AACI
ASSOCIATION OF ACOUSTIC CONSULTANTS OF IRELAND

DALTON Acoustics Ltd.

Dalton Acoustics Ltd. / Sound Test Ireland,
Unit A3, JFK Trading Centre, JFK Road,
JFK Industrial Estate, Dublin 12. D12 PK83

Phone: 01 4242405 Email: info@daltonacoustics.ie

Web: www.daltonacoustics.ie www.acousticconsultant.ie

Acoustic review of the impact of noise from Truck Washer Unit at Old Naas Road, Kingswood Cross, Dublin 22.

Revision: TWKCAR1 1.1 (Issue)

Author: Ted Dalton, M.Sc., MIOA, MInstSCE

Qualifications: M.Sc. (Hons) Degree – Applied Acoustics
Diploma in Acoustics & Noise Control (Hons)
Member of the Association of Acoustic Consultants of Ireland (MAACI)
Member of the Institute of Acoustics (MIOA)
Certificate in Competence Environmental Noise Measurement IOA (Hons)
B.Sc. (Hons) Degree – Surveying.

Organisation: Dalton Acoustics Ltd.

Date: Tuesday 18th. October 2022

Signature Approvals:

Ted Dalton, Dalton Acoustics Ltd.
Email: daltonacoustics@eircom.net
Web: www.daltonacoustics.ie
Tel: 01-4242405

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1. 0 INTRODUCTION

Dalton Acoustics Ltd. have been commissioned by HA Design Studio on behalf of Bradawl Ltd. to carry out a noise study of the local ambient noise environment and assess the impact of a newly located Truck Wash Unit in the direction of Brownsbarn Wood - the nearest noise sensitive dwellings.

The total proposed works are the subject of a planning application to **South Dublin County Council Reg. Ref. SD22A/0150** which consist of the following:

Development: *Relocation of 3 fuel pumps and the reconfiguration of permitted fuel islands from 1 long fuel island and 1 small fuel island to now provide for 3 small fuel islands, demolitions / removal of single storey building along southern boundary and one new truck wash to south-western boundary of site; Planning permission is sought to remove 1 existing truck wash along the western boundary, demolition / removal of existing storage building to the western boundary and alterations to internal road layout to include directional arrows.*

South Dublin County Council **Additional Information Request dated 24/05/22 Item 1** requests the following acoustic analysis.

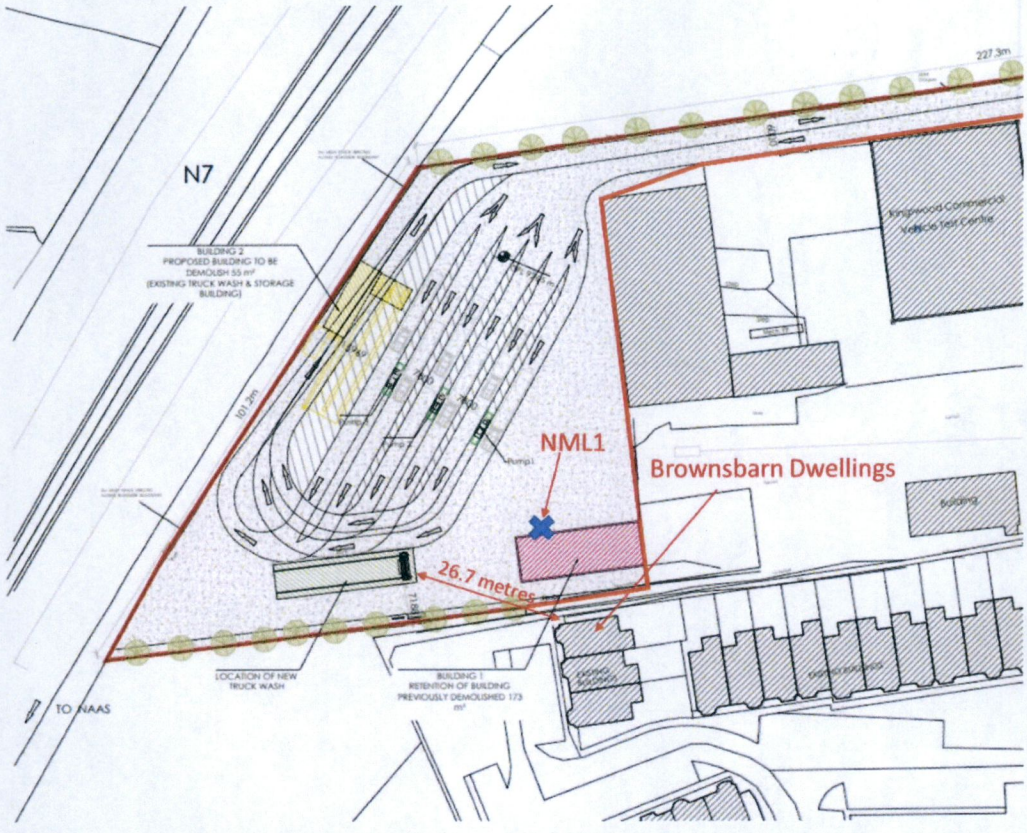
1. *The applicant is requested to provide a noise impact assessment which should address the following;*

(a) *how the development has impacted within the residential area of Browns barn wood in particular those houses and the public green closest to the development site.*

(b) *how the development can be altered to reduce any such impact identified under (a)*

(c) *if applicable how the development has been designed or redesigned as the case may be to ensure no negative impacts on the adjoining residential area*

Illustration 1 below indicates the site location with the truck wash, nearest noise sensitive dwellings in Brownsbarn and the Long-Term monitoring position NML1. NML1 had its microphone position set at 4.00 metres from ground level to measure as per a 2-storey dwelling with window access into a noise sensitive room.



Ill 1: Site Layout at Kingswood, with NML1, Truck wash & Noise Sensitive Dwellings

The nearest noise sensitive dwellings which may be affected by the relocation of the Truck Wash Unit were identified for the purpose of this report and are located at 23 / 24 Brownsbarn Wood. Kingswood, Dublin 22.

These identified dwellings are located in an Easterly direction from the Truck Washer Unit at a distance of 26.7 Metres from the nearest extremity of the washer unit to the front elevations of the dwellings.

The measurement strategy in this instance, is to measure the existing ambient noise levels at the vacinity and ascertain what additional noise will be introduced at the location when the Truck Wash commences in operation at the nearest noise sensitive dwellings as identified. Manufacturer's data has been provided for the truck washer unit as – **ISTOBAL Roll Over HW PROGRESS "MODEL 4HW-P100"** by HA Design Studio.

A long-term unmanned measurement was carried out at NML1 commencing at 09:17 hours on 25th. August 2022 and completed on 1st. September 12:17 hours. Additionally, a witnessed measurement sample for ambient noise was carried out on 16th. September from 12:24 hours to 14:33 hours. The existing ambient noise sources observed at the noise monitoring location were, predominant traffic noise from the N7 Road, aircraft movements overhead, trucks coming and going to the open space are adjacent the proposed development's location and the operating truck washer unit nearby the N7.

All measurement sampling was logged / carried out using an NTI XL2 sound level meter, which recorded full compressed audio during the measurement process for desktop analysis of measurement data gathered.

The method of measurement for the survey process is based on **BS EN ISO 1996-1: 2016** *"Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures"*.

2.0 SURVEY DETAILS.

2.1 Noise measurement

Unmanned measurement was carried out for gathering of baseline data commencing 09:17 hours on 25th. August 2022 and ceased on 1st. September at 12:17 hours. Manned measurement was carried out commencing at 12:24 hours on 16th. September 2022 and ceased at 14:33 hours, whereby the sound level meter location was selected to represent similar proximity in distance terms from the main noise sources of concern.

Picture 1 below indicates the setup of the sound level metre at a similar distance from the noise sources under consideration, traffic noise from the N7. The microphone is placed at 4.00 metres above ground to replicate for a first-floor level room.

Pic 1: Setup at NML1 adjacent No. 24 Brownsbarn Wood front elevation.

During the measurement process, the NTI XL2 Sound Level Meter (Class 1) was set up as follows; The pre-amplifier and microphone were setup at 4.0 metres high above ground level measuring the noise levels in the direction of the nearest noise sensitive dwellings. The mic and pre-amplifier were connected back to the sound level meter with a 5-metre extension lead locked inside a weatherproof pelitor.

This allowed for all weather monitoring and unmanned measurement to occur right throughout the process, as the SLM was set to record all audio and noise measurement metrics simultaneously.

25th. August 2022

Temperature 20° Centigrade,

Windspeed at Ne. 1.00 – 2.00 M/Sec,

Wind Direction Varied

Clear Skies with Dry Ground,

No Temperature inversion conditions present.

28th. August 2022

Temperature 18° Centigrade,

Windspeed at Ne. 1.00 – 2.00 M/Sec,

Wind Direction Varied

Clear Skies with Dry Ground,

No Temperature inversion conditions present

29th. August 2022

Temperature 23° Centigrade,

Windspeed at Ne. 1.00 – 2.00 M/Sec,

Wind Direction Varied

Clear Skies with Dry Ground,

No Temperature inversion conditions present

30th. August 2022

Temperature 19° Centigrade,

Windspeed at Ne. 1.00 – 2.00 M/Sec,

Wind Direction Varied

Clear Skies with Dry Ground,

No Temperature inversion conditions present

31st. August 2022

Temperature 19° Centigrade,

Windspeed at Ne. 1.00 – 2.00 M/Sec,

Wind Direction Varied

Clear Skies with Dry Ground,

No Temperature inversion conditions present

1st. September 2022

Temperature 20° Centigrade,

Windspeed at Ne. 1.00 – 2.00 M/Sec,

Wind Direction Varied

Clear Skies with Dry Ground,

No Temperature inversion conditions present

2.3 Personnel & Instrumentation

Ted Dalton (Dalton Acoustics Ltd.) commenced the acoustic measurement for the survey period intended, along with the setup of all measurement equipment at location.

Ted Dalton - Statement of Authority

- BSc Surv. (Hons) 1995 – Trinity College
- Diploma (Hons) in Acoustics & Noise Control 1999 (Institute of Acoustics).
- MSc (Hons) in Applied Acoustics 2016 (University of Derby).
- Member of Institute of Acoustics (MIOA) & Member of Irish branch committee (IOA).
- Secretary and Member of the Association of Acoustic Consultants of Ireland (MAACI).
- Diploma (Hons) in Environmental Noise Measurement & Assessment (IOA).
- 2014 to present: Principal at Dalton Acoustics Ltd.

2.3.1 Instrument (Sound Level Meters)

NTI XL2 Class 1 Integrating Sound Level Meter & Audio Analyser,
Serial No. A2A-14622-EO
Calibration Cert 220166
Calibration Certificate Dated: 22/06/22 (2-year calibration)

2.3.2 Calibrator

Calibrator Rion NC 74 with serial No. 34551704
Calibration Cert AC210144
Dated: 19/11/21
Valid for 1 year

2.3.3 Field Calibration

Using the Rion NC74 Sound Level Calibrator, which produces a sound level of 94.0dB (re. $2x10^{-5}$) at a frequency of 1Khz. The instruments were calibrated before and after each measurement with a recorded maximum deviation of < 0.1dB.

These instruments meet the requirements of **Annex B for Class 1 of IEC 60942: 2003** and **BS EN 61672-1:2013 Electroacoustics. Sound level meters. Specifications.** See attached certs in **Appendix 1.**

2.4 Topography of Measurement Location.

The site comprises of mainly level hard ground which extends out to the edge of the N7 Roadway (a very busy road). In the direction of the Brownsbarn Wood Dwellings there is presently a concrete and metal clad boundary wall which is estimated to between 3.5 and 4.0 metres high above the ground level.

3.0 MEASUREMENT PROCEDURE

The following readings were taken at the SLM microphone positions – Attended and Unattended Measurement of 15 minute 1/3rd. Octave and Broadband samples for LAeq, LAfmax, LA10 & LA90. The SLM measurements were taken using "Fast" time weighting and "A" Frequency Weighting. The 3 No. XL2 SLMs were also set to record all audio simultaneously in compressed format, so that events can be examined in PC Data Explorer for their relevance / suitability and inclusion within the measurement samples.

The explanation for the most important descriptors is provided below;

ISO 1996-1:2016 *(Standard for this measurement data gathering)* ***Acoustics*** *- Description, measurement and assessment of environmental noise* ***Part 1:*** *Basic quantities and assessment procedures*

Where;

LAeq,T This is 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 (T).

LAFmax The maximum RMS A-weighted sound pressure level occurring within a specified time period. Measured using the "Fast" time weighting.

LAF90 Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. Measured using the "Fast" time weighting.

LAF10 Refers to those A-weighted noise levels in the top 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period. Measured using the "Fast" time weighting

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 ie. LAeq, LAfMax, LA90 & LA10

Decibel. The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro pascals (20 uPa).

4.0 THE PROPOSED DEVELOPMENT

The proposed development consists of the relocation of a truck washing machine on site described in the planning application as follows;

Planning permission is sought to remove 1 existing truck wash along the western boundary, demolition / removal of existing storage building to the western boundary and alterations to internal road layout to include directional arrows.

This truck wash is now in situ although non-operational as services to it cannot be connected until grant has been received. On the basis that the truck wash is presently unable to operate measurement of the machine in-situ at this location could not be achieved. Thus, reliance is specifically placed on data provided by The Manufacturers / Suppliers of The Truck Wash and the Proprietors of the Development and their Agents HA Design Studio.

The machine in question is stated as an **ISTOBAL Roll Over HW PROGRESS "MODEL 4HW-P100",** The Manufacturer's provide the following noise data in their technical **"USER GUIDE"**

NOISE CONTROL

Table summarising the results of the NOISE LEVEL READINGS performed by AIMME (The Metal-Mechanical Technological Institute) in report T13-00486, as per standard EN ISO 3744, carried out for 4HW-P100 rollovers, with the following wash options (the most common ones).

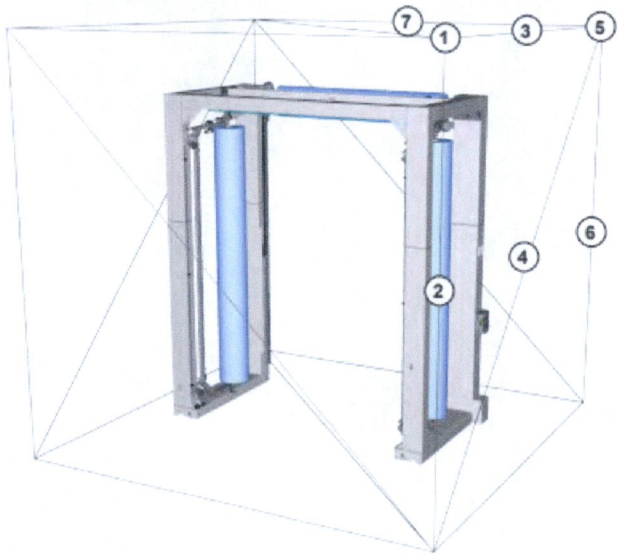
1) Brush wash.
2) Brush wash + pressurized water onto the lower half. Pump power 3x3kW and flow rate 63 l/min.
3) Wash with pressurized water onto the upper half. Pump power 5x3kW and flow rate 105 l/min. .

For the readings, the rollover was installed in an open, clear space, away from any building as defined in standard EN ISO 3744 in the section "Test environment".

Parameter	Description	①	②	③	Unit
N	Number of positions of the microphone.	7	7	7	-
d	Measurement distances.	3	3	3	m
S	Surface area of the parallelepiped of measurement.	453	453	453	
L'p	Average level of sound pressure on the surface (Level of sound pressure source 'A' weighed).	68.49	71.6	75.2	dB (A)
L"p	Average level of background noise pressure.	68.7	71.6	75.2	dB (A)
K1	Correction factor for background noise.	0.21	0	0	-
K2	Ambient correction factor.	0	0	0	-

Table 1: Manufacturers Noise Measurement Data in User Manual supplied by HA Design.

The highest average noise level measured over the 7 surrounding positions for scenario 3 of the **Istobal** produces a measured level of 75.2 dB(A) at 3 metres from the machine's parallelepiped. The 7 positions of the parallelepiped are indicated in **Illustration 2** below as part of the User Guide. However, no detailed spectrum information is provided just a broadband representation of noise emission, the test is performed without machine travel and without the presence of a vehicle inside the washer unit. The data provided is an average over the 7 positions of measurement and doe not provide any information on directivity of noise, therefore the greatest average level quoted is used in the absence of any other data provided.



INFORMATION

» In the values shown, the 'A' weighed sound pressure emitted is below 80 dB (A) and, in accordance with point 1.7.4.2-u of European Directive 2006/42/EC, the data provided is sufficient.

INFORMATION

» The values shown in the table correspond to readings, taken at a facility in the open air, away from any buildings, and without an enclosure or similar. If the rollover is installed inside any type of enclosure or in conditions different to the test conditions, the value of the parameters will be affected and the user will need to incorporate corrective readings (insulating or acoustic) to maintain the sound levels within the limits allowed by the legislation in force.

» The test is performed without machine travel. Each reading is taken during 1 minute.

» ISTOBAL declines any responsibility for alterations in sound caused by installation close to buildings, or inside enclosures and consequently denies any obligation to carry out noise level correction.

» ISTOBAL shall not elaborate a noise level report under any circumstances. Should the user require a noise level report, they should contact the competent authorities.

Ill 2: Parallelepiped positions of measurement around the Istobal Washing Machine

The above data is the full extent of noise emission data made available to Dalton Acoustics Ltd. for this acoustic evaluation. HA Designs have provided some additional information on the expected usage of the Truck Wash as follows;

Domenica Musolino (HA Design) received email response of 17/10/22

The truck wash is expected to operate at circa 20 times daily from 08:00 to 18:00 hours as per the proposed opening periods weekdays. It is also proposed to open from 08:00 hours till 13:00 hours on Saturdays. The average time of operation for a wash is 6 minutes and there is expected to be no substantial change to the amount of existing truck traffic at the location. This location is already heavily used by trucks for various purposes including parking up and trailer changeover.

5.0 EXISTING NOISE LEVELS

In order to evaluate the noise contribution that may occur at the nearest noise sensitive dwellings the data should be broken up into the operation periods of the truck wash facility. The truck wash facility is proposed to operate from 08:00 hours to 18:00 hours Monday to Friday and 08:00 to 13:00 hours on Saturdays. The existing baseline measurement data measured at NML1 for the long-term period can be expressed from 08:00 to 18:00 hours as an average daily LAeq (10-hour) to ascertain the current levels of noise exposure at the dwellings First Floor Levels. It is proposed to open for a 5-hour period on a Saturday morning from 08:00 hours until 13:00 hours.

Measurement Data:

25th. August 2022 = 66dB LAeq 10-hours from 08:00 hours to 18:00 hours
26th. August 2022 = 67dB LAeq 5-hours from 08:00 hours to 13:00 hours
29th. August 2022 = 63dB LAeq 10-hours from 08:00 hours to 18:00 hours
30th. August 2022 = 63dB LAeq 10-hours from 08:00 hours to 18:00 hours
31st. August 2022 = 64dB LAeq 10-hours from 08:00 hours to 18:00 hours
1st. Sept. 2022 = 64dB LAeq 10-hours from 08:00 hours to 18:00 hours

5.1 Noise Guidance

Below are acoustic guidelines and standards used which suggest absolute levels for mainly steady state noise / environmental noises but, may still be of some assistance.

5.1.1 WHO 1999 "Community Noise Guidelines" World Health Organisation (Residential) 1999 – Community Noise Guidelines Recommends internal levels of - Ne. 30dB LAeq in bedrooms over 8 Hours at night from 23.00 to 07.00 Hours, and ne. 35dB LAeq over 16 hours in Living Rooms for daytime. External levels outside

dwellings are equated to these internally quoted levels on the assumption that a partially ajar window provides circa 15dB(A) attenuation from outside to inside. The document also quotes **outdoor levels for daytime 16-hour at 55dB LAeq and night-time 8-hour at 45dB LAeq.**

Table 1 offers values for acoustic comfort in residential living areas and bedrooms; however, it does not offer daytime and night-time comparisons for similar rooms. ***"Guideline values for community noise in specific environments"***

Table 1 - Guideline values for community noise in specific environments

Specific Environ	Critical Health effect(s)	Leq [dBA]	Time Based Hrs.	LAfmax dB
Dwelling, Indoors	**Speech intelligibility and moderate annoyance, daytime & evening**	**35**	**16**	**------**
Inside Bedrooms	**Sleep disturbance, night-time**	**30**	**8**	**45**

5.1.2 BS 8233: 2014 – 'Guidance on Sound Insulation and Noise Reduction for Buildings' Suggests specific internal room noise criteria for bedrooms at Ne. 30dB LAeq over 8 Hours at night from 23.00 to 07.00 Hours. It also suggests daytime levels at Ne. 40dB LAeq 16-hour. These levels are similar to those suggested by WHO 1999 Guidance. These values have been obtained by assuming that the noise reduction from outside to inside with the window partly open is 15 dB"

However; **Section 7.7 Specific types of building**

7.7.2 Internal ambient noise levels for dwellings

NOTE 7 states

"Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved".

5.1.3 Dublin Agglomeration Noise Action Plan - Noise Action Plan 2018– 2023 Volume 4 – South Dublin County Council

Desirable and Undesirable Sound Levels

In line with the previous noise action plan, the following are the target values for desirable low and undesirable high sound levels in the Noise Action Plan 2018-2023:

Desirable Low Sound levels

< 50 dB(A) Lnight

< 55 dB(A) Lday

Undesirable High Sound levels

> 55 dB(A) Lnight

> 70 dB(A) Lday

The present measured baseline data indicates that noise levels at the vacinity are located between the 2 categories stated and are closer to desirable category for during the daytime period. The present measured levels also exceed those suggested by WHO 1999 and BS8233: 2014 due to traffic noise from the N7.

6.0 ADDITION OF NEW NOISE SOURCE

The commencement of the truck wash in operation brings a new noise source to the vacinity located at just less than 27 metres from the facades of the dwellings at Brownsbarn Wood. The noise source data for evaluation is limited to what the manufacturers have provided and therefore the maximum average level measured shall be used for evaluation purposes of 75.2dB A at 3 metres from the truck wash (average level over parallelepiped and not is quoted directionally).

The truck wash may be evaluated as a moving noise source and therefore the worst-case scenario for noise emissions is when it's in its closest position to Brownsbarn Wood circa 27 metres.

The following acoustic formula for a point source can be used to ascertain the change in noise level from the Manufacturers evaluation of noise at 3.00 metres providing the highest average level of 75.2dB(A). Treating the Truck Wass as a point source at 27 metres from the nearest dwellings the following equation may be used for attenuation over distance.

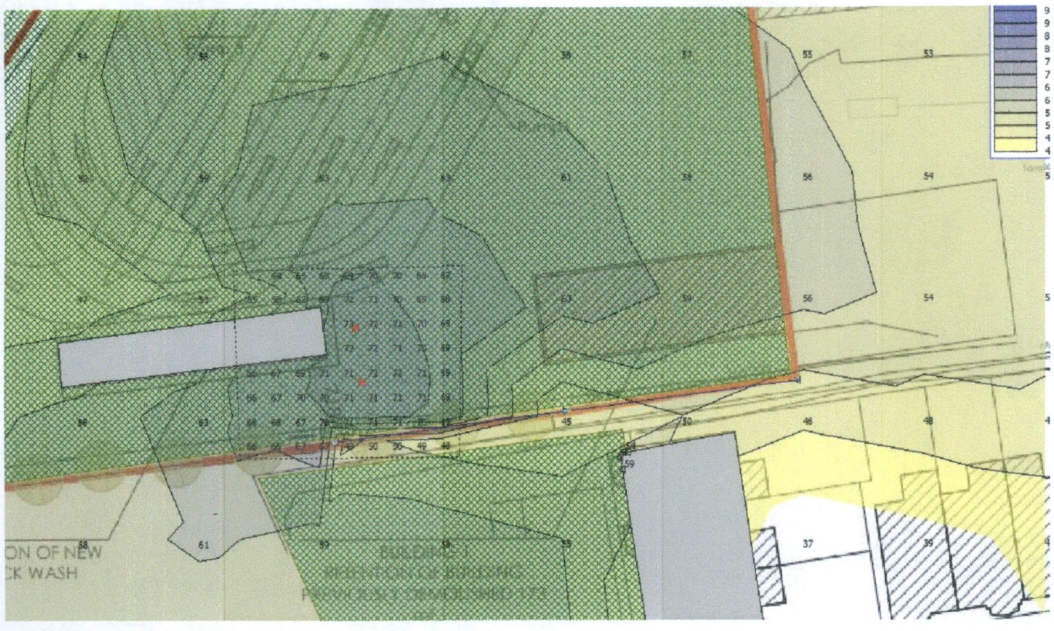
SPL2 = SPL1 – 20Log (r2/r1) SPL2 = 75.2dB – 20Log(27/3) =56dB(A)

The level of attenuation over distance causes the noise emissions specifically coming from the Truck Wash to drop below those levels which already exist at the location. Therefore, they will have a negligible effect on noise at these dwellings. There is presently a barrier located at the boundary of the site between the proposed truck wash location and the houses of concern, it consists of a concrete base and metal cladding to a height of between 3.5 and 4.00 metres high above ground level. This will create acoustic shading to the rear of same affording better levels of noise attenuation at 1.5 metres from the ground. The presence of this barrier may offer from 3dB(A) to 15dB(A) improvement on levels already stated depending on the specific noise source and its proximity to the barrier in both distance and height. If the lowest figure for barrier attenuation is taken, then 19dB(A) + 3dB(A) offers an overall level of 22dB(A) attenuation for these dwellings at ground floor level during the daytime when the truck wash is in operation(08:00 to 18:00 hours).

Note the height of the main noise emission from the truck wash is unknown therefore the lowest value of barrier attenuation has been used.

The specific noise from the proposed truck wash machine should not have a negative effect on the nearby dwellings at Brownsbarn Woods where levels will be below what exists from other present source contributors, These levels will.be roughly in line with the suggested external metrics provided by **BS8233: 2014** and **WHO 1999** "Community Noise Guidelines", as well as substantially below those prescribed by South Dublin County Council Noise Action Plan.

A Noise contour map of the location has been developed using the limited Manufacturer's noise data for the Truck Washer, indicating that due to the source noise of the washer alone, levels incident onto the facades of houses at Brownsbarn Wood would be circa 54dB(A) at ground floor level and 60dB(A) at second floor level. However, this takes no account of the additional contributions from other existing noise sources at the vacinity. Levels measured at the vacinity of Brownsbarn Woods in the absence of the specific noise under investigation but with all other ambient noises present are suggested to be from 63dB(A) to 67dB(A) over the proposed period of operation from 08:00 hours to 18:00 hours on weekdays regardless.



Ill 3: Noise Contour Map providing similar results to distance attenuation calc

7.0 CONCLUSION

The measurement data obtained on site is the level of noise currently experienced at first-floor level of the Brownsbarn Woods houses (23 & 24) which are nearest in location to the proposed truck wash. Noise levels at this location are predominantly traffic at up to 66dBA during the period from 08:00 hours and 18:00 hours. This is mainly noise from the N7 and aircraft movements from the nearby Casement Aerodrome. It was not possible to measure the new truck washer in-situ as it is not commissioned yet. Therefore, whatever Manufacturer's data for the system could be obtained and assumed usage times etc has been offered by HA Design in order to assist the acoustic evaluation of the Truck Washer Unit.

It is stated by HA Design that the washer will operate circa 20 times daily for an approximate period of 6 minutes per cycle and that due to the nature of the location, this will have a minimal impact on the number of heavy vehicles coming and going to use the facilities of the washer.

The assessment of noise emission from the proposed truck wash at circa 27 metres away from the nearest noise sensitive dwelling made using a point source evaluation situated at the nearest end of the wash run to the dwellings suggests there will be a level drop of an additional 19dB(A), with some additional attenuation provided by the existing site boundary wall at lower levels ie. Ground Level.

However, as the noise emission from the truck wash is not measured in situ it may be pertinent to assume at a certain stage of emission the noise acts more like a line source for attenuation purposes.

Line Source Attenuation **LP2 = LP1 – 10 Log(r2/r1) = 9.5dB(A)**

It is therefore somewhat pertinent to say that the level drop due to attenuation over distance may at a stage alter from a line source to a point source and therefore the actual resultant at the receiving dwellings will be between -10dB(A) and -19dB(A) excluding for the partial height barrier effect of the boundary wall at the site. When allowing for the minimal effect of the barrier at ground level (daytime) an additional 3dB(A) reduction in levels will be achieved. Ground level between 08:00 hours and 16:00 hours may be expected to achieve an attenuation from source to receiving houses of circa 13dB(A) to 22dB(A).

The minimal drop of noise levels coming from the truck wash operating alone as a standalone source, excluding all / any other associated noises at the vacinity will result in a worst-case level of 62dB(A) and may be as low as 53dB(A). Noise modelling of the scenario with minimal technical information available for input suggests levels at the nearest noise sensitive dwellings will range between 54dB(A) and 60dB(A) over the height of the dwellings.

The current daily values of noise at NML1 between 08:00 hours and 18:00 hours on weekdays are ranging from 63dB LAeq 8-hour to 67dB LAeq 8-hour, these levels are above the levels of noise that will be introduced by the truck wash and there will be little overall change should the truck wash only operate 20 times per day as informed.

We trust you find the above satisfactory and look forward to being of service in the future,

Yours sincerely,

Ted Dalton B.Sc., MIOA. MInstSCE
(Senior Acoustic Consultant)

APPENDIX:

Instrumentation Calibration Certs.

Limitations.

SONITUS SYSTEMS

Statement of Calibration

Issued to:	Calibration Reference
Dalton Acoustics Ltd Unit A3 JFK Trading Centre JFK Road JFK Industrial Estate Dublin 12	SLM220166

Test Date: 22/06/2022
Procedure: TP-SLM-1

Equipment

Item Calibrated:	Sound Level Meter	**Model**	XL2-TA
Make:	Nti-Audio	**Serial Number:**	14622

Calibration Procedure

The sound level meter was allowed to stabilize for a suitable period, as described in the manufacturer's instruction manual, in laboratory conditions. The sound level meter was calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), Periodic tests, specification of sound level meters. Tolerances for verification procedures are specified in IEC 61672-1 (2003).

Calibration Standards

Description	Serial Number
National Instruments PXI-4461	19C91D2
Stanford Research DS360	123803

The standards used in this calibration are traceable to NIST and/or other National Measurement Institutes (NMI's) that are signatories of the International Committee of Weights and Measures (CIPM) mutual recognition agreement (MRA).

Signed on behalf of Sonitus Systems:

SONITUS SYSTEMS

Certificate of Calibration

Issued to:	Certificate Number
Dalton Acoustics Ltd Unit A3 JFK Trading Centre JFK Road JFK Industrial Estate Dublin 12	AC210144

Test Date: 19/11/2021

Equipment Information

Item Calibrated:	Acoustic Calibrator	**Model:**	NC-74
Make:	Rion	**Serial Number:**	34551704

Calibration Procedure

The above calibrator was verified in line with the requirements of BS EN 60942:2003. The calibrator was allowed to stablize for a suitable period, as described in the manufacturer's instruction manual, in laboratory conditions. The sound pressure level in the cavity (half-inch). The operating frequency and signal distortion were also measured.

Calibration Standards

Description	Serial Number
National Instruments PXI-4461	19C91D2
GRAS 42AA Pistonphone	227947
GRAS 46A0 Pressure Field Microphone	228216

The standards used in this calibration are traceable to NIST and/or other National Measurement Institutes (NMI's) that are signatories of the International Committee of Weights and Measures (CIPM) mutual recognition agreement (MRA).

Signed on behalf of Sonitus Systems:

Unit 2, Goldenbridge Industrial Estate, Tyrconnell Rd, Inchicore, Dublin, D08 YY38
www.sonitussystems.com Email: info@sonitussystems.com

Report Limitations

Dalton Acoustics Ltd, Unit A3, JFK Trading Centre, JFK Industrial Estate, D12, have prepared this report for the sole use of HA Design Ltd and their Client Bradawl Ltd. and their Agents in accordance with the agreement under which our services were performed. No other warranty, expressed or implied, is made as to the professional advice included in this desktop study or any other services provided by Dalton Acoustics Ltd to any other third parties.

The conclusions and recommendations contained in this study are based upon assumption and limited information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by Dalton Acoustics Ltd. has not been independently verified by Dalton Acoustics Ltd, unless otherwise stated in the report. The technical information provided for noise emissions of the proposed truck wash should be verified during commissioning and additional mitigation measures taken if necessary to avoid any negative impact on the nearest residential dwellings. The calculations in this report are limited to the technical information supplied to Dalton Acoustics Ltd. The noise emission data for the truck wash is an average level of noise emission and does not provide for a maximum noise level or directivity of emissions. It also does not allow for noise reflection from any vehicle using the wash.

The methodology adopted and the sources of information used by Dalton Acoustics Ltd. in providing its services are outlined in this report. The work described in this report was undertaken between 16th. Sept 2022 (measurement) and 20/10/22 (report issue) and is based on the conditions encountered and the information available during the said period. The statement by HA Design on normal conditions is taken at face value by Dalton Acoustics Ltd.

The scope of this study / report and the services provided are accordingly factually limited by the technical information made available. Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

Dalton Acoustics Ltd. disclaim any undertaking or obligation to advise any person of any change in any matter affecting the report, which may come or be brought to Dalton Acoustics Ltd.'s attention after the date of the report issue.

Certain statements made in the report that are not historical facts may constitute estimates, projections or other forward-looking statements and even though they are based on reasonable assumptions as of the date of the report, such forward-looking statements by their nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. Dalton Acoustics Ltd specifically does not guarantee or warrant any estimate or projections contained in this report. Calculations are based on the limited technical data provided to Dalton Acoustics Ltd. For this exercise.

Where field investigations are carried out, these have been restricted to a level of detail required to meet the stated objectives of the services within a reasonable time and cost frame. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant delay in issuing this report or the commencement of works.

Before commencement on-site it is recommended that all levels of measurement stated in this study / report are validated and cross checked for any material changes in noise at the proposed site location. Such levels obtained after this report issue should be used for final evaluation of the noisescape and designed for in detail. The final installation and measurement of the proposed development should be used for the actual installation of acoustic mitigation measures if required, as those levels used in this report are limited factually to the technical information that has been provided to date.