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TOWENS WESTERZOYLAND

NOISE IMPACT ASSESSMENT

Technical Report: R10640-1 Rev 0

Date: 28th January 2025

For: Towens Group Ltd
Plot 2,
Warne Rd,
Weston-super-Mare
BS23 3UU

24 Acoustics Document Control Sheet

Project Title: Towens Westernzoyand –Noise Impact Assessment

Report Ref: R10640-1 Rev 0

Date: 28th January 2025

	Name	Position	Signature	Date
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For and on behalf of 24 Acoustics Ltd				

Document Status and Approval Schedule

Revision	Description	Prepared By	Reviewed By	Approved By
0	Approved for issue	Reuben Peckham	Stephen Gosling	Stephen Gosling

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1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been instructed by Towens Group Ltd, to undertake an assessment of the impact of the operation of their treatment facility at Westernzoyland near Bridgwater in Somerset.

1.2 This report presents the results of the assessment, following background noise surveys undertaken on the 20th July 2023, 7th to 12th September 2023 and following a site visit and source-term noise surveys undertaken on 20 January 2025.

1.3 All noise levels in this report are presented in dB relative to 20µPa. Appendix A provides a glossary of the acoustic terminology used in this report.

2.0 SITE DESCRIPTION AND PROPOSALS

2.1 The treatment facility site is located south of the A372 and approximately 825 m south-east of the village of Westernzoyland. The area around the site is industrial/ commercial in nature and includes a forestry contracting yard (Kleen Kutt Ltd), a coal supplier (Burnham Coal Supplier), slabs retailed (Slabs R Us) and an auto parts store (JWF Engineering).

2.2 Middlezoy Aerodrome is located directly east of the site which holds the annual Somerset Aerofest. Westonzoyland Airfield is located north of the site, with the runway aligned toward the site (i.e. aircraft land and take off over directly the site and neighbouring industrial/commercial/residential properties).

2.3 The site is used for the processing and treatment of inert and non-hazardous waste. Noise generating plant on the site includes an aggregate processing plant, 360 degree loader, wheeled loader and HGV movements. It is 24 Acoustics' understanding that the crusher plant that has previously operated on the site on a campaign basis is no longer required.

2.4 Hours of operation at the site are 07:00 to 17:00 Monday to Friday with no processing operations on weekends.

2.5 The nearest residential properties are located within the cluster of commercial/industrial uses and comprise a Travellers' Site (Receptor 1), approximately 75 m to the south-east of the site. Residential properties are also located at Springway Farm (Receptor 2) to the north, adjacent to the A372, approximately 260 m from the site.

2.6 Other residential properties are also located to the south and southeast, at Middlezoy and Thorngrove, and to the northwest at Westonzoyland. Due to these properties being sufficiently distant from the site (i.e. >1km), noise arising from the proposed operation is considered to be very low and, therefore, these properties have not been included in the assessment.

2.7 Figure 1 shows the site location and surrounding area. Figure 2 shows the site layout.

3.0 CRITERIA

3.1 The following represents current relevant guidance in relation to the proposed operations.

Environment Agency Guidance

3.2 EA guidance "Noise and vibration management: environmental permits" [Reference 1] provides guidance on how the agency will assess noise, how to manage noise and in particular how to carry out a noise impact assessment in the context of an environmental permit.

3.3 The guidance refers to BS 4142 to assess noise from industrial processes. It describes how the level of impact relates to BS 4142 descriptors and this is summarised below.

- *Unacceptable level of audible or detectable noise – this level of noise means that significant pollution is being or is likely to be caused at a receptor and you must take further action to reduce or stop operations. The closest corresponding BS 4142 descriptor is 'significant adverse impact'.*
- *Audible or detectable noise – this level of noise means that noise pollution is being (or is likely to be) caused at a receptor – your duty is to use appropriate measures to prevent or minimise noise. You are not in breach if you are using appropriate measures. The closest corresponding BS 4142 descriptor is 'adverse impact'.*
- *No noise, or barely audible or detectable noise – this level of noise means that no action is needed beyond basic appropriate measures. The closest corresponding BS 4142 descriptor is 'low impact or no impact' following consideration of context. The agency may decide that taking action to minimise noise is a low priority.*

BS 4142:2014+A1:2019 - Methods for Rating Industrial and Commercial Sound

3.4 BS 4142:2014+A1:2019 [Reference 2] provides a method for rating the effects of industrial and commercial sound on residential areas.

3.5 The standard advocates a comparison between the representative measured L_{A90} background noise level and L_{Aeq} noise level from the source being considered. For rating purposes if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction should be applied.

3.6 The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact, also depending on the context. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact (depending upon the context).

4.0 ASSESSMENT METHODOLOGY

4.1 The following assessment methodology has been used:

i. A background noise survey has been undertaken to determine existing levels of background noise at locations representative of the nearest residential properties to the site;

ii. An acoustic model of the proposed operations has been developed. This has predicted the operational noise level at the nearest residential properties;

iii. An assessment of the likely noise impact associated with the proposals has been undertaken, in accordance with BS 4142:2014+A1:2019.

5.0 ENVIRONMENTAL NOISE MEASUREMENTS

Methodology

5.1 Background noise surveys were undertaken on the 20th July 2023 and the 7th to 12th September 2023. Measurements were undertaken at locations representative of the nearest residential receptors as described below:

- Location 1: To the west of the site, approximately 25m from Receptor 1 (Travellers Site), at a height of 2m above local ground level in free-field conditions (OSBG Ref: ST 36195 34343);

- Location 2: To the north of the site, approximately 15m from Receptor 2 (Springway Farm) and equidistant to the A372. At a height of 2m above local ground level in free-field conditions (OSGB Ref: ST 36270 33901).

5.2 Measurement locations are shown in Figure 1.

5.3 Due to access and security restrictions, background noise measurements at Location 1 were undertaken during daytime hours on the 20th July and 7th September 2023 for a minimum of three hours per day. Long-term noise monitoring was undertaken at Location 2 over a 6-day period including a weekend.

5.4 The instrumentation was setup to monitor background noise levels and store data in 5-minute intervals of the overall A-weighted L_{eq}, L_{max} and L_{90} using fast time weighting. The majority of equipment was configured to record octave band data and audio samples to assist in identification of noise sources throughout the survey. The following instrumentation was used:

- 2 x Rion NL52 Type 1 sound level meter;
- Rion NL32 Type 1 sound level meter;
- Rion NC74 acoustic calibrator;
- Norsonic 1251 acoustic calibrator.

5.5 Calibration of the equipment was checked before and on completion of the measurements and no drift was recorded. Noise measurements were made in accordance with BS 7445: 1991 'Description and measurement of environmental noise Part 2 – Acquisition of data pertinent to land use' [Reference 3]. Calibration certificates of the instrumentation are provided in Appendix B.

5.6 Weather conditions during the measurements were generally favourable with only minor periods of precipitation with wind speeds below 5m/s. Measurements affected by periods of rainfall have been omitted from the representative background noise levels. Meteorological data is shown in Appendix B.

Results

5.7 The measured background noise levels are summarised in Table 1 and shown graphically in Appendix D. From on-site investigations and analysis of spectral and audio data, industrial/commercial operations were taking place, associated with the surrounding industrial and commercial units, and included HGV movements, loading operations and plant movement. Additionally, light aircraft were noted, associated with Westonzoyland Airfield, with take-off and landing paths passing directly over the receptor locations. These activities form part of the existing noise climate in the area.

Measurement Location 1 (Receptor 1 – Travellers' Site)		
Date	**Time**	**Background Noise Level dB $L_{A90\ 1\ hour}$**
20/07/2023	12:50 – 13:50	41
20/07/2023	13:50 – 14:50	43
20/07/2023	14:50 - 15:50	43
07/09/2023	13:25 – 14:25	39
07/09/2023	14:25 – 15:25	39
07/09/2023	15:25 – 16:25	40
Representative Level		**41**

Table 1 - Location 1 - Measured Background Noise Levels

Measurement Location 2 (Receptor 2 – Springway Farm)		
Date (Sept 2023)	**Operational Period**	**Background Noise Level dB $L_{A90\ 1\ hour}$**
Thursday 7th	07:00 to 17:00	39
Friday 8th	07:00 to 17:00	34
Saturday 9th	NA	NA
Sunday 10th	NA	NA
Monday 11th	07:00 to 17:00	38
Tuesday 12th	07:00 to 17:00	38
Representative Level		**37**

Table 2 - Location 2 - Measured Background Noise Levels

Source-term Noise Data

5.8 Source-term noise measurements of the aggregate processing plant were undertaken at the site on the 20th January 2025. Measurements were undertaken with the following equipment:

- Norsonic Nor 118 Class 1 accuracy sound level meter;
- Bruel and Kjaer Type 4231 acoustic calibrator.

5.9 Calibration of the equipment was checked before and on completion of the measurements and no drift was recorded. Calibration certificates of the instrumentation are provided in Appendix B.

5.10 Measurements were carried out following the guidance of BS EN ISO 3746: 2010 [Reference 4] whilst the plant was under continuous operation and fed by a Volvo EC1400 360 degree excavator.

5.11 Calculations have been undertaken in accordance with BS EN ISO 3746 to determine the sound power level of each unit. Calculated overall A-weighted sound power levels are shown below with single octave band calculation results shown in Appendix E:

- Aggregate processing plant: 106 dB L_w;

5.12 Manufacturer's data for the wheeled loading shovels used on the site is shown below.

Screening and Crushing Plant Manufacturer's Details			
Make	**Model**	**Description**	**Manufacturer's Stated Sound Power Level**
Hyundai	970 HHKHWL70EL0000275	Wheeled Loading Shovels	107 dBA

Table 3 - Manufacturers' Detail – Screening and Crushing Plant

5.13 For the calculation of noise from HGV movements to the receptor locations from the site's access road, a source noise level of 68 dB $L_{Aeq\,T}$ at 5m for a slow-moving HGV has been used, with reference to 24 Acoustics' library database from measurements on similar sites.

6.0 NOISE IMPACT ASSESSMENT

Proposed Operations

6.1 The operations include the importation of inert waste by HGV which is tipped and stored on the site in stockpiles prior to being treated in the aggregate treatment plant. The final product is then stored in stockpiles/ bays prior to collection and onward delivery by HGV. To provide a worst case analysis of the proposals, a scenario comprising full operation of the aggregate treatment plant, serviced by a 360 degree loader in operation for a 1-hour period, has been used in the assessment. It is further assumed that there will be 5 HGV movements in and out of the site in a worst case hourly assessment period and the wheeled loading shovel will operate for 50% of the time during an hourly assessment period.

6.2 HGVs will utilise the existing access road to the north of the site, from the A372, as shown in Figure 1.

Acoustic Model

6.3 The source-term noise data and proposed operations described above have been used to populate an acoustic model of the site. IMMI 2024 noise mapping software has been used following the methodology of ISO 9613 [Reference 5] to determine the noise levels from each relevant source at the receptor locations, taking into account the effects of geometric divergence, screening and ground/atmospheric absorption. The model factors an ambient air temperature of 10 Celsius with 70% relative humidity and G=0.5 (hard ground) representing the mix of hard and soft ground propagation conditions.

6.4 Resultant cumulative noise levels from all proposed plant and HGV activities at the receptor locations are shown in Table 4.

Receptor Location	**Operational Noise Level dB $L_{Aeq\ 1\ hour}$**
1- Travellers' Park	45
2 Springway Farm	36

Table 4 - Noise Modelling Results – Receptor Location Cumulative Plant Noise Levels

Assessment

6.5 A comparison of the predicted rating noise levels, relative to the prevailing typical background noise level at each receptor location has been carried out in accordance with BS 4142:2014+A1:2019 with the results are shown in Table 5.

6.6 Due to the potentially impulsive nature of the proposed operations, a + 3 dB rating correction has been applied to the predicted noise levels at Receptor 1 (Travellers' Site). Due to the significant distances and screening involved, unfavourable noise characteristics from the proposed operations are considered unlikely to be perceptible at Receptor 2 (Springway Farm) hence a rating correction is not applicable.

	Receptor and Noise Level	
	1. Travellers' Site	**2. Springway Farm**
Representative Background Noise Level, dB $L_{A90,\ 1\ hour}$	41	39
Source Specific Noise Level, dB $L_{Aeq,\ 1\ hour}$	45	36
Character Rating Correction dB	+3	0
Rating Sound Level dB	48	36
Difference between background and rating Level, dB	+7	-3

Table 5 - Noise Impact Assessment to BS 4142:2014+A1:2019

6.7 The assessment outcomes at the travellers' site is indicative of an adverse impact, depending on context (see below). The impact at Springway Farm is 'low', subject to context.

Context

6.8 Under BS 4142, consideration must be given to the context of the site and proposals.

6.9 In this instance, noise arising from the proposals will be similar in character to surrounding industrial/commercial premises.

6.10 Additionally, the daytime only operations reduce the risk of noise disturbance.

6.11 Based on the above and the recommended mitigation, it is considered that the proposals employ reasonable and practicable measures to limit noise and will not be out of character for the area.

Uncertainty

6.12 All reasonable measures have been undertaken to ensure minimal uncertainty in the measurement procedures and assessment. This includes:

- Representative background noise levels determined during periods of suitable weather conditions;

- Measurement equipment fully calibrated to national standards and traceable with on-site calibration checks undertaken before and after the measurement exercises;
- Real-world measurement data utilised of the proposed screening and crushing plant to be used at the site;
- Calculations undertaken using proprietary software including the calculation methodology of ISO 9613;
- One metre resolution topographical data utilised in the acoustic model to ensure accurate topography of the site and surrounding area.

6.13 Based on the above, uncertainty associated with the assessment has been reduced to a minimum.

7.0 CONCLUSIONS

7.1 24 Acoustics Ltd has been instructed by Towens Group Ltd, to undertake an assessment of the impact of the operation of their treatment facility at Westernzoyland near Bridgwater in Somerset.

7.2 The assessment has been carried out following background noise measurements undertaken at representative locations of the closest residential properties to the site and, following the production of an acoustic model of the proposed operations.

7.3 Results are indicative of an adverse impact at the nearby Travellers' site. However, when assessed in accordance with BS 4142 and considering the context of the site and proposals, noise arising from the operations will employ reasonable and practicable measures to reduce noise to a minimum and will not be out of character for the area.

REFERENCES

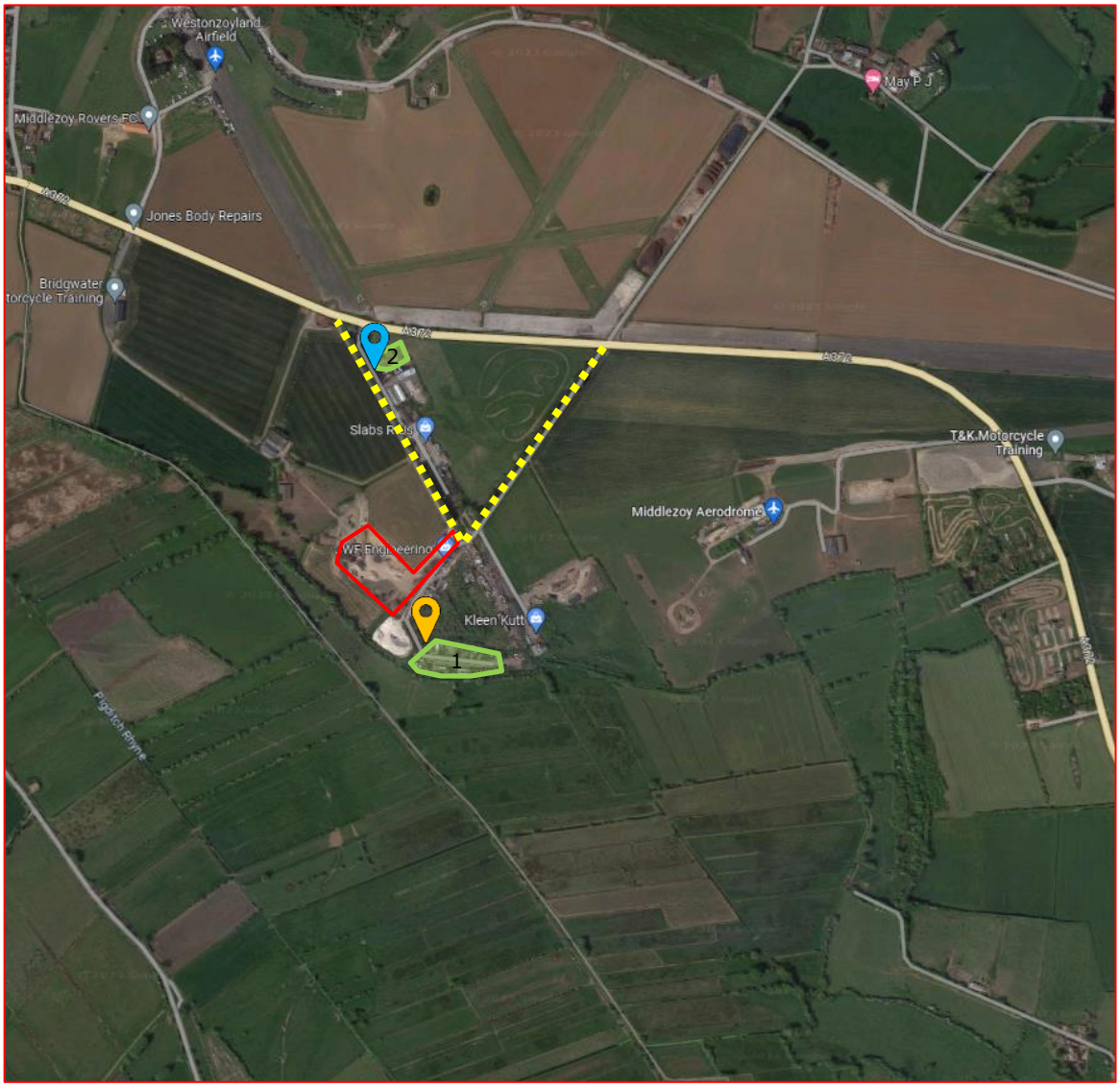
1. Environment Agency Guidance "Noise and Vibration Management: Environmental Permits", updated Jan 2022

2. British Standards Institution. British Standard 4142:2014+A1:2019. Methods for Rating and Assessing Industrial and Commercial Sound, 2014.

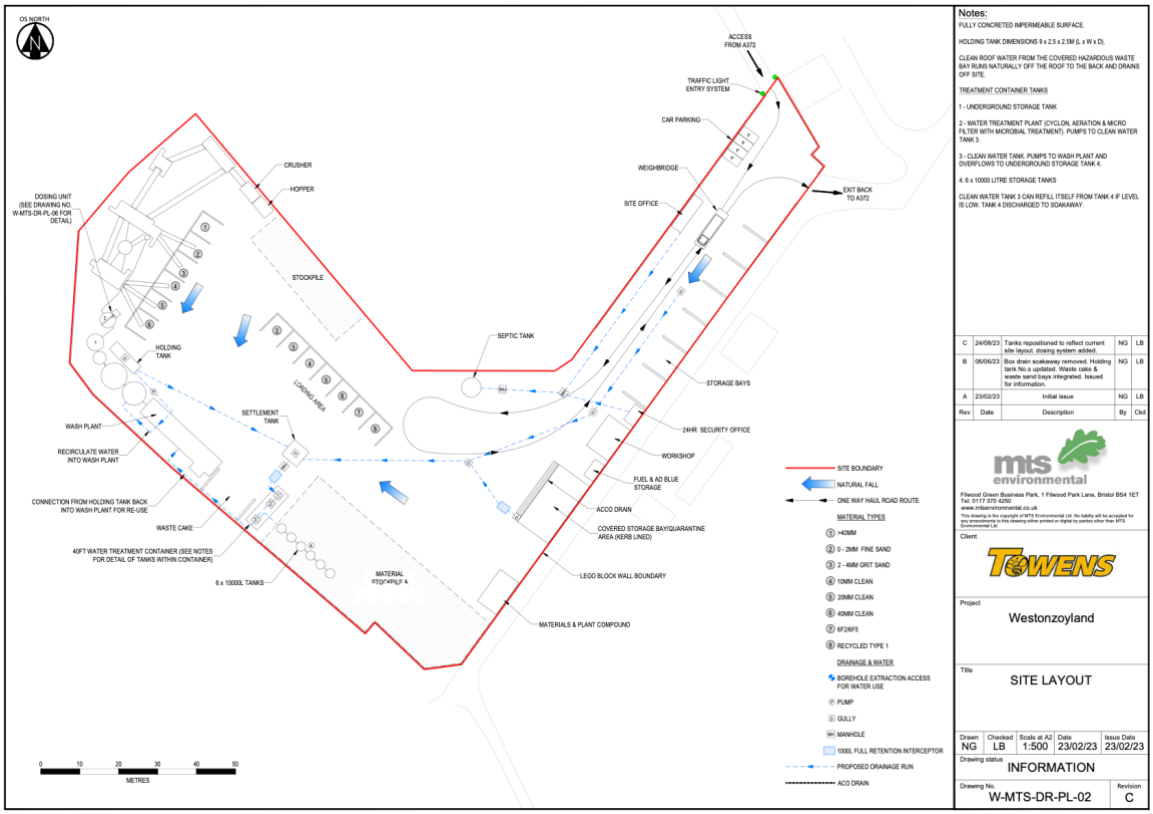
3. British Standards Institution. BS 7445: 'Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use' 1991.

4. British Standards Institution. BS 3746: 2010 Acoustics. Determination of sound power levels and sound energy levels of noise sources using sound pressure. Survey method using an enveloping measurement surface over a reflecting plane.

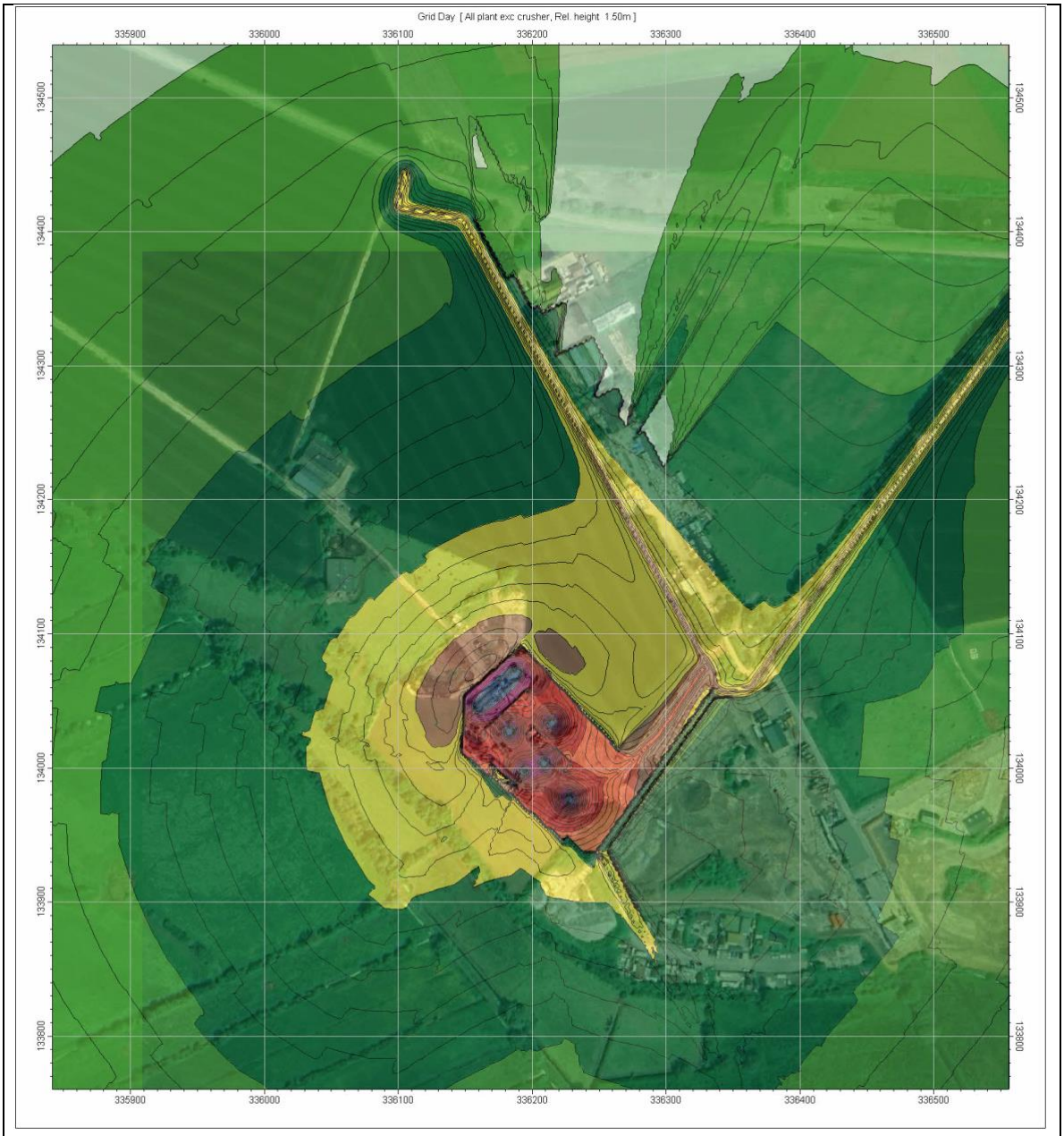
5. International Standards Organisation. ISO 9613. Acoustics - Propagation of Environmental Noise, 1997.

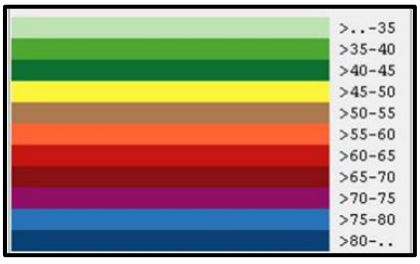


Project: Towens Westernzoyland	**Title:** Site, Receptor and measurement Locations	
DWG No: Figure 1	**Scale:** N.T.S.	**Rev: -**
Date: January 2025	**Drawn By:** RP	**Job No:** 10640



Project: Towens Westernzoyland	**Title:** Site Plan	
DWG No: Figure 2	**Scale:** N.T.S.	**Rev: -**
Date: January 2025	**Drawn By:** RP	**Job No:** 10640





Project: Towens Westernzoyland	**Title:** Operational Noise Contours, dB $L_{Aeq,\ 1\ hour}$		24Acoustics
DWG No: Figure 3	**Scale:** N.T.S.	**Rev: -**	
Date: January 2025	**Drawn By:** RP	**Job No:** 10640	

APPENDIX A – ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time internal, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B – INSTRUMENTATION CALIBRATION CERTIFICATES

Calibration Certificate

Calibration undertaken by Noise and Vibration Calibration Services Ltd
The Old Kennels Building, 3 Bassett Avenue, Southampton, SO16 7DP
+44 (0)23 8155 5020 hello@nvcal.co.uk

NVCal
NOISE & VIBRATION CALIBRATION SERVICES

IEC 61672-3:2006 Calibration

Procedures from IEC 61672-3:2006 were used to perform the periodic tests on **18th August 2022** for the following sound level meter:

Rion NL-52, serial number 00620851

The following tests were undertaken:

Acoustical signal tests of a frequency weighting	**PASS**
Electrical signal tests of frequency weightings	**PASS**
Frequency and time weightings at 1 kHz	**PASS**
Long-term stability	**PASS**
Level linearity on the reference level range	**PASS**
Level linearity including the level range control	**PASS**
Toneburst response	**PASS**
Peak C sound level	**PASS**
Overload indication	**PASS**

Calibration result

Sound level meter: Rion NL-52, serial 00620851
Performance Specification: IEC 61672-3:2006 Class 1
Date: 18th August 2022
Certificate Number: C00397

PASS

Approved Signatory: .....

Notes

No information on the uncertainty of measurement, required by 11.7 of IEC 61672-3:2006, of the adjustment data given in the instruction manual or obtained from the manufacturer or supplier of the sound level meter, or the manufacturer of the microphone, or the manufacturer of the multi frequency sound calibrator was published in the instruction manual or made available by the manufacturer or supplier. The uncertainty of measurement of the adjustment data has therefore been assumed to be numerically zero for the purpose of this periodic test. If these uncertainties are not actually zero, there is a possibility that the frequency response of the sound level meter may not conform to the requirements of IEC 61672-1:2002.

Calibration Certificate

Calibration undertaken by Noise and Vibration Calibration Services Ltd
The Old Kennels Building, 3 Bassett Avenue, Southampton, SO16 7DP
+44 (0)23 8155 5020 hello@nvcal.co.uk

IEC 61672-3:2006 Calibration

Procedures from IEC 61672-3:2006 were used to perform the periodic tests on **18th November 2022** for the following sound level meter:

Rion NL-52, serial number 00620967

The following tests were undertaken:

Acoustical signal tests of a frequency weighting	**PASS**
Electrical signal tests of frequency weightings	**PASS**
Frequency and time weightings at 1 kHz	**PASS**
Long-term stability	**PASS**
Level linearity on the reference level range	**PASS**
Level linearity including the level range control	**PASS**
Toneburst response	**PASS**
Peak C sound level	**PASS**
Overload indication	**PASS**

Calibration result

Sound level meter: Rion NL-52, serial 00620967
Performance Specification: IEC 61672-3:2006 Class 1
Date: 18th November 2022
Certificate Number: C00405

PASS

Approved Signatory: .....

Notes

No information on the uncertainty of measurement, required by 11.7 of IEC 61672-3:2006, of the adjustment data given in the instruction manual or obtained from the manufacturer or supplier of the sound level meter, or the manufacturer of the microphone, or the manufacturer of the multi-frequency sound calibrator was published in the instruction manual or made available by the manufacturer or supplier. The uncertainty of measurement of the adjustment data has therefore been assumed to be numerically zero for the purpose of this periodic test. If these uncertainties are not actually zero, there is a possibility that the frequency response of the sound level meter may not conform to the requirements of IEC 61672-1:2002.

Calibration Certificate

Calibration undertaken by Noise and Vibration Calibration Services Ltd
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NVCal
NOISE & VIBRATION CALIBRATION SERVICES

IEC 60942:2003 Calibration

Periodic tests were performed in accordance with procedures from Annex B of IEC 60942:2003 (using the Insert Voltage Technique) on **10th January 2023** for the following sound calibrator:

Rion NC-74, serial number 34425550

Calibration result

Sound Calibrator: Rion NC-74, serial 34425550
Performance Specification: IEC 60942:2003 Class 1
Date: 10th January 2023
Certificate Number: C00423

PASS

Approved Signatory: .....

Test results

Level	**93.78**	**dB** re 20 µPa	+/- 0.091 dB
Frequency	**1002.765**	**Hz**	+/- 0.01 Hz
Distortion	**1.46**	**%**	+/- 0.051 %

Notes

As public evidence was available, from a testing organisation (PTB) responsible for approving the result of pattern evaluation tests, to demonstrate that the model of sound calibrator fully confirmed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to confirm to all the class 1 requirements of IEC 60942:2003.

This certificate provides traceability of measurement to the SI system of units and to units of measurements realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Calibration Certificate

Calibration undertaken by Noise and Vibration Calibration Services Ltd
The Old Kennels Building, 3 Bassett Avenue, Southampton, SO16 7DP
+44 (0)23 8155 5020 hello@nvcal.co.uk

IEC 61672-3:2006 Calibration

Procedures from IEC 61672-3:2006 were used to perform the periodic tests on **9th February 2024** for the following sound level meter:

Norsonic Type 118, serial number 31465

The following tests were undertaken:

Acoustical signal tests of a frequency weighting	**PASS**
Electrical signal tests of frequency weightings	**PASS**
Frequency and time weightings at 1 kHz	**PASS**
Long-term stability	**PASS**
Level linearity on the reference level range	**PASS**
Level linearity including the level range control	**PASS**
Toneburst response	**PASS**
Peak C sound level	**PASS**
Overload indication	**PASS**

Calibration result

Sound level meter: Norsonic Type 118, serial 31465
Performance Specification: IEC 61672-3:2006 Class 1
Date: 9th February 2024
Certificate Number: C00460

PASS

Approved Signatory: .....

Notes

No information on the uncertainty of measurement, required by 11.7 of IEC 61672-3:2006, of the adjustment data given in the instruction manual or obtained from the manufacturer or supplier of the sound level meter, or the manufacturer of the microphone, or the manufacturer of the multi-frequency sound calibrator was published in the instruction manual or made available by the manufacturer or supplier. The uncertainty of measurement of the adjustment data has therefore been assumed to be numerically zero for the purpose of this periodic test. If these uncertainties are not actually zero, there is a possibility that the frequency response of the sound level meter may not conform to the requirements of IEC 61672-1:2002.

Calibration Certificate

Calibration undertaken by Noise and Vibration Calibration Services Ltd
The Old Kennels Building, 3 Bassett Avenue, Southampton, SO16 7DP
+44 (0)23 8155 5020 hello@nvcal.co.uk

IEC 60942:2003 Calibration

Periodic tests were performed in accordance with procedures from Annex B of IEC 60942:2003 (using the Insert Voltage Technique) on **5th January 2024** for the following sound calibrator:

Brüel & Kjær 4231, serial number 2253117

Calibration result

Sound Calibrator: Brüel & Kjær 4231, serial 2253117
Performance Specification: IEC 60942:2003 Class 1
Date: 5th January 2024
Certificate Number: C00454

PASS

Approved Signatory: .....

Test results

Level		**93.91**	**dB** re 20 µPa	+/- 0.091 dB
		113.94	**dB** re 20 µPa	+/- 0.091 dB
Frequency	@ 94 dB	**999.974**	**Hz**	+/- 0.01 Hz
	@ 114 dB	**999.974**	**Hz**	+/- 0.01 Hz
Distortion	@ 94 dB	**0.34**	**%**	+/- 0.015 %
	@ 114 dB	**0.16**	**%**	+/- 0.011 %

Notes

As public evidence was available, from a testing organisation (PTB) responsible for approving the result of pattern evaluation tests, to demonstrate that the model of sound calibrator fully confirmed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to confirm to all the class 1 requirements of IEC 60942:2003.

Calibration Certificate

Calibration undertaken by Noise and Vibration Calibration Services Ltd
The Old Kennels Building, 3 Bassett Avenue, Southampton, SO16 7DP
+44 (0)23 8155 5020 hello@nvcal.co.uk

IEC 60942:2003 Calibration

Periodic tests were performed in accordance with procedures from Annex B of IEC 60942:2003 (using the Insert Voltage Technique) on **10th January 2023** for the following sound calibrator:

Norsonic Type 1251, serial number 31469

Calibration result

Sound Calibrator: Norsonic Type 1251, serial 31469
Performance Specification: IEC 60942:2003 Class 1
Date: 10th January 2023
Certificate Number: C00421

PASS

Approved Signatory: .....

Test results

Level	**113.89**	**dB** re 20 µPa	+/- 0.092 dB
Frequency	**1000.259**	**Hz**	+/- 0.01 Hz
Distortion	**0.11**	**%**	+/- 0.011 %

Notes

The sound calibrator has been shown to conform to the class 1 requirements for periodic testing, described in Annex B of IEC 609442:2003 for the sound pressure level and frequency stated, for the environmental conditions under which the tests were performed. However, as public evidence was not available, from a testing organisation responsible for pattern approval, to demonstrate that the model of sound calibrator confirmed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, no general statement or conclusion can be made about conformance of the sound calibrator to the requirements of IEC 60942:2003.

This certificate provides traceability of measurement to the SI system of units and to units of measurements realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

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APPENDIX C – METEOROLOGICAL DATA

Date/Time	Temperature °C	Wind Direction	Wind Speed m/s	Pressure hPa	Cloud Cover Oktas
20/07/2023 12:04	20	East	0.4	1019	5
20/07/2023 12:09	20	NE	0.4	1019	5
20/07/2023 12:14	20	East	0.4	1019	5
20/07/2023 12:19	20	SSE	0.4	1019	5
20/07/2023 12:24	20	SE	0.3	1018	5
20/07/2023 12:29	20	SSW	0.5	1019	5
20/07/2023 12:34	20	NE	0.4	1018	5
20/07/2023 12:39	20	South	0.8	1018	5
20/07/2023 12:44	20	South	0.5	1018	5
20/07/2023 12:49	20	SSW	0.4	1018	5
20/07/2023 12:54	20	SW	0.8	1018	5
20/07/2023 12:59	20	WSW	0.9	1018	5
20/07/2023 13:04	20	South	0.4	1018	5
20/07/2023 13:09	21	NNW	0.7	1018	6
20/07/2023 13:14	20	WSW	1.3	1018	6
20/07/2023 13:19	21	SE	0.5	1018	6
20/07/2023 13:24	21	SE	0.8	1018	6
20/07/2023 13:29	21	South	0.7	1018	6
20/07/2023 13:34	21	SSW	0.8	1018	6
20/07/2023 13:39	21	SW	0.9	1018	6
20/07/2023 13:44	20	WNW	1.0	1018	6
20/07/2023 13:49	20	NE	0.8	1018	6
20/07/2023 13:54	20	SSW	0.6	1018	6
20/07/2023 13:59	20	West	0.8	1018	6
20/07/2023 14:04	20	NNE	0.8	1018	6
20/07/2023 14:09	20	NNW	0.6	1018	6
20/07/2023 14:14	20	WSW	0.8	1018	6
20/07/2023 14:19	20	North	1.2	1018	6
20/07/2023 14:24	21	SE	1.0	1018	6
20/07/2023 14:29	21	West	1.2	1018	6
20/07/2023 14:34	20	NNW	0.8	1018	6
20/07/2023 14:39	19	WSW	1.0	1018	5
20/07/2023 14:44	19	SSW	0.8	1018	5
20/07/2023 14:49	19	WSW	1.1	1018	5
20/07/2023 14:54	19	SW	1.4	1018	5
20/07/2023 14:59	19	SW	0.9	1018	5
20/07/2023 15:04	19	WSW	1.0	1018	5
20/07/2023 15:09	18	WSW	1.5	1018	5
20/07/2023 15:14	18	SSW	0.9	1018	5
20/07/2023 15:19	18	SSW	0.9	1018	5
20/07/2023 15:24	18	SSW	0.8	1018	5
20/07/2023 15:29	18	SW	0.9	1018	5
20/07/2023 15:34	18	SW	1.2	1018	5
20/07/2023 15:39	18	SW	1.3	1018	6
20/07/2023 15:44	18	SW	1.1	1018	6
20/07/2023 15:49	18	SW	1.3	1018	6
20/07/2023 15:54	18	SW	1.1	1018	6
20/07/2023 15:59	19	SSW	0.8	1018	6
20/07/2023 16:04	19	SW	1.0	1018	6

Figure B1: Meteorological Record During Attended Measurements – 20th July 2023

Date/Time	Temperature °C	Wind Direction	Wind Speed m/s	Pressure hPa	Rain mm
07/09/2023 13:00	29	N	0.0	1017.1	0.0
07/09/2023 13:15	30	NE	0.0	1017.0	0.0
07/09/2023 13:30	31	ENE	0.0	1017.1	0.0
07/09/2023 13:45	31	WNW	0.0	1017.2	0.0
07/09/2023 14:00	31	SE	0.0	1016.9	0.0
07/09/2023 14:15	31	SE	0.0	1016.8	0.0
07/09/2023 14:30	31	SSE	0.4	1016.7	0.0
07/09/2023 14:45	31	SE	0.0	1016.7	0.0
07/09/2023 15:00	30	SSE	0.0	1016.6	0.0
07/09/2023 15:15	30	SE	0.0	1016.6	0.0
07/09/2023 15:30	30	SE	0.9	1016.6	0.0
07/09/2023 15:45	30	SE	0.4	1016.4	0.0
07/09/2023 16:00	30	SE	0.0	1016.2	0.0
07/09/2023 16:15	30	W	0.0	1016.5	0.0
07/09/2023 16:30	30	SE	0.4	1016.4	0.0
07/09/2023 16:45	29	SE	1.3	1016.6	0.0
07/09/2023 17:00	29	SE	1.3	1016.3	0.0
07/09/2023 17:15	28	SSE	1.8	1016.4	0.0
07/09/2023 17:30	28	SE	1.8	1016.5	0.0
07/09/2023 17:45	28	SE	1.3	1016.3	0.0
07/09/2023 18:00	27	SE	0.9	1016.1	0.0
07/09/2023 18:15	27	SSE	0.9	1016.3	0.0
07/09/2023 18:30	27	SE	0.4	1016.5	0.0
07/09/2023 18:45	27	SE	0.0	1016.5	0.0
07/09/2023 19:00	26	---	0.0	1016.4	0.0
07/09/2023 19:15	26	---	0.0	1016.5	0.0
07/09/2023 19:30	25	---	0.0	1016.6	0.0
07/09/2023 19:45	24	---	0.0	1016.7	0.0
07/09/2023 20:00	24	---	0.0	1016.8	0.0
07/09/2023 20:15	23	---	0.0	1017.0	0.0
07/09/2023 20:30	23	---	0.0	1016.9	0.0
07/09/2023 20:45	22	---	0.0	1017.0	0.0
07/09/2023 21:00	22	---	0.0	1017.0	0.0
07/09/2023 21:15	22	---	0.0	1017.2	0.0
07/09/2023 21:30	21	---	0.0	1017.2	0.0
07/09/2023 21:45	21	---	0.0	1017.3	0.0
07/09/2023 22:00	21	---	0.0	1017.3	0.0
07/09/2023 22:15	21	SE	0.4	1017.4	0.0
07/09/2023 22:30	21	SE	0.0	1017.4	0.0
07/09/2023 22:45	21	SE	0.0	1017.4	0.0
07/09/2023 23:00	21	---	0.0	1017.5	0.0
07/09/2023 23:15	21	---	0.0	1017.5	0.0
07/09/2023 23:30	20	---	0.0	1017.4	0.0
07/09/2023 23:45	20	---	0.0	1017.4	0.0

08/09/2023 00:00	20	SE	0.0	1017.5	0.0
08/09/2023 00:15	20	---	0.0	1017.4	0.0
08/09/2023 00:30	20	---	0.0	1017.6	0.0
08/09/2023 00:45	20	SE	0.0	1017.6	0.0
08/09/2023 01:00	20	SE	0.0	1017.7	0.0
08/09/2023 01:15	20	---	0.0	1017.5	0.0
08/09/2023 01:30	19	---	0.0	1017.7	0.0
08/09/2023 01:45	19	---	0.0	1017.5	0.0
08/09/2023 02:00	19	---	0.0	1017.5	0.0
08/09/2023 02:15	19	---	0.0	1017.3	0.0
08/09/2023 02:30	18	---	0.0	1017.5	0.0
08/09/2023 02:45	18	---	0.0	1017.5	0.0
08/09/2023 03:00	18	---	0.0	1017.4	0.0
08/09/2023 03:15	18	---	0.0	1017.4	0.0
08/09/2023 03:30	18	---	0.0	1017.4	0.0
08/09/2023 03:45	18	---	0.0	1017.2	0.0
08/09/2023 04:00	18	---	0.0	1017.4	0.0
08/09/2023 04:15	18	---	0.0	1017.3	0.0
08/09/2023 04:30	18	---	0.0	1017.3	0.0
08/09/2023 04:45	18	SE	0.0	1017.3	0.0
08/09/2023 05:00	18	SE	0.0	1017.3	0.0
08/09/2023 05:15	18	---	0.0	1017.1	0.0
08/09/2023 05:30	18	SE	0.0	1017.4	0.0
08/09/2023 05:45	18	SE	0.0	1017.4	0.0
08/09/2023 06:00	18	---	0.0	1017.3	0.0
08/09/2023 06:15	18	---	0.0	1017.3	0.0
08/09/2023 06:30	18	SE	0.0	1017.4	0.0
08/09/2023 06:45	18	SSE	0.0	1017.9	0.0
08/09/2023 07:00	18	---	0.0	1017.8	0.0
08/09/2023 07:15	18	---	0.0	1017.8	0.0
08/09/2023 07:30	18	---	0.0	1018.1	0.0
08/09/2023 07:45	18	---	0.0	1017.9	0.0
08/09/2023 08:00	19	---	0.0	1018.0	0.0
08/09/2023 08:15	19	---	0.0	1018.1	0.0
08/09/2023 08:30	19	---	0.0	1018.1	0.0
08/09/2023 08:45	19	---	0.0	1018.2	0.0
08/09/2023 09:00	20	---	0.0	1018.2	0.0
08/09/2023 09:15	20	---	0.0	1018.4	0.0
08/09/2023 09:30	20	---	0.0	1018.4	0.0
08/09/2023 09:45	21	---	0.0	1018.3	0.0
08/09/2023 10:00	22	---	0.0	1018.4	0.0
08/09/2023 10:15	22	WSW	0.0	1018.5	0.0
08/09/2023 10:30	23	WSW	0.0	1018.4	0.0
08/09/2023 10:45	24	W	0.0	1018.5	0.0
08/09/2023 11:00	25	WSW	0.0	1018.5	0.0
08/09/2023 11:15	26	NNW	0.0	1018.5	0.0
08/09/2023 11:30	26	SE	0.0	1018.5	0.0
08/09/2023 11:45	27	SSE	0.0	1018.6	0.0

08/09/2023 12:00	27	SE	0.4	1018.4	0.0
08/09/2023 12:15	28	SE	0.4	1018.3	0.0
08/09/2023 12:30	28	SSW	0.0	1018.2	0.0
08/09/2023 12:45	29	NW	0.0	1018.1	0.0
08/09/2023 13:00	29	W	0.0	1018.1	0.0
08/09/2023 13:15	30	NNW	0.0	1018.0	0.0
08/09/2023 13:30	31	NNW	0.0	1018.1	0.0
08/09/2023 13:45	31	NW	0.0	1018.1	0.0
08/09/2023 14:00	30	WNW	0.4	1017.8	0.0
08/09/2023 14:15	31	NW	0.4	1017.7	0.0
08/09/2023 14:30	30	W	0.4	1017.5	0.0
08/09/2023 14:45	30	NNW	0.0	1017.3	0.0
08/09/2023 15:00	30	WSW	0.0	1017.3	0.0
08/09/2023 15:15	30	NW	0.0	1017.2	0.0
08/09/2023 15:30	30	NW	0.0	1017.2	0.0
08/09/2023 15:45	30	WNW	0.0	1017.1	0.0
08/09/2023 16:00	30	NNW	0.0	1017.0	0.0
08/09/2023 16:15	29	NW	0.4	1017.0	0.0
08/09/2023 16:30	28	NW	0.4	1017.0	0.0
08/09/2023 16:45	28	N	0.4	1016.9	0.0
08/09/2023 17:00	28	NNW	0.0	1017.0	0.0
08/09/2023 17:15	27	NW	0.4	1017.1	0.0
08/09/2023 17:30	27	NW	0.4	1017.0	0.0
08/09/2023 17:45	25	NW	0.9	1017.0	0.0
08/09/2023 18:00	24	NW	0.4	1017.1	0.0
08/09/2023 18:15	24	NW	0.4	1017.1	0.0
08/09/2023 18:30	23	NW	0.0	1017.1	0.0
08/09/2023 18:45	23	NW	0.4	1017.1	0.0
08/09/2023 19:00	23	NW	0.4	1017.1	0.0
08/09/2023 19:15	22	NNW	0.4	1017.2	0.0
08/09/2023 19:30	22	N	0.4	1017.3	0.0
08/09/2023 19:45	21	N	0.4	1017.5	0.0
08/09/2023 20:00	21	NW	0.0	1017.6	0.0
08/09/2023 20:15	21	NW	0.0	1017.8	0.0
08/09/2023 20:30	21	NE	0.0	1017.8	0.0
08/09/2023 20:45	21	NNE	0.0	1017.8	0.0
08/09/2023 21:00	21	---	0.0	1017.9	0.0
08/09/2023 21:15	21	NE	0.0	1017.9	0.0
08/09/2023 21:30	20	N	0.0	1017.9	0.0
08/09/2023 21:45	20	---	0.0	1018.1	0.0
08/09/2023 22:00	20	---	0.0	1018.1	0.0
08/09/2023 22:15	20	---	0.0	1018.0	0.0
08/09/2023 22:30	20	N	0.0	1018.0	0.0
08/09/2023 22:45	20	N	0.0	1018.0	0.0
08/09/2023 23:00	20	---	0.0	1017.9	0.0
08/09/2023 23:15	20	---	0.0	1017.7	0.0
08/09/2023 23:30	20	N	0.0	1017.7	0.0
08/09/2023 23:45	20	ESE	0.0	1018.0	0.0

09/09/2023 00:00	20	---	0.0	1017.8	0.0
09/09/2023 00:15	20	---	0.0	1017.6	0.0
09/09/2023 00:30	20	---	0.0	1017.5	0.0
09/09/2023 00:45	20	ESE	0.0	1017.5	0.0
09/09/2023 01:00	20	---	0.0	1017.4	0.0
09/09/2023 01:15	19	---	0.0	1017.5	0.0
09/09/2023 01:30	19	---	0.0	1017.3	0.0
09/09/2023 01:45	19	---	0.0	1017.2	0.0
09/09/2023 02:00	19	---	0.0	1017.2	0.0
09/09/2023 02:15	19	---	0.0	1017.1	0.0
09/09/2023 02:30	18	---	0.0	1017.1	0.0
09/09/2023 02:45	18	---	0.0	1017.2	0.0
09/09/2023 03:00	18	---	0.0	1017.1	0.0
09/09/2023 03:15	18	---	0.0	1017.0	0.0
09/09/2023 03:30	18	---	0.0	1017.0	0.0
09/09/2023 03:45	18	ESE	0.0	1017.1	0.0
09/09/2023 04:00	18	---	0.0	1017.0	0.0
09/09/2023 04:15	18	---	0.0	1017.1	0.0
09/09/2023 04:30	18	---	0.0	1017.0	0.0
09/09/2023 04:45	18	---	0.0	1017.0	0.0
09/09/2023 05:00	17	---	0.0	1017.1	0.0
09/09/2023 05:15	17	---	0.0	1017.0	0.0
09/09/2023 05:30	18	---	0.0	1017.0	0.0
09/09/2023 05:45	18	NNW	0.0	1016.9	0.0
09/09/2023 06:00	19	N	0.0	1017.1	0.0
09/09/2023 06:15	19	NW	0.0	1017.1	0.0
09/09/2023 06:30	19	NW	0.0	1017.0	0.0
09/09/2023 06:45	19	NNW	0.0	1017.1	0.0
09/09/2023 07:00	19	---	0.0	1017.1	0.0
09/09/2023 07:15	19	NW	0.0	1017.1	0.0
09/09/2023 07:30	19	NW	0.0	1017.2	0.0
09/09/2023 07:45	19	---	0.0	1017.2	0.0
09/09/2023 08:00	19	---	0.0	1017.4	0.0
09/09/2023 08:15	19	SSE	0.0	1017.4	0.0
09/09/2023 08:30	19	SSE	0.0	1017.5	0.0
09/09/2023 08:45	19	---	0.0	1017.4	0.0
09/09/2023 09:00	20	SW	0.0	1017.5	0.0
09/09/2023 09:15	19	---	0.0	1017.6	0.0
09/09/2023 09:30	20	---	0.0	1017.5	0.0
09/09/2023 09:45	20	---	0.0	1017.6	0.0
09/09/2023 10:00	20	W	0.0	1017.7	0.0
09/09/2023 10:15	21	SE	0.0	1017.7	0.0
09/09/2023 10:30	21	SSE	0.0	1017.8	0.0
09/09/2023 10:45	22	SSE	0.0	1017.7	0.0
09/09/2023 11:00	22	S	0.0	1017.7	0.0
09/09/2023 11:15	23	SE	0.0	1017.7	0.0
09/09/2023 11:30	24	SSE	0.0	1017.6	0.0
09/09/2023 11:45	25	SSE	0.0	1017.6	0.0

09/09/2023 12:00	27	S	0.0	1017.5	0.0
09/09/2023 12:15	26	SE	0.4	1017.5	0.0
09/09/2023 12:30	27	SSE	0.0	1017.4	0.0
09/09/2023 12:45	28	SE	0.0	1017.2	0.0
09/09/2023 13:00	30	SE	0.0	1017.1	0.0
09/09/2023 13:15	30	SE	0.0	1017.1	0.0
09/09/2023 13:30	30	WNW	0.0	1017.0	0.0
09/09/2023 13:45	30	---	0.0	1017.1	0.0
09/09/2023 14:00	31	---	0.0	1017.0	0.0
09/09/2023 14:15	30	NW	0.0	1016.8	0.0
09/09/2023 14:30	30	NW	0.0	1016.9	0.0
09/09/2023 14:45	31	W	0.0	1016.9	0.0
09/09/2023 15:00	31	WNW	0.0	1016.7	0.0
09/09/2023 15:15	32	NW	0.0	1016.6	0.0
09/09/2023 15:30	33	NW	0.0	1016.6	0.0
09/09/2023 15:45	32	NW	0.0	1016.5	0.0
09/09/2023 16:00	32	N	0.0	1016.4	0.0
09/09/2023 16:15	31	W	0.0	1016.3	0.0
09/09/2023 16:30	32	WNW	0.0	1016.1	0.0
09/09/2023 16:45	33	NW	0.0	1016.0	0.0
09/09/2023 17:00	33	NW	0.0	1015.8	0.0
09/09/2023 17:15	34	W	0.0	1015.8	0.0
09/09/2023 17:30	33	W	0.0	1016.0	0.0
09/09/2023 17:45	34	---	0.0	1015.9	0.0
09/09/2023 18:00	33	WNW	0.0	1016.0	0.0
09/09/2023 18:15	32	NNW	0.0	1016.0	0.0
09/09/2023 18:30	30	NW	0.0	1016.1	0.0
09/09/2023 18:45	29	NW	0.0	1016.2	0.0
09/09/2023 19:00	27	NW	0.0	1016.3	0.0
09/09/2023 19:15	26	NW	0.0	1016.2	0.0
09/09/2023 19:30	25	NW	0.0	1016.3	0.0
09/09/2023 19:45	24	W	0.0	1016.5	0.0
09/09/2023 20:00	23	W	0.0	1016.5	0.0
09/09/2023 20:15	23	---	0.0	1016.7	0.0
09/09/2023 20:30	23	---	0.0	1017.1	0.0
09/09/2023 20:45	22	SE	0.0	1017.2	0.0
09/09/2023 21:00	22	SE	0.0	1017.3	0.0
09/09/2023 21:15	21	---	0.0	1017.3	0.0
09/09/2023 21:30	21	---	0.0	1017.4	0.0
09/09/2023 21:45	21	---	0.0	1017.3	0.0
09/09/2023 22:00	21	---	0.0	1017.2	0.0
09/09/2023 22:15	21	---	0.0	1017.0	0.0
09/09/2023 22:30	20	---	0.0	1017.0	0.0
09/09/2023 22:45	20	---	0.0	1017.1	0.0
09/09/2023 23:00	20	---	0.0	1017.2	0.0
09/09/2023 23:15	20	---	0.0	1017.2	0.0
09/09/2023 23:30	20	---	0.0	1017.3	0.0
09/09/2023 23:45	20	---	0.0	1017.1	0.0

10/09/2023 00:00	20	---	0.0	1017.2	0.0
10/09/2023 00:15	20	---	0.0	1017.4	0.0
10/09/2023 00:30	20	---	0.0	1017.5	0.0
10/09/2023 00:45	20	SE	0.0	1017.9	0.0
10/09/2023 01:00	20	SSE	0.9	1018.4	0.0
10/09/2023 01:15	20	SSE	0.4	1018.1	0.0
10/09/2023 01:30	20	ESE	0.0	1017.9	0.0
10/09/2023 01:45	20	ESE	0.0	1017.5	0.0
10/09/2023 02:00	20	---	0.0	1017.3	0.0
10/09/2023 02:15	20	---	0.0	1016.9	0.0
10/09/2023 02:30	20	---	0.0	1016.4	0.0
10/09/2023 02:45	20	ESE	0.0	1015.9	0.0
10/09/2023 03:00	20	W	0.0	1016.1	0.0
10/09/2023 03:15	20	E	0.0	1016.2	0.0
10/09/2023 03:30	20	SE	0.0	1016.5	0.2
10/09/2023 03:45	20	SE	0.4	1016.6	0.2
10/09/2023 04:00	19	SSE	0.9	1017.1	0.0
10/09/2023 04:15	19	SSE	1.8	1017.7	0.6
10/09/2023 04:30	20	S	1.8	1017.7	0.8
10/09/2023 04:45	20	SE	1.3	1018.2	0.2
10/09/2023 05:00	20	SE	0.4	1017.8	0.0
10/09/2023 05:15	20	---	0.0	1017.4	0.4
10/09/2023 05:30	19	---	0.0	1016.4	0.0
10/09/2023 05:45	19	---	0.0	1016.2	0.2
10/09/2023 06:00	19	---	0.0	1016.2	0.0
10/09/2023 06:15	19	SE	0.0	1016.1	0.0
10/09/2023 06:30	19	---	0.0	1016.0	0.0
10/09/2023 06:45	19	SW	0.0	1016.1	0.0
10/09/2023 07:00	19	SE	0.0	1016.3	0.0
10/09/2023 07:15	19	SSE	0.0	1016.6	0.0
10/09/2023 07:30	19	SSE	0.0	1016.8	0.0
10/09/2023 07:45	19	SSE	0.0	1016.6	0.0
10/09/2023 08:00	19	S	0.4	1016.3	0.0
10/09/2023 08:15	20	---	0.0	1016.3	0.0
10/09/2023 08:30	20	S	0.0	1016.1	0.0
10/09/2023 08:45	20	---	0.0	1016.1	0.0
10/09/2023 09:00	20	ESE	0.0	1016.2	0.0
10/09/2023 09:15	20	SE	0.0	1016.4	0.0
10/09/2023 09:30	20	SE	0.0	1016.2	0.2
10/09/2023 09:45	20	---	0.0	1016.2	0.0
10/09/2023 10:00	20	W	0.0	1016.1	0.0
10/09/2023 10:15	20	SSE	0.9	1016.6	3.4
10/09/2023 10:30	20	NNE	0.4	1015.8	2.8
10/09/2023 10:45	20	NW	0.4	1016.2	0.2
10/09/2023 11:00	21	NW	0.0	1016.0	0.0
10/09/2023 11:15	21	N	0.4	1016.0	0.0
10/09/2023 11:30	21	NNW	0.0	1015.8	0.0
10/09/2023 11:45	22	NW	0.0	1015.8	0.0

10/09/2023 12:00	22	---	0.0	1015.9	0.0
10/09/2023 12:15	23	SE	0.0	1015.9	0.0
10/09/2023 12:30	23	ESE	0.0	1015.8	0.0
10/09/2023 12:45	24	SSE	0.0	1015.6	0.0
10/09/2023 13:00	25	SE	0.0	1015.4	0.0
10/09/2023 13:15	26	SE	0.0	1015.2	0.0
10/09/2023 13:30	26	SSE	0.0	1015.3	0.0
10/09/2023 13:45	27	SE	0.9	1015.1	0.0
10/09/2023 14:00	27	SE	0.0	1014.9	0.0
10/09/2023 14:15	26	SSE	0.4	1014.8	0.0
10/09/2023 14:30	27	SSE	0.4	1014.7	0.0
10/09/2023 14:45	27	SE	0.4	1014.6	0.0
10/09/2023 15:00	27	SE	0.9	1014.5	0.0
10/09/2023 15:15	27	SE	1.8	1014.5	0.0
10/09/2023 15:30	27	SE	2.7	1014.5	0.0
10/09/2023 15:45	26	SE	2.7	1014.3	0.0
10/09/2023 16:00	26	SE	1.3	1014.1	0.0
10/09/2023 16:15	26	SE	1.3	1013.8	0.0
10/09/2023 16:30	26	SE	0.4	1013.8	0.0
10/09/2023 16:45	27	SE	1.3	1013.8	0.0
10/09/2023 17:00	27	SE	0.9	1013.8	0.0
10/09/2023 17:15	26	SE	1.8	1013.8	0.0
10/09/2023 17:30	25	SE	2.2	1013.7	0.0
10/09/2023 17:45	25	SE	2.2	1013.6	0.0
10/09/2023 18:00	25	SE	1.8	1013.5	0.0
10/09/2023 18:15	24	SE	1.8	1013.6	0.0
10/09/2023 18:30	23	SSE	1.8	1014.0	0.0
10/09/2023 18:45	22	SE	2.7	1013.9	0.0
10/09/2023 19:00	22	SE	2.7	1013.9	0.0
10/09/2023 19:15	21	SSE	1.8	1014.1	0.0
10/09/2023 19:30	21	SSE	1.8	1014.1	0.0
10/09/2023 19:45	20	SSE	1.8	1014.2	0.0
10/09/2023 20:00	20	SE	1.8	1014.2	0.0
10/09/2023 20:15	20	SE	2.2	1014.4	0.0
10/09/2023 20:30	20	SE	1.8	1014.6	0.0
10/09/2023 20:45	19	SE	1.8	1014.8	0.0
10/09/2023 21:00	19	SE	1.3	1014.9	0.0
10/09/2023 21:15	19	SE	1.3	1015.0	0.0
10/09/2023 21:30	19	SE	0.9	1014.9	0.0
10/09/2023 21:45	19	SE	0.9	1015.1	0.0
10/09/2023 22:00	18	SE	0.9	1015.1	0.0
10/09/2023 22:15	18	SE	0.4	1015.4	0.0
10/09/2023 22:30	18	SE	0.4	1015.4	0.0
10/09/2023 22:45	18	SE	0.4	1015.5	0.0
10/09/2023 23:00	18	SE	0.9	1015.6	0.0
10/09/2023 23:15	19	SE	0.4	1015.6	0.0
10/09/2023 23:30	19	SE	0.4	1015.8	0.0
10/09/2023 23:45	19	SE	0.4	1015.8	0.0

11/09/2023 00:00	19	SE	0.4	1015.9	0.0
11/09/2023 00:15	19	SE	0.0	1015.9	0.0
11/09/2023 00:30	18	SW	0.0	1015.9	0.0
11/09/2023 00:45	18	---	0.0	1015.9	0.0
11/09/2023 01:00	18	SE	0.0	1015.9	0.0
11/09/2023 01:15	18	SSE	0.4	1015.9	0.0
11/09/2023 01:30	17	S	0.9	1015.8	0.0
11/09/2023 01:45	17	SW	0.0	1015.5	0.0
11/09/2023 02:00	17	S	0.0	1015.5	0.0
11/09/2023 02:15	18	SE	0.0	1015.4	0.0
11/09/2023 02:30	18	SE	0.0	1015.3	0.0
11/09/2023 02:45	18	SE	0.0	1015.3	0.0
11/09/2023 03:00	18	SE	0.4	1015.2	0.0
11/09/2023 03:15	18	SE	0.4	1015.2	0.0
11/09/2023 03:30	18	SE	0.0	1015.2	0.0
11/09/2023 03:45	18	SE	0.0	1015.0	0.0
11/09/2023 04:00	18	SE	0.0	1014.7	0.0
11/09/2023 04:15	18	SE	0.0	1014.7	0.0
11/09/2023 04:30	18	SE	0.0	1014.7	0.0
11/09/2023 04:45	18	SE	0.0	1014.7	0.0
11/09/2023 05:00	18	SE	0.4	1014.8	0.0
11/09/2023 05:15	18	SE	0.4	1014.7	0.0
11/09/2023 05:30	18	SE	0.4	1014.7	0.0
11/09/2023 05:45	18	SE	0.4	1014.8	0.0
11/09/2023 06:00	18	SE	1.3	1014.9	0.0
11/09/2023 06:15	18	SE	0.9	1014.9	0.0
11/09/2023 06:30	18	SE	1.8	1014.9	0.0
11/09/2023 06:45	18	SSE	1.8	1015.0	0.0
11/09/2023 07:00	18	SE	1.3	1014.8	0.0
11/09/2023 07:15	18	SSE	1.3	1014.9	0.0
11/09/2023 07:30	18	SSE	1.8	1015.0	0.0
11/09/2023 07:45	18	SSE	1.8	1015.1	0.0
11/09/2023 08:00	19	SSE	1.8	1014.9	0.0
11/09/2023 08:15	19	SE	1.8	1015.0	0.0
11/09/2023 08:30	19	SSE	2.2	1014.9	0.0
11/09/2023 08:45	19	SSE	1.8	1015.0	0.0
11/09/2023 09:00	20	SSE	1.3	1015.1	0.0
11/09/2023 09:15	21	SSE	1.3	1015.2	0.0
11/09/2023 09:30	21	SSE	1.8	1015.2	0.0
11/09/2023 09:45	21	SSE	0.9	1015.2	0.0
11/09/2023 10:00	21	SSE	2.2	1015.1	0.0
11/09/2023 10:15	22	SSE	2.7	1015.0	0.0
11/09/2023 10:30	23	S	2.7	1015.2	0.0
11/09/2023 10:45	23	SSW	1.8	1015.4	0.0
11/09/2023 11:00	22	SSW	1.8	1015.4	0.0
11/09/2023 11:15	22	SW	1.8	1015.4	0.0
11/09/2023 11:30	22	SW	1.3	1015.3	0.0
11/09/2023 11:45	23	SW	1.3	1015.2	0.0

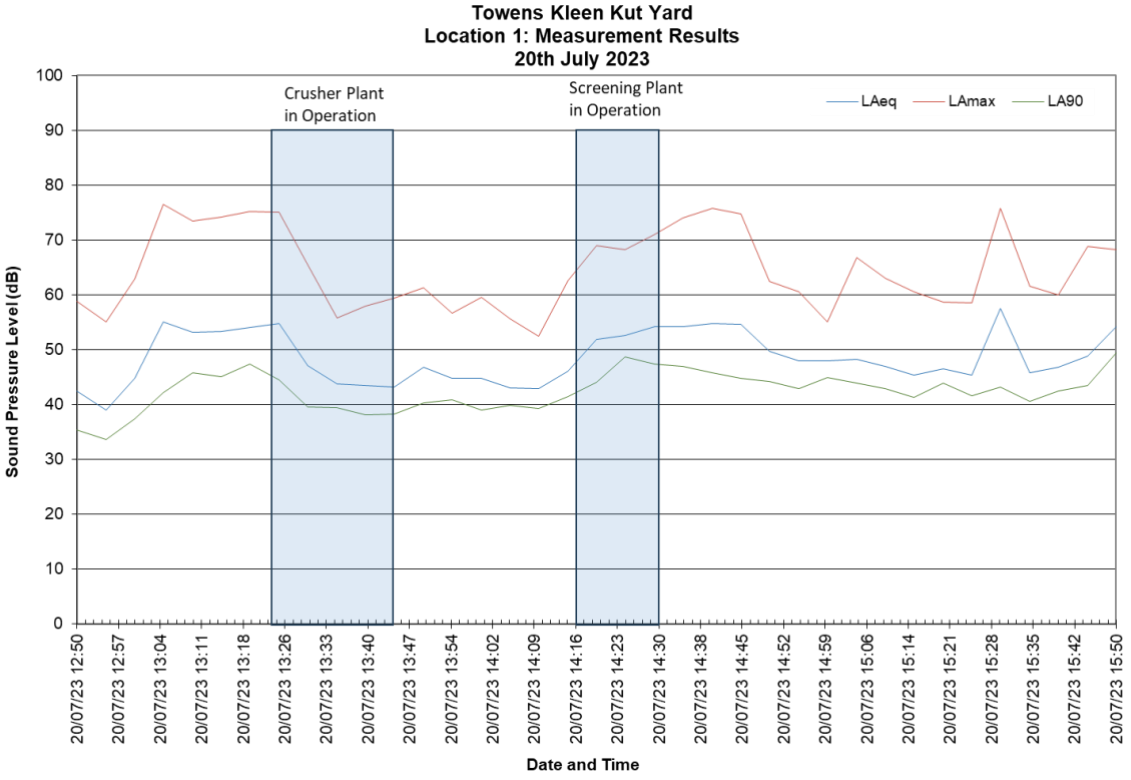
11/09/2023 12:00	23	SSW	1.3	1015.2	0.0
11/09/2023 12:15	22	WSW	0.9	1015.2	0.0
11/09/2023 12:30	22	N	0.9	1015.1	0.0
11/09/2023 12:45	22	NW	1.3	1015.1	0.0
11/09/2023 13:00	21	NW	1.3	1015.0	0.0
11/09/2023 13:15	21	NW	1.3	1015.1	0.0
11/09/2023 13:30	21	NW	1.3	1015.1	0.0
11/09/2023 13:45	21	NW	0.9	1015.2	0.0
11/09/2023 14:00	21	NNE	1.3	1015.1	0.0
11/09/2023 14:15	21	NW	1.3	1015.0	0.0
11/09/2023 14:30	21	NW	1.3	1015.0	0.0
11/09/2023 14:45	21	NW	1.3	1014.9	0.0
11/09/2023 15:00	22	NW	1.3	1014.9	0.0
11/09/2023 15:15	22	N	0.9	1014.8	0.0
11/09/2023 15:30	22	N	0.4	1014.7	0.0
11/09/2023 15:45	22	NNW	0.4	1014.6	0.0
11/09/2023 16:00	22	NW	0.4	1014.6	0.0
11/09/2023 16:15	21	NW	0.4	1014.6	0.0
11/09/2023 16:30	21	NW	0.4	1014.6	0.0
11/09/2023 16:45	21	NNE	0.0	1014.8	0.0
11/09/2023 17:00	20	N	0.0	1014.9	0.2
11/09/2023 17:15	20	NNW	0.0	1014.8	0.0
11/09/2023 17:30	20	NW	0.9	1014.8	0.0
11/09/2023 17:45	20	NNW	0.9	1014.7	0.0
11/09/2023 18:00	19	NW	0.9	1014.8	0.0
11/09/2023 18:15	19	NW	0.4	1014.8	0.0
11/09/2023 18:30	19	NW	0.9	1014.8	0.0
11/09/2023 18:45	19	NW	0.4	1014.8	0.0
11/09/2023 19:00	19	NW	0.4	1014.9	0.0
11/09/2023 19:15	19	NW	0.4	1014.8	0.0
11/09/2023 19:30	19	NW	0.4	1014.8	0.0
11/09/2023 19:45	19	NW	0.4	1015.0	0.0
11/09/2023 20:00	19	NW	0.4	1015.0	0.0
11/09/2023 20:15	19	NNW	0.4	1015.1	0.0
11/09/2023 20:30	19	NW	0.4	1015.3	0.0
11/09/2023 20:45	19	NW	0.0	1015.3	0.0
11/09/2023 21:00	19	NNW	0.0	1015.3	0.0
11/09/2023 21:15	18	NNW	0.0	1015.4	0.0
11/09/2023 21:30	18	NNW	0.0	1015.4	0.0
11/09/2023 21:45	18	NW	0.0	1015.4	0.0
11/09/2023 22:00	18	WSW	0.0	1015.4	0.0
11/09/2023 22:15	18	---	0.0	1015.4	0.0
11/09/2023 22:30	18	SE	0.0	1015.3	0.0
11/09/2023 22:45	18	---	0.0	1015.3	0.0
11/09/2023 23:00	18	---	0.0	1015.4	0.0
11/09/2023 23:15	18	---	0.0	1015.4	0.0
11/09/2023 23:30	18	---	0.0	1015.3	0.0
11/09/2023 23:45	18	---	0.0	1015.4	0.0

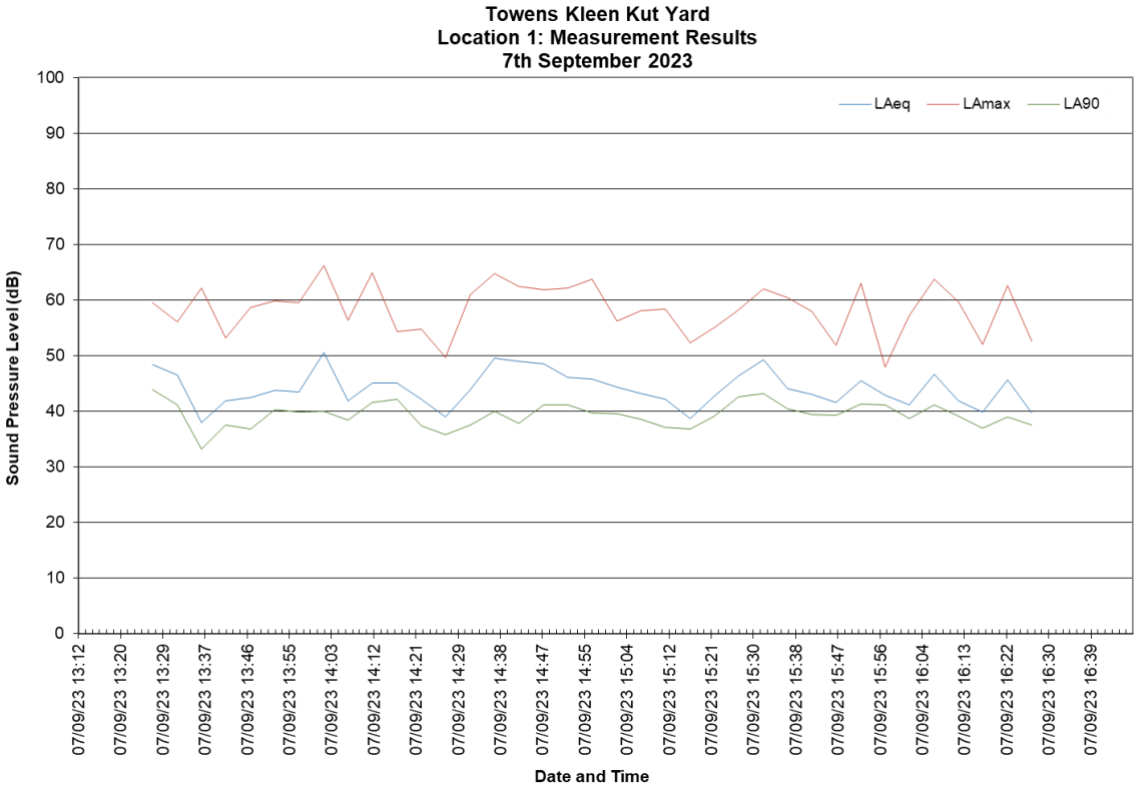
12/09/2023 00:00	18	---	0.0	1015.3	0.0
12/09/2023 00:15	18	---	0.0	1015.3	0.0
12/09/2023 00:30	18	---	0.0	1015.3	0.0
12/09/2023 00:45	17	---	0.0	1015.2	0.0
12/09/2023 01:00	17	---	0.0	1015.2	0.0
12/09/2023 01:15	17	---	0.0	1015.1	0.0
12/09/2023 01:30	17	---	0.0	1015.2	0.0
12/09/2023 01:45	17	---	0.0	1015.2	0.0
12/09/2023 02:00	17	---	0.0	1015.1	0.0
12/09/2023 02:15	17	SE	0.0	1015.0	0.0
12/09/2023 02:30	17	SE	0.4	1014.9	0.0
12/09/2023 02:45	17	SE	0.0	1015.0	0.0
12/09/2023 03:00	17	SE	0.4	1014.9	0.0
12/09/2023 03:15	17	SE	0.0	1014.9	0.0
12/09/2023 03:30	17	SE	0.0	1014.9	0.0
12/09/2023 03:45	17	SE	0.0	1015.0	0.0
12/09/2023 04:00	17	SE	0.4	1015.0	0.0
12/09/2023 04:15	17	SE	0.4	1015.0	0.0
12/09/2023 04:30	17	SE	0.4	1014.8	0.0
12/09/2023 04:45	17	SE	0.0	1014.7	0.0
12/09/2023 05:00	17	---	0.0	1014.8	0.0
12/09/2023 05:15	17	---	0.0	1014.7	0.0
12/09/2023 05:30	17	SSE	0.0	1014.5	0.0
12/09/2023 05:45	17	SSE	0.4	1014.5	0.0
12/09/2023 06:00	17	SSE	0.4	1014.5	0.0
12/09/2023 06:15	17	SE	0.0	1014.6	0.0
12/09/2023 06:30	17	SE	0.0	1014.6	0.0
12/09/2023 06:45	17	---	0.0	1014.6	0.0
12/09/2023 07:00	17	---	0.0	1014.7	0.0
12/09/2023 07:15	18	SSE	0.0	1014.7	0.0
12/09/2023 07:30	18	---	0.0	1014.7	0.0
12/09/2023 07:45	18	SE	0.0	1014.8	0.2
12/09/2023 08:00	18	SE	0.4	1014.8	0.0
12/09/2023 08:15	18	SSE	0.4	1014.9	0.0
12/09/2023 08:30	18	SE	0.0	1015.0	0.0
12/09/2023 08:45	18	SE	0.0	1015.0	0.0
12/09/2023 09:00	18	SSE	0.0	1015.1	0.0
12/09/2023 09:15	19	SE	0.0	1015.2	0.0
12/09/2023 09:30	19	SE	0.4	1015.2	0.0
12/09/2023 09:45	19	S	0.9	1015.3	0.0
12/09/2023 10:00	19	S	0.9	1015.3	0.0
12/09/2023 10:15	19	SSE	0.4	1015.3	0.0
12/09/2023 10:30	19	---	0.0	1015.3	0.0
12/09/2023 10:45	20	---	0.0	1015.3	0.0
12/09/2023 11:00	20	---	0.0	1014.4	0.0
12/09/2023 11:15	20	---	0.0	1014.5	0.0
12/09/2023 11:30	21	---	0.0	1014.6	0.0
12/09/2023 11:45	21	---	0.0	1010.5	0.0

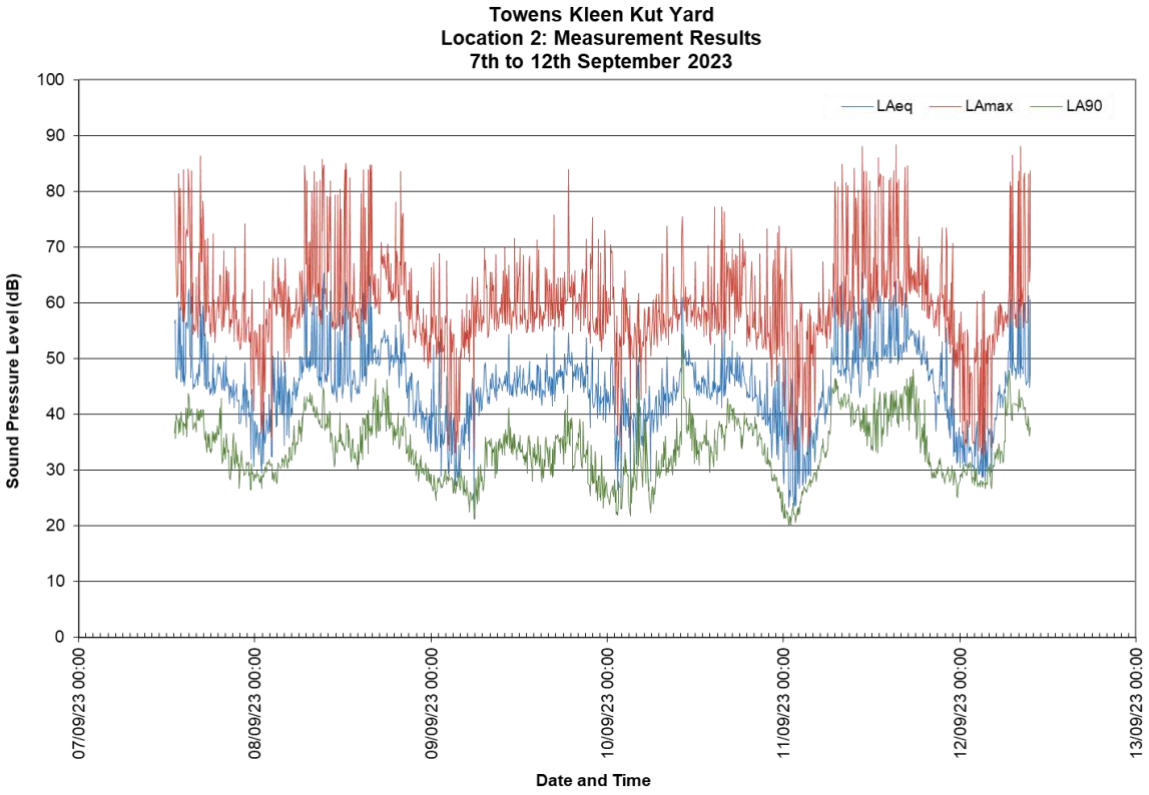
12/09/2023 12:00	21	---	0.0	992.9	0.0
12/09/2023 12:15	21	---	0.0	1001.5	0.0
12/09/2023 12:30	22	---	0.0	1003.7	0.0
12/09/2023 12:45	22	---	0.0	1007.3	0.0
12/09/2023 13:00	22	---	0.0	1009.2	0.0
12/09/2023 13:15	22	---	0.0	1006.8	0.0
12/09/2023 13:30	22	---	0.0	1009.0	0.0

Figure B2: Meteorological Record During Long Term Measurements – 7th to 12th September 2023

APPENDIX D – MEASUREMENT RESULTS






Towens Kleen Kut Yard
Location 2: Measurement Results
7th to 12th September 2023
LAeq
LAmax
LA90
Sound Pressure Level (dB)
100
90
80
70
60
50
40
30
20
10
0
07/09/23 00:00
08/09/23 00:00
09/09/23 00:00
10/09/23 00:00
11/09/23 00:00
12/09/23 00:00
13/09/23 00:00
Date and Time

APPENDIX E – SOURCE-TERM NOISE DATA

L_{Aw}	Octave Band Frequency, Hz and Sound Power Level, dB								
	31.5	**63**	**125**	**250**	**500**	**1 k**	**2 k**	**4 k**	**8 k**
106	124	125	117	115	115	116	115	111	104

Table E1: Aggregate Processing Plant Derived Sound Power Level