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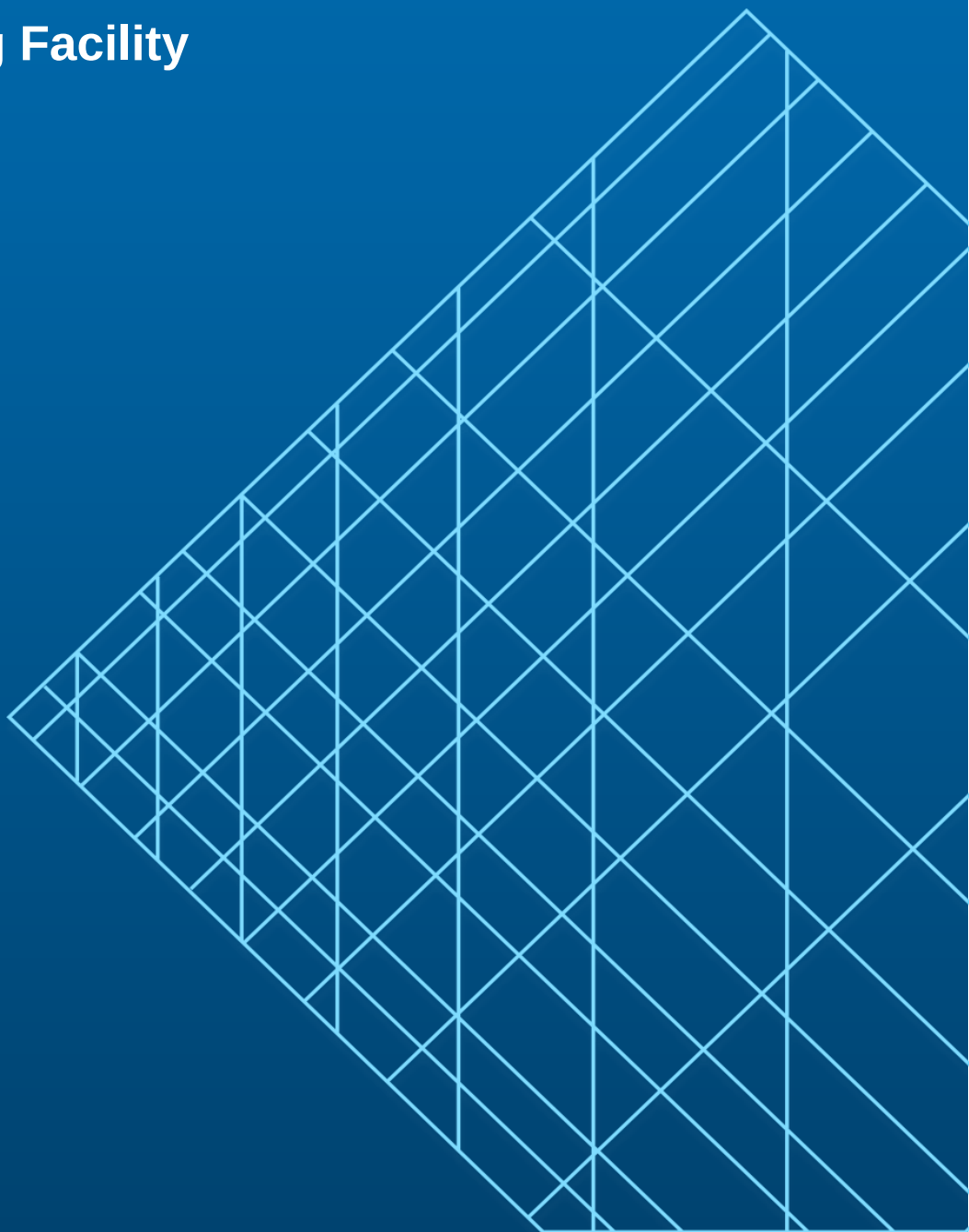
Independent Acoustic Consultancy Practice

Noise Impact Assessment

Manufacturing Facility
Newport Dock

5238/NIA1- Rev 7



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Noise Impact Assessment

Project:	**Manufacturing Facility**
Site Address:	ABP Newport Docks Newport NP20.
HA Reference:	5238/NIA1- Rev 7
Date:	23/01/2020
Client:	Gleeds Management Services c/o McCann & Partners Faraday House Terra Nova Way Penarth Marina Cardiff CF64 1SA
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ISSUE / REVISION

Rev	Date			
0	26 September 2019	**Filename**	19.5238_NIA_ Report	
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			Prepared by:	**Checked by:**
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		Signature		
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		Description	Updated site plan and further explanation of Tipper lorry and HGV flow rates used in noise map model included.	
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		Description	Update referring to the latest planning drawings/sections/elevations as detailed in Appendix C.	
			Prepared by:	**Checked by:**
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1. INTRODUCTION

It is proposed to develop a Manufacturing Facility at ABP Newport Docks, Newport, NP20.

As part of the planning process, an assessment of plant & operational noise emissions to the closest residential Sound Sensitive Receivers (SSR's) is required.

An environmental noise survey has been undertaken covering weekday and weekend periods to assess the existing noise climate at the closest SSRs. Results are used along with current planning guidance, to set environmental noise limits at the SSRs.

Source plant noise/operation measurements have been taken at The Tennant's existing factory.

Results of the above surveys are used as the basis for an acoustic model;

a) Calculating sound insulation performance requirements of the main factory building fabric and;
b) Assess/control emissions from external operations,

..to control noise break-out to the closest residential SSR's at the Newport site.

Advice is also included on potential impact of construction site noise and vibration.

The impact of operational or construction noise on ecological receptors is outside the scope of this report, and this is to be considered within the Ecological Impact Assessment.

2. CRITERIA

Local Planning Authorities, Environmental Health Officers and Regulators refer to British Standard 4142:2014 “Methods for rating and assessing industrial and commercial sound”, as current guidance for the assessment of industrial noise affecting residential receivers.

This standard describes a rating method comparing industrial L_{Aeq} sound levels measured outside the residential receiver, with pre-existing background L_{A90} levels. In paragraph 11 it advises:

11 Assessment of the impacts

COMMENTARY ON ***11***

The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.

Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level (see Clause ***8*** *) from the rating level (see Clause* ***9*** *).*

NOTE 1 More than one assessment might be appropriate.

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.

NOTE 2 Adverse impacts may include but not be limited to annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.

1) The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.

   Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

   Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

A sliding scale of penalties can be applied to industrial/commercial L_{Aeq} sound levels which have acoustically distinguishing characteristics, including tonality, impulsivity and intermittency.

Tonality – A penalty of 2dB for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible.

Impulsivity – A penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it clearly perceptible, and 9dB where it is highly perceptible.

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

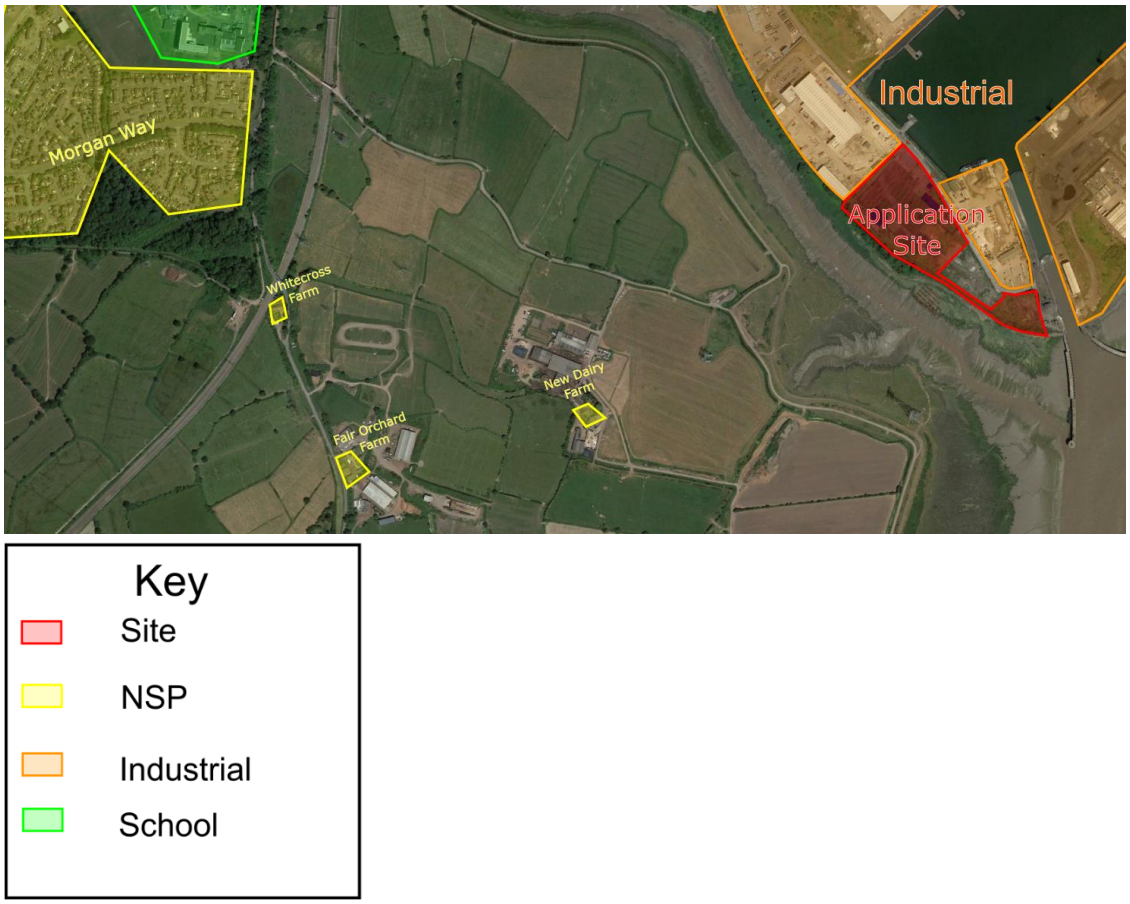
Intermittency – If intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied.

BS4142 2014 uses a 1 hour reference period daytime (0700-2300hrs), and a 15 minute reference period night (2300-0700hrs). This does not affect continuous plant noise break-out from the main factory plant, however it does affect the assessment of Tipper lorry ‘goods in’, HGV ‘goods out’ and wheeled loader operation in the ‘Raw Materials storage area’ – explained in the appropriate sections of the report.

3. SITE PLAN SHOWING FACTORY SITE RELATIVE TO SOUND SENSITIVE RECEIVERS (SSR'S).

The site is located on the southern end of the existing Newport Docks, approximately 680m from the closest farmhouse receiver, and 1.3km from the closest residential estates around Morgan Way, Dyffryn, on the west side of Lighthouse Road.

Figure 3.1 – Noise Sensitive Properties



4. NOISE SURVEYS

4.1 Newport: Environmental Noise Survey

Continuous noise monitoring has been carried out at positions assessed representative of the closest residential receivers.

2no continuous monitoring positions were set up from 1015hrs on Friday 06th September through to 1015hrs Wednesday 11th September. Data including L_{Amax}, L_{Aeq} & L_{A90} was logged at 15-minute intervals over the monitoring period.

Figure 4.1 shows the development site and the continuous monitoring positions A & B.

Figure 4.1 – Site Plan

Measurement positions;

Position A — 1.8m above ground level at John Frost School approximately 1.3km North-west of the industrial site in line with the closest residential receivers.

Position B — 1.5m above ground level on fence line adjacent to the closest farmhouse receiver, 680m south-east of the industrial site.

4.2 Source Plant Noise Survey

In order to predict noise break-out levels outside the new factory, source plant measurements have been taken at The Tenant's existing factory. These source measurements are then used in an acoustic model predicting noise break-out from the proposed facility, to the closest residential receivers at Newport. This allows;

i) An assessment of sound insulation required from the new building fabric, to control levels at the closest residential receivers.
ii) An assessment of noise from external activities including;
   a) Tipper lorries bringing raw materials in,
   b) Articulated lorries taking plasterboard pallets out,
   c) Wheeled loader loading Silo feeder on west side of proposed factory.

Sample noise measurements were carried out on Monday 15th September 2019.

4.3 Equipment

The following equipment was used:

Table 4-1 – Equipment List

Continuous Monitoring (Newport)

Make	Description	Model	Serial Number	Last Calibrated	Certificate No.
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-08723-E0	12 December 2018	1612652
	Preamplifier	MA220	1820	12 December 2018	1612650
	Microphone	Capsule	9381	12 December 2018	1612650
Rion	Type 1 - Sound Level Meter	NL-32	1103396	01 March 2019	UCRT19/1270
	Preamplifier	NH-21	34335	01 March 2019	UCRT19/1270
	Microphone	UC-53A	317921	01 March 2019	UCRT19/1270
Rion	Calibrator (94.04dB @ 984Hz)	NC-73	10355197	01 March 2019	UCRT19/1273

Sample Measurements (Tenant's Existing Factory)

Make	Description	Model	Serial Number	Last Calibrated	Certificate No.
Norsonic AS	Type 1 - Integrating - averaging Sound Level Meter	118	31808	10 August 2018	U22383
	Preamplifier	1206	30892	10 August 2018	U22383
	Microphone	1225	62659	10 August 2018	22381
Norsonic AS	Calibrator (113.95dB @ 999.27Hz)	1251	24202	20 August 2019	UCRT19/1921
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-13022-E0	20 August 2019	TCRT19/1649
	Preamplifier	MA220	6853	20 August 2019	TCRT19/1649
	Microphone capsulte	MC230	A14127	20 August 2019	TCRT19/1649

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

4.4 Weather Conditions

Weather conditions for the environmental noise survey in Newport are shown in Figures B.1-6 in Appendix B.

To summarise;

- Friday 06/09/2019 – Weather conditions were dry but quite breezy.
- Saturday 07/09/2019 - Weather conditions were dry with wind speeds relatively low
- Sunday 08/09/2019 - Weather conditions were dry with wind speeds relatively low
- Monday 09/09/2019 – Rain showers through Monday between 0409-0614hrs, 0904-1224hrs, 0249-0309hrs, 0524-0814hrs, 1114-0024hrs. Wind speeds were moderate. We therefore let the meters run over Tuesday to Wednesday.
- Tuesday 10/09/2019 – Weather conditions were dry with wind speeds generally low.
- Wednesday 11/09/2019 - weather conditions were generally dry with rain showers between 0559-0614hrs & 0659-0714hrs. Wind speeds were generally low.

The initial intention was to monitor from Friday through to Tuesday morning to cover a week day (Monday) and weekend period. However due to poor weather conditions on the Friday and Monday, the meters were left to run through to Wednesday morning for a robust assessment.

4.5 Results

4.5.1 Continuous Monitoring

Figure B.7 & Figure B.8 in Appendix B show L_{Amax}, L_{Aeq} & L_{A90} sound pressure level time histories measured over consecutive 15-minute periods at Position A & B respectively.

Table 4-2 shows ambient L_{Aeq} 16-hour daytime and 8-hour night-time levels measured at positions A & B over the 5 day continuous monitoring.

Table 4-2 – Typical Ambient L_{Aeq}, Day And Night

Position A						
06/09/2019	Daytime	1015-2300hrs	$L_{Aeq,13hr}$	=	53.3	dB
	Night-time	2300-0700hrs	$L_{Aeq,8hr}$	=	47.6	dB
07/09/2019	Daytime	0700-2300hrs	$L_{Aeq,16hr}$	=	52.6	dB
	Night-time	2300-0700hrs	$L_{Aeq,8hr}$	=	45.8	dB
08/09/2019	Daytime	0700-2300hrs	$L_{Aeq,16hr}$	=	47.3	dB
	Night-time	2300-0700hrs	$L_{Aeq,8hr}$	=	46.6	dB
09/09/2019	Daytime	0700-2300hrs	$L_{Aeq,16hr}$	=	54.3	dB
	Night-time	2300-0700hrs	$L_{Aeq,8hr}$	=	47.8	dB
10/09/2019	Daytime	0700-2300hrs	$L_{Aeq,16hr}$	=	53.5	dB
	Night-time	2300-0700hrs	$L_{Aeq,8hr}$	=	46.4	dB
11/09/2019	Daytime	0700-1015hrs	$L_{Aeq,3hr}$	=	56.9	dB
	Night-time	2300-0700hrs	$L_{Aeq,8hr}$	=	N/A	dB
Position B						
06/09/2019	Daytime	1015-2300hrs	$L_{Aeq,13hr}$	=	56.9	dB
	Night-time	2300-0700hrs	$L_{Aeq,8hr}$	=	51.5	dB
07/09/2019	Daytime	0700-2300hrs	$L_{Aeq,16hr}$	=	56.4	dB
	Night-time	2300-0700hrs	$L_{Aeq,8hr}$	=	50.7	dB
08/09/2019	Daytime	0700-2300hrs	$L_{Aeq,16hr}$	=	57.3	dB
	Night-time	2300-0700hrs	$L_{Aeq,8hr}$	=	49.3	dB
09/09/2019	Daytime	0700-2300hrs	$L_{Aeq,16hr}$	=	58.9	dB
	Night-time	2300-0700hrs	$L_{Aeq,8hr}$	=	50.4	dB
10/09/2019	Daytime	0700-2300hrs	$L_{Aeq,16hr}$	=	58.6	dB
	Night-time	2300-0700hrs	$L_{Aeq,8hr}$	=	47.6	dB
11/09/2019	Daytime	0700-1015hrs	$L_{Aeq,3hr}$	=	61.1	dB
	Night-time	2300-0700hrs	$L_{Aeq,8hr}$	=	N/A	dB

Table 4.3 shows typical background L_{A90} levels measured over the survey period.

Table 4-3 – Typical Background L_{A90}, Day, Evening & Night

Position	Period	Typical L_{A90} (BS4142 2014)					
		06-07	07-08	08-09	09-10	10-11	11
A	Day (0700-1900hrs)	47	41	35	44	47	47
	Evening (1900-2300hrs)	38	40	34	40	38	-
	Night (2300-0700)	34	40	31	40	32	-
B	Day (0700-1900hrs)	45	41	41	43	43	47
	Evening (1900-2300hrs)	43	42	42	43	42	-
	Night (2300-0700)	39	40	38	39	38	-

Ambient and background levels at position A on the John Frost school site were controlled by road traffic. The meter position was away from external areas accessed by pupils during the day. Night time background levels were controlled by distant road traffic noise and possibly an element from Newport docks 1.3km to the east.

These results are used as the basis for setting environmental noise criteria at residential SSRs.

4.5.2 Criteria

We propose an environmental noise criterion such that the plant rating level (BS4142 2014) does not exceed the pre-existing typical background L_{90} at the noise sensitive receiver. A lower external limit of 35dBL_{Aeq} daytime/evening and 30dBL_{Aeq} night is applied, in the context of residences in an urban/suburban environment.

The following environmental noise criteria are therefore proposed based on the typical background L_{A90} levels as detailed in Table 4-3 above, applying a 5dB correction for the nature of the source;

Position	Period	L_{Aeq}		
		Weekday	Saturday	Sunday
A	Day (0700-1900hrs)	40	35	35
	Evening (1900-2300hrs)	35	35	35
	Night (2300-0700)	30	30	30
B	Day (0700-1900hrs)	38	36	36
	Evening (1900-2300hrs)	37	37	37
	Night (2300-0700)	33	35	33

**A lower limit of 35dBL_{Aeq} daytime/evening and 30dBL_{Aeq} night is applied, in the context of residences in an urban/suburban environment.*

These levels are well within the following WHO/BS8233 guidance albeit the guidance refers to more 'anonymous sources';

a) External for gardens (50-55dBL_{Aeq}),

b) Internal living & bedrooms 35/30dBL_{Aeq} (taking a -15dB loss through a partially open window off the proposed external criteria).

4.5.3 Source Plant Measurements

In order to assess noise emissions to residential receivers, we must first confirm source plant/operational noise levels on site to base the model on.

Table 4-4 below shows overall L_{Aeq} and L_{Amax} levels measured from various sources at the Tennant's existing factory. Levels were measured at 1m from the quoted plant/operation unless otherwise stated in the description. Table B.1 in Appendix B includes octave band frequency spectra used in the factory cladding analysis.

Table 4-4 - Source Plant/Operation Levels: dB(A)

Description (Measurements at 1m unless otherwise stated)	Duration	LAeq	LAFmax
Mill Line 1 (Level 1)	(0:0:10.0)	90.3	92.7
Ballmill @ 3m (Level 1)	(0:0:10.0)	91.5	93.3
Burner Fan (Level 1)	(0:0:10.0)	90.2	91.1
General Measurement @ Level 2	(0:0:10.0)	88.2	92.4
Mill (Level 2)	(0:0:9.0)	86.8	92.7
Fan Line 1 (Level 3)	(0:0:10.0)	89.3	91.7
Ignore	(0:0:9.0)	90.5	97.5
Charger Line 1 (Level 3)	(0:0:10.0)	89.5	97.2
Adjacent to Filter Line 1 (Not source - General @ Level 4)	(0:0:10.0)	86.9	92.7
Filter Valves @ 2m (Level 4)	(0:0:41.0)	85.8	101.7
Classifier Line 1 (Level 4)	(0:0:11.0)	83.7	87.7
Fan Exhaust (Level 4)	(0:0:10.0)	93.8	94.4
Bridge of CCM 5	(0:0:22.0)	85.7	92.5
Board Stacking @ 3M	(0:0:20.0)	81.4	85
Plastic Wrapping @ 3M	(0:1:45.0)	85.6	94.9
Water Tank Pump	(0:0:20.0)	79.9	81.8
Wheeled Loader @ 10-15m	(0:0:38.0)	73.7	80.7
Wheeled Loader @ 3m loading silo (NTI 04 has all @ 20m)	(0:0:47.0)	75.3	83.7
Base of Silo Feeder	(0:0:19.0)	75.7	85.2
Compressor Plantroom	(0:0:24.0)	80.9	82.1
Forklift including Reversing Beeper @ 3m	(0:0:26.0)	68.1	73.3
External Forklift including reversing beeper @ 5m	(0:0:34.0)	70.8	82.6
Mixer @ 5m level 1	(0:0:32.0)	80.2	81.8
Dosing Silo Level 1	(0:0:10.0)	75.5	77.4
Mixer Motor Level 2	(0:0:29.0)	76.5	77.8
Extract Fan Level 2 @ 3m	(0:0:11.0)	81.6	82.9
Water Spray on Plasterboard line	(0:0:9.0)	78.8	79.6
Drier Position 1	(0:0:15.0)	83	84.1
Articulated lorry loading @ 5m including taking off metal retaining sections and loading 1st pallet	(0:5:6.0)	68.3	87.4

Table 4.4 cont'd

Description (Measurements at 1m unless otherwise stated)	Duration	LAeq	LAFmax
External Position 1 20m from quiet side of factory (louver)	(0:0:30.0)	47.6	52.2
External Position 2 20m from quiet side of factory	(0:0:17.0)	47.2	52.2
Inside factory in line with external position 2	(0:2:19.0)	76.7	85.5
External position 2 10m from quiet side of factory	(0:2:27.0)	77	83.5
Inside factory in line with external position 2	(0:1:54.0)	47.5	53.3
External Position 3 20m from quiet side of factory (louver to storage area)	(0:0:59.0)	48.4	51.9
Ignore	(0:0:4.0)	48.5	50.2
Outside factory @ 20m far end from office	(0:0:19.0)	49	51
Inside factory (storage Area)	(0:0:14.0)	74.7	77.4
Outside Factory @ 10m	(0:0:10.0)	50.9	53.1
Outside factory @ 10m controlled by fans/discharges at around 50m	(0:0:21.0)	59.4	63.1
Outside Factory @ 20m, controlled by Fans @ 2nd and 3rd floor levels	(0:0:10.0)	68.1	69.3
Outside factory @ 20m controlled by fans at 3rd & 4th floor level	(0:0:19.0)	67.3	72.5
Outside Factory 20m from Calcification façade - door open	(0:0:59.0)	73.8	75.8
Outside Factory 20m from Calcification façade - door closed - Fans at level 4	(0:0:11.0)	70.6	71.2
Drier (half way down)	(0:0:10.0)	82.2	82.8
Drier	(0:0:19.0)	85.6	86.9
On Bridge over p'brd line at south End	(0:0:20.0)	85.9	88.4
Drier Ventilation fan (Level 2)	(0:0:13.0)	87.9	88.7
Drier (repeat of 28) Flue above	(0:0:15.0)	85.2	91.7
Drier where plasterboard leaves - impulsive as boards drop onto rollers	(0:0:20.0)	86.6	93.1
Calcination Level 1 General position	(0:1:11.0)	89	93
Calcination level 3	(0:0:36.7)	90	98
Filter Valves @ 2m (Level 4)	(0:0:36.7)	84	98
Calcination Level 4 General	(0:0:36.8)	87	92
Loading Silo @ 20m	(0:2:46.7)	70	83
Loading Silo full period @ 3m	(0:1:31.6)	76	92
Silo feeder	(0:0:23.3)	76	87
Compressor Plantroom	(0:0:26.1)	81	82
External Forklift including reversing beeper @ 5m (compare with Nor 22)	(0:1:26.2)	60	74
Mixer @ 5m level 1	(0:0:31.4)	80	81
Dosing Silo Level 2	(0:0:09.2)	76	77
Mixer Motor Level 2	(0:0:36.0)	76	78
Extract Fan Level 2 @ 3m	(0:0:10.5)	82	83
Drier	(0:0:17.4)	83	85
Articulated lorry loading @ 5m including taking off metal retaining sections and loading 1st pallett	(0:10:00.0)	70	92
Articulated lorry loading @ 5m long measurement	(1:07:25.5)	71	99
10m inside boundary fence quiet side of factory (50m approx)	(0:0:44.9)	49	54

5. NOISE MAP ASSESSMENT

Figure 5.1 below shows the new factory layout as shown on Stride Treglown Drawing

PROJECT | ORIGINATOR | ZONE | LEVEL | TYPE | ROLE | CLASS. | NUMBER	REVISION
153091-STL-00-00-DR-A-ZZZZ-01001	P29

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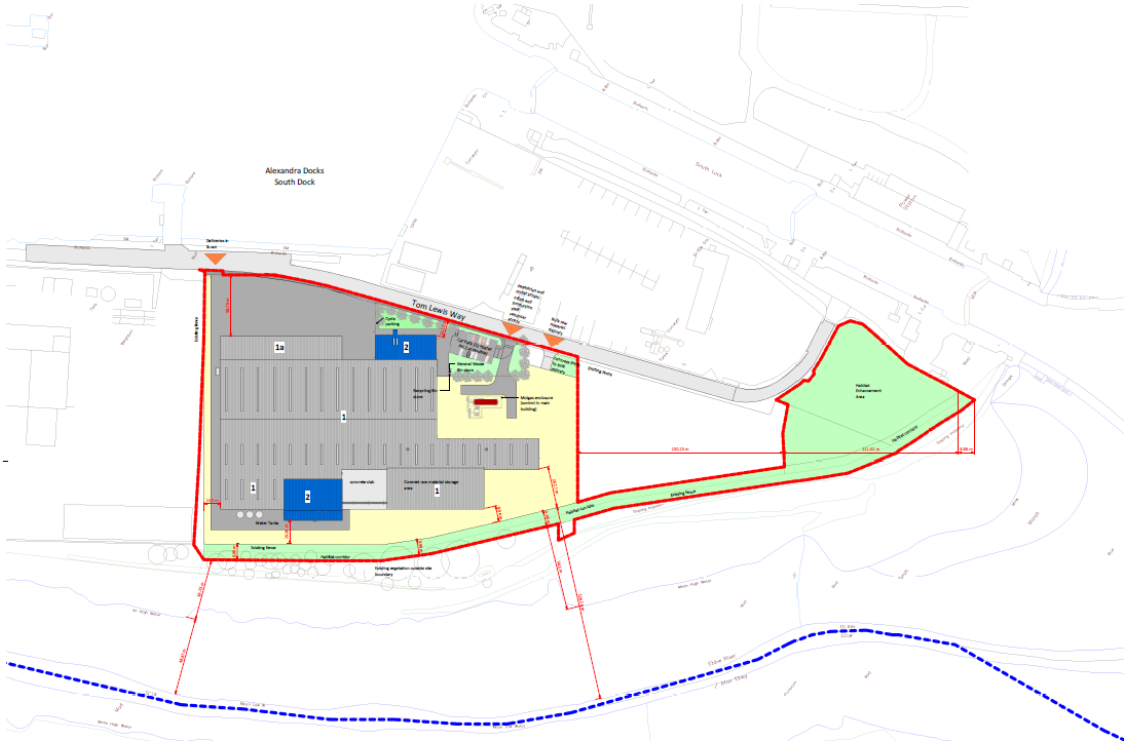
This is similar to the Tenant's existing factory site, except that raw materials are to be brought in by Tipper lorry from a neighbouring site within the ABP Newport Docks, rather than stored on site. Remaining plans/sections/elevations used in our assessment are detailed in Appendix C.

Figure 5.1 Proposed Factory Layout



Acoustic models have been set up using NoiseMap *Five* (5.1.6), which in turn uses methodology from BS 5228 Part 1: 2009. Losses are included for screening from buildings, site topography, distance ground & air absorption. The assessment refers to drawings as detailed in Appendix C.

BS4142 2014 uses a 1 hour reference period daytime (0700-2300hrs) and 15 minute night (2300-0700hrs).

The assessment is therefore based on;

i) Up to 4 articulated lorries per 'busy' hour (daytime)/1 articulated lorry per 15 minutes (night time) arriving on site, loaded (forklifts loading palleted plasterboard), and leaving site. This is assessed representative of 'busy' daytime hour and night time 15 minute periods.

ii) Up to 2 Tipper Lorries per hour daytime/1 per 15 minute (night time) arriving on site, depositing raw materials within the Silo Feeder building, and leaving. Wheeled loader loading Silo feeder for 15 minutes in any 1 hour period inside feeder building. This is assessed representative of a busy daytime hour and night time 15 minutes.

iii) Source plant levels measured at the Tennant's existing factory – runs continuously and therefore overall levels not affected by 1 hour day/15 minute night BS4142 reference period.

iv) A lightweight factory wall and roof cladding system providing the minimum octave band sound reduction performance quoted in Table 5-1 – Factory Cladding Sound Insulation Performance Requirement, as discussed in section 5.1 below.

5.1 External Building Fabric Review / Enclosure Specification

Calculations have been undertaken to confirm required sound reduction performance requirements for the existing factory building.

The assessment is based on source levels measured at the Tennant's existing factory, as well as source Tipper lorry data taken from BS5228:2009-1.

In order to meet proposed daytime and night time environmental noise criteria the external wall and roof cladding shall achieve the following octave band sound reduction performance (including around the enclosed raw materials storage area);

Table 5-1 – Factory Cladding Sound Insulation Performance Requirement

	Minimum Octave Band Rw : BSENISO140							
	63Hz	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
Insulated Wall/Roof Cladding panel	14	14	19	24	27	43	52	52

This is **not** a high cladding acoustic specification – equates to around Rw27.

The successful tenderers shall provide independent laboratory test data to BS EN ISO140 or equivalent, showing the above specification is met/allow their proposed system to be checked against the model.

The following 150mm Rainspan Kingspan system is currently being considered;

Sound Insulation Prediction (v7.0.6)

Program copyright Marshall Day Acoustics 2012

- Key No. 2517

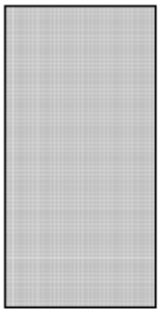
Margin of error is generally within Rw +/- 3 dB

Job Name:

Job No.: Page No.: Notes:

Date: 23 Jun 15 Initials:david bampton

File Name: insul

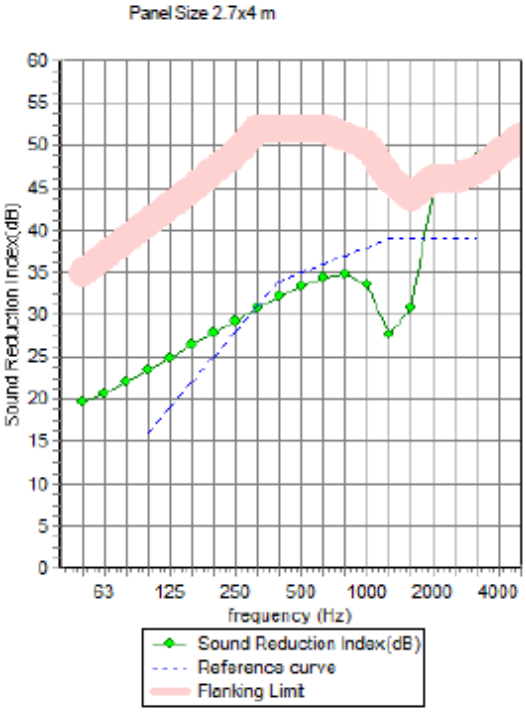


Rw 34 dB
C -2 dB
C_{tr} -4 dB

System description

Panel 1 Outer layer: 1 x 150.0 mm Rainspan- (m=27.9 kg/m2, fc=25000 Hz, Damping=0.01) Profile

frequency (Hz)	TL(dB)	TL(dB)
50	20	
63	21	21
80	22	
100	23	
125	25	25
160	26	
200	28	
250	29	29
315	31	
400	32	
500	33	33
630	34	
800	35	
1000	34	31
1250	28	
1600	31	
2000	45	34
2500	47	
3150	49	
4000	50	50
5000	52	



The above is indicated to control noise levels at critical residential Sound Sensitive Receiver's (SSR's) to within the proposed environmental noise limits.

For night operation in particular all external doors on the west elevation and returns must be closed and maintain the above cladding sound insulation performance.

Single access doors: A solid core single leaf door 28kg/m^2 with rebated neoprene seals to head and jambs should be sufficient.

Roller shutter/large doors: Tenderer(s) shall confirm their door system meets the quoted sound reduction performance for the complete door system including frames/seals. Ensure doors on the critical west façade and returns are kept closed during critical night time hours and opened/ closed promptly during the day to minimise noise break-out.

For information, the following roller shutter door system is indicated to meet the specification (other suppliers are available);

SAFE-door Industries Ltd

separating environments through innovation

Frequency f [Hz]	R 1/3 Octave [dB]
100	24.2
125	21
160	24.8
200	25.2
250	25.1
315	24.7
400	24.7
500	24.3
630	24.7
800	26.6
1000	33.3
1250	38.6
1600	40.8
2000	44.2
2500	43.6
3150	42.1
R_w	31
C	-1
Ctr	-3

5.2 External Operations

The assessment is based on source levels measured at The Tennant's existing site, as well as source Tipper lorry source noise data taken from BS5228.

Source octave band sound pressure levels for external operations scheduled to occur at Newport are shown in Table B.1 in Appendix B, overall L_{Aeq} levels are shown in Table 5.2 below, with the estimated 'on-time'/number of movements in a typical busy hour;

Table 5-2 – External Operations

Source		LAeq	LAF max	On Time min/hr
Loading Silo @ 20m	(0:2:46.7)	70	83	15
Articulated lorry loading @ 5m including taking off metal retaining sections and loading 1st pallett	(0:10:00.0)	70	92	60
Articulated lorries arrive/load & leave @ 5m 1 hour measurement	(1:07:25.5)	71	99	60
Tipper Lorry (BS5228 Part 1, Table C8, Ref No 20)			79*	
** Drive-by maximum Lp @ 10m*				

We would suggest these external operations are relatively limited in the context of a site on the end of an existing well established docklands area, bearing in mind;

a) Vehicle movements for raw material are largely limited to daytime hours during normal operations. On exceptions, lorry movements may occur outside of these hours e.g. following periods of maintenance outages to maintain production.
b) The majority of deliveries are to take place during daytime hours, though delivery at night will be required from time to time in order to meet customer requirements.
c) Raw Material Storage where Silo loading takes place at the Newport site is to be enclosed in factory wall/roof cladding meeting minimum SRI performance specified in section 5.1 above.

Figure 5.2 & Figure 5.3 below show daytime $L_{Aeq,1hr}$ and night time $L_{Aeq,15min}$ noise maps predicting plant levels to the closest residential SSRs at 1st floor level.

BS4142 2014 uses;

i) A 1 hour reference period for daytime assessment, which means a -6db correction for % on time is applied to the measured wheeled loader 'loading Silo' levels in Table 5.2 above.
ii) 15 minute reference period for night time operations, which means no correction for % on time applies for wheeled loader 'loading Silo' operations.

Overall therefore the model includes;

Daytime: 2 Tipper Lorries and 4 Articulated Lorries per hour in/out/loading assessed representative of a typical 'busy' daytime hour.

Silo feeder/wheeled loader operations within the enclosed raw materials storage area (15 minutes per hour : 25% on time).
Noise break-out through the main factory wall/roof cladding discussed in section 5.1 above.

Night: 1 Tipper Lorry and 1 Articulated Lorry per 15 minute period in/out/loading assessed representative of a 'busy' 15 minute night time period.
Silo feeder/wheeled loader operations within the enclosed Silo Feeder station (15 minutes : 100% on-time).
Noise break-out through the main factory wall/roof cladding discussed in section 5.1 above.

Figure 5.2 – Noise Map NM1: Daytime $L_{Aeq,1hr}$ Levels at 4.0m Above Local Ground Height

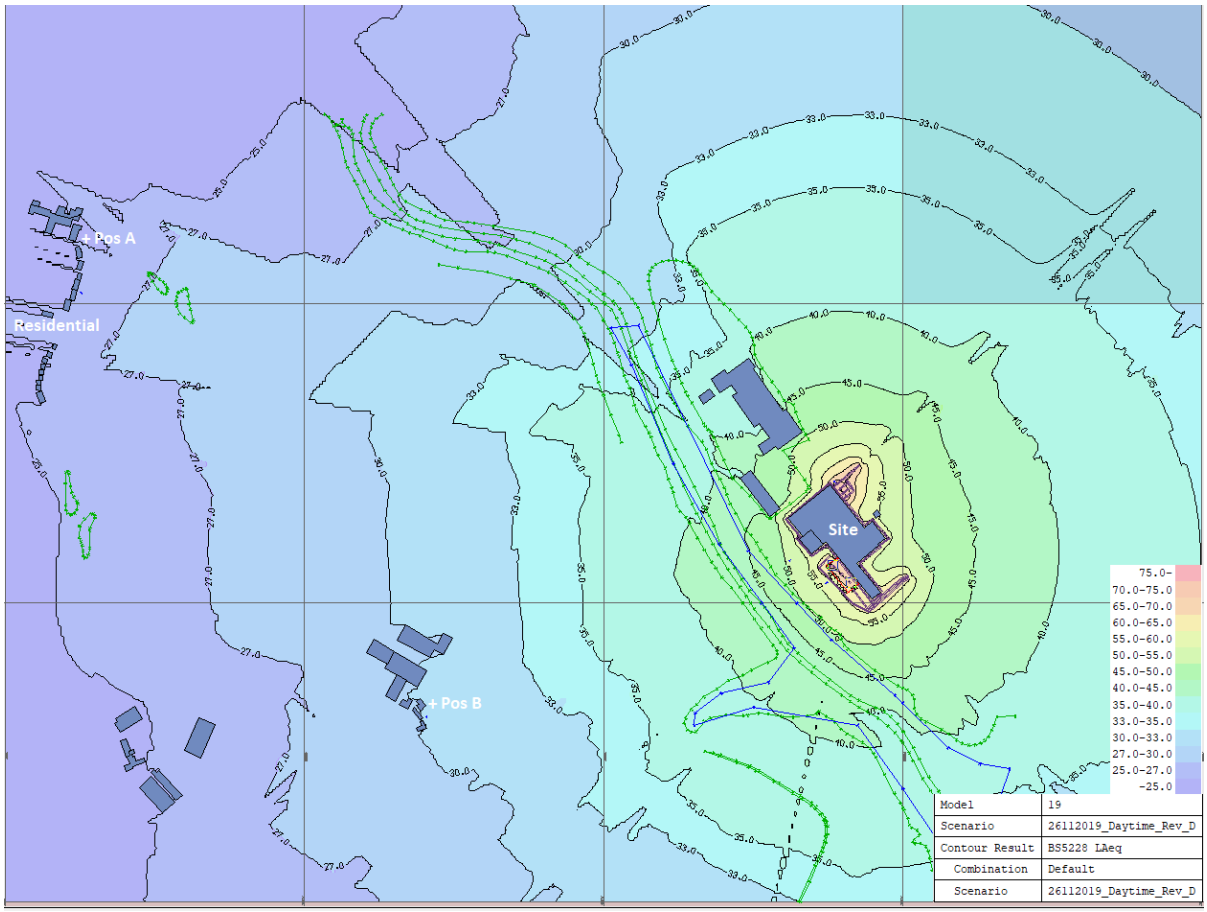


Figure 5.3 – Noise Map NM2: Night $L_{Aeq,15min}$ Levels at 4m Above Local Ground Height

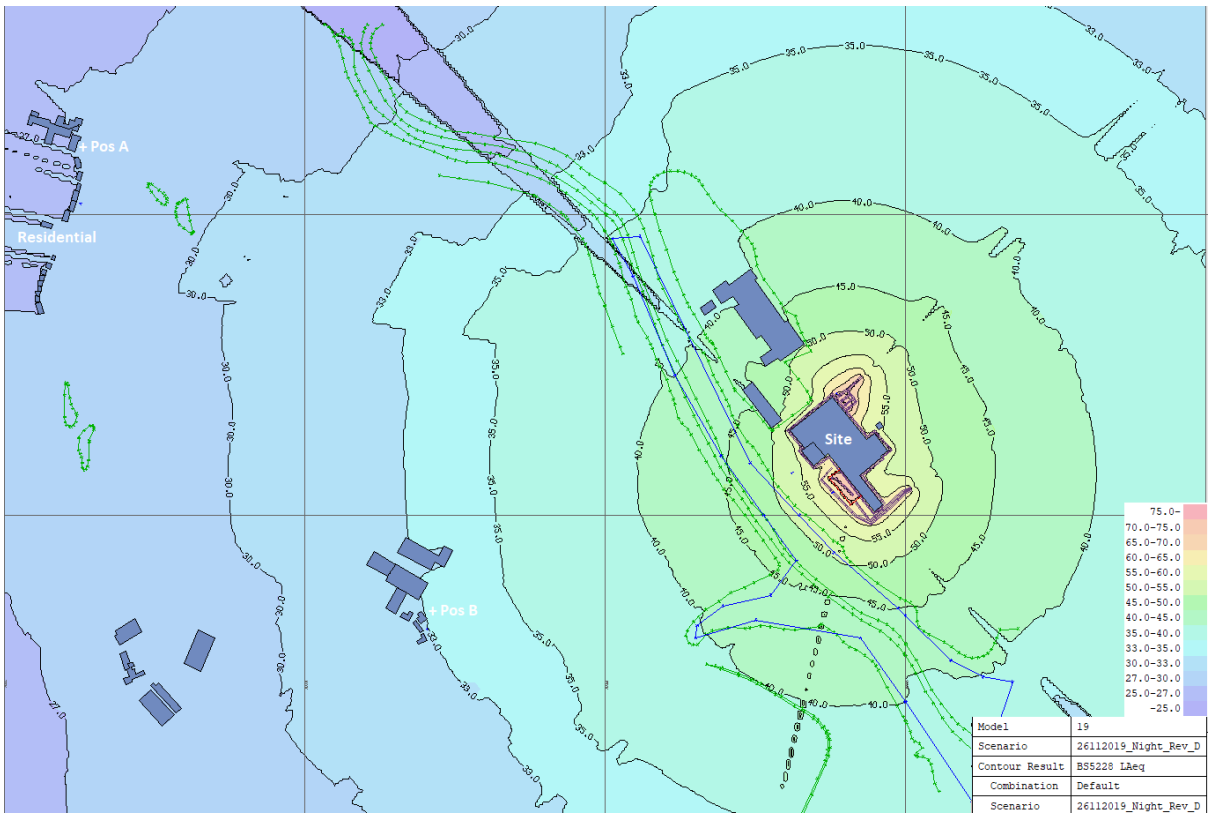


Table 5-3 compares predicted $L_{Aeq(1hr)}$ daytime and $L_{Aeq(15\ minute)}$ night time levels at residential receivers adjacent to positions A & B, with environmental noise criteria proposed earlier in this report.

Table 5-3 – Predicted levels at residential receivers

Period	Position A Residences: Predicted L_{Aeq}	Position A: Criterion L_{Aeq}	Conclusion
0700-1900hrs	26.2	35	Meets criterion
1900-2300hrs	26.2	35	Meets criterion
2300-0700hrs	28.4	30	Meets criterion
Period	**Position B Farm: Predicted L_{Aeq}**	**Position B: Criterion L_{Aeq}**	**Conclusion**
0700-1900hrs	30.1	36	Meets criterion
1900-2300hrs	30.1	36	Meets criterion
2300-0700hrs	33	33	Meets criterion

Predicted levels are therefore indicated to meet proposed criteria.

6. GOOD PRACTICE/BEST AVAILABLE TECHNIQUES (BAT)

The following is proposed to reduce noise impact;

i) Articulated Lorry 'Goods-out' has direct access to Tom Lewis Way.
ii) Silo feeder loading operations to be enclosed.
iii) Access road for Tipper Lorries designed to minimise use of reversing beepers.

Main Building Access Doors

Acoustically rated access doors (including large/roller shutter doors) are proposed on the critical western elevation and returns.

Reversing Alarms

Should be broadband self-adjusting volume systems that automatically set the volume relative to the prevailing ambient level, rather than tonal (provided this is acceptable from a Health & Safety viewpoint).

Access Routes/Yard areas

The yards and access roads shall be smooth with no speed humps, as these could;

a) Generate impact noise.
b) Generate higher vehicle noise levels while braking and accelerating.

Forklift/Combi-lift Operation

The new factory layout has external Forklift operations away from the closest residential receivers (Goods-Out is on the eastern side of the factory).

Building Services Plant and main Flues/Intakes/Discharges

'Shall be designed to an initial design source limit of 60dB(A) @ 3m, in order to avoid exceeding environmental criteria at the residential SSR's with all plant operating normally. A detailed review of services plant should be included at detailed design stage. However with a minimum 600m+ distance to the closest residential receiver, implications for attenuating plant/openings should not be excessive.

It is important to ensure all plant is supported independent of the main lightweight factory structure to avoid the risk of structure-borne noise/drumming. Building services plant and associated duct/pipework can be supported off structural steels with appropriate proprietary vibration isolation.

7. CONSTRUCTION SITE NOISE & VIBRATION MANAGEMENT

As a detailed construction programme is not currently available, quantitative predictions of site noise have not been undertaken at this stage. As an alternative, noise limits are proposed for construction activities at the nearest potentially affected SSR's.

The noise limits are based on existing pre-construction ambient L_{Aeq} noise levels, in accordance with BS5228-1 2009 'ABC' methodology.

7.1 Site Noise Limits (BS5228 Part 1: 2009)

E.3.2 Example method 1 – The ABC method

Table E.1 shows an example of the threshold of significant effect at dwellings when the total noise level, rounded to the nearest decibel, exceeds the listed value. The table can be used as follows: for the appropriate period (night, evening/weekends or day), the ambient noise level is determined and rounded to the nearest 5 dB. This is then compared with the total noise level, including construction. If the total noise level exceeds the appropriate category value, then a significant effect is deemed to occur.

Table E.1 Example threshold of significant effect at dwellings

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A [A]	Category B [B]	Category C [C]
Night-time (23.00–07.00)	45	50	55
Evenings and weekends [D]	55	60	65
Daytime (07.00–19.00) and Saturdays (07.00–13.00)	65	70	75

NOTE 1 A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.

NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total L_{Aeq} noise level for the period increases by more than 3 dB due to construction activity.

NOTE 3 Applied to residential receptors only.

[A] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

[B] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

[C] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

[D] 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.

Referring to Table 4-2 of this report, the following existing/pre-construction ambient daytime levels rounded to the nearest 5dB are indicated;

Position A: Morgan Way, Dyffryn: 55dBL_{Aeq} weekdays/50dBL_{Aeq} Saturday

Position B: New Dairy Farm: 60dBL_{Aeq} weekdays/55dBL_{Aeq} Saturday

A site noise limit of 65dBL_{Aeq} is therefore indicated at Positions A & B.

Position B is indicated to be the critical receiver as there is 'only' 680m distance loss from the site, compared with 1300m to Position A receivers.

A detailed site noise prediction model could be set up once details of the construction methodology are confirmed, if assessed necessary. However, given the distances involved, the Local Authority may assess this site can be controlled by conditioning site operating hours, possibly with additional conditions on Piling operations (see below). At 680m to the closest residential receiver, source site sound power levels are indicated to fall by around 70dB with distance, air & ground absorption losses. At this distance vibration is also not indicated to be an issue, though industrial sites immediately adjacent to the development site should be checked for any vibration sensitive equipment.

Inevitably on most construction sites, significant noise levels are generated in the immediate vicinity. It is the duty of the contractor to use 'best practical means' to minimise noise levels.

BS5228:2009 Part 1 – 'Code of Practice for Noise & Vibration Control on Construction and Open sites' gives guidance on 'best practical means' on basic procedures and methods of controlling noise.

The main issues are listed below;

1) Quietest plant available should be selected, or where possible existing plant modified to reduce noise. Manufacturers often have attenuation kits for their equipment.
2) All equipment shall be properly maintained and switched off/throttled down to the minimum required when not in use, so no unnecessary noise is caused.
3) All access roads should be kept clean and maintained in a good state of repair to avoid unwanted rattle and "body slap" from vehicles.
4) Any reversing alarms fitted to vehicles should be minimised as far as is reasonably practicable and subject to maintaining site safety. This could involve automatic alarm volume setting relative to site ambient noise levels; and / or manoeuvring vehicles in a circular manner to avoid the use of reversing alarms.
5) Site layout should locate the noisiest stationary plant as far as is practicable from critical receivers, and allow mobile plant to enter and exit site in a forward direction except where space limitations do not allow this.
6) The operatives of the site should be made aware of noise control requirements and trained to employ appropriate techniques to keep site noise to a minimum including;
    i) The proper use and maintenance of equipment,
    ii) The positioning on site of machinery to limit emissions to critical neighbouring receivers and site personnel,
    iii) The avoidance of unnecessary noise when carrying out manual operations and when operating plant,
    iv) The protection of persons against excessive noise.
7) Operatives working in noisy areas to be monitored to ensure they are wearing all necessary hearing protection and not exceeding their permitted exposure levels.

8) Local residents to be informed in advance of starting works in sensitive areas, and working hours confirmed (in particular for potentially noisy operations such as piling).

   However, bearing in mind the large distance losses to the closest SSR's this site should not be considered critical with respect to site noise emissions.

9) Options for potentially noisy operations to be reviewed – in particular piling. BS5228 advises;

> **8.5.2.1 Selection of piling method**
>
> The selection of a method to be used for the installation of piles will depend on many factors (see Annex H for types of piling). A decision regarding the type of pile to be used on a site should not be governed solely by noise, but should also take into account criteria such as loads to be carried, strata to be penetrated and the economics of the system, e.g. the time it will take to complete the installation and other associated operations such as soil removal. In some cases, adjacent land uses can play a significant role in the choice of piling technique, e.g. due to the effects of noise.
>
> It might not be possible for technical reasons to replace a noisy process by a quieter alternative. Even if it is possible, the adoption of
>
> a quieter method might prolong the piling operation; the net result being that the overall disturbance to the community, not only that caused by noise, will not necessarily be reduced.

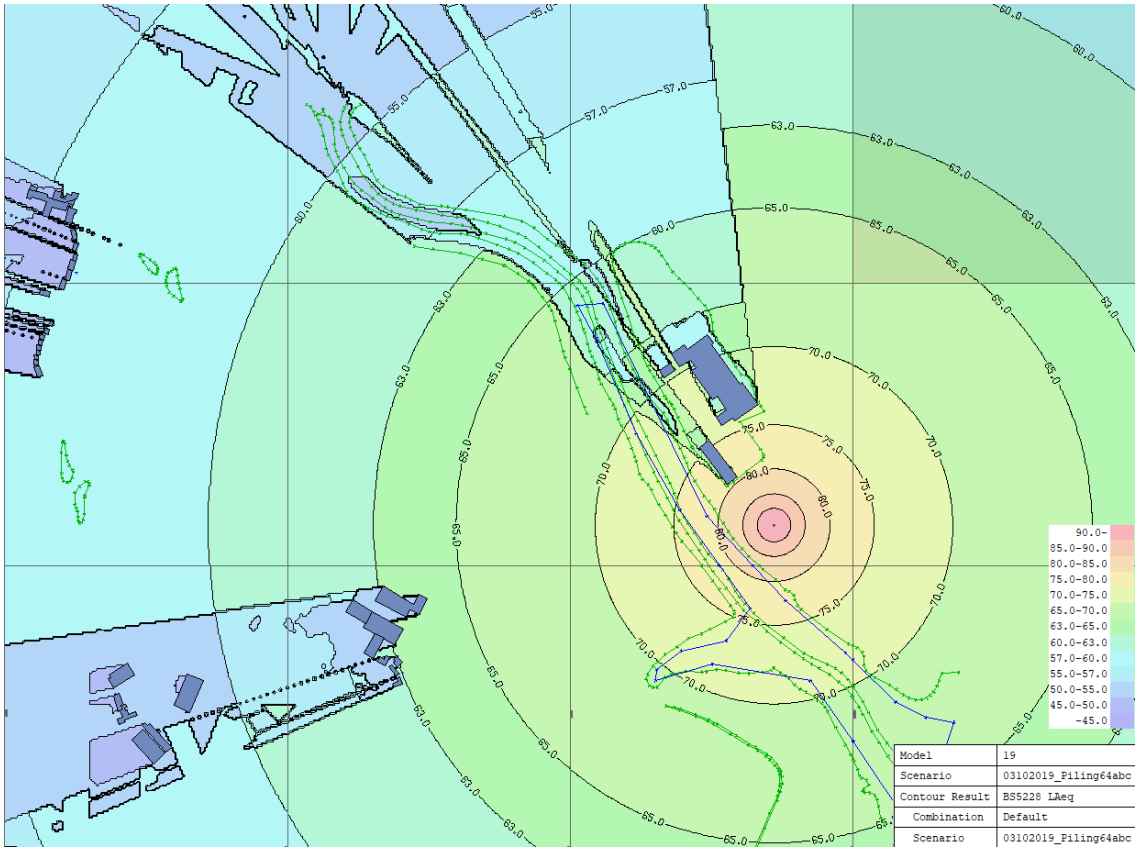
7.2 Preliminary Piling Noise Map Assessment (BS5228 Part 1: 2009)

As the 'worst case' potential site noise source, an initial piling assessment has been carried out based on the following source data from BS5228 Part 4;

Ref no.	Pile		Method	Energy, power rating	Dolly	Sound power level L_{WA}	Soil	Cycle time	On-time	Activity equivalent continuous sound pressure level L_{Aeq} at 10 m (1 cycle)	
	Depth	Width									
	TUBULAR STEEL CASING/PILE CAST IN PLACE										
64(a)	14	0.4 dia.	Drop hammer	4 t, 1.2 m drop	Resilient composite pad	132	Dense sand	45 min	40	100	100
64(b)	14	0.4 dia.		4 t, 1.2 m drop	Resilient composite pad	125	Dense sand	45 min	20	90	
64(c)	14	0.4 dia.	Drop hammer, extracting casing	4 t	Resilient composite pad	118	Dense sand	45 min	5	77	

The following Noise Map shows contours predicted across the surrounding area from this piling activity.

Figure 7.1 – Noise Map NM3: Piling $L_{Aeq(1\ hour)}$ Levels at 4m Above Local Ground Height



The following levels are predicted at the closest residential receivers;

Position A: 57.6dBL_{Aeq}

Position B: 63.0dBL_{Aeq}

Therefore, based on a 'worst case' piling site source, the 65dBL_{Aeq} site noise criteria are indicated to be met at the closest residential receivers.

7.3 Off-Site Traffic Noise Impact on Existing Roads

The Department of Transport's 'Design Manual for Roads & Bridges' includes the following classification for the magnitude of impact of changes in road traffic noise level. For Construction site traffic the 'short term' advice is assessed appropriate guidance, whilst for operational traffic, the 'Long Term' advice is assessed appropriate.

3.37 A change in road traffic noise of 1 dB $L_{A10,18h}$ in the short term (e.g. when a project is opened) is the smallest that is considered perceptible. In the long term (typically 15 years after project opening), a 3 dB $L_{A10,18h}$ change is considered perceptible. The magnitude of impact should, therefore, be considered different in the short term and long term. The classification of magnitude of impacts to be used for traffic noise is given in Table 3.1 (short term) and Table 3.2 (long term).

Noise change, $L_{A10,18h}$	Magnitude of Impact
0	No change
0.1 – 0.9	Negligible
1 – 2.9	Minor
3 – 4.9	Moderate
5+	Major

Table 3.1 – Classification of Magnitude of Noise Impacts in the Short Term

Noise change, $L_{A10,18h}$	Magnitude of Impact
0	No change
0.1 – 2.9	Negligible
3 – 4.9	Minor
5 – 9.9	Moderate
10+	Major

Table 3.2 – Classification of Magnitude of Noise Impacts in the Long Term

DMRB also advises;

ii) changes in traffic volume on existing roads or new routes may cause either of the threshold values for noise to be exceeded. A change in noise level of 1 dB $L_{A10,18h}$ is equivalent to a 25% increase or a 20% decrease in traffic flow, assuming other factors remain unchanged and a change in noise level of 3 dB $L_{A10,18h}$ is equivalent to a 100% increase or a 50% decrease in traffic flow;

For this site we are looking at access roads on and approaching an existing, well-established main docklands area. Both construction and operational traffic is not therefore assessed likely to approach (or come close to) the % of overall flow rates required to generate any significant impact on the existing road traffic noise climate. Impact of traffic associated with the construction site and operations on existing roads is therefore indicated to be negligible.

8. CONCLUSION

A Manufacturing Facility is proposed at ABP Newport Docks, Newport, NP20. The facility is to operate 24/7.

Environmental noise limits are proposed, based on results of an environmental noise survey covering weekday and weekend periods. These limits should be confirmed acceptable with the local authority planners/EHO prior to any orders being placed.

8.1 Operational Noise

A noise breakout assessment has been carried out to the closest residential receivers covering daytime and night time operation, with specifications included for the main factory wall/roof cladding, access doors and service/ventilation plant/intakes/discharges.

The Tenant's proposals to limit noise impact from the new facility have been incorporated into the assessment. This includes enclosing the Silo feeder station (wheeled loader loading raw material into Silo feeder hopper) at the Newport facility.

With the site located on the edge of a well-established working docks area, and a minimum 680m to the closest Sound Sensitive Receiver (SSR), implications for controlling plant & operational noise emissions are not indicated to be excessive. Insulated panels and roller shutter doors are commercially available capable of meeting the required sound reduction performance and examples have been included in this report – other suppliers are available.

A detailed noise map analysis has been carried out incorporating main factory building and external operation sources, confirming the proposed site meets proposed environmental noise criteria daytime and night time.

8.2 Construction Site Noise & Vibration

Advice has also been included on Best Practical Means of controlling construction site noise & vibration.

Again, bearing in mind the large distance losses to the closest SSR's (680m minimum), this site should not be considered critical with respect to site noise emissions. The adjacent industrial sites on the docks should be checked for any vibration sensitive equipment, bearing in mind potential piling operations.

As a detailed construction programme is not currently available, detailed quantitative predictions of site noise have not been undertaken at this stage. However an initial noise map has been plotted for a 'worst case' drop hammer tubular steel casing piling site source for initial guidance.

Predicted levels at residential receivers are indicated to meet daytime (Monday-Friday & Saturday morning) site noise limits proposed using BS5228 Part 1 2009 methodology.

An initial review of the impact of off-site construction and operation traffic on existing roads has also been included. Impact of traffic associated with the construction site and operations on existing roads is indicated to be negligible.

8.3 Noise Impact on Ecological Receptors

The impact of operational or construction noise on ecological receptors is outside the scope of this report, and this is to be considered within the Ecological Impact Assessment [to be provided by others].

APPENDIX A - ACOUSTIC TERMINOLOGY

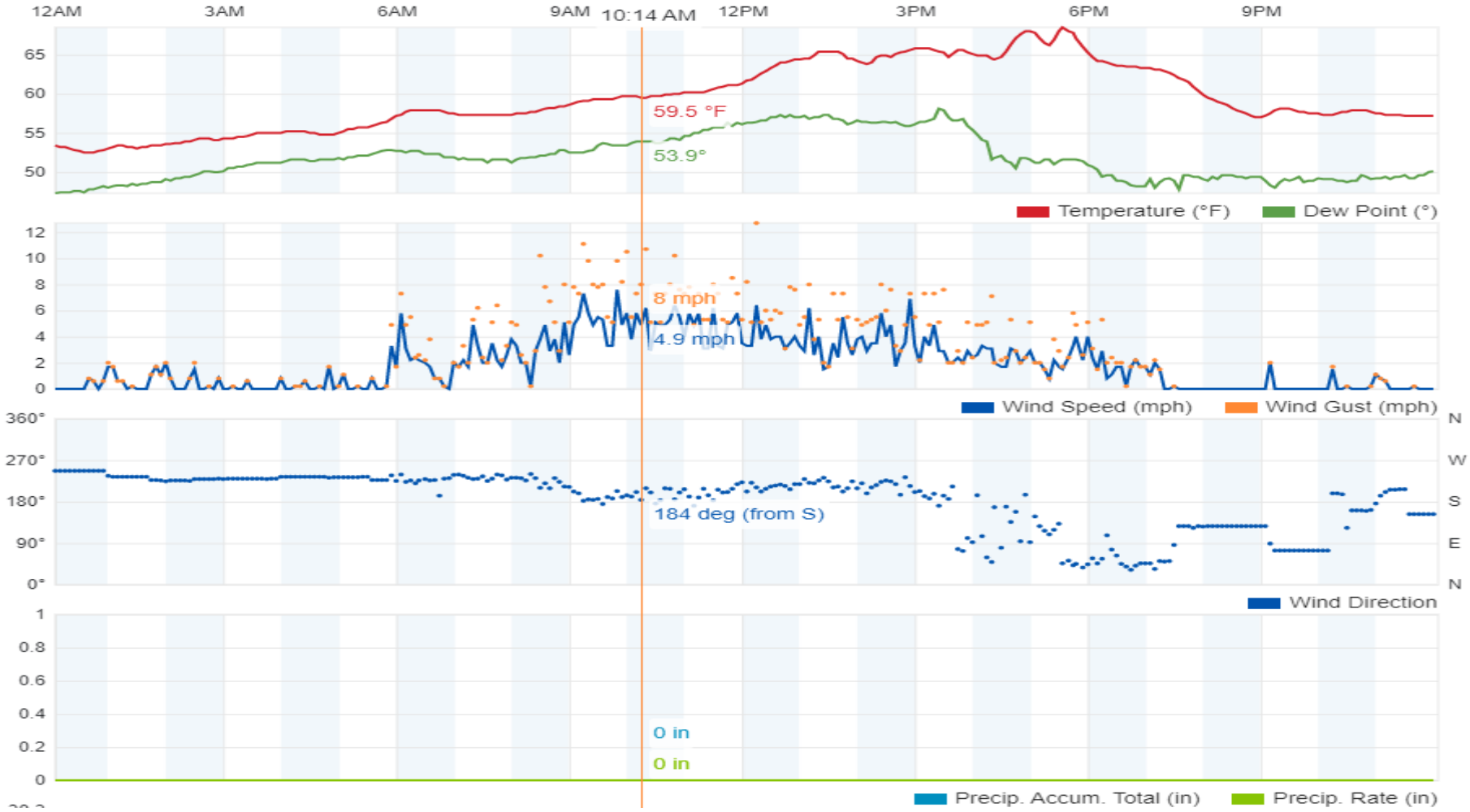
Human response to noise depends on a number of factors including loudness, frequency content and variations in level with time. Various frequency weightings and statistical indices have been developed in order to objectively quantify 'annoyance'.

The following units have been used in this report:

dB(A)	The sound pressure level A-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_{max}	The highest instantaneous sound level recorded during the measurement period.
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 - used as a measure of background noise.
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 - used as a measure of background noise.
$L_{Ar,Tr}$	The 'rating' level, as described in BS 4142:2014 – the specific noise plus any adjustment for the characteristic features of the noise.
SSR	Sound sensitive receiver

APPENDIX B - DIAGRAMS, GRAPHS AND TABLES

Figure B.1 – Approximate Weather History For Continuous Monitoring Period (06/09/2019)



** Taken from www.wunderground.com - weather station INEWPRT49 located in Newport, Elev 66 ft, 51.59 °N, 2.98 °W*

Figure B.2 – Approximate Weather History For Continuous Monitoring Period (07/09/2019)

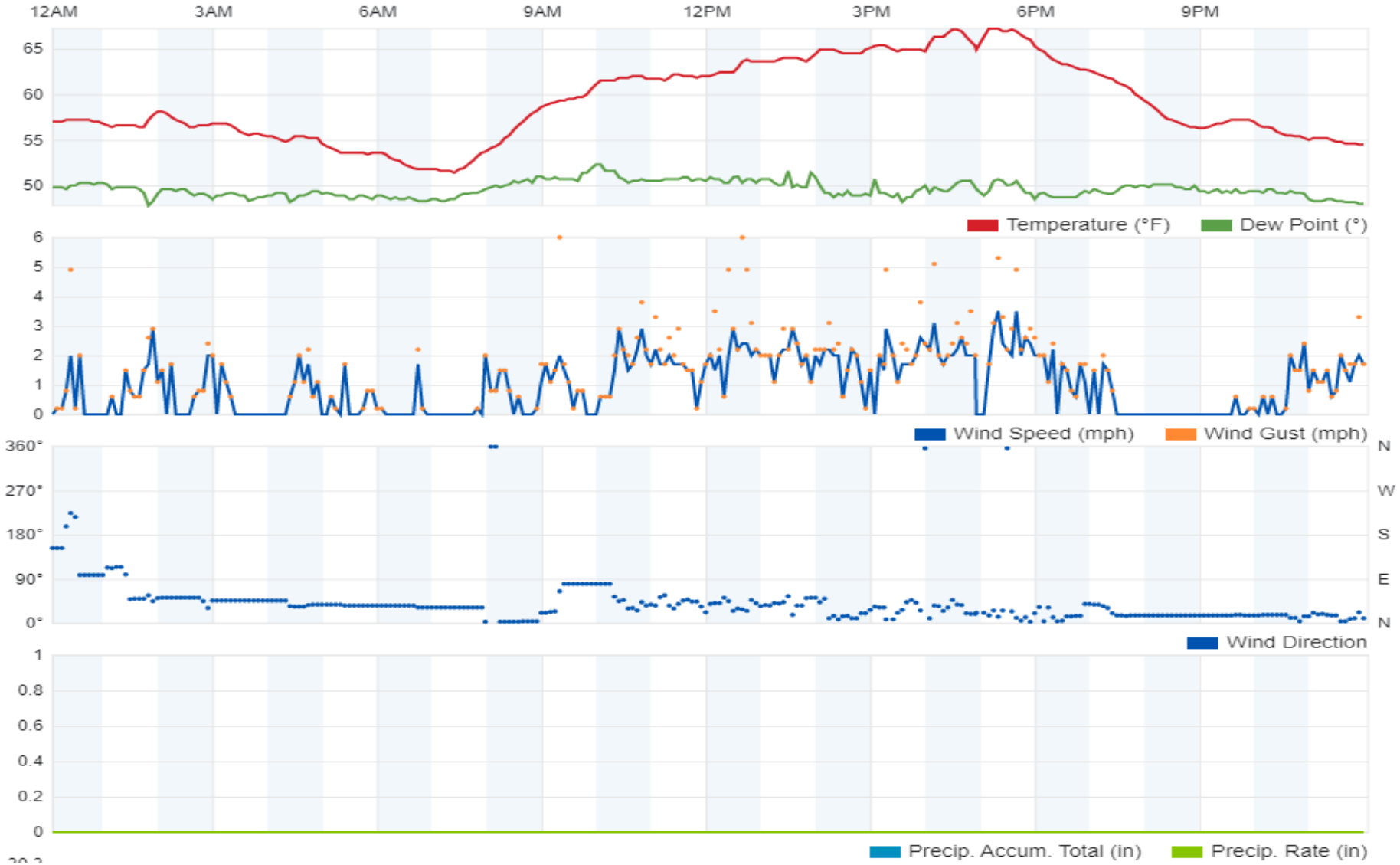


Figure B.3 - Approximate Weather History For Continuous Monitoring Period (08/09/2019)

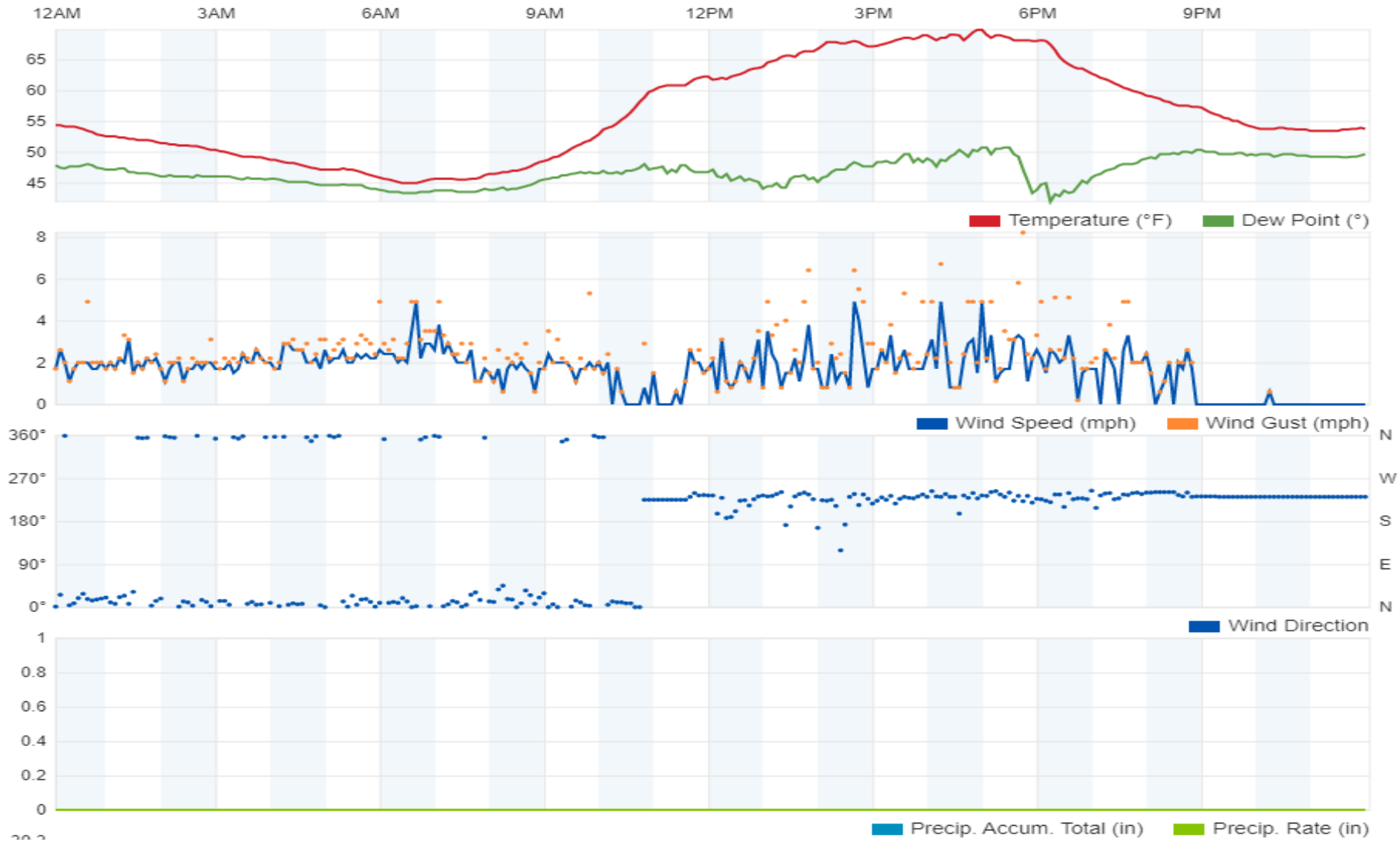


Figure B.4 - Approximate Weather History For Continuous Monitoring Period (09/09/2019)

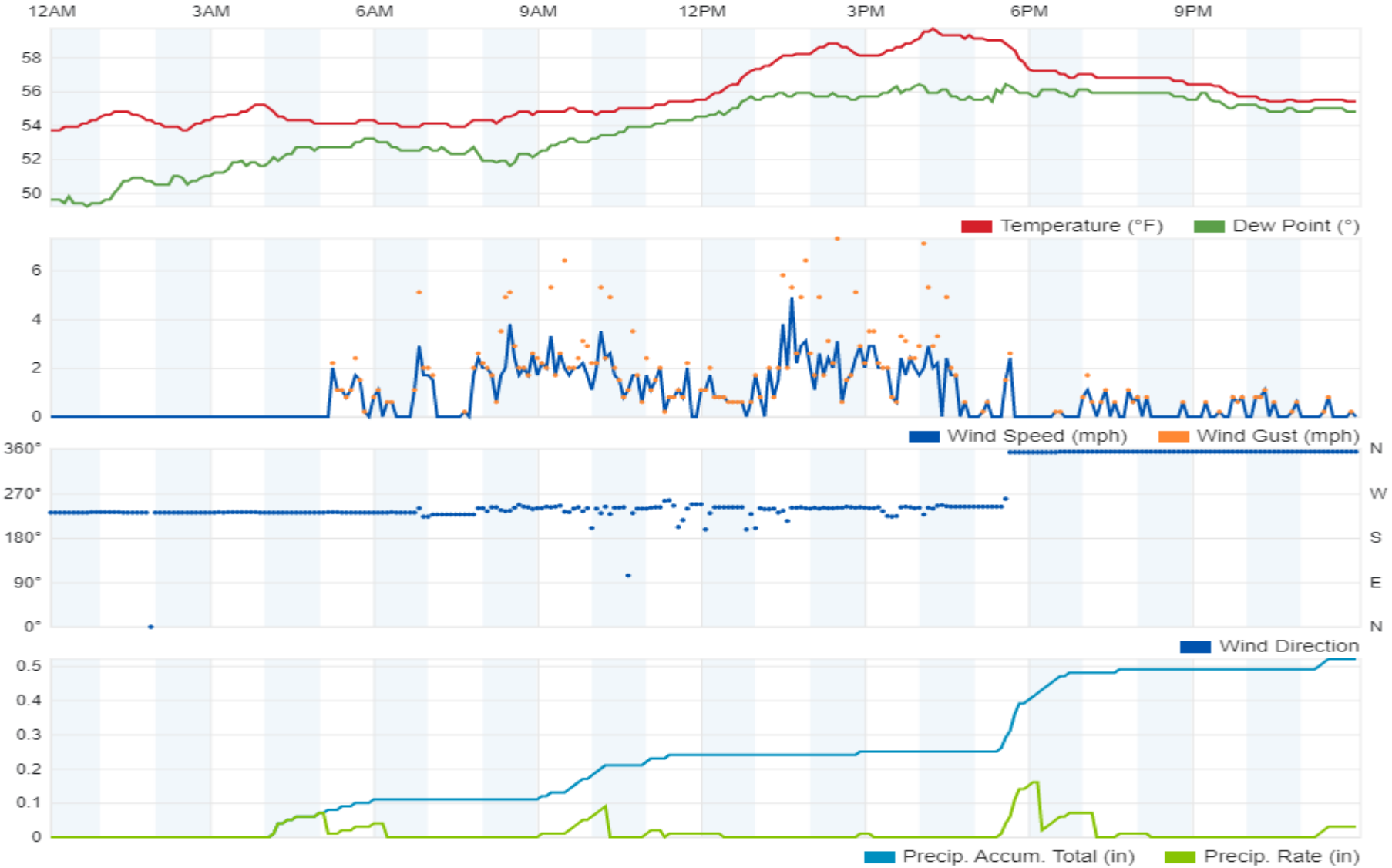


Figure B.5 - Approximate Weather History For Continuous Monitoring Period (10/09/2019)

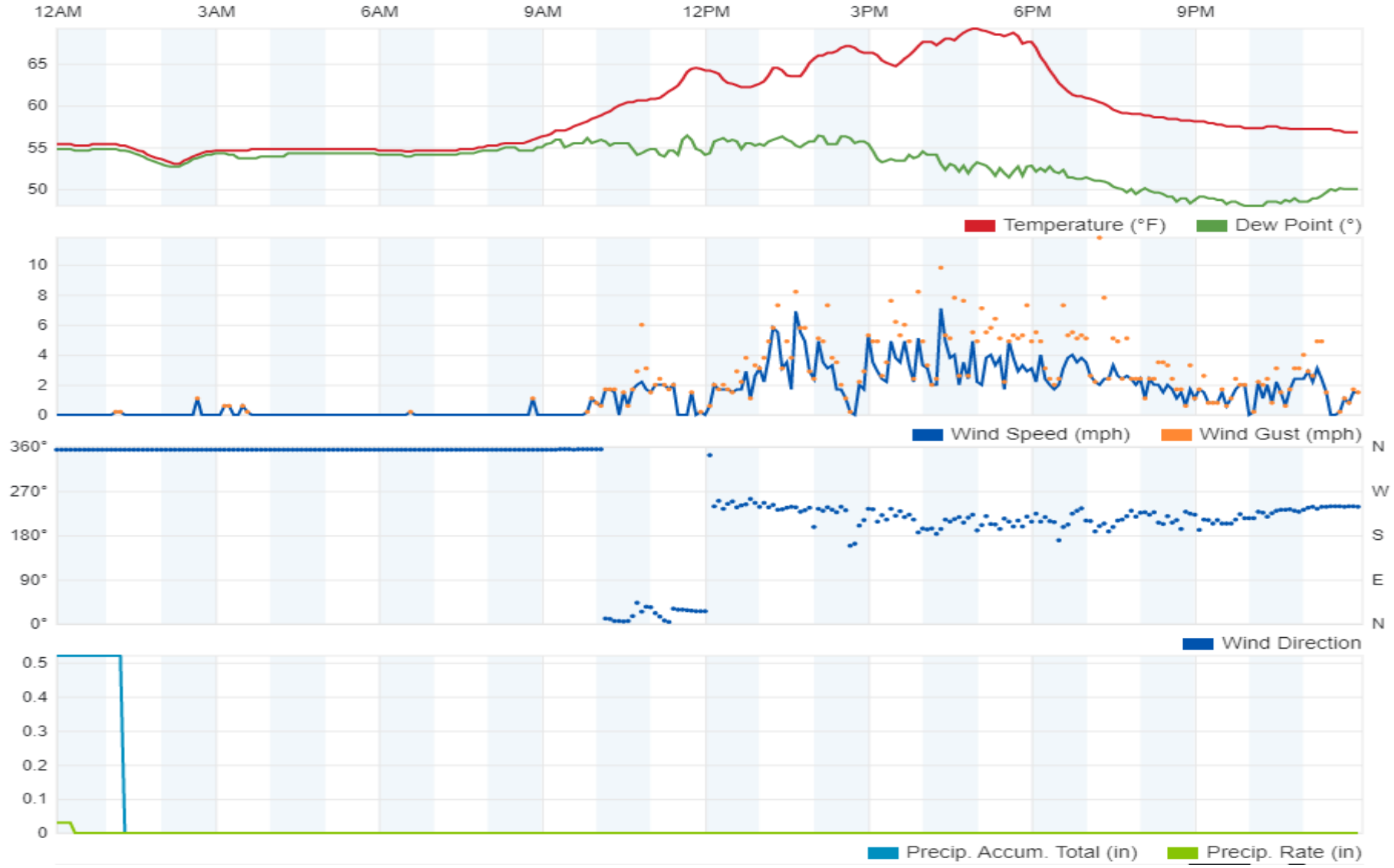


Figure B.6 - Approximate Weather History For Continuous Monitoring Period (11/09/2019)

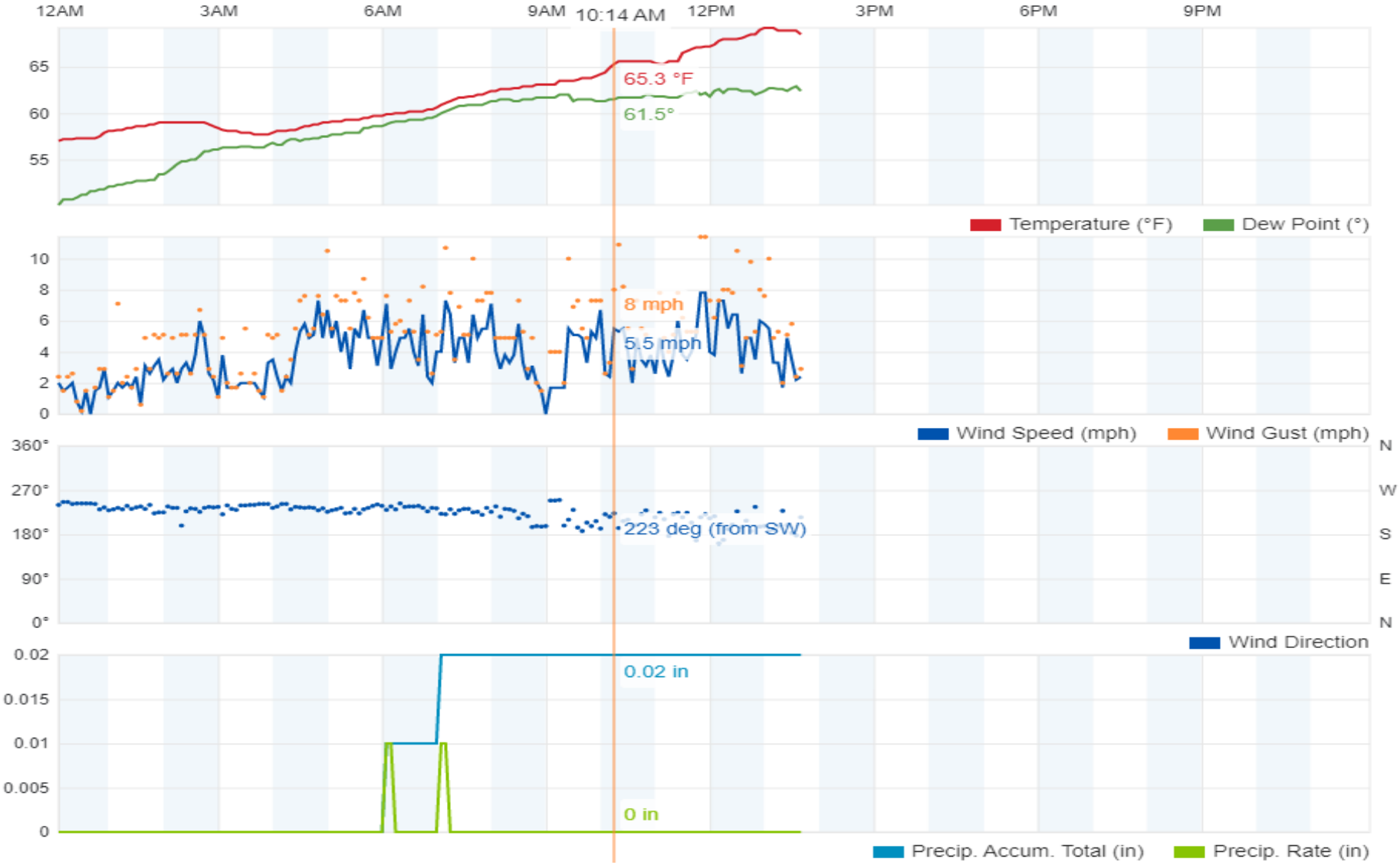


Figure B.7 – Continuous Monitoring At Position A

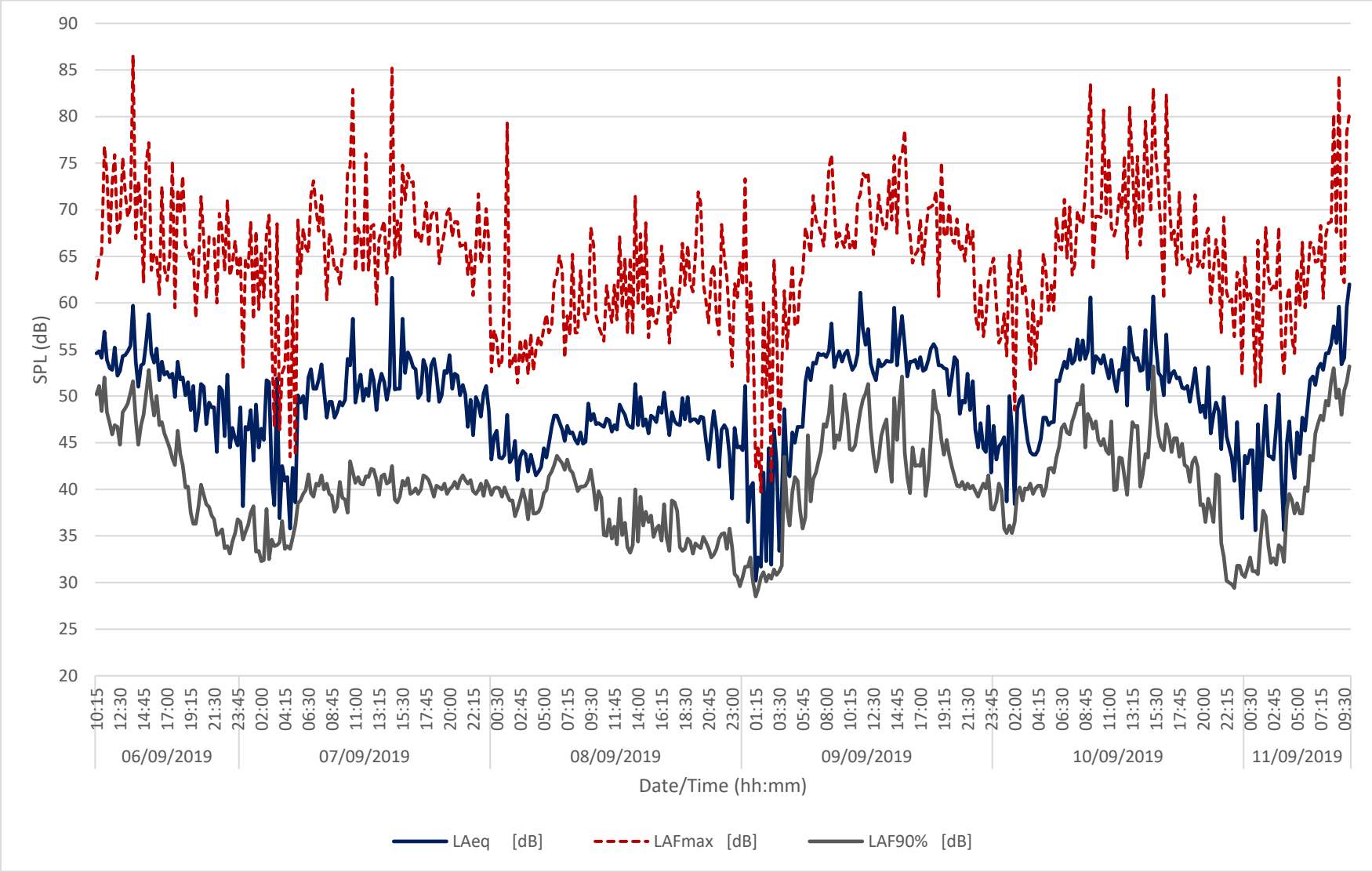


Figure B.8 – Continuous Monitoring at Position B

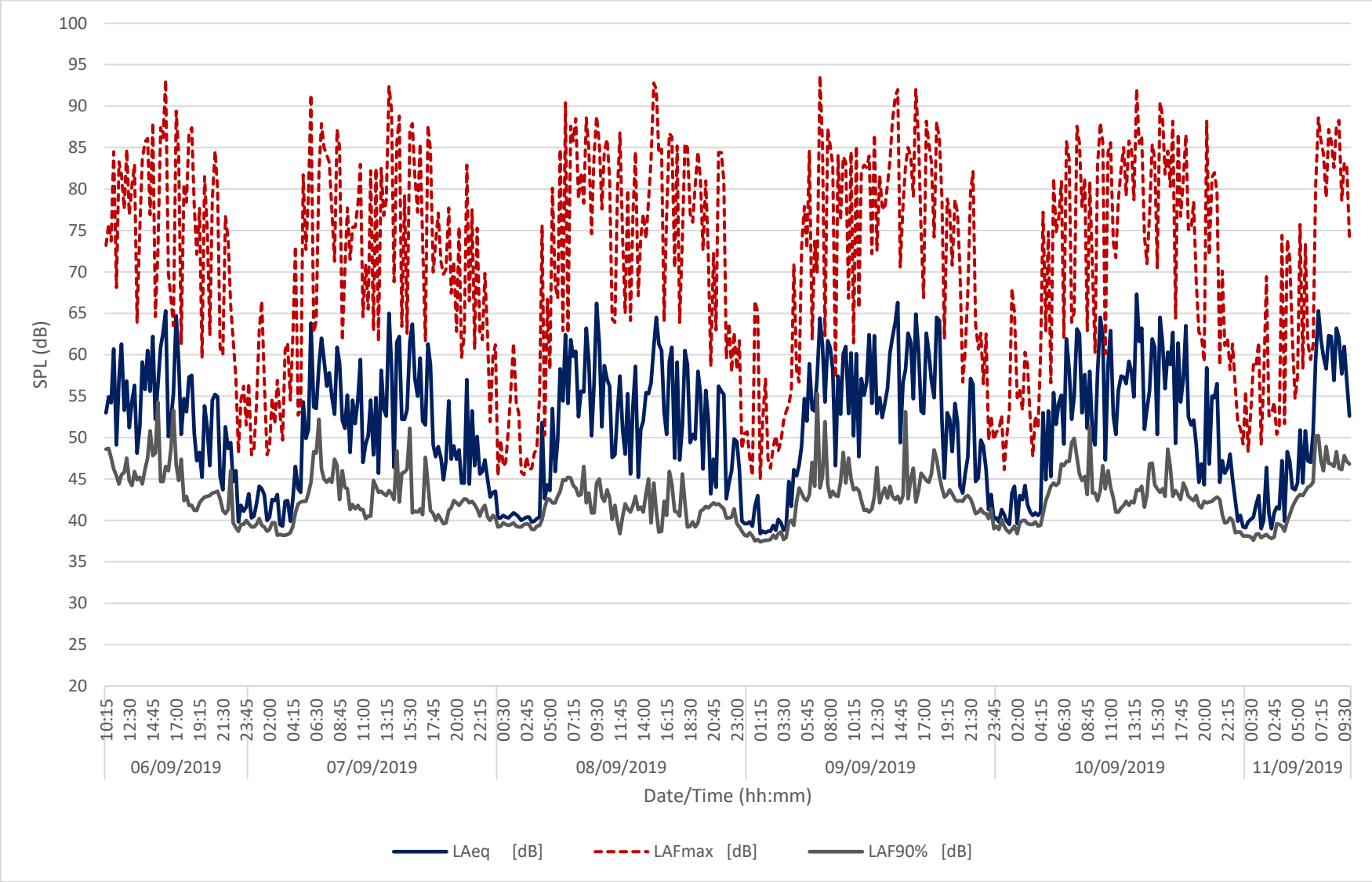


Table B.1 – Sample Measurement Results Including Octave Band Spectra

Description (Measurements at 1m unless otherwise stated)	Duration	LAeq	LAFmax	Leq (dB) @ Octave Band Centre Frequency (Hz)							
				63 Hz	125 Hz	250 Hz	500 Hz	1.0 kHz	2.0 kHz	4.0 kHz	8.0 kHz
Mill Line 1 (Level 1)	(0:0:10.0)	90.3	92.7	86.8	86.7	83.9	81.2	83.5	86.0	82.0	74.0
Ballmill @ 3m (Level 1)	(0:0:10.0)	91.5	93.3	83.8	81.3	80.3	82.4	84.4	86.8	84.7	73.3
Burner Fan (Level 1)	(0:0:10.0)	90.2	91.1	83.0	84.5	84.0	82.0	87.2	82.6	79.7	72.5
General Measurement @ Level 2	(0:0:10.0)	88.2	92.4	81.0	81.5	81.1	80.2	81.8	82.9	80.8	72.6
Mill (Level 2)	(0:0:9.0)	86.8	92.7	85.9	84.5	81.1	79.6	80.0	81.3	79.7	72.8
Fan Line 1 (Level 3)	(0:0:10.0)	89.3	91.7	83.2	84.9	83.1	84.3	84.1	82.9	81.0	73.9
Ignore	(0:0:9.0)	90.5	97.5	87.0	85.1	83.6	83.9	83.7	84.7	83.9	78.0
Charger Line 1 (Level 3)	(0:0:10.0)	89.5	97.2	87.9	84.6	84.1	82.8	83.0	83.4	82.3	77.6
Adjacent to Filter Line 1 (Not source - General @ Level 4)	(0:0:10.0)	86.9	92.7	83.9	81.0	81.4	80.7	81.6	80.8	78.5	70.3
Filter Valves @ 2m (Level 4)	(0:0:41.0)	85.8	101.7	80.6	79.6	78.9	79.9	80.1	79.0	78.0	75.5
Classifier Line 1 (Level 4)	(0:0:11.0)	83.7	87.7	80.8	80.7	80.1	78.7	77.6	76.8	76.3	68.7
Fan Exhaust (Level 4)	(0:0:10.0)	93.8	94.4	81.8	86.3	88.9	91.2	90.5	85.6	78.7	70.2
Bridge of CCM 5	(0:0:22.0)	85.7	92.5	84.0	82.3	81.5	80.4	80.3	79.4	76.9	73.3
Board Stacking @ 3M	(0:0:20.0)	81.4	85	78.4	74.5	74.9	75.6	75.3	74.3	73.7	73.2
Plastic Wrapping @ 3M	(0:1:45.0)	85.6	94.9	76.9	73.3	75.3	75.6	75.0	74.9	77.4	83.2
Water Tank Pump	(0:0:20.0)	79.9	81.8	80.6	75.8	75.7	77.7	73.9	72.4	69.1	64.3
Wheeled Loader @ 10-15m	(0:0:38.0)	73.7	80.7	73.8	73.7	70.7	71.3	69.4	64.8	62.3	57.8
Wheeled Loader @ 3m loading silo (NTI 04 has all @ 20m)	(0:0:47.0)	75.3	83.7	74.4	75.4	72.4	74.5	70.9	65.6	60.2	54.5
Base of Silo Feeder	(0:0:19.0)	75.7	85.2	75.7	71.0	70.0	69.1	68.7	68.2	69.8	66.0
Compressor Plantroom	(0:0:24.0)	80.9	82.1	76.1	77.5	75.6	74.6	74.4	73.8	75.0	64.5
Forklift including Reversing Beeper @ 3m	(0:0:26.0)	68.1	73.3	59.7	56.8	59.1	61.3	63.8	59.3	59.7	60.9
External Forklift including reversing beeper @ 5m	(0:0:34.0)	70.8	82.6	57.2	56.0	58.1	59.9	69.5	60.9	58.6	54.4
Mixer @ 5m level 1	(0:0:32.0)	80.2	81.8	79.6	77.0	77.5	76.4	72.8	75.7	67.9	63.4
Dosing Silo Level 1	(0:0:10.0)	75.5	77.4	80.8	71.3	74.2	72.0	70.3	67.8	65.5	60.1
Mixer Motor Level 2	(0:0:29.0)	76.5	77.8	81.3	76.6	74.1	73.3	70.5	69.3	67.5	58.6
Extract Fan Level 2 @ 3m	(0:0:11.0)	81.6	82.9	84.6	78.2	76.4	78.0	76.6	73.9	72.7	60.4
Water Spray on Plasterboard line	(0:0:9.0)	78.8	79.6	82.8	78.9	77.2	72.2	70.1	68.3	72.9	73.1
Drier Position 1	(0:0:15.0)	83	84.1	86.3	84.3	85.2	79.5	78.7	73.1	70.8	63.2
Articulated lorry loading @ 5m including taking off metal retaining sections and loading 1st pallet	(0:5:6.0)	68.3	87.4	70.2	66.5	61.3	63.0	64.2	61.7	58.0	52.6

Table B.1 – (Cont'd) Sample Measurement Results Including Octave Band Spectra

Description (Measurements at 1m unless otherwise stated)	Duration	LAeq	LAFmax	Leq (dB) @ Octave Band Centre Frequency (Hz)							
				63 Hz	125 Hz	250 Hz	500 Hz	1.0 kHz	2.0 kHz	4.0 kHz	8.0 kHz
External Position 1 20m from quiet side of factory (louver)	(0:0:30.0)	47.6	52.2	61.6	51.9	46.0	46.5	41.5	38.1	34.0	26.0
External Position 2 20m from quiet side of factory	(0:0:17.0)	47.2	52.2	63.4	52.3	45.0	45.4	41.1	37.6	34.1	24.9
Inside factory in line with external position 2	(0:2:19.0)	76.7	85.5	75.1	67.6	71.9	71.6	70.9	68.9	68.2	68.8
External position 2 10m from quiet side of factory	(0:2:27.0)	77	83.5	75.1	67.9	70.8	71.0	69.7	68.3	68.0	72.8
Inside factory in line with external position 2	(0:1:54.0)	47.5	53.3	64.0	56.2	48.0	43.9	41.6	37.2	31.3	29.4
External Position 3 20m from quiet side of factory (louver to storage area)	(0:0:59.0)	48.4	51.9	63.3	55.2	47.9	44.9	43.1	39.4	35.0	27.6
Ignore	(0:0:4.0)	48.5	50.2	63.1	52.4	46.3	45.6	43.4	40.3	35.6	29.3
Outside factory @ 20m far end from office	(0:0:19.0)	49	51	64.3	55.5	48.6	46.6	43.8	38.9	33.6	26.3
Inside factory (storage Area)	(0:0:14.0)	74.7	77.4	77.3	65.3	70.1	71.3	69.5	67.7	65.6	58.1
Outside Factory @ 10m	(0:0:10.0)	50.9	53.1	65.8	55.9	51.2	48.5	45.5	40.5	36.4	26.0
Outside factory @ 10m controlled by fans/discharges at around 50m	(0:0:21.0)	59.4	63.1	64.4	60.4	55.7	56.0	55.3	50.6	47.6	38.0
Outside Factory @ 20m, controlled by Fans @ 2nd and 3rd floor levels	(0:0:10.0)	68.1	69.3	70.1	65.8	59.6	67.2	61.4	58.3	59.1	46.0
Outside factory @ 20m controlled by fans at 3rd & 4th floor level	(0:0:19.0)	67.3	72.5	68.3	61.6	62.3	61.3	63.2	61.9	54.2	44.8
Outside Factory 20m from Calcification façade - door open	(0:0:59.0)	73.8	75.8	76.7	71.7	71.5	70.1	68.5	67.4	63.2	54.4
Outside Factory 20m from Calcification façade - door closed - Fans at level 4	(0:0:11.0)	70.6	71.2	76.1	69.6	70.8	67.9	66.3	62.1	55.7	46.5
Drier (half way down)	(0:0:10.0)	82.2	82.8	85.0	80.6	79.2	78.9	76.7	75.2	72.5	66.2
Drier	(0:0:19.0)	85.6	86.9	89.1	84.5	85.6	83.0	80.1	77.8	72.9	65.6
On Bridge over p'brd line at south End	(0:0:20.0)	85.9	88.4	85.8	84.5	85.0	82.7	80.6	78.6	73.8	71.3
Drier Ventilation fan (Level 2)	(0:0:13.0)	87.9	88.7	90.3	84.5	83.3	83.2	83.3	80.4	78.2	75.0
Drier (repeat of 28) Flue above	(0:0:15.0)	85.2	91.7	84.9	81.1	82.5	80.0	80.5	78.5	76.2	68.6
Drier where plasterboard leaves - impulsive as boards drop onto rollers	(0:0:20.0)	86.6	93.1	85.5	80.1	81.0	80.0	81.3	81.0	77.6	74.3

Table B.1 – (Cont'd) Sample Measurement Results Including Octave Band Spectra

Description (Measurements at 1m unless otherwise stated)	Duration	LAeq	LAFmax	Leq (dB) @ Octave Band Centre Frequency (Hz)							
				63 Hz	125 Hz	250 Hz	500 Hz	1.0 kHz	2.0 kHz	4.0 kHz	8.0 kHz
NTI Sample Measurements											
Calcination Level 1 General position	(0:1:11.0)	89	93	85.1	84.1	82.3	80.3	82.1	83.6	81.4	73.4
Calcination level 3	(0:0:36.7)	90	98	87.7	87.7	84.1	83.6	84.0	84.2	83.1	77.5
Filter Valves @ 2m (Level 4)	(0:0:36.7)	84	98	80.7	79.9	78.8	80.7	79.2	76.2	74.3	72.3
Calcination Level 4 General	(0:0:36.8)	87	92	82.4	82.3	82.8	82.2	81.7	79.6	77.6	71.6
Loading Silo @ 20m	(0:2:46.7)	70	83	71.6	71.4	66.7	62.8	59.3	58.1	55.7	52.0
Loading Silo full period @ 3m	(0:1:31.6)	76	92	76.5	80.5	72.2	74.0	72.6	66.5	60.7	55.7
Silo feeder	(0:0:23.3)	76	87	76.0	71.1	71.0	69.3	68.4	68.5	71.1	65.5
Compressor Plantroom	(0:0:26.1)	81	82	76.8	78.1	75.8	74.9	74.2	73.7	74.3	64.0
External Forklift including reversing beeper @ 5m (compare with Nor 22)	(0:1:26.2)	60	74	70.6	62.8	57.7	57.2	54.6	51.2	47.2	43.0
Mixer @ 5m level 1	(0:0:31.4)	80	81	80.0	76.6	78.4	77.8	73.2	73.7	68.1	63.8
Dosing Silo Level 2	(0:0:09.2)	76	77	80.3	71.7	74.2	71.4	70.7	67.9	64.8	60.9
Mixer Motor Level 2	(0:0:36.0)	76	78	80.6	76.8	74.7	72.8	70.6	69.2	66.4	57.9
Extract Fan Level 2 @ 3m	(0:0:10.5)	82	83	84.2	77.5	76.8	79.3	76.8	73.8	72.4	60.1
Drier	(0:0:17.4)	83	85	86.3	84.7	85.5	79.7	78.7	73.2	70.8	63.1
Articulated lorry loading @ 5m including taking off metal retaining sections and loading 1st pallett	(0:10:00.0)	70	92	71.1	64.4	64.2	67.7	64.5	62.1	59.0	53.9
Articulated lorry loading @ 5m long measurement	(1:07:25.5)	71	99	75.7	65.0	61.8	63.9	67.2	64.4	60.2	54.4
10m inside boundary fence quiet side of factory (50m approx)	(0:0:44.9)	49	54	67.0	60.4	49.0	45.1	44.1	40.3	35.9	38.3

APPENDIX C - DRAWINGS

Our assessment has referred to the following Stride Treglown drawings;

Name	Date modified
153091-STL-00-00-DR-A-ZZZZ-00002	21/01/2020 15:36
153091-STL-00-00-DR-A-ZZZZ-00003	21/01/2020 15:36
153091-STL-00-00-DR-A-ZZZZ-01001	21/01/2020 15:36
153091-STL-00-00-DR-A-ZZZZ-01002	21/01/2020 15:36
153091-STL-00-01-DR-A-ZZZZ-01003	21/01/2020 15:36
153091-STL-00-02-DR-A-ZZZZ-01004	21/01/2020 15:36
153091-STL-00-ZZ-DR-A-ZZZZ-02001	21/01/2020 15:36
153091-STL-00-ZZ-DR-A-ZZZZ-03001	21/01/2020 15:36
153091-STL-00-ZZ-DR-A-ZZZZ-06001	21/01/2020 15:36