Cardiff Scrap Metal Sorting Facility – Noise Assessment

To:	Michael Sylvester	Company:	EAME Ltd
Address:	7th Floor, West One, Forth Banks, Newcastle Upon Tyne, NE1 3PA, UK	Report Ref.:	13331-008-R1
Date:	6 November, 2019		

Dear Michael,

It is TNEI's understanding that Natural Resources Wales (NRW) have provided comment on a noise assessment report (Reference: 7265/DO) produced by Acoustic Consultants Ltd in August 2018 for the '*Proposed Scrap Metal Sorting Machine and Building*' located to the south east of the Celsa Manufacturing site off Rover Way in Cardiff (hereafter referred to as the August 2018 assessment).

With regards to the August 2018 noise assessment, NRW have requested further information supporting the conclusions made. Specifically;

"*Please provide an update Noise assessment/provide additional information to support the conclusions made in the noise assessment. Please consider (but not limited too) the following points: Provide evidence/calculations to justify the proposed noise limits from the activity. When will noise from the plant and activities associated be assessed in accordance with BS4142:2014?*".

This letter provides details of an updated noise assessment undertaken by TNEI Services Ltd (TNEI) and reports newly measured baseline data and operational noise level predictions.

The assessment relies solely on the noise levels as measured by TNEI and does not consider any of the measured levels presented in the August 2018 noise assessment. As such, rather than justifying the noise limits presented within the August 2018 assessment we have undertaken an assessment using what we consider to be more appropriate noise level limits.

Presented below are details of the assessment methodology results of the noise assessment for the proposed Scrap Metal Sorting facility. In summary, the predicted operational noise levels from the proposed process will not exceed the existing background sound levels at any of the nearest noise sensitive receptors (NSRs), with the exception of one receptor. Predicted operational noise levels at this receptor, however, have been found to be below the fixed guideline levels set out in BS8223:2014. In addition, the Rating Level is calculated to be just 1 dB above the background sound level and we have concluded (in accordance with BS4142:2014) that this is not an indication of adverse impact.

Assessment Criteria

TNEI have previously undertaken consultation with an Environmental Health Officer at Cardiff Council with regards to the planning applications of newly proposed developments within the Celsa site and we hope that the agreed assessment methods will also be agreeable to NRW. To summarise, the agreed assessment method was as follows:

- The predicted operational noise levels are to be compared to the existing ambient sound levels. Where the noise immission levels are at least 10 dB below the existing ambient sound levels then no further assessment is necessary as no noise level increase will occur. If, however, noise levels are above the ambient sound levels or within 10 dB then;
- A quantitative assessment will be made against the fixed guideline levels defined in BS 8233:2014; and,
- A qualitative assessment will be undertaken in accordance with BS 4142:2014, taking into consideration the context of the developments/processes and the outcome of the quantitative assessment.

Baseline Sound Level Monitoring

Attended baseline sound level monitoring was undertaken at three locations agreed with the EHO, on the 12th and 13th May 2019, during daytime periods only. No night-time monitoring was undertaken as the proposed operational hours for the new process will occur during the daytime only.

The local noise environment within the Celsa site is dominated by noise from the existing industrial activities and processes, in addition to road traffic on Rover Way.

At all of the NSRs the local noise environment is influenced considerably by local road traffic, particularly at the traveller site, where ambient sound levels are dominated by road traffic on Rover Way.

Table 1 details the NMLs, which are also displayed on Figure 1 (appended).

Table 1: TNEI Baseline Noise Monitoring Locations

NML		Coordinates		Comments
ID	Descriptor	Easting	Northing	
NML01	Willow Avenue	321084	176583	Representative of closest NSRs to the North West on Willows Avenue.
NML02	Rover Way	321788	176715	Representative of NSRs within the traveller site on Rover Way.
NML03	Runway Road	321283	177044	Representative of closest NSRs to North in the area of Pengam Green and Tremorfa Park.

Throughout all of the monitoring periods wind speeds were low and no precipitation events were noted.

The noise monitoring equipment consisted of a Cirrus Optimus Green integrating sound level meter (SLM) fitted with a standard wind shield. All noise monitoring equipment (calibrator, SLM and microphone) used for the study are categorised as Class 1, as specified in IEC 61672-1 'Electroacoustics. Sound level meters. Specifications' (IEC, 2002). The equipment was calibrated on site at the beginning and end of each measurement period with no significant deviations noted. Equipment and laboratory calibration details are available upon request.

All measurements were made with the SLM and microphone mounted on a tripod approximately 1.5 meters above the ground and away from nearby reflective surfaces (i.e. building façades, fences etc). At all locations, measurements were logged in 5-minute increments.

Measurements were made from 07:00 at all NMLs and conducted during both morning and afternoon periods for a minimum of 75 mins total survey time, per location. Additional monitoring was also undertaken during weekend daytime and weekend & weekday early morning periods (06:00 – 07:00), however, this data is not reported here as the Scrap Metal Sorting facility will not be operational during these time periods.

Table 2 details the arithmetic average Ambient Sound Level at each NML.

Table 2: Average Ambient Sound Levels, dB $L_{Aeq(5mins)}$

Measurement Location		Measurement period
ID	**Descriptor**	**Weekday: Daytime**
NML01	Willow Avenue	64
NML02	Rover Way	75
NML03	Runway Road	48

Table 3 details the typical background sound levels $L_{A90\,(15mins)}$, which have been determined after considering the distribution of data for each measurement period. Detailed measurement data including statistical analysis charts are appended.

Table 3: Representative Background Sound level, dB L_{A90}, Derived Through Statistical Analysis

Measurement Location		Measurement Period
ID	**Descriptor**	**Weekday: Daytime**
NML01	Willow Avenue	50
NML02	Rover Way	66
NML03	Runway Road	39

Calculation Methods

In order to predict the noise immission levels attributable to the proposed process, a noise propagation model was constructed using propriety noise modelling software (CadnaA). Within the software, complex models can be produced in order to simulate the propagation of noise according to a range of international calculation standards.

For this assessment, noise propagation was calculated in accordance with ISO9613 '*Acoustics – Attenuation of sound during propagation outdoors'* using the following input parameters:

- Temperature is assumed to be 10°C and relative humidity as 70%;
- A ground attenuation factor of 0 (hard ground) is used; and
- Receiver heights set to 4 m for residential buildings (to represent a first-floor bedroom) and 1.5 m for the single-story dwellings within the traveller site.

The noise propagation model is intended to give a good approximation of the specific sound level and the contribution of each individual sound source; however, it is expected that measured levels are unlikely to be matched exactly with modelled values and the following limitations in the model should be considered:

- In accordance with ISO 9613, all assessment locations are modelled as downwind of all sound sources and propagation calculations are based on a moderate ground-based temperature inversion, such as commonly occurs at night. These conditions are favourable to the propagation of sound;
- Table 5 of ISO 9613 estimates overall accuracy for broadband noise predictions of ± 3dB, with average source to receiver heights <5m, at distances of up to 1000m;
- The predicted barrier attenuation provided by local topography, embankments, walls, buildings and other structures in the intervening ground between source and receiver can only be approximated and not all barrier attenuation may have been accounted for; and
- The model assumes all sound sources are operating continuously and simultaneously, estimating a worst-case source noise level.

Operational Noise Impacts

The noise model considers all of the individual sound sources associated with the proposed Scrap Metal Sorting facility. These include both fixed internal plant and externally located mobile plant. With regards to the mobile plant, a single vehicle has been modelled as a point source operating in proximity to the process area, in the anticipated work area that is closest to the NSRs. In reality, the mobile plant will move around the process site and noise levels will fluctuate, however, given the separation distances between source and receiver and the fact that the point source is assumed to be operating continually, it is thought that this provides a reasonable and conservative approach to the modelling (as opposed to simulating a moving point source along an assumed movement path).

In this particular case, a wheeled excavator has been modelled as operating outside the building. Source level data for a Wheeled Loader has been taken directly from Annex C of BS 5228:2009+A1:2014 '*Code of practice for noise and vibration control on construction and open sites. Noise*' (BS 5228 reference C6.32). The BS 5228 standard contains sound power level data for a variety of construction plant, which was obtained from field measurements of actual plant operating on construction and open sites throughout the United Kingdom and is therefore appropriate to use as source level data for the noise propagation calculations.

No noise data sheets or similar are available for the equipment to be operated within the Scrap Metal Sorting facility, however, the preferred technology provider for the main plant has stated that noise levels in the area around the scrap metal sorter are below 85 dBA when running empty but can increase to between 95 dBA and 100 dBA, depending on the material that is being processed. As such, the model has assumed an internal SPL within the entire building of 100 dBA in order to provide a conservative assessment. In reality, noise levels will fluctuate throughout the day and are unlikely to be the same throughout the building.

To model the breakout noise from the building, each façade and roof element is assigned a SWL, which is automatically calculated in CadnaA after considering the sound reduction index (SRI) of the building fabric. Subsequently, each façade is modelled as a vertical area source and the roof modelled as a horizontal area source, with typical SRI values for trapezoidal steel sheets incorporated into the calculations.

Calculated Noise Immission Levels

The broadband noise immission levels have been calculated assuming all plant associated with the Scrap Metal Sorting facility is operating continuously and concurrently and at maximum capacity.

The predictions have been made for a total of four Noise Assessment Locations (NALs) and these are detailed in Table 4.

Table 4: Noise Immission Levels of Scrap Metal Sorting facility, dB $LAeq_{(t)}$

Noise Assessment Location		Calculated Noise Immission Level, dB $L_{Aeq(t)}$
NAL ID	NAL Descriptor	
NAL01	Willows Avenue	35
NAL02	Traveller Site	40
NAL03	Greenbay Road	35
NAL04	Hind Close	40

Noise Impact Assessment

Table 5 compares the calculated noise immission level with the existing ambient sound levels at the nearest noise sensitive receptors. The assessment of NAL04 has been undertaken using the baseline sound levels measured at NML03, the closest and most representative monitoring location to the NAL.

Table 5: Comparison of Predicted Levels Versus Existing Ambient Sound Levels

Measurement Location		Existing Ambient Sound Levels, $L_{Aeq(t)}$	Calculated Noise Immission Level, dB $L_{Aeq(t)}$	Margin Above/Below (+/-) Existing Levels, dB
ID	Descriptor			
NAL01	Willows Avenue	64	35	-29
NAL02	Traveller Site	75	40	-35
NAL03	Greenbay Road	48	35	-13
NAL04	Hind Close	48	40	-8

It can be seen that at all receptors, with the exception of NAL04, the calculated noise immission levels are at least 10 dB below the existing ambient sound levels and therefore no further assessment is necessary at these locations, as no noise level increase will occur. The calculated immission level at NAL04, however, is 8 dB below the existing ambient sound levels and therefore requires further assessment.

Quantitative Assessment

BS 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*' presents guideline fixed noise levels for daytime and night-time periods for a number of different building types; for residential developments these are based on guidelines issued by the WHO. Specifically, the Standard states; *"it is desirable that the internal ambient noise level does not exceed the guideline values in Table 4."*. Table 4 of the standard is reproduced here as Table 6 below;

Table 6: Indoor Ambient Noise Levels for Dwellings (*BS8233:2014 Table 4*)

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16\ hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16\ hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16\ hour}$	30 dB $L_{Aeq,8\ hour}$

BS 8223 suggests that an allowance of 15 dBA for the attenuation of a partially open window is reasonable in order to convert between internal and external sound levels and limits. Therefore, an assessment of external noise levels can assume an external noise level limit of 15 dB above those values detailed within Table 6, i.e. to achieve an internal night-time level of 30 dB $L_{Aeq(8hour)}$ with windows open, the external sound level must not exceed 45dB $L_{Aeq(8hour)}$.

The assessment against fixed noise levels is made against the most stringent of the guideline levels presented in BS 8233:2014 (detailed in Table 6). To determine a set of limits, 15 dB has been added to the BS 8233 internal levels to allow for the attenuation that is provided by a partially open window, as detailed in Table 7 below;

Table 7: Derived Fixed Level Limits, dB LAeq(t)

Assessment parameter	BS8233 guideline level	Allowance for open window attenuation	Equivalent external level (Daytime Noise Limit)
Daytime 07:00 – 23:00	35	15	50 dB $L_{Aeq(16\ hours)}$

Table 8 below compares the calculated immission level with the derived noise level limit;

Table 8: Quantitative Assessment

Noise Assessment Location		Calculated Noise Immission Level, dB $L_{Aeq(t)}$	Daytime Noise Limit	Margin Above/Below (+/-) Daytime Limit, dB
NAL ID	NAL Descriptor			
NAL04	Hind Close	40	50	-10

As demonstrated in Table 8, the predicted noise immissions from the Scrap Metal Sorting facility will be 10 dB below the BS8223 guideline levels.

Qualitative Assessment

BS 4142:2014 *'Methods for Rating and Assessing Industrial and Commercial Sound'* is commonly used to assess the potential impacts of new sound sources on nearby residential receptors. In June 2019 the standard was amended and reissued as BS 4142:2014 + A1:2019. No material changes have been made to the assessment process detailed within the Standard, rather the amendments are simply to provide clarifications to the existing text. Hereafter, the Standard is referred to simply as BS4142 and denotes the 2019 publication.

BS4142 uses the following definitions;

Ambient Sound: Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, both near and far. Described using the metric, $L_{Aeq\ (t)}$.

Specific Sound Level: Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, *Tr*. Described using the metric $L_{Aeq\ (t)}$. Also referred to in this report as the *Immission Level*.

Residual Sound Level: Equivalent continuous A-weighted sound pressure level of the residual sound without the specific sound source(s) present at the assessment location over a given time interval, *T*. Described using the metric $L_{Aeq\ (t)}$.

Background Sound Level: A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, *T*, measured using time weighting *F* and quoted to the nearest whole number of decibels. Described using the metric $L_{A90\ (t)}$.

The BS 4142 form of assessment is based on the predicted or measured levels of an assessed sound source compared to the measured background sound levels without the specific sound source present and uses, *"outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident".*

Specifically, the assessment is made by subtracting the measured background sound level from a calculated or measured 'Rating Level'. The Rating Level allows for character corrections to be added to the Specific Sound Level (equivalent to the Calculated Noise Immission Level) in order to account for particular characteristics of the sound which may be perceived as more annoying. In particular, the Rating Level considers the tonality, impulsivity and intermittency of the sound, as well any other sound characteristics that are neither tonal, impulsive, or intermittent, but are otherwise readily distinctive against the residual acoustic environment.

With regards to tonality, BS4142:2014 states:

"For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible."

With regards to impulsivity, BS4142:2014 states:

"A correction of up to +9dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively this can be converted to a penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it is clearly perceptible, and 9dB where it is highly perceptible."

With regards to intermittency, BS4142:2014 states:

"If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."

With regards to other sound characteristics, BS4142:2014(+A1-2019) states:

"Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."

In this particular case, there have been no acoustic character corrections applied; based on our experience of similar installations and considering the separation distance between source and receiver (approximately 580 m), we do not expect any tonal noise characteristics to be perceptible at the receptor. Similarly, no impulsive characteristics are anticipated. With regards to intermittency and 'other sound characteristics', as the noise immissions from the proposed process are below the existing ambient sound level, operational noise will not be 'readily distinctive against the residual acoustic environment'. Therefore, the BS4142 Rating Level is equal to the Specific Sound Level.

BS4142, Section 11, requires that the assessment considers the context in which the sound occurs, and as such there is no definitive pass/fail element to the standard. However, as a starting point the standard states:

"Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level, and consider the following…

a) Typically, the greater this difference, the greater the magnitude of the impact.

b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

Table 9 details the results of the BS4142 Assessment.

Table 9: BS4142 Assessment - Margin Above / Below (+/-) Background Sound Level, dB

NAL ID	Background Noise Level ($LA90_{(15mins)}$)	Specific Sound Level, dB $L_{Aeq(t)}$	Acoustic character correction (dB)	Rating Level ($LAeq_{(t)}$)	Margin above/below (+/-) background sound level
NAL04	39	40	0	40	+1

The Rating Level is 1 dB above the background sound level but is below the indicator "*of an adverse impact, depending on the context".*

The context in which the assessment is made is as follows;

- The assessment considers a new process being introduced into an area where the soundscape is already dominated by industrial and traffic noise.
- The process will only operate during weekday daytimes, when ambient sound levels will be at their highest.
- The predict levels will remain comfortably below the existing ambient sound levels

Consideration of the context does not change the assessment outcome and operational noise from the proposed process is expected to have a low impact.

Summary

At all of the NALs, with the exception of NAL04, the predicted operational noise levels from the consented Scrap Metal Sorting facility are more than 10 dB below the existing ambient sound levels, therefore, no further assessment required at these locations.

The calculated noise immission level at NAL04 was within 10 dB of the existing ambient sound levels, therefore additional assessment was required. After both a quantitative and qualitative assessment, it was found that the operational noise from the proposed process is unlikely to cause any adverse impact.

I trust that the details of the above address the comments made in response to the original noise assessment and that TNEI's noise assessment has explained the impact of the proposed process on the existing sound environment in a clear and concise way. If you have any questions or queries with regards to the report contents or conclusions, please don't hesitate to contact me by email or phone.

Yours sincerely,

Ewan Watson

Technical Consultant

TNEI Services Ltd

Document Control

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R0	DRAFT	EW	JB	JS	05/11/2019
R1	FINAL ISSUE	EW	JS	JS	06/11/2019

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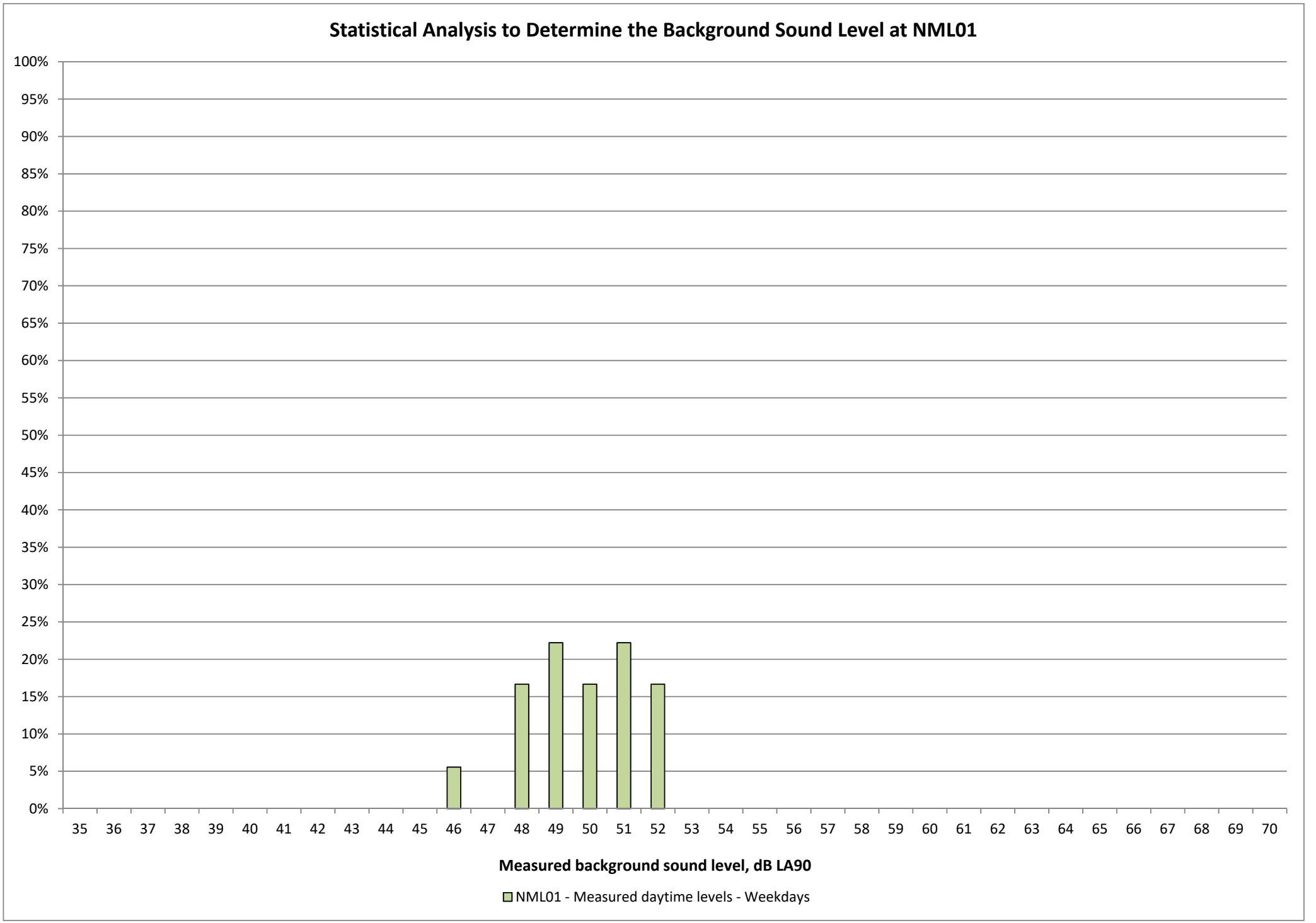
Company Registration Number: 03891836		VAT Registration Number: 239 0146 20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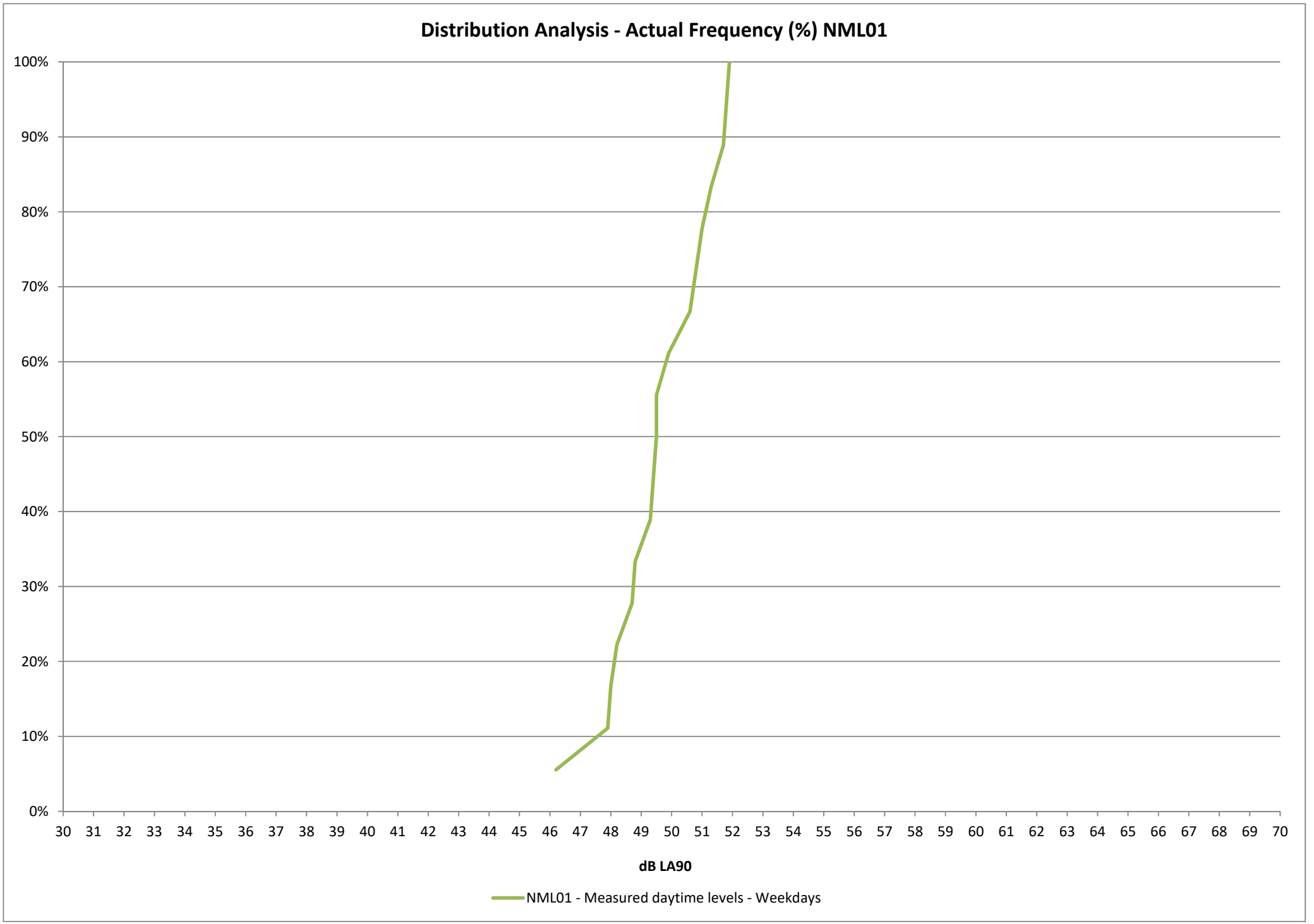
Measured background sound level, dB LA90
NML01 - Measured daytime levels - Weekdays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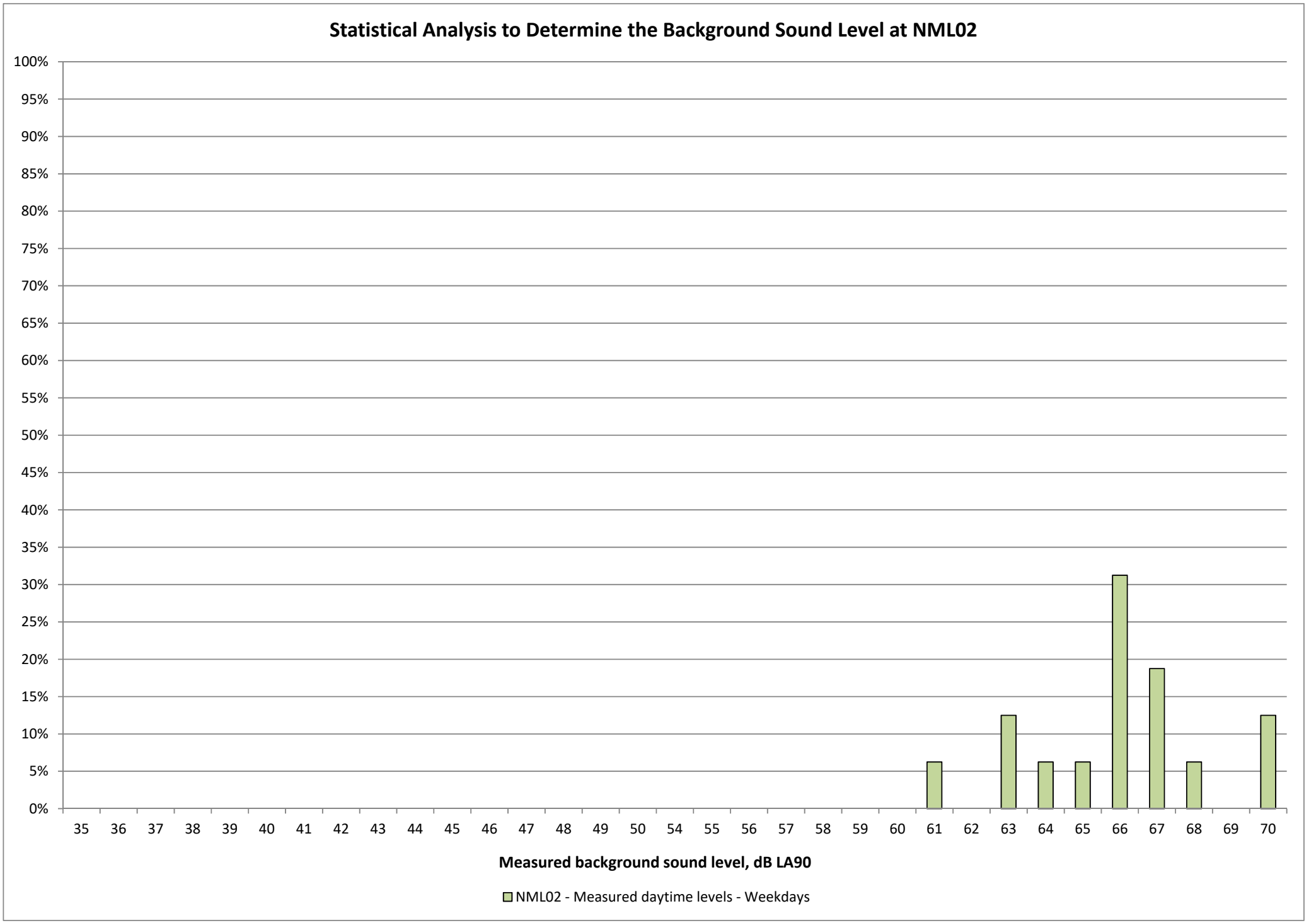
dB LA90
NML01 - Measured daytime levels - Weekdays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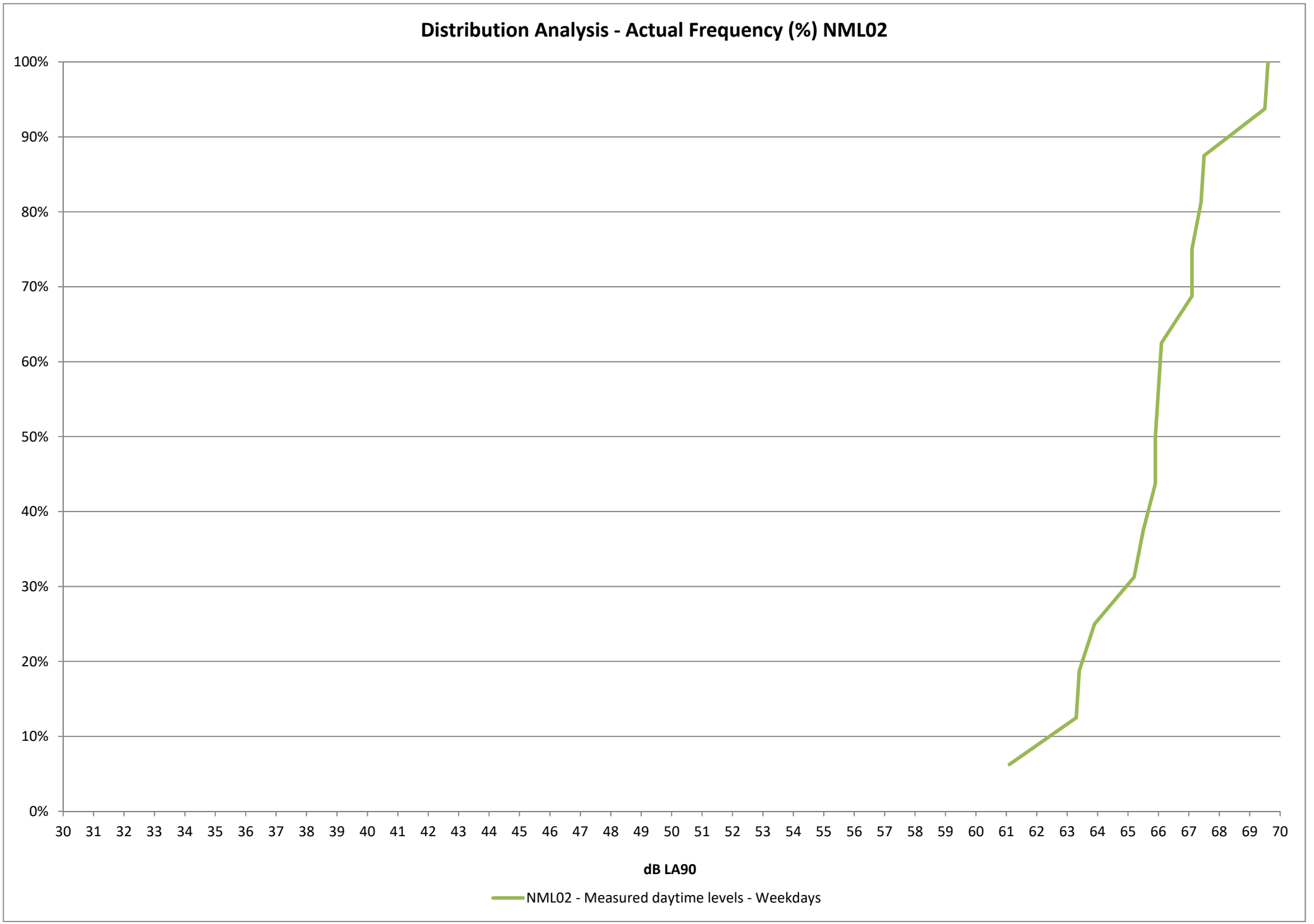
Measured background sound level, dB LA90
NML02 - Measured daytime levels - Weekdays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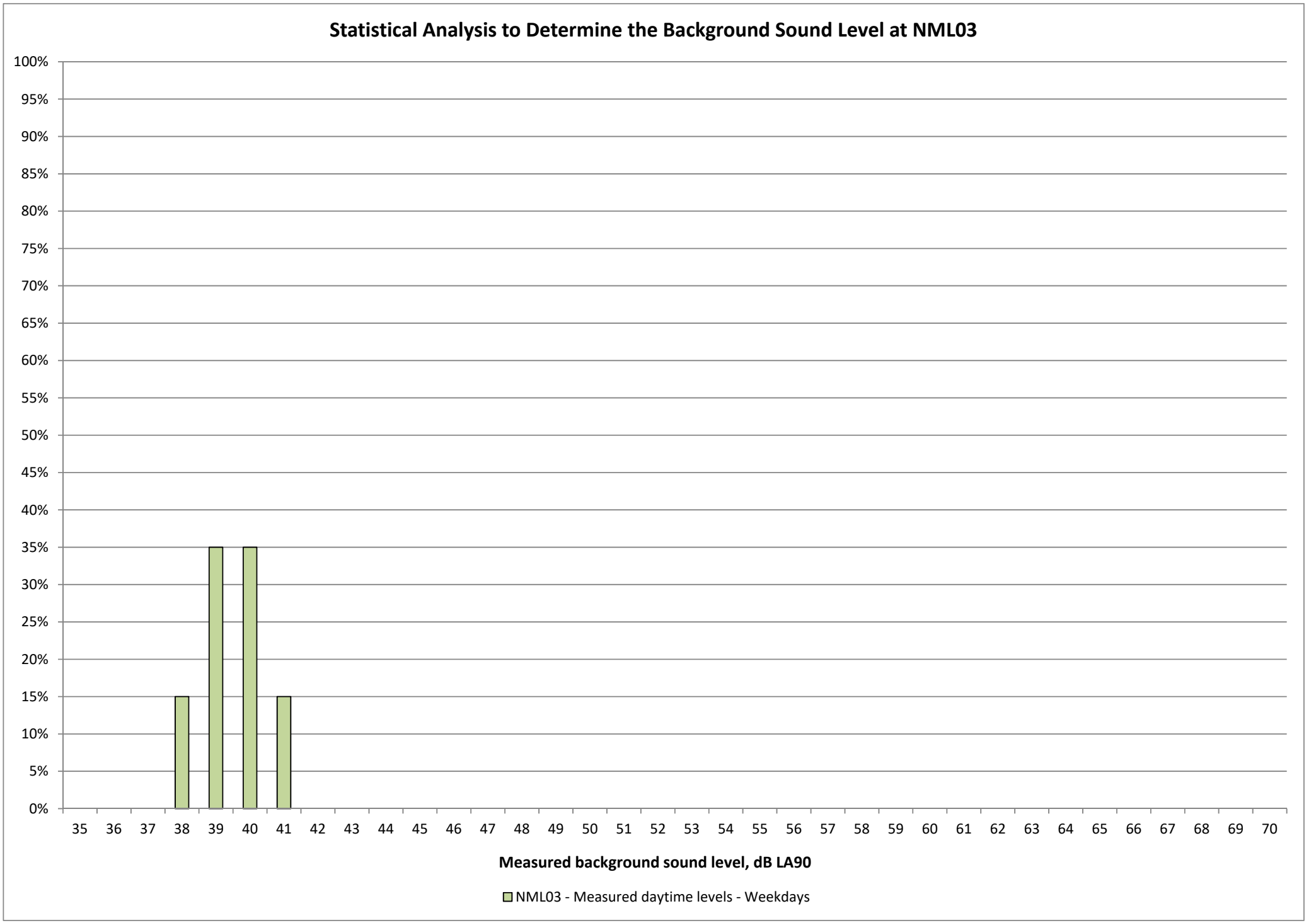
dB LA90
NML02 - Measured daytime levels - Weekdays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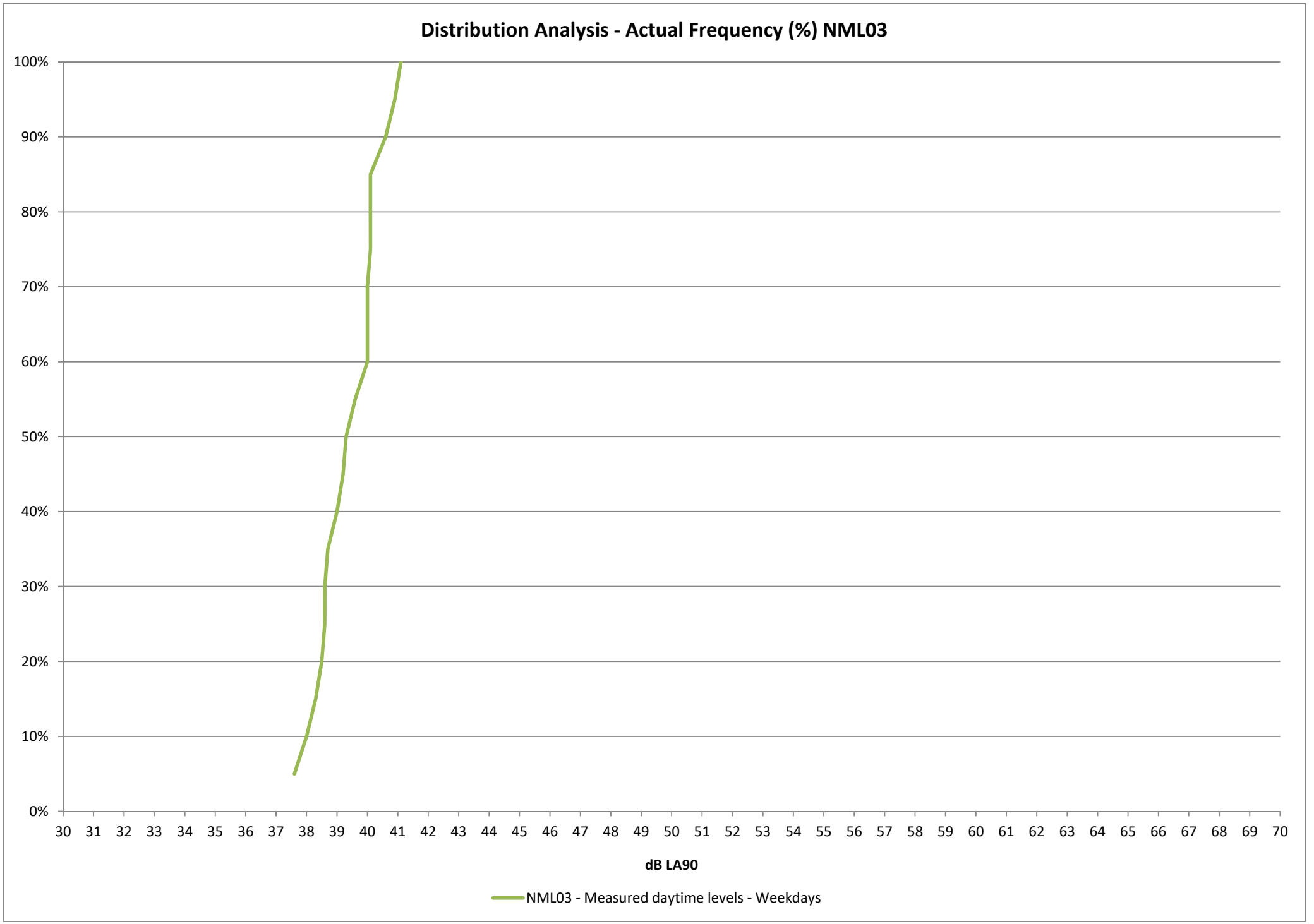
Measured background sound level, dB LA90
NML03 - Measured daytime levels - Weekdays


Distribution Analysis - Actual Frequency (%) NML03
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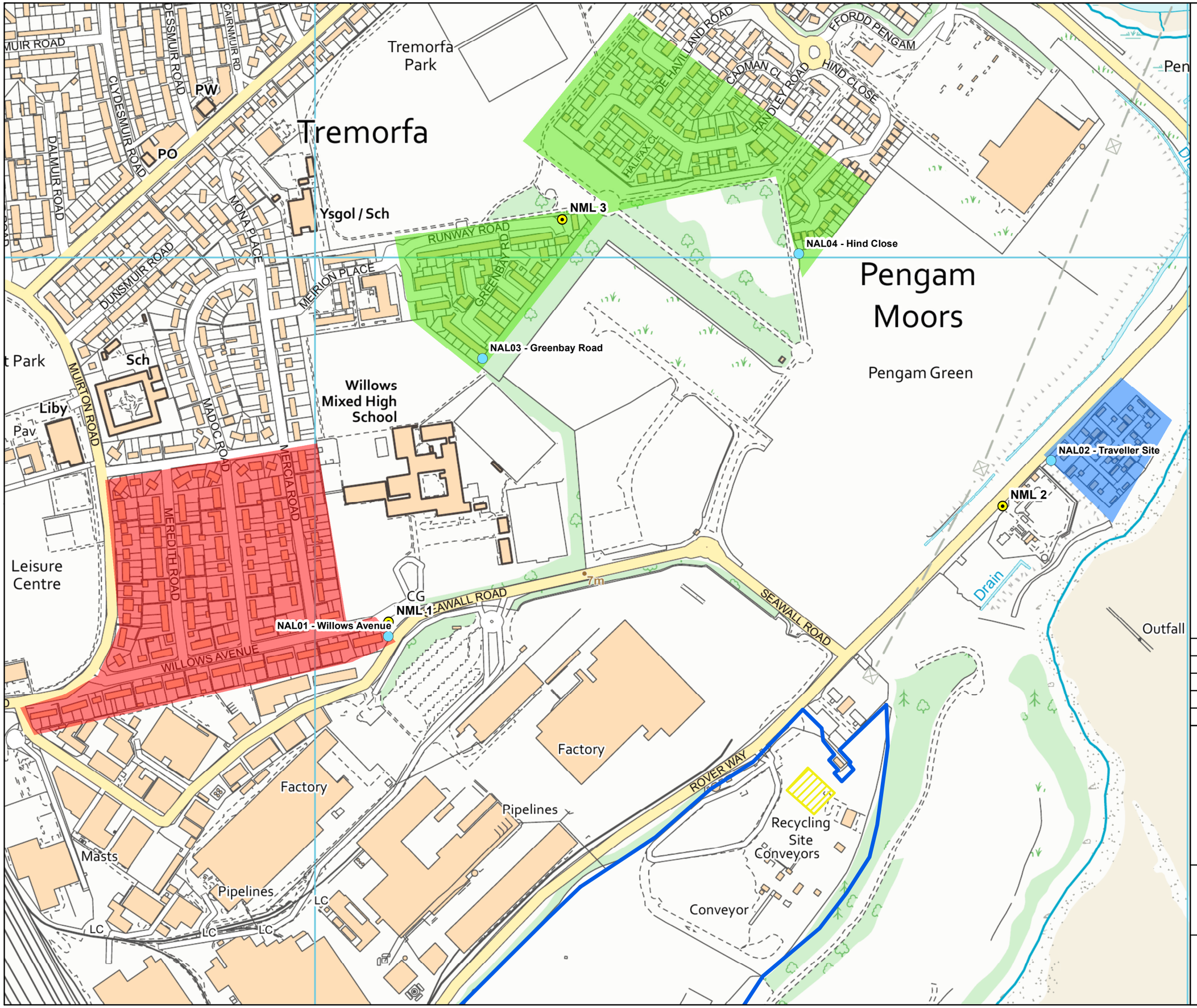
dB LA90
NML03 - Measured daytime levels - Weekdays



Legend

- Noise Monitoring Locations (NMLs)
- Noise Assessment Location (NAL)
- Scrap Metal Sorting Facility Indicative Area
- IPPC Permitting Area

Nearest Noise Sensitive Receptors (NSRs)

- NSRs represented by NML 1
- NSRs represented by NML 2
- NSRs represented by NML 3

0 50 100 Metres

N

REV.	DETAILS	DRAWN	CHK'D	APP'D	DATE
R0	FIRST ISSUE	EW	JS	JS	05/11/2019

Project	Cardiff Scrap Metal Sorting Facility
Client	EAME
Title	Noise Study Area
Figure No.	1
Scale	1:4,000 @A3
Doc. Ref.	13331-009

EAME Earth & Marine Environmental Consultants

tnei