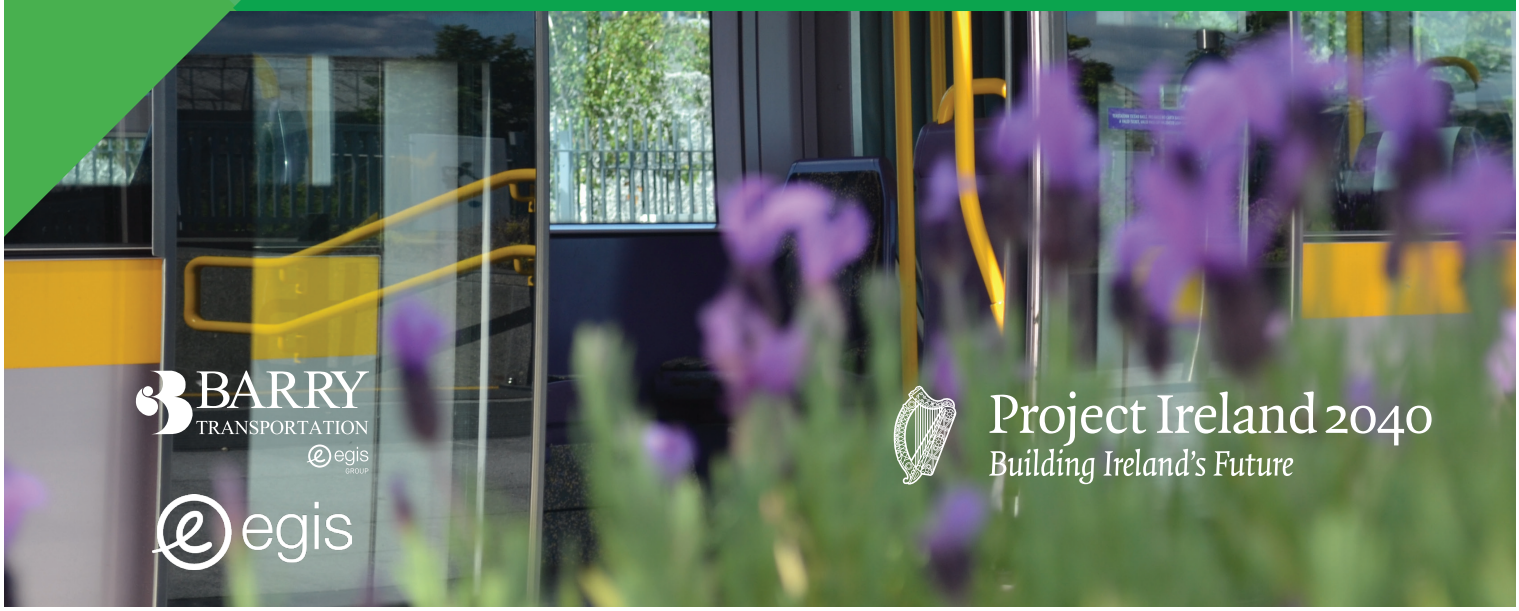
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

NTA
Údarás Náisiúnta Iompair
National Transport Authority

Luas Finglas

Environmental Impact Assessment Report 2024

Appendix A15.1: Baseline Noise & Vibration Survey Details



BARRY TRANSPORTATION
egis GROUP
egis

Project Ireland 2040
Building Ireland's Future

awnconsulting
A Trinity Consultants Company

The Tecpro Building,
Clonshaugh Business & Technology Park,
Dublin 17, Ireland.

T: + 353 1 847 4220
F: + 353 1 847 4257
E: info@awnconsulting.com
W: www.awnconsulting.com

BASELINE NOISE & VIBRATION MONITORING FOR LUAS FINGLAS EIAR

Technical Report Prepared For

Barry Transportation

Technical Report Prepared By

Dr Stephen Smyth BAI MAI MIEI MIOA

Our Reference

217501.0195NR01

Date Of Issue

29 August 2024

Cork Office
Unit 5, ATS Building,
Carrigaline Industrial Estate,
Carrigaline, Co. Cork.
T: + 353 21 438 7400
F: + 353 21 483 4606

AWN Consulting Limited
Registered in Ireland No. 319812
Directors: F Callaghan, C Dilworth,
T Donnelly, T Hayes, D Kelly, E Porter

CONTENTS

1.0 INTRODUCTION

This report includes the relevant survey details and results associated with baseline noise & vibration monitoring undertaken as part of the Luas Finglas Scheme. The surveys have been undertaken to inform the airborne noise and vibration chapter of the Luas Finglas EIAR.

Long-term surveys (typically 24hours in duration) were made at a total of 8 locations.

Short-term surveys (attended measurements), made at a total of 15 locations along the length of the Proposed Scheme, were used to supplement the long-term surveys.

Survey details and results for each of the monitoring locations are included within this report.

2.0 SURVEY METHODOLOGY

2.1 Study Area

The Proposed Project covers an extensive linear study area in the Finglas suburb of Northwest Dublin. The baseline environment has been characterized through a series of noise and vibration surveys.

2.2 Survey Locations

Baseline surveys have been conducted at locations representative of the nearest noise sensitive areas which have the potential to be impacted by construction works and/or those likely to be impacted during the operational phase of the Proposed Scheme. Baseline noise measurements were made over both unattended and attended periods to inform the assessment.

- Unattended surveys (typically one day in duration) were made at a total of 8 locations.

- Attended surveys (attended day-time measurements), made at a total of 15 locations along the length of the proposed Project were used to supplement the long-term surveys.

Baseline vibration surveys have been conducted at locations representative of the nearest vibration sensitive areas which have the potential to be impacted by construction works and/or those likely to be impacted during the operational phase of the Proposed Project. Baseline vibration measurements were made over short-term periods to inform the assessment.

The location reference along with a description of each survey location is displayed in Table 2:

Location	Description of Survey Location
Unattended (Long-term) Noise Survey Locations	
UT1	Colorman Ireland printing factory (Broombridge Road)
UT2	No.10 Gortmore Drive (private dwelling)
UT3	St Helena's Child Care & Community Resource Center
UT4	No.19 Farnham Drive (private dwelling)

Location	Description of Survey Location
UT5	No.11 Patrickswell Place (private dwelling)
UT6	Finglas Garda Station
UT7	No.223 Mckee Avenue (private dwelling)
UT8	ESB St Margaret's Road
Attended Noise Survey Locations	
AT1	Junction of St Margaret's Road / Melville Road
AT2	Outside private dwelling at corner of McKelvey Ave / St Margaret's Road
AT3	Entrance to Polnez Finglas on St Margaret's Road
AT4	Mellowes Park (Northern End)
AT5	Mellowes Park (Southern End)
AT6	Entrance to Mellowes Park Depot on Mellowes Road
AT7	Greenspace on Cardiff Castle Road
AT8	Farnham Drive outside Erins Isle club entrance
AT9	Greenspace walkway between R102 & St Helena's Road
AT10	Junction of Broombridge road / Ballybogan road
AT11	Bridge over Tolka River in Tolka Valley Park
AT12	Bridge on Broombridge road
AT13	Car park at Broombridge Station
AT14	Footpath along rail track behind Broombridge National School
AT15	Depot area along rail track East of Broombridge Station
Attended Vibration Survey Locations	
VM01	Bridge on Broombridge road
VM02	Bridge over Tolka River in Tolka Valley Park

Table 2 Noise & Vibration Monitoring Locations

2.3 Survey Periods

Unattended noise surveys at locations UT1-UT7 were undertaken between 1st – 16th June 2022. The unattended survey at UT8 was carried out between 6th-8th December 2022. The specific survey dates for each location are included in the survey results tables in Section 3.0.

Attended noise surveys were undertaken between 27th May 2022 and 9th June 2022. The specific survey dates and times for each location are included in the survey results tables in Section 3.0.

Attended vibration surveys were undertaken on 29th June 2022.

Additional attended surveys were undertaken on the 27th March 2024. The specific survey dates and times for each location are included in the survey results tables in Section 3.0.

2.4 Survey Equipment and Personnel

The unattended noise surveys were undertaken by AWN Consulting using Rion NL-52 sound level meters, while the attended noise surveys were undertaken using a Bruel & Kjaer 2250L sound level meter. Attended vibration surveys were undertaken using a Rion VM-56 with PV-83D tri-axial accelerometer. The specific equipment details are summarised in Table 8. Calibration certificates of the monitoring equipment are included within Appendix A.

Equipment	Serial Number	Calibration Date
Rion NL-52	186672	03/05/2022
	186669	12/05/2022
	764925	09/09/2021
	976162	02/09/2022
	164427	12/05/2022
Bruel & Kjaer 2250L	2818091	22/11/2023
Rion VM-56	00680043	17/03/2022

Table 8 Noise Monitoring Equipment

For unattended surveys, a Rion WS-15 Outdoor Microphone Protection System was used with microphone extension cable and outdoor peli-case. An image of the equipment install at each monitoring location is included in Appendix B.

2.5 Survey Parameters

The following noise parameters were measured and are discussed within this report.

$L_{Aeq,T}$ is the A-weighted equivalent continuous steady sound level during the sample period and effectively represents an average value over the defined measurement period, T.

$L_{Aeq,16hr}$ refers to the ambient daytime noise level between 07:00 and 23:00hrs.
$L_{Aeq,8hr,}$ refers to the ambient night-time noise level between 23:00 and 07:00hrs

$L_{A10,T}$ is the A-weighted sound level that is exceeded for 10% of the sample period; this parameter gives an indication of the upper limit of fluctuating noise such as that from road traffic. The T is the sample period the parameter is measured over.
$L_{A10,18hr}$ is the L_{A10} parameter between 06:00 and 00:00hrs as defined within the CRTN[1].

$L_{A90,T}$ is the A-weighted sound level that is exceeded for 90% of the sample period; generally used to quantify background noise. The T is the sample period the parameter is measured over.

$L_{A90,16hr,}$ refers to the background daytime noise level between 07:00 and 23:00hrs

$L_{A90,8hr,}$ refers to the background night-time noise level between 23:00 and 07:00hrs

PPV Peak Particle Velocity (PPV) is a measure of the velocity of vibration displacement in terms of millimetres per second (mm/s). It is defined as follows within BS 7385: (1990) as:

"the maximum instantaneous velocity of a particle at a point during a given time interval"

[1] UK's Department of Transport. 1988. *Calculation of Road Traffic Noise* (CRTN)

The L_{den} parameter is also discussed within the report. For long-term survey locations, this parameter is derived from the L_{Aeq} data over each 24 hour period and is defined as follows:

L_{den} is the 24hour noise rating level determined by the averaging of the L_{day} with the $L_{evening}$ (plus a 5 dB penalty) and the L_{night} (plus a 10 dB penalty). L_{den} is calculated using the following formula, as defined within the Environmental Noise Regulations[2]:

$$L_{\text{den}} = 10log\left(\frac{1}{24}\right)\left(12 * \left(10^{\frac{Lday}{10}}\right) + 4 * \left(10^{\frac{Levening+5}{10}}\right) + 8 * \left(10^{\frac{Lnight+10}{10}}\right)\right)$$

Where:

L_{day} is the A-weighted long-term average sound level as defined in ISO 1996-2, determined over all the day periods of a year. The 12 hour daytime period is between 07:00 to 19:00hrs.

$L_{evening}$ is the A-weighted long-term average sound level as defined in ISO 1996-2, determined over all the evening periods of a year. The 4 hour evening period is between 19:00 to 23:00hrs.

L_{night} is the A-weighted long-term average sound level as defined in ISO 1996-2, determined over all the night periods of a year. The 8 hour night-time period is between 23:00 to 07:00hrs.

2.6 Survey Procedure

Noise measurements were conducted in general accordance with the guidance contained in ISO 1996: *Acoustics – Description measurement and assessment and environmental noise.* Part 1: *Basic quantities and assessment procedures* (2016) and Part 2: *Determination of sound pressure levels* (2017).

2.6.1 Unattended Measurements

For unattended noise surveys, the monitoring equipment was installed within the private grounds of residential properties or private property lands (schools, churches, hospitals, parks etc.). The microphone was installed at a height of approximately 3.8 m above ground. The equipment was set to measure continuously over a 1 day period, logging data at 1 hour intervals.

2.6.2 Attended Measurements

Attended noise surveys were undertaken at public locations at positions representative of the adjacent noise sensitive locations (e.g. on green areas in residential areas, footpaths, parks etc.). For all attended surveys, the microphone was positioned at a height of approximately 1.2 m above ground.

The attended surveys were undertaken in accordance with the shortened measurement procedure described in the UK Department of Transport document *Calculation of Road Traffic Noise* (CRTN) (1988) and the Transport Infrastructure Ireland (TII) document *Guidelines for the Treatment of Noise and Vibration on National Roads* (2004).

[2] S.I. No. 140/2006 - Environmental Noise Regulations 2006

This methodology involves a method whereby $L_{A10(18hour)}$ and L_{den} values are obtained through a combination of measurement and calculation as follows:

- Noise level measurements are undertaken at the chosen location over three consecutive hours between 10:00 and 17:00hrs;
- Each sample period should be 15 minutes in duration;
- The $L_{A10(18hour)}$ for the location is derived by subtracting 1 dB from the arithmetic average of the three hourly sample values, i.e.

  $L_{A10(18hour)} = ((\sum L_{A10(15\ minutes)}) \div 3) - 1$ dB;

- The derived L_{den} value is calculated from the $L_{A10(18hour)}$ value, i.e.

  $L_{den} = 0.86 \times L_{A10(18hour)} + 9.86$ dB.

Vibration measurements were conducted in general accordance with the guidance contained in British Standard BS 7385. Part 1*: Guide for measurement of vibrations and evaluation of their effects on buildings* (1990)*.*

Vibration was measured in the three orthogonal axes.

3.0 SURVEY RESULTS

3.1 Noise

3.1.1 Unattended Surveys

The unattended noise survey results are summarised in Table 9.

Within the study area road traffic is the dominant noise source at the monitoring positions in the vicinity of the Scheme.

Location	Date	Daytime			Evening	Night-time		L_{den}
		$L_{Aeq,16hr}$	L_{day}	$L_{A90,16hr}$	$L_{evening}$	L_{night}	$L_{A90,8hr}$	
UT1	9-13/06/2022	59	60	48	57	52	42	61
UT2	01-02/06/2022	54	55	40	47	43	36	54
UT3	01-02/06/2022	54	54	45	51	48	38	56
UT4	13-15/06/2022	49	49	42	48	44	37	52
UT5	01-02/06/2022	60	60	45	58	50	38	61
UT6	08-09/06/2022	55	55	49	55	50	43	58
UT7	08-09/06/2022	58	58	56	58	54	48	62
UT8	06-08/12/2022	69	69	61	68	63	53	71

Table 9 Summary of unattended noise measurements

3.1.2 Attended Surveys

The survey results for the attended monitoring locations are presented in Table 10.

Survey Location Reference	Date	Start Time	Measured Noise Levels (dB re.2x10^{-5}Pa)			Derived L_{den}	Survey Notes
			L_{Aeq}	L_{A10}	L_{A90}		
AT1	27/05/2022	09:20	69	73	62	71	Road traffic noise dominates measurement. Occasional aircraft noise.
		10:23	68	71	62		
		11:22	68	71	61		
AT2	27/05/2022	09:40	66	70	57	69	Local road traffic dominates noise environment. Distant road traffic audible during lulls in local traffic. Occasional aircraft noise.
		10:43	67	70	59		
		11:42	66	70	57		
AT3	27/05/2022	10:02	70	73	61	72	Road traffic noise dominates measurement. Occasional aircraft noise.
		11:01	71	73	64		
		12:01	70	74	61		
AT4	27/05/2022	12:54	63	65	59	65	Road traffic noise dominates measurement. Occasional aircraft noise.
		13:33	62	65	58		
		14:10	63	65	60		
AT5	27/05/2022	13:13	63	65	58	63	Road traffic noise dominates measurement. Occasional aircraft noise and birdsong audible.
		13:51	61	63	57		
		14:29	60	62	58		
AT6	01/06/2022	12:15	68	72	53	71	Road traffic noise from Mellowes Road and distant road traffic from R135 traffic lulls.
		14:22	69	72	53		

Survey Location Reference	Date	Start Time	Measured Noise Levels (dB re.2x10^{-5}Pa)			Derived L_{den}	Survey Notes
			L_{Aeq}	L_{A10}	L_{A90}		
		15:25	68	73	53		
AT7	01/06/2022	12:36	49	51	43	54	Local road traffic noise from Cardiff castle road and occasional pedestrian movements.
		14:42	51	53	44		
		15:45	49	51	43		
AT8	01/06/2022	14:01	66	71	49	70	Road noise from Farnham Drive dominant, distant road noise during traffic lulls.
		15:03	67	71	52		
		16:05	66	71	50		
AT9	02/06/2022	12:06	46	49	40	52	Road noise from R102 dominant during measurement, occasional pedestrian movements.
		13:03	49	51	42		
		13:47	48	51	42		
AT10	02/06/2022	12:29	70	73	60	72	Road traffic noise from the Ballybogan Road dominant, intermittent industrial noise in traffic lulls.
		13:26	70	73	60		
		14:09	70	73	62		
AT11	09/06/2022	15:18	56	58	53	60	Road traffic noise from the Ballybogan road and pedestrian movements within Tolka Valley Park.
		16:04	58	59	54		
		16:50	60	61	54		
AT12	09/06/2022	14:54	67	68	50	67	Traffic noise on Broombridge Road and occasional rail pass bys consistent pedestrian pass bys.
		15:42	64	68	51		
		16:29	65	68	51		
AT13	27/03/2024	13:17	50	55	43	58	Distant road traffic noise, occasional rail pass bys, electric gates lifting, pedestrian pass bys and intermittent electric gate alarm.
		14:16	55	55	46		
		15:17	58	61	48		
AT14	27/03/2024	13:35	51	48	42	54	Depot traffic/road traffic noise, distant construction, electric gates alarm, occasional rail pass bys and distant traffic siren.
		14:37	53	52	45		
		15:38	56	57	46		
AT15	27/03/2024	13:54	52	54	47	54	Road traffic on Bannow Road to the South, occasional rail pass bys, machinery operating briefly to the East and distant sirens.
		14:56	51	51	47		
		15:57	52	52	48		

Table 10 Attended noise survey results

3.2 Vibration

Location	Date	Start Time	Median PPV		
			X-Axis	Y-Axis	Z-Axis
VM01	09/06/2022	14:55	0.14	0.17	0.21
		15:43	0.19	0.27	0.62
VM02	09/06/2022	15:19	0.42	0.72	0.45
		16:04	0.75	0.63	17.18

Table 13 Attended vibration monitoring results

At survey location VM01, PPV values measured less than 1mm/s indicating a low vibration environment. The maximum events recorded are expected to be as a result of passing traffic on the bridge and occasional train movements on the tracks below.

At survey location VM02, PPV values also measured less than 1mm/s indicating a low vibration environment. The maximum events recorded are as a result of passing pedestrian on the bridge.

4.0 SUMMARY AND CONCLUSION

Baseline monitoring has been undertaken at locations across the Luas Finglas study area to inform the baseline study for the noise and vibration chapter of Luas Finglas EIAR.

The survey locations have been selected to gain a representative range of noise levels associated with the nearest noise sensitive areas which have the potential to be impacted by construction works and/or those likely to be impacted during the operational phase of the Scheme.

Long-term surveys (typically 24hours in duration) were made at a total of 8 locations. Short-term surveys (attended measurements) were made at a total of 15 locations along the length of the Scheme to supplement the long-term surveys.

All noise sensitive buildings and areas along the length of the Scheme are in suburban areas. Road traffic is the dominant source of noise at the survey locations.

Low levels of vibration are currently experienced at the survey locations.

APPENDIX A

Calibration Certificate for Monitoring Equipment

MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 12 May 2022

Certificate Number: UCRT22/1642

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Approved Signatory

K. Mistry

Customer	AWN Consulting Ltd The Tecpro Building IDA Business and Technology Park Clonshaugh Dublin D17 XD90
Order No.	DOD/22/Cal041
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	00186672
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	76822
Rion	Microphone	UC-59	12818
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1

Test Procedure TP 10. SLM 61672-3:2013

Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2013 Yes

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013

Date Received 10 May 2022 ANV Job No. UKAS22/05320

Date Calibrated 12 May 2022

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	04 May 2020	UCRT20/1388	0653

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 12 May 2022

Certificate Number: UCRT22/1643

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer	AWN Consulting Ltd The Tecpro Building IDA Business and Technology Park Clonshaugh Dublin D17 XD90			
Order No.	DOD/22/Cal041			
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator			
Identification	*Manufacturer*	*Instrument*	*Type*	*Serial No. / Version*
	Rion	Sound Level Meter	NL-52	00186669
	Rion	Firmware		2.0
	Rion	Pre Amplifier	NH-25	76819
	Rion	Microphone	UC-59	12814
	Rion	Calibrator	NC-74	34536109
		Calibrator adaptor type if applicable		NC-74-002
Performance Class	1			
Test Procedure	TP 10. SLM 61672-3:2013 *Procedures from IEC 61672-3:2013 were used to perform the periodic tests.*			
Type Approved to IEC 61672-1:2013	Yes *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013*			
Date Received	10 May 2022		ANV Job No.	UKAS22/05320
Date Calibrated	12 May 2022			

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	04 May 2020	UCRT20/1389	0653

MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 09 September 2021 **Certificate Number: UCRT21/2107**

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer	AWN Consulting Limited The Tecpro Building IDA Business and Technology Park Clonshaugh Dublin D17 XD90			
Order No.	2157			
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator			
Identification	*Manufacturer*	*Instrument*	*Type*	*Serial No. / Version*
	Rion	Sound Level Meter	NL-52	00764925
	Rion	Firmware		2.0
	Rion	Pre Amplifier	NH-25	65051
	Rion	Microphone	UC-59	09853
	Brüel & Kjær	Calibrator	4231	3010488
		Calibrator adaptor type if applicable		UC 0210
Performance Class	1			
Test Procedure	TP 10. SLM 61672-3:2013 *Procedures from IEC 61672-3:2013 were used to perform the periodic tests.*			
Type Approved to IEC 61672-1:2013	Yes *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013*			
Date Received	03 September 2021	ANV Job No.	UKAS21/09586	
Date Calibrated	09 September 2021			

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	10 June 2021	UCRT21/1719	0653

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 02 September 2022 **Certificate Number: UCRT22/2053**

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer	AWN Consulting Limited The Tecpro Building IDA Business and Technology Park Clonshaugh Dublin, D17 XD90 Ireland
Order No.	2243
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	00976162
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	76279
Rion	Microphone	UC-59	12055
Rion	Calibrator	NC-75	34313057
	Calibrator adaptor type if applicable		NC-75-022

Performance Class 1

Test Procedure TP 10. SLM 61672-3:2013

Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2013 Yes

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013

Date Received 01 September 2022 ANV Job No. UKAS22/09555

Date Calibrated 02 September 2022

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	17 July 2020	UCRT20/1661	0653

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 12 May 2022 **Certificate Number: UCRT22/1644**

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer	AWN Consulting Ltd The Tecpro Building IDA Business and Technology Park Clonshaugh Dublin D17 XD90
Order No.	DOD/22/Cal041
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	00164427
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	54560
Rion	Microphone	UC-59	09208
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class	1
Test Procedure	TP 10. SLM 61672-3:2013 *Procedures from IEC 61672-3:2013 were used to perform the periodic tests.*
Type Approved to IEC 61672-1:2013	Yes *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013*
Date Received	10 May 2022 ANV Job No. UKAS22/05320
Date Calibrated	12 May 2022

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	05 May 2020	UCRT20/1393	0653

HBK HOTTINGER BRÜEL & KJÆR

The Calibration Laboratory
Teknikerbyen 28, DK-2830 Virum, Denmark

ilac-MRA DANAK CAL Reg.No. 307 Member of EA MLA

CERTIFICATE OF CALIBRATION

No: CDK2308717 Page 1 of 12

CALIBRATION OF

Sound Level Meter:	Brüel & Kjær Type 2250	No: 2818091	Id: -
Microphone:	Brüel & Kjær Type 4189	No: 2199217	
PreAmplifier:	Brüel & Kjær Type ZC-0032	No: 32786	
Calibrator:	None		
Software version:	BZ7223 Version 4.7.7	Pattern Approval:	None
Instruction manual:	BE1712-22		

CUSTOMER

AWN Consulting Ltd.
Tecpro House
IDA Business and Technology Park
D17 XD90 Dublin
Ireland

CALIBRATION CONDITIONS

Preconditioning: 4 hours at 23°C ± 3°C

Environment conditions: *See actual values in **Environmental conditions** sections.*

SPECIFICATIONS

The Sound Level Meter Brüel & Kjær Type 2250 has been calibrated in accordance with the requirements as specified in IEC 61672-1:2013 class 1. Procedures from IEC 61672-3:2013 were used to perform the periodic tests. The accreditation assures the traceability to the international units system SI.

PROCEDURE

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System 3630 with application software type 7763 (version 9.0 - DB: 9.00) by using procedure B&K proc 2250, 4189 (IEC 61672:2013).

RESULTS

Calibration Mode: **Calibration after repair/adjustment.**

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device(s) under calibration. The results are only applicable for the specific device(s) listed above.

Date of calibration: 2023-11-22

Date of issue: 2023-11-22

Lene Petersen
Calibration Technician

Morten Høngård Hansen
Approved Signatory

CERTIFICATE OF CALIBRATION

Date of Issue: 17 March 2022

Certificate Number: TCRT22/1190

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Approved Signatory

K. Mistry

Client	AWN Consulting Limited The Tecpro Building, IDA Business and Technology Park, Clonshaugh, Dublin, D17 XD90 Ireland
Purchase Order No.	2201
Instrument	Rion VM-56 Tri-Axial Vibration Meter
Serial No.	00680043
Accelerometer Type	PV-83D
Accelerometer Serial No.	80047
Program	2.0
Client Asset No.	VIB-06
Procedure ID.	VM-56 Issue 2
Job Number	TRAC22/03098
Date of Calibration	17 Mar 2022
Previous Cert. number	TCRT20/1651
Date of Previous Cert.	03 Nov 2020
Rig Number	5
Kit Number	24
Calibration Status	**Passed Calibration**

This calibration is traceable to National Standards. ANV Measurement Systems sources used to perform calibrations are calibrated at the National Physical Laboratory or by UKAS laboratories accredited for the purpose.

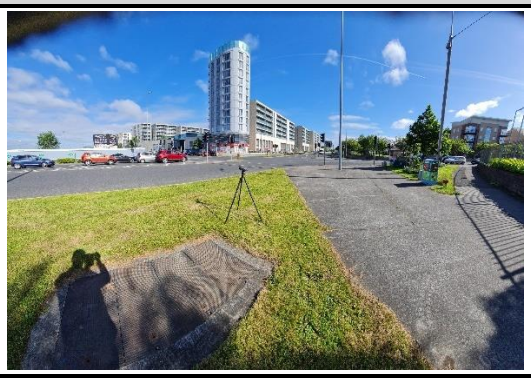
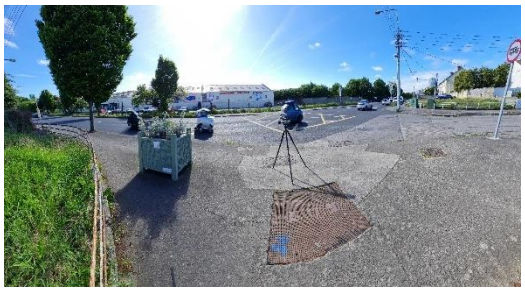
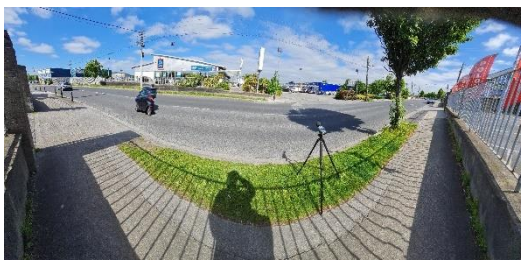
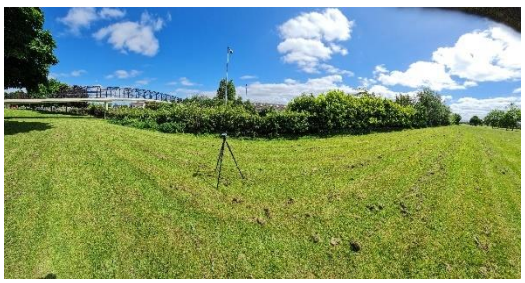
The performance of the system (the meter, accelerometer) was found to be within the manufacturer's specification.

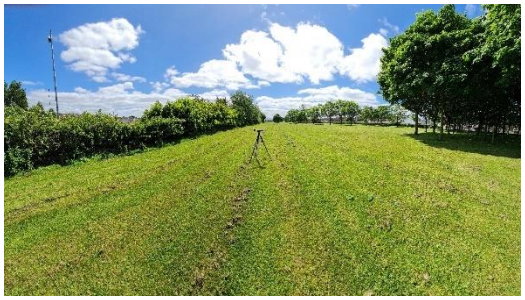
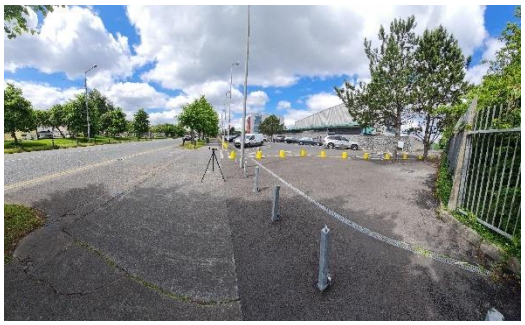
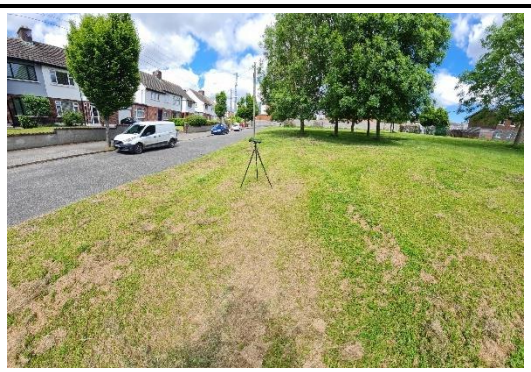
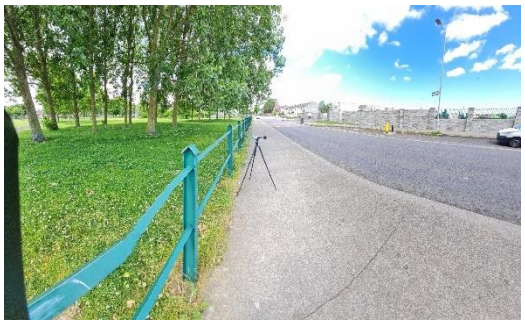
Comment
This certificate reports recorded values for the instrument 'As Received'.

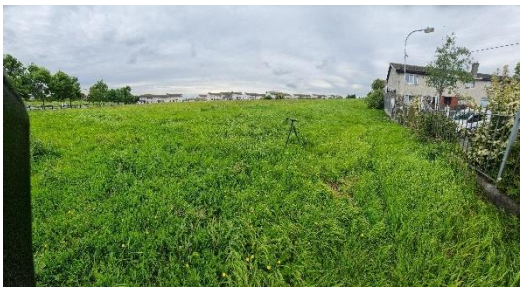
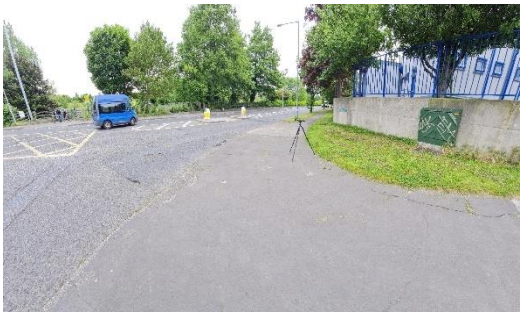
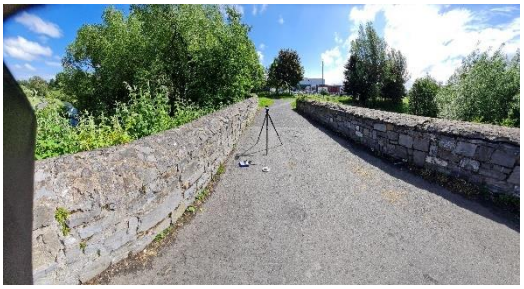
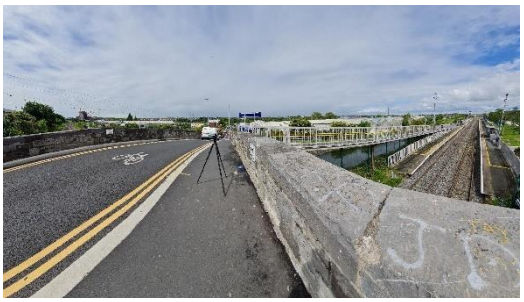
APPENDIX A.1

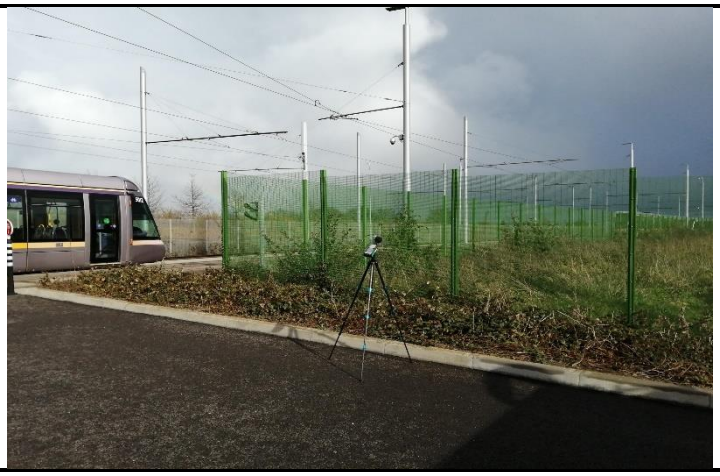
Noise Monitoring Locations

A1.1 Attended Monitoring Locations

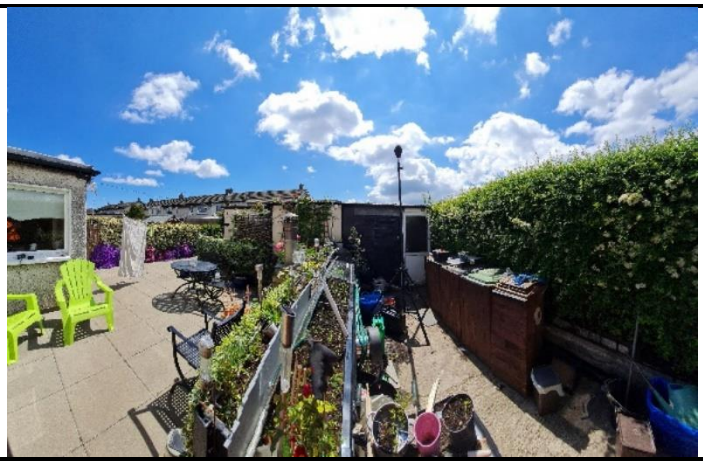
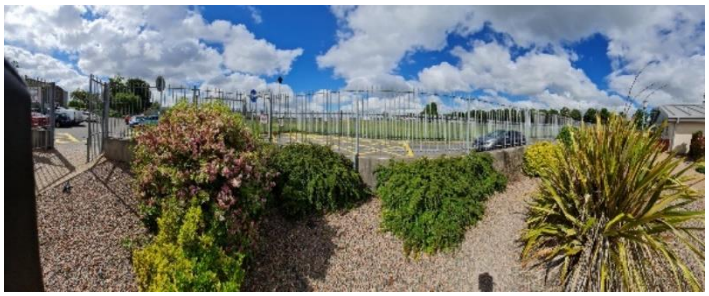
Survey Location Reference	Survey Location
AT1	
AT2	
AT3	
AT4	

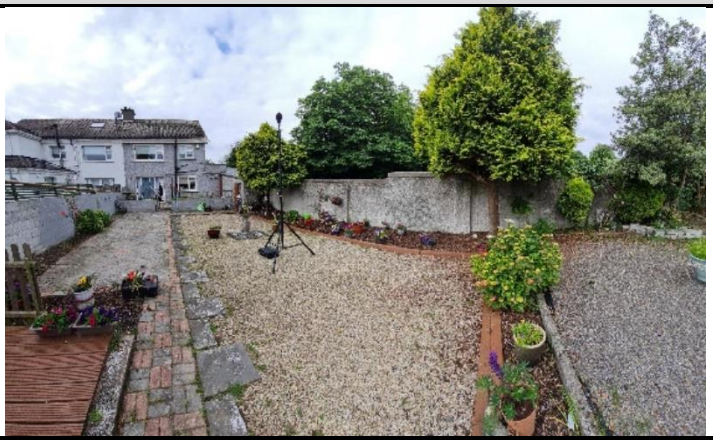
Survey Location Reference	Survey Location
AT5	
AT6	
AT7	
AT8	

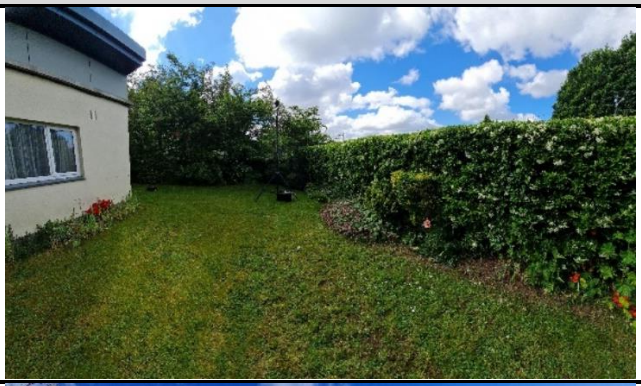
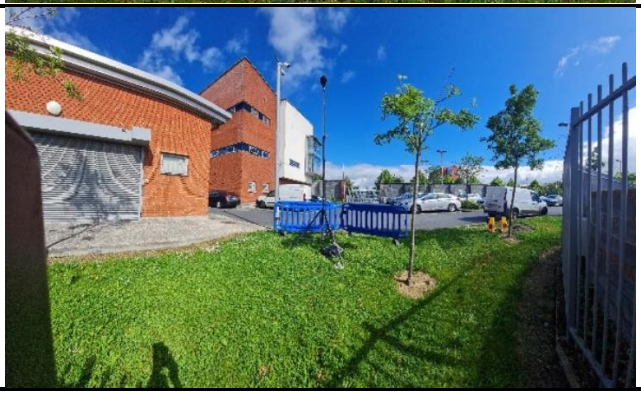
Survey Location Reference	Survey Location
AT9	
AT10	
AT11	
AT12	

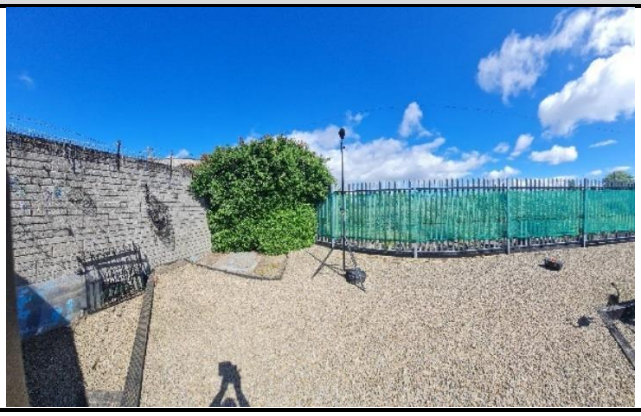
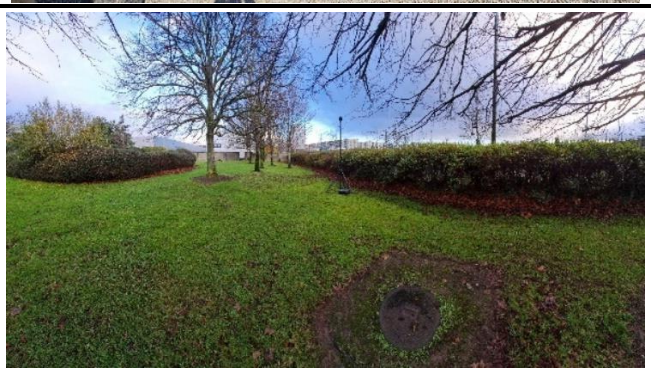
Survey Location Reference	Survey Location
AT13	
AT14	
AT15	

A1.2 Unattended Monitoring Locations

Survey Location Reference	Survey Location
UT1	
UT2	
UT3	

Survey Location Reference	Survey Location
UT4	

Survey Location Reference	Survey Location
UT5	
UT6	

Survey Location Reference	Survey Location
UT7	
UT8	

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Údarás Náisiúnta Iompair
National Transport Authority

BARRY TRANSPORTATION
egis GROUP

egis

Project Ireland 2040
Building Ireland's Future