.



Figure 1 – Site Location and Surroundings (Aerial Image © Google)

2.1 Proposed Plant

The development is a small-scale café with a small kitchen extract fan and air source heat pump (ASHP). The kitchen extract will be a simple wall-mounted extract. Further details are provided in the calculation section. In addition, as part of the development, an existing water pump sited near the Anglo-Welsh offices to the south will be relocated to an enclosure in the location shown in Figure1. The new water pump location is over 100 metres from the nearest residential properties.

3 Planning Guidance

3.1 Technical Advice Note 11: Noise (1997) (TAN 11)

The current planning guidance in respect of planning and noise in Wales is TAN 11. In terms of “noise generating development”, the document states:

"Local planning authorities must ensure that noise generating development does not cause an unacceptable degree of disturbance. They should also bear in mind that if subsequent intensification or change of use results in greater intrusion, consideration should be given to the use of appropriate conditions."

"Noise characteristics and levels can vary substantially according to their source and the type of

activity involved. In the case of industrial development, for example, the character of the noise should be taken into account as well as its level. Sudden impulses, irregular noise or noise which contains a distinguishable continuous tone will require special consideration."

The assessment requirements described above can be addressed by a BS 4142 assessment, as required by draft condition 10, as this considers the level and character of the noise.

3.2 BS 4142:2014+A1: 2019

The standard method for assessing plant noise affecting residential locations is British Standard BS 4142 "Method for rating and assessing industrial and commercial sound". A BS 4142 assessment is made by determining the difference between the plant noise under consideration and the background sound level as represented by the L_{A90} parameter, determined in the absence of the plant noise. The L_{A90} statistical parameter is the level exceeded for 90% of the measurement time. Therefore, it represents the underlying noise in the absence of short-term events.

The plant noise is assessed in terms of the equivalent continuous noise level, L_{Aeq} , but a character correction penalty can be applied where the noise exhibits certain characteristics such as distinguishable tones, impulsiveness, or if the noise is distinctively intermittent. The L_{Aeq} parameter is defined as the steady-state noise level with the same energy as the actual fluctuating sound over the same time period. It is effectively the average noise level during the period. The plant noise level (L_{Aeq}) with the character correction (if necessary) is known as the rating level, L_{Ar} , and the difference between the background noise and the rating level is determined to make the BS 4142 assessment. With regard to the magnitude of impact the standard states:

- *Typically, the greater this difference, the greater the magnitude of the impact.*
- *A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

In this case, draft condition 10 requires noise from the development not to exceed the pre-existing background which is consistent with the rating of a 'low impact' as described above.

With regard to the quantification of the background noise level L_{A90} , BS 4142: 2014 states:

In using the background sound level in the method for rating and assessing industrial and commercial sound, it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.

To determine the 'typical' level BS 4142 provides an example analysis whereby a frequency distribution graph of the measured background sound levels is created. The modal value can then be used to determine the typical level.

BS 4142:2014 also states in Section 11 *"where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night"*.

Therefore, in some circumstances, an absolute limit can be imposed, and it is relevant to note that BS 4142 states that a rating level of 30 dB L_{Ar} is 'low'.

4 Noise Survey

4.1 Survey Methodology

A baseline noise survey was carried out from 20th to 21st April 2022 with a noise monitor set up on the Trust's land at the edge of the site. The monitor was positioned towards the northern end to ensure that the monitoring position was as far away from the canal as possible. Nevertheless, low frequency noise from a narrow boat engine running was audible at start-up. The boat was close to the entrance to the basin on the far side and therefore closer to Rose Cottage than the monitoring location.

Figure 2 below shows the monitoring position.



Figure 2 – Noise Monitoring Location Looking South-West

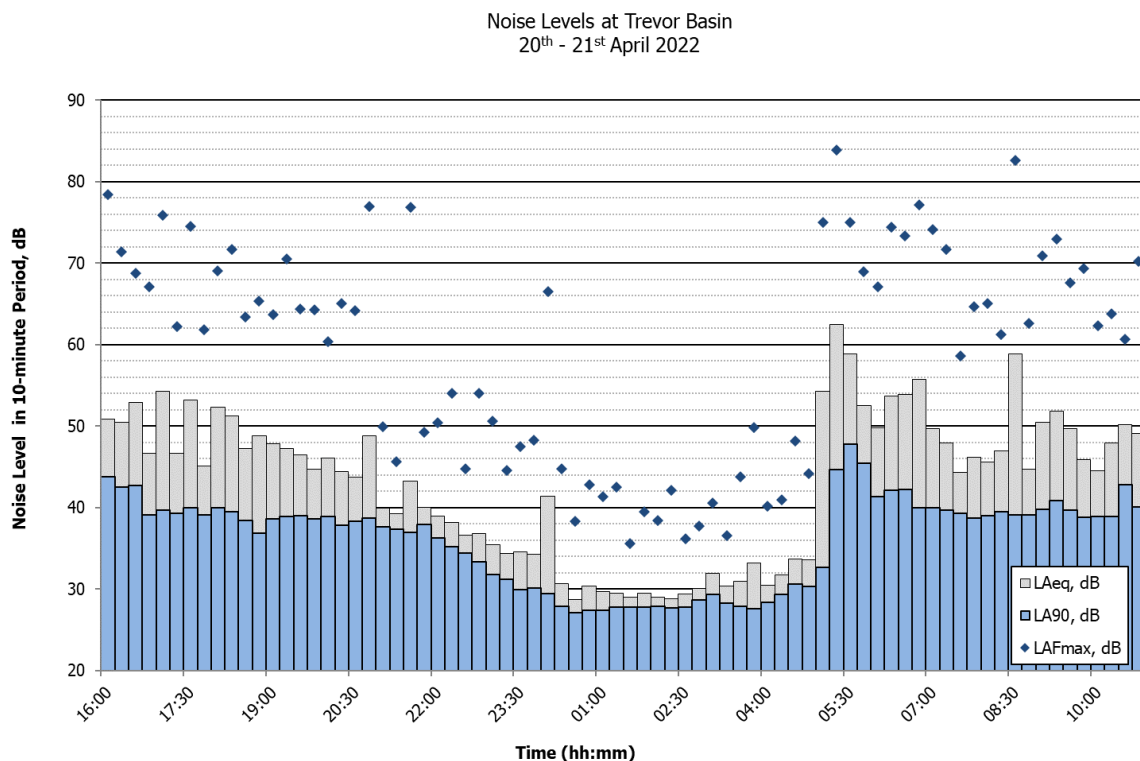
A Rion NL52 sound level meter was used for the survey with Type WS-15 windshield and was set up to log various noise parameters in 15-minute periods, including the L_{Aeq} , L_{AFmax} , and L_{A90} . The sound level meter was calibration checked at set-up and collection using a Brüel & Kjær 4231 calibrator. The drift was not significant and was within expected tolerances (<0.1 dB). The meter was unattended for the duration of the survey except during the set-up and collection,

however audio files were recorded at 10-minute intervals in order to identify noise sources. Both the sound level meter and the calibrator were within their required external calibration intervals. Calibration certificates are available upon request.

The weather conditions were fine and dry with low wind speeds and conducive for noise monitoring.

4.2 Survey Results

A time history chart for the monitoring period is shown below in Figure 3. Tabulated survey data is provided in Appendix A in terms of the 15-minute noise values over the survey period.



At the start of the monitoring period, a narrow boat motor was running and there was a prominent low frequency noise. Various boats were mooring for the night and people were walking around the area between the car park, the basin and the viaduct. When the motor stopped, background noise levels dropped to a steady level of just below 40 dB LA90. This was mainly from traffic noise from the surrounding road network. Bird song was also heard. A visit was made to the monitor at 21.30 hours. Distant traffic noise was the dominant source and the levels had dropped slightly (around 36dB LA90). From the time history chart, noise levels then steadily drop after 22.00 hours to a minimum level at around midnight of around 27 dB LA90. From 05.00 hours there is a sudden increase in noise due to the dawn chorus. At collection one narrow boat motor was operating but at a relatively low level compared with that heard at set up.

BS 4142 requires the "typical" background noise level to be determined. This has been determined by studying the distribution of the integer LA90 values in 15-minute periods. This is shown below for a 12-hour day, a 4-hour evening and 8-hour night-time period.

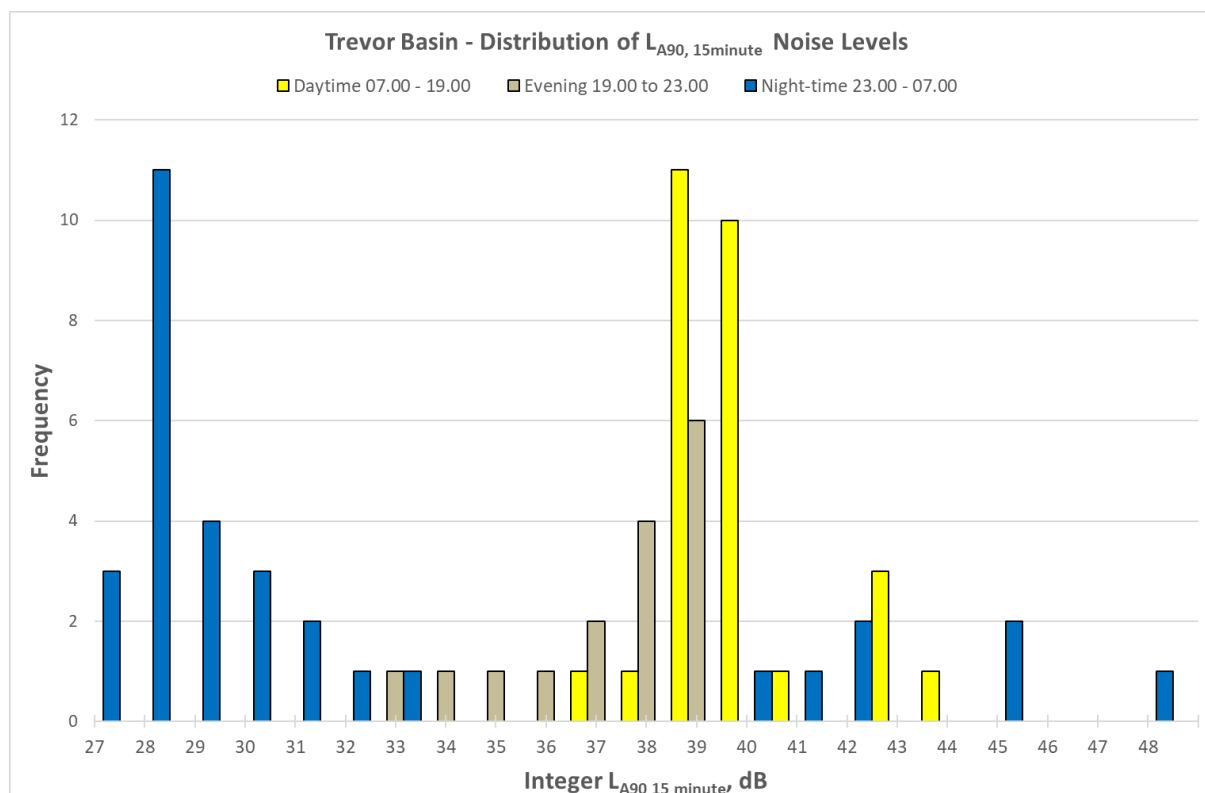


Figure 3 Distribution of 15-minute Background Noise Values

Based on the above and the time history chart in Figure 2, it can be seen that a value of 39 dB L_{A90} is typical for the daytime period and the evening up to 22.00 hours. After 22.00 hours there is a steady reduction in noise levels until around 00:30 hours. The levels at night are much lower, dropping to a typical level of 28dB L_{A90} .

4.3 Proposed Noise Limits

Based on BS 4142 and draft planning condition 10, a noise limit no greater than the typical daytime background should ensure that plant noise has a low impact. Therefore, the proposed daytime limit is 39 dB L_{Ar} where L_{Ar} is the BS 4142 rating level. Background noise levels can be as low as 27 dB L_{A90} during the middle of the night but it is also worth noting the highest background noise value of 48 dB L_{A90} occur during the dawn chorus. BS 4142 indicates that the period when people are trying to get to sleep may be more important. Background noise levels are around 30 dB L_{A90} at this time. Given that BS 4142 also indicates that 30 dB L_{Ar} is a low level it is proposed to set the night limit at 30 dB L_{Ar} .

5 Calculations

The proposed mechanical plant comprises the following:

- A Samsung Joule R32 12kW Air Source Heat Pump With an A-weighted Sound Power Level of 64 dB L_{WA} ;
- A 6 pole 400 x 400 plate kitchen extract fan with a noise level of 49 dB at 3 metres.
- A Selwood D80 water pump located in an enclosure over 100 metres from residential properties.

Note that the kitchen extract fan and ASHP are indicative plant selections which meet the operational requirements. The actual plant selections may differ, but the selections will take into account the noise output to ensure that the noise limits will be met.

The air source heat pump will be used for heating and as such may operate at any time during the day or night. The kitchen extract fan will only operate during the café opening hours typically until 18.00 hours during the summer.

To determine the noise levels at the residential receptors, single figure noise predictions have been made for the kitchen extract fan (FEF) and ASHP considering distance loss only. The calculation is set out below.

Table 1 Noise Predictions

Source	ASHP	KEF
Sound Power or Pressure Level	64 dB L _{WA}	49 L _{pA} at 3m
Distance to Station Road	52m	52m
Distance to Rose Cottage	79m	79m
Distance Loss Station Road	42 dB	25 dB
Distance Loss Rose Cottage	46 dB	28 dB
Predicted Noise Level Station Road	22 dB(A)	24 dB(A)
Predicted Noise Level Rose Cottage	18 dB(A)	21 dB(A)

It can be seen that the predictions indicate very low noise levels well below the noise limits. No specific attenuation measures are required, since plant with inherently low noise levels has been selected. Even if both sources operate at the same time, combined noise levels will be 26 dB(A) at Station Road.

A prediction cannot be carried out for the water pump as there is no data available, but it should be remembered that the pump is fully enclosed and over 100 metres from the residential properties. Any noise should be minimal. The existing pump location by the Anglo-Welsh offices is actually closer to residential properties off the B5434.

5.1 Uncertainty and Context

BS 4142 requires consideration of uncertainty and context in the assessment. In this case, there is some uncertainty in the noise data, but low noise limits have been set based on a representative survey and simple calculations have indicated that the predicted noise levels are well within the proposed noise limits. Therefore, uncertainty would not affect the outcome of the assessment.

The context in this case is that the Trevor Basin and Aqueduct is a tourist attraction and canal boats use the basin for overnight mooring sometimes with high noise levels from engines. The noise of these engines will be higher than that of the café plant and is more intermittent and potentially more disturbing than the new plant. There is also already a tearoom and pub in the area and the site has previously been used by a boat trip operator with an informal café. Therefore, any noise and disturbance will be similar to that already occurring in the area. Noise levels from plant are predicted to be well below the typical background noise so that there will be no significant noise impact.

6 Conclusion

The report presents a noise survey and assessment for new plant associated with a proposed café at Trevor Basin to discharge draft planning conditions imposed on the development. The café will be built on land formerly used by a boat trip company.

A survey has been carried out to set noise limits for the plant in accordance with BS 4142 and draft planning condition 10. Plant noise predictions have been carried out to ensure the noise limits can be met. The predictions indicate very low noise levels well within the proposed noise limits. Given that amenity can be protected the planning conditions can be discharged.

TREVOR BASIN
Plant Noise Assessment
Appendix A – Tabulated Survey Data



Time	L _{Aeq} dB	L _{Amax,F} dB	L _{AF90} dB	Time	L _{Aeq} dB	L _{Amax,F} dB	L _{AF90} dB
20/04/2022 16:00	50.9	78.4	43.8	21/04/2022 04:00	30.5	40.2	28.4
20/04/2022 16:15	50.5	71.4	42.5	21/04/2022 04:15	31.7	41.0	29.3
20/04/2022 16:30	52.9	68.8	42.7	21/04/2022 04:30	33.7	48.2	30.6
20/04/2022 16:45	46.7	67.1	39.1	21/04/2022 04:45	33.6	44.2	30.3
20/04/2022 17:00	54.3	75.9	39.7	21/04/2022 05:00	54.3	75.0	32.7
20/04/2022 17:15	46.7	62.2	39.3	21/04/2022 05:15	62.5	83.9	44.7
20/04/2022 17:30	53.2	74.5	40.0	21/04/2022 05:30	58.9	75.0	47.8
20/04/2022 17:45	45.1	61.8	39.1	21/04/2022 05:45	52.5	69.0	45.4
20/04/2022 18:00	52.3	69.1	40.0	21/04/2022 06:00	49.8	67.1	41.3
20/04/2022 18:15	51.2	71.7	39.5	21/04/2022 06:15	53.7	74.4	42.1
20/04/2022 18:30	47.2	63.4	38.4	21/04/2022 06:30	53.9	73.3	42.2
20/04/2022 18:45	48.8	65.3	36.9	21/04/2022 06:45	55.7	77.1	40.0
20/04/2022 19:00	47.8	63.7	38.6	21/04/2022 07:00	49.7	74.1	40.0
20/04/2022 19:15	47.2	70.5	38.9	21/04/2022 07:15	47.9	71.7	39.7
20/04/2022 19:30	46.5	64.4	39.0	21/04/2022 07:30	44.3	58.6	39.3
20/04/2022 19:45	44.7	64.3	38.6	21/04/2022 07:45	46.2	64.7	38.7
20/04/2022 20:00	46.1	60.4	38.9	21/04/2022 08:00	45.6	65.1	39.0
20/04/2022 20:15	44.4	65.1	37.8	21/04/2022 08:15	47.0	61.2	39.5
20/04/2022 20:30	43.7	64.2	38.3	21/04/2022 08:30	58.9	82.6	39.1
20/04/2022 20:45	48.8	77.0	38.7	21/04/2022 08:45	44.7	62.6	39.1
20/04/2022 21:00	39.9	49.9	37.6	21/04/2022 09:00	50.5	70.9	39.8
20/04/2022 21:15	39.2	45.6	37.3	21/04/2022 09:15	51.8	73.0	40.9
20/04/2022 21:30	43.2	76.9	37.0	21/04/2022 09:30	49.7	67.6	39.7
20/04/2022 21:45	40.0	49.2	37.9	21/04/2022 09:45	45.9	69.3	38.8
20/04/2022 22:00	39.0	50.4	36.3	21/04/2022 10:00	44.5	62.3	38.9
20/04/2022 22:15	38.2	54.0	35.2	21/04/2022 10:15	47.9	63.8	38.9
20/04/2022 22:30	36.6	44.8	34.4	21/04/2022 10:30	50.2	60.7	42.8
20/04/2022 22:45	36.8	54.0	33.3	21/04/2022 10:45	49.1	70.2	40.1
20/04/2022 23:00	35.4	50.6	31.8	21/04/2022 11:00			
20/04/2022 23:15	34.4	44.6	31.2	21/04/2022 11:15			
20/04/2022 23:30	34.6	47.5	29.9	21/04/2022 11:30			
20/04/2022 23:45	34.3	48.3	30.1	21/04/2022 11:45			
21/04/2022 00:00	41.4	66.5	29.4	21/04/2022 12:00			
21/04/2022 00:15	30.7	44.8	27.9	21/04/2022 12:15			
21/04/2022 00:30	28.7	38.3	27.1	21/04/2022 12:30			
21/04/2022 00:45	30.4	42.8	27.4	21/04/2022 12:45			
21/04/2022 01:00	29.7	41.3	27.4	21/04/2022 13:00			
21/04/2022 01:15	29.5	42.5	27.8	21/04/2022 13:15			
21/04/2022 01:30	29.0	35.6	27.8	21/04/2022 13:30			
21/04/2022 01:45	29.5	39.5	27.8	21/04/2022 13:45			
21/04/2022 02:00	29.0	38.4	27.9	21/04/2022 14:00			
21/04/2022 02:15	28.8	42.1	27.7	21/04/2022 14:15			
21/04/2022 02:30	29.4	36.2	27.8	21/04/2022 14:30			
21/04/2022 02:45	30.1	37.7	28.7	21/04/2022 14:45			
21/04/2022 03:00	31.9	40.6	29.3	21/04/2022 15:00			
21/04/2022 03:15	30.4	36.6	28.3	21/04/2022 15:15			
21/04/2022 03:30	31.0	43.8	27.9	21/04/2022 15:30			
21/04/2022 03:45	33.2	49.8	27.6	21/04/2022 15:45			