

REPORT

Castlefield Viaduct, Manchester

Noise Survey Report

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Executive Summary

Royal HaskoningDHV was commissioned by the National Trust (the Trust) to undertake a noise survey for Castlefield Viaduct, Manchester, M3 4RU (herein referred to as the 'site').

The Trust's vision is for the structure to be repurposed as an urban park, to be utilised in a variety of ways, ranging from exhibitions, fruit and vegetable growing, sculptures, workspace, onward travel information, community meeting and green space.

A Phase 1 Pilot Scheme 'micro park' will be delivered on the eastern section of the viaduct, for a 13-month period from June 2022 - July 2023. The temporary scheme will be undertaken to test the design possibilities and opportunities at the viaduct and generate momentum and support for the proposed scheme.

A noise survey was undertaken to identify the dominant noise source at the site and surrounding area and to determine any potential noise impacts to future visitors or employees.

The measured data and subjective impression indicate that noise associated with Metrolink and rail movements are the dominant noise sources at the site. Noise associated with nearby road traffic and leisure and entertainment facilities are not highly influential on the noise level incident on the site, in comparison to the noise associated with Metrolink and rail movements.

The measured noise levels at the site are below the World Health Organization (WHO) recommended levels for leisure and commercial facilities, 70 dB $L_{Aeq,24hr}$ and 110 dB $L_{AFmax,24hr}$, and below the daily lower exposure action value, 80 dB L_{Aeq} , established for workplaces in the Control of Noise at Work Regulations 2005.

Therefore, the indication from this initial assessment is that use of the site as an urban park and transport hub would not present any significant noise effects to future visitors or employees.

1 Introduction

Royal HaskoningDHV was commissioned by the National Trust (the Trust) to undertake a noise survey for Castlefield Viaduct, Manchester, M3 4RU (herein referred to as the 'site').

Castlefield Viaduct is an unused, 330m long, historic structure in the heart of Manchester. The Trust wishes to bring the viaduct back into use by repurposing the structure into an elevated urban park and integrated active travel hub. The Trust's vision is for the urban park to be utilised in a variety of ways, ranging from exhibitions, fruit and vegetable growing, sculptures, workspace, onward travel information, community meeting and green space.

A Phase 1 Pilot Scheme 'micro park' will be delivered on the eastern section of the viaduct, for a 13-month period from June 2022 - July 2023. The temporary scheme will be undertaken to test the design possibilities and opportunities at the viaduct and generate momentum and support for the permanent scheme. The temporary scheme will comprise the use of the viaduct as a 'micro park' for community events and supervised tours of the space.

The site will be divided into four zones:

- the Entrance;
- the Viaduct as Existing;
- the Secret Garden / Partner Plots; and
- the Event Space.

The masterplan produced by Twelve Architects shows installation of a footpath across the first half of the viaduct, leading through these zones to a temporary event space in the middle of the structure. The Entrance will comprise a welcome kiosk, seating, planting and toilet facilities. The Viaduct as Existing will leave the structure largely untouched except for interpretation boards and seating, and the Secret Garden / Partner Plots zone will see planters with dense, nature rich planting giving the impression of a lush green space above the city, as well as areas for installations and exhibitions. The path then leads to the temporary events space where consultation and pop-up events for 50 people can take place.

Through this Phase One project, the National Trust will determine what the next phase of the permanent scheme will look like.

Figure 1 illustrates the Castlefield Viaduct site boundary.

The following sections of this report outline:

- The methodology for the noise survey;
- The baseline noise conditions at the site and surrounding area; and
- The potential for noise impacts at the site for visitors and staff.

The proposals for the site are not considered to generate noise of an industrial or commercial manner, as defined in BS 4142¹. Therefore, assessment of potential noise impacts associated with operation of the site are beyond the scope of this document.

¹ British Standards Institution (2019). BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound.

2 Relevant Guidance

The following best practice and guidance were considered for the methodology of the noise survey and in drawing conclusions on the noise levels at the site.

Table 1: Noise survey methodology guidance

Document	Policy / guidance purpose
BS 7445 - Description and measurement of environmental noise parts 1 & 2 (BS 7445) ^{2,3}	These guidelines define the basic quantities used for the description of noise in community environments and detail the procedures for determination and acquisition of these quantities.
BS 4142:2014+A1:2019 – Method for Rating and Assessing Industrial and Commercial Sound (BS 4142)	Although the site is not considered to be noise generating, BS 4142 describes general best practice measures when undertaking an environmental noise survey.
World Health Organisation Guidelines for Community Noise, 1999 (WHO 1999) ⁴	These guidelines present health-based noise limits intended to protect the population from exposure to excess noise. They present guideline limit values at which the likelihood of particular effects, such as sleep disturbance or annoyance, may increase. The guideline values for industrial, commercial shopping and traffic areas are 70 dB L_{Aeq} and 110 dB L_{Amax} over a 24-hour period.
World Health Organisation Environmental Noise Guidelines for the European Region, 2018 (WHO 2018) ⁵	The guidance states: <i>“The main purpose of these guidelines is to provide recommendations for protecting human health from exposure to environmental noise originating from various sources: transportation (road traffic, railway and aircraft) noise, wind turbine noise and leisure noise. They provide robust public health advice underpinned by evidence, which is essential to drive policy action that will protect communities from the adverse effects of noise.”</i> The guideline yearly average exposure value for all leisure noise sources combined is 70 dB L_{Aeq} over a 24-hour period.
The Control of Noise at Work Regulations 2005 ⁶	The Regulations are for the protection of persons against the risk to their health and safety arising from exposure to noise at work. Employers who undertake work which is liable to expose any employees to noise above the lower exposure action value, 80 dB L_{Aeq} , shall make a suitable and sufficient assessment of the risk to the employees' health and safety.

² British Standards Institution (2003). BS 7445-1:2003 - Description and measurement of environmental noise – Part 1: Guide to quantities and procedures.

³ British Standards Institution (1991). BS 7445-2:1991 - Description and measurement of environmental noise – Part 2: Guide to acquisition of data pertinent to land use.

⁴ World Health Organization (1999) Guidelines for Community Noise

⁵ World Health Organization (2018) Environmental Noise Guidelines for the European Region

⁶ The Control of Noise at Work Regulations 2005, UK Statutory Instruments 2005 No. 1643 Regulation 1

3 Environmental Noise Survey Methodology

An environmental noise survey was undertaken from 12th to 14th August 2021. Measurement locations are illustrated in **Figure 1** and presented in **Table 2**.

Although it is not common practice to undertake a noise survey during the school summer holiday due to the fluctuations in local noise sources (such as road traffic), at this location where the dominant noise source was predicted to be the railway, it was not considered unreasonable to do so. Prior to mobilisation of the noise survey, consultation was undertaken with a representative of the Environmental Health team at Manchester City Council (MCC) to seek their opinion on the matter. The response from MCC indicated that a survey being undertaken at this location would be acceptable.⁷

Continuous unattended monitoring was undertaken at two locations on Castlefield Viaduct, LT1 and LT2.

LT1 was towards the north-east of the site, approximately 18m north of the Metrolink line and 10m south-west of rail line. LT2 was towards the south-west of the site, approximately 4m north of the Metrolink line.

Attended monitoring was undertaken on 12th and 13th August 2021 to supplement the unattended measurements and identify the dominant noise sources at the site and surrounding area, including:

- Noise from the Metrolink line between Deansgate-Castlefield and Cornbrook stations;
- Rail noise from trains arriving and departing Deansgate station;
- Noise from nearby restaurants and bars;
- Noise from a private event along Potato Wharf playing amplified music on 12th August 2021; and
- Road traffic noise along Egerton Street (A57).

During the survey it was noted that construction works associated with the nearby Potato Wharf residential development were near completion and appeared to be limited to the interior of the development. Therefore, construction works were barely perceivable at the viaduct and were not considered to be a dominant noise source.

Table 2: Noise survey monitoring locations

ID	Description
LT1	North-east of the site, approximately 18m north of the Metrolink line and 10m south-west of rail line
LT2	South-west of the site, approximately 4m north of the Metrolink line
ST1	Attended measurement in the centre of site, approximately 5.5m from Metrolink line
ST2	Attended measurement at location LT1
ST3	Attended measurement location outside mechanical plant associated with Barca bar, adjacent and below the site
ST4	Attended measurement locations approximately 40m north-west of the amplified music system associated with the private event at Potato Wharf

⁷ email from Graeme Souter (MCC) to Helen Makewell (RHDHV) on 26th July 2021

ID	Description
ST5	Attended measurement locations approximately 50m north of the amplified music system associated with the private event at Potato Wharf
ST6	Attended measurement location during the night-time Metrolink, Deansgate-Castlefield Metrolink station car park, approximately 10m east of the site and 3m from the Metrolink line
ST7	Attended measurement location approximately 5m north-east of Egerton Street (A57)
ST8	Attended measurement location approximately 11m south-west of Egerton Street (A57)

Sound Level Meters (SLMs) were fully calibrated, traceable to UKAS standards and satisfied the requirements of BS EN 61672-1⁸ for a 'Class 1' SLM. The measurements were taken using the SLMs and associated equipment detailed in **Table 2**.

Table 3: Noise survey instrumentation

Instrument	Type	Serial number
Sound Level Meter	Rion NL-52	864982
Sound Level Meter	Rion NL-52	864983
Sound Level Meter	Rion NL-52	732101
Calibrator	Rion NC-74	01020506

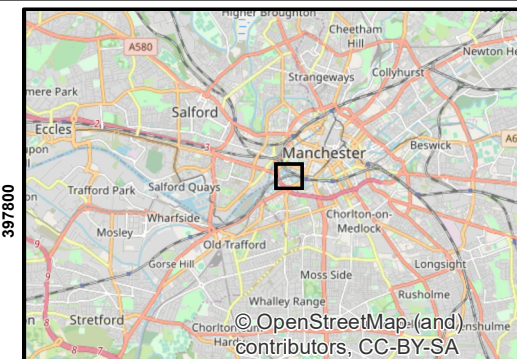
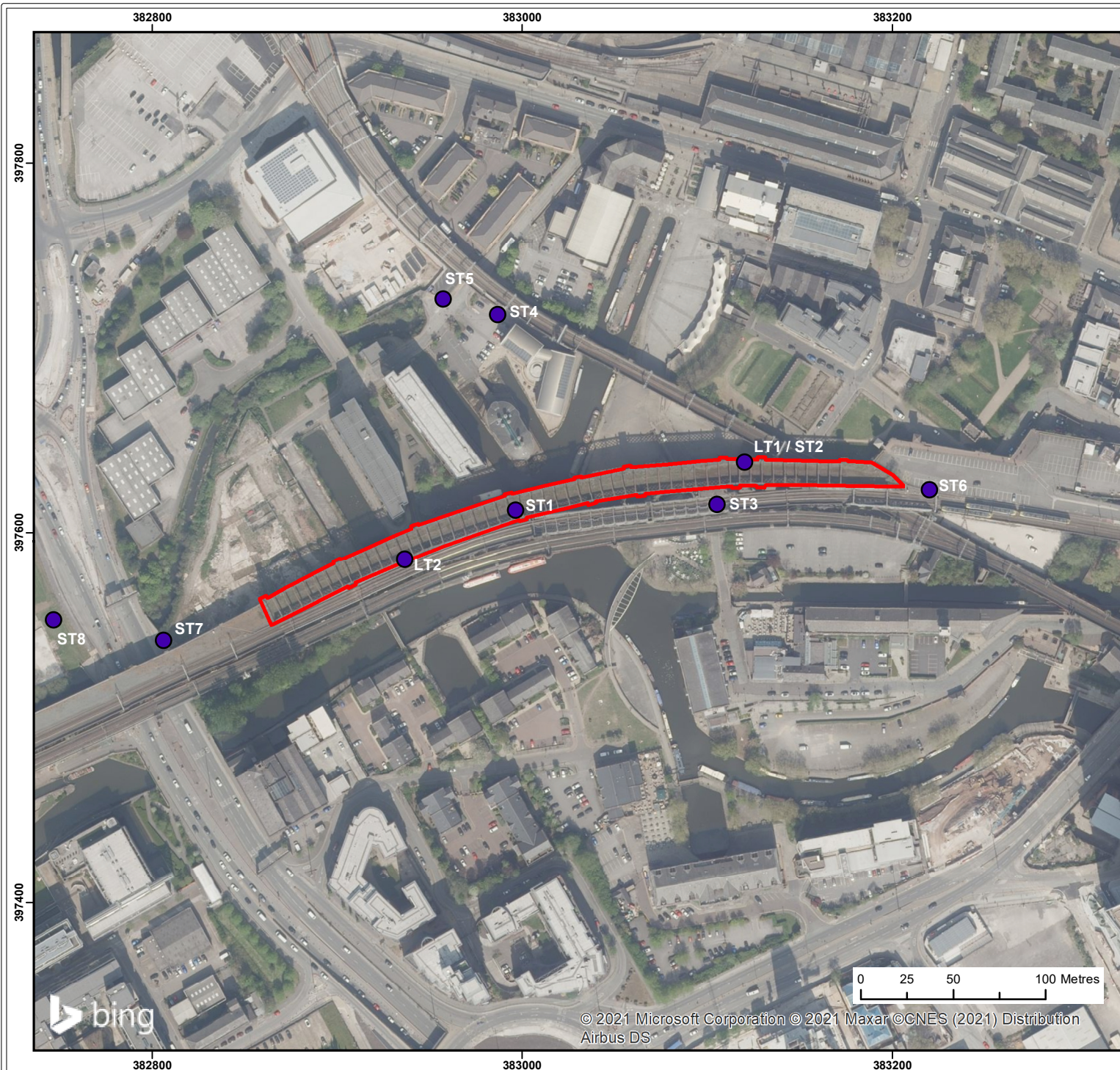
Baseline survey measurements were conducted in accordance with the procedure described in BS 7445 and BS 4142, with the SLMs mounted on tripods at a height of between 1.2m and 1.5m above ground level (and the floor level of the viaduct) and 3.5m away from any reflecting surface other than the ground, i.e. in free-field conditions. The instruments were calibrated before and after the survey and during the battery change using a portable calibrator with no significant drift (>0.1 dB) noted.

For all measurement locations during the noise survey, SLMs were set to record the following:

- L_{Aeq} – the equivalent continuous sound pressure level over the measurement period. This parameter is standardised as pertinent for land use within BS 7445;
- L_{AFmax} – the maximum sound pressure level occurring within the defined measurement period;
- L_{A90} – the sound pressure level exceeded for 90% of the measurement period and is indicative of the background noise level; and,
- L_{A10} – the sound pressure level exceeded for 10% of the measurement period. The L_{A10} index is used within the CRTN as an appropriate descriptor of traffic noise.

A weather station was employed to record of the meteorological conditions during the survey. Weather conditions were favourable and in accordance with guidance detailed in BS 7445 and BS 4142 for noise measurements, with wind speeds of less than 5m/s and no precipitation.

⁸ British Standards Institution (2013). BS 61672-1:2013 – Electroacoustics. Sound level meters - Specifications.



Legend:

- Red Line Boundary
- Noise Survey Locations

Data Sources: © HaskoningDHV UK Ltd, 2021
Base map: © OpenStreetMap (and) contributors, CC-BY-SA.

Client:	Project:
National Trust	Castlefield Viaduct

Title:

Site Location Plan and Noise Survey Monitoring Locations

B97400

Figure: 1		Drawing No: N/A			
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	31/08/2021	SC	DC	A4	1:3,000

Co-ordinate system: British National Grid



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4 Noise Survey Results

Results from the baseline noise survey are provided in **Table 3** for the unattended monitoring locations. Results are displayed for the daytime (07:00 - 23:00) and night-time (23:00 - 07:00), in accordance with the definitions provided in BS 4142.

Table 4: Unattended baseline survey results (dB)

ID	Start time	Duration (hh:mm:ss)	L _{Aeq,T}	L _{AFmax}	L _{A10} *	L _{A90} *
LT1	12/08/2021 13:00	10:00:00	62.5	93.1	65.7	52.1
	12/08/2021 23:00	08:00:00	57.7	85.5	56.5	46.9
	13/08/2021 07:00	16:00:00	62.5	91.5	65.5	52.8
	13/08/2021 23:00	08:00:00	58.1	86.8	56.8	47.7
	14/08/2021 07:00	00:15:00	58.6	75.7	63.0	47.6
LT2	12/08/2021 12:30	10:30:00	65.1	93.9	68.4	53.2
	12/08/2021 23:00	08:00:00	59.8	84.0	56.9	47.6
	13/08/2021 07:00	16:00:00	64.8	88.6	68.1	53.7
	13/08/2021 23:00	08:00:00	59.5	85.8	55.9	47.8
	14/08/2021 07:00	00:45:00	63.8	84.8	63.6	48.9

*displayed as the arithmetic mean

The measured noise levels at the site are below the WHO recommended levels for leisure and commercial facilities, 70 dB L_{Aeq,24hr} and 110 dB L_{AFmax,24hr}. Noise levels are also below the daily lower exposure action value, 80 dB L_{Aeq}, presented in the Control of Noise at Work Regulations 2005.

4.1 Metrolink and Rail Noise

Results at the attended measurement locations representative of noise associated with the Metrolink and the railway are presented in **Table 4**.

Table 5: Attended baseline survey results – Metrolink and rail noise (dB)

ID	Start time	Duration (hh:mm:ss)	L _{Aeq}	L _{AFmax}	L _{A10} *	L _{A90} *
ST1	12/08/2021 12:30:21	00:13:02	59.2	78.7	61.0	50.5
ST2	12/08/2021 12:52:06	00:24:26	61.0	78.0	64.8	53.2
ST6	12/08/2021 22:08:40	00:15:57	67.6	85.9	70.5	48.5

*displayed as the arithmetic mean

The noise levels at ST1 and ST2 are consistent with those measured at the unattended monitoring locations on the viaduct, LT1 and LT2, and therefore are representative of the noise levels on the site, which were dominated by noise from the nearby Metrolink and rail lines.

Measurement location ST6 was closer to the Metrolink line than measurement locations LT1 and LT2 and closer to Deansgate-Castlefield station. Therefore, noise from trams breaking and accelerating was more prominent at ST6 than at the site itself.

4.2 Entertainment and Leisure Facilities Noise

Results at the attended measurement locations representative of noise associated with nearby entertainment and leisure facilities are presented in **Table 6**.

Table 6: Attended baseline survey results – entertainment and leisure facilities noise (dB)

ID	Start time	Duration (hh:mm:ss)	L _{Aeq}	L _{AFmax}	L _{A10} *	L _{A90} *
ST3	12/08/2021 14:17:19	00:11:08	65.7	77.6	70.3	59.5
	12/08/2021 22:30:29	00:11:24	63.5	78.7	65.7	56.1
ST4	12/08/2021 20:58:04	00:02:02	76.1	82.4	78.6	72.6
ST5	12/08/2021 21:00:46	00:02:32	69.3	74.2	70.8	67.3

*displayed as the arithmetic mean

4.2.1 Barca Plant Noise

At measurement location ST3 plant noise associated with Barca, the nearest bar to the site, was barely perceptible over the ambient noise level which was dominated by noise from the Metrolink and rail lines. Noise from the plant associated with Barca was only audible during lulls of Metrolink or rail movements.

Table 7 displays the measured noise levels at ST3 in the absence of Metrolink and rail movements.

During the daytime the plant noise appeared to be dominated by an extractor fan. During the evening the extractor fan was not operational, and it is likely that the kitchen was closed. Instead, plant noise during the evening was dominated by what appeared to be refrigeration units.

Table 7: Attended baseline survey results – Barca plant noise (dB)

ID	Start time	Duration (hh:mm:ss)	L _{Aeq}	L _{AFmax}	L _{A10} *	L _{A90} *
ST3	12/08/2021 14:24:40	00:01:12	59.7	62.8	60.2	59.4
	12/08/2021 22:36:25	00:02:12	56.6	59.3	57.0	56.2

*displayed as the arithmetic mean

It is seen from **Table 6** and **Table 7** that the measured noise levels at ST3 were dominated by Metrolink and rail movements, with noise levels in their absence reducing by approximately 6 to 7 dB. The site is significantly shielded from plant noise from Barca by the existing Metrolink operations and so plant noise emissions were not deemed a significant noise source at the site.

During the survey it was noted that there was a beer garden associated with the Barca venue, further south along Castle Street. There was limited noise emanating from the beer garden during the time of the survey and it is not likely to be a significant sound source at the site due to the screening provided by existing Metrolink and rail line structures.

4.2.2 Potato Wharf Private Event Noise

During the attended measurement survey, there was an outdoor private event at Potato Wharf, playing amplified music. The event started at approximately 15:00 and finished at 23:00.

Due to the proximity of the outdoor event to the site and the source noise level from amplified music, this is likely representative of the worst-case for entertainment noise at the site.

Table 8 presents the corresponding measured noise levels on-site during the attended measurement survey outside the private event, ST4 and ST5. Measured noise levels after the event had finished are also presented for context and to assess the change in noise level at the site during and after the event.

Table 8: Unattended baseline survey results – Potato Wharf private event noise (dB)

ID	Start time	Duration (hh:mm:ss)	L _{Aeq}	L _{AFmax}	L _{A10} *	L _{A90} *
LT1	12/08/2021 20:58:10	00:01:50	61.7	71.5	59.4	55.8
	12/08/2021 21:00:50	00:02:10	56.2	68.6	56.4	53.4
	12/08/2021 23:30:00	00:30:00	58.5	78.5	55.1	51.1
LT2	12/08/2021 20:58:10	00:01:50	57.9	69.7	57.6	53.8
	12/08/2021 21:00:50	00:02:10	59.9	74.3	56.5	53.7
	12/08/2021 23:30:00	00:30:00	63.9	82.9	57.9	53.2

*displayed as the arithmetic mean

The measured noise levels presented in **Table 8** indicate that the outdoor private event had little significance on the overall noise level at the site, which is dominated by nearby Metrolink and rail movements.

4.3 Road Traffic Noise

Results at the attended measurement locations representative of noise associated with road traffic along Egerton Street (A57) are presented in **Table 9**.

Table 9: Attended baseline survey results – road noise (dB)

ID	Start time	Duration (hh:mm:ss)	L _{Aeq}	L _{AFmax}	L _{A10} *	L _{A90} *
ST7	12/08/2021 22:51:54	00:23:26	77.4	94.8	80.4	67.5
	13/08/2021 10:17:25	00:15:07	79.6	96.1	81.8	72.3
ST8	13/08/2021 10:36:44	00:15:06	69.9	81.3	72.5	64.8

*displayed as the arithmetic mean

During the survey it was noted that road noise was barely perceptible on the viaduct due over the regular Metrolink and rail movements. However, during the night-time, when the Metrolink is not operating, it is likely that road traffic noise along Egerton Street will be more significant at the site.

Table 10 presents the noise levels at LT2, which is closer to Egerton Street, when the Metrolink is not operating, between 01:00 and 05:00. Noise levels during the time immediately before, 23:00 to 01:00, when the Metrolink is operating are also presented.

Table 10: Unattended baseline survey results, LT2 – road noise (dB)

ID	Start time	Duration (hh:mm:ss)	L _{Aeq}	L _{AFmax}	L _{A10} *	L _{A90} *
LT1	12/08/2021 23:00	02:00:00	59.0	85.5	61.1	48.3
	13/08/2021 01:00	04:00:00	55.6	80.1	51.7	45.4
	13/08/2021 23:00	02:00:00	60.3	86.8	61.6	50.2
	14/08/2021 01:00	04:00:00	55.1	82.9	52.6	47.0
LT2	12/08/2021 23:00	02:00:00	62.0	82.9	61.6	49.9
	13/08/2021 01:00	04:00:00	51.6	72.9	51.7	45.1
	13/08/2021 23:00	02:00:00	62.1	84.3	60.9	50.3
	14/08/2021 01:00	04:00:00	52.9	75.6	52.2	46.7

*displayed as the arithmetic mean

From **Table 10** it is seen that the noise levels at LT2 reduce by approximately 10 dB in the absence of the Metrolink movements. Therefore, noise associated with other nearby sources, including road traffic noise, are not considered to be significant at the site.

5 Next Steps and Conclusion

5.1 Next steps

This report supports the use of the Castlefield Viaduct for Phase 1 of the proposal, which, as detailed in **Section 1** of this report, includes visitors utilising the viaduct as a temporary park and viewing platform inclusive of garden areas, exhibition stalls, seating areas, an events space and toilet facilities.

This report will also support the permanent Phase 2 use of the viaduct, for the purposes of and assuming only the event uses described above. However, should there be any other proposed uses or activities that would introduce noise sources associated with industrial, commercial or amplified entertainment purposes, it is likely an additional noise assessment would be required to demonstrate suitability.

In addition to this, any construction works undertaken would be likely to require a separate assessment and possibly an additional noise survey to determine impacts at the nearest noise sensitive receptors.

5.2 Conclusion

The measured data and subjective impression indicate that noise associated with Metrolink and rail movements are the dominant noise sources at the site.

Noise associated with nearby road traffic and leisure and entertainment facilities are not highly influential on the noise level incident on the site, over the noise associated with Metrolink and rail movements.

The measured noise levels at the site are below the WHO recommended levels for leisure and commercial facilities, 70 dB $L_{Aeq,24hr}$ and 110 dB $L_{AFmax,24hr}$, and below the daily lower exposure action value, 80 dB L_{Aeq} , set out in the Control of Noise at Work Regulations 2005.

It is considered that the WHO guidelines are relevant benchmarks for the assessment of noise associated with the proposed use of the Castlefield Viaduct, and that therefore the proposed use of the site as an urban park and transport hub will not present any significant noise effects to future visitors or employees at the site.