

**Linde Industrial Park
Merthyr Tydfil
CF48 4LA**

**Noise Impact Assessment
3647/NIA2_Rev1**

7th November 2018

For: **Lee Wakemans**
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1.0 Introduction

Further to our Noise Impact Assessment report 3647/NIA1_Rev2 dated 08/04/2015, we understand the vehicle test track at General Dynamics in Merthyr Tydfil was granted permission subject to the following noise related conditions;

“8. The test track shall not be used on any Saturday, unless a report that assesses the noise impact of the test track on nearby noise sensitive properties on a Saturday, has been submitted to and approved in writing by the local planning authority. If acceptable, the development shall thereafter be carried out into accordance with the approved report. Reason - To ensure that the noise emitted is not a source of nuisance to occupants of nearby properties in accordance with Policy BW7 of the Merthyr Tydfil Local Development Plan.”

In addition to the above, we understand the predicted level of 50dB $L_{Aeq,1hr}$ of tank testing noise at critical receivers at Rhydfach was accepted by the LPA's environmental health department for use during the week (Mon-Fri).

General Dynamics wish to use the track on Saturdays and Sundays when required. We understand proposed hours of operation on a Saturday would be between 0900-1700hrs, and between 1000-1600hrs on a Sunday.

Hunter Acoustics has therefore been commissioned to assess noise impact of the track on nearby noise sensitive premises now the track is operational.

Acoustic terminology used is explained in Appendix B.

2.0 Planning Guidance

2.1 British Standard 4142:2014

British Standard 4142:2014 “Methods for rating and assessing industrial and commercial sound”

This standard describes a rating method comparing L_{Aeq} sound levels from the industrial source with pre-existing background L_{A90} levels at the residential receiver. It advises at a difference (industrial noise - background) of:

- +10dB or higher, likely to be an indication of a significant adverse impact, depending on the context.
- A difference of + 5dB, likely to be an indication of an adverse impact, depending on the context.
- 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.

A penalty of between 0dB and 9dB can be applied to the industrial noise depending on its characteristics (tonality/impulsivity/intermittency), as described in sections 9.2 and 9.3 of BS4142:2014.

2.2 British Standard 8233:2014

British Standard 8233:2014 (Sound Insulation and Noise Reduction for Buildings – Code of Practice) gives guideline values for ambient noise levels in habitable rooms for anonymous noise sources (such as road and rail traffic). These are shown in table 3647/T1 below;

3647/T1 - BS 8233 Internal Ambient Noise Levels

Location	Desired		Reasonable *	
	07:00 to 23:00	23:00 to 07:00	07:00 to 23:00	23:00 to 07:00
Living room	35 dB $L_{Aeq,16hr}$	-	40 dB $L_{Aeq,16hr}$	-
Dining room/area	40 dB $L_{Aeq,16hr}$	-	45 dB $L_{Aeq,16hr}$	-
Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$	40 dB $L_{Aeq,16hr}$	35 dB $L_{Aeq,8hr}$

* 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.

2.3 World Health Organisation Guidelines for Community Noise 1999

World Health Organisation's (WHO) Guidelines for Community Noise (1999) states,

"To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB LAeq for a steady, continuous noise. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB LAeq."

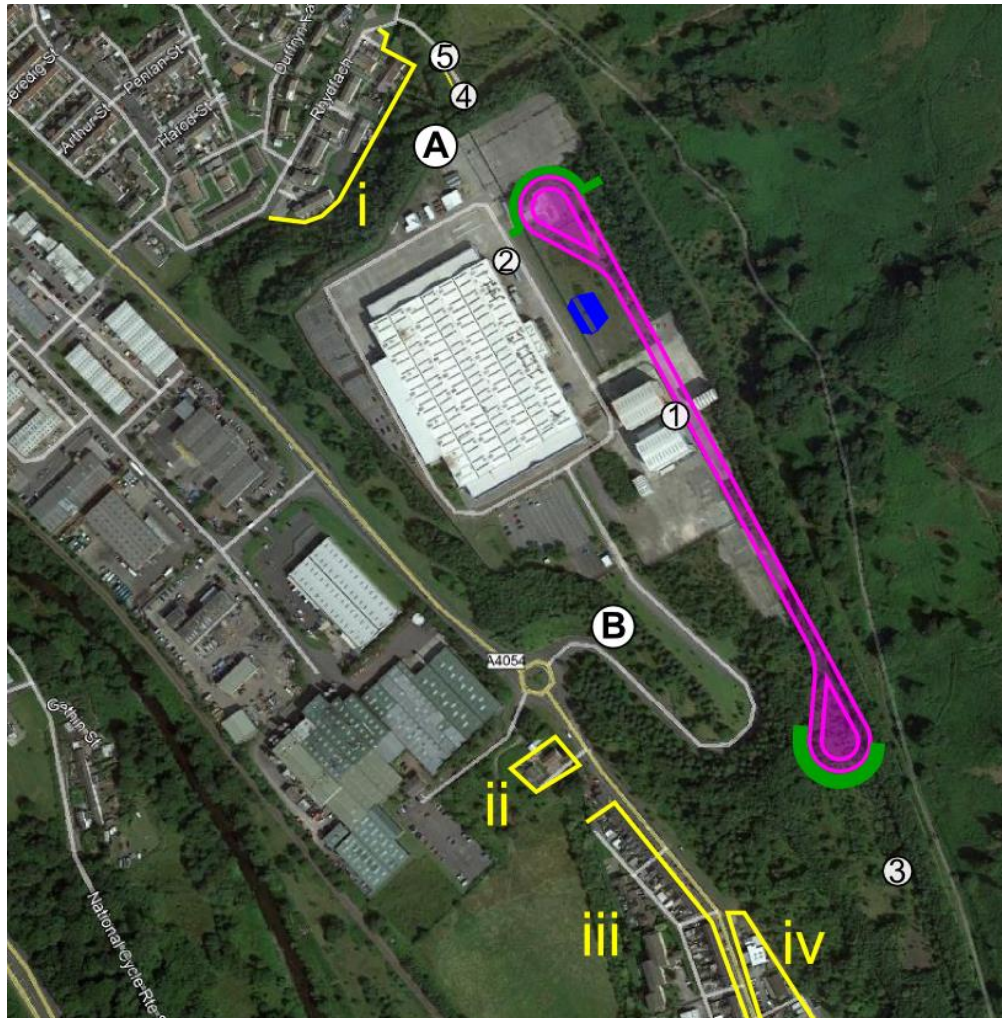
In addition to this, BS 8233:2014 states,

"However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

3.0 Noise Sensitive Premises

Closest residential areas or 'Noise sensitive premises' (NSPs) have been identified - these should be confirmed with the Local Planning Authority. Site plan 3647/SP1 shows the critical NSPs as described below.

3647/SP1 - Noise Sensitive Properties Highlighted



- i) **Rhydfach (residential)**
North west of proposed facility, with line of sight (excluding trees)
Approximately 80m from to the nearest dwelling to track section.
- ii) **Isolated dwellings on A4054 (residential)**
South west of proposed facility, at a lower height
Approximately 165m from to the nearest dwelling to track section.
- iii) **Holly Terrace / Hazel Terrace / Laburnam Terrace etc. (residential)**
South west of proposed facility, at a lower height
Approximately 165m from to the nearest dwelling to track section.
- iv) **Tydfil Terrace / Rhodfa Terrace / Taldwyn Terrace etc. (residential)**
South of proposed facility, at a lower height
Approximately 250m from to the nearest dwelling to track section.

4.0 Surveys

4.1 Procedures

4.1.1 Sample Measurements

Measurements were undertaken on 12th September 2018 between 1145-1215hrs.

Sample measurements were taken both on and off site to measure operational levels when the track and ramp were in use. Measurement positions used are shown on site plan 3647/SP1 above;

On-site Source Positions

- Position 1 - Approximately 12m from the track 1.5m above local ground height with line of sight to vehicles/exhaust.
- Position 2 - Approximately 50m from the edge of the ramp 1.5m above local ground level, in direction of nearest dwellings.

Off-site Receiver Positions

- Position 3 - Located approximately 95m south of the track, 1.5m above local ground height with no line of sight as the track was screened by bund highlighted in green on site plan – 36476/SP2
- Position 4 - Located adjacent to rear gardens of the closest NSPs north of the track approximately 92m away and 1.5m above local ground level. There was no line of sight to the track as the track is elevated higher than the sample position with the addition of a 5m high acoustic fence on top of a 1.5m bund on the northern boundary of the track highlighted in green on site plan – 36476/SP2
- Position 5 - Located 30m north of Position 4, in line with rear facades of closest NSPs, 1.5m above local ground height with no line of sight to the track

Approximately 6no laps of the track were monitored along with 2no test runs over the ramp. Speed of tank on the straights was approximately 60km/h and the speed on the bends was approximately 30km/h.

Data including L_{Amax} , L_{Aeq} and L_{A90} was logged at consecutive 1min intervals along with 100ms data and audio recordings to allow post analysis of results.

4.1.2 Continuous Monitoring

Continuous sound monitoring was carried out from 1030hrs on Friday the 19th to 1500hrs on Monday 22nd October 2018 at Positions A - B to capture ambient and background Saturday daytime sound levels at locations representative of the nearest noise sensitive premises.

These locations are the same as used in our original noise survey to support the original planning application in 2015. Measurement positions used are shown on site plan 3647/SP1 above;

- Position A - On northern site boundary fence, approximately 2m above local ground height, deemed representative of NSP 1.
- Position B - In trees towards southern site boundary with A4054, approximately 1.5m above local ground height, deemed representative of NSPs 2-4.

Data including L_{Amax} , L_{Aeq} , and background L_{A90} was logged at 15 minute intervals at positions A - B over the monitoring period.

4.2 Equipment

Table 3647/T2 below shows equipment used.

3647/T2 - Equipment List

Make	Description	Model	Serial Number	Last Calibrated	Certificate No.
Norsonic AS	Calibrator (113.95dB @ 999.27Hz)	1251	24202	10-Aug-18	UCRT17/1718
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-08723-E0	20-Dec-16	1612652
NTi	Preamplifier	MA220	1820	20-Dec-16	1612650
NTi	Filters	XL2-TA	A2A-08723-E0	20-Dec-16	1612651
NTi	Microphone	Capsule	9381	20-Dec-16	1612650
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-10021-E0	24-Aug-17	UCRT17/1722
NTi	Preamplifier	MA220	5435	24-Aug-17	UCRT17/1722
NTi	Microphone	Capsule	8547	24-Aug-17	UCRT17/1722
NTi	Type 1 - Sound Level Meter	XL2-TA	ASA-14577-E0	20-Jun-18	FL-18-044
NTi	Preamplifier	MA220	7485	20-Jun-18	FL-18-044
NTi	Microphone	Capsule	A15594	20-Jun-18	FL-18-044
Rion	Type 1 - Sound Level Meter	NL-32	1103396	14-Mar-17	UCRT17/1127
Rion	Preamplifier	NH-21	34335	14-Mar-17	UCRT17/1127
Rion	Microphone	UC-53A	317921	14-Mar-17	UCRT17/1127

The measurement systems were calibrated before and after the surveys, no variation occurred.

4.3 Weather Conditions

4.3.1 Sample Measurements (12/09/2018)

Weather conditions were dry and calm throughout the measurement period.

4.3.2 Continuous Monitoring (19-22/10/2018)

Approximate weather data for the area can be seen on graph 3647/WH1 given in Appendix A of this report.

Conditions were generally fine during the monitoring period however a rain shower occurred between 0400-0530hrs on Sunday 21/10/2018. Wind conditions were generally calm throughout.

The daytime periods in question were dry with a light breeze.

4.4 Results

4.4.1 Sample Measurements

Results of sample measurements are shown in tables 3647/T2-T3 below.

Note: Noise levels in these tables have not been corrected for residual noise from road traffic.

3647/T3 - Tank Lapping Track

Position	Approx. Distance	Time period (HH:MM:SS)	Duration (secs)	LAeq (1 lap) dB(A)	LAmx (1 lap) dB(A)
1	12	11:49:03 - 11:50:29	85/86	82.2	94.6
3	115			58.7	65.6
4	92			49.4	56.2
5	122	11:51:10 - 11:52:35		50.3	57.2

Source sound levels were mostly controlled by exhaust noise located at the rear of the tank.

3647/T4 – Results of Ramp Test

Position	Approx. Distance	Time period (HH:MM:SS)	Duration (secs)	LAeq dB(A)	LAmx dB(A)
2	50	12:01:52 - 12:05:14	202	72.1	51
4	115			51.1	58

It is understood that the ramp is not used as often as the track.

Analysis in 3647/G1 in Appendix A shows the time history of 1no lap recorded at Position 3, with the ambient noise level from distant road traffic highlighted at 45.5dB(A).

Analysis in 3647/G2 in Appendix A shows the time history of 1no lap recorded at Position 4, with the ambient noise level from distant road traffic highlighted at 43.8dB(A).

Correcting the off-site measurements for residual noise from distant road traffic;

- Corrected tank level for 1no lap at Position 3 = 59dB L_{Aeq}
- Corrected tank level for 1no lap at Position 4 = 48dB L_{Aeq}
- Corrected tank level for 1no lap at Position 5 = 49dB L_{Aeq}
- Corrected tank level for 1no ramp test at Position 4 = 50dB L_{Aeq}

Note: Use of the ramp is not indicated to be critical for receivers south of the site (Position 3).

4.4.2 Continuous Monitoring

Results of continuous monitoring at Positions A and B are shown on time history graphs 3647/TH1 & TH2 respectively in Appendix A at the end of this report.

A background sound level of 46dB L_{A90} has been determined during the 0900-1230hrs period on Saturday 20th October 2018 at Position A and 48dB L_{A90} at Position B – see graphs 3647/G3 and 3647/G4 in Appendix A.

Marginally higher levels were determined for Saturday afternoon (1230-1700hrs) and on Sunday (1000-1600hrs); Position A 48dB L_{A90} and Position B 49dB L_{A90} .

During the previous survey in 2015 for a typical weekday, a background sound level of 44dB L_{A90} was determined during the 0800-1800hrs operational period at Position A and 53dB L_{A90} at Position B.

The measured Saturday morning background level in 2018 is therefore indicated to be lower than weekday 2015 at Position B by around 4-5dB but marginally higher at Position A by around 2-4dB.

As the Saturday morning period has the lowest background sound levels at Position A, the following assessments are based on this.

5.0 Environmental Noise Criteria

BS 4142:2014 uses background sound levels as a basis for assessing noise impact at residential receivers, though it also allows the context of the site to be considered.

As the proposed test track is to be operational on a Saturday between 0900-1700hrs and Sunday 1000-1600hrs, daytime noise criteria have been proposed.

We propose setting environmental noise criteria (Plant Rating Level) at 5dB above the existing background level L_{A90} . This effectively means designing the plant absolute L_{Aeq} to the measured background, allowing a +5dB acoustic feature correction.

Proposed environmental noise criteria given in table 3647/T4 below are based on background sound levels determined in section 4.4.2 above for the critical Saturday morning period.

3647/T5 - Proposed Weekend Environmental Noise Criteria

Location	Environmental Noise Criteria
	Saturday (0900-1700hrs) Sunday (1000-1600hrs)
	$L_{Aeq,1hr}$ (dB)
i - Rhydfach	46
ii - Isolated dwellings on A4054	48
iii - Holly Terrace / Hazel Terrace / Laburnam Terrace etc.	48
iv - Tydfil Terrace / Rhodfa Terrace / Taldwyn Terrace etc.	48

BS 4142:2014 would assess this as 'likely to be an indication of an adverse impact, depending on the context.'

In this instance, the context is residential receivers in an existing industrial area where an element of plant noise might be expected alongside road traffic noise sources, as is currently the case.

Note: Proposed Noise criteria would need to be confirmed acceptable with the Council's Environmental Health Officer.

6.0 Discussion

6.1 Noise Map Model

Previous noise impact assessment of the test track was based on limited noise data provided by General Dynamics. This impact assessment for weekend operations is now based on the noise map model calibrated to the actual measured levels of the tank using the track, as detailed in section 4.0 of this report. Excellent agreement is indicated between the model and on/off-site measurement results.

We understand from our previous impact assessment that the track is likely to be used in short bursts of up to 30 minutes.

An updated noise map model is shown below for 30mins use in a 1hr reference period.

3647/NM1 - Daytime Noise Map (1.2m above local ground level); 30mins Use in 1hr Period

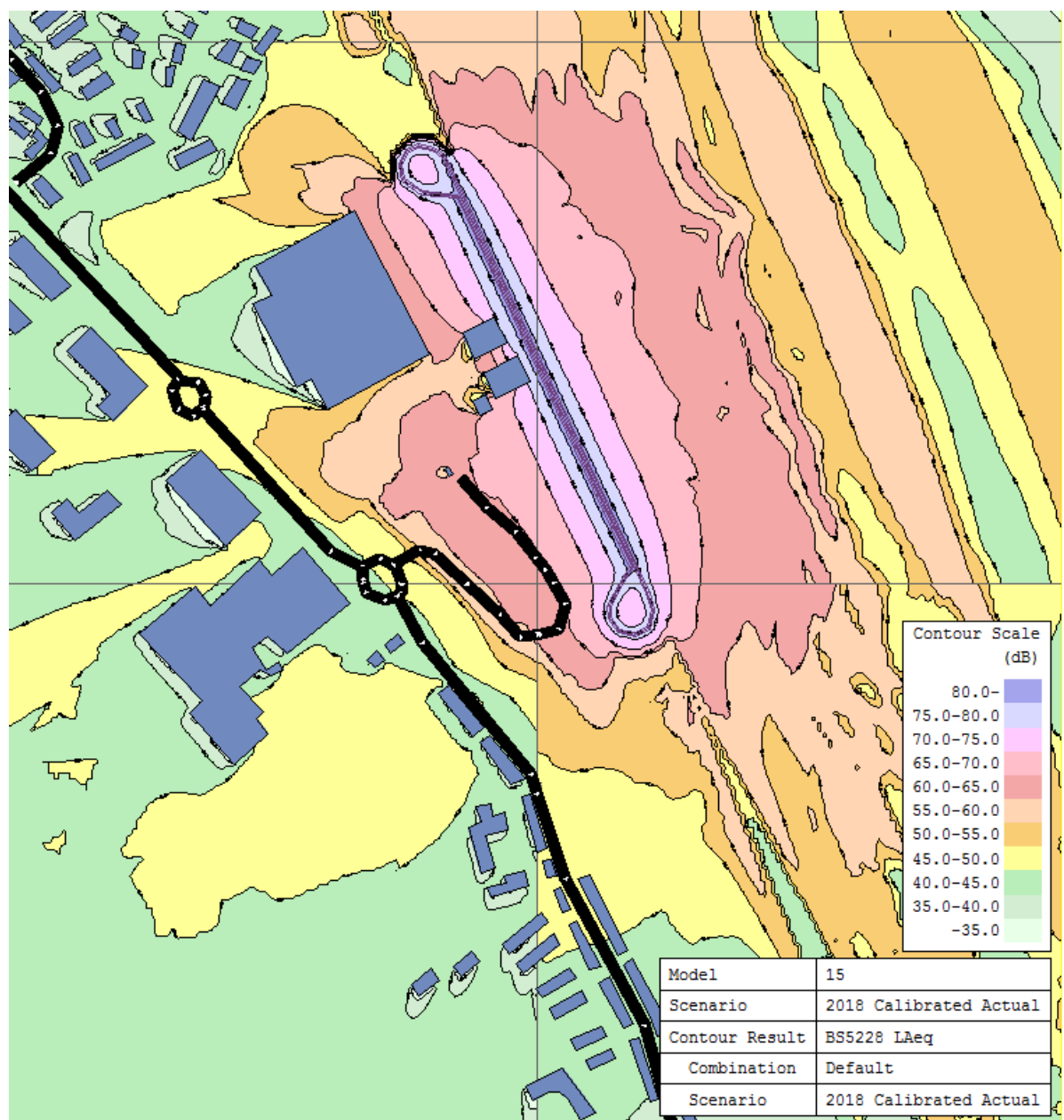


Table 3647/T6 below summarises predicted absolute daytime $L_{Aeq,1hr}$ noise levels at the NSPs identified in section 3.0 of this report.

3647/T6 - Predicted Daytime Noise Levels at NSPs

Noise Sensitive Premises (NSP)	Daytime $L_{Aeq,1hr}$ (dB)	
	Predicted	Criteria
i - Rhydfach	46	46
ii - Isolated dwellings on A4054	46	48
iii - Holly Terrace / Hazel Terrace / Laburnam Terrace etc.	45	48
iv - Tydfil Terrace / Rhodfa Terrace / Taldwyn Terrace etc.	42	48

6.2 BS 4142 Assessments

BS 4142 assessments are included in Appendix C for weekend use at each NSP.

Based on subjective assessments during the sample measurements off-site, a 3dB penalty has been included as the sound is not indicated to be tonal or impulsive but could be described as intermittent (tank becomes audible as it approaches receiver location, then becomes inaudible again as it moves further away).

A 3dB excess over background is therefore indicated at location i (Rhydfach), a 1dB excess at location ii (isolated dwellings on A4054) and no excess at locations iii and iv.

Using absolute levels to give context (≤ 46 dB $L_{Aeq,1hr}$ daytime), an adverse impact is indicated to be unlikely.

6.3 Ramp Use

The ramp is only considered critical at NSPs to the north of the site (Rhydfach) due to its location towards the northern end of the track.

Based on a level of 51dB measured over the duration of the ramp test (202seconds) at position 4 in line with Rhydfach, a total of 5 ramp tests could be conducted per hour which would equate to a level of 46dB $L_{Aeq,1hr}$ – in line with the proposed criteria.

7.0 Good Practice Guide

BS 5228-1:2009 gives general information on control of noise at source, some of which can be applied to this 'specialist' site.

A summary of the practical measures in the choice and use of plant to reduce noise is given below:

- Avoid unnecessary revving of engines and switch off equipment when not required.
- Ensure plant and vehicles are properly maintained, check silencers and bearings.
- If the noise is directional, point the source away from noise-sensitive locations.
- Keep internal haul routes well maintained and avoid steep gradients.
- Minimise drop height of materials.
- Limit the use of particularly noisy plant or vehicles.
- Start-up plant and vehicles sequentially rather than together.
- Ensure the plant and vehicles are operated with noise control hoods closed.
- Any reversing beepers should be minimised as far as is reasonably practicable and subject to maintaining site safety. This could involve muting / switching off reversing beepers and using a visual system at night; automatically set beeper volume relative to background noise; and / or manoeuvring vehicles in a circular manner to minimize the need to reverse/use reversing alarms.

8.0 Conclusion

A noise impact assessment has been carried out for the vehicle testing track and ramp at the rear of the new General Dynamics factory in Merthyr Tydfil for weekend use between 0900-1700hrs on a Saturday and between 1000-1600hrs on a Sunday.

Noise sensitive properties (NSPs) have been identified and the existing weekend daytime noise climates have been established by undertaking environmental noise surveys.

Sample measurements have also been undertaken at a number of positions both on and off-site, of a tank using the test track and ramp.

The previous noise map model has been calibrated using results of sample measurements on and off site, with excellent agreement indicated.

Proposed weekend daytime noise criteria at all identified critical NSPs are indicated to be met based on a tank using the track for a maximum of 30mins in any 1 hour period (we understand from our previous impact assessment that the track is likely to be used in short bursts of up to 30 minutes).

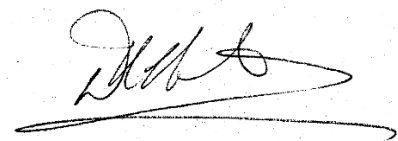
Based on a level of 51dB measured over the duration of the ramp test (202seconds) at position 4 in line with Rhydfach, a total of 5 ramp tests could be conducted per hour on the weekend morning which would equate to a level of 46dB $L_{Aeq,1hr}$ – in line with the proposed criteria.

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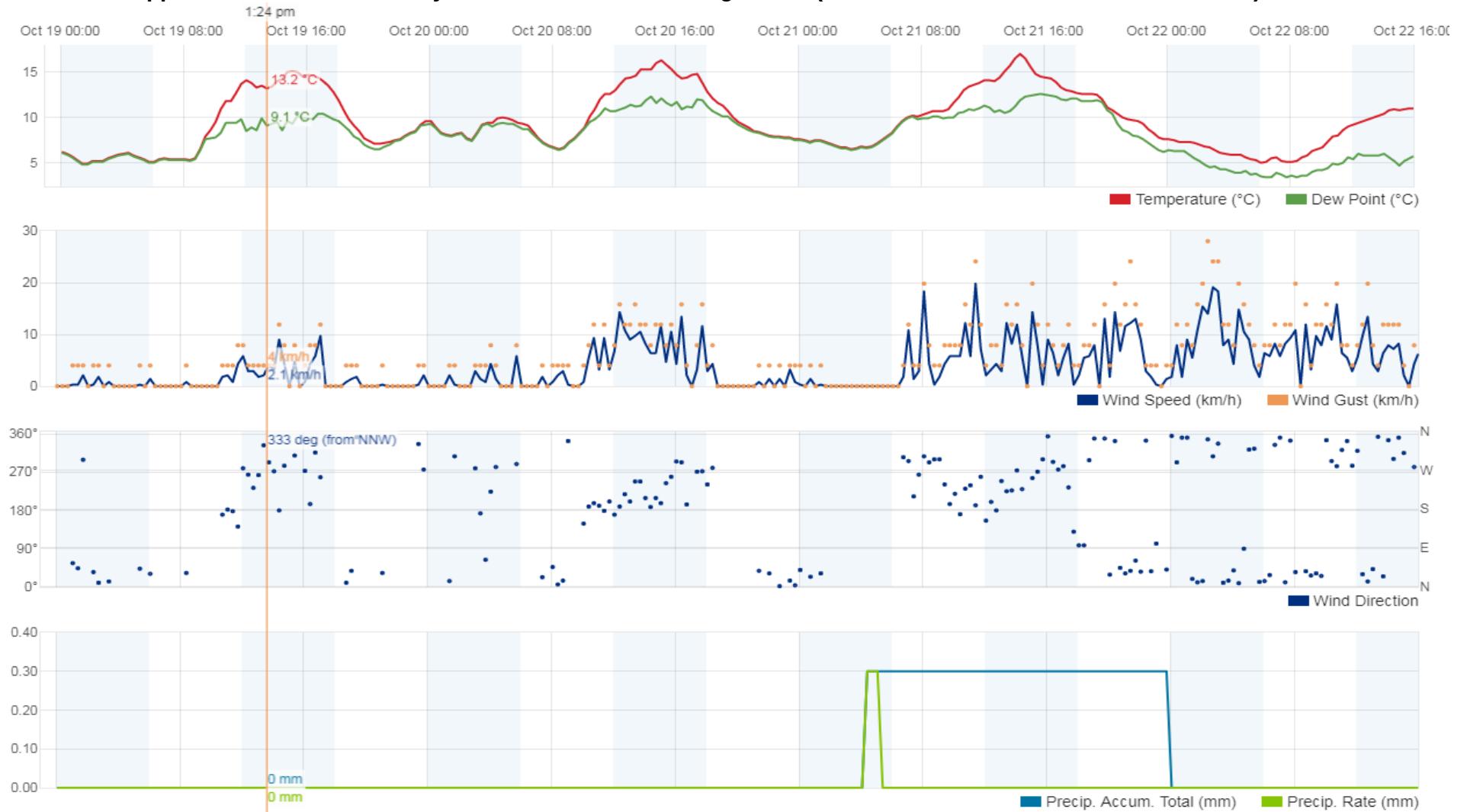
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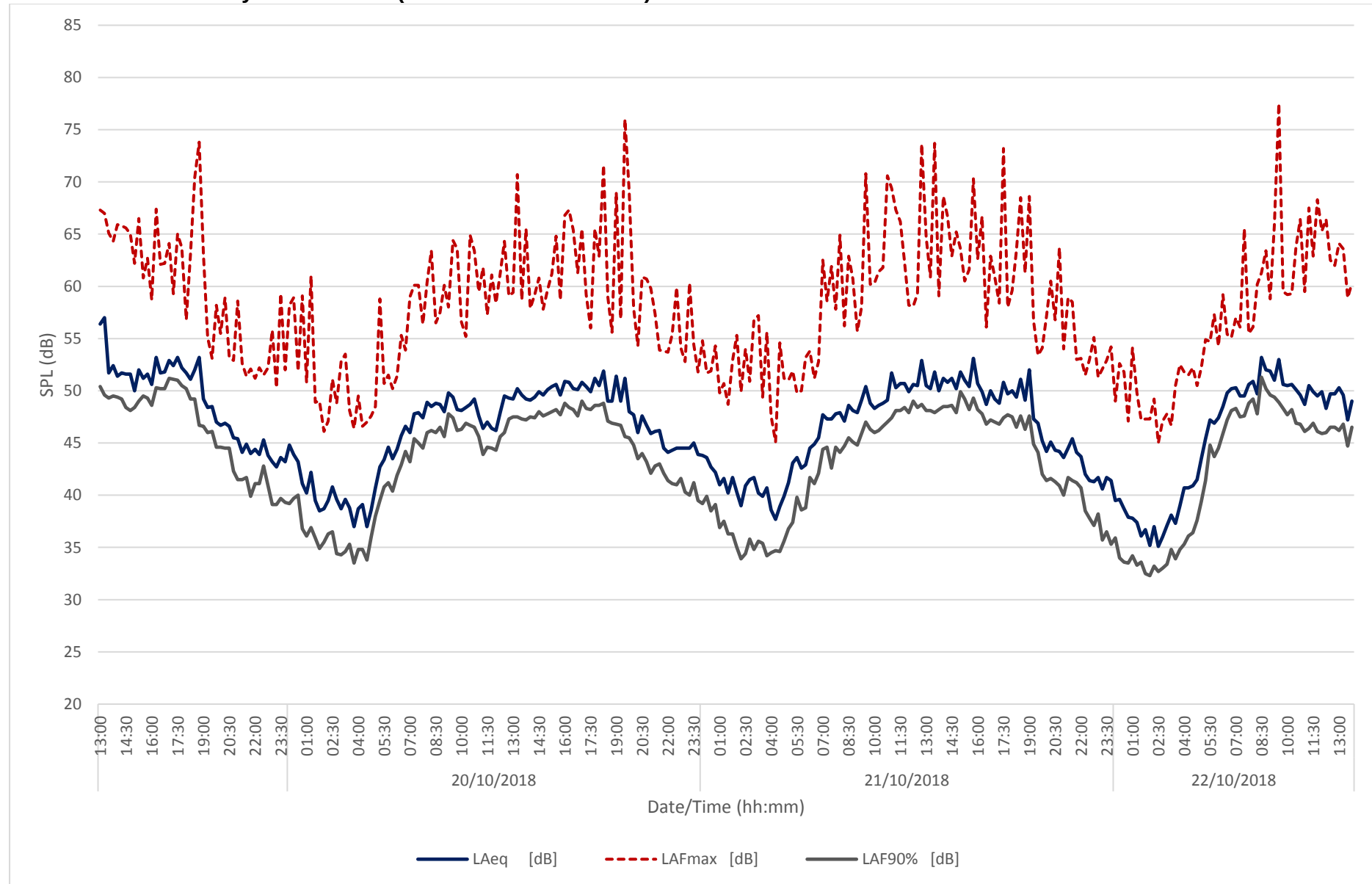
David Hunter
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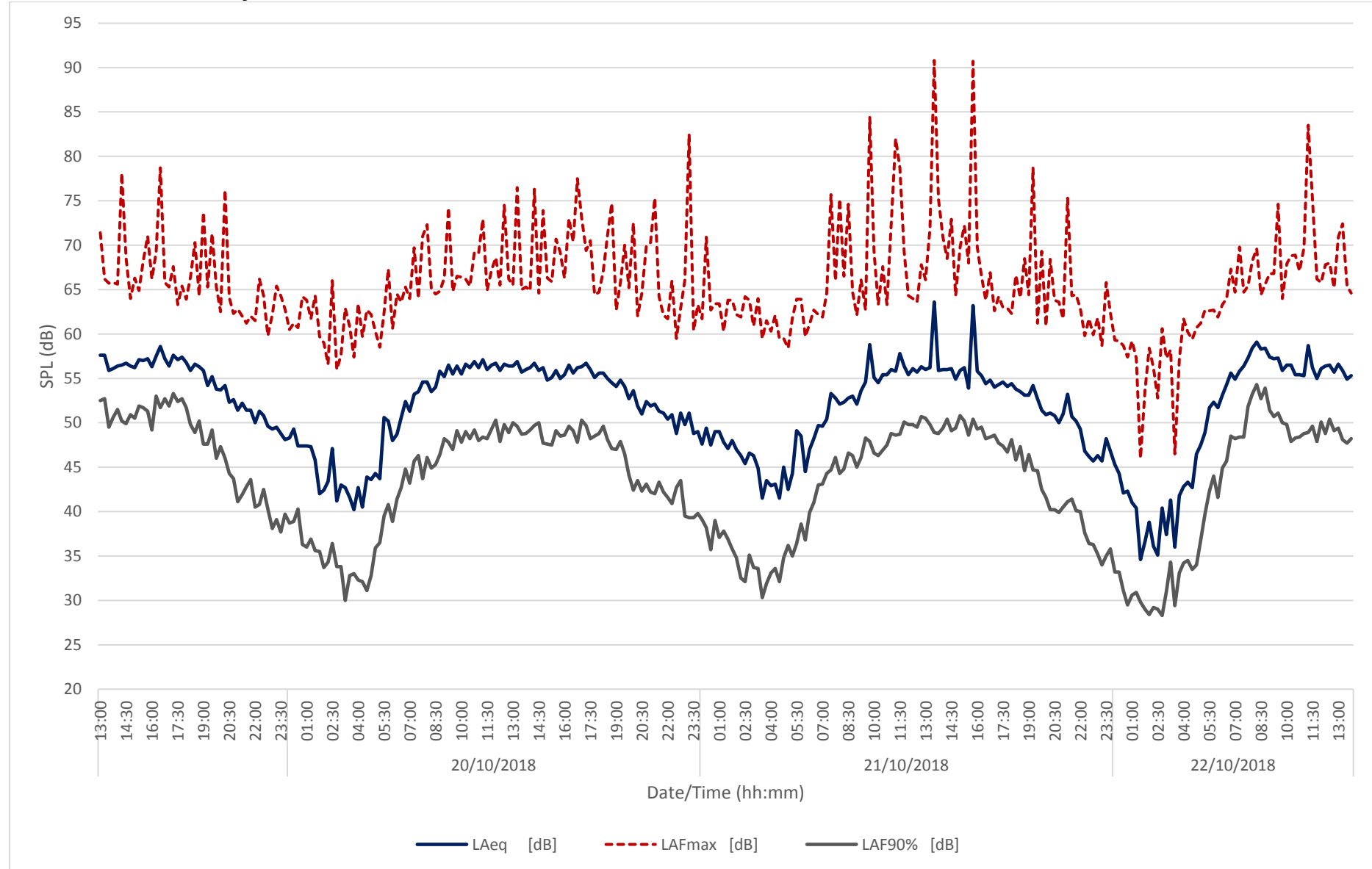
Appendix A – Diagrams, Graphs and Tables

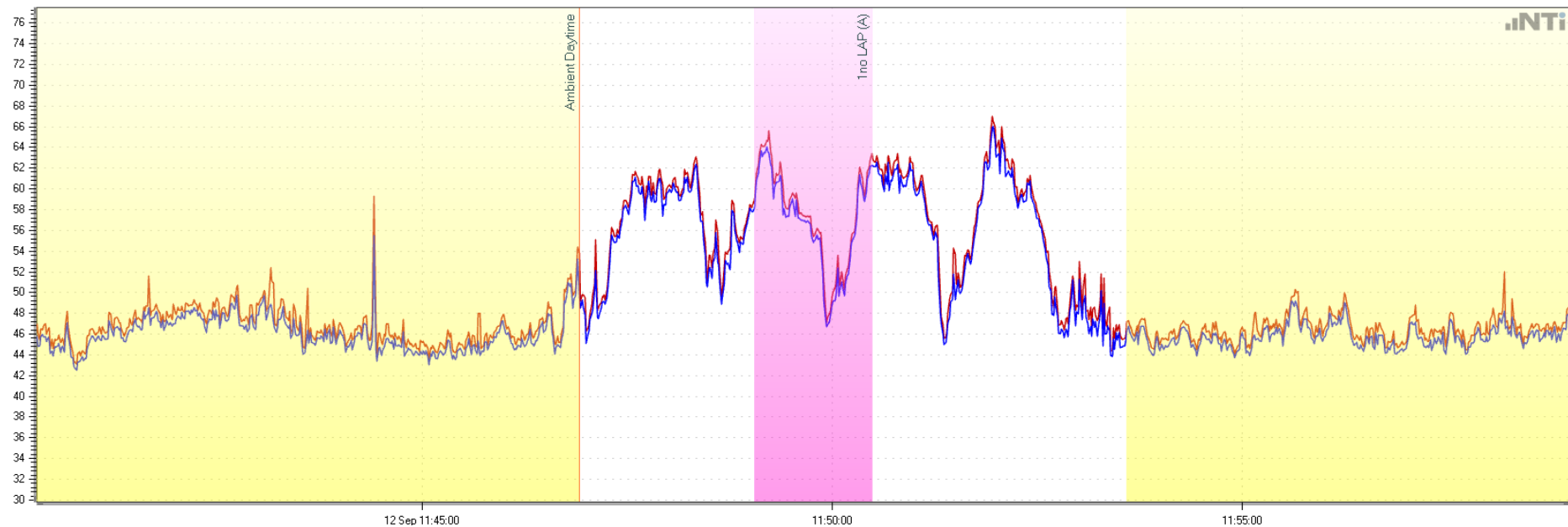
3647/WH1 – Approximate Weather History for Continuous Monitoring Period (1030hrs 19/10/2018 – 1530hrs 22/10/2018)



* Taken from www.wunderground.com - weather station IWALESEB2 located at Ebbw Vale [N 51 ° 48 ' 6 " , W 3 ° 12 ' 59 "]

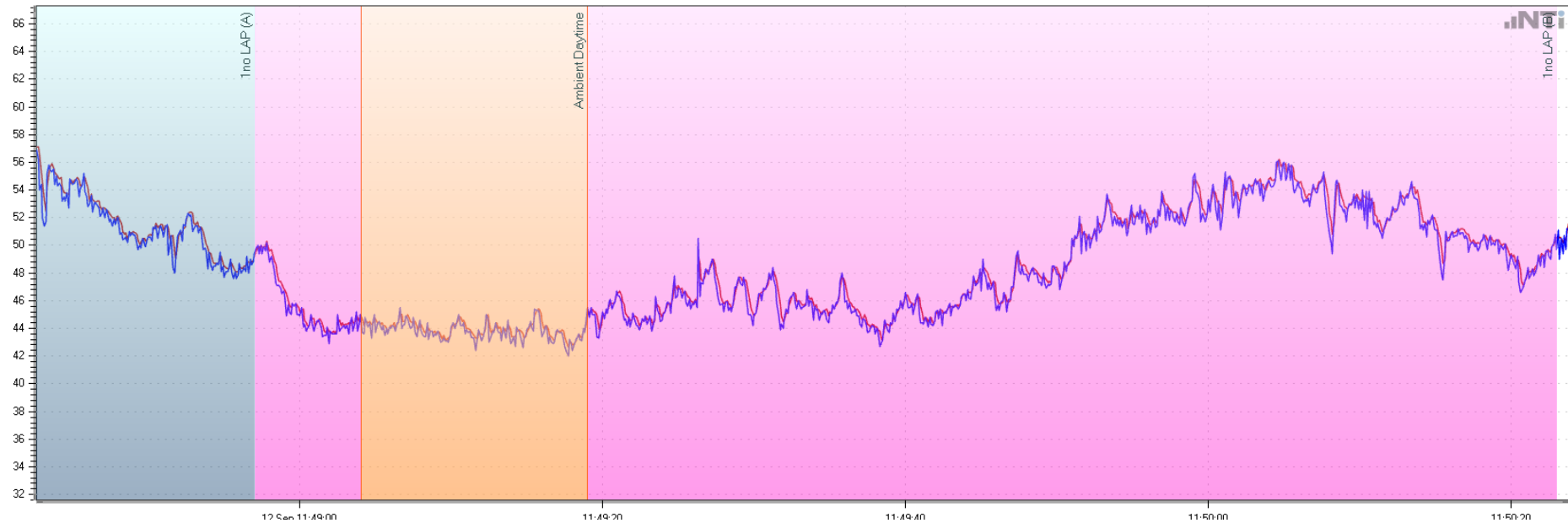
3647/TH1 - Time History at Position A (19/10/2018 – 22/10/2018)

3647/TH2 - Time History at Position B

3647/G1 – Time History at Position 3 of 1no Lap on Test Track (South of Track)

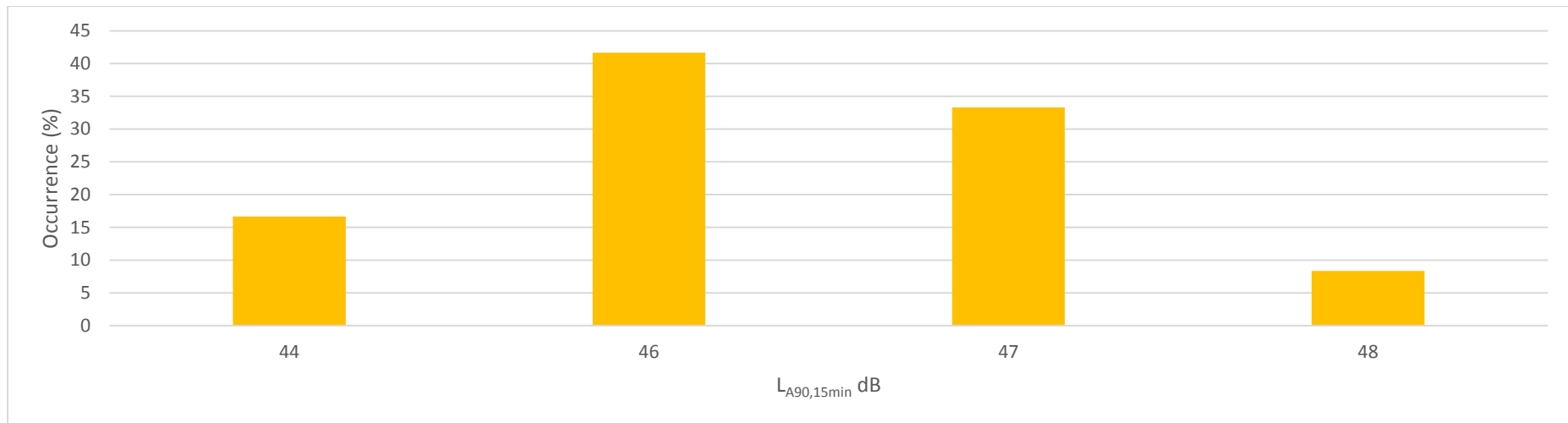
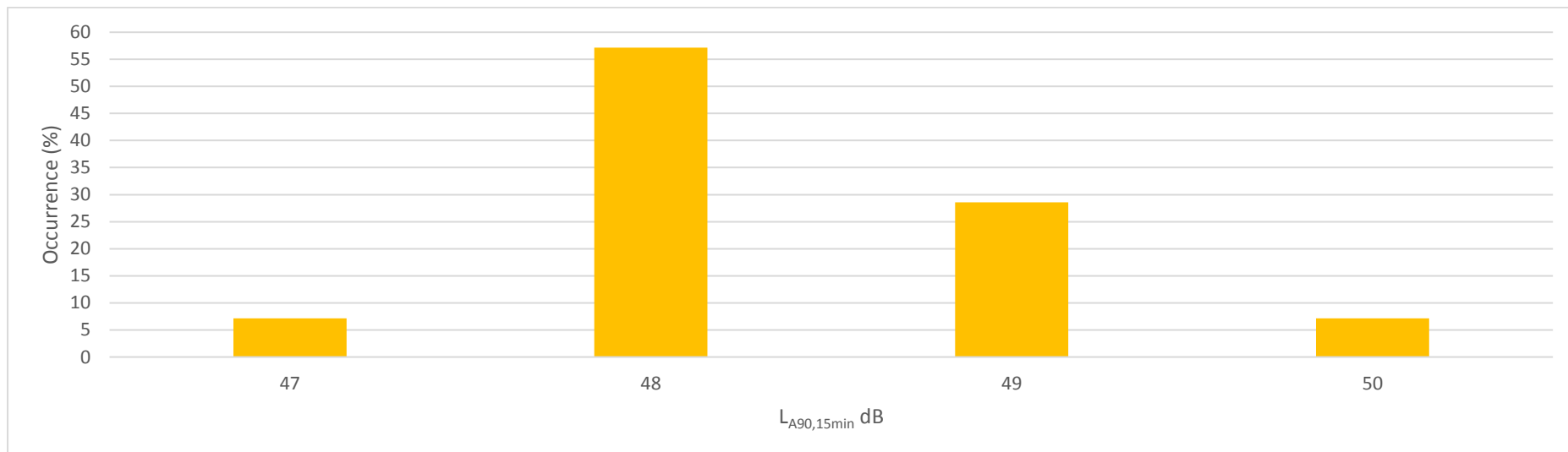
Marker	
Type	Ambient Daytime
Start	12 Sep 11:28:45
End	12 Sep 11:46:55
Duration	00:18:10
L _{Aeq}	45.5 dB
L _A F _{max}	59.3 dB

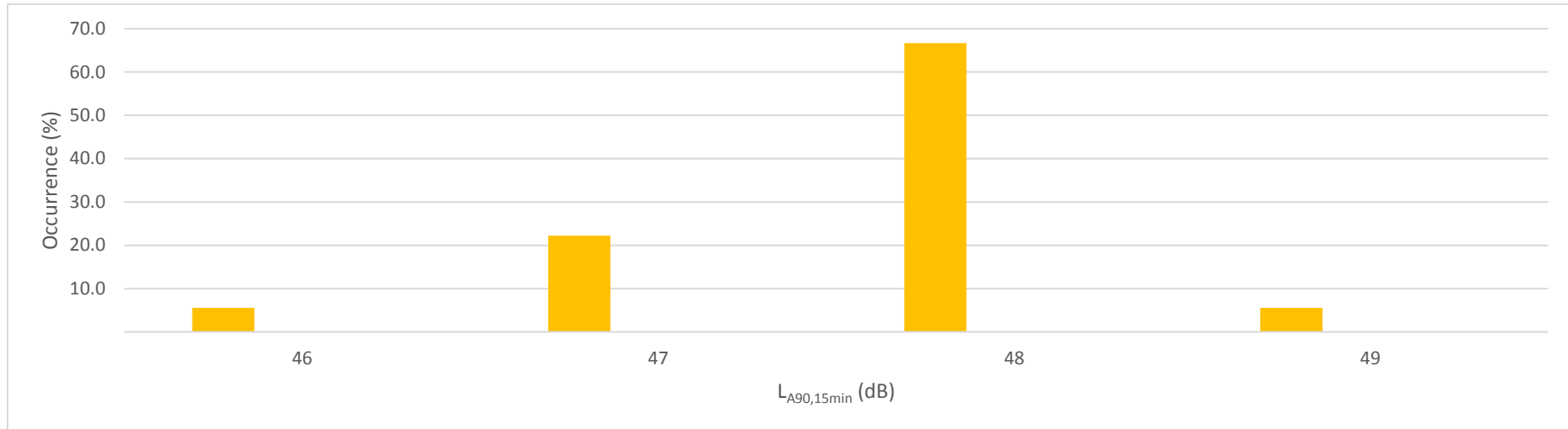
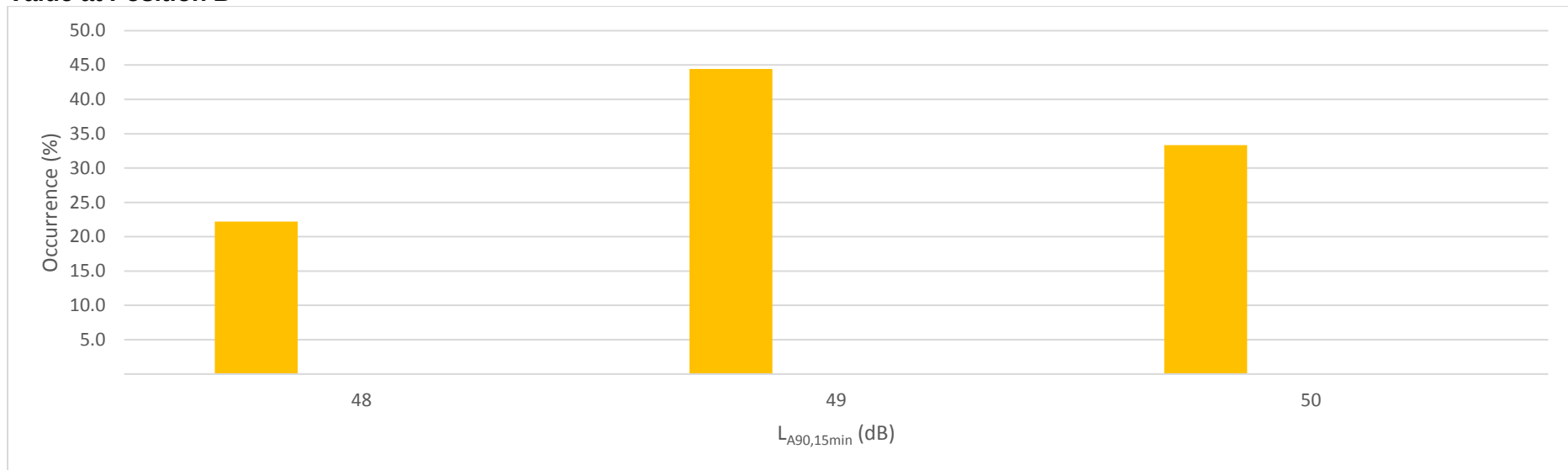
Marker	
Type	1no LAP (A)
Start	12 Sep 11:49:03
End	12 Sep 11:50:29
Duration	00:01:26
L _{Aeq}	58.7 dB
L _A F _{max}	65.6 dB

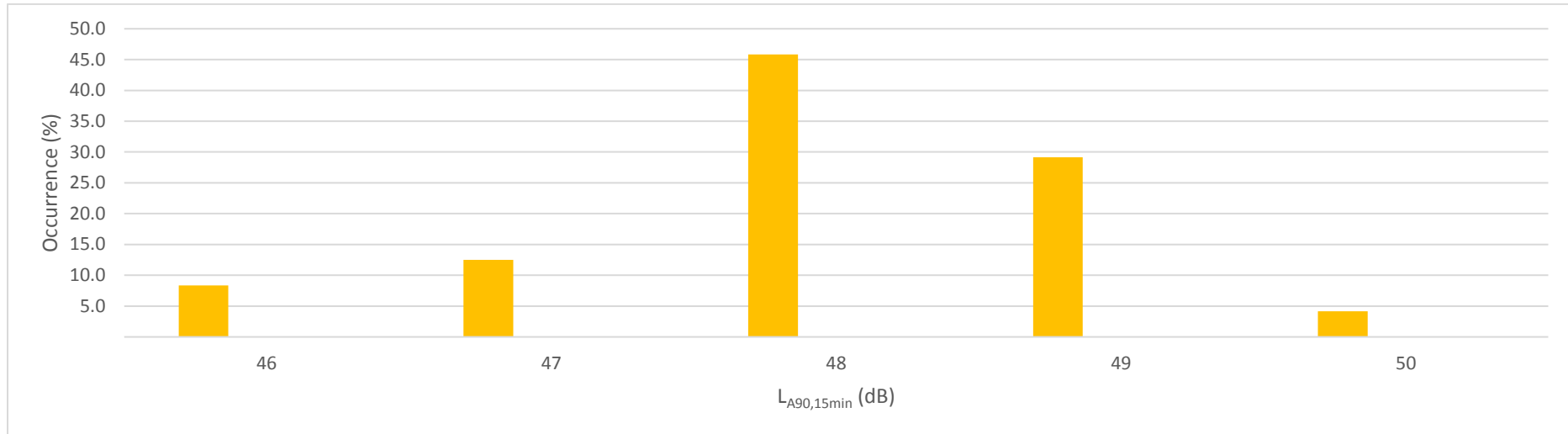
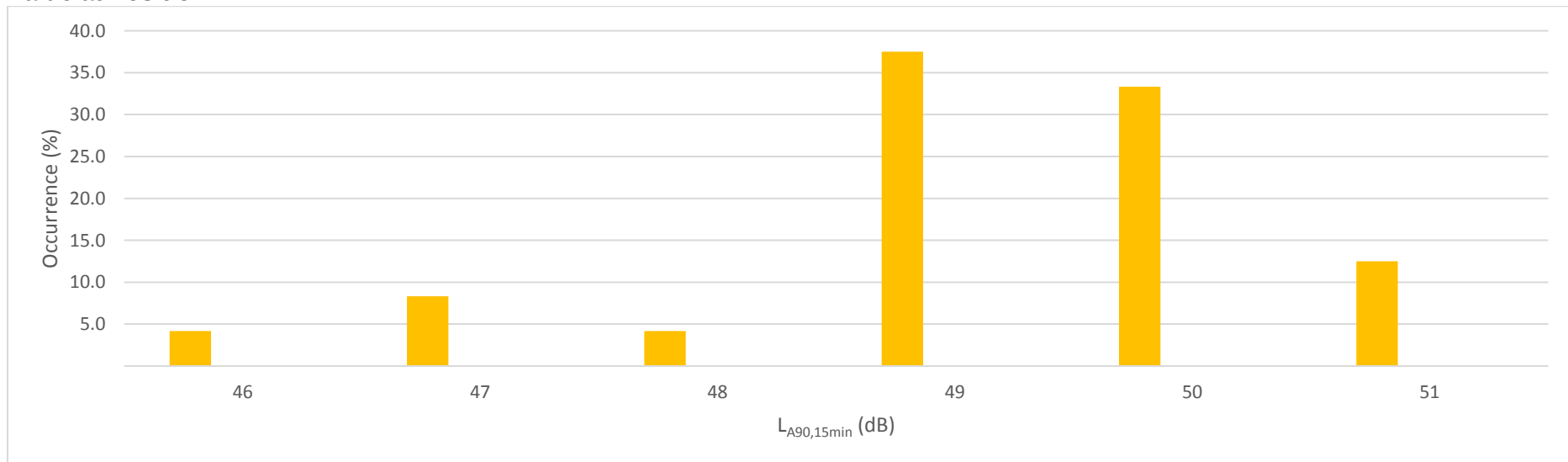
3647/G2 – Time History at Position 4 of 1no Lap on Test Track (North of Track)

Marker	
Type	Ambient Daytime
Start	12 Sep 11:49:04
End	12 Sep 11:49:19
Duration	00:00:15
L _{Aeq}	43.8 dB
L _A F _{max}	45.4 dB

Marker	
Type	1no LAP (B)
Start	12 Sep 11:48:57
End	12 Sep 11:50:23
Duration	00:01:26
L _{Aeq}	49.4 dB
L _A F _{max}	56.2 dB

3647/G3 - Statistical Analysis of Saturday Morning (0900-1230hrs) Background Sound Levels Showing Most Commonly Occurring Value at Position A**3647/G4 - Statistical Analysis of Saturday Morning (0900-1230hrs) Background Sound Levels Showing Most Commonly Occurring Value at Position B**

3647/G5 - Statistical Analysis of Saturday Afternoon (1230-1700hrs) Background Sound Levels Showing Most Commonly Occurring Value at Position A**3647/G6 - Statistical Analysis of Saturday Afternoon (1230-1700hrs) Background Sound Levels Showing Most Commonly Occurring Value at Position B**

3647/G7 - Statistical Analysis of Sunday Daytime (1000-1600hrs) Background Sound Levels Showing Most Commonly Occurring Value at Position A**3647/G8 - Statistical Analysis of Sunday Daytime (1000-1600hrs) Background Sound Levels Showing Most Commonly Occurring Value at Position B**

Appendix B - Acoustic Terminology

Human response to noise depends on a number of factors including; Loudness, Frequency content, and variations in level with time. Various frequency weightings and statistical indices have been developed in order to objectively quantify 'annoyance'. The following units have been used in this report:

dB(A):	The sound pressure level weighted to correspond with the frequency response of the human ear, and therefore a persons' subjective response to frequency content.
L _{eq} :	The equivalent continuous sound level is a notional steady state level which over a quoted time period would have the same acoustic energy content as the actual fluctuating noise measured over that period.
L ₉₀ :	The sound level which is exceeded for 90% of the measurement period. i.e. The level exceeded for 54 minutes of a 1-hour measurement. It is often used to define the background sound level.
L ₁₀ :	The sound level which is exceeded for 10% of the measurement period. i.e. The level exceeded for 6 minutes of a 1-hour measurement
L _{max} :	The highest instantaneous sound level recorded during the measurement period.
L _{ArTr} :	The 'rating' level, as described in BS4142 – the specific noise + 'acoustic correction figure'

Appendix C – BS 4142:2014 Assessments

3647/C1 – BS4142:2014 Assessment at Location i)

Results			Relevant Clause	Commentary
Predicted Level at NSP i (Rhydfach)	$L_{Aeq(1hr)} = 46\text{dB}$		7.3.2	Measured level, corrected for 50% on-time
Residual sound level	$L_{Aeq(1hr)} = \text{N/A}$		7.3.3	No correction for residual sound level is applied as we are working with a predicted specific sound level.
Background sound level (daytime)	$L_{A90(0900-1230hrs)} = 46\text{dB}$		8.1.1 8.1.3 8.3	Background sound level measured on site
Assessment made during the day so the reference time interval is 1 hour.			7.2	
Specific sound level calculated by correcting the ambient sound level to remove the contribution of the residual sound level.	$L_{Aeq(1hr)} = 46\text{dB}$		7.3.4	
Acoustic feature correction		3 dB	9.2	3dB penalty for intermittency
Rating Level	$(46 + 3) = 49\text{dB}$			
Background sound level (daytime)	$L_{A90(0900-1230hrs)} = 46\text{dB}$		8.3	
Excess of rating over background sound level	$(49 - 46) \text{ dB} = 3\text{dB}$		11	
Assessment indicates an adverse impact depending on context			11	At 3dB above background and with an absolute level of 46dB outside the noise sensitive premises during the daytime, this is assessed as being unlikely to have an adverse impact. Taking a 15dB loss through a partially open window would result in levels well below the 35dB BS 8233:2014 desirable level during the daytime.
Uncertainty of assessment			10	Uncertainty in background noise measurements is considered low. Specific sound level based on measured levels at receivers. Uncertainty is therefore considered low.

3647/C2 – BS4142:2014 Assessment at Location ii)

Results		Relevant Clause	Commentary
Predicted Level at NSP ii (Isolated dwellings on A4054)	$L_{Aeq(1hr)} = 46\text{dB}$	7.3.2	Measured level, corrected for 50% on-time
Residual sound level	$L_{Aeq(1hr)} = \text{N/A}$	7.3.3	No correction for residual sound level is applied as we are working with a predicted specific sound level.
Background sound level (daytime)	$L_{A90(0900-1230hrs)} = 48\text{dB}$	8.1.1 8.1.3 8.3	Background sound level measured on site
Assessment made during the day so the reference time interval is 1 hour.		7.2	
Specific sound level calculated by correcting the ambient sound level to remove the contribution of the residual sound level.	$L_{Aeq(1hr)} = 46\text{dB}$	7.3.4	
Acoustic feature correction	3 dB	9.2	3dB penalty for intermittency
Rating Level	$(46 + 3) = 49\text{dB}$		
Background sound level (daytime)	$L_{A90(0900-1230hrs)} = 48\text{dB}$	8.3	
Excess of rating over background sound level	$(49 - 48) \text{ dB} = 1\text{dB}$	11	
Assessment indicates an adverse impact depending on context		11	At 1dB above background and with an absolute level of 46dB outside the noise sensitive premises during the daytime, this is assessed as being unlikely to have an adverse impact. Taking a 15dB loss through a partially open window would result in levels well below the 35dB BS 8233:2014 desirable level during the daytime.
Uncertainty of assessment		10	Uncertainty in background noise measurements is considered low. Predicted noise levels have been based on measured noise levels on site and predicted back to the receivers using methodology from BS 5228. Uncertainty is therefore considered low.

3647/C3 – BS4142:2014 Assessment at Location iii)

Results			Relevant Clause	Commentary
Predicted Level at NSP iii (Holly Terrace / Hazel Terrace / Laburnam Terrace etc)	$L_{Aeq(1hr)} = 45\text{dB}$		7.3.2	Measured level, corrected for 50% on-time
Residual sound level	$L_{Aeq(1hr)} = \text{N/A}$		7.3.3	No correction for residual sound level is applied as we are working with a predicted specific sound level.
Background sound level (daytime)	$L_{A90(0900-1230hrs)} = 48\text{dB}$		8.1.1 8.1.3 8.3	Background sound level measured on site
Assessment made during the day so the reference time interval is 1 hour.			7.2	
Specific sound level calculated by correcting the ambient sound level to remove the contribution of the residual sound level.	$L_{Aeq(1hr)} = 45\text{dB}$		7.3.4	
Acoustic feature correction		3 dB	9.2	3dB penalty for intermittency
Rating Level	$(45 + 3) = 48\text{dB}$			
Background sound level (daytime)	$L_{A90(0900-1230hrs)} = 48\text{dB}$		8.3	
Excess of rating over background sound level	$(48 - 48) \text{ dB} = 0\text{dB}$		11	
Assessment indicates an adverse impact is unlikely depending on context			11	With no excess over background and with an absolute level of 45dB outside the noise sensitive premises during the daytime, this is assessed as being unlikely to have an adverse impact. Taking a 15dB loss through a partially open window would result in levels well below the 35dB BS 8233:2014 desirable level during the daytime.
Uncertainty of assessment			10	Uncertainty in background noise measurements is considered low. Predicted noise levels have been based on measured noise levels on site and predicted back to the receivers using methodology from BS 5228. Uncertainty is therefore considered low.

3647/C4 – BS4142:2014 Assessment at Location iv)

Results			Relevant Clause	Commentary
Predicted Level at NSP iv (Tydfil Terrace / Rhodfa Terrace / Taldwyn Terrace etc)	$L_{Aeq(1hr)} = 42\text{dB}$		7.3.2	Measured level, corrected for 50% on-time
Residual sound level	$L_{Aeq(1hr)} = \text{N/A}$		7.3.3	No correction for residual sound level is applied as we are working with a predicted specific sound level.
Background sound level (daytime)	$L_{A90(0900-1230hrs)} = 48\text{dB}$		8.1.1 8.1.3 8.3	Background sound level measured on site
Assessment made during the day so the reference time interval is 1 hour.			7.2	
Specific sound level calculated by correcting the ambient sound level to remove the contribution of the residual sound level.	$L_{Aeq(1hr)} = 42\text{dB}$		7.3.4	
Acoustic feature correction		3 dB	9.2	3dB penalty for intermittency
Rating Level	$(42 + 3) = 45\text{dB}$			
Background sound level (daytime)	$L_{A90(0900-1230hrs)} = 48\text{dB}$		8.3	
Excess of rating over background sound level	$(45 - 48) \text{ dB} = -3\text{dB}$		11	
Assessment indicates an adverse impact is unlikely depending on context			11	With no excess over background and with an absolute level of 42dB outside the noise sensitive premises during the daytime, this is assessed as being unlikely to have an adverse impact. Taking a 15dB loss through a partially open window would result in levels well below the 35dB BS 8233:2014 desirable level during the daytime.
Uncertainty of assessment			10	Uncertainty in background noise measurements is considered low. Predicted noise levels have been based on measured noise levels on site and predicted back to the receivers using methodology from BS 5228. Uncertainty is therefore considered low.