Appendix A14.1
Baseline Noise and Vibration Monitoring for DART+ Coastal North

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Appendix 14.1: Baseline Noise and Vibration Monitoring for DART+ Coastal North

1. INSTALLATION REPORT FOR NOISE AND VIBRATION MONITORING DART+ COASTAL NORTH

Installation Report for Noise and Vibration Monitoring along the DART and Coastal Northern Line

ARUP

Executive Summary

NVM Limited were requested to complete attended and unattended noise and vibration monitoring along the DART and Coastal Northern Line prior to development work commencing.

There are seventeen (17) monitoring locations ranging from Drogheda (MacBride) Train Station, Co. Louth to Howth Junction and Donaghmede Train Station, Co. Dublin. Noise sensitive locations were deemed to be residential dwellings that are in close proximity to the train line, where works were proposed.

The scope of this survey was to provide and background measurements of the noise and vibration levels currently experienced in the monitored locations. The unattended noise levels were taken over a continuous 24 hour period, with attended noise surveys conducted following EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4). The attended vibration monitoring was conducted following BS ISO 4866:2010.

This report details the installation of the monitors and a description of the various locations.

Document Control

Report Check	Authored by	Reviewed by
	Adam Lyons	
Signed	Adam Lyons	
Date	28/04/2023	

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Introduction

NVM Limited were requested to complete attended and unattended noise and vibration monitoring along the DART and Coastal Northern Line prior to development work commencing. Attended and unattended noise and vibration measurements were conducted at seventeen noise and vibration sensitive locations along the DART and Coastal Northern Line.

Unattended monitoring took place over one entire 24 hour period on a normal weekday (i.e., not starting on Friday, Saturday, or Sunday, and not on a bank holiday or during school holidays), once the weather conditions were conducive to obtaining good noise measurements as mentioned within Memorandum 285051-00.

Noise & Vibration Measurement Details

The measurement and assessment of background noise and vibration levels were conducted in accordance with the following standards:

- EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).
- ISO 1996-1:2016 “Acoustics – Description, measurement and assessment of environmental noise Part 1: Basic Quantities and assessment Procedures”
- BS ISO 4866:2010: Mechanical vibration and shock-vibration of fixed structures- Guidelines for the measurement of vibrations and evaluation of their effects on structures.

Methodology

All sound levels in this report are expressed in terms of decibels (dB) relative to 2x10-5 Pa.

For attended noise measurements a Cirrus CR171B and a Svantek SVAN 977 noise monitoring device was attached to a tripod extending >1.5m above ground level and approximately 3.5m away from any reflective surfaces. All measurements during daytime, evening and nighttime measurements were completed using this monitoring method.

For unattended noise measurements a Svantek SV307A noise monitoring terminal and a Svantek SVAN 977 noise monitoring device was attached to a tripod extending >1.5m above ground level and approximately 3.5m away from any reflective surfaces.

All vibration monitoring was undertaken with accordance to BS ISO 4866:2010. A Vibrock V9000 digital seismograph was installed in a level position set to record VDV and PPV logging at 10 second intervals.

Noise Parameters

LAeq	The equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period. It is typically used as a descriptor for ambient noise.
LAmax	The instantaneous maximum sound level measured during the sample period.
L10	The sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.
L90	The sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.
'A' Suffix	Denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to 2x10-5 Pa.

Vibration Parameters

Peak Particle Velocity (PPV) is the parameter normally used to assess ground vibration expressed in millimeters per second (mm/s).

Frequency (Hz) is equal to the number of cycles per second**.**

VDV (Vibration Dose Value) measures human exposure to vibration in buildings and the effects of vibration on human annoyance

Measurement Locations

All locations proximities to the train lines are reflected in Appendix 1.

Location Ref	Description	Co – ordinates	Date of Installation
Location 01	Unattended Noise Monitoring	53.712842, -6.338128	8th of May
Location 02	Unattended Noise Monitoring	53.711134, -6.333304	29th of March
Location 03	Unattended Nois Monitoring	53.710610, -6.331994	27th of April
Location 04	Attended Noise Monitoring	53.711084, -6.336344	18th of April
Location 05	Unattended Noise Monitoring	53.705600, -6.299931	8th of May
Location 06	Unattended Noise Monitoring	53.694989, -6.261851	26th of April
Location 07	Unattended Noise Monitoring	53.679031, -6.241729	20th of April
Location 08	Unattended Noise Monitoring	53.650384, -6.228441	20th of April
Location 09	Attended Noise Monitoring	53.610093, -6.180903	18th of April
Location 10	Unattended Noise Monitoring	53.583553, -6.146784	17th of April
Location 11	Unattended Noise Monitoring	53.573793, -6.118120	17th of April
Location 12	Unattended Nois Monitoring	53.565005, -6.112735	25th of April
Location 13	Unattended Noise Monitoring	53.521546, -6.141816	18th of April
Location 14	Unattended Noise Monitoring	53.520872, -6.146185	18th of April
Location 15	Unattended Noise Monitoring and Attended Vibration Monitoring	53.453735, -6.155618	Noise: 24th of April Vibration: 27th of April
Location 16	Unattended Noise Monitoring and Attended Vibration Monitoring	53.400169, -6.148991	Noise: 24th of April Vibration: 27th of April
Location 17	Unattended Noise Monitoring	53.391965, -6.156024	24th of April

Personal and Instrumentation

The instrumentation was installed by Ciaran Mythen and Adam Lyons with the attended noise and vibration surveys were attended by Alexander Konchar and Adam Lyons.

The measurements were performed using Type 1 Sound Level Meters; two Svantek 977, a Cirrus CR: 171B and two Svantek SV307A noise monitoring terminal. Both before and after the survey the meters were checked and calibrated using Type 1 Sound Level Calibrators which were calibrated in accordance with International Standards IEC – 61672 – 1:2002. Both sound level meters were fitted with windshields suitable for environmental noise monitoring.

A Vibrock V9000 digital seismograph was setup to measure both PPV and VDV.

The instrumentation used during the attended surveys is presented below.

Manufacturer	Instrument Type	Calibrated by	Calibration Reference	Last Laboratory Calibration
Svantek	Svan 307A Noise monitor S/N 119141	AcSoft	1505027-1	05/04/2023
Svantek	Svan 307A Noise monitor S/N 119098	AcSoft	1505027-2	05/04/2023
Svantek	Svan 977 Noise Monitor S/N 99026	AcSoft	1504818-1	15/03/2023
Svantek	Svan 977 Noise Monitor S/N 92146	Sonitus Systems	SLM220164	09/06/2022
Cirrus	CR171B S/N G302863	Cirrus Research PLC	179347	29/08/2022
Vibrock	V9000 Digital Seismograph S/N 2151	Vibrock	02232151	01/03/2023

Monitoring Locations

Location 1- No. 2 Dublin Rd, Pines Hamlet, Drogheda, Co. Louth, A92 FD3A

This dwelling is located west of Drogheda (MacBride) Train Station. Circa. 65 metres from the closest rail line. The monitor was installed on the balcony facing towards the station.

Location 2- No. 5 Railway Terrace, Wheaton Hall, Drogheda, Co. Louth

This location is part of a row of dwellings which overlook the train station, located down an embankment, circa. 30 metres from the closest rail lane and circa. 190 metres from the main platforms at Drogheda (MacBride) Train station.

Location 3- 14 Harvest Way, Wheaton Hall, Drogheda, Co. Louth, A92 YFK2

This location is circa. 50 metres from the rail line with a small lane (Railway Terrace) and shrubbery dividing the two locations. The dwelling is accompanied on either side by other similar buildings.

Location 4- St. Mary's Villa, Drogheda, Co. Louth

The dwelling is located circa. 15 metres from the rail line which is not for commuting lines but for commercial usage. The dwelling and Drogheda (MacBride) Train Station itself are divided by the Dublin Road.

Location 5- Park Ridge, Grange Rath, Drogheda, Co. Meath

This location consists of apartments and multiple housing estates to the east. The Colpe Road runs perpendicular to the rail line with the rail line located circa. 45 metres from the apartment block.

Location 6- 13 Ardmore Cl, Betaghstown, Co. Meath

This location is circa. 100 metres from the rail line, divided by an unoccupied building site. The dwelling itself consists of a ground floor household with a private patio.

Location 7- Laytown Viaduct, Co. Meath

This dwelling is located circa. 25 metres from Laytown Train station divided by a row of shrubbery. Neighbouring the dwelling is a garden centre and Beach Grove housing estate.

Location 8- Irishtown, Gormanston Camp area, Co. Meath

This dwelling is circa. 235 metres from the rail line with an agricultural yard located between the dwelling and rail line. A lane, Irishtown, separates the dwelling from the border of Gormanston Army Camp with their main facilities located westerly circa. 650 metres.

Location 9- Quay Street, Balbriggan, Co. Dublin

This location is a row of dwellings on Quay Street. These dwellings face on to Balbriggan harbour (circa. 90 metres), Balbriggan Train Station (circa 200 metres) as well as Balbriggan Viaduct that the train line is located upon (circa. 60 metres).

Location 10- Flower Power Garden Centre, Skerries, Dublin, K34 VY16

This location consists of a garden centre and a dwelling neighboured immediately to the north by another dwelling. The rail line is circa 40 metres from any structures within the garden centre's property.

Location 11- 67 St Patricks Close, Townparks, Skerries, Co. Dublin, K34 VY16

This location is circa. 50 metres from the closest rail line and circa. 70 metres from Skerries Train station's southbound platform. The dwelling is neighboured by other dwellings on either side with the Station Road between the rail line and dwelling. The train station is a terminal for Dublin Bus routes 33 and 33A.

Location 12- Skerries Golf Club, Skerries, Co. Dublin

This location is a dwelling located on the Golf Links Road and is neighboured by agricultural yards to the north and south with an educational school located to the east. The rail line is circa. 85 metres from the dwelling and runs adjacent to Skerries Golf Club.

Location 13- Windhook, Effelstown, Lusk, Co. Dublin

This location is a dwelling that the rail line is running adjacent to. It is circa. 15 metres to the closest structure with the dwelling's boundaries. The entrance of the dwelling is found across from the entrance to the R128 parking lot, separated by the R128 itself.

Location 14- Rogerstown Lane, Lusk, Co. Dublin

This location is found west, circa 25 metres, of the main road into the Lusk & Rush Train station Parking Lot and circa 85 metres from the northbound platform at the Lusk & Rush Train station. The dwelling is neighboured to the north, circa. 30 metres by Neary's Lusk Car Dealership.

Location 15- 255 Marina Village, Malahide, Co. Dublin, K36 N122

This dwelling is circa. 20 metres from the rail line with a lane located between both locations. The dwelling is neighboured on both sides by similar dwellings. Malahide Train Station is located circa. 310 metres from the dwelling.

Location 16- 15 Myrtle Close, The Coast, Dublin 13, D13 HX27

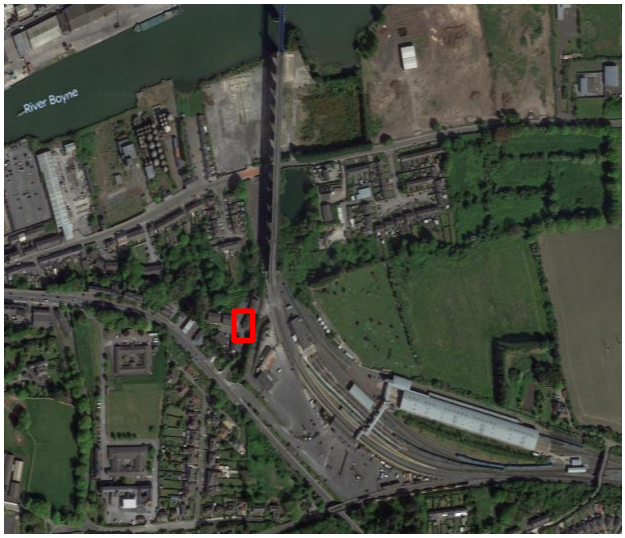
This location is circa 20 metres from the rail line separated by a garden boundary wall. Clongriffan Train Station is circa 250 metres from the dwelling. This location consists of multiple housing estates within close proximity.

Location 17- 37 Carndonagh Lawn, Grange, Dublin 13, D13 WV05

This location is circa 55 metres from Howth Junction and Donaghmede Train station with the rail line at its closest at circa 50 metres. The dwelling is within a cluster of dwellings of the same design with rows of other dwellings found in the north and west directions.

Appendix 1 Monitoring Locations with Install Photographs

Location 1



Location 2

Location 3

Location 4

Location 5

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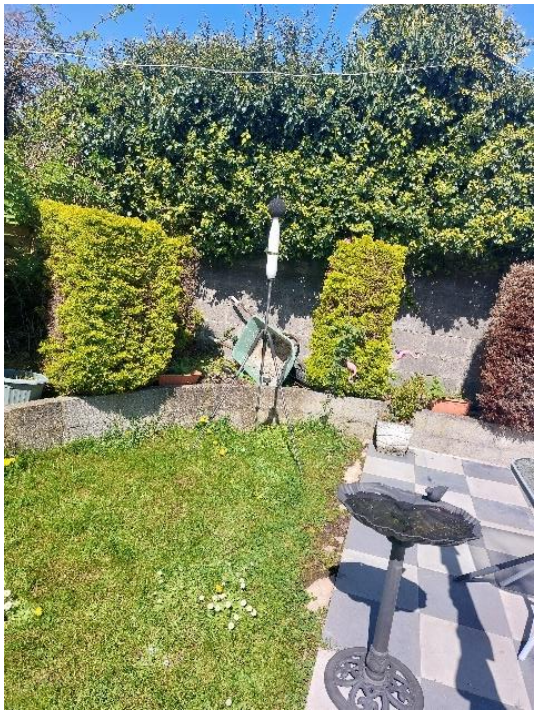
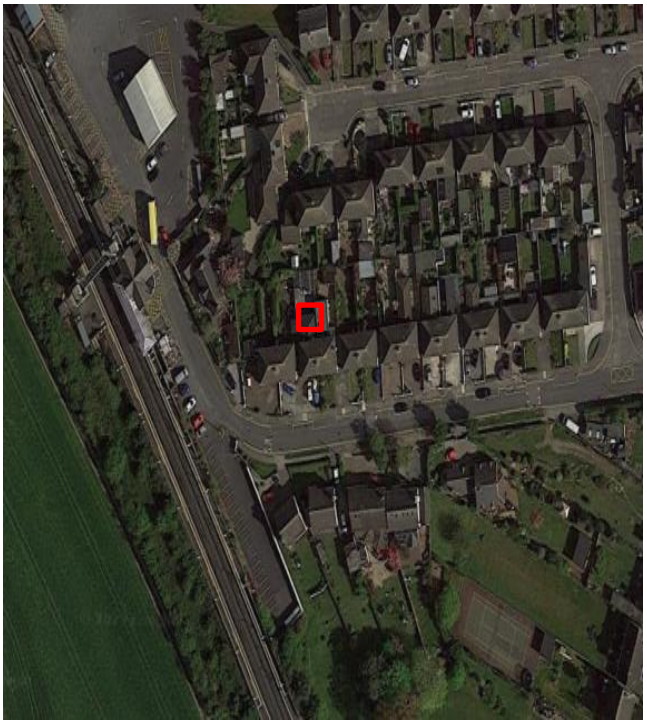
Location 9

Location 10

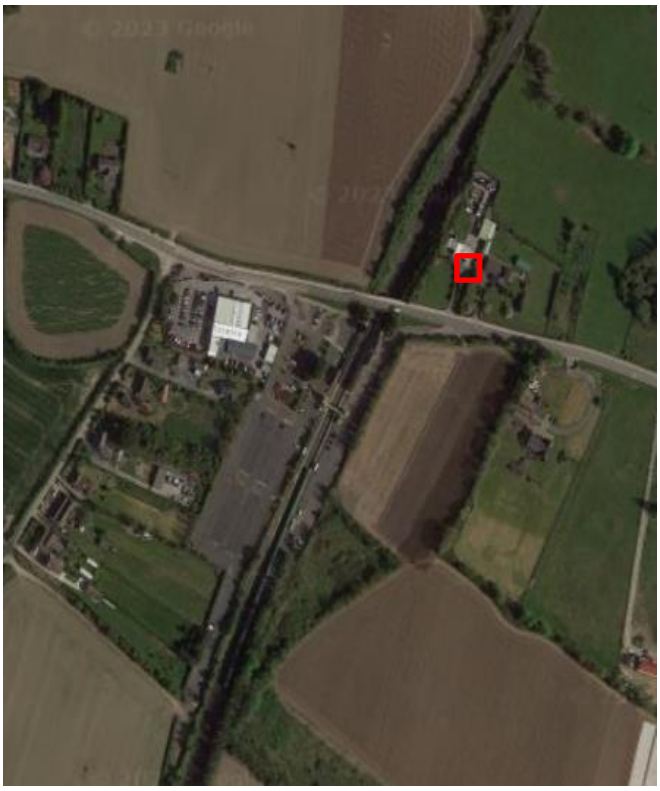
Location 11





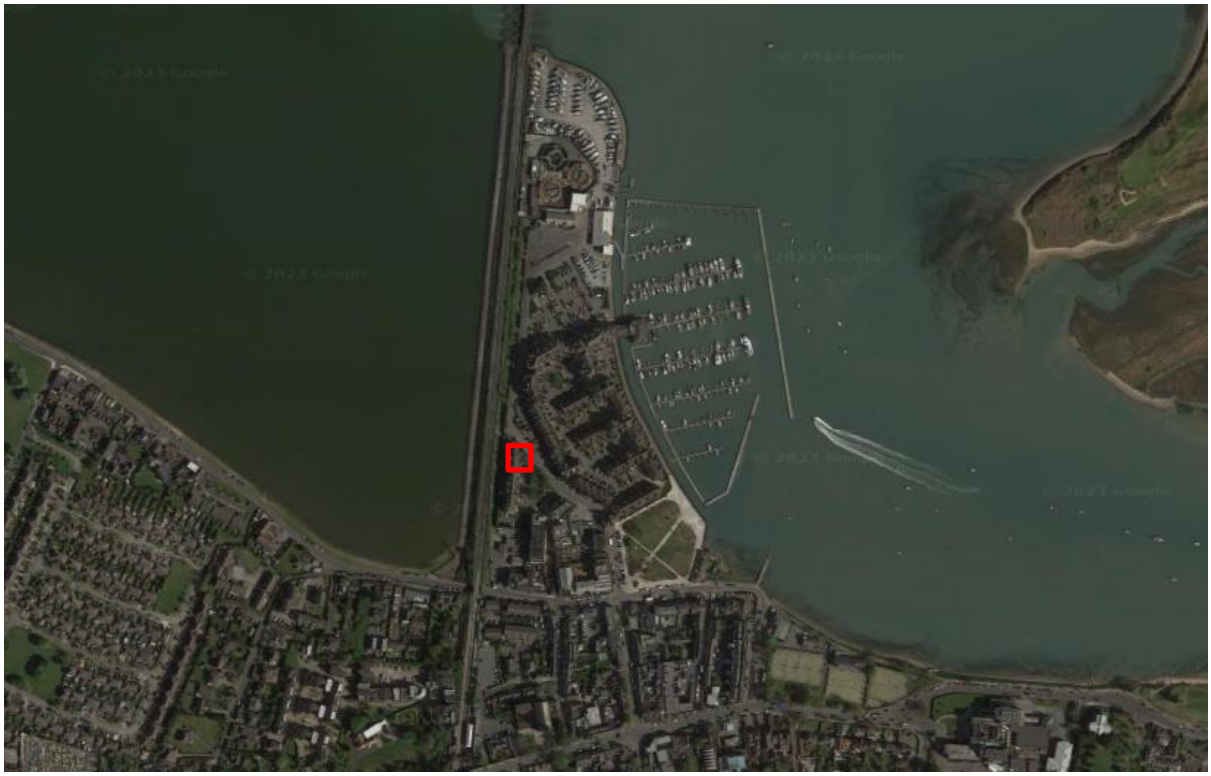
Location 12

Location 13

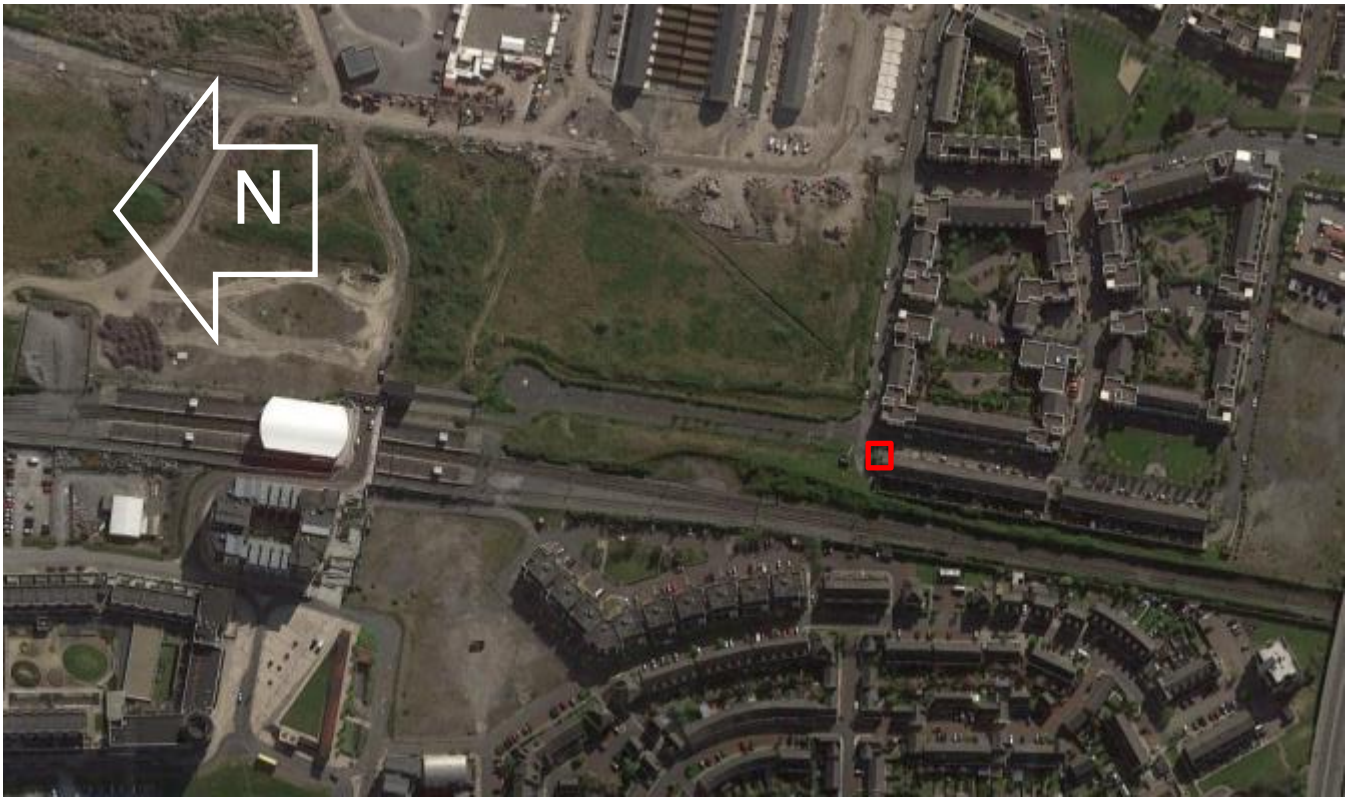


Location 14

Location 15



Location 16



Location 17

2. ENVIRONMENTAL NOISE MONITORING REPORT: QUAY STREET, BALBRIGGAN

ARUP

Environmental Noise Monitoring Report

Quay Street

Balbriggan

Co. Dublin

April 2023

Report prepared for: ARUP

Report prepared by: Adam Lyons

Report Date: 20/04/2023

Executive summary

NVM Limited were requested to conduct an attended noise survey at Quay Street, Balbriggan, Co. Dublin.

The scope of this survey is to establish the current noise environment at local dwellings before the commencement of development on the DART+ Coastal Northern Line.

The location of the noise survey is on Quay Street which faces on to the harbour, Balbriggan Train Station as well as Seapoint, the main road to Skerries. The noise sensitive locations were deemed to be the row of dwellings located facing on to Quay Street.

The following report details the findings from the measurements taken from various stages of the day during Tuesday the 18th of April 2023.

The main contributor to the noise environment was found to be local traffic and noises from natural sources. The trains travelling through Balbriggan Train Station influence the environment through their operational procedures. i.e., Horn usage as entering the station.

Report Check	Authored by	Reviewed by
	Adam Lyons	
Signed	Adam Lyons	
Date	20/04/2023	

Disclaimer:

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Introduction

NVM Limited were requested by Arup to conduct an attended noise survey at Quay Street, Balbriggan, Co. Dublin to provide an insight to what factors were influencing the noise environment in the area.

The noise measurements were completed at a specified location close to local dwellings. This attended noise survey was carried on the 18th of April 2023.

Scope of the Assessment

The noise levels are expressed as L*Aeq* T30 minute measurements for both daytime measurements, and L*Aeq* T15 minute measurements for evening and night-time measurements, in accordance with the noted periods expressed in the memorandum supplied. The reference number is 285051-00 and file reference is AAc_M001.

The survey was completed in accordance with the following documents:

- The EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in relation to Scheduled Activities (NG4) (January 2016).

- ISO 1996-1:2016 “Acoustics – Description, measurement and assessment of environmental noise Part 1: Basic Quantities and assessment Procedures”
- ISO 1996-1: 2016 “Acoustics – Description, measurement, and assessment of environmental noise Part 1: Basic Quantities and Assessment Procedures”

- Previously mentioned Memorandum, AAc_M001.

All measurements were completed at each noted location, during the following timed periods:

- Daytime hours 07:00 – 19:00 hrs.
- Evening hours 19:00 – 23:00 hrs.
- Night-time hours 23:00 – 07:00 hrs.

The measurements are based on the collected data from each measurement location obtained during the single period in April 2023. The results are therefore only applicable to the date in question; however, noise levels would be deemed indicative of the normal noise levels generated from the area during daily activities.

Explanation of the measurement parameters

- ***LAeq*** is the equivalent continuous sound level. It is an averaging mechanism used to describe and compare fluctuating noise in terms of a single noise level over the sample period.
- ***LAmax*** is the instantaneous maximum sound level measured during the sample period.
- ***LA10*** is the sound level that is exceeded for 10% of the sample period. It is typically used for the measurement of the impact of traffic noise.
- ***LA90*** is the sound level that is exceeded for 90% of the sample period. It is typically used as a measurement for background noise.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to 2x10-5 Pa.

The sound level meter was attached to a tripod extending >1.5m above ground level and approximately 3.5m away from any reflective surfaces. All measurements during daytime, evening and nighttime measurements were completed using this monitoring method.

Measurement Locations

The monitoring location can be found in the below map. The co-ordinates for the noise survey location are 53.610027, -6.180739. It is located in front of a row of houses across from the Quay Street Car Park.

Figure 1 Map overview of monitoring location. Reference Google Earth

Personnel and Instrumentation

Personnel

The survey was completed by Adam Lyons of NVM Limited.

Instrumentation

The measurements were performed using a Cirrus Research PLC CR171B. Both before and after the survey the meter was checked and calibrated using Type 1 Sound Level Calibrators which were calibrated in accordance with International Standards IEC – 61672 – 1:2002. The sound level meter was fitted with a windshield suitable for environmental noise monitoring.

Manufacturer	Instrument Type and Serial Number	Calibrated by	Calibrated Reference	Last Laboratory Calibration
Cirrus Research PLC	CR171B G302863	Cirrus Research PLC	179347	29/08/2022

Table 1 Noise instrumentation details

On site calibration details: Sound level meter was checked and calibrated both before and on completion of the monitoring run, to 94 dB (A). No change was noted on the meter during these calibrations (+ / - 0.5dB). Calibration certificates for instrumentation are attached in the appendix of this report.

Weather Conditions

The following table shows the weather reports during the measurement period. These measurements were taken from the Met Eireann station at Phoenix Park which was deemed to be the closest to the monitoring location.

Date	Rainfall (mm)	Max Temp (°C)	Min Temp (°C)	Mean Wind Speed (knots)
18/04/2023	0.0	12.5	9.6	8.1

Table 2 Met Eireann weather details

Measurement Results and Discussion

The following tables outline the measurement results collected during the survey periods at the monitoring location. Graphed results for each period may be found in Appendix 2.

Measurement details			Measured Noise Levels (dB re. 2x10-5 Pa) – LAr,T			
Period	**Date**	**Times**	**LAeq**	**LAMax**	**LA10**	**LA90**
Day time	18/04/2023	11:16-11:46	63	93	64	51
Day time	18/04/2023	12:00-12:30	59	79	62	48
Day time	18/04/2023	13:00-13:30	59	78	61	52
Evening	18/04/2023	22:20-22:35	61	78	63	50
Night time	18/04/2023	23:00-23:15	53	72	53	49
Night time	18/04/2023	23:30-23:45	51	71	51	49

Measurements were taken along the footpath in front of the row of dwellings facing Quay Street. The location is circa 65 metres from Balbriggan Viaduct (UBB 56) with the harbour a further circa 15 metres beyond. Across from the dwellings, Quay Street Car Park is found along with a playground.

During the day aspect of the noise survey, a constant background noise consisted of a generator located at a construction site below the viaduct. This was accompanied by works on the previously mentioned site and noise of a natural origin. A consistent flow of traffic is found at this location due to the Quay Street leading to the harbour, Balbriggan Train Station and also Seapoint, the main road to Skerries.

During the Evening and Night aspect of the noise survey there was a reduction in traffic in the monitoring area. The main background noise environment consisted of noise produced from natural sources such as birds and the River Bracken circa 60 metres from the monitoring location.

Within the Day and Evening monitoring periods, trains travelling over the viaduct have influenced the noise environment through different methods, which include horn usage, consistent acceleration through the station and halting at Balbriggan Train Station.

Appendices

Appendix 1: Calibration Certificate

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research GmbH**

DATE OF ISSUE **29 August 2022** CERTIFICATE NUMBER **179347**

Cirrus Research GmbH
Arabella Center
Lyoner Strasse 44-48
D-60528 Frankfurt
Germany

Page 1 of 2

Approved signatory
M.McDonald
Electronically signed:

M J McDonald

Sound Level Meter : IEC 61672-3:2013

Instrument information

Manufacturer:	Cirrus Research plc	Notes:
Model:	CR:151A	
Serial number:	G302863	
Class:	1	
Firmware version:	5.6.3177	

Test summary

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
Periodic tests were performed in accordance with procedures from IEC 61672-3:2013.

The sound level meter submitted for testing successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 because (a) evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to determine that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Notes

ENVIRONMENTAL & STRUCTURAL MONITORING

OTT HydroMet

CERTIFICATE OF CALIBRATION

Certificate Number: **179347**

Environmental conditions

The following conditions were recorded at the time of the test:

Before	Pressure:	NaN	Temperature:	NaN	Humidity:	NaN %
After	Pressure:	101.90 kPa	Temperature:	21.1 °C	Humidity:	29.3 %

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	TTi	TGA1241	439193
Attenuator	Cirrus Research	ZE:952	80381
Environmental Monitor	Comet	T7510	17963955

Additional instrument information

Instruction manual:

Reference level range: Single range

Pattern approval: No

Source of pattern approval: -

Preamplifier

Model: MV:200F

Serial number: 11369F

Microphone

Model: MK:224

Serial number: 213532A

Test results summary

Test	Result
Toneburst response	Complies
Electrical noise-floor	Complies
Linearity	Complies
Electrical Frequency weightings	Complies
Frequency and time weightings at 1 kHz	Complies
High level stability	Complies
Long-term stability	Complies

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research GmbH**

DATE OF ISSUE **08 November 2022** CERTIFICATE NUMBER **182760**

Cirrus Research GmbH
Arabella Center
Lyoner Strasse 44-48
D-60528 Frankfurt
Germany

Approved signatory
M.Berezovskis
Electronically signed:

Sound Calibrator : IEC 60942:2003

Instrument information

Manufacturer: Cirrus Research plc **Notes:**
Model: CR:515
Serial number: 97720
Class: 1

Test summary

The sound calibrator detailed above has been calibrated to the published data as described in the operating manual and in the half-inch configuration. The procedures and techniques used are as described in IEC60942_2003 Annex B – Periodic Tests and three determinations of the sound pressure level, frequency and total distortion were made.

The sound pressure level was measured using a WS2F condenser microphone type MK:224 manufactured by Cirrus Research plc.

The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer's data.

As public evidence was available, from a testing organisation responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the Class 1 requirements of IEC 60942:2003.

The manufacturer's product information indicates that this model of sound calibrator has been formally pattern approved to IEC60942_2003 Annex A to Class 1. This has been confirmed with the PhysikalischTechnische Bundesanstalt (PTB), Laboratoire National d'Essais (LNE) and APPLUS.

Notes:

NVM
ENVIRONMENTAL & STRUCTURAL MONITORING

OTT HydroMet

CERTIFICATE OF CALIBRATION

Certificate Number: **182760**

Environmental conditions

The following conditions were recorded at the time of the test:

Pressure: 100.70 kPa
Temperature: 23.9 °C
Humidity: 54.4 %

Test equipment

Equipment	Manufacturer	Model	Serial number
Acoustic Calibrator	Bruel and Kjaer	4231	1795641
Distortion Meter	Keithley	2015	1175401
Multimeter	Fluke	8845A	9440017

Results

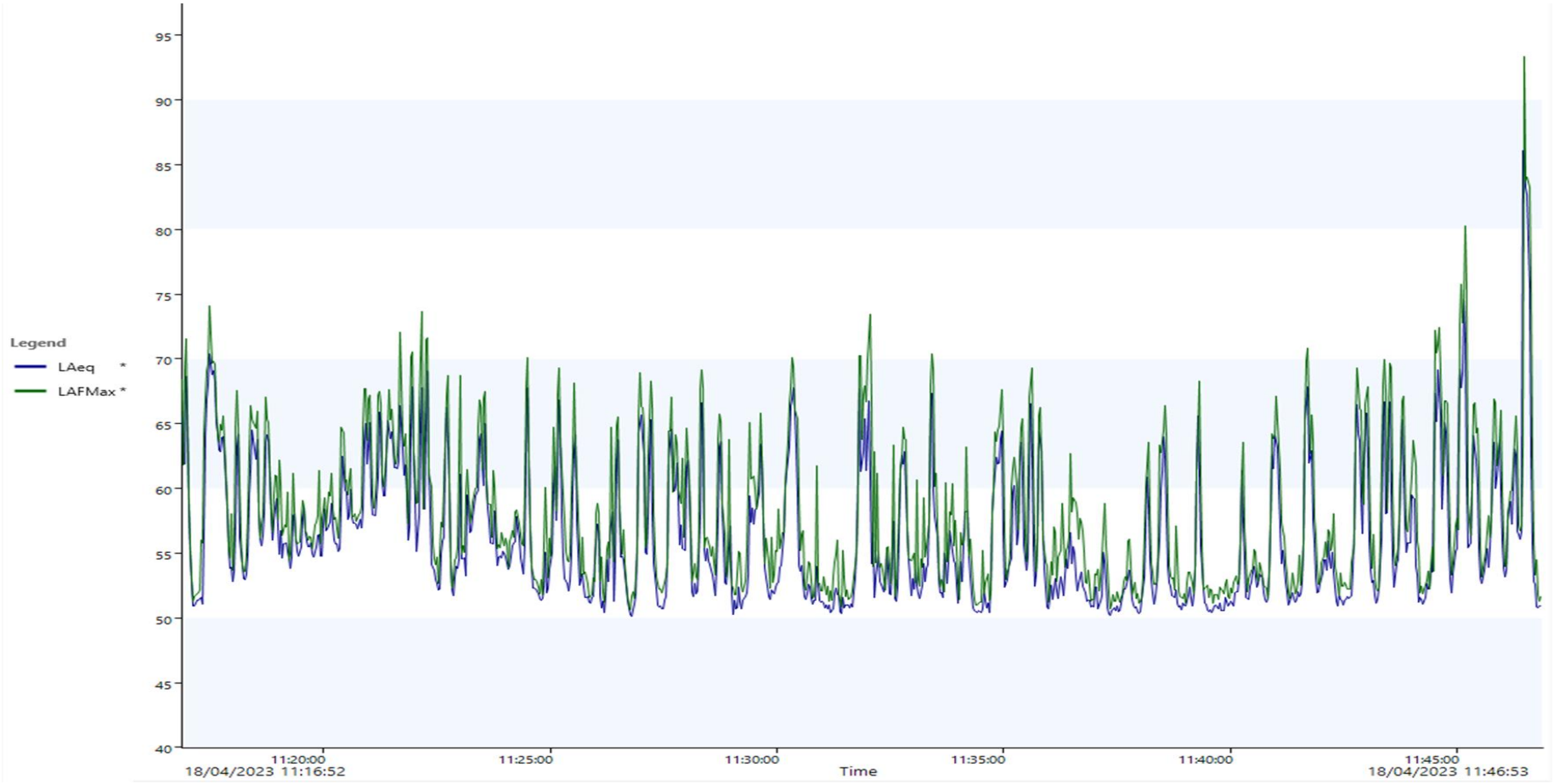
	Expected	Sample 1	Sample 2	Sample 3	Average	Deviation	Tolerance	Uncertainty
Level (dB)	94.00	94.00	94.00	94.00	**94.00**	0.00	±0.40	0.11 dB
Distortion (%)	< 3.00	1.17	1.30	1.15	**1.21**	1.21	+3.00	0.13 %
Frequency (Hz)	1000.0	1000.0	1000.0	1000.0	**1000.0**	0.0	±10.0	0.1 Hz

The measured quantities or deviations (as applicable), extended by the expanded combined uncertainty of measurement, must not exceed the corresponding tolerance.

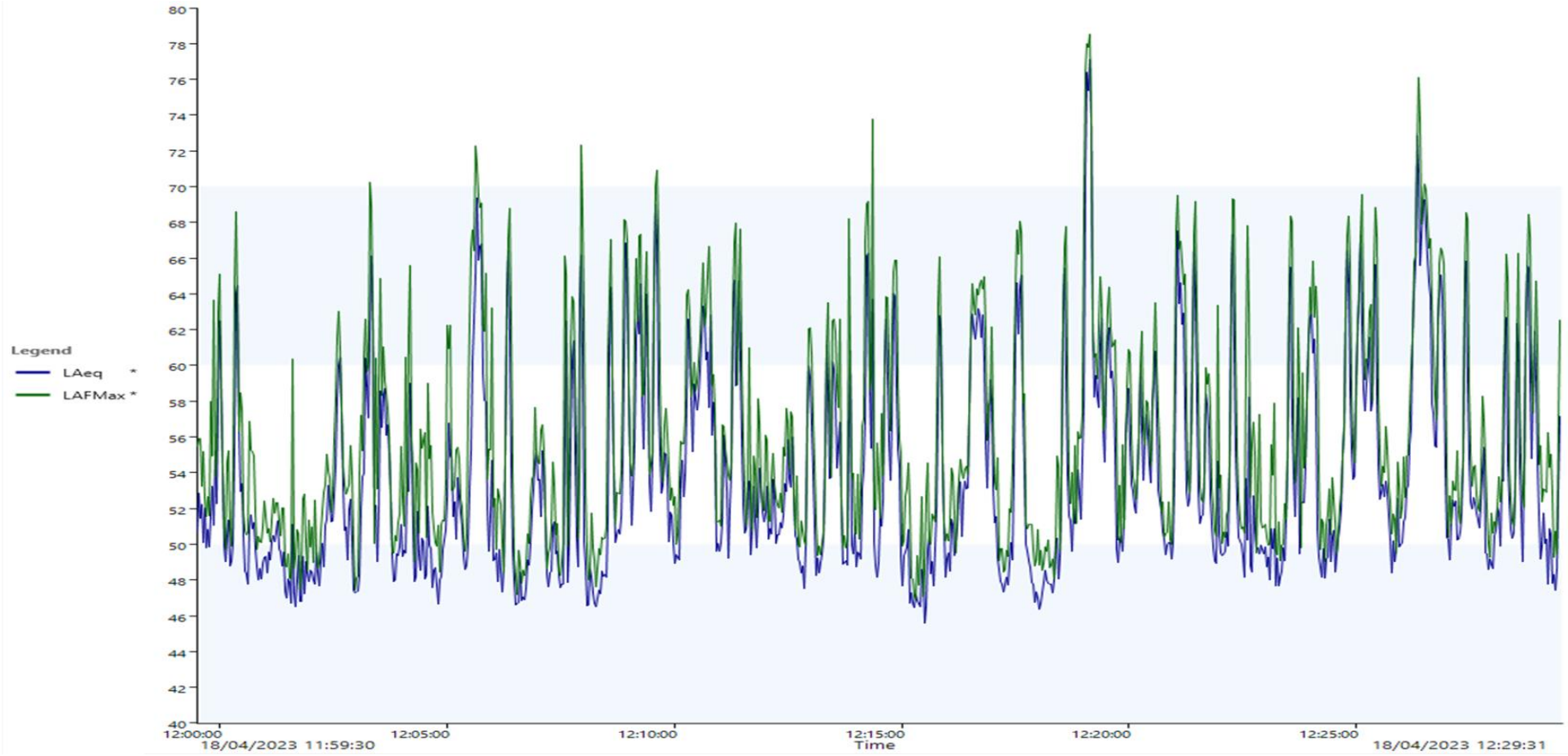
End of results

Appendix 2: Monitoring Results

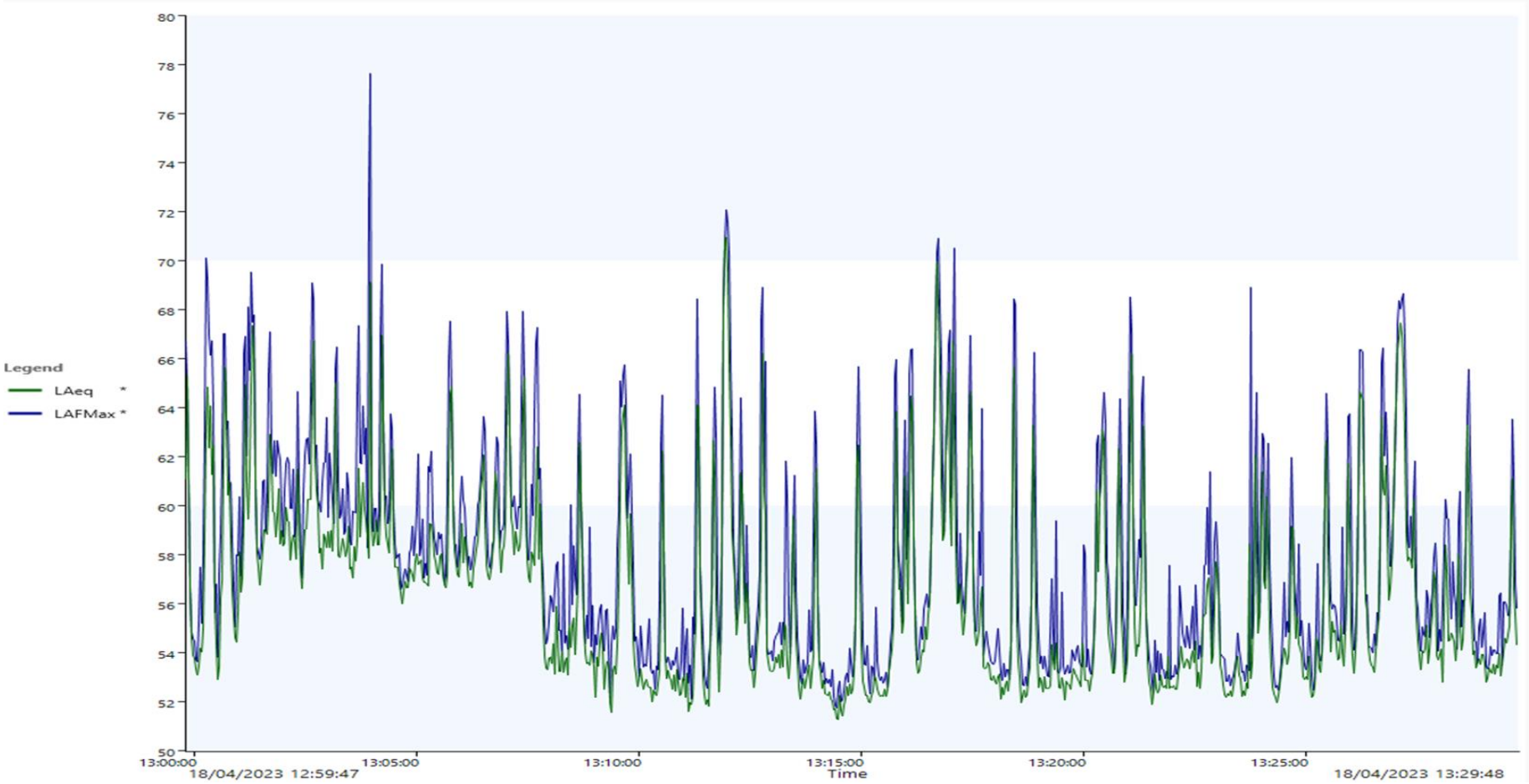
Day Time period 1



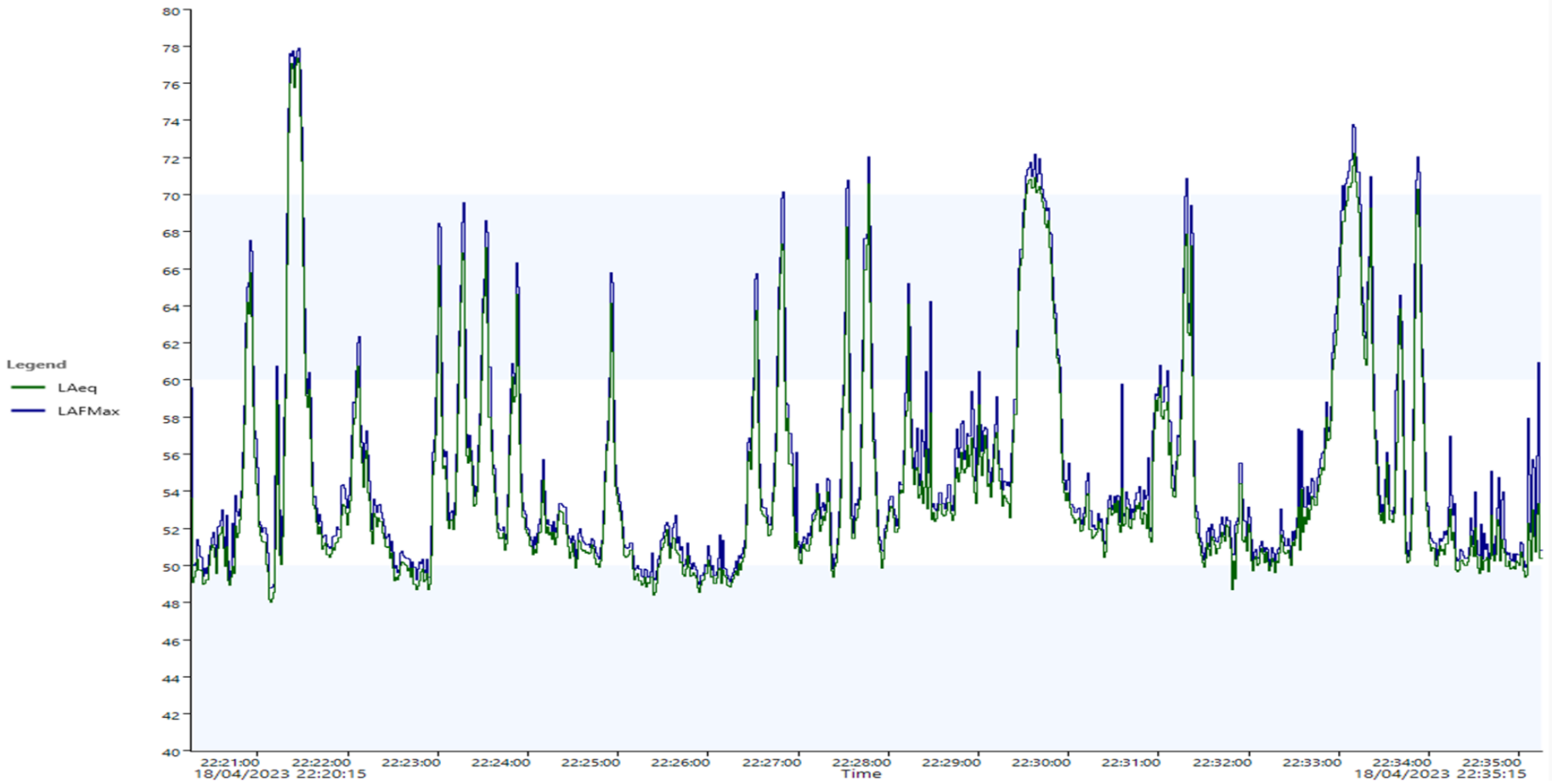
Day Time period 2



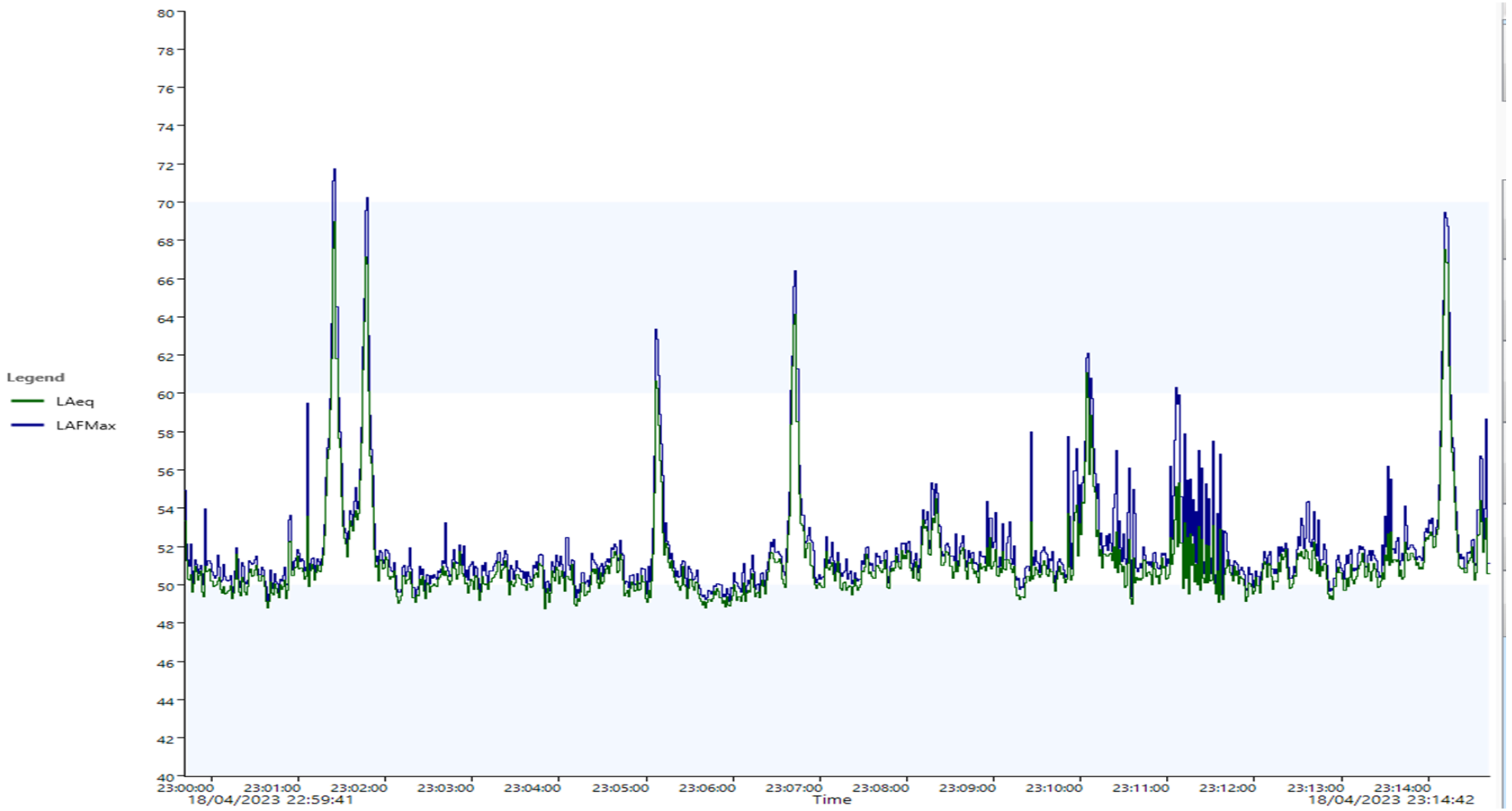
Day Time period 3



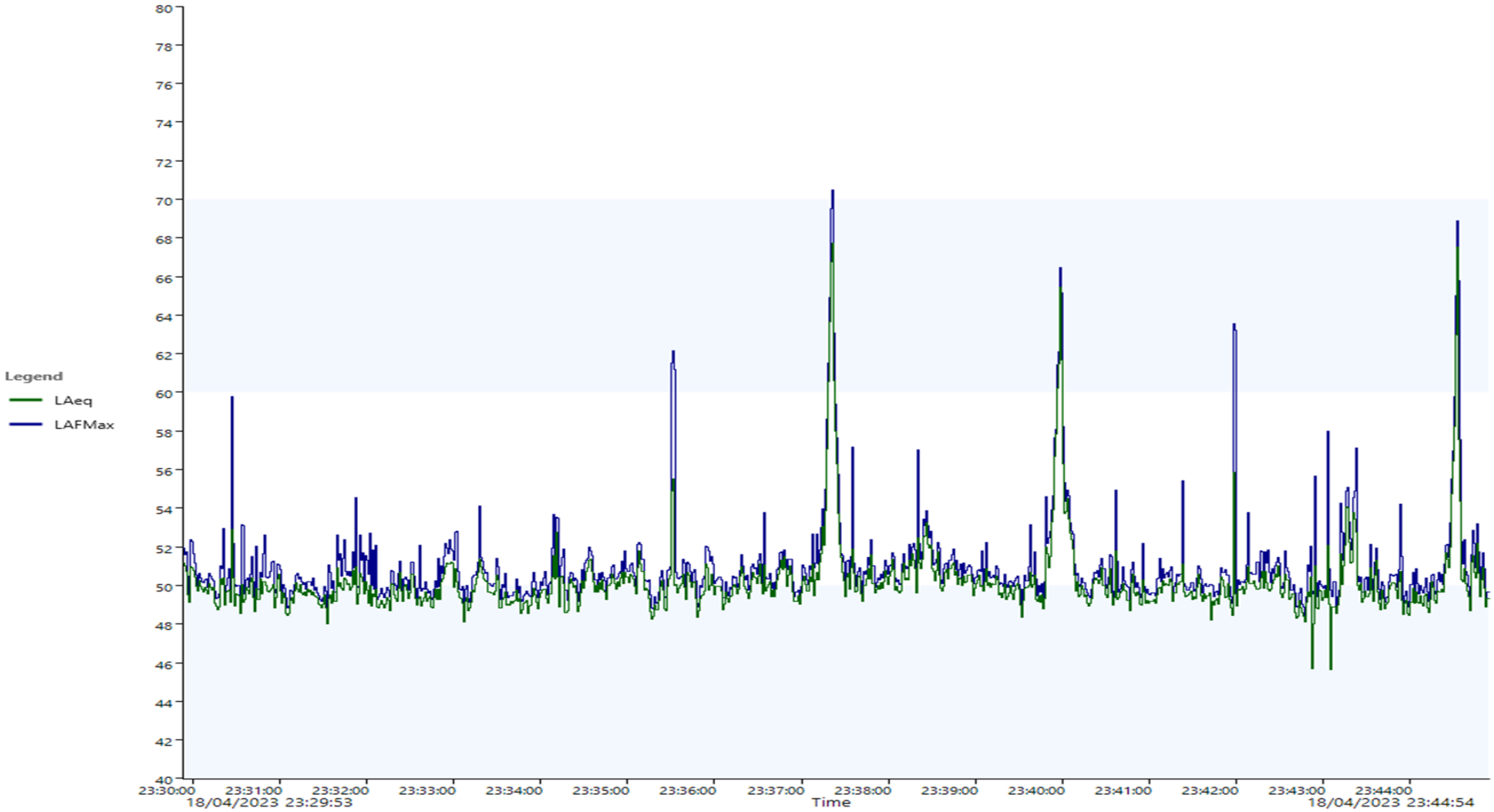
Evening Time Period



Night-time period 1



Night-time period 2




Workhorse
Construction
085 1323394
09-D-122408

3. ENVIRONMENTAL NOISE MONITORING REPORT: ST. MARY'S VILLAS, DROGHEDA

ARUP

Environmental Noise Monitoring Report

St. Mary's Villas

Drogheda

Co. Louth

April 2023

ARUP

Report prepared for: ARUP

Report prepared by: Alexander Konchar

Report Date: 09/05/2023

Executive Summary

NVM Limited were requested to conduct an attended noise survey at St. Mary's Villas, Drogheda, Co. Louth.

The purpose of the survey is to establish the general noise conditions of the area, prior to the development of the DART+ Coastal Northern Line. The location is adjacent to MacBride train station, ~80m away, and runs parallel to the Dublin Road. The location is within the vicinity of occupied residential properties, that would be deemed as a receptor of the noise that will be emitted during development.

Noise levels at St. Mary's Villas are dominated by the constant stream of traffic along the Dublin Road.

Report Date:		**Report No.**	
Report Prepared By:	Alexander Konchar	**Report Approved By:**	
Signed:		**Signature:**	
Date	09/05/2023		

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Instrumentation 6
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Introduction

NVM Limited were requested to conduct an attended noise survey at St. Mary's Villas, Drogheda, Co. Louth. The purpose of the survey is to establish the general noise conditions of the area, prior to the development of the DART+ Coastal Northern Line.

The environmental noise measurements were completed at St. Mary's Villas, Drogheda, between 18/04/2023 – 19/04/2023, during normal daily operations. The measurement and assessment of background noise levels were conducted in accordance with the following standards:

- ISO 1996-1: 2016 "Acoustics – Description, measurement, and assessment of environmental noise Part 1: Basic Quantities and Assessment Procedures"
- Memorandum, AAc_M001

Scope of the Assessment

The noise levels are expressed as L*Aeq* T30 minute measurements for both daytime and evening measurements, and L*Aeq* T15 minute measurements for night-time measurements, in accordance with the noted periods expressed in the EPA NG4 (2016) document.

The survey was completed in accordance with the following documents:

- The EPA Guidance Note for Noise: Licence Applications, Surveys and Assessments in relation to Scheduled Activities (NG4) (January 2016).
- ISO 1996-1:2016 "Acoustics – Description, measurement and assessment of environmental noise Part 1: Basic Quantities and assessment Procedures"

Methodology

All measurements were completed at the noted location, during the following timed periods.

- Daytime Hours 0700 - 1900.
- Evening Hours 1900 - 2300.
- Night time Hours 2300 – 0700.

The measurements are based on the collected data from each measurement location obtained during the single period in April 2023. The results are therefore only applicable to the dates in question; however, noise levels would be deemed indicative of the normal noise levels generated from the site during daily activities. In addition to the recording of statistical averages, data was logged at 1 second intervals and audio recordings were made.

Explanation of the measurement parameters

- ***LAeq*** is the equivalent continuous sound level. It is an averaging mechanism used to describe and compare fluctuating noise in terms of a single noise level over the sample period.
- ***LAMax*** is the instantaneous maximum sound level measured during the sample period.
- ***LA10*** is the sound level that is exceeded for 10% of the sample period. It is typically used for the measurement of the impact of traffic noise.
- ***LA90*** is the sound level that is exceeded for 90% of the sample period. It is typically used as a measurement for background noise.

The “A” suffix denotes the fact that the sound levels have been “A-weighted” in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to 2x10-5 Pa.

The sound level meter was attached to a tripod extending >1.5m above ground level and approximately 3.5m away from any reflective surfaces. All measurements during daytime, evening and nighttime measurements were completed using this monitoring method.

Measurement Locations

The monitored locations and their coordinates are shown in Table 1. The actual monitoring was completed at reference points within the named area location. All efforts were made to use these points during both the daytime, evening and night time monitoring periods to ensure continuity in the measurements.

Location Reference Co - ordinates		Location Title
4	53.711137, -6.336282	St Mary’s Villas

Table 1 Reference to location coordinates

Overviews of the noted monitoring locations are displayed below**.**

Personnel and Instrumentation

Personnel

The measurements were completed by Alexander Konchar of NVM Limited.

Instrumentation

The measurements were performed using Type 1 Sound Level Meters: a Svantek 977. Before and after the survey the meters were checked and calibrated using Type 1 Sound Level Calibrators which were calibrated in accordance with International Standards IEC – 61672 – 1:2002. The sound level meter was fitted with a windshield suitable for environmental noise monitoring.

The instrumentation used during the attended surveys is presented in Table 2.

Manufacturer	Instrument Type	Calibrated by	Calibrated Reference	Last Laboratory Calibration
Svantek	SVAN 977 Sound Level Meter S/N 92146	Acsoft UK Limited	SLM220164	09/06/2022

Table 2 Noise Instrumentation details

On site calibration details: Sound level meters were checked and calibrated both before and on completion of the monitoring run, the Svantek monitors to 114 dB (A) and the Cirrus monitor to 94 dB (A). No change was noted on the meter during these calibrations (+ / - 0.5dB). Calibration certificates for instrumentation are attached in the appendix of this report.

Weather Conditions

The following table shows the weather reports during the measurement period. These measurements were taken from the Met Eireann station at Dunsany which was deemed to be the closest to the monitoring location

Date	Rainfall (mm)	Max Temp (°C)	Min Temp (°C)	Mean Wind Speed (knots)
18/04/2023	0.0	12.0	7.8	9.2

Table 3 Met Eireann Weather details

Measurement results and discussion

The following table outlines the measurement results collected during the survey periods at the monitoring location.

Measurements were completed at St. Mary's Villas, parallel to the Dublin Road, and approximately 88m South West of Drogheda MacBride train station. Traffic on the Dublin Road was the main source of noise throughout all measurements, with noises being emitted from birds in the surrounding trees. The table shows the recorded noise levels.

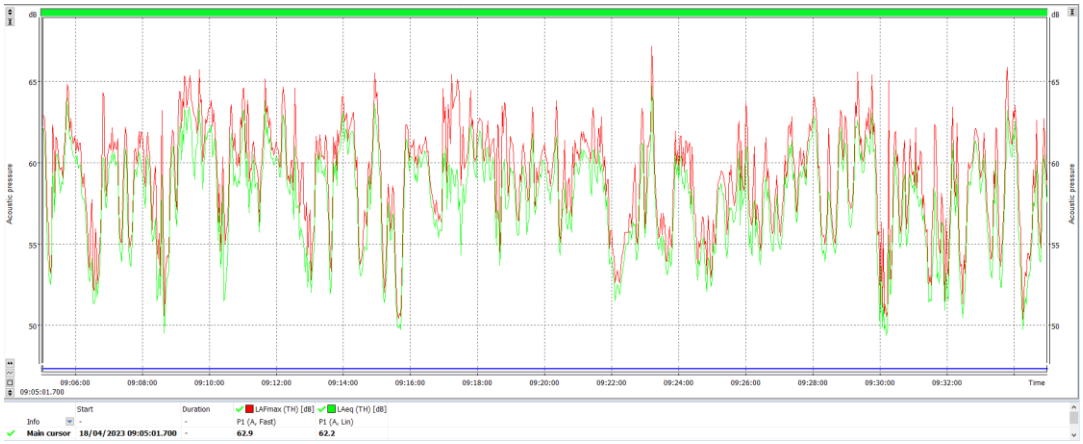
During the night, cars present on the road were less frequent, with distant traffic becoming more audible as a background noise.

Measurement details			Measured Noise Levels (dB re. 2x10-5 Pa) – LAr, T				
Period	***Date***	***Time***	***LAeq***	***LAMax***	***LAMin***	***LA10***	***LA90***
Day time	18/04/2023	9:05-9:35	57	67	48	61	53
Day time	18/04/2023	9:50-10:20	60	79	47	62	52
Day time	18/04/2023	10:36-11:06	66	103	44	62	52
Evening	18/04/2023	20:42-20:57	59	73	45	62	49
Night time	18/04/2023	23:27-23:42	53	70	39	58	43
Night time	18/04/2023	23:57-00:12	55	69	43	59	47

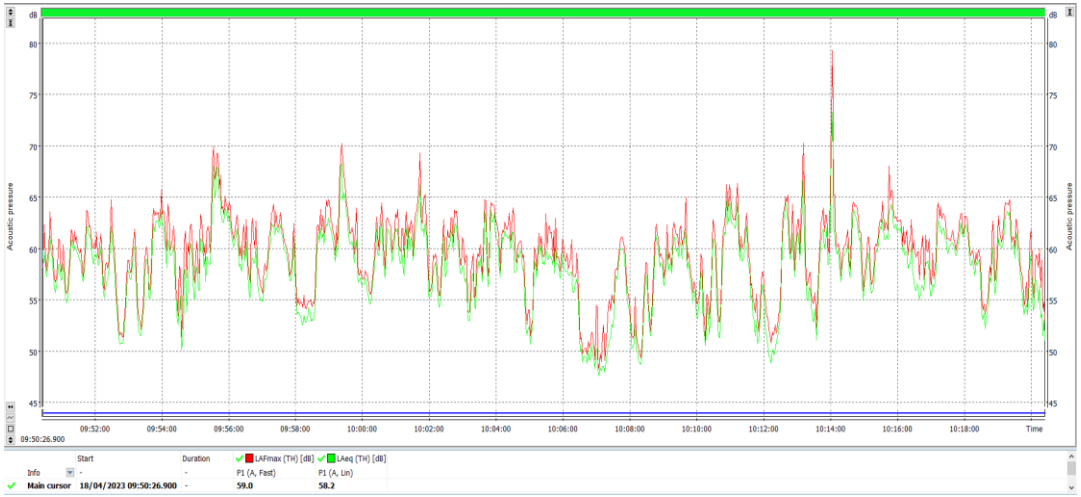
Appendices

Daytime Measurements

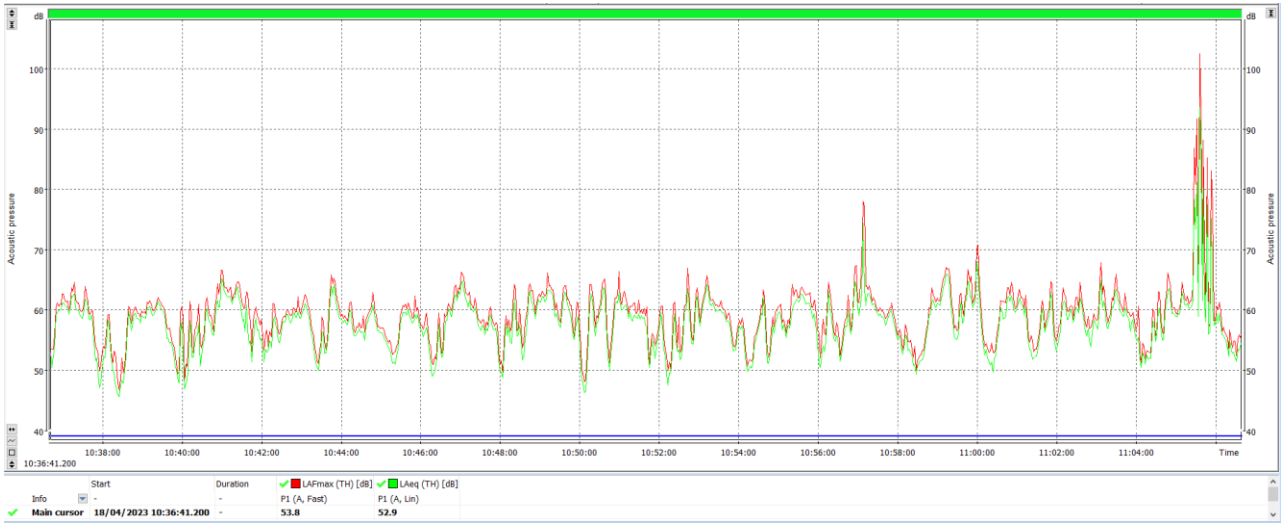
Measurement 1.



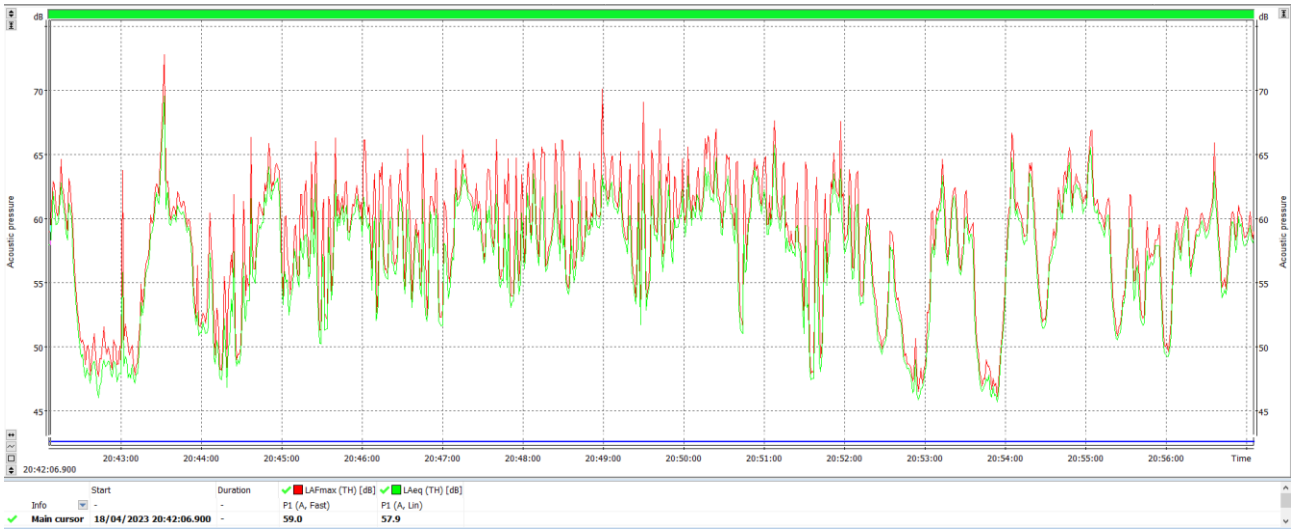
Measurement 2



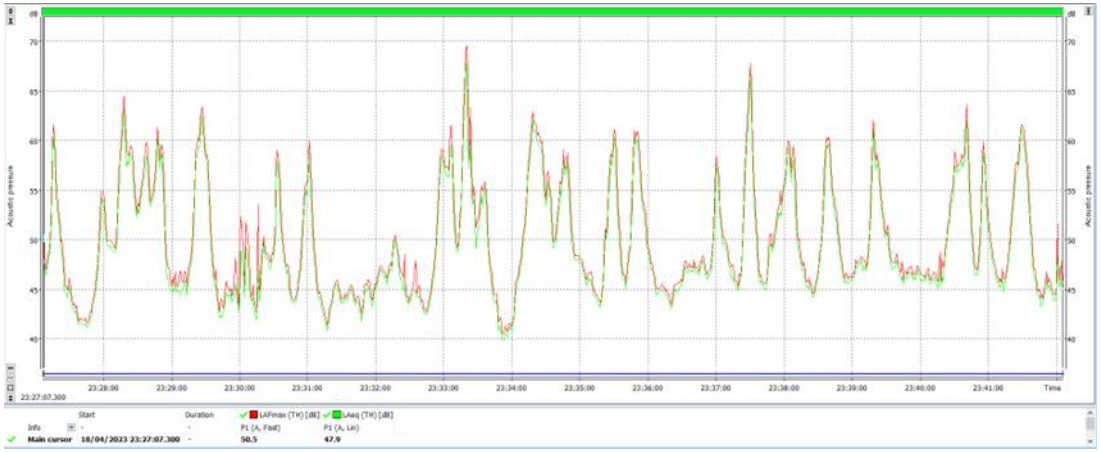
Measurement 3



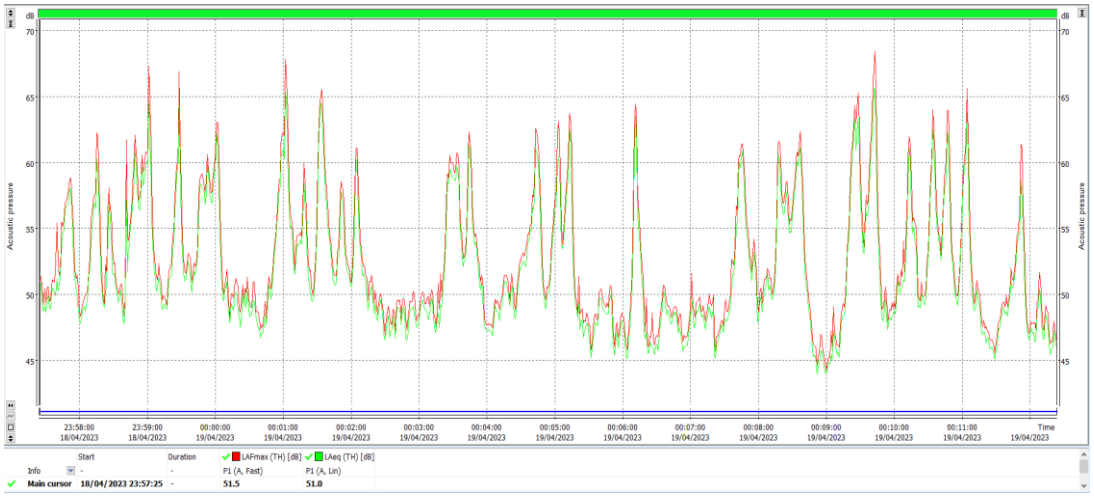
Measurement 4



Measurement 5



Measurement 6



Calibration certificates

ENVIRONMENTAL CONDITIONS

Temperature	Relative humidity	Ambient pressure
24 °C	28%	998 hPa

TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTEK	SVAN 401	65	Signal generator
2.	SVANTEK	SVAN 979	69475	Sound &Vibration Analyser
3.	RIGOL	DM3068	DM3015510077 3	Digital multimeter
4.	SVANTEK	SV30A	7449	Acoustic calibrator
5.	SVANTEK	ST02	-	Microphone equivalent electrical impedance (18pF)
6.	DYTRAN	3233A	450	Reference accelerometer

CONFORMITY & TEST DECLARATION

1. Herewith Svantek company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.
2. The acoustic calibration was performed using the Sound Calibrator and is traceable to the GUM (Central Office of Measures) reference standard - sound level calibrator type 4231 No 2292773.
3. The vibrational calibration was performed using the Back-to-Back Comparison method and is traceable to the GUM (Central Office of Measures) reference standard - accelerometer type 8305 No 1435233.
4. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
5. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Ryszard Leoniak ..... Test date: 2020-05-07

SVANTEK ISO9001 certified

FACTORY CALIBRATION DATA OF THE *SVAN 977A No. 92146*

with preamplifier SVANTEK type SV12L No. 95183 and microphone ACO PACIFIC type 7052E No. 77762

SOUND LEVEL METER

1. CALIBRATION (electrical)

LEVEL METER function; Characteristic: A; f_{nn}=1 kHz; Input signal =110.9 dB;

Range	Low (120dB)	High (137dB)
Indication [dB]	114.0	114.0
Error [dB]	-0.0	-0.0

2. CALIBRATION* (acoustical)

LEVEL METER function; Range: High; Reference frequency: 1000 Hz; Sound Pressure Level: : 114.01 dB

Characteristic	Correct value [dB]	Indication [dB]	Error [dB]
Z	114.01	113.98	-0.03
A	114.01	113.98	-0.03
C	114.01	113.98	-0.03

Calibration measured with the microphone ACO PACIFIC type 7052E No. 77762. Calibration factor: -0.57 dB

3. LINEARITY TEST* (electrical)

LEVEL METER function; Range: Low; Characteristic: A; f_{nn}= 31.5 Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0
Error [dB]	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0

LEVEL METER function; Range: Low; Characteristic: A; f_{nn}= 1000 Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	120.0
Error [dB]	0.1	0.0	0.0	-0.0	-0.0	-0.1	-0.0	-0.0	-0.0	-0.0

LEVEL METER function; Range: Low; Characteristic: A; f_{nn}= 8000 Hz

Nominal result LEQ [dB]	24.0	25.0	26.0	28.0	30.0	40.0	60.0	80.0	100.0	119.0
Error [dB]	0.1	0.1	-0.0	-0.0	-0.0	-0.1	-0.0	-0.0	-0.0	-0.0

LEVEL METER function; Range: High; Characteristic: A; f_{nn}= 31.5 Hz

Nominal result LEQ [dB]	35.0	36.0	37.0	38.0	40.0	60.0	80.0	97.0
Error [dB]	0.1	0.0	0.0	0.0	0.0	-0.0	-0.0	0.0

LEVEL METER function; Range: High; Characteristic: A; f_{nn}= 1000 Hz

Nominal result LEQ [dB]	35.0	36.0	37.0	38.0	40.0	60.0	80.0	100.0	120.0	137.0
Error [dB]	0.1	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0

LEVEL METER function; Range: High; Characteristic: A; f_{nn}= 8000 Hz

Nominal result LEQ [dB]	35.0	36.0	37.0	38.0	40.0	60.0	80.0	100.0	120.0	136.0
Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0

4. TONE BURST RESPONSE*

LEVEL METER function; Characteristic: A; f_{nn}= 4000 Hz; Burst duration: 2 s

Range: Low; Steady level nominal result = 117dB

Result	Detector	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	Indication [dB]	117.0	116.9	116.0	114.4	112.2	108.7	105.8	102.9	99.0	96.0	92.9	89.9
		Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
	Slow	Indication [dB]	115.0	113.0	109.6	106.8	103.9	100.0	97.0	94.0	90.0	-	-	-
		Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
SEL	-	Indication [dB]	117.0	114.0	110.0	107.0	104.0	100.0	97.0	94.0	90.0	87.0	83.9	80.9
		Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	-0.1	-0.1

NG4 (2016): Recommended sampling periods

Table 5 Recommended Minimum Survey Durations

Period	Minimum Survey Duration
Daytime (07:00 to 19:00hrs)	A minimum of 3 sampling periods[viii] at each noise monitoring location.
Evening (19:00 to 23:00hrs)	A minimum of 1 sampling period at each noise monitoring location.
Night-time[ix] (23:00 to 07:00hrs)	A minimum of 2 sampling periods at each noise monitoring location.

Guidance on the interpretation of Table 5 is provided below.

Daytime: If an existing licensed site has just one NSL, then a minimum of 3 no. consecutive 30 minute measurements (i.e. 3x30 = 90 minutes) will be required. For two NSL's, that will increase to 3x30x2= 180 minutes etc.
Evening: If an existing licensed site has just one NSL, then a minimum of 1 no. 30 minute measurement (i.e. 1x30 = 90 minutes) will be required. For two NSL's, that will increase to 1x30x2= 60 minutes etc.
Night-time: If an existing licensed site has just one NSL, then a minimum of 2 no. consecutive 30 minute measurements (i.e. 2x30 = 60 minutes) will be required. For two NSL's, that will increase to 2x30x2= 120 minutes etc.

Photographs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