Tata Steel Ltd.

Sinter Plant De-Dust 2020 Project

Noise Impact Assessment

Project No. 297308-01(03)

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RSK GENERAL NOTES

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Title: Sinter Plant De-Dust 2020 Project – Noise Impact Assessment

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1 INTRODUCTION

1.1 Instruction

RSK Environment Ltd. prepared a noise assessment report in December 2018 to support a planning consent application for the proposed replacement 'de-dust facilities' associated with the Sinter Plant in Port Talbot, South Wales. Full planning permission for this development was granted on 6 February 2019 (ref. P2018/1036).

The primary purpose of the noise impact assessment was to identify any likely adverse or significantly adverse airborne noise effects caused by the demolition of the existing facilities and the construction and operation of the new facilities on noise sensitive receptors in the vicinity of the site. The exposure to occupational noise of workers in the northern parts of the Sinter Plant where the new de-dust facilities are proposed to be installed, was also assessed. Finally, an approach to noise control was proposed in order to reduce or avoid any likely adverse or significant adverse effects identified.

RSK Environment Ltd. has recently been commissioned by Turley on behalf of Tata Steel Ltd. to provide an updated noise assessment report to support a non-material amendment (NMA) to change the working hours (Condition 17) of extant planning permission P2018/1036.

These changes are required in order to ensure that the proposed development is built and fully operational by October 2020, in order to comply with the terms agreed with Natural Resources Wales (NRW).

1.2 Method

The following activities have been carried out to achieve the purpose outlined above:

- Review of relevant legislation and guidance;
- Measure noise levels at the site boundary and in close proximity to the existing facilities;
- Measure noise levels during the operation of the existing de-dust facilities at a number of locations considered representative of the closest noise sensitive receptors to the site;
- Quantify noise associated with the demolition of the existing facility and the construction of the new facilities;
- Assess construction noise impacts at the boundary of the site and at nearest residential receptors in line with the relevant guidelines;
- Quantify noise associated with the operational phase of the proposed new plant items associated with the new de-dust facilities;
- Assess operational noise impacts from the proposed new de-dust plant at the boundary of the site and at nearest residential receptors in line with the relevant guidelines;
- Analyse any impact during the construction/ dismantling works and the operation of the proposed facilities on workers at the Sinter Plant site; and
- Where required, provide indication of best practicable means and noise control measures to be implemented to reduce impacts.

2 REGULATORY BACKGROUND AND APPLICABLE ACOUSTICS STANDARDS AND GUIDANCE

2.1 Planning Policy Wales: Ed. 10, December 2018

The Planning Policy Wales states:

'Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales.'

2.2 Planning Guidance (Wales), Technical Advice Note (TAN) 11 Noise: October 1997

Technical Advice Note (TAN) 11 should be taken into account by local planning authorities in Wales in the preparation of development plans. This document provides guidance on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development.

Annex A of TAN 11 includes indications on the Noise Exposure Categories (NECs) to be considered when assessing noise affecting residential dwellings, as shown below:

- NEC A – '*Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable*;
- NEC B – '*Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection'*;
- NEC C – '*Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise'*; and
- NEC D – '*Planning permission should normally be refused'*.

The noise values for each Noise Exposure Category are included in Annex A Table 2.1 of TAN 11, as shown below:

Table 2.1 Recommended Noise Exposure Categories for new dwellings near existing noise sources, as per TAN 11, Annex A, Table 2.

Noise Levels [1] corresponding to the Noise Exposure Categories for New Dwellings $L_{Aeq,T}$ dB					
Noise Source		Noise Exposure Category			
		A	B	C	D
Road traffic	0700 - 2300	<55	55-63	63-72	>72
	2300 – 0700 [2]	<45	45-57	57-66	>66
Rail traffic	0700 - 2300	<55	55-66	66-74	>74
	2300 – 0700 [2]	<45	45-59	59-66	>66
Air traffic [3]	0700 - 2300	<57	57-66	66-72	>72

Noise Levels [1] corresponding to the Noise Exposure Categories for New Dwellings $L_{Aeq,T}$ dB					
Noise Source		Noise Exposure Category			
		A	B	C	D
	2300 – 0700 [2]	<48	48-57	57-66	>66
Mixed sources [4]	0700 - 2300	<55	55-63	63-72	>72
	2300 – 0700 [2]	<45	45-57	57-66	>66

(1) *Noise levels: the noise level(s) ($L_{Aeq,T}$) used when deciding the NEC of a site should be representatives of typical conditions.*
(2) *Night-time noise levels (2300-0700): sites where individual noise events regularly exceed 82 dB L_{Amax} (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq,8H}$ (except where the $L_{Aeq,8H}$ already puts the site in NEC D).*
(3) *Aircraft noise: daytime values accord with the contour values adopted by the Department of Transport which relate to levels measured 1.2m above open ground. For the same amount of noise energy, contour values can be up to 2 dB(A) higher than those of other sources because of ground reflection effects.*
(4) *Mixed sources: this refers to any combination of road, rail, air and industrial noise sources. The "mixed source" values are based on the lowest numerical values of the single source limits in the table. The "mixed source" NECs should only be used where no individual noise source is dominant. To check if any individual noise source is dominant (for the purposes of this assessment) the noise level from the individual sources should be determined and then combined by decibel addition (remembering first to subtract 2 dB(A) from any aircraft noise contour values). If the level of any one source then lies within 2 dB(A) of the calculated combined value, that source should be taken as the dominant one and the site assessed against the appropriate NEC for that source, rather than using the "mixed source" NECs. If the dominant source is industrial noise see paragraph B17 of Annex B. If the contribution of the individual noise sources to the overall noise level cannot be determined by measurement and/or calculation, then the overall measured level should be used and the site assessed against the NECs for "mixed sources".*

2.3 BS 5228-1 & -2: 2009+A1:2014 'Code of Practice for noise and vibration control on construction and open sites. Noise and Vibration'

The two parts of BS 5228 provide guidance on the control of noise and vibration on construction and open sites. BS 5228 contains a methodology for predicting construction noise levels taking both stationary and mobile noise sources into consideration within designated construction areas. BS 5228 also contains methodology for assessing construction noise levels, and methods of reducing noise emissions from construction sites.

Annexe E of BS 5228 provides broad guidance on the significance of construction noise on residential and commercial sensitive receptors. This includes significance based on absolute limit levels and those according to magnitude of change in ambient levels. In terms of absolute limits, Section E.2 recommends that daytime construction noise should not exceed 70 dB(A) in rural & suburban environments and 75 dB(A) in urban environments close to main roads or heavy industry, in order to limit overall impact on receptors. This absolute criterion can be applied to both residential and commercial receptors.

Section E.3 of BS5228 presents two methods of deriving construction noise criteria, based on existing ambient noise levels. The first method looks at the existing ambient noise in combination with threshold values for day, evening and night-time periods, and then prescribes the appropriate value, as shown in Table 2.2.

Table 2.2 Example threshold of potential significant effect at dwellings (BS5228 Table E.1)

Assessment category and threshold value period	Threshold value in decibels (dB) ($LA_{eq,T}$)		
	Category A [A]	Category B [B]	Category C [C]
Night-time (23.00 – 07.00)	45	50	55
Evening and weekends [D]	55	60	65
Daytime (07.00 – 19.00) and Saturdays (07.00 – 13.00)	65	70	75
NOTE 1 A potential significant effect is indicated if the L_{Aeq} noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level. NOTE 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise levels is higher than the above values), then a significant effect is indicated if the total $L_{Aeq, T}$ noise level for the period increases by more than 3 dB due to site noise. 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(A)) 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 the category A values. [C] Category C: Threshold values to use when the 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.			

The second method identifies significance where a 5 dB(A) increase in the ambient noise levels occur, subject to lower cut off values of 65, 55 and 45 dB(A) for each assessment period respectively. For the purpose of this assessment a conservative assumption has been applied and the lower criteria of the two methods have been applied.

In addition to the general construction assessment criteria, Section E.4 of BS 5228 provides thresholds at which consideration to noise insulation should be given. Given the distances and activities involved the likelihood of any of these applying is considered negligible.

2.4 BS 4142:2014+A1:2019 'Method for rating and assessing industrial and commercial sound'

BS 4142:2014+A1:2019 provides a method for rating industrial and commercial sound and assessing the resulting impacts upon surrounding receptors. The method is applicable to fixed plant installations, sound from industrial and manufacturing process and other associated activities. The rating method considers specific acoustic characteristics of the noise source, such as tonality, impulsivity and intermittency.

The impact assessment procedure described in BS 4142 is based on a comparison of rating level from the noise source with the background sound level prevailing at the receptor locations. The assessment of impact and likelihood of complaints is made based on the following differences:

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on context; and

- 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.

2.5 BS 8233: 2014 'Guidance on sound insulation and noise reduction for buildings'

Internal Noise Criteria

BS 8233 establishes internal ambient noise levels for dwellings based upon occupancy patterns and derived from World Health Organisation (WHO) guidelines for community noise. These are summarised in Table 2.3.

Table 2.3 Summary of internal noise levels

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

It should be noted that the internal target levels as shown in Table 2.3 can be relaxed by 5 dB where the proposed development is considered '*necessary or desirable'* and reasonable internal conditions would still be achieved, as per noted in Paragraph 7.7.2 of BS 8233.

External Noise Criteria

BS8233 also provides design criteria for external noise and Section 7.7.3.2 states:

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited."

2.6 The Control of Noise at Work Regulations: 2005

The relevant regulatory framework for controlling and assessing occupational noise exposure is The Control of Noise at Work Regulations 2005, which came into force in 2006 and replaced the 1989 Noise Regulations. The key criteria in The Control of Noise at Work Regulations 2005 are exposure limit values and action values, as summarised in Table 2.4.

Table 2.4 Exposure limit values and exposure action values

Action Value	Daily or weekly personal noise exposure $L_{EP,d}$ / $L_{EP,w}$	Peak sound pressure L_{Cpeak}
Lower exposure action values	80 dB	135 dB

Action Value	Daily or weekly personal noise exposure $L_{EP,d}$ / $L_{EP,w}$	Peak sound pressure L_{Cpeak}
Upper exposure action values	85 dB	137 dB
Exposure limit values	87 dB	140 dB

The exposure action values are the levels of exposure to noise at which employers are required to take certain actions. Where employees are liable to be exposed to noise at or above a lower action value, a number of actions are required, including a risk assessment from noise to the health and safety of the employees, personal hearing protectors to be made available on request by the employee, etc.

Where employees are liable to be exposed to noise at or above an upper action value, further actions will be required, including the reduction of noise exposure to '*as low a level as is reasonably practicable'*, provision of hearing protectors when the employer is unable to reduce noise exposure of employees below an upper action value, etc.

Employees must not be exposed to noise above an exposure limit value.

2.7 Mandatory Engineering Standard 002: Specification for Limiting Noise from Plant and Equipment: November 2002

Mandatory Engineering Standard (MES) 002 is an internal standard issued by Tata Steel UK in 2002 which specifies the requirements for limiting noise from new plant and equipment.

This document includes considerations on workplace noise and community noise, as shown below:

> *'3 Workplace Noise*
>
> *Plant or equipment installed on site should not increase existing noise levels and where there is an impulsive, tonal or intermittent noise component an additional 5 dB penalty below existing conditions shall be imposed. Particular care is required when equipment is to be installed in areas where noise levels are just below Corus' hearing protection limit of 85 dB(A), to ensure that the final conditions are still below 85 dB(A).*
>
> *Plant or equipment supplied should normally be less than 85 dB(A) at 1 meter under normal operating conditions to control workplace noise and help reduce personal noise exposures*.' (…)
>
> *'6 Community Noise*
>
> *Plant or equipment installed on site should not increase noise levels beyond the site boundary and where there is an impulsive, tonal or intermittent noise component an additional 5 dB penalty below existing conditions shall be imposed.*
>
> *Noise during demolition, construction, and commissioning stages shall be controlled so as not to give rise to complaints. (…)*
>
> *Plants authorised under IPPC legislation will require an environmental impact assessment for any equipment that could affect noise levels in the local communities around the site'.(…)*

Therefore, the above criteria (new plant/ equipment should not exceed 85 dB(A) L_{Aeq} at 1 metre distance; operation noise should not increase baseline noise levels beyond the site boundary) have been considered within the noise report.

This document also includes some notes on the weather conditions under which the noise measurements should be undertaken, as well as specifications on the noise monitoring equipment to be used.

2.8 BS 7445-1,-2,-3 'Description and measurement of environmental noise. Guide to quantities and procedures'

The three-part standard (BS) 7445 provides the framework within which environmental noise should be quantified.

BS 7445 does not prescribe the meteorological conditions under which noise measurements should or should not be taken, although it recommends that in order to facilitate the comparison of results, measurements should be undertaken under certain weather conditions (wind speed not exceeding 5 ms^{-1}, no strong temperature inversions and no heavy precipitation).

2.9 International Standard ISO 9613-2:1996 'Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation'

International Standard: ISO 9613-2: 1996(E): '*Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation*' enables the prediction of noise levels in the community from sources of known sound emission.

The noise prediction method described in this part of the standard is general and is suitable for a wide range of engineering applications where the noise level outdoors is of interest. The noise source(s) may be moving or stationary and the method considers the following major mechanisms of noise attenuation:

- Geometrical divergence (also known as distance loss or geometric damping);
- Atmospheric absorption;
- Ground effect;
- Reflection from surfaces; and
- Screening by obstacles.

The method predicts noise levels under meteorological conditions favourable to noise propagation from the sound source to the receiver, such as downwind propagation, or equivalently, propagation under a moderate ground-based temperature inversion as commonly occurs at night.

The propagation algorithms described in ISO 9613-2 are implemented into the three-dimensional noise modelling software package SoundPLAN v8.1, which has been used to undertake the propagation calculations for this assessment.

2.10 Consultation

2.10.1 Initial Consultation

An initial consultation with the Planning and Public Protection Department at Neath Port Talbot County Borough Council (NPTCBC) was undertaken on 2 October 2018, with regards to the proposed noise monitoring strategy and assessment methodology. It was confirmed that the proposed methodology was appropriate for this assessment; the

Public Protection Officer made some comments on the relevant noise sensitive receptors to be considered during the assessment (i.e. residents at Lower West End and Mariners Point) which were addressed when planning the noise survey.

2.10.2 Further Consultation

Further to the received comments from the Planning and Public Protection Department at NPTCBC, a meeting between Natural Resources Wales (NRW), NPTCBC and Turley was held on 3 October 2018, during which a number of queries were raised. All these queries (i.e. industrial noise to be assessed in accordance with the most up-to-date version of BS4142; operating times for the construction works to be restricted to daytime hours during the weekend and morning times on Saturdays; technical specifications for new fans and equipment to be considered when assessing operational noise; and impacts on workers to be considered) have been addressed within the noise assessment, the most relevant of which would be the necessity of including some considerations on occupational noise during the operation of the new facilities.

2.10.3 Statutory Pre-Application Consultation

An initial version of this noise assessment report accompanied the draft planning application during the statutory Pre-Application Consultation. Further to the consultation, Natural Resources Wales (NRW) issued a letter response on 7 December 2018 which included a number of comments regarding noise and vibration.

Some of these comments refer to the necessity of considering residents at Prince Street (Taibach) as sensitive receptors within the noise report; taking this into account, a second round of baseline noise measurements were undertaken in various locations considered representative of these receptors.

The consultation response from NRW also includes considerations on narrow band sound emission levels for the new plant and equipment to be installed. It should be noted that these data are not available at the moment; therefore, other considerations have been made in order to account for a conservative scenario during the operation of the new facilities (e.g. a tonality penalty have been applied to the calculated noise levels for the operation of the new plant/ equipment).

All other comments have been addressed within this version of the noise report.

2.10.4 Further Consultation

It has been agreed with NPTCBC that a new version of the noise assessment report will be submitted in support of the NMA.

This report has been prepared in order to assess noise impacts as result of the extended working hours for the mechanical construction phase; it should be noted that all other construction/ demolition works including the most intrusive activities (i.e. piling and dismantling/ demolition) will be undertaken during normal working hours (i.e. 07:00-19:00 Monday to Friday and 07:00-13:00 Saturdays).

3 PROJECT DETAILS

3.1 Site Location and Description

The Sinter Plant is located within the Tata Steel industrial site in Port Talbot, which is a fully integrated steel making facility. The Sinter Plant forms part of the large industrial site and is surrounded by other industrial facilities such as a power plant and the steelworks/ blast furnaces. The Sinter plant is not directly visible from any of the closest noise sensitive receptors.

Sinter is produced in the Sinter Plant as result of the processing of iron ore, coal and lime. The sinter is then used to produce iron, with the raw product pressed and processed to produce steel.

The '*Secondary De-Dust Project'* is part of the '*Sinter Recovery Programme'* and consists of a network of ductwork associated integrated within the Sinter Plant which contains a number of suction points at locations where the dust is generated and collects dust in a central point, with a current maximum collection of 4.8 tonnes per hour for the current de-dust facilities.

In order to support current environmental regulations, the installation of a fabric filter and associated ductwork is proposed. Therefore, the proposed works include the dismantling of existing structures accommodating the secondary dust extraction system for the Sinter Plant and installation of a replacement secondary dust extraction system, including a bag filter system comprising a 6-storey structure), pipework and ducting, new pneumatic conveying line, chimney stack (55 m tall), hard and soft landscaping and associated development.

An initial site visit to the Sinter Plant was undertaken on Wednesday 3 October 2016, to characterise the main noise sources affecting the development area; identified as plant to the north-western corner of the sinter plan site.

3.2 Existing Receptors

The closest noise sensitive receptors to the sinter plant are circa 1 km to the NNE and NE of the site, at Lower West End and Prince Street. Another group of noise sensitive receptors to be considered will be the residential dwellings located at Mariners Point, which are some 1.4 km to the WNW of the Sinter Plant.

For the assessment of existing operational noise, the nearest properties adjacent to Lower West End, Prince Street and Mariners Point have been utilised; these are illustrated in Figure 3.1 overleaf.

Figure 3.1 Nearest Receptors to the development site (to scale when printed at A4).

3.3 Proposed New Plant

Based on the workplace noise limit in MES 002 a maximum noise emission value of 85 dB(A) at 1 metre from the source has been used for the following proposed plant/ equipment to be installed on site:

- **New compressors** - 2 * fixed-speed Atlas Copco GA90; and 1 * variable-speed driven Atlas Copco GA90 VSD, to be installed within a compressors room.

Tata Steel Ltd has provided estimated octave band noise levels at 1 metre distance from the new Inducted Draft (ID) Fan, which is proposed to be cladded and installed in close proximity to the new stack and bag filter. Estimated sound pressure levels at 1 metre distance from the fan package are included in Table 3.1 below.

Table 3.1 Sound Pressure Levels at 1 metre distance from the fan package

Name	Octave Band Sound Pressure Levels at 1 m dB when running at 786 rpm, including cladding [1]							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
DWDI-BAW-2800/100-100	79	81	73	72	72	65	54	60

(1) A 10 mm thick metal case with 150 mm thick cladding is proposed to be used.

In addition to the above, other new plant which will have the potential to produce noise during its operation have been considered within this noise assessment, such as the new pneumatic conveyor line which will run parallel to the new dust return line.

A detailed site location map is shown in Appendix 1.

3.4 Working Hours

The construction and demolition works will be undertaken during normal construction hours i.e. between the hours of 07:00 to 19:00 hrs Monday to Friday and 07:00 to 13:00 hrs Saturdays.

However, some construction activities are required to be undertaken during extended working hours (i.e. weekdays, weekends and night-time periods) in order to make it possible for the scheme to be complete and fully operational by October 2020. In any case, it should be noted that the most intrusive tasks such as dismantling/ demolition and piling works will be undertaken exclusively during normal working hours.

The operation of the Sinter Plant and the associated new de-dust facilities is planned to be 24 hours a day, 7 days a week; it should be noted that the existing facilities already operate within this regime (continuous operation).

3.5 Construction and Demolition Activities

The construction and demolition works to be considered as part of this noise assessment are as follows:

- **Activity 1 – Initial Site Clearance**: an excavator, a forklift and a dumper will be used during the site setup/ clearance. These works will be undertaken exclusively during normal working hours (daytime);

- **Activity 2 – Civil Enabling Works**: A number of civil enabling works will be undertaken in the areas where the new plant will be installed; this task includes the undertaking of driven piles at the area in which the new bag filter will be installed; these piling works will be also required to build the supports to the new suction duct work and the dense conveyor. These works will be undertaken exclusively during normal working hours (daytime);

- **Activity 3 – Construction of Bagfilte**r: A bagfilter system with an equivalent height of a 6-storey building will be built at the northwest corner of the Sinter Plant site by using two mobile cranes, forklifts, MEWPs, etc. These activities will be undertaken during both daytime and night-time periods;

- **Activity 4 – Construction of external duct**: An external new suction ductwork will be installed at circa 17 metres above ground; two mobiles cranes and ancillary plant will be required in order to complete this activity. These activities will be undertaken during both daytime and night-time periods;

- **Activity 5 – Installation of dense conveyor**: A dense conveyor will be installed in parallel with the external duct, at circa 17 metres above ground level; the use of 2 mobile cranes will be required for these works. These activities will be undertaken during both daytime and night-time periods;

- **Activity 6 – Installation of air compressors and room**: A total of 3 compressors will be installed within a compressors' room; 2 of them will be fixed-speed Atlas Copco GA90, and the third one will be a variable-speed driven Atlas Copco GA90 VSD. The dimensions of the compressors are 3400 mm length/ 1850 mm width/ 2150 mm height. These activities will be undertaken during both daytime and night-time periods;

- **Activity 7 – Post-activity groundworks**: A telehandler will be used for the post-activity works, which will consist of tree plantations and concrete vehicle segregation works. These works will be undertaken exclusively during normal working hours (daytime); and

- **Activity 8 – Removal of existing de-dust facilities**: These works will include the removal of the existing de-dust Electro Static Precipitators (ESP), stack, ducting, Induced Draft (ID) fan, ladders, stairs and access gantry; the use of a 75-t mobile crane and excavator-mounted hydraulic breakers will be required to complete this activity. These works will be undertaken exclusively during normal working hours (daytime).

3.6 Construction and Demolition Plant Requirements

Each plant list is specified as individual tasks. Construction and demolition plant lists, provided by Tata Steel Ltd, have been included in Appendix 5, tables A5.1 to A5.8. Those tables provide the plant requirements for undertaking construction/ demolition tasks in addition to the total noise output for the task (cumulative noise level of all plant equipment proposed operating at the same time).

The percentage on-times refer to the estimated time period for which the plant will be approximately operational within any one-hour period.

3.7 Programme of Works

A programme of works as provided by Tata Steel Ltd is included in Appendix 6, tables A6.1 to A6.6. Coloured cells within the tables indicate when specific activities/tasks will occur. Different colours are used for each of the considered work activities.

4 EXISTING NOISE ENVIRONMENT

4.1 Survey Details

A noise survey was undertaken between Thursday 4 and Friday 5 October 2018. Two noise monitoring locations where positioned in order to obtain noise data for locations representative of the closest existing receptors to the proposed de-dust facilities (to be built/ installed at the north boundary of the Sinter Plant, as per Drawing Ref. '*TCE.11011M-02-08-GEN-0002'* issued by Tata Steel in September 2018). A second round of baseline noise measurements were undertaken at locations representative of the noise sensitive receptors located at Prince Street (Taibach) between Thursday 10 and Tuesday 15 January 2019.

UL1 was located to the northeast of the site, in line with the closest residential areas to the Sinter Plant at Lower West End; these receptors are located circa 900 m to the northeast of the Sinter Plant. The sound level meter was installed in the rear garden of 3 Lower West End and facing the industrial site.

It is considered that noise measurements at this monitoring location will represent a conservative scenario for the closest residents to the site, since this location is sheltered from road traffic noise at the A4241 by an existing barrier located between the road and the monitoring location.

UL2 was located at the Little Warren Playing Fields, in line with the closest residents at Mariners Point to the Sinter Plant; these receptors are located circa 1.5 km to the northwest of the Sinter Plant and circa 200 m to the west of the port facilities ('Associated British Ports').

UL3 was located approximately 1 km to the east pf the site. in line with the closest residents to the Sinter Plant at Prince Street. The sound level meter was installed in the rear garden of 30 Prince Street and facing the site.

Attended noise measurements encompassing short-term samples were taken on Thursday 4 and Friday 5 October 2018 at 3 locations (i.e. AL1 to AL3) during daytime, evening and night-time periods. A second round of attended noise measurements were undertaken on Thursday 10 and Friday 11 January 2019 at a single location (AL4) off Prince Street during day, evening and night-time periods. The attended measurements provided a better understanding of the existing noise environment for the closest noise sensitive receptors to the site.

Finally, a number of attended noise measurements were undertaken at locations considered representative of the part of the site where the new de-dust facilities are proposed i.e. north boundary of the Sinter Plant. These measurements were undertaken during a night-time period on Thursday 4 and Friday 5 October 2018, in order to minimise the influence of non-industrial related noise sources on the measurements.

During the entire survey it was understood that the site was operating normally.

The noise monitoring locations are shown in Figure 4.1 and Figure 4.2. Photographs of the monitoring positions are included in Appendix 2.

4.2 Noise Monitoring Locations

Noise monitoring locations including distances to the closest noise sources are presented in Table 4.1 overleaf.

All measurements were undertaken in free field conditions with the microphone positioned away from reflecting surfaces and at 1.5 m above the ground height to the requirements of BS 7445.

Table 4.1 Noise monitoring locations

Noise Monitoring Location ID	Type of noise measurement	Coordinates	Closest noise source	Distance from noise source, Approx.
UL1	Closest sensitive receptors (unattended)	277130, 188904	A4241/ Railway Line/ Power Plan. The Sinter Plant was not audible.	30 m (A4241)/ 70 m (rail line)/ 330 m (power plant)
UL2		275291, 188891	Port facilities/ stockpiling areas within the industrial site/ Other industrial noise sources within Tata's site. The Sinter Plant was not audible.	220 m (Port facilities)/ 680 m (stockpiling areas within the industrial site)/ more than 800 m (other industrial noise sources)
UL3		277696, 188271	Railway Line/ A4241/ / Power Plan (noise from the Sinter Plant was not discernable)	40 m (rail line)/ 140 m (A4241)/ 450 m (power plant/ steelworks)
AL1	Closest sensitive receptors (attended)	277043, 189066	A4241/ Railway Line/ Power Plant. The Sinter Plant was not audible.	40 m (A4241)/ 50 m (rail line)/ 470 m (power plant)
AL2		275291, 188861	Port facilities/ stockpiling areas within the industrial site/ Other industrial noise sources within Tata's site. The Sinter Plant was not audible.	210 m (Port facilities)/ 670 m (stockpiling areas within the industrial site)/ more than 800 m (industrial facilities within the Tata site other than the Sinter Plant)
AL3		276991, 189033	A4241/ Railway Line/ Power Plant. The Sinter Plant was not audible.	5 m (A4241)/ 120 m (rail line)/ 460 m (power plant)
AL4		277716, 188239	Railway Line/ A4241/ / Power Plan & steelworks (noise from the Sinter Plant was not discernable)	50 m (rail line)/ 160 m (A4241)/ 460 m (power plant/ steelworks)
SB1	Site boundary measurements	276511, 188091	Overhead conveyor (blended mix conveyor at the Sinter Plant site)/ existing process (3 electro-static precipitators or ESPs). All the above noise sources are included within the Sinter Plant site	7 m (blended mix conveyor)/ 60 m (building housing the 3 ESPs)
SB2		276540, 188087	Overhead conveyor (blended mix conveyor)/ existing process (3 electro-static precipitators or ESPs). All the above noise sources are included within the Sinter Plant site	10 m (blended mix conveyor)/ 40 m (building housing the 3 ESPs)
SB3		276569, 188082	Overhead conveyor (blended mix conveyor)/ existing process (3 electro-static precipitators or ESPs). All the above noise sources are included within the Sinter Plant site	10 m (blended mix conveyor)/ 30 m (building housing the 3 ESPs)

Noise Monitoring Location ID	Type of noise measurement	Coordinates	Closest noise source	Distance from noise source, Approx.
SB4		276599, 188078	Overhead conveyor (blended mix conveyor)/ existing process (3 electro-static precipitators or ESPs)/ dumper passing to the north (haul road). All the above sources (with the exception of the dumper movements) are included within the Sinter Plant site	10 m (blended mix conveyor)/ 30 m (building housing the 3 ESPs)/ 28 m to the haul road
SB5		276627, 188073	Overhead conveyor (blended mix conveyor)/ conveyor at ground level (product sinter conveyor)/ existing process (3 electro-static precipitators or ESPs)/ dumper passing to the north (haul road). All the above sources (with the exception of the dumper movements) are included within the Sinter Plant site	10 m (blended mix conveyor)/ 40 m (product sinter conveyor)/ 21 m (building housing the 3 ESPs)/ 40 m to the haul road
SB6		276656, 188069	Overhead conveyor (blended mix conveyor)/ conveyor at ground level (product sinter conveyor)/ ESP & ID Fan to be dismantled. All the above noise sources are included within the Sinter Plant site	9 m (blended mix conveyor)/ 14 m (product sinter conveyor) / 30 m ESP & ID Fan to be dismantled
SB7		276688, 188063	Conveyor at ground level (product sinter conveyor, to the south of the sound level meter)/ Conveyor at ground level (conveyor to blast furnace, to the north of the SLM)/ ESP & ID Fan to be dismantled. All the above noise sources are included within the Sinter Plant site	9 m (product sinter conveyor)/ 5 m (conveyor to blast furnace)/ 20 m ESP & ID Fan to be dismantled
SB8		276707, 188061	Conveyor at ground level (product sinter conveyor, to the south of the sound level meter)/ Conveyor at ground level (conveyor to blast furnace, to the north of the SLM)/ ESP & ID Fan to be dismantled. All the above noise sources are included within the Sinter Plant site	10 m (product sinter conveyor)/ 4 m (conveyor to blast furnace)/ 20 m ESP & ID Fan to be dismantled
SB9		276728, 188057	Conveyor at ground level (product sinter conveyor, to the south of the sound level meter)/ Conveyor at ground level (conveyor to blast furnace, to the north of the SLM)/ Dust Hopper. All the above noise sources are included within the Sinter Plant site	9 m (product sinter conveyor)/ 4 m (conveyor to blast furnace)/ 27 m dust hopper

Figure 4.1 Noise Monitoring Locations (Sensitive Receptors) (to scale when printed at A4).

Figure 4.2 Noise Monitoring Locations (Site Boundary Locations) (to scale when printed at A4).

4.3 Noise Survey Equipment

Noise survey was undertaken using the following equipment:

Table 4.2 Survey Equipment

Equipment	Type	Serial number	Calibration date
Class 1 Sound Level Meter	Rion NL-52	1043374	29/11/2017
		0453834	24/09/2018
		1043374	05/04/2017
		1021276	08/08/2018
		0112392	05/12/2017
		0976225	29/11/2017
Acoustic Calibrator	Rion NC-75	35270127	06/03/2018

The calibration of each sound level meter was checked before and after the measurements, and calibration drift was within acceptable limits. Equipment calibration certificates can be made available if required.

The sound level meters used conform to the requirements of *BS EN 61672-1: 2013 Electroacoustics. Sound level meter, Specifications*. The calibrator used conforms to the requirements of *BS EN IEC 60942: 2018 Electroacoustics, Sound calibrators*. The equipment used has a calibration history that is traceable to a certified calibration institution.

4.4 Meteorological/Weather Conditions

Weather conditions recorded during the first round of the attended measurements were noted to be dry and calm, with temperatures of 14-17 ˚C. Wind speeds during the attended noise measurement were below 1 ms^{-1} in average.

records for a weather station located in Port Talbot (weather station Id. '*IPORTTAL5)* were obtained through Wunderground[1]. The analysis of that data show that the weather conditions during the first round of the unattended noise measurements were suitable for noise monitoring, with dry and calm weather conditions being recorded during the entire unattended noise measurement.

The available weather data have been included in Appendix 3 and summarised in Table 4.3 below.

Table 4.3 Weather conditions during the first round of unattended noise measurements (weather station ref. '*IPORTTAL5*).

Date	Temperature (ºC)	Precipitation (mm)	Average hourly wind speed (ms^{-1})[1]	Wind direction
Thursday 04/10/2018	13 to 20	0.0	0.0-0.5	North East
Friday 05/10/2018	14 to 17	0.0	0.0-2.4	North East

[1] www.wunderground.com

Taking all the above into account, the weather conditions during the first part of the baseline survey were considered to be suitable for environmental noise monitoring.

During the second round of attended noise measurements undertaken at the Prince Street area, weather conditions were noted to be dry and calm, with temperatures of 5-8 ˚C. Wind speeds during the attended noise measurement were below 2 ms^{-1} in average.

A portable weather station was installed in close proximity to the unattended noise monitoring location UL3, in order to obtain weather data throughout the second round of unattended noise measurements.

The analysis of the data obtained from the weather station demonstrates that the weather conditions during the unattended noise measurements were suitable for noise monitoring, with dry and calm weather conditions being recorded. The weather data is summarised have been included in Appendix 3 and summarised in Table 4.4 below.

Table 4.4 Weather conditions during the second round of unattended noise measurements (portable weather station).

Date	Temperature (°C)	Precipitation (mm)	Average hourly wind speed (ms^{-1})	Prevailing wind direction
Thursday 10/01/2019	5 to 10	0.0	0.0-2.7	North
Friday 11/01/2019	5 to 10	0.0	0.0-1.4	North
Saturday 12/01/2019	9 to 11	0.0	0.0-2.4	North
Sunday 13/01/2019	9 to 12	0.0	0.0-3.1	North
Monday 14/01/2019	6 to 10	0.0	0.0-3.1	North
Tuesday 15/01/2019	8 to 9	0.0	0.0-0.7	North

4.7 Noise Monitoring Results

The dominant noise sources during the baseline survey consisted of road traffic noise from A4241, the operation of the power station located within the site, train movements at the railway line between Cardiff and Port Talbot, plant movements at the port facilities and other plant movements at a stockpiling area located within the industrial site. The Sinter Plant was not audible/ discernible at any of the off-site receptors and therefore the data collected can be classed as background for the purpose of the BS4142 assessment.

A summary of the noise measurement results is shown in tables 4.4 and 4.5, for the unattended and attended monitoring respectively (community noise). The results of the attended measurements undertaken at the northern boundary of the Sinter Plant site are summarised in Table 4.6. A full set of results are provided in Appendix 4.

Also refer to Appendix 4 for statistical analysis of the $L_{A90,T}$ noise levels for UL1 and UL2, which has been used to inform the BS4142:2014 assessment.

Table 4.4 Noise monitoring results (community noise) - Unattended noise monitoring

NML ID	Date	Period [1]	Time	$L_{Aeq, T}$ dB	$L_{Amax, T}$ dB	$L_{A90, T}$ dB	$L_{A10, T}$ dB
UL1	Thu. 04/10/2018	Daytime	14:10 – 19:00	55	86	50	55
		Evenings	19:00 – 23:00	52	73	49	53
		Night-time	23:00 – 07:00	53	82	51	54
	Fri. 05/10/2018	Daytime	07:00 – 14:25	55	90	51	55
UL2	Thu. 04/10/2018	Daytime	13:33 – 19:00	48	75	43	49
		Evenings	19:00 – 23:00	49	64	46	50
		Night-time	23:00 – 07:00	49	65	47	50
	Fri. 05/10/2018	Daytime	07:00 – 14:18	48	76	44	47
UL3	Thu. 10/01/2019	Daytime	10:54 – 19:00	55	81	50	53
		Evenings	19:00 – 23:00	53	78	49	52
		Night-time	23:00 – 07:00	54	78	50	53
	Fri. 11/01/2019	Daytime	07:00 – 19:00	59	81	54	58
		Evenings	19:00 – 23:00	56	81	51	54
		Night-time	23:00 – 07:00	56	77	54	57
	Sat. 12/01/2019	Daytime	07:00 – 13:00	58	80	56	59
		Weekends	13:00 – 23:00	57	80	54	57
		Night-time	23:00 – 07:00	55	77	53	56
	Sun. 13/01/2019	Weekends	07:00 – 23:00	57	83	54	57
		Night-time	23:00 – 07:00	55	79	53	55
	Mon. 14/01/2019	Daytime	07:00 – 19:00	57	93	53	56
		Evenings	19:00 – 23:00	54	81	50	52
		Night-time	23:00 – 07:00	55	77	52	55

(1) Reference periods as per BS5228 Table E.1.

Table 4.5 Noise monitoring results (community noise) - Attended noise monitoring

NML ID	Date	Period	Start Time	Duration	$L_{Aeq, T}$ dB	$L_{Amax, T}$ dB	$L_{A90, T}$ dB	$L_{A10, T}$ dB
AL1	Fri. 05/10/2018	Day	11:57	60 min	62	76	57	64
	Thu. 04/10/2018	Evening	19:25	60 min	59	80	51	61
	Fri. 05/10/2018	Night	00:42	30 min	55	75	52	56
AL2	Fri. 05/10/2018	Day	13:23	60 min	45	61	41	46
	Thu. 04/10/2018	Evening	19:25	60 min	50	78	46	50
	Thu. 04/10/2018	Night	23:21	30 min	50	72	47	52
AL3	Fri. 05/10/2018	Day	12:57	15 min	73	88	66	77
	Thu. 04/10/2018	Evening	20:27	15 min	65	83	59	68
	Thu. 04/10/2018	Night	01:14	15 min	58	77	55	59
AL4	Thu. 10/01/2019	Day	12:57	15 min	53	75	50	53
	Thu. 10/01/2019	Evening	20:27	15 min	53	75	50	53
	Fri. 10/01/2019	Night	01:14	15 min	51	67	50	51

Through field observations during both the attended noise measurements and during the installation and retrieval of the unattended noise equipment, noise from the Sinter Plant was subjectively inaudible at locations representative of the closest noise sensitive receptors to the plant; noise from the operation of Sinter Plant is likely to be masked by other sources such as the operation of the power plant and the steelworks/ blast furnaces. Therefore, these measurements can be used as an indication of the 'background noise' in accordance with BS4142.

It should be noted that measured noise levels at Prince Street during the weekend are similar to those measured at the same location during weekdays. Taking into account

that the noise sources affecting these receptors are mainly road traffic, train movements and industrial activities at Tata's site (i.e. power plant, steel works/ blast furnaces) and assuming that both road traffic flows and train movements would be reduced during the weekend, we understand that the measured noise levels are higher than expected during the weekend as result of some changes to the industrial sources directly affecting the site (e.g. changes to the production cycles which result in more prominent industrial noise over the weekend).

Site boundary noise measurements were undertaken at the closest site boundary to the proposed de-dust plant, in order to compare existing noise levels at that site boundary with the predicted noise levels at the same locations during the operation of the new plant. It should be noted that all the measurements were undertaken in proximity to existing industrial noise sources included within the Sinter Plant site (e.g. conveyors, ESPs).

Table 4.6 Boundary Noise Monitoring Results

Location/ nearest existing plant item	ID [1]	Date	Time	$L_{Aeq, T}$ dB	$L_{AFmax, T}$ dB	$L_{A90, T}$ dB	$L_{A10, T}$ dB
West	SB1	04&05/10/2018	00:15	70.4	72.0	70.2	70.8
	SB2		00:15	71.1	72.5	70.8	71.4
	SB3		00:15	74.3	76.0	74.0	74.8
	SB4		00:15	74.8	77.1	74.5	75.2
	SB5		00:15	74.0	76.5	73.5	74.4
	SB6		00:15	76.3	83.2	75.4	76.7
	SB7		00:15	76.8	83.4	75.7	77.8
	SB8		00:15	77.2	80.9	76.3	78.3
	SB9		00:15	76.3	79.2	75.4	77.2
	Average Noise Level			**75.1**	**77.9**	**74.0**	**75.2**

(1) Monitoring locations are equidistant, with circa 30 metres between 2 consecutive locations, with the exception of SB7-SB8 and SB8-SB9 which have a separation of 20 metres (Approx.).

The highest levels along the north boundary were between SB6 and SB9 where the noise levels ranged between 76.3 – 77.2 dB $L_{Aeq, T}$. The corresponding L_{10} values ranged between 77.8 – 78.8 dB(A). These maximum noise levels correspond to locations in which a number of noise sources (conveyors, ESP, hopper) were affecting the measurements.

The lowest boundary noise levels were measured at SB1 and SB2. The averaged noise level of the two measurements at both receptors were 70.4 and 71. dB $L_{Aeq, T,}$ with 71.0 and 71.8 dB L_{A10}. These levels correspond to locations mainly dominated by noise from the activity of a conveyor running overhead, with no major influence from other parts of the site. It should be noted that noise from other parts of the Tata site was not audible during the undertaking of the site boundary measurements, and therefore these measurements are assumed to be related exclusively to the operation of the existing facilities located at the northern part of the Sinter Plant.

In any case, it should be noted that the noise measurements along the northern boundary of the Sinter Plant site are relatively constant, with an average $L_{Aeq, T}$ of 75.1 dB and an average L_{A10} of 75.2 dB. Averaged L_{Amax} is roughly 3 dB above the average L_{Aeq} and L_{A10}, and 4 dB above the average L_{A90}, which indicates that the noise sources are constant, with no peaks and impulses.

4.8 Noise Criteria

4.8.1 Construction and Demolition Noise

Based on the measured baseline noise levels at each of the noise monitoring locations, the noise criteria have been established in accordance with BS5228 Table E.1 as shown in Table 4.7 below. It should be noted that the majority of the construction works will be undertaken 07:00 – 19:00 Monday to Friday and 07:00 – 13:00 on Saturdays, with some activities being scheduled for night-time and weekends.

Table 4.7 Noise assessment criteria

Noise Sensitive Receptors ID	Threshold values as per BS5228 Table E.1 ($L_{Aeq, T}$)		
	Daytime [1]	Evenings and weekends [2]	Night-time [3]
R1 – Lower West End	65 (Cat A)	55 (Cat A)	55 (Cat C)
R2 – Mariners Point	65 (Cat A)	55 (Cat A)	55 (Cat C)
R3 – Prince Street	65 (Cat A)	60 (Cat B)	55 (Cat C)

(1) 07:00 – 19:00 Monday to Friday and 07:00 – 13:00 on Saturdays;

(2) 19:00 – 23:00 Monday to Friday, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays;

(3) 23:00 – 07:00 Monday to Sunday.

4.8.2 Operational Noise

4.8.2.1 Employee Exposure Limits

MES 002 '*Specification for Limiting Noise from Plant and Equipment*' stipulates that employees should not be exposed to noise levels above 85 dB L_{Aeq}. It is understood that in line with the Noise at Work Regulations, this would equate to a personal exposure of 85 dB(A) over a standard working 8-hour shift, 40 hours per week. Where employees exceed these criteria, it is recommended they wear the appropriate hearing protection whilst working in those high-risk zones (i.e. those above 85 dB(A)).

As an example of how noise level and exposure time are related, an individual could spend 8 hours in a noisy environment with levels of 85 dB(A) before exceeding the Tata Steel criteria. If the noise level is increased to 88 dB(A) the maximum exposure time before the individual's exposure exceeds the criteria is halved to 4 hours and at a noise level of 91 dB(A) the maximum exposure time is 2 hours. In short, for every 3 dB increase in noise level, the employee halves the length of time available to work in that environment.

Table 4.8 below details how long an employee can spend working at a particular noise level prior to the 85 dB(A) criteria being exceeded.

Table 4.8 Allowance Time

Noise Level (L_{Aeq})	Allowable Time[1] (hh:mm)
85	08:00
88	04:00
91	02:00
94	01:00
97	00:30
100	00:15

(1) Allowable time assumed to be in isolation. Should employees work under varying noise conditions, the allowing time would need to be summed for each individual task.

4.8.2.2 *Site Boundary*

Noise levels were measured at various positions, equidistant apart, along the north site boundary of the Sinter Plant, since this is the location of the current and proposed de-dust facilities. The purpose of the exercise is to assess the new secondary de-dust plant to ensure noise contribution does not result in non-compliance above the 'Community Noise' criteria as per the MES 002 (i.e. the new plant/ equipment should not increase noise levels beyond the site boundary).

The significance of the contribution is discussed later in this report.

Based on the guidance within MES 002 (detailed in Section 2 of this report) and the measured site boundary noise levels, the following specific assessment criteria has been derived. The applicable criteria against those sensitive receptors are presented in Table 4.9.

Table 4.9 Boundary Noise Criteria

Receptor	Type	Criteria (dB L_{Aeq})
Site Boundary North	Industrial	75 [1]

(1) Averaged $L_{Aeq, T}$ noise levels for all the measurements undertaken at the site boundary (locations SB1 to SB9).

4.8.2.3 *Noise Sensitive Receptors*

As noted in Section 2, the noise impact assessment described in BS4142:2014 is based on the comparison of rating levels during the site operation with respect to the background sound level prevailing at representative noise sensitive receptors. According to this methodology, where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact on the receptors under investigation. This is also in line with the requirements of MES 002 (Section 6 '*Community Noise'*).

The proposed de-dust facilities will operate 24 hours a day and 7 days a week, and therefore considerations have been made to both daytime and night-time periods when analysing the noise criteria to be considered.

As previously noted, noise from the Sinter Plant was inaudible at locations representative of the closest noise sensitive receptors to the plant, and therefore these measurements can be used as an indication of 'background noise'. These noise data for daytime and night-time periods as obtained during the noise survey have been used to determine the '*background'* noise levels for the purposes of the operational assessment of the proposed new facilities as shown in Table 4.10 below. It should be noted that a statistical analysis of the lowest measured levels ($L_{A90, T}$) for each considered period have been included in Appendix 4, Tables A4.2, A4.3, A4.5, A4.6, A4.8, A4.9, A4.10 and A4.11; this will provide a conservative approach for the noise assessment.

The background noise data for the receptors located at Prince Street have been analysed separately for both weekday and weekend periods; then, the lowest background level has been selected which will provide a conservative scenario. It should be noted that the background noise levels during weekdays have been observed to be lower than the background levels during the weekend; this could be as result of changes to the operating cycles for the closest industrial activities to these receptors (i.e. operation of the power plant and steelworks/ blast furnaces).

Table 4.10 Noise assessment criteria

Noise Sensitive Receptors ID	Background noise data ($L_{A90,T}$)	
	Daytime	Night-time
R1 – Lower West End	45	49
R2 – Mariners Point	39	43
R3 – Prince Street	49 [1]	50 [1]

(1) Correspond to the background noise levels during weekdays.

5 NOISE MODELLING

5.1 Introduction

A computer noise model of the site has been constructed using SoundPLAN (v8.1) noise prediction software. The method predicts noise levels under meteorological conditions favourable to noise propagation from the sound source to the receiver, such as downwind propagation.

Two different scenarios have been modelled for the site, as detailed below:

- Scenario 01 - Construction and demolition noise sources operating during the construction/ demolition phase of the project;
- Scenario 02 – Operation of the new de-dust plant and equipment, as per the currently available noise emission data. The outputs of this scenario will be used to assess predicted noise impacts at the closest noise sensitive receptors to the site, although this will also allow to illustrate those areas within the site which require employees to wear suitable hearing protection.

The calculation parameters are shown in Table 5.1 below.

Table 5.1 Calculation Parameters

Item	Setting
Algorithms	Construction and demolition - BS 5228-1:2009+A1:2014 '*Code of practice for noise and vibration control on construction and open sites. Noise.* Operational – ISO 9613-2: 1996 *'Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation'.*
Meteorological Conditions	10 degrees Celsius; 70% humidity; and Wind from source to receiver.
Source Height	0.5 m to 50 m above ground level, depending of the considered construction/ demolition/ operation activity. Hemispherical propagation of noise has been assumed.
Source Modeling	Shortest distance from receptor has been assumed; Each separate piece of equipment has been calculated as an area source; and Operational plant data taken from information provided by Tata Steel Ltd (Section 3.3). Noise emission data from the proposed pneumatic conveying line have been obtained from the attended site boundary measurements undertaken in close proximity to similar conveyors.
Receptor Height	Residential receptors: - Ground Floor 1.5 m above ground; and - First Floor 4.0 m above ground. Workers at Sinter Plant (occupational noise receptors): - 1.5 m above ground.
Terrain	LIDAR 10 meters-resolution elevation lines (DGM).

Item	Setting
Barriers / structures	Structures of the existing and surround plant have been assumed to provide a 5-dB reduction in noise level. The existing and proposed structures located at the north site boundary for the Sinter Plant have been included within the noise model. No other structures or barriers have been incorporated into the model.
Site Layout	Taken from Tata Steel Ltd plan ref. '*2313-00-00-19-063-S1'* .

5.2 Model Results

5.2.1 Construction and Demolition

The overall noise level impacts are a logarithmic summation of construction/ demolition and ambient noise levels. The noise predictions are deemed to represent a worst-case scenario, assuming the works take place close to the receptor and all works are undertaken at once. Construction/ demolition generated noise has been predicted at the closest sensitive receptors to the proposed works. Receptors have been chosen as representative of a larger number of neighbouring receptors. Neighbouring receptors are likely to experience similar magnitudes of noise.

Table Introduction (Tables 5.2 to 5.8) – Noise Predictions:

- All tasks are inclusive of ambient noise levels, with construction/demolition contribution shown in brackets;
- Daytime hours are defined as 07:00-19:00 weekdays and 07:00-13:00 Saturdays; evening and weekends are defined as 19:00-23:00 weekdays, 13:00-23:00 Saturdays and 07:00-23:00 Sundays; night-time hours are defined as 23:00-07:00 Monday to Sunday. These assessment periods are as per BS5228 Table E.1;
- Levels all represented as dB for an $L_{Aeq, T}$;
- Noise levels are reported as the maximum of any floor dwelling/property;
- The data below identify where tasks have the potential to occur at the same time, this is based on information provided by the construction team (refer to Appendix 6 for the programme of works);
- Cumulative noise levels if all the construction activities proposed for each period are occurring simultaneously are also shown below; this would provide a worst-case scenario for each considered period.

Table 5.2: Modelling results: (Construction/ demolition) plus Ambient Noise Levels at Receptor (dB $L_{Aeq, period}$). Individual activities, Activity 1 'Initial Site Clearance' and Activity 2 'Civil Enabling Works'

Receptor ID	Noise Impact Threshold (dB $L_{Aeq, T}$)	Modelling results: Construction plus Ambient Noise Levels at Receptor (dB $L_{Aeq, T}$)	
	Daytime	Act. 1 'Initial Site Clearance' (Daytime)	Act. 2 'Civil Enabling Works' (Daytime)
R1 (UL1)	65	55 (37)	56 (47)
R2 (UL2)	65	49 (39)	51 (48)
R3 (UL3)	65	57 (36)	57 (46)

**The values in bracket indicate construction noise impacts only*

Table 5.3: Modelling results: (Construction/ demolition) plus Ambient Noise Levels at Receptor (dB $L_{Aeq, period}$). Combined activities, Activity 3 'Construction of bag filter' and Activity 4 'Construction of external duct'

Receptor ID	Noise Impact Threshold (dB $L_{Aeq, T}$)			Modelling results: Construction plus Ambient Noise Levels at Receptor (dB $L_{Aeq, T}$)		
	Daytime	Evenings & Weekends	Night-time	Daytime	Evenings & Weekends	Night-time
R1 (UL1)	65	55	55	55 (43)	52 (43)	53 (43)
R2 (UL2)	65	55	55	48 (39)	49 (39)	49 (39)
R3 (UL3)	65	60	55	57 (38)	55 (38)	55 (38)

**The values in bracket indicate construction noise impacts only*

Table 5.4: Modelling results: (Construction/ demolition) plus Ambient Noise Levels at Receptor (dB $L_{Aeq, period}$). Combined activities, Activity 3 'Construction of bag filter' and Activity 5 'Installation of Dense Conveyor'

Receptor ID	Noise Impact Threshold (dB $L_{Aeq, T}$)			Modelling results: Construction plus Ambient Noise Levels at Receptor (dB $L_{Aeq, T}$)		
	Daytime	Evenings & Weekends	Night-time	Daytime	Evenings & Weekends	Night-time
R1 (UL1)	65	55	55	55 (44)	53 (44)	53 (44)
R2 (UL2)	65	55	55	49 (40)	49 (40)	49 (40)
R3 (UL3)	65	60	55	57 (39)	55 (39)	55 (39)

**The values in bracket indicate construction noise impacts only*

Table 5.5: Modelling results: (Construction/ demolition) plus Ambient Noise Levels at Receptor (dB $L_{Aeq, period}$). Combined activities, Activity 3 'Construction of bag filter', Activity 5 'Installation of Dense Conveyor' and Activity 6 'Installation of Air Compressors and Room'

Receptor ID	Noise Impact Threshold (dB $L_{Aeq, T}$)			Modelling results: Construction plus Ambient Noise Levels at Receptor (dB $L_{Aeq, T}$)		
	Daytime	Evenings & Weekends	Night-time	Daytime	Evenings & Weekends	Night-time
R1 (UL1)	65	55	55	55 (44)	53 (44)	53 (44)
R2 (UL2)	65	55	55	49 (40)	49 (40)	49 (40)
R3 (UL3)	65	60	55	57 (39)	55 (39)	55 (39)

The values in bracket indicate construction noise impacts only

Table 5.6: Modelling results: (Construction/ demolition) plus Ambient Noise Levels at Receptor (dB $L_{Aeq, period}$). Combined activities, Activity 7 'Post-activity ground works' and Activity 8 'Removal of existing de-dust facilities'

Receptor ID	Noise Impact Threshold (dB $L_{Aeq, T}$)	Modelling results: Construction plus Ambient Noise Levels at Receptor (dB $L_{Aeq, T}$)	
	Daytime	Act. 7 'Post-activity ground works' (Daytime)	Act. 8 'Removal of existing de-dust facilities' (Daytime)
R1 (UL1)	65	55 (29)	56 (47)
R2 (UL2)	65	48 (31)	49 (43)
R3 (UL3)	65	57 (28)	57 (47)

The values in bracket indicate construction noise impacts only

Table 5.7: Modelling results: (Construction/ demolition) plus Ambient Noise Levels at Receptor (dB $L_{Aeq, period}$). All combined activities, daytime

Receptor ID	Noise Impact Threshold (dB $L_{Aeq, T}$)	Modelling results: Construction plus Ambient Noise Levels at Receptor (dB $L_{Aeq, T}$)
	Daytime	Activity 1 to Activity 8
R1 (UL1)	65	56 (47)
R2 (UL2)	65	50 (47)
R3 (UL3)	65	57 (47)

The values in bracket indicate construction noise impacts only

Table 5.8: Modelling results: (Construction/ demolition) plus Ambient Noise Levels at Receptor (dB $L_{Aeq, period}$). All combined activities, evenings, night-time and weekends

Receptor ID	Noise Impact Threshold (dB $L_{Aeq, T}$)		Modelling results: Construction plus Ambient. Noise Levels at Receptor (dB $L_{Aeq, T}$) Activity 3 to Activity 6	
	Evenings & Weekends	Night-time	Evenings & Weekends	Night-time
R1 (UL1)	55	55	53 (44)	53 (44)
R2 (UL2)	55	55	49 (40)	49 (40)
R3 (UL3)	60	55	55 (43)	55 (43)

The values in bracket indicate construction noise impacts only

5.2.2 Site Operation

5.2.2.1 Noise at the North Site Boundary

Noise data for the new plant to be installed as shown in Section 3.3. have been incorporated into a noise model in order to calculate the contribution of the operation of the proposed de-dust facilities on the noise environment at the northern site boundary of the Sinter Plant. Modelled noise levels will be compared with the site boundary noise measurements, in order to analyse the compliance with the MES 002 criteria at the site boundary. Predicted noise levels at the locations in which the site boundary noise measurements were undertaken are presented in Table 5.9 below. This will also provide an indication of the impact on the current noise emissions from the new plant.

Table 5.9 Noise measurements and operational noise model results. Noise levels at the site boundary

Receptor ID	Site Boundary Noise Monitoring Results, $L_{Aeq, T}$ dB [1]	Modelled New Plant Contribution (for daytime and night-time periods), $L_{Aeq, T}$ dB
SB1	70	68
SB2	71	59
SB3	74	63
SB4	75	61
SB5	74	58
SB6	76	57
SB7	77	60
SB8	77	67
SB9	76	66
Average (North Site Boundary)	**75**	**64**

(1) As included in Table 4.6

5.2.2.2 *Noise at the northern parts of the Sinter Plant Site*

A noise 'heat map' for the proposed facilities at the northern part of the Sinter Plant site has been prepared based on the noise emission data for the new plant; this map is presented in Appendix 7 (Figure A7.1) and will be used in Section 6 to assess employee's exposure to occupational noise.

5.2.2.3 *Noise at the closest sensitive receptors*

The noise model for the operation of the new plant has also been interrogated to determine the contribution of the operation of the proposed de-dust facilities on the future noise environment for the closest noise sensitive receptors to the site. The calculated noise levels as shown in Table 5.10 will be analysed later in order to assess operational noise in accordance with BS4142:2014+A1:2019.

Table 5.10 Noise contribution (new plant) at the closest sensitive receptors.

Receptor ID	Modelling Results (for daytime and night-time periods) $L_{Aeq, T}$ dB
R1	33
R2	32
R3	30

6 NOISE ASSESSMENT

6.1 Construction/ Demolition Noise

The calculated noise levels during the construction and demolition works as shown in tables 5.2 to 5.8 are below the BS5228 lowest impact threshold levels for all the considered receptors, with the exception of Receptor 3 for which the calculate noise levels during the night would equate to the noise criteria; in any case, it should be noted that calculated construction noise levels for that receptor during the night are well below the pre-construction noise levels; therefore, the absolute noise levels at this receptor are determine by the pre-construction levels obtained during the baseline noise survey.

It should be noted that the predicted noise levels meet the noise criteria for all the three considered receptors, and therefore adverse impacts are predicted to be unlikely on the closest noise sensitive receptors as result of the proposed construction and demolition works.

6.2 Occupational Noise

As previously noted, a noise 'heat map' for the proposed facilities at the northern part of the Sinter Plant site is included in Appendix 7; it should be noted that this map is only related to the contribution of the new de-dust facilities. According to the contour noise map during the operation of the new de-dust facilities, the MES 002 criteria and the '*Upper Exposure Action Value'* as per the Noise at Work Regulations (i.e. 85 dB(A) L_{EPd}/ L_{EPw}) are expected to be exceeded in close proximity to some of the new plant (compressors room), and therefore hear protection must be provided to those employees working in these areas. These areas are recommended to be designated as hearing protection zones; hearing protection zones should be identified by blue and white hearing protection signs (or a suitable alternative colour scheme) and access to these areas should be restricted. It is recommended that these areas are designated as '*Hearing Protection Zones'* and identified as such using signage to the relevant standard, as shown in Figure 6.1 below.

Figure 6.1 Hearing Protection Zone Sign[2]

In any case and taking into account that the new facilities are unmanned, the only workers which should use hear protection will be those on charge for the inspection/ maintenance works for the compressors; it is unlikely that the Upper Exposure Action Value will be exceeded for any worker at the northern part of Sinter Plant.

[2] '*Controlling Noise at Work. The Control of Noise at Work Regulations 2005. Guidance on Regulations'*. Health & Safety Executive, 2005

6.3 Site Boundary Noise

Noise levels at the north boundary of the Sinter Plant have been calculated during the operation of the new de-dust facilities as shown in Table 5.4. Predicted noise levels at locations SB1 to SB9 result in an average noise level for the north boundary of the Sinter Plant site of 64 dB $L_{Aeq, T}$, which is in fact 11 dB below the average level of the measured levels for the site boundary (75 dB $L_{Aeq, T}$). It should be noted that since noise levels for the operation of the new plant are predicted to be more than 10 dB(A) below the existing noise levels, the operation of the new plant is expected to have no influence on the overall noise levels for the north boundary of the Sinter Plant site.

6.4 BS4142 Assessment

The acoustic characteristics of a specific sound that are likely to result in an increase in the significance of impact are tonality, impulsivity and intermittency. No 1/3 octave band data is available for the new plant; therefore, it has not been possible to conduct a frequency analysis to determine whether a tonal component will be present during the operation of the new de-dust plant.

However, a frequency analysis has been carried out for the attended noise measurements undertaken both onsite and at locations representative of the closest noise sensitive receptors to Sinter Plant. These measurements were undertaking during the operation of the existing facilities and showed the following tonal features as per the objective analysis method described in BS4142:2014:

- Attended noise measurements for the closest receptors to the site at Lower West End show a tonal component at 8 kHz, 10 kHz, 12.5 kHz and 16 kHz during the day and at 16 kHz during the night; this tonal component at high-frequencies will not be as result of the operation of the Sinter Plant, since any high-frequency sound from the site will be largely attenuated as result of the existing distance between the Sinter Plant and the receptors at Lower West End;

- Attended noise measurements for the closest receptors to the site at Mariners Point show a tonal component at 16 kHz during both day and night; again, any high-frequency sound from the site will be largely attenuated if the distance between the Sinter Plant and the receptors at Mariners Point is considered, and therefore the analysed tonal component is not related to the activity of the Sinter Plant;

- Unattended and attended noise measurements for the closest receptors to the site at Prince Street show a tonal component at high frequencies during day, evening and night-time periods; as previously noted, any high-frequency sound from the site will be attenuated if the distance between the receptors and Sinter Plant (i.e. 1 km) is considered; therefore, it can be concluded that this tonal component is not related to the operation of the Sinter Plant; and

- Attended site measurements at SB9 show a tonal component at 16 kHz. This was noted to be related with the operation of the ESP which is intended to be dismantled, and therefore it will not be considered when analysing the operation of the new facilities.

On a precautionary basis a tonal penalty has been applied to the rating level as the new plant includes rotating and electrical equipment that could have distinct tonal components despite the overall noise output being relatively low. Taking the above into account, it is assumed that the operational noise is likely to have a tonal feature and therefore a maximum rate penalty of +6 dB will be applied to the calculated noise levels, in order to consider a conservative scenario. As the existing plant has a relatively steady noise

output, no penalty will be applied with regards to impulsivity sound. The above has been summarised in Table 6.1.

Table 6.1 Rating Penalty

Characteristic	Reason	Penalty
Tonality	Analysis of the source data for the existing sources/ analysis of noise measurements at the closest receptors - Linear 1/3 octave spectrum shows tonality using the objective method for each measurement	+6 dB
Impulsivity	The specific sound will have no impulsivity characteristics	0
Intermittency	The specific sound will have no intermittency characteristics	0
TOTAL		**+6 dB**

The BS4142 assessment is presented in Table 6.2. A description of the table entries is provided below:

- Specific sound level at receptor – Noise produced by the new de-dust facilities only (noise from the operation of other plant/ equipment included in the Sinter Plant site has not been considered), as shown in Table 5.5;

- Rating penalty – Acoustic feature correction (as shown in Table 6.1);

- Rating sound level at receptor – Specific sound level including rating penalty;

- Measured 'background' noise level (day/night) – Measured background noise level at a representative location for the receptor positions without the proposed new de-dust facilities in operation); noise measurements were undertaken during the operation of the existing de-dust facilities, although no noise from the Sinter Plant was audible at receptors; and

- Rating level minus background level (day/night) – Difference between rating noise level and background noise level.

Table 6.2 BS4142 Assessment – New de-dust facilities only (Sinter Plant)

BS4142 Assessment		Considered receptors		
		R1 (UL1)	R2 (UL2)	R3 (UL3)
Specific Sound Level at receptor, $L_{Aeq, T}$ dB		33	32	30
Total Rating Penalty, dB		6	6	6
Rating Sound Level at receptor, $L_{Ar, T}$ dB		39	38	36
Daytime	Measured Background, $L_{A90, T}$, dB	45	39	49
	Rating Level – Background Level, dB	-6	-1	-13
Night-time	Measured Background, $L_{A90, T}$, dB	49	43	50
	Rating Level – Background Level, dB	-10	-5	-14

Accordingly, based on the BS4142 wording as the rating level does not exceed the background sound level, this is an indication of the specific sound source (proposed de-dust facilities) having a low impact, since noise levels at the closest sensitive receptors to the site are not expected to increase during the operation of the new facilities.

This is in line with the comparison between the calculated noise levels at the north site boundary and the noise measurements for the same locations, which indicates that the operation of the new facilities will not result in an increase in the noise levels at the site boundary.

It can be concluded that the operation of the new de-dust facilities will have a negligible influence on the noise environment at the closest receptors.

7 NOISE CONTROL MEASURES

7.1 Construction and Demolition Phase

7.1.1 Best Practicable Means

Noise levels at the nearest sensitive receptors to the site are predicted not to exceed the lowest impact thresholds during both the construction/ demolition and operation phases. Good practice should still be considered throughout the construction and demolition works.

In doing so, due consideration should be given to the recommendations contained within BS5228:2009+A1:2014, approved by the Secretary of State as the Code of Practice for noise and vibration control on construction and open sites.

- Where practicable, temporary enclosures will be used to screen all static plant (i.e. generators) from noise sensitive receptor locations;
- All plant, equipment and noise control measures applied to plant and equipment shall be maintained in good working order and operated such that noise emissions are minimised as far as reasonably practicable;
- All plant and equipment will comply with the noise limit and noise marking requirements prescribed by the "*Noise Emission in the Environment by Equipment for Use Outdoors Regulations 2001*" and the "*Noise Emission in the Environment by Equipment for Use Outdoors (Amendment) Regulations 2005*" implementing the EU Directives 2000/14/EC;
- Vehicles and mechanical plant employed for any activity associated with the construction/ demolition works will, where reasonably practicable, be fitted with effective exhaust silencers and shall be maintained in good working order and operated in a manner such that noise emissions are controlled and limited as far as reasonably practicable;
- Machines in intermittent use should be shut down or throttled down to a minimum during periods between works. Static noise emitting equipment operating continuously will be screened or housed within suitable acoustic enclosure, where appropriate; and
- All personnel on site will undergo site specific inductions and briefings. Where relevant, specific noise control measures will be incorporated into Works Package Plans;

The above Best Practice will be briefed to all parties via:

- Site Induction;
- Toolbox talks; and
- Start of Shift briefings.

7.1.2 Monitoring Regime

As noted in Section 6.1, no exceedances above the noise criteria are expected during the construction and demolition works and therefore no noise monitoring during these activities have been proposed.

However, should any noise complaint related to the construction/ demolition works is received during this phase, the following procedure for reactive noise monitoring will be referenced:

- The noise survey will be undertaken at a monitoring location representative of the complainant property, with the noise monitoring data being assessed against the noise criteria for the nearest receptor considered within this assessment (i.e. either '*R1 Lower West End'*, '*R2 Mariners Point'* or '*R3 Prince Street'*). The noise monitoring results will be used to assess compliance with the noise criteria as per Table 4.7 of this report;
- Sound level meters to be used during the survey will conform to the requirements of BS EN 61672-1:2013 '*Electroacoustics. Sound level meter, Specifications'*. The calibrator used conforms to the requirements of BS EN IEC 60942:2018 '*Electroacoustics, Sound calibrators'*;
- The noise survey will be carried out during a minimum of one hour at the considered location, and will be representative of the construction/ demolition activities under investigation;
- Measurements will comprise of broadband indices L_{Aeq}, L_{A10}, L_{Amax} and L_{A90}, with a sampling period of 15 minutes; field notes will be undertaken with respect to the nature and especial features of all the noise sources affecting the monitoring location during the measurement;
- Measurements will be undertaken under stable weather conditions (i.e. absence of precipitation and temperature inversion events, wind speeds below 5 ms^{-1} in average);
- Noise monitoring should be undertaken by a competent and qualified person; and
- Noise survey results would be included in a letter report to be submitted to the NPTCBC Public Protection Department within one week of the monitoring.

7.2 Operational Phase. Hearing Protection

The use of hearing protection is only recommended as a last resort and should only be used after methods of noise reduction through organisational and technical measures have been considered as a first priority.

Where hearing protection is made available, employees have a duty to wear the hearing protection when they are exposed to noise at or above 85 dB(A) and in hearing protection zones. Hearing protection should be selected and provided by the employer, through consultation with employees or their representatives, to eliminate the risk to hearing or reduce the risk to as low a level as is reasonably practicable.

The operating company should ensure that employees are trained in the appropriate use of any hearing protection issued. This training should include the correct procedure for fitting the protector, inspecting for damage and how to obtain replacement protectors or spares. A record of this training should be made and retained. Employees are also required to take care of any hearing protection issued and report any defects to their employers.

8 CONCLUSIONS

A noise impact assessment was prepared in December 2018 to support a planning consent application for the proposed replacement ‘de-dust facilities‘ associated with the Sinter Plant in Port Talbot, South Wales; full planning permission for this development was granted on 6 February 2019 (ref. P2018/1036). The assessment included noise monitoring at nine positions located at the northern site boundary and in close proximity to the existing plant, as well as noise measurements in various locations representative of the closest noise sensitive receptors to the site. The report also included the results of the predicted noise levels during the construction/ demolition and operation of the de-dust facilities (which will be located at the northern boundary of the Sinter Plant) along with noise control measures/ Best Practicable Means. The results discussed in the original report were based on computer noise modelling predictions, which were developed from plant information provided by Tata Steel UK.

RSK has prepared an updated noise assessment report to support an NMA to change the construction working hours as included in planning permission P2018/1036. It is proposed that some of the construction activities will be undertaken during extended working hours (i.e. weekdays, weekends and night-time periods) in order to make it possible for the scheme to be complete and fully operational by October 2020. All other construction/ demolition works including the most intrusive activities (i.e. piling and dismantling/ demolition) will be undertaken exclusively during normal working hours (i.e. 07:00-19:00 Monday to Friday and 07:00-13:00 Saturdays).

The construction and demolition noise assessment included within the original noise assessment report has been updated. No exceedances above the lowest effect thresholds have been predicted during the construction and demolition works, and therefore it can be concluded that adverse noise effects are unlikely on the closest noise sensitive receptors as result of the proposed works. Therefore, the conclusion of the construction and demolition assessment remains unaltered if the updated working hours are considered.

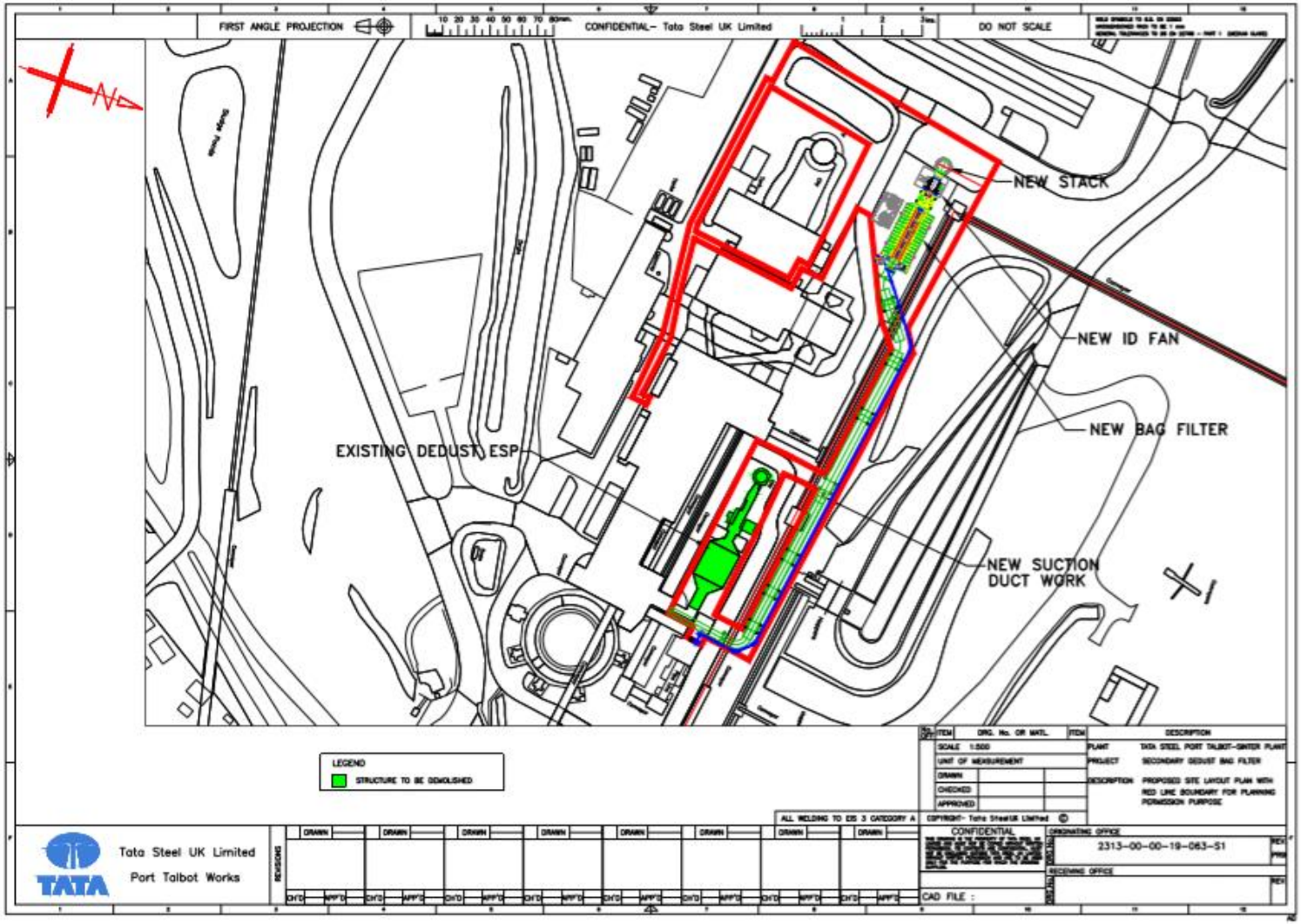
Similarly, the conclusions of the operational noise assessment remain unaltered with respect to those included in the previous noise assessment report.

Noise levels across the site and at the closest sensitive receptors are predicted to be below the relevant lowest impact thresholds. The construction, demolition and operation of the proposed de-dust facilities are therefore unlikely to result in any adverse noise impact on both the plant employees (taking into account hearing protection as defined) and the neighbouring residential communities.

9 REFERENCES

- Planning Policy Wales: 9th Edition, December 2018.
- Planning Guidance (Wales), Technical Advice Note (TAN) 11 Noise: October 1997.
- British Standard (BS) 5228-1-2:2009+A1:2014, 'Code of practice for noise and vibration control on construction and open sites. Noise and Vibration'. British Standards Institution, 2009 and 2014.
- BS 4142: 2014+A1:2019, Methods for rating and assessing industrial and commercial sound, 2014.
- BS 8233: 2014, Sound insulation and noise reduction in buildings – code of practice. British Standards Institution, 2014.
- The Control of Noise at Work regulations 2005.
- BS 7445-1:2003, Description and measurement of environmental noise. Parts 1 to 3: Guide to quantities and procedures. British Standards Institution, 1991 to 2003.
- ISO 9613-2: 1996(E): Acoustics. Attenuation of sound during propagation outdoors. Part 2: General method of calculation. International Organization for Standardization, 1996.
- Mandatory Engineering Standard (MES) 002: Specification for Limiting Noise from Plant and Equipment. Tata Steel UK Ltd, 2002.

APPENDIX 1: SITE LAYOUT AND NEW PLANT LOCATIONS



APPENDIX 2: PHOTOGRAPHS

Figure A2.1 Noise Monitoring Location UL1

Figure A2.2 Residential properties at Lower West End

Figure A2.3 Noise Monitoring Location UL2

Figure A2.4 Noise Monitoring Location AL1

Figure A2.5 Sinter Plant from Noise Monitoring Location AL3

Figure A2.6 Noise Monitoring Location AL2

Figure A2.7 Noise Monitoring Location AL3

Figure A2.8 Initial site visit. Proposed location for the bag filter

Figure A2.9 Initial site visit. Existing conveyor (blended mix conveyor, overhead) and stack

Figure A2.10 Initial site visit. Blended mix conveyor and stack

Figure A2.11 Initial site visit. Existing ESP to be dismantled

Figure A2.12 Noise Monitoring Location SB1

Figure A2.13 Noise Monitoring Location SB2

Figure A2.14 Noise Monitoring Location SB3

Figure A2.15 Noise Monitoring Location SB4

Figure A2.16 Noise Monitoring Location SB5

Figure A2.17 Noise Monitoring Location SB6

Figure A2.18 Noise Monitoring Location SB7

Figure A2.19 Noise Monitoring Location SB8

Figure A2.20 Noise Monitoring Location SB9

Figure A2.21 Noise Monitoring Location UL3

Figure A2.22 Residential properties at Prince Street

Figure A2.23 Noise Monitoring Location AL4

APPENDIX 3: WEATHER DATA

Table A3.1 Weather Data from Wunderground's Weather Station Ref. '*IPORTAL5*' (Name: *Ynys Y Gored*). 4 October 2018

Start time	Temperature	Wind Direction	Wind Speed (Ave.)	Wind Speed (gust)	Precipitation	Precipitation (Accum.)
1:29 PM	15.9 °C	North	0 kph	1.1 kph	0 mm	0 mm
1:34 PM	16 °C	North	0 kph	1.1 kph	0 mm	0 mm
1:39 PM	16 °C	East	0 kph	2.6 kph	0 mm	0 mm
1:44 PM	16 °C	East	0 kph	1.1 kph	0 mm	0 mm
1:49 PM	16.1 °C	SW	3.5 kph	5 kph	0 mm	0 mm
1:54 PM	16 °C	SW	1.1 kph	3.5 kph	0 mm	0 mm
1:59 PM	16 °C	SW	2.6 kph	5 kph	0 mm	0 mm
2:04 PM	15.9 °C	NE	1.1 kph	2.6 kph	0 mm	0 mm
2:09 PM	15.7 °C	NE	1.1 kph	3.5 kph	0 mm	0 mm
2:14 PM	15.7 °C	WNW	2.6 kph	3.5 kph	0 mm	0 mm
2:19 PM	15.7 °C	North	0 kph	1.1 kph	0 mm	0 mm
2:24 PM	15.9 °C	North	2.6 kph	5 kph	0 mm	0 mm
2:29 PM	15.9 °C	SW	2.6 kph	5 kph	0 mm	0 mm
2:34 PM	16.1 °C	South	1.1 kph	3.5 kph	0 mm	0 mm
2:39 PM	16.7 °C	NE	5 kph	7.2 kph	0 mm	0 mm
2:44 PM	16.6 °C	SE	3.5 kph	5 kph	0 mm	0 mm
2:49 PM	16.8 °C	NE	1.1 kph	3.5 kph	0 mm	0 mm
2:54 PM	17 °C	North	1.1 kph	2.6 kph	0 mm	0 mm
2:59 PM	17 °C	NE	1.1 kph	3.5 kph	0 mm	0 mm
3:04 PM	17 °C	North	0 kph	1.1 kph	0 mm	0 mm
3:09 PM	16.9 °C	North	1.1 kph	2.6 kph	0 mm	0 mm
3:14 PM	16.8 °C	North	0 kph	2.6 kph	0 mm	0 mm
3:19 PM	17 °C	NE	0 kph	2.6 kph	0 mm	0 mm
3:24 PM	17.2 °C	NE	1.1 kph	2.6 kph	0 mm	0 mm
3:29 PM	18 °C	North	0 kph	1.1 kph	0 mm	0 mm
3:34 PM	19 °C	North	1.1 kph	3.5 kph	0 mm	0 mm
3:39 PM	19.4 °C	North	1.1 kph	2.6 kph	0 mm	0 mm
3:44 PM	19.5 °C	North	1.1 kph	2.6 kph	0 mm	0 mm
3:49 PM	19.6 °C	NW	0 kph	1.1 kph	0 mm	0 mm
3:54 PM	19.8 °C	North	0 kph	0 kph	0 mm	0 mm
3:59 PM	20.1 °C	NE	0 kph	1.1 kph	0 mm	0 mm
4:04 PM	20 °C	North	1.1 kph	2.6 kph	0 mm	0 mm
4:09 PM	19.6 °C	NE	2.6 kph	3.5 kph	0 mm	0 mm
4:14 PM	19.5 °C	NW	1.1 kph	3.5 kph	0 mm	0 mm
4:19 PM	19.2 °C	NE	0 kph	2.6 kph	0 mm	0 mm
4:24 PM	19 °C	North	1.1 kph	2.6 kph	0 mm	0 mm
4:29 PM	19.2 °C	North	0 kph	0 kph	0 mm	0 mm
4:34 PM	19.3 °C	North	0 kph	1.1 kph	0 mm	0 mm
4:39 PM	19.2 °C	NE	1.1 kph	2.6 kph	0 mm	0 mm

Start time	Temperature	Wind Direction	Wind Speed (Ave.)	Wind Speed (gust)	Precipitation	Precipitation (Accum.)
4:44 PM	18.8 °C	NE	2.6 kph	5 kph	0 mm	0 mm
4:49 PM	18.5 °C	NE	1.1 kph	2.6 kph	0 mm	0 mm
4:54 PM	18.2 °C	NE	0 kph	3.5 kph	0 mm	0 mm
4:59 PM	17.9 °C	North	0 kph	1.1 kph	0 mm	0 mm
5:04 PM	17.8 °C	NE	0 kph	0 kph	0 mm	0 mm
5:09 PM	17.6 °C	NE	0 kph	1.1 kph	0 mm	0 mm
5:14 PM	17.6 °C	NW	0 kph	2.6 kph	0 mm	0 mm
5:19 PM	17.5 °C	NE	0 kph	1.1 kph	0 mm	0 mm
5:24 PM	17.5 °C	NE	0 kph	0 kph	0 mm	0 mm
5:29 PM	17.4 °C	NE	1.1 kph	2.6 kph	0 mm	0 mm
5:34 PM	17.2 °C	North	0 kph	1.1 kph	0 mm	0 mm
5:39 PM	17.4 °C	North	0 kph	0 kph	0 mm	0 mm
5:44 PM	17.4 °C	North	0 kph	0 kph	0 mm	0 mm
5:49 PM	17.4 °C	North	0 kph	1.1 kph	0 mm	0 mm
5:54 PM	17.2 °C	North	1.1 kph	2.6 kph	0 mm	0 mm
5:59 PM	17 °C	North	1.1 kph	3.5 kph	0 mm	0 mm
6:04 PM	16.8 °C	SW	2.6 kph	5 kph	0 mm	0 mm
6:09 PM	16.6 °C	North	0 kph	1.1 kph	0 mm	0 mm
6:14 PM	16.5 °C	North	2.6 kph	5 kph	0 mm	0 mm
6:19 PM	16.2 °C	SW	0 kph	1.1 kph	0 mm	0 mm
6:24 PM	16 °C	North	0 kph	2.6 kph	0 mm	0 mm
6:29 PM	15.8 °C	North	0 kph	1.1 kph	0 mm	0 mm
6:34 PM	15.5 °C	East	0 kph	1.1 kph	0 mm	0 mm
6:39 PM	15.3 °C	East	0 kph	0 kph	0 mm	0 mm
6:44 PM	15 °C	East	0 kph	0 kph	0 mm	0 mm
6:49 PM	14.7 °C	North	0 kph	0 kph	0 mm	0 mm
6:54 PM	14.4 °C	NE	0 kph	0 kph	0 mm	0 mm
6:59 PM	14 °C	NE	0 kph	0 kph	0 mm	0 mm
7:04 PM	13.8 °C	NE	0 kph	0 kph	0 mm	0 mm
7:09 PM	13.6 °C	NE	0 kph	0 kph	0 mm	0 mm
7:14 PM	13.5 °C	NE	0 kph	0 kph	0 mm	0 mm
7:19 PM	13.3 °C	NE	0 kph	0 kph	0 mm	0 mm
7:24 PM	13.2 °C	NE	0 kph	0 kph	0 mm	0 mm
7:29 PM	13.1 °C	NE	0 kph	0 kph	0 mm	0 mm
7:34 PM	13.1 °C	NE	0 kph	0 kph	0 mm	0 mm
7:39 PM	13.2 °C	NE	0 kph	0 kph	0 mm	0 mm
7:44 PM	13.2 °C	NE	0 kph	0 kph	0 mm	0 mm
7:49 PM	13.3 °C	NE	0 kph	0 kph	0 mm	0 mm
7:54 PM	13.3 °C	NE	0 kph	0 kph	0 mm	0 mm
7:59 PM	13.4 °C	NE	0 kph	0 kph	0 mm	0 mm
8:04 PM	13.4 °C	NE	0 kph	0 kph	0 mm	0 mm
8:09 PM	13.5 °C	NE	0 kph	0 kph	0 mm	0 mm
8:14 PM	13.5 °C	North	0 kph	0 kph	0 mm	0 mm
8:19 PM	13.6 °C	NE	0 kph	0 kph	0 mm	0 mm

Start time	Temperature	Wind Direction	Wind Speed (Ave.)	Wind Speed (gust)	Precipitation	Precipitation (Accum.)
8:24 PM	13.6 °C	NE	0 kph	0 kph	0 mm	0 mm
8:29 PM	13.7 °C	NE	0 kph	0 kph	0 mm	0 mm
8:34 PM	13.7 °C	NE	0 kph	1.1 kph	0 mm	0 mm
8:39 PM	13.7 °C	NE	0 kph	0 kph	0 mm	0 mm
8:44 PM	13.7 °C	North	0 kph	0 kph	0 mm	0 mm
8:49 PM	14 °C	NE	0 kph	0 kph	0 mm	0 mm
8:54 PM	14.2 °C	North	0 kph	0 kph	0 mm	0 mm
8:59 PM	14.4 °C	SW	1.1 kph	2.6 kph	0 mm	0 mm
9:04 PM	14.4 °C	NW	0 kph	1.1 kph	0 mm	0 mm
9:09 PM	14.4 °C	North	0 kph	0 kph	0 mm	0 mm
9:14 PM	14.3 °C	NE	0 kph	0 kph	0 mm	0 mm
9:19 PM	14.2 °C	North	0 kph	0 kph	0 mm	0 mm
9:24 PM	14 °C	North	2.6 kph	3.5 kph	0 mm	0 mm
9:29 PM	14.1 °C	NE	0 kph	0 kph	0 mm	0 mm
9:34 PM	14 °C	East	0 kph	0 kph	0 mm	0 mm
9:39 PM	14 °C	North	1.1 kph	2.6 kph	0 mm	0 mm
9:44 PM	14 °C	NE	0 kph	0 kph	0 mm	0 mm
9:49 PM	14.1 °C	NW	1.1 kph	2.6 kph	0 mm	0 mm
9:54 PM	14.2 °C	NE	0 kph	0 kph	0 mm	0 mm
9:59 PM	14.2 °C	East	0 kph	0 kph	0 mm	0 mm
10:04 PM	14.3 °C	NE	1.1 kph	3.5 kph	0 mm	0 mm
10:09 PM	14.6 °C	North	2.6 kph	6.1 kph	0 mm	0 mm
10:14 PM	14.8 °C	NE	1.1 kph	6.1 kph	0 mm	0 mm
10:19 PM	15 °C	South	3.5 kph	6.1 kph	0 mm	0 mm
10:24 PM	15.1 °C	North	1.1 kph	2.6 kph	0 mm	0 mm
10:29 PM	15.2 °C	East	0 kph	2.6 kph	0 mm	0 mm
10:34 PM	15.2 °C	NE	1.1 kph	3.5 kph	0 mm	0 mm
10:39 PM	15.2 °C	NE	0 kph	1.1 kph	0 mm	0 mm
10:44 PM	15.2 °C	West	5 kph	7.2 kph	0 mm	0 mm
10:49 PM	15.3 °C	West	5 kph	6.1 kph	0 mm	0 mm
10:54 PM	15.3 °C	North	1.1 kph	2.6 kph	0 mm	0 mm
10:59 PM	15.3 °C	SW	1.1 kph	3.5 kph	0 mm	0 mm
11:04 PM	15.3 °C	ESE	0 kph	2.6 kph	0 mm	0 mm
11:09 PM	15.3 °C	North	1.1 kph	3.5 kph	0 mm	0 mm
11:14 PM	15.2 °C	NE	0 kph	2.6 kph	0 mm	0 mm
11:19 PM	15.3 °C	NW	1.1 kph	2.6 kph	0 mm	0 mm
11:24 PM	15.3 °C	North	0 kph	2.6 kph	0 mm	0 mm
11:29 PM	15.3 °C	WNW	1.1 kph	5 kph	0 mm	0 mm
11:34 PM	15.3 °C	South	0 kph	1.1 kph	0 mm	0 mm
11:39 PM	15.3 °C	NE	2.6 kph	3.5 kph	0 mm	0 mm
11:44 PM	15.3 °C	NW	0 kph	1.1 kph	0 mm	0 mm
11:49 PM	15.2 °C	West	1.1 kph	2.6 kph	0 mm	0 mm
11:54 PM	15.2 °C	SE	1.1 kph	2.6 kph	0 mm	0 mm
11:59 PM	15.2 °C	NW	0 kph	1.1 kph	0 mm	0 mm

Table A3.2 Weather Data from Wundergrounds Weather Station Ref. '*IPORTAL5*' (Name: *Ynys Y Gored*). 5 October 2018

Start time	Temperature	Wind Direction	Wind Speed (Ave.)	Wind Speed (gust)	Precipitation	Precipitation (Accum.)
12:04 AM	15.1 °C	North	2.6 kph	5 kph	0 mm	0 mm
12:09 AM	15 °C	SW	1.1 kph	3.5 kph	0 mm	0 mm
12:14 AM	15 °C	West	0 kph	2.6 kph	0 mm	0 mm
12:19 AM	14.9 °C	North	1.1 kph	3.5 kph	0 mm	0 mm
12:24 AM	14.9 °C	SW	1.1 kph	2.6 kph	0 mm	0 mm
12:29 AM	14.9 °C	NW	1.1 kph	3.5 kph	0 mm	0 mm
12:34 AM	14.8 °C	SW	1.1 kph	2.6 kph	0 mm	0 mm
12:39 AM	14.7 °C	NW	1.1 kph	3.5 kph	0 mm	0 mm
12:44 AM	14.6 °C	North	0 kph	0 kph	0 mm	0 mm
12:49 AM	14.6 °C	North	0 kph	2.6 kph	0 mm	0 mm
12:54 AM	14.5 °C	SW	0 kph	1.1 kph	0 mm	0 mm
12:59 AM	14.4 °C	North	0 kph	0 kph	0 mm	0 mm
1:04 AM	14.3 °C	North	0 kph	1.1 kph	0 mm	0 mm
1:09 AM	14.3 °C	NW	0 kph	1.1 kph	0 mm	0 mm
1:14 AM	14.2 °C	NE	0 kph	0 kph	0 mm	0 mm
1:19 AM	14.1 °C	NE	0 kph	0 kph	0 mm	0 mm
1:24 AM	14.1 °C	NE	0 kph	0 kph	0 mm	0 mm
1:29 AM	14.1 °C	NE	0 kph	0 kph	0 mm	0 mm
1:34 AM	14 °C	SW	0 kph	1.1 kph	0 mm	0 mm
1:39 AM	14 °C	NE	0 kph	0 kph	0 mm	0 mm
1:44 AM	14.1 °C	NE	0 kph	1.1 kph	0 mm	0 mm
1:49 AM	14.2 °C	North	0 kph	0 kph	0 mm	0 mm
1:54 AM	14.2 °C	North	1.1 kph	2.6 kph	0 mm	0 mm
1:59 AM	14.2 °C	East	0 kph	1.1 kph	0 mm	0 mm
2:04 AM	14.2 °C	NE	0 kph	0 kph	0 mm	0 mm
2:09 AM	14.2 °C	NE	0 kph	0 kph	0 mm	0 mm
2:14 AM	14.2 °C	NE	0 kph	0 kph	0 mm	0 mm
2:19 AM	14.3 °C	NNE	0 kph	1.1 kph	0 mm	0 mm
2:24 AM	14.4 °C	NE	0 kph	1.1 kph	0 mm	0 mm
2:29 AM	14.5 °C	NE	1.1 kph	2.6 kph	0 mm	0 mm
2:34 AM	14.5 °C	NE	1.1 kph	2.6 kph	0 mm	0 mm
2:39 AM	14.6 °C	NE	0 kph	2.6 kph	0 mm	0 mm
2:44 AM	14.6 °C	East	2.6 kph	5 kph	0 mm	0 mm
2:49 AM	14.6 °C	NE	0 kph	1.1 kph	0 mm	0 mm
2:54 AM	14.6 °C	NW	0 kph	1.1 kph	0 mm	0 mm
2:59 AM	14.6 °C	NE	0 kph	1.1 kph	0 mm	0 mm
3:04 AM	14.6 °C	East	0 kph	1.1 kph	0 mm	0 mm
3:09 AM	14.6 °C	West	1.1 kph	3.5 kph	0 mm	0 mm
3:14 AM	14.6 °C	NE	0 kph	0 kph	0 mm	0 mm
3:19 AM	14.6 °C	East	0 kph	2.6 kph	0 mm	0 mm
3:24 AM	14.5 °C	North	0 kph	1.1 kph	0 mm	0 mm
3:29 AM	14.6 °C	NE	1.1 kph	2.6 kph	0 mm	0 mm

Start time	Temperature	Wind Direction	Wind Speed (Ave.)	Wind Speed (gust)	Precipitation	Precipitation (Accum.)
3:34 AM	14.7 °C	NE	0 kph	1.1 kph	0 mm	0 mm
3:39 AM	14.8 °C	NW	0 kph	2.6 kph	0 mm	0 mm
3:44 AM	14.8 °C	North	0 kph	1.1 kph	0 mm	0 mm
3:49 AM	14.8 °C	North	2.6 kph	6.1 kph	0 mm	0 mm
3:54 AM	14.8 °C	NW	1.1 kph	2.6 kph	0 mm	0 mm
3:59 AM	14.8 °C	North	1.1 kph	2.6 kph	0 mm	0 mm
4:04 AM	14.9 °C	NW	0 kph	0 kph	0 mm	0 mm
4:09 AM	14.8 °C	West	0 kph	3.5 kph	0 mm	0 mm
4:14 AM	14.8 °C	NE	0 kph	1.1 kph	0 mm	0 mm
4:19 AM	14.8 °C	NE	0 kph	0 kph	0 mm	0 mm
4:24 AM	14.8 °C	North	0 kph	1.1 kph	0 mm	0 mm
4:29 AM	14.9 °C	SSW	1.1 kph	2.6 kph	0 mm	0 mm
4:34 AM	14.9 °C	West	0 kph	2.6 kph	0 mm	0 mm
4:39 AM	14.9 °C	WNW	0 kph	1.1 kph	0 mm	0 mm
4:44 AM	14.9 °C	SW	1.1 kph	3.5 kph	0 mm	0 mm
4:49 AM	14.9 °C	East	1.1 kph	3.5 kph	0 mm	0 mm
4:54 AM	14.9 °C	East	0 kph	1.1 kph	0 mm	0 mm
4:59 AM	14.9 °C	North	0 kph	0 kph	0 mm	0 mm
5:04 AM	14.9 °C	NE	0 kph	0 kph	0 mm	0 mm
5:09 AM	14.8 °C	North	0 kph	0 kph	0 mm	0 mm
5:14 AM	14.8 °C	NE	0 kph	0 kph	0 mm	0 mm
5:19 AM	14.8 °C	North	0 kph	0 kph	0 mm	0 mm
5:24 AM	14.8 °C	North	0 kph	0 kph	0 mm	0 mm
5:29 AM	14.8 °C	NE	0 kph	0 kph	0 mm	0 mm
5:34 AM	14.8 °C	NE	0 kph	0 kph	0 mm	0 mm
5:39 AM	14.7 °C	East	0 kph	0 kph	0 mm	0 mm
5:44 AM	14.7 °C	NE	0 kph	0 kph	0 mm	0 mm
5:49 AM	14.7 °C	NE	0 kph	0 kph	0 mm	0 mm
5:54 AM	14.7 °C	NE	0 kph	0 kph	0 mm	0 mm
5:59 AM	14.6 °C	NE	0 kph	0 kph	0 mm	0 mm
6:04 AM	14.6 °C	NE	0 kph	0 kph	0 mm	0 mm
6:09 AM	14.6 °C	NE	0 kph	0 kph	0 mm	0 mm
6:14 AM	14.5 °C	NE	0 kph	0 kph	0 mm	0 mm
6:19 AM	14.4 °C	NE	0 kph	0 kph	0 mm	0 mm
6:24 AM	14.3 °C	NE	0 kph	0 kph	0 mm	0 mm
6:29 AM	14.3 °C	NE	0 kph	0 kph	0 mm	0 mm
6:34 AM	14.2 °C	NE	0 kph	0 kph	0 mm	0 mm
6:39 AM	14.2 °C	NE	0 kph	0 kph	0 mm	0 mm
6:44 AM	14 °C	NE	0 kph	0 kph	0 mm	0 mm
6:49 AM	14 °C	NE	0 kph	0 kph	0 mm	0 mm
6:54 AM	14 °C	North	0 kph	0 kph	0 mm	0 mm
6:59 AM	13.9 °C	NE	0 kph	0 kph	0 mm	0 mm
7:04 AM	13.9 °C	North	0 kph	0 kph	0 mm	0 mm
7:09 AM	13.8 °C	NE	0 kph	0 kph	0 mm	0 mm

Start time	Temperature	Wind Direction	Wind Speed (Ave.)	Wind Speed (gust)	Precipitation	Precipitation (Accum.)
7:14 AM	13.7 °C	NE	0 kph	0 kph	0 mm	0 mm
7:19 AM	13.6 °C	NE	0 kph	0 kph	0 mm	0 mm
7:24 AM	13.6 °C	NE	0 kph	0 kph	0 mm	0 mm
7:29 AM	13.5 °C	NE	0 kph	0 kph	0 mm	0 mm
7:34 AM	13.5 °C	NE	0 kph	0 kph	0 mm	0 mm
7:39 AM	13.5 °C	NE	0 kph	0 kph	0 mm	0 mm
7:44 AM	13.5 °C	NE	0 kph	0 kph	0 mm	0 mm
7:49 AM	13.5 °C	NE	0 kph	0 kph	0 mm	0 mm
7:54 AM	13.5 °C	NE	0 kph	0 kph	0 mm	0 mm
7:59 AM	13.5 °C	NE	0 kph	0 kph	0 mm	0 mm
8:04 AM	13.5 °C	NE	0 kph	0 kph	0 mm	0 mm
8:09 AM	13.5 °C	NE	0 kph	0 kph	0 mm	0 mm
8:14 AM	13.5 °C	NE	0 kph	0 kph	0 mm	0 mm
8:19 AM	13.5 °C	NE	0 kph	0 kph	0 mm	0 mm
8:24 AM	13.5 °C	NE	0 kph	0 kph	0 mm	0 mm
8:29 AM	13.6 °C	NE	0 kph	0 kph	0 mm	0 mm
8:34 AM	13.6 °C	NE	0 kph	0 kph	0 mm	0 mm
8:39 AM	13.8 °C	NE	0 kph	0 kph	0 mm	0 mm
8:44 AM	13.9 °C	NE	0 kph	0 kph	0 mm	0 mm
8:49 AM	14 °C	NE	0 kph	0 kph	0 mm	0 mm
8:54 AM	14 °C	NE	0 kph	0 kph	0 mm	0 mm
8:59 AM	14.2 °C	NE	0 kph	0 kph	0 mm	0 mm
9:04 AM	14.3 °C	NE	0 kph	0 kph	0 mm	0 mm
9:09 AM	14.4 °C	NE	0 kph	0 kph	0 mm	0 mm
9:14 AM	14.5 °C	North	0 kph	0 kph	0 mm	0 mm
9:19 AM	14.5 °C	North	0 kph	0 kph	0 mm	0 mm
9:24 AM	14.5 °C	North	0 kph	0 kph	0 mm	0 mm
9:29 AM	14.6 °C	North	0 kph	0 kph	0 mm	0 mm
9:34 AM	14.6 °C	North	0 kph	0 kph	0 mm	0 mm
9:39 AM	14.6 °C	North	0 kph	0 kph	0 mm	0 mm
9:44 AM	14.7 °C	North	0 kph	0 kph	0 mm	0 mm
9:49 AM	14.9 °C	North	0 kph	0 kph	0 mm	0 mm
9:54 AM	15 °C	North	0 kph	0 kph	0 mm	0 mm
9:59 AM	15.1 °C	NE	0 kph	0 kph	0 mm	0 mm
10:04 AM	15 °C	NE	0 kph	0 kph	0 mm	0 mm
10:09 AM	15.1 °C	NE	0 kph	0 kph	0 mm	0 mm
10:14 AM	15.1 °C	NE	0 kph	0 kph	0 mm	0 mm
10:19 AM	15.1 °C	NE	0 kph	0 kph	0 mm	0 mm
10:24 AM	15.1 °C	NE	0 kph	0 kph	0 mm	0 mm
10:29 AM	15.1 °C	NE	0 kph	0 kph	0 mm	0 mm
10:34 AM	15.1 °C	North	0 kph	0 kph	0 mm	0 mm
10:39 AM	15.1 °C	NE	0 kph	0 kph	0 mm	0 mm
10:44 AM	15.1 °C	NE	0 kph	0 kph	0 mm	0 mm
10:49 AM	15.2 °C	North	0 kph	0 kph	0 mm	0 mm

Start time	Temperature	Wind Direction	Wind Speed (Ave.)	Wind Speed (gust)	Precipitation	Precipitation (Accum.)
10:54 AM	15.2 °C	NE	0 kph	0 kph	0 mm	0 mm
10:59 AM	15.2 °C	NE	0 kph	0 kph	0 mm	0 mm
11:04 AM	15.2 °C	North	0 kph	0 kph	0 mm	0 mm
11:09 AM	15.2 °C	North	0 kph	0 kph	0 mm	0 mm
11:14 AM	15.2 °C	North	0 kph	0 kph	0 mm	0 mm
11:19 AM	15.4 °C	East	0 kph	0 kph	0 mm	0 mm
11:24 AM	15.6 °C	North	0 kph	0 kph	0 mm	0 mm
11:29 AM	15.7 °C	NE	0 kph	0 kph	0 mm	0 mm
11:34 AM	15.9 °C	North	0 kph	0 kph	0 mm	0 mm
11:39 AM	16.1 °C	North	0 kph	0 kph	0 mm	0 mm
11:44 AM	16.4 °C	SW	0 kph	0 kph	0 mm	0 mm
11:49 AM	16.7 °C	North	0 kph	0 kph	0 mm	0 mm
11:54 AM	16.7 °C	North	0 kph	0 kph	0 mm	0 mm
11:59 AM	16.7 °C	NE	0 kph	0 kph	0 mm	0 mm
12:04 PM	16.6 °C	North	0 kph	0 kph	0 mm	0 mm
12:09 PM	16.5 °C	NE	0 kph	0 kph	0 mm	0 mm
12:14 PM	16.4 °C	SE	0 kph	0 kph	0 mm	0 mm
12:19 PM	16.5 °C	NE	0 kph	0 kph	0 mm	0 mm
12:24 PM	16.6 °C	SE	0 kph	0 kph	0 mm	0 mm
12:29 PM	16.6 °C	East	0 kph	0 kph	0 mm	0 mm
12:34 PM	16.6 °C	NE	0 kph	0 kph	0 mm	0 mm
12:39 PM	16.6 °C	North	0 kph	0 kph	0 mm	0 mm
12:44 PM	16.7 °C	South	1.1 kph	3.5 kph	0 mm	0 mm
12:49 PM	16.7 °C	SE	0 kph	1.1 kph	0 mm	0 mm
12:54 PM	16.7 °C	North	0 kph	1.1 kph	0 mm	0 mm
12:59 PM	16.8 °C	SE	1.1 kph	3.5 kph	0 mm	0 mm
1:04 PM	16.8 °C	NE	0 kph	0 kph	0 mm	0 mm
1:09 PM	16.8 °C	North	0 kph	0 kph	0 mm	0 mm
1:14 PM	16.9 °C	SW	1.1 kph	3.5 kph	0 mm	0 mm
1:19 PM	16.8 °C	North	0 kph	2.6 kph	0 mm	0 mm
1:24 PM	16.8 °C	East	0 kph	1.1 kph	0 mm	0 mm
1:29 PM	16.8 °C	SSE	1.1 kph	3.5 kph	0 mm	0 mm
1:34 PM	16.8 °C	NE	0 kph	0 kph	0 mm	0 mm
1:39 PM	16.9 °C	South	1.1 kph	5 kph	0 mm	0 mm
1:44 PM	16.9 °C	NE	0 kph	1.1 kph	0 mm	0 mm
1:49 PM	16.9 °C	NE	0 kph	2.6 kph	0 mm	0 mm
1:54 PM	16.9 °C	North	1.1 kph	2.6 kph	0 mm	0 mm
1:59 PM	17 °C	ENE	1.1 kph	3.5 kph	0 mm	0 mm
2:04 PM	17 °C	NE	0 kph	2.6 kph	0 mm	0 mm
2:09 PM	16.9 °C	SW	1.1 kph	3.5 kph	0 mm	0 mm
2:14 PM	16.9 °C	North	1.1 kph	3.5 kph	0 mm	0 mm
2:19 PM	16.9 °C	North	1.1 kph	3.5 kph	0 mm	0 mm
2:24 PM	16.9 °C	SW	0 kph	2.6 kph	0 mm	0 mm
2:29 PM	16.8 °C	North	0 kph	2.6 kph	0 mm	0 mm

Start time	Temperature	Wind Direction	Wind Speed (Ave.)	Wind Speed (gust)	Precipitation	Precipitation (Accum.)
2:34 PM	16.8 °C	North	1.1 kph	2.6 kph	0 mm	0 mm
2:39 PM	16.7 °C	NNE	1.1 kph	2.6 kph	0 mm	0 mm

Table A3.3 Weather Data from a portable weather station. 10 to 15 January 2019

Date	Start time	Temp. (°C)	Wind Direction (ms^{-1})	Wind Speed (Ave.) (ms^{-1})	Wind Speed (gust) (ms^{-1})	Precipitation (mm)	Precipitation (Accumm.) (mm)
10/01/2019	10:47	6.9	SSW	0.0	0.3	0.0	0.0
10/01/2019	11:02	5.5	N	0.3	0.7	0.0	0.0
10/01/2019	11:17	5.4	N	0.0	0.0	0.0	0.0
10/01/2019	11:32	5.4	NW	0.0	0.3	0.0	0.0
10/01/2019	11:47	5.4	N	0.7	1.0	0.0	0.0
10/01/2019	12:02	5.3	NW	0.3	0.7	0.0	0.0
10/01/2019	12:17	5.4	N	0.3	0.7	0.0	0.0
10/01/2019	12:32	5.4	N	0.0	0.0	0.0	0.0
10/01/2019	12:47	6.0	N	0.0	0.3	0.0	0.0
10/01/2019	13:02	6.1	N	0.3	0.7	0.0	0.0
10/01/2019	13:17	6.4	NNW	0.3	1.0	0.0	0.0
10/01/2019	13:32	6.4	N	0.7	1.0	0.0	0.0
10/01/2019	13:47	6.1	N	0.3	1.4	0.0	0.0
10/01/2019	14:02	6.1	NW	1.0	1.7	0.0	0.0
10/01/2019	14:17	6.0	N	0.7	1.7	0.0	0.0
10/01/2019	14:32	6.4	N	0.7	1.4	0.0	0.0
10/01/2019	14:47	6.0	NW	0.7	1.4	0.0	0.0
10/01/2019	15:02	6.0	N	0.3	1.0	0.0	0.0
10/01/2019	15:17	6.4	NW	0.3	1.4	0.0	0.0
10/01/2019	15:32	6.4	N	0.7	1.0	0.0	0.0
10/01/2019	15:47	6.4	NE	0.3	1.0	0.0	0.0
10/01/2019	16:02	6.0	N	0.0	0.0	0.0	0.0
10/01/2019	16:17	5.9	NNW	0.0	0.3	0.0	0.0
10/01/2019	16:32	6.0	NW	0.0	0.3	0.0	0.0
10/01/2019	16:47	5.7	NW	0.0	0.3	0.0	0.0
10/01/2019	17:02	5.6	N	0.0	0.0	0.0	0.0
10/01/2019	17:17	5.3	N	0.0	0.0	0.0	0.0
10/01/2019	17:32	5.2	N	0.0	0.3	0.0	0.0
10/01/2019	17:47	5.1	N	0.0	0.0	0.0	0.0
10/01/2019	18:02	5.1	N	0.0	0.3	0.0	0.0
10/01/2019	18:17	4.7	N	0.0	0.3	0.0	0.0
10/01/2019	18:32	5.7	N	1.4	2.0	0.0	0.0
10/01/2019	18:47	8.2	NW	1.0	1.7	0.0	0.0
10/01/2019	19:02	9.1	NE	1.4	2.0	0.0	0.0
10/01/2019	19:17	9.5	E	2.0	2.7	0.0	0.0
10/01/2019	19:32	9.7	NE	0.7	1.7	0.0	0.0
10/01/2019	19:47	9.8	NE	2.4	3.4	0.0	0.0
10/01/2019	20:02	9.8	SE	0.7	1.0	0.0	0.0
10/01/2019	20:17	10.1	N	2.4	4.1	0.0	0.0
10/01/2019	20:32	10.1	W	2.7	4.1	0.0	0.0
10/01/2019	20:47	10.1	N	1.7	2.7	0.0	0.0
10/01/2019	21:02	9.9	NW	1.7	2.4	0.0	0.0

Date	Start time	Temp. (°C)	Wind Direction (ms^{-1})	Wind Speed (Ave.) (ms^{-1})	Wind Speed (gust) (ms^{-1})	Precipitation (mm)	Precipitation (Accumm.) (mm)
10/01/2019	21:17	9.9	E	0.7	1.0	0.0	0.0
10/01/2019	21:32	9.9	NNW	0.7	2.0	0.0	0.0
10/01/2019	21:47	9.7	NW	0.7	1.0	0.0	0.0
10/01/2019	22:02	9.8	NE	1.7	3.4	0.0	0.0
10/01/2019	22:17	9.9	N	1.7	2.4	0.0	0.0
10/01/2019	22:32	10.0	N	1.4	2.7	0.0	0.0
10/01/2019	22:47	9.8	N	2.0	4.4	0.0	0.0
10/01/2019	23:02	9.7	N	0.0	0.3	0.0	0.0
10/01/2019	23:17	9.5	NW	1.0	1.7	0.0	0.0
10/01/2019	23:32	9.0	N	0.0	0.7	0.0	0.0
10/01/2019	23:47	8.3	NW	0.3	1.0	0.0	0.0
11/01/2019	00:02	7.9	N	0.3	1.0	0.0	0.0
11/01/2019	00:17	7.4	N	1.0	2.0	0.0	0.0
11/01/2019	00:32	7.5	N	0.7	1.0	0.0	0.0
11/01/2019	00:48	7.4	NE	0.0	0.0	0.0	0.0
11/01/2019	01:04	6.9	NW	0.0	0.0	0.0	0.0
11/01/2019	01:20	6.6	NW	0.0	0.0	0.0	0.0
11/01/2019	01:36	6.5	NW	0.0	0.3	0.0	0.0
11/01/2019	01:52	6.6	N	0.0	0.0	0.0	0.0
11/01/2019	02:08	6.8	N	0.0	0.7	0.0	0.0
11/01/2019	02:24	6.6	NW	0.0	0.3	0.0	0.0
11/01/2019	02:40	6.5	N	0.3	0.7	0.0	0.0
11/01/2019	02:56	6.4	N	0.0	0.3	0.0	0.0
11/01/2019	03:12	6.0	N	0.0	0.0	0.0	0.0
11/01/2019	03:27	6.4	N	0.0	0.0	0.0	0.0
11/01/2019	03:42	6.4	NW	0.3	0.7	0.0	0.0
11/01/2019	03:57	5.9	NE	0.0	0.0	0.0	0.0
11/01/2019	04:12	6.4	NW	0.0	0.3	0.0	0.0
11/01/2019	04:27	5.9	S	0.0	0.7	0.0	0.0
11/01/2019	04:42	5.7	S	0.0	0.0	0.0	0.0
11/01/2019	04:57	5.5	N	0.0	0.0	0.0	0.0
11/01/2019	05:12	5.4	N	0.0	0.0	0.0	0.0
11/01/2019	05:27	5.9	NW	0.0	0.3	0.0	0.0
11/01/2019	05:42	5.9	W	0.0	0.0	0.0	0.0
11/01/2019	05:57	5.9	NW	0.0	0.0	0.0	0.0
11/01/2019	06:12	5.4	SE	0.0	0.0	0.0	0.0
11/01/2019	06:27	4.9	N	0.0	0.0	0.0	0.0
11/01/2019	06:42	5.0	N	0.0	0.3	0.0	0.0
11/01/2019	06:57	4.9	N	0.0	0.0	0.0	0.0
11/01/2019	07:12	5.0	N	0.0	0.0	0.0	0.0
11/01/2019	07:27	4.9	N	0.0	0.0	0.0	0.0
11/01/2019	07:42	5.4	N	0.0	0.7	0.0	0.0
11/01/2019	07:57	5.7	N	0.0	0.3	0.0	0.0
11/01/2019	08:12	5.8	E	0.0	0.0	0.0	0.0

Date	Start time	Temp. (°C)	Wind Direction (ms^{-1})	Wind Speed (Ave.) (ms^{-1})	Wind Speed (gust) (ms^{-1})	Precipitation (mm)	Precipitation (Accumm.) (mm)
11/01/2019	08:27	5.7	N	0.0	0.0	0.0	0.0
11/01/2019	08:42	5.9	N	0.0	0.0	0.0	0.0
11/01/2019	08:57	5.9	N	0.0	0.0	0.0	0.0
11/01/2019	09:12	5.9	N	0.0	0.3	0.0	0.0
11/01/2019	09:27	6.3	N	0.0	0.0	0.0	0.0
11/01/2019	09:42	6.5	N	0.0	0.7	0.0	0.0
11/01/2019	09:57	7.2	N	0.0	0.7	0.0	0.0
11/01/2019	10:12	7.6	N	0.0	0.0	0.0	0.0
11/01/2019	10:27	7.9	N	0.0	0.3	0.0	0.0
11/01/2019	10:42	8.0	NE	0.0	0.0	0.0	0.0
11/01/2019	10:57	8.1	NNW	0.0	0.3	0.0	0.0
11/01/2019	11:12	8.3	N	0.0	0.3	0.0	0.0
11/01/2019	11:27	8.6	N	0.0	0.3	0.0	0.0
11/01/2019	11:42	9.0	N	0.0	0.3	0.0	0.0
11/01/2019	11:57	9.2	N	0.0	0.7	0.0	0.0
11/01/2019	12:12	9.0	SW	0.0	0.3	0.0	0.0
11/01/2019	12:27	9.4	WNW	0.0	0.3	0.0	0.0
11/01/2019	12:42	10.0	N	1.0	1.4	0.0	0.0
11/01/2019	12:57	10.3	N	0.3	0.7	0.0	0.0
11/01/2019	13:12	10.0	N	0.0	0.3	0.0	0.0
11/01/2019	13:27	9.6	N	0.0	0.3	0.0	0.0
11/01/2019	13:42	9.7	N	0.0	0.7	0.0	0.0
11/01/2019	13:57	9.7	SW	0.3	1.0	0.0	0.0
11/01/2019	14:12	9.9	NW	0.0	0.7	0.0	0.0
11/01/2019	14:27	10.1	NE	0.3	1.0	0.0	0.0
11/01/2019	14:42	10.0	N	0.0	0.0	0.0	0.0
11/01/2019	14:57	10.0	NW	0.0	0.3	0.0	0.0
11/01/2019	15:12	9.8	N	0.0	0.3	0.0	0.0
11/01/2019	15:27	9.6	NE	0.0	0.0	0.0	0.0
11/01/2019	15:42	9.3	N	0.0	0.3	0.0	0.0
11/01/2019	15:57	9.1	N	0.3	0.7	0.0	0.0
11/01/2019	16:12	8.8	NW	0.0	0.0	0.0	0.0
11/01/2019	16:27	8.9	NE	0.0	0.3	0.0	0.0
11/01/2019	16:42	8.8	N	0.0	0.7	0.0	0.0
11/01/2019	16:57	8.7	N	0.0	0.3	0.0	0.0
11/01/2019	17:12	8.7	N	0.0	0.7	0.0	0.0
11/01/2019	17:27	8.9	N	0.3	0.7	0.0	0.0
11/01/2019	17:42	8.9	N	0.3	0.7	0.0	0.0
11/01/2019	17:57	8.8	NW	0.0	0.0	0.0	0.0
11/01/2019	18:12	8.7	NE	0.3	0.7	0.0	0.0
11/01/2019	18:27	8.6	N	0.0	0.3	0.0	0.0
11/01/2019	18:42	8.8	NW	0.3	0.7	0.0	0.0
11/01/2019	18:57	8.8	N	0.0	0.3	0.0	0.0
11/01/2019	19:12	8.9	N	0.3	1.0	0.0	0.0

Date	Start time	Temp. (°C)	Wind Direction (ms^{-1})	Wind Speed (Ave.) (ms^{-1})	Wind Speed (gust) (ms^{-1})	Precipitation (mm)	Precipitation (Accumm.) (mm)
11/01/2019	19:27	8.8	N	0.7	1.0	0.0	0.0
11/01/2019	19:42	8.9	N	0.3	0.7	0.0	0.0
11/01/2019	19:57	8.8	N	0.3	0.7	0.0	0.0
11/01/2019	20:12	8.8	NE	0.7	1.0	0.0	0.0
11/01/2019	20:27	8.9	N	0.3	1.0	0.0	0.0
11/01/2019	20:42	8.9	N	1.0	2.0	0.0	0.0
11/01/2019	20:57	9.0	N	0.3	0.7	0.0	0.0
11/01/2019	21:12	8.8	N	0.3	1.0	0.0	0.0
11/01/2019	21:27	8.8	N	1.0	1.7	0.0	0.0
11/01/2019	21:42	8.8	NW	1.0	1.7	0.0	0.0
11/01/2019	21:57	8.8	N	0.7	1.4	0.0	0.0
11/01/2019	22:12	8.8	NW	0.7	1.0	0.0	0.0
11/01/2019	22:27	8.8	N	1.0	1.7	0.0	0.0
11/01/2019	22:42	8.6	NNW	1.0	2.0	0.0	0.0
11/01/2019	22:57	8.7	N	1.0	1.4	0.0	0.0
11/01/2019	23:12	8.6	N	0.3	0.7	0.0	0.0
11/01/2019	23:27	8.7	NW	0.7	1.0	0.0	0.0
11/01/2019	23:42	8.7	NNW	1.4	2.0	0.0	0.0
11/01/2019	23:57	8.7	N	0.3	1.4	0.0	0.0
12/01/2019	00:12	8.7	NW	1.0	1.7	0.0	0.0
12/01/2019	00:27	8.8	NW	0.7	1.0	0.0	0.0
12/01/2019	00:42	8.7	NW	0.7	1.7	0.0	0.0
12/01/2019	00:57	8.7	NW	1.0	1.7	0.0	0.0
12/01/2019	01:12	8.7	N	1.0	1.7	0.0	0.0
12/01/2019	01:27	8.7	N	1.4	2.7	0.0	0.0
12/01/2019	01:42	8.6	NW	0.7	1.7	0.0	0.0
12/01/2019	01:57	8.6	NW	0.7	2.0	0.0	0.0
12/01/2019	02:12	8.7	N	0.3	1.0	0.0	0.0
12/01/2019	02:27	8.7	NW	0.7	1.7	0.0	0.0
12/01/2019	02:42	8.7	N	0.0	0.3	0.0	0.0
12/01/2019	02:57	8.8	NW	0.7	1.0	0.0	0.0
12/01/2019	03:12	9.1	NNW	0.3	1.0	0.0	0.0
12/01/2019	03:27	9.3	NW	1.0	1.4	0.0	0.0
12/01/2019	03:42	9.2	N	0.0	0.7	0.0	0.0
12/01/2019	03:57	9.1	N	0.3	1.4	0.0	0.0
12/01/2019	04:12	9.4	NE	2.0	2.7	0.0	0.0
12/01/2019	04:27	9.3	SW	0.7	2.4	0.0	0.0
12/01/2019	04:42	9.3	N	1.0	2.0	0.0	0.0
12/01/2019	04:57	9.3	NE	0.0	0.3	0.0	0.0
12/01/2019	05:12	9.3	NW	0.0	0.3	0.0	0.0
12/01/2019	05:27	9.3	NW	0.3	0.7	0.0	0.0
12/01/2019	05:42	9.3	NE	0.7	1.4	0.0	0.0
12/01/2019	05:57	9.4	NW	0.7	1.4	0.0	0.0
12/01/2019	06:12	9.3	N	0.3	0.7	0.0	0.0

Date	Start time	Temp. (°C)	Wind Direction (ms^{-1})	Wind Speed (Ave.) (ms^{-1})	Wind Speed (gust) (ms^{-1})	Precipitation (mm)	Precipitation (Accumm.) (mm)
12/01/2019	06:27	9.3	N	0.0	0.3	0.0	0.0
12/01/2019	06:42	9.3	N	0.0	0.0	0.0	0.0
12/01/2019	06:57	9.6	NW	1.7	2.4	0.0	0.0
12/01/2019	07:12	9.7	NNW	1.4	2.0	0.0	0.0
12/01/2019	07:27	9.8	N	1.0	2.0	0.0	0.0
12/01/2019	07:42	9.9	N	0.7	1.4	0.0	0.0
12/01/2019	07:57	9.8	NW	0.3	0.7	0.0	0.0
12/01/2019	08:12	9.8	NE	0.7	1.4	0.0	0.0
12/01/2019	08:27	9.9	N	0.7	1.7	0.0	0.0
12/01/2019	08:42	10.0	NW	0.3	1.0	0.0	0.0
12/01/2019	08:57	10.0	N	1.4	2.4	0.0	0.0
12/01/2019	09:12	9.9	NW	1.0	1.7	0.0	0.0
12/01/2019	09:27	10.0	NW	1.4	2.0	0.0	0.0
12/01/2019	09:42	10.2	N	2.4	3.4	0.0	0.0
12/01/2019	09:57	10.4	NE	1.7	3.1	0.0	0.0
12/01/2019	10:12	10.4	NW	0.7	1.4	0.0	0.0
12/01/2019	10:27	10.2	NE	1.0	1.4	0.0	0.0
12/01/2019	10:42	10.3	N	1.0	2.4	0.0	0.0
12/01/2019	10:57	10.4	NW	1.4	2.0	0.0	0.0
12/01/2019	11:12	10.5	NW	0.3	1.0	0.0	0.0
12/01/2019	11:27	10.5	N	0.7	1.7	0.0	0.0
12/01/2019	11:42	10.7	NW	0.3	1.0	0.0	0.0
12/01/2019	11:57	10.9	NE	1.0	1.4	0.0	0.0
12/01/2019	12:12	10.8	NE	0.7	1.4	0.0	0.0
12/01/2019	12:27	10.8	N	0.7	1.7	0.0	0.0
12/01/2019	12:42	10.8	NW	0.7	1.7	0.0	0.0
12/01/2019	12:57	10.9	NNE	1.4	2.4	0.0	0.0
12/01/2019	13:12	11.0	N	1.7	4.4	0.0	0.0
12/01/2019	13:27	10.9	N	0.7	2.7	0.0	0.0
12/01/2019	13:42	10.9	NE	0.7	1.4	0.0	0.0
12/01/2019	13:57	10.8	N	1.4	2.0	0.0	0.0
12/01/2019	14:12	10.9	N	0.7	1.4	0.0	0.0
12/01/2019	14:27	10.8	N	2.0	3.7	0.0	0.0
12/01/2019	14:42	10.7	NW	0.7	1.4	0.0	0.0
12/01/2019	14:57	10.5	NW	1.4	2.4	0.0	0.0
12/01/2019	15:12	10.4	NE	0.7	1.4	0.0	0.0
12/01/2019	15:27	10.3	NW	0.0	0.3	0.0	0.0
12/01/2019	15:42	10.2	N	0.3	1.4	0.0	0.0
12/01/2019	15:57	10.1	NW	0.3	1.4	0.0	0.0
12/01/2019	16:12	10.0	N	0.3	1.0	0.0	0.0
12/01/2019	16:27	9.8	NNW	0.7	2.4	0.0	0.0
12/01/2019	16:42	9.8	NNW	1.0	2.0	0.0	0.0
12/01/2019	16:57	9.7	NW	0.3	0.7	0.0	0.0
12/01/2019	17:12	9.7	N	0.3	1.0	0.0	0.0

Date	Start time	Temp. (°C)	Wind Direction (ms^{-1})	Wind Speed (Ave.) (ms^{-1})	Wind Speed (gust) (ms^{-1})	Precipitation (mm)	Precipitation (Accumm.) (mm)
12/01/2019	17:27	9.7	NNW	0.0	0.7	0.0	0.0
12/01/2019	17:42	9.8	N	0.7	1.4	0.0	0.0
12/01/2019	17:57	9.8	ENE	1.0	2.7	0.0	0.0
12/01/2019	18:12	9.9	N	1.4	2.7	0.0	0.0
12/01/2019	18:27	9.9	W	2.0	2.7	0.0	0.0
12/01/2019	18:42	10.0	N	1.0	1.7	0.0	0.0
12/01/2019	18:57	10.1	N	0.7	2.0	0.0	0.0
12/01/2019	19:12	10.2	WSW	1.4	2.7	0.0	0.0
12/01/2019	19:27	10.2	NNW	0.3	1.0	0.0	0.0
12/01/2019	19:42	10.2	NW	1.7	2.4	0.0	0.0
12/01/2019	19:57	10.3	SW	1.7	2.7	0.0	0.0
12/01/2019	20:12	10.4	N	0.7	1.4	0.0	0.0
12/01/2019	20:27	10.4	N	2.4	5.1	0.0	0.0
12/01/2019	20:42	10.4	NE	0.7	1.7	0.0	0.0
12/01/2019	20:57	10.3	NNW	1.4	2.7	0.0	0.0
12/01/2019	21:12	10.3	N	1.4	3.1	0.0	0.0
12/01/2019	21:27	10.4	NNW	0.7	1.7	0.0	0.0
12/01/2019	21:42	10.4	NW	1.0	1.7	0.0	0.0
12/01/2019	21:57	10.4	N	0.3	1.0	0.0	0.0
12/01/2019	22:12	10.4	NE	2.0	3.1	0.0	0.0
12/01/2019	22:27	10.4	N	1.7	2.4	0.0	0.0
12/01/2019	22:42	10.4	N	1.0	2.4	0.0	0.0
12/01/2019	22:57	10.4	N	1.7	3.7	0.0	0.0
12/01/2019	23:12	10.4	N	2.0	3.7	0.0	0.0
12/01/2019	23:27	10.4	E	1.4	1.7	0.0	0.0
12/01/2019	23:42	10.4	W	0.7	1.0	0.0	0.0
12/01/2019	23:57	10.4	N	1.0	1.7	0.0	0.0
13/01/2019	00:12	10.4	NNE	0.7	1.0	0.0	0.0
13/01/2019	00:27	10.4	NE	0.7	1.7	0.0	0.0
13/01/2019	00:42	10.4	NW	1.7	2.7	0.0	0.0
13/01/2019	00:57	10.4	N	0.3	1.0	0.0	0.0
13/01/2019	01:12	10.4	NE	1.7	2.7	0.0	0.0
13/01/2019	01:27	10.4	N	1.4	2.0	0.0	0.0
13/01/2019	01:42	10.4	SW	2.0	3.1	0.0	0.0
13/01/2019	01:57	10.4	N	1.4	2.4	0.0	0.0
13/01/2019	02:12	10.4	NE	1.4	2.4	0.0	0.0
13/01/2019	02:27	10.5	N	2.7	4.8	0.0	0.0
13/01/2019	02:42	10.4	NW	1.4	2.0	0.0	0.0
13/01/2019	02:57	10.3	N	1.0	3.1	0.0	0.0
13/01/2019	03:12	10.3	N	0.0	0.7	0.0	0.0
13/01/2019	03:27	10.2	N	0.3	0.7	0.0	0.0
13/01/2019	03:42	10.3	N	1.4	2.7	0.0	0.0
13/01/2019	03:57	10.3	N	1.0	1.4	0.0	0.0
13/01/2019	04:12	10.3	NW	1.0	1.7	0.0	0.0

Date	Start time	Temp. (°C)	Wind Direction (ms^{-1})	Wind Speed (Ave.) (ms^{-1})	Wind Speed (gust) (ms^{-1})	Precipitation (mm)	Precipitation (Accumm.) (mm)
13/01/2019	04:27	10.2	NE	0.3	0.7	0.0	0.0
13/01/2019	04:42	10.1	NW	1.4	3.1	0.0	0.0
13/01/2019	04:57	10.0	NW	0.7	2.0	0.0	0.0
13/01/2019	05:12	9.9	N	1.0	1.7	0.0	0.0
13/01/2019	05:27	9.7	N	0.7	1.4	0.0	0.0
13/01/2019	05:42	9.6	NW	0.0	0.3	0.0	0.0
13/01/2019	05:57	9.6	N	1.0	1.4	0.0	0.0
13/01/2019	06:12	9.6	N	0.0	0.3	0.0	0.0
13/01/2019	06:27	9.6	N	0.3	0.7	0.0	0.0
13/01/2019	06:42	9.7	N	0.3	0.7	0.0	0.0
13/01/2019	06:57	9.7	N	0.3	1.0	0.0	0.0
13/01/2019	07:12	9.9	N	0.7	1.4	0.0	0.0
13/01/2019	07:27	9.8	SW	0.7	1.4	0.0	0.0
13/01/2019	07:42	9.9	NW	0.7	1.0	0.0	0.0
13/01/2019	07:57	9.9	NW	0.7	1.0	0.0	0.0
13/01/2019	08:12	9.9	WSW	0.3	0.7	0.0	0.0
13/01/2019	08:27	9.9	N	0.0	0.7	0.0	0.0
13/01/2019	08:42	10.0	N	0.3	1.0	0.0	0.0
13/01/2019	08:57	10.0	E	0.0	0.7	0.0	0.0
13/01/2019	09:12	10.1	N	0.0	0.3	0.0	0.0
13/01/2019	09:27	10.3	SW	1.0	1.7	0.0	0.0
13/01/2019	09:42	10.2	NW	1.4	2.0	0.0	0.0
13/01/2019	09:57	10.2	N	1.4	2.0	0.0	0.0
13/01/2019	10:12	10.3	NE	0.7	1.7	0.0	0.0
13/01/2019	10:27	10.3	W	0.3	0.7	0.0	0.0
13/01/2019	10:42	10.5	NW	0.7	2.0	0.0	0.0
13/01/2019	10:57	10.6	E	1.4	3.1	0.0	0.0
13/01/2019	11:12	10.7	W	0.3	1.0	0.0	0.0
13/01/2019	11:27	10.7	NW	0.3	1.0	0.0	0.0
13/01/2019	11:42	10.8	N	0.3	1.4	0.0	0.0
13/01/2019	11:57	10.9	W	0.7	1.7	0.0	0.0
13/01/2019	12:12	11.0	W	0.7	1.4	0.0	0.0
13/01/2019	12:27	11.0	SSW	0.7	1.7	0.0	0.0
13/01/2019	12:42	10.9	E	0.7	1.4	0.0	0.0
13/01/2019	12:57	10.9	N	0.3	0.7	0.0	0.0
13/01/2019	13:12	10.9	E	0.3	1.0	0.0	0.0
13/01/2019	13:27	10.7	N	0.3	1.0	0.0	0.0
13/01/2019	13:42	10.6	SW	0.7	1.0	0.0	0.0
13/01/2019	13:57	10.7	SW	0.3	0.7	0.0	0.0
13/01/2019	14:12	10.8	SE	0.7	1.0	0.0	0.0
13/01/2019	14:27	10.8	N	0.3	1.0	0.0	0.0
13/01/2019	14:42	10.8	N	0.3	1.0	0.0	0.0
13/01/2019	14:57	10.8	N	0.3	0.7	0.0	0.0
13/01/2019	15:12	10.8	SW	0.3	0.7	0.0	0.0

Date	Start time	Temp. (°C)	Wind Direction (ms^{-1})	Wind Speed (Ave.) (ms^{-1})	Wind Speed (gust) (ms^{-1})	Precipitation (mm)	Precipitation (Accumm.) (mm)
13/01/2019	15:27	11.0	N	0.7	1.4	0.0	0.0
13/01/2019	15:42	11.3	ESE	0.7	1.7	0.0	0.0
13/01/2019	15:57	11.6	N	1.7	4.4	0.0	0.0
13/01/2019	16:12	11.6	NNW	0.0	0.3	0.0	0.0
13/01/2019	16:27	11.6	N	0.7	1.7	0.0	0.0
13/01/2019	16:42	11.6	N	0.3	1.4	0.0	0.0
13/01/2019	16:57	11.3	N	0.3	1.4	0.0	0.0
13/01/2019	17:12	11.1	NNE	0.7	2.4	0.0	0.0
13/01/2019	17:27	11.1	N	0.0	0.7	0.0	0.0
13/01/2019	17:42	11.1	NW	1.0	1.4	0.0	0.0
13/01/2019	17:57	10.9	NW	1.0	2.0	0.0	0.0
13/01/2019	18:12	11.0	W	0.0	0.7	0.0	0.0
13/01/2019	18:27	11.0	NNW	0.0	1.0	0.0	0.0
13/01/2019	18:42	11.2	N	0.7	2.0	0.0	0.0
13/01/2019	18:57	11.3	SW	0.3	0.7	0.0	0.0
13/01/2019	19:12	11.2	N	2.4	4.1	0.0	0.0
13/01/2019	19:27	10.9	E	0.7	1.7	0.0	0.0
13/01/2019	19:42	10.6	N	2.0	4.1	0.0	0.0
13/01/2019	19:57	10.4	NW	1.0	3.4	0.0	0.0
13/01/2019	20:12	10.1	N	0.3	1.0	0.0	0.0
13/01/2019	20:27	10.0	SW	1.7	3.1	0.0	0.0
13/01/2019	20:42	9.6	NW	2.0	5.4	0.0	0.0
13/01/2019	20:57	9.9	NW	1.0	1.7	0.0	0.0
13/01/2019	21:12	9.9	WNW	2.4	5.8	0.0	0.0
13/01/2019	21:27	9.8	NW	2.0	4.1	0.0	0.0
13/01/2019	21:42	9.8	NNW	0.7	1.7	0.0	0.0
13/01/2019	21:57	9.6	E	2.0	4.1	0.0	0.0
13/01/2019	22:12	9.3	NW	2.7	5.4	0.0	0.0
13/01/2019	22:27	9.5	NW	2.0	3.7	0.0	0.0
13/01/2019	22:42	9.3	NW	1.0	3.1	0.0	0.0
13/01/2019	22:57	8.9	NW	1.0	2.0	0.0	0.0
13/01/2019	23:12	8.9	WNW	3.1	5.8	0.0	0.0
13/01/2019	23:27	8.9	NE	0.0	0.7	0.0	0.0
13/01/2019	23:42	9.0	NW	0.3	1.0	0.0	0.0
13/01/2019	23:57	8.9	NW	0.7	1.4	0.0	0.0
14/01/2019	00:12	8.9	NE	0.3	1.0	0.0	0.0
14/01/2019	00:27	8.9	NW	1.7	3.4	0.0	0.0
14/01/2019	00:42	9.0	NE	1.4	2.7	0.0	0.0
14/01/2019	00:57	9.1	NE	1.0	2.0	0.0	0.0
14/01/2019	01:12	9.2	NE	1.4	3.1	0.0	0.0
14/01/2019	01:27	9.0	NE	1.7	2.7	0.0	0.0
14/01/2019	01:42	9.0	N	1.4	2.7	0.0	0.0
14/01/2019	01:57	8.8	N	0.0	0.3	0.0	0.0
14/01/2019	02:12	8.9	WNW	0.3	1.0	0.0	0.0

Date	Start time	Temp. (°C)	Wind Direction (ms^{-1})	Wind Speed (Ave.) (ms^{-1})	Wind Speed (gust) (ms^{-1})	Precipitation (mm)	Precipitation (Accumm.) (mm)
14/01/2019	02:27	8.9	NW	1.4	2.4	0.0	0.0
14/01/2019	02:42	8.9	NW	2.0	4.4	0.0	0.0
14/01/2019	02:57	8.7	WNW	2.0	2.7	0.0	0.0
14/01/2019	03:12	8.7	N	1.0	2.4	0.0	0.0
14/01/2019	03:27	8.5	N	1.4	2.7	0.0	0.0
14/01/2019	03:42	8.4	NW	1.4	1.7	0.0	0.0
14/01/2019	03:57	8.7	W	3.1	4.1	0.0	0.0
14/01/2019	04:12	8.6	NW	0.7	1.7	0.0	0.0
14/01/2019	04:27	8.5	N	1.4	2.0	0.0	0.0
14/01/2019	04:42	8.5	N	0.0	0.7	0.0	0.0
14/01/2019	04:57	8.6	N	1.0	2.0	0.0	0.0
14/01/2019	05:12	8.7	N	0.7	1.7	0.0	0.0
14/01/2019	05:27	8.5	N	0.3	1.0	0.0	0.0
14/01/2019	05:42	8.4	W	0.3	1.4	0.0	0.0
14/01/2019	05:57	7.9	N	2.0	4.1	0.0	0.0
14/01/2019	06:12	7.2	WNW	0.0	1.4	0.0	0.0
14/01/2019	06:27	7.5	NNE	0.3	1.0	0.0	0.0
14/01/2019	06:42	7.3	N	0.0	0.3	0.0	0.0
14/01/2019	06:57	6.9	N	0.0	0.3	0.0	0.0
14/01/2019	07:12	6.2	NE	0.0	0.3	0.0	0.0
14/01/2019	07:27	6.4	NE	0.0	0.0	0.0	0.0
14/01/2019	07:42	7.1	NW	0.3	1.4	0.0	0.0
14/01/2019	07:57	6.9	N	0.0	0.3	0.0	0.0
14/01/2019	08:12	7.6	NW	0.0	0.3	0.0	0.0
14/01/2019	08:27	7.6	NW	0.0	0.3	0.0	0.0
14/01/2019	08:42	8.0	N	0.3	1.0	0.0	0.0
14/01/2019	08:57	7.8	N	0.3	0.7	0.0	0.0
14/01/2019	09:12	7.7	N	0.3	0.7	0.0	0.0
14/01/2019	09:27	9.3	NW	0.0	0.0	0.0	0.0
14/01/2019	09:42	8.9	N	0.7	1.4	0.0	0.0
14/01/2019	09:57	8.7	N	0.0	0.7	0.0	0.0
14/01/2019	10:12	8.8	WNW	1.7	2.7	0.0	0.0
14/01/2019	10:27	9.0	NW	0.3	0.7	0.0	0.0
14/01/2019	10:42	9.2	N	1.0	2.0	0.0	0.0
14/01/2019	10:57	9.5	N	2.7	4.1	0.0	0.0
14/01/2019	11:12	9.5	NNW	1.7	2.7	0.0	0.0
14/01/2019	11:27	9.6	WNW	0.3	1.7	0.0	0.0
14/01/2019	11:42	9.7	NW	1.7	2.7	0.0	0.0
14/01/2019	11:57	9.9	NW	1.4	3.1	0.0	0.0
14/01/2019	12:12	10.1	N	1.4	2.4	0.0	0.0
14/01/2019	12:27	10.1	N	1.4	2.7	0.0	0.0
14/01/2019	12:42	10.0	N	1.4	2.0	0.0	0.0
14/01/2019	12:57	9.8	NW	1.0	2.7	0.0	0.0
14/01/2019	13:12	9.6	N	2.4	4.8	0.0	0.0

Date	Start time	Temp. (°C)	Wind Direction (ms^{-1})	Wind Speed (Ave.) (ms^{-1})	Wind Speed (gust) (ms^{-1})	Precipitation (mm)	Precipitation (Accumm.) (mm)
14/01/2019	13:27	9.6	NW	0.7	2.7	0.0	0.0
14/01/2019	13:42	9.5	ENE	0.3	0.7	0.0	0.0
14/01/2019	13:57	9.2	N	0.7	1.4	0.0	0.0
14/01/2019	14:12	9.0	NE	2.0	3.4	0.0	0.0
14/01/2019	14:27	8.8	N	1.0	2.4	0.0	0.0
14/01/2019	14:42	8.8	N	0.0	0.7	0.0	0.0
14/01/2019	14:57	8.9	NW	0.3	1.0	0.0	0.0
14/01/2019	15:12	8.9	NNW	0.3	1.0	0.0	0.0
14/01/2019	15:27	9.0	NE	1.0	1.4	0.0	0.0
14/01/2019	15:42	8.9	N	0.7	2.4	0.0	0.0
14/01/2019	15:57	8.9	N	0.0	1.0	0.0	0.0
14/01/2019	16:12	8.8	N	0.3	0.7	0.0	0.0
14/01/2019	16:27	8.8	NE	1.0	1.7	0.0	0.0
14/01/2019	16:42	8.6	NW	0.7	1.4	0.0	0.0
14/01/2019	16:57	8.4	N	0.0	0.7	0.0	0.0
14/01/2019	17:12	8.4	N	0.3	1.0	0.0	0.0
14/01/2019	17:27	8.5	SW	0.3	0.7	0.0	0.0
14/01/2019	17:42	8.2	NNW	0.3	1.4	0.0	0.0
14/01/2019	17:57	8.1	NW	0.3	1.0	0.0	0.0
14/01/2019	18:12	8.1	N	0.7	1.0	0.0	0.0
14/01/2019	18:27	8.0	E	0.0	0.0	0.0	0.0
14/01/2019	18:42	7.4	NW	0.0	0.3	0.0	0.0
14/01/2019	18:57	7.2	N	0.0	0.3	0.0	0.0
14/01/2019	19:12	6.8	N	0.0	0.3	0.0	0.0
14/01/2019	19:27	6.8	NW	0.0	0.7	0.0	0.0
14/01/2019	19:42	6.8	N	0.0	0.3	0.0	0.0
14/01/2019	19:57	5.7	NW	0.7	1.4	0.0	0.0
14/01/2019	20:12	6.6	NNW	0.7	1.4	0.0	0.0
14/01/2019	20:27	6.5	N	0.3	1.0	0.0	0.0
14/01/2019	20:42	6.3	N	0.7	1.4	0.0	0.0
14/01/2019	20:57	6.3	N	0.3	1.0	0.0	0.0
14/01/2019	21:12	6.9	NNW	1.0	1.7	0.0	0.0
14/01/2019	21:27	7.2	NE	0.7	1.4	0.0	0.0
14/01/2019	21:42	7.2	N	0.0	0.3	0.0	0.0
14/01/2019	21:57	7.3	NW	0.0	0.3	0.0	0.0
14/01/2019	22:12	7.6	N	0.7	1.4	0.0	0.0
14/01/2019	22:27	7.6	NE	0.0	0.3	0.0	0.0
14/01/2019	22:42	7.9	NE	0.7	1.4	0.0	0.0
14/01/2019	22:57	8.0	NW	0.7	1.7	0.0	0.0
14/01/2019	23:12	8.1	NW	0.0	0.7	0.0	0.0
14/01/2019	23:27	8.0	NW	0.3	1.4	0.0	0.0
14/01/2019	23:42	8.0	N	0.7	1.4	0.0	0.0
14/01/2019	23:57	8.0	N	0.7	1.4	0.0	0.0
15/01/2019	00:12	7.8	NW	0.0	0.3	0.0	0.0

Date	Start time	Temp. (°C)	Wind Direction (ms^{-1})	Wind Speed (Ave.) (ms^{-1})	Wind Speed (gust) (ms^{-1})	Precipitation (mm)	Precipitation (Accumm.) (mm)
15/01/2019	00:27	7.7	N	0.7	1.4	0.0	0.0
15/01/2019	00:42	7.7	NW	0.3	0.7	0.0	0.0
15/01/2019	00:57	7.9	NE	0.0	0.3	0.0	0.0
15/01/2019	01:12	8.0	E	0.3	0.7	0.0	0.0
15/01/2019	01:27	8.1	N	0.3	0.7	0.0	0.0
15/01/2019	01:42	8.2	N	0.0	0.7	0.0	0.0
15/01/2019	01:57	8.2	N	0.0	0.7	0.0	0.0
15/01/2019	02:12	8.4	N	0.7	1.7	0.0	0.0
15/01/2019	02:27	8.6	N	0.0	0.7	0.0	0.0
15/01/2019	02:42	8.6	NE	0.0	0.3	0.0	0.0
15/01/2019	02:57	8.7	N	0.3	1.0	0.0	0.0
15/01/2019	03:12	8.7	N	0.0	0.3	0.0	0.0
15/01/2019	03:27	8.7	N	0.3	1.0	0.0	0.0
15/01/2019	03:42	8.6	N	0.3	1.0	0.0	0.0
15/01/2019	03:57	8.7	N	0.3	1.0	0.0	0.0
15/01/2019	04:12	8.5	NW	0.0	0.3	0.0	0.0
15/01/2019	04:27	8.4	NW	0.0	0.0	0.0	0.0
15/01/2019	04:42	8.4	NE	0.0	0.3	0.0	0.0
15/01/2019	04:57	8.4	NE	0.3	0.7	0.0	0.0
15/01/2019	05:12	8.7	NNW	0.3	0.7	0.0	0.0
15/01/2019	05:27	8.7	N	0.0	0.7	0.0	0.0
15/01/2019	05:42	8.7	N	0.3	1.0	0.0	0.0
15/01/2019	05:57	8.6	N	0.7	1.7	0.0	0.0
15/01/2019	06:12	8.4	SE	0.0	0.3	0.0	0.0
15/01/2019	06:27	8.4	N	0.0	0.3	0.0	0.0
15/01/2019	06:42	8.5	S	0.0	0.3	0.0	0.0
15/01/2019	06:57	8.7	S	0.0	0.3	0.0	0.0

Weather conditions as detailed in Table A3.1 to Table A3.3 were suitable for noise monitoring, with dry and calm weather conditions being recorded during the entire monitoring exercise. Therefore, all the noise measurements have been considered within this report, with no data being discounted as result of unsettled weather conditions.

APPENDIX 4: NOISE MONITORING DATA

Table A4.1 Noise Monitoring Data. Noise measurements at UL1

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
04/10/2018	14:10:05	54	71	51	56
04/10/2018	14:25:05	54	67	51	56
04/10/2018	14:40:05	53	65	51	55
04/10/2018	14:55:05	54	69	51	56
04/10/2018	15:10:05	53	68	49	55
04/10/2018	15:25:05	52	68	48	54
04/10/2018	15:40:05	54	81	48	54
04/10/2018	15:55:05	53	66	49	55
04/10/2018	16:10:05	54	69	52	56
04/10/2018	16:25:05	54	79	51	56
04/10/2018	16:40:05	55	76	52	57
04/10/2018	16:55:05	56	71	53	57
04/10/2018	17:10:05	58	83	53	57
04/10/2018	17:25:05	55	69	53	57
04/10/2018	17:40:05	54	68	51	56
04/10/2018	17:55:05	57	82	50	55
04/10/2018	18:10:05	54	63	50	56
04/10/2018	18:25:05	58	86	50	55
04/10/2018	18:40:05	53	70	49	55
04/10/2018	18:55:05	51	70	47	53
04/10/2018	19:10:05	51	72	45	52
04/10/2018	19:25:05	49	64	45	50
04/10/2018	19:40:05	48	64	45	50
04/10/2018	19:55:05	50	60	47	51
04/10/2018	20:10:05	52	59	50	54
04/10/2018	20:25:05	52	61	50	53
04/10/2018	20:40:05	51	58	50	53
04/10/2018	20:55:05	52	64	50	54
04/10/2018	21:10:05	53	73	51	54
04/10/2018	21:25:05	52	58	50	54
04/10/2018	21:40:05	52	64	50	53
04/10/2018	21:55:05	52	70	50	53
04/10/2018	22:10:05	53	60	51	54
04/10/2018	22:25:05	54	59	51	55
04/10/2018	22:40:05	54	60	52	56
04/10/2018	22:55:05	55	62	53	57
04/10/2018	23:10:05	56	61	54	57
04/10/2018	23:25:05	52	58	50	53
04/10/2018	23:40:05	54	59	52	56

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
04/10/2018	23:55:05	54	65	51	56
05/10/2018	00:10:05	51	56	50	53
05/10/2018	00:25:05	52	56	50	53
05/10/2018	00:40:05	54	64	52	55
05/10/2018	00:55:05	53	58	51	54
05/10/2018	01:10:05	52	61	50	54
05/10/2018	01:25:05	51	56	50	53
05/10/2018	01:40:05	51	56	49	53
05/10/2018	01:55:05	53	58	51	54
05/10/2018	02:10:05	52	57	50	54
05/10/2018	02:25:05	52	59	50	54
05/10/2018	02:40:05	51	58	50	53
05/10/2018	02:55:05	51	56	49	53
05/10/2018	03:10:05	52	59	50	53
05/10/2018	03:25:05	51	56	50	53
05/10/2018	03:40:05	51	59	50	52
05/10/2018	03:55:05	52	60	50	53
05/10/2018	04:10:05	53	60	51	54
05/10/2018	04:25:05	53	71	50	54
05/10/2018	04:40:05	52	72	50	54
05/10/2018	04:55:05	52	59	51	54
05/10/2018	05:10:05	53	64	52	55
05/10/2018	05:25:05	54	63	52	55
05/10/2018	05:40:05	53	66	51	55
05/10/2018	05:55:05	53	66	50	54
05/10/2018	06:10:05	52	65	50	54
05/10/2018	06:25:05	53	68	50	55
05/10/2018	06:40:05	54	65	52	56
05/10/2018	06:55:05	55	82	51	55
05/10/2018	07:10:05	54	70	52	55
05/10/2018	07:25:05	55	83	51	55
05/10/2018	07:40:05	54	64	52	56
05/10/2018	07:55:05	54	73	51	55
05/10/2018	08:10:05	54	73	50	55
05/10/2018	08:25:05	57	85	49	56
05/10/2018	08:40:05	52	72	49	54
05/10/2018	08:55:05	54	75	49	54
05/10/2018	09:10:05	53	73	49	55
05/10/2018	09:25:05	52	66	49	54
05/10/2018	09:40:05	55	79	49	56
05/10/2018	09:55:05	55	73	50	54
05/10/2018	10:10:05	53	65	50	55
05/10/2018	10:25:05	55	73	51	57

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
05/10/2018	10:40:05	54	71	51	55
05/10/2018	10:55:05	53	65	51	54
05/10/2018	11:10:05	56	85	52	57
05/10/2018	11:25:05	54	71	51	55
05/10/2018	11:40:05	54	61	52	56
05/10/2018	11:55:05	56	61	53	58
05/10/2018	12:10:05	55	74	52	57
05/10/2018	12:25:05	55	72	53	56
05/10/2018	12:40:05	59	90	52	56
05/10/2018	12:55:05	55	73	52	57
05/10/2018	13:10:05	55	69	52	56
05/10/2018	13:25:05	55	78	52	56
05/10/2018	13:40:05	54	72	51	55
05/10/2018	13:55:05	53	62	51	55
05/10/2018	14:10:05	53	61	50	55
05/10/2018	14:25:05	53	60	50	55

Table A4.2 UL1 background noise data analysis – Daytime

Time	Monitoring Position UL1 - Daytime Data (dB $L_{A90,15min}$)		
	04/10/2018	05/10/2018	Arithmetic Average for 15min time period - 'Column 1'
06:55	-	51	51
07:10	-	52	52
07:25	-	51	51
07:40	-	52	52
07:55	-	51	51
08:10	-	50	50
08:25	-	49	49
08:40	-	49	49
08:55	-	49	49
09:10	-	49	49
09:25	-	49	49
09:40	-	49	49
09:55	-	50	50
10:10	-	50	50
10:25	-	51	51
10:40	-	51	51
10:55	-	51	51
11:10	-	52	52
11:25	-	51	51
11:40	-	52	52
11:55	-	53	53
12:10	-	52	52
12:25	-	53	53
12:40	-	52	52
12:55	-	52	52
13:10	-	52	52
13:25	-	52	52
13:40	-	51	51
13:55	-	51	51
14:10	51	50	50
14:25	51	50	51
14:40	51	-	51
14:55	51	-	51
15:10	49	-	49
15:25	48	-	48
15:40	48	-	48
15:55	49	-	49
16:10	52	-	52
16:25	51	-	51
16:40	52	-	52
16:55	53	-	53
17:10	53	-	53
17:25	53	-	53
17:40	51	-	51
17:55	50	-	50
18:10	50	-	50
18:25	50	-	50
18:40	49	-	49
18:55	47	-	47
19:10	45	-	45
19:25	45	-	45
19:40	45	-	45
19:55	47	-	47
20:10	50	-	50
20:25	50	-	50
20:40	50	-	50
20:55	50	-	50
21:10	51	-	51
21:25	50	-	50
21:40	50	-	50
21:55	50	-	50
22:10	51	-	51
22:25	51	-	51
22:40	52	-	52

Average of Column 1:	50
Minimum value column 1:	45
Maximum value column 1:	53

Mean value of full dataset:	50
Min. value of full dataset:	45
Max. value of full dataset:	53
Modal value of full dataset:	49

On the basis of the statistical analysis, a representative background noise level during the sixteen-hour daytime period has been taken to be 45 dB $L_{A90,\ 16hr}$ (free-field).

Table A4.3 UL1 background noise data analysis – Night-time

Time	04/10/2018	05/10/2018	Arithmetic Average for 15min time period - 'Column 1'
	Monitoring Position UL1 - Night-time Data (dB $L_{A90,15min}$)		
22:55	53	-	53
23:10	54	-	54
23:25	50	-	50
23:40	52	-	52
23:55	51	-	51
00:10	-	50	50
00:25	-	50	50
00:40	-	52	52
00:55	-	51	51
01:10	-	50	50
01:25	-	50	50
01:40	-	49	49
01:55	-	51	51
02:10	-	50	50
02:25	-	50	50
02:40	-	50	50
02:55	-	49	49
03:10	-	50	50
03:25	-	50	50
03:40	-	50	50
03:55	-	50	50
04:10	-	51	51
04:25	-	50	50
04:40	-	50	50
04:55	-	51	51
05:10	-	52	52
05:25	-	52	52
05:40	-	51	51
05:55	-	50	50
06:10	-	50	50
06:25	-	50	50
06:40	-	52	52

Average of Column 1:	51
Minimum value column 1:	49
Maximum value column 1:	54

Mean value of full dataset:	51
Min. value of full dataset:	49
Max. value of full dataset:	54
Modal value of full dataset:	50

On the basis of the statistical analysis, a representative background noise level during the eight-hour night-time period has been taken to be 49 dB $L_{A90,8hr}$ (free-field).

Table A4.4 Noise Monitoring Data. Noise measurements at UL2

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
04/10/2018	13:33:03	49	65	46	51
04/10/2018	13:48:03	50	73	44	50
04/10/2018	14:03:03	53	75	45	51
04/10/2018	14:18:03	48	64	44	50
04/10/2018	14:33:03	47	57	44	50
04/10/2018	14:48:03	49	59	45	51
04/10/2018	15:03:03	49	64	45	51
04/10/2018	15:18:03	54	75	45	52
04/10/2018	15:33:03	48	59	44	51
04/10/2018	15:48:03	47	63	44	49
04/10/2018	16:03:03	46	58	43	49
04/10/2018	16:18:03	48	62	44	50
04/10/2018	16:33:03	47	65	45	48
04/10/2018	16:48:03	46	63	44	47
04/10/2018	17:03:03	45	56	44	47
04/10/2018	17:18:03	43	55	41	45
04/10/2018	17:33:03	42	55	39	44
04/10/2018	17:48:03	43	53	40	46
04/10/2018	18:03:03	45	70	40	47
04/10/2018	18:18:03	46	61	42	48
04/10/2018	18:33:03	46	59	41	50
04/10/2018	18:48:03	45	62	41	48
04/10/2018	19:03:03	47	64	42	49
04/10/2018	19:18:03	50	64	47	52
04/10/2018	19:33:03	48	64	46	49
04/10/2018	19:48:03	49	59	47	50
04/10/2018	20:03:03	50	54	49	52

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
04/10/2018	20:18:03	51	57	48	52
04/10/2018	20:33:03	49	58	47	50
04/10/2018	20:48:03	49	55	48	51
04/10/2018	21:03:03	49	54	48	51
04/10/2018	21:18:03	49	55	48	51
04/10/2018	21:33:03	49	55	47	51
04/10/2018	21:48:03	48	56	45	50
04/10/2018	22:03:03	46	52	44	47
04/10/2018	22:18:03	48	57	46	50
04/10/2018	22:33:03	47	54	44	49
04/10/2018	22:48:03	47	55	44	49
04/10/2018	23:03:03	47	53	45	49
04/10/2018	23:18:03	47	53	45	49
04/10/2018	23:33:03	47	53	45	49
04/10/2018	23:48:03	48	65	46	50
05/10/2018	00:03:03	48	55	46	49
05/10/2018	00:18:03	50	65	48	51
05/10/2018	00:33:03	50	57	49	52
05/10/2018	00:48:03	51	60	49	52
05/10/2018	01:03:03	50	56	49	52
05/10/2018	01:18:03	50	56	49	52
05/10/2018	01:33:03	50	57	48	51
05/10/2018	01:48:03	49	56	48	51
05/10/2018	02:03:03	50	56	48	52
05/10/2018	02:18:03	50	57	48	52
05/10/2018	02:33:03	50	56	48	52
05/10/2018	02:48:03	51	57	49	52

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
05/10/2018	03:03:03	51	58	49	53
05/10/2018	03:18:03	51	59	49	53
05/10/2018	03:33:03	51	57	49	52
05/10/2018	03:48:03	52	59	50	53
05/10/2018	04:03:03	51	60	49	53
05/10/2018	04:18:03	50	58	48	52
05/10/2018	04:33:03	49	59	46	51
05/10/2018	04:48:03	49	55	48	51
05/10/2018	05:03:03	49	55	48	51
05/10/2018	05:18:03	48	57	45	50
05/10/2018	05:33:03	46	53	44	47
05/10/2018	05:48:03	45	53	43	46
05/10/2018	06:03:03	45	52	43	46
05/10/2018	06:18:03	45	54	44	46
05/10/2018	06:33:03	46	63	44	46
05/10/2018	06:48:03	47	58	45	48
05/10/2018	07:03:03	47	59	45	48
05/10/2018	07:18:03	47	56	45	49
05/10/2018	07:33:03	48	61	46	49
05/10/2018	07:48:03	48	57	46	49
05/10/2018	08:03:03	47	59	46	49
05/10/2018	08:18:03	48	61	47	49
05/10/2018	08:33:03	48	55	46	49
05/10/2018	08:48:03	47	57	46	48
05/10/2018	09:03:03	46	65	45	48
05/10/2018	09:18:03	47	54	45	48
05/10/2018	09:33:03	48	55	46	49

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
05/10/2018	09:48:03	51	75	46	49
05/10/2018	10:03:03	48	71	46	48
05/10/2018	10:18:03	47	54	46	49
05/10/2018	10:33:03	52	76	47	50
05/10/2018	10:48:03	51	76	46	49
05/10/2018	11:03:03	48	65	46	50
05/10/2018	11:18:03	47	57	46	49
05/10/2018	11:33:03	47	58	45	49
05/10/2018	11:48:03	47	62	46	49
05/10/2018	12:03:03	47	53	45	48
05/10/2018	12:18:03	47	56	45	48
05/10/2018	12:33:03	47	60	45	48
05/10/2018	12:48:03	47	63	45	48
05/10/2018	13:03:03	47	62	45	49
05/10/2018	13:18:03	47	58	45	49
05/10/2018	13:33:03	46	55	38	49
05/10/2018	13:48:03	40	47	38	41
05/10/2018	14:03:03	41	54	36	43
05/10/2018	14:18:03	38	61	35	39

Table A4.5 UL2 background noise data analysis – Daytime

Time	Monitoring Position UL2 - Daytime Data (dB $L_{A90,15min}$)		
	04/10/2018	05/10/2018	Arithmetic Average for 15min time period - 'Column 1'
07:03	-	45	45
07:18	-	45	45
07:33	-	46	46
07:48	-	46	46
08:03	-	46	46
08:18	-	47	47
08:33	-	46	46
08:48	-	46	46
09:03	-	45	45
09:18	-	45	45
09:33	-	46	46
09:48	-	46	46
10:03	-	46	46
10:18	-	46	46
10:33	-	47	47
10:48	-	46	46
11:03	-	46	46
11:18	-	46	46
11:33	-	45	45
11:48	-	46	46
12:03	-	45	45
12:18	-	45	45
12:33	-	45	45
12:48	-	45	45
13:03	-	45	45
13:18	-	45	45
13:33	46	38	42
13:48	44	38	41
14:03	45	36	40
14:18	44	35	40
14:33	44	-	44
14:48	45	-	45
15:03	45	-	45
15:18	45	-	45
15:33	44	-	44
15:48	44	-	44
16:03	43	-	43

16:18	44	-	44
16:33	45	-	45
16:48	44	-	44
17:03	44	-	44
17:18	41	-	41
17:33	39	-	39
17:48	40	-	40
18:03	40	-	40
18:18	42	-	42
18:33	41	-	41
18:48	41	-	41
19:03	42	-	42
19:18	47	-	47
19:33	46	-	46
19:48	47	-	47
20:03	49	-	49
20:18	48	-	48
20:33	47	-	47
20:48	48	-	48
21:03	48	-	48
21:18	48	-	48
21:33	47	-	47
21:48	45	-	45
22:03	44	-	44
22:18	46	-	46
22:33	44	-	44
22:48	44	-	44

Average of Column 1:	45
Minimum value column 1:	39
Maximum value column 1:	49

Mean value of full dataset:	44

Min. value of full dataset:	35
Max. value of full dataset:	49
Modal value of full dataset:	45

On the basis of the statistical analysis, a representative background noise level during the sixteen-hour daytime period has been taken to be 39 dB $L_{A90,\ 16hr}$ (free-field).

Table A4.6 UL2 background noise data analysis – Night-time

Time	Monitoring Position UL2 - Night-time Data (dB $L_{A90,15min}$)		
	04/10/2018	05/10/2018	Arithmetic Average for 15min time period - 'Column 1'
23:03	45	-	45
23:18	45	-	45
23:33	45	-	45
23:48	46	-	46
00:03	-	46	46

00:18	-	48	48
00:33	-	49	49
00:48	-	49	49
01:03	-	49	49
01:18	-	49	49
01:33	-	48	48
01:48	-	48	48
02:03	-	48	48
02:18	-	48	48
02:33	-	48	48
02:48	-	49	49
03:03	-	49	49
03:18	-	49	49
03:33	-	49	49
03:48	-	50	50
04:03	-	49	49
04:18	-	48	48
04:33	-	46	46
04:48	-	48	48
05:03	-	48	48
05:18	-	45	45
05:33	-	44	44
05:48	-	43	43
06:03	-	43	43
06:18	-	44	44
06:33	-	44	44
06:48	-	45	45

Average of Column 1:	47
Minimum value column 1:	43
Maximum value column 1:	50

Mean value of full dataset:	47
Min. value of full dataset:	43

Max. value of full dataset:	50
Modal value of full dataset:	49

On the basis of the statistical analysis, a representative background noise level during the eight-hour night-time period has been taken to be 43 dB $L_{A90,8hr}$ (free-field).

Table A4.7 Noise Monitoring Data. Noise measurements at UL3

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
10/01/2019	10:54:04	49	66	46	50
10/01/2019	11:09:04	51	69	46	49
10/01/2019	11:24:04	53	73	47	51
10/01/2019	11:39:04	54	73	48	51
10/01/2019	11:54:04	52	67	48	52
10/01/2019	12:09:04	54	72	48	53
10/01/2019	12:24:04	50	66	48	50
10/01/2019	12:39:04	53	71	47	51
10/01/2019	12:54:04	49	66	47	49
10/01/2019	13:09:04	53	72	47	50
10/01/2019	13:24:04	54	76	48	53
10/01/2019	13:39:04	55	71	49	53
10/01/2019	13:54:04	51	72	49	51
10/01/2019	14:09:04	54	72	49	53
10/01/2019	14:24:04	52	67	50	53
10/01/2019	14:39:04	56	76	51	54
10/01/2019	14:54:04	52	67	50	53
10/01/2019	15:09:04	56	75	52	56
10/01/2019	15:24:04	56	74	53	56
10/01/2019	15:39:04	58	75	55	58
10/01/2019	15:54:04	55	73	54	56
10/01/2019	16:09:04	57	72	55	58
10/01/2019	16:24:04	56	72	54	57
10/01/2019	16:39:04	57	74	54	57
10/01/2019	16:54:04	55	66	53	56
10/01/2019	17:09:04	56	74	53	56
10/01/2019	17:24:04	57	75	53	57
10/01/2019	17:39:04	58	72	55	58
10/01/2019	17:54:04	63	81	54	57
10/01/2019	18:09:04	57	70	55	57
10/01/2019	18:24:04	58	76	51	55
10/01/2019	18:39:04	53	72	50	52
10/01/2019	18:54:04	56	76	50	53
10/01/2019	19:09:04	53	71	49	52
10/01/2019	19:24:04	52	72	49	52
10/01/2019	19:39:04	52	73	49	52
10/01/2019	19:54:04	52	69	48	51
10/01/2019	20:09:04	57	78	48	53
10/01/2019	20:24:04	51	68	49	52
10/01/2019	20:39:04	54	75	48	51
10/01/2019	20:54:04	52	69	48	51
10/01/2019	21:09:04	52	73	48	51
10/01/2019	21:24:04	55	77	48	52
10/01/2019	21:39:04	51	74	49	52
10/01/2019	21:54:04	52	69	48	52
10/01/2019	22:09:04	52	72	49	52
10/01/2019	22:24:04	51	71	49	52
10/01/2019	22:39:04	50	67	48	51
10/01/2019	22:54:04	55	78	49	51
10/01/2019	23:09:04	50	68	49	51
10/01/2019	23:24:04	55	69	50	55
10/01/2019	23:39:04	53	69	52	54

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
10/01/2019	23:54:04	54	71	52	53
11/01/2019	00:09:04	54	70	51	54
11/01/2019	00:24:04	53	70	51	53
11/01/2019	00:39:04	52	66	51	53
11/01/2019	00:54:04	60	78	50	52
11/01/2019	01:09:04	50	67	49	51
11/01/2019	01:24:04	51	66	49	51
11/01/2019	01:39:04	52	66	51	52
11/01/2019	01:54:04	53	69	51	53
11/01/2019	02:09:04	52	67	51	53
11/01/2019	02:24:04	52	67	51	52
11/01/2019	02:39:04	53	67	52	54
11/01/2019	02:54:04	53	67	52	53
11/01/2019	03:09:04	52	65	50	53
11/01/2019	03:24:04	52	69	49	53
11/01/2019	03:39:04	53	67	52	54
11/01/2019	03:54:04	50	66	48	51
11/01/2019	04:09:04	52	68	47	50
11/01/2019	04:24:04	49	65	47	50
11/01/2019	04:39:04	51	64	49	52
11/01/2019	04:54:04	51	68	49	51
11/01/2019	05:09:04	54	73	49	52
11/01/2019	05:24:04	51	66	50	52
11/01/2019	05:39:04	55	75	50	52
11/01/2019	05:54:04	53	71	51	53
11/01/2019	06:09:04	55	72	50	54
11/01/2019	06:24:04	56	74	53	55

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
11/01/2019	06:39:04	57	77	52	55
11/01/2019	06:54:04	54	72	52	55
11/01/2019	07:09:04	57	75	54	56
11/01/2019	07:24:04	56	76	54	57
11/01/2019	07:39:04	57	73	54	57
11/01/2019	07:54:04	56	75	54	57
11/01/2019	08:09:04	60	80	53	57
11/01/2019	08:24:04	57	72	54	58
11/01/2019	08:39:04	56	74	54	57
11/01/2019	08:54:04	58	75	53	57
11/01/2019	09:09:04	63	81	54	59
11/01/2019	09:24:04	59	72	55	61
11/01/2019	09:39:04	59	74	56	60
11/01/2019	09:54:04	59	73	54	61
11/01/2019	10:09:04	61	81	55	62
11/01/2019	10:24:04	60	69	58	62
11/01/2019	10:39:04	61	72	58	63
11/01/2019	10:54:04	61	68	58	63
11/01/2019	11:09:04	62	73	59	64
11/01/2019	11:24:04	61	72	58	64
11/01/2019	11:39:04	61	75	56	63
11/01/2019	11:54:04	61	71	58	63
11/01/2019	12:09:04	62	73	58	64
11/01/2019	12:24:04	59	67	56	61
11/01/2019	12:39:04	59	73	55	61
11/01/2019	12:54:04	61	72	59	63
11/01/2019	13:09:04	62	74	57	64

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
11/01/2019	13:24:04	58	77	55	58
11/01/2019	13:39:04	57	72	53	58
11/01/2019	13:54:04	54	66	53	55
11/01/2019	14:09:04	56	75	53	56
11/01/2019	14:24:04	55	70	54	57
11/01/2019	14:39:04	57	75	53	56
11/01/2019	14:54:04	56	67	54	57
11/01/2019	15:09:04	59	75	55	58
11/01/2019	15:24:04	57	73	55	58
11/01/2019	15:39:04	57	70	55	57
11/01/2019	15:54:04	59	77	54	57
11/01/2019	16:09:04	59	77	53	56
11/01/2019	16:24:04	56	73	53	56
11/01/2019	16:39:04	56	74	53	56
11/01/2019	16:54:04	54	70	53	55
11/01/2019	17:09:04	57	74	52	55
11/01/2019	17:24:04	54	70	52	54
11/01/2019	17:39:04	56	77	51	53
11/01/2019	17:54:04	52	68	51	53
11/01/2019	18:09:04	55	72	52	54
11/01/2019	18:24:04	52	67	51	53
11/01/2019	18:39:04	57	79	51	52
11/01/2019	18:54:04	52	68	50	52
11/01/2019	19:09:04	53	69	51	52
11/01/2019	19:24:04	54	77	51	53
11/01/2019	19:39:04	55	76	50	53
11/01/2019	19:54:04	55	73	50	53

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
11/01/2019	20:09:04	58	81	51	53
11/01/2019	20:24:04	55	71	52	54
11/01/2019	20:39:04	55	70	51	53
11/01/2019	20:54:04	54	70	51	53
11/01/2019	21:09:04	54	76	51	53
11/01/2019	21:24:04	54	70	51	53
11/01/2019	21:39:04	55	72	52	54
11/01/2019	21:54:04	53	68	52	54
11/01/2019	22:09:04	55	74	52	55
11/01/2019	22:24:04	61	79	52	55
11/01/2019	22:39:04	56	72	53	57
11/01/2019	22:54:04	57	78	53	56
11/01/2019	23:09:04	54	71	53	55
11/01/2019	23:24:04	57	71	53	57
11/01/2019	23:39:04	56	72	54	57
11/01/2019	23:54:04	60	77	53	57
12/01/2019	00:09:04	54	69	51	54
12/01/2019	00:24:04	56	73	53	57
12/01/2019	00:39:04	56	66	54	57
12/01/2019	00:54:04	55	70	53	56
12/01/2019	01:09:04	55	70	53	56
12/01/2019	01:24:04	55	63	54	56
12/01/2019	01:39:04	56	71	54	56
12/01/2019	01:54:04	55	64	53	56
12/01/2019	02:09:04	55	69	54	56
12/01/2019	02:24:04	56	69	54	57
12/01/2019	02:39:04	56	66	55	57

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
12/01/2019	02:54:04	55	67	54	56
12/01/2019	03:09:04	56	70	54	56
12/01/2019	03:24:04	56	67	55	57
12/01/2019	03:39:04	55	69	54	56
12/01/2019	03:54:04	55	69	54	56
12/01/2019	04:09:04	56	70	53	56
12/01/2019	04:24:04	55	67	54	57
12/01/2019	04:39:04	56	66	54	57
12/01/2019	04:54:04	55	66	54	57
12/01/2019	05:09:04	57	73	54	57
12/01/2019	05:24:04	56	64	55	57
12/01/2019	05:39:04	58	75	55	58
12/01/2019	05:54:04	57	74	56	58
12/01/2019	06:09:04	58	73	56	58
12/01/2019	06:24:04	58	70	55	59
12/01/2019	06:39:04	58	73	55	58
12/01/2019	06:54:04	56	74	55	57
12/01/2019	07:09:04	58	73	55	58
12/01/2019	07:24:04	58	74	55	59
12/01/2019	07:39:04	59	76	56	59
12/01/2019	07:54:04	59	74	56	61
12/01/2019	08:09:04	60	75	56	60
12/01/2019	08:24:04	58	71	56	59
12/01/2019	08:39:04	59	75	56	59
12/01/2019	08:54:04	57	70	56	58
12/01/2019	09:09:04	58	72	56	58
12/01/2019	09:24:04	58	72	56	59

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
12/01/2019	09:39:04	59	75	56	59
12/01/2019	09:54:04	60	80	56	59
12/01/2019	10:09:04	59	76	56	59
12/01/2019	10:24:04	58	78	56	58
12/01/2019	10:39:04	57	67	56	58
12/01/2019	10:54:04	59	77	55	58
12/01/2019	11:09:04	58	76	55	58
12/01/2019	11:24:04	58	77	56	58
12/01/2019	11:39:04	59	75	56	59
12/01/2019	11:54:04	58	69	56	59
12/01/2019	12:09:04	59	75	56	59
12/01/2019	12:24:04	57	73	55	58
12/01/2019	12:39:04	58	75	55	58
12/01/2019	12:54:04	57	68	55	58
12/01/2019	13:09:04	59	77	55	58
12/01/2019	13:24:04	57	76	55	58
12/01/2019	13:39:04	59	76	55	58
12/01/2019	13:54:04	56	65	55	57
12/01/2019	14:09:04	57	73	55	57
12/01/2019	14:24:04	58	77	54	57
12/01/2019	14:39:04	59	79	55	57
12/01/2019	14:54:04	57	67	55	58
12/01/2019	15:09:04	59	80	55	58
12/01/2019	15:24:04	61	78	55	61
12/01/2019	15:39:04	59	76	55	59
12/01/2019	15:54:04	57	71	55	58
12/01/2019	16:09:04	57	70	55	58

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
12/01/2019	16:24:04	58	73	55	59
12/01/2019	16:39:04	58	71	55	58
12/01/2019	16:54:04	60	79	55	57
12/01/2019	17:09:04	60	78	54	59
12/01/2019	17:24:04	58	77	55	58
12/01/2019	17:39:04	57	71	55	57
12/01/2019	17:54:04	56	73	54	57
12/01/2019	18:09:04	56	71	54	57
12/01/2019	18:24:04	57	71	55	57
12/01/2019	18:39:04	57	73	55	57
12/01/2019	18:54:04	55	68	54	56
12/01/2019	19:09:04	56	71	54	57
12/01/2019	19:24:04	58	73	55	58
12/01/2019	19:39:04	58	78	54	57
12/01/2019	19:54:04	57	78	54	56
12/01/2019	20:09:04	58	75	53	56
12/01/2019	20:24:04	55	72	53	56
12/01/2019	20:39:04	54	76	52	55
12/01/2019	20:54:04	54	69	52	55
12/01/2019	21:09:04	56	73	53	55
12/01/2019	21:24:04	54	71	52	54
12/01/2019	21:39:04	53	67	51	54
12/01/2019	21:54:04	54	70	52	55
12/01/2019	22:09:04	58	80	53	56
12/01/2019	22:24:04	55	67	54	56
12/01/2019	22:39:04	57	76	54	57
12/01/2019	22:54:04	57	72	55	58

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
12/01/2019	23:09:04	58	77	55	57
12/01/2019	23:24:04	56	69	55	57
12/01/2019	23:39:04	57	75	55	58
12/01/2019	23:54:04	55	69	54	56
13/01/2019	00:09:04	56	71	54	57
13/01/2019	00:24:04	55	69	54	57
13/01/2019	00:39:04	55	72	54	56
13/01/2019	00:54:04	55	69	54	57
13/01/2019	01:09:04	55	67	54	56
13/01/2019	01:24:04	55	70	53	56
13/01/2019	01:39:04	55	67	54	57
13/01/2019	01:54:04	55	68	54	56
13/01/2019	02:09:04	54	65	53	55
13/01/2019	02:24:04	54	65	52	55
13/01/2019	02:39:04	55	75	53	56
13/01/2019	02:54:04	55	68	53	56
13/01/2019	03:09:04	55	70	53	55
13/01/2019	03:24:04	54	68	53	55
13/01/2019	03:39:04	55	70	53	56
13/01/2019	03:54:04	54	70	53	55
13/01/2019	04:09:04	55	68	53	56
13/01/2019	04:24:04	55	69	54	56
13/01/2019	04:39:04	55	64	53	56
13/01/2019	04:54:04	54	69	53	55
13/01/2019	05:09:04	54	69	53	55
13/01/2019	05:24:04	54	69	52	55
13/01/2019	05:39:04	54	66	53	56

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
13/01/2019	05:54:04	54	68	52	55
13/01/2019	06:09:04	54	67	53	55
13/01/2019	06:24:04	55	67	53	57
13/01/2019	06:39:04	55	64	54	57
13/01/2019	06:54:04	55	69	53	56
13/01/2019	07:09:04	55	67	53	56
13/01/2019	07:24:04	54	65	53	56
13/01/2019	07:39:04	56	72	54	57
13/01/2019	07:54:04	55	67	53	57
13/01/2019	08:09:04	55	65	53	56
13/01/2019	08:24:04	55	70	53	56
13/01/2019	08:39:04	56	64	54	57
13/01/2019	08:54:04	57	68	55	58
13/01/2019	09:09:04	59	76	55	58
13/01/2019	09:24:04	57	75	55	58
13/01/2019	09:39:04	58	73	55	57
13/01/2019	09:54:04	56	69	55	57
13/01/2019	10:09:04	57	66	55	58
13/01/2019	10:24:04	57	70	56	59
13/01/2019	10:39:04	58	71	56	59
13/01/2019	10:54:04	57	64	56	59
13/01/2019	11:09:04	57	65	56	58
13/01/2019	11:24:04	58	71	56	59
13/01/2019	11:39:04	60	77	56	60
13/01/2019	11:54:04	58	71	56	60
13/01/2019	12:09:04	59	74	56	60
13/01/2019	12:24:04	58	66	56	59

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
13/01/2019	12:39:04	59	74	56	59
13/01/2019	12:54:04	58	72	56	59
13/01/2019	13:09:04	58	70	56	59
13/01/2019	13:24:04	57	72	56	59
13/01/2019	13:39:04	58	73	56	58
13/01/2019	13:54:04	58	74	56	58
13/01/2019	14:09:04	58	76	56	58
13/01/2019	14:24:04	60	81	55	59
13/01/2019	14:39:04	60	78	56	58
13/01/2019	14:54:04	57	67	55	58
13/01/2019	15:09:04	57	71	55	58
13/01/2019	15:24:04	58	78	55	57
13/01/2019	15:39:04	57	73	54	57
13/01/2019	15:54:04	56	72	54	57
13/01/2019	16:09:04	57	76	54	56
13/01/2019	16:24:04	56	68	54	57
13/01/2019	16:39:04	55	64	54	57
13/01/2019	16:54:04	55	71	53	56
13/01/2019	17:09:04	60	83	54	56
13/01/2019	17:24:04	56	69	54	56
13/01/2019	17:39:04	55	72	53	56
13/01/2019	17:54:04	56	68	54	57
13/01/2019	18:09:04	59	81	53	56
13/01/2019	18:24:04	55	70	53	55
13/01/2019	18:39:04	56	76	53	56
13/01/2019	18:54:04	55	67	53	55
13/01/2019	19:09:04	55	70	53	55

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
13/01/2019	19:24:04	56	70	53	56
13/01/2019	19:39:04	55	72	53	55
13/01/2019	19:54:04	55	65	54	56
13/01/2019	20:09:04	57	72	54	56
13/01/2019	20:24:04	55	72	53	55
13/01/2019	20:39:04	53	68	51	54
13/01/2019	20:54:04	56	78	51	54
13/01/2019	21:09:04	53	70	51	54
13/01/2019	21:24:04	54	70	51	53
13/01/2019	21:39:04	56	75	51	54
13/01/2019	21:54:04	53	68	52	54
13/01/2019	22:09:04	53	69	52	54
13/01/2019	22:24:04	58	79	52	54
13/01/2019	22:39:04	53	68	52	54
13/01/2019	22:54:04	56	77	52	54
13/01/2019	23:09:04	53	67	52	54
13/01/2019	23:24:04	55	70	52	55
13/01/2019	23:39:04	56	78	53	55
13/01/2019	23:54:04	54	65	52	55
14/01/2019	00:09:04	61	79	53	56
14/01/2019	00:24:04	55	71	53	55
14/01/2019	00:39:04	53	72	52	54
14/01/2019	00:54:04	54	64	53	55
14/01/2019	01:09:04	54	72	52	54
14/01/2019	01:24:04	54	68	52	54
14/01/2019	01:39:04	53	67	52	54
14/01/2019	01:54:04	53	67	52	54

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
14/01/2019	02:09:04	54	70	53	55
14/01/2019	02:24:04	53	69	52	54
14/01/2019	02:39:04	53	66	52	54
14/01/2019	02:54:04	53	66	52	54
14/01/2019	03:09:04	53	70	52	54
14/01/2019	03:24:04	53	69	52	54
14/01/2019	03:39:04	52	64	51	53
14/01/2019	03:54:04	52	69	50	53
14/01/2019	04:09:04	54	68	52	54
14/01/2019	04:24:04	54	74	52	54
14/01/2019	04:39:04	54	70	52	55
14/01/2019	04:54:04	54	71	53	55
14/01/2019	05:09:04	56	72	53	55
14/01/2019	05:24:04	55	70	54	56
14/01/2019	05:39:04	58	77	54	57
14/01/2019	05:54:04	58	73	54	57
14/01/2019	06:09:04	60	75	56	60
14/01/2019	06:24:04	56	71	55	57
14/01/2019	06:39:04	59	77	55	57
14/01/2019	06:54:04	57	76	55	56
14/01/2019	07:09:04	57	71	54	58
14/01/2019	07:24:04	56	71	54	56
14/01/2019	07:39:04	58	74	55	58
14/01/2019	07:54:04	58	74	55	58
14/01/2019	08:09:04	59	78	53	58
14/01/2019	08:24:04	57	70	55	58
14/01/2019	08:39:04	57	76	53	56

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
14/01/2019	08:54:04	55	66	53	56
14/01/2019	09:09:04	55	71	52	56
14/01/2019	09:24:04	55	67	53	56
14/01/2019	09:39:04	58	73	53	58
14/01/2019	09:54:04	54	67	52	56
14/01/2019	10:09:04	55	73	52	54
14/01/2019	10:24:04	56	78	52	54
14/01/2019	10:39:04	56	75	52	55
14/01/2019	10:54:04	54	67	53	55
14/01/2019	11:09:04	57	73	53	58
14/01/2019	11:24:04	56	76	53	57
14/01/2019	11:39:04	57	74	53	57
14/01/2019	11:54:04	55	68	53	56
14/01/2019	12:09:04	56	71	52	57
14/01/2019	12:24:04	55	70	53	56
14/01/2019	12:39:04	56	72	53	57
14/01/2019	12:54:04	55	68	53	56
14/01/2019	13:09:04	57	75	53	57
14/01/2019	13:24:04	56	74	54	57
14/01/2019	13:39:04	57	70	54	57
14/01/2019	13:54:04	55	71	53	57
14/01/2019	14:09:04	56	71	53	57
14/01/2019	14:24:04	55	74	52	56
14/01/2019	14:39:04	58	79	53	57
14/01/2019	14:54:04	55	68	53	56
14/01/2019	15:09:04	55	72	52	56
14/01/2019	15:24:04	56	73	53	57

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
14/01/2019	15:39:04	56	73	53	56
14/01/2019	15:54:04	54	68	53	55
14/01/2019	16:09:04	56	72	53	57
14/01/2019	16:24:04	55	74	52	56
14/01/2019	16:39:04	56	72	53	55
14/01/2019	16:54:04	63	93	53	56
14/01/2019	17:09:04	57	74	54	56
14/01/2019	17:24:04	55	67	53	56
14/01/2019	17:39:04	57	72	54	56
14/01/2019	17:54:04	56	74	53	56
14/01/2019	18:09:04	57	71	54	56
14/01/2019	18:24:04	54	68	53	55
14/01/2019	18:39:04	58	79	52	55
14/01/2019	18:54:04	53	69	50	54
14/01/2019	19:09:04	53	70	49	51
14/01/2019	19:24:04	53	72	50	53
14/01/2019	19:39:04	55	74	50	52
14/01/2019	19:54:04	53	73	49	52
14/01/2019	20:09:04	58	81	50	53
14/01/2019	20:24:04	54	75	52	54
14/01/2019	20:39:04	55	72	51	54
14/01/2019	20:54:04	55	74	52	54
14/01/2019	21:09:04	55	71	51	54
14/01/2019	21:24:04	55	78	50	53
14/01/2019	21:39:04	54	70	50	53
14/01/2019	21:54:04	50	66	48	51
14/01/2019	22:09:04	52	73	48	51

Date	Start time	Measured Noise Levels / dB			
		$L_{Aeq, T}$	L_{AFmax}	$L_{A90, T}$	$L_{A10, T}$
14/01/2019	22:24:04	50	68	49	51
14/01/2019	22:39:04	51	67	49	51
14/01/2019	22:54:04	55	79	50	52
14/01/2019	23:09:04	52	69	50	52
14/01/2019	23:24:04	51	67	49	51
14/01/2019	23:39:04	51	68	49	51
14/01/2019	23:54:04	52	67	50	52
15/01/2019	00:09:04	52	69	49	51
15/01/2019	00:24:04	50	67	48	51
15/01/2019	00:39:04	57	77	48	51
15/01/2019	00:54:04	54	69	51	55
15/01/2019	01:09:04	51	65	50	52
15/01/2019	01:24:04	53	71	52	54
15/01/2019	01:39:04	52	67	51	54
15/01/2019	01:54:04	55	70	53	55
15/01/2019	02:09:04	54	70	53	55
15/01/2019	02:24:04	54	70	52	55
15/01/2019	02:39:04	54	69	52	55
15/01/2019	02:54:04	55	65	53	55
15/01/2019	03:09:04	55	65	54	56
15/01/2019	03:24:04	55	69	54	56
15/01/2019	03:39:04	55	67	54	56
15/01/2019	03:54:04	54	68	52	56
15/01/2019	04:09:04	57	77	51	55
15/01/2019	04:24:04	54	66	53	55
15/01/2019	04:39:04	54	71	53	55
15/01/2019	04:54:04	55	71	54	56
15/01/2019	05:09:04	55	64	54	56
15/01/2019	05:24:04	56	71	55	57
15/01/2019	05:39:04	58	74	55	58
15/01/2019	05:54:04	57	73	55	57
15/01/2019	06:09:04	57	70	55	57
15/01/2019	06:24:04	57	77	55	57
15/01/2019	06:39:04	58	76	55	57

Table A4.8 UL3 background noise data analysis – Daytime (weekday)

Time	Monitoring Position UL3 - Daytime Data (dB $L_{A90,15min}$)			
	10/01/2019	11/01/2019	14/01/2019	Arithmetic Average for 15min time period - 'Column 1'
06:54	-	52	55	53
07:09	-	54	54	54
07:24	-	54	54	54
07:39	-	54	55	55
07:54	-	54	55	55
08:09	-	53	53	53
08:24	-	54	55	55
08:39	-	54	53	54
08:54	-	53	53	53
09:09	-	54	52	53
09:24	-	55	53	54
09:39	-	56	53	54
09:54	-	54	52	53
10:09	-	55	52	54
10:24	-	58	52	55

10:39	-	58	52	55
10:54	46	58	53	52
11:09	46	59	53	53
11:24	47	58	53	53
11:39	48	56	53	52
11:54	48	58	53	53
12:09	48	58	52	53
12:24	48	56	53	52
12:39	47	55	53	52
12:54	47	59	53	53
13:09	47	57	53	52
13:24	48	55	54	52
13:39	49	53	54	52
13:54	49	53	53	52
14:09	49	53	53	52
14:24	50	54	52	52
14:39	51	53	53	52
14:54	50	54	53	52
15:09	52	55	52	53
15:24	53	55	53	54
15:39	55	55	53	54
15:54	54	54	53	54
16:09	55	53	53	54
16:24	54	53	52	53
16:39	54	53	53	53
16:54	53	53	53	53
17:09	53	52	54	53
17:24	53	52	53	53
17:39	55	51	54	53
17:54	54	51	53	53
18:09	55	52	54	53
18:24	51	51	53	52
18:39	50	51	52	51
18:54	50	50	50	50
19:09	49	51	49	49
19:24	49	51	50	50
19:39	49	50	50	50
19:54	48	50	49	49
20:09	48	51	50	50
20:24	49	52	52	51
20:39	48	51	51	50
20:54	48	51	52	50
21:09	48	51	51	50
21:24	48	51	50	50
21:39	49	52	50	50
21:54	48	52	48	49
22:09	49	52	48	50
22:24	49	52	49	50
22:39	48	53	49	50

Average of Column 1:	52
Minimum value column 1:	49
Maximum value column 1:	55

Mean value of full dataset:	52
Min. value of full dataset:	46
Max. value of full dataset:	59
Modal value of full dataset:	53

On the basis of the statistical analysis, a representative background noise level during the sixteen-hour daytime period has been taken to be 49 dB $L_{A90,\ 16hr}$ (free-field).

Table A4.9 UL3 background noise data analysis – Night-time (weekday)

Time	Monitoring Position UL3 - Night-time Data (dB $L_{A90,15min}$)			
	10/01/2019	11/01/2019	14/01/2019	Arithmetic Average for 15min time period - 'Column 1'
22:54	49	53	50	51
23:09	49	53	49	50
23:24	50	53	49	51
23:39	52	54	50	52
23:54	52	53	49	51
00:09	51	51	48	50
00:24	51	53	48	51
00:39	51	54	51	52
00:54	50	53	50	51
01:09	49	53	52	51
01:24	49	54	51	51
01:39	51	54	53	52
01:54	51	53	53	52
02:09	51	54	52	52
02:24	51	54	52	53
02:39	52	55	53	53
02:54	52	54	54	53
03:09	50	54	54	53
03:24	49	55	54	53
03:39	52	54	52	52
03:54	48	54	51	51
04:09	47	53	53	51
04:24	47	54	53	51
04:39	49	54	54	52
04:54	49	54	54	52
05:09	49	54	55	52
05:24	50	55	55	53
05:39	50	55	55	53
05:54	51	56	55	54
06:09	50	56	55	54
06:24	53	55	55	54
06:39	52	55	55	54

Average of Column 1:	52
Minimum value column 1:	50
Maximum value column 1:	54

Mean value of full dataset:	52
Min. value of full dataset:	47
Max. value of full dataset:	56
Modal value of full dataset:	53

On the basis of the statistical analysis, a representative background noise level during the eight-hour night-time period has been taken to be 50 dB $L_{A90,8hr}$ (free-field).

Table A4.10 UL3 background noise data analysis – Daytime (weekend)

Time	Monitoring Position UL3 - Daytime Data (dB $L_{A90,15min}$)		
	12/01/2019	13/01/2019	Arithmetic Average for 15min time period - 'Column 1'
06:54	55	53	54
07:09	55	53	54
07:24	55	53	54
07:39	56	54	55
07:54	56	53	55
08:09	56	53	55
08:24	56	53	55
08:39	56	54	55
08:54	56	55	56
09:09	56	55	56
09:24	56	55	56
09:39	56	55	55
09:54	56	55	55
10:09	56	55	56
10:24	56	56	56
10:39	56	56	56
10:54	55	56	56
11:09	55	56	56
11:24	56	56	56
11:39	56	56	56
11:54	56	56	56
12:09	56	56	56
12:24	55	56	56
12:39	55	56	56
12:54	55	56	56
13:09	55	56	56
13:24	55	56	55
13:39	55	56	55
13:54	55	56	55
14:09	55	56	55
14:24	54	55	55
14:39	55	56	55
14:54	55	55	55
15:09	55	55	55
15:24	55	55	55
15:39	55	54	55
15:54	55	54	55
16:09	55	54	54
16:24	55	54	54
16:39	55	54	55
16:54	55	53	54
17:09	54	54	54
17:24	55	54	54
17:39	55	53	54
17:54	54	54	54
18:09	54	53	54
18:24	55	53	54
18:39	55	53	54
18:54	54	53	54
19:09	54	53	54
19:24	55	53	54
19:39	54	53	54
19:54	54	54	54
20:09	53	54	53
20:24	53	53	53
20:39	52	51	52
20:54	52	51	52
21:09	53	51	52
21:24	52	51	51

21:39	51	51	51
21:54	52	52	52
22:09	53	52	52
22:24	54	52	53
22:39	54	52	53

Average of Column 1:	54
Minimum value column 1:	51
Maximum value column 1:	56

Mean value of full dataset:	54
Min. value of full dataset:	51
Max. value of full dataset:	56
Modal value of full dataset:	55

On the basis of the statistical analysis, a representative background noise level during the sixteen-hour daytime period has been taken to be 51 dB $L_{A90,\ 16hr}$ (free-field).

Table A4.11 UL3 background noise data analysis – Night-time (weekend)

Time	Monitoring Position UL3 - Night-time Data (dB $L_{A90,15min}$)			
	10/01/2019	11/01/2019	14/01/2019	Arithmetic Average for 15min time period - 'Column 1'
22:54	55	52	54	55
23:09	55	52	53	55
23:24	55	52	53	55
23:39	55	53	54	55
23:54	54	52	53	54
00:09	54	53	54	54
00:24	54	53	53	54
00:39	54	52	53	54
00:54	54	53	53	54
01:09	54	52	53	54
01:24	53	52	52	53
01:39	54	52	53	54
01:54	54	52	53	54
02:09	53	53	53	53
02:24	52	52	52	52
02:39	53	52	52	53
02:54	53	52	52	53
03:09	53	52	52	53
03:24	53	52	52	53
03:39	53	51	52	53
03:54	53	50	52	53
04:09	53	52	52	53
04:24	54	52	53	54
04:39	53	52	53	53
04:54	53	53	53	53
05:09	53	53	53	53
05:24	52	54	53	52
05:39	53	54	54	53
05:54	52	54	53	52

06:09	53	56	54	53
06:24	53	55	54	53
06:39	54	55	54	54

Average of Column 1:	53
Minimum value column 1:	52
Maximum value column 1:	54

Mean value of full dataset:	53
Min. value of full dataset:	50
Max. value of full dataset:	56
Modal value of full dataset:	53

On the basis of the statistical analysis, a representative background noise level during the eight-hour night-time period has been taken to be 52 dB $L_{A90,8hr}$ (free-field).

APPENDIX 5: PLANT LISTS

Table A5.1 – Initial Site Clearance

Task 1 Initial Site Clearance								
Plant	Noise Data			On time, %	Number of plant items	Screening/dB	Total Correction/ dB	Total Lp at 10 m dB(A)
	Plant Ref	Type	Lp (at 10 m) dB(A)					
Forklift	D.7.94	Site forklift trucks	88	25	1	0	-6	82
Dumper Truck	C.4.4	9 t	76	25	1	0	-6	70
Excavator	C.4.8	18t excavator	66	75	1	0	-1	65
							TOTAL	**82**

Table A5.2 – Civil Enabling Works

Task 2 Civil Enabling Works								
Plant	Noise Data			On time, %	Number of plant items	Screening/dB	Total Correction/ dB	Total Lp at 10 m dB(A)
	Plant Ref	Type	Lp (at 10 m) dB(A)					
Forklift	D.7.94	Site forklift trucks	88	15	1	0	-8	80
Dumper Truck	C.4.4	9 t	76	25	2	0	-3	73
Excavator (with hydraulic breaker)	C.9.12	23 t	85	75	1	0	-1	84
Excavator	C.4.8	18t excavator	66	75	1	0	-1	65
Hydraulic compactor	C.2.42	225 kg / 193 bar / 17 500 N	78	75	1	0	-1	77
Driven precast concrete piling	Data as provided by Balfour Beatty	PM20 piling rig	90	50	2	0	0	90
							TOTAL	**91**

Table A5.3 – Construction of bagfilter

Task 3 Construction of Bagfilter								
Plant	Noise Data			On time, %	Number of plant items	Screening/dB	Total Correction/ dB	Total Lp at 10 m dB(A)
	Plant Ref	Type	Lp (at 10 m) dB(A)					
75t Crane	C.4.39	Wheeled mobile crane	77	10	1	0	-10	67

40t Crane	C.4.43	Wheeled mobile crane	70	10	1	0	-10	60
Forklift	D.7.94	Site forklift trucks	88	20	1	0	-7	81
MEWP	C.4.57	Lifting Platform 8t	67	15	2	0	-5	62
Low loader lorry	C.2.34	4-axle lorry	80	10	2	0	-7	73
							TOTAL	**82**

Table A5.4 – Construction of external duct

Task 4 Construction of external duct								
Plant	Noise Data			On time, %	Number of plant items	Screening/dB	Total Correction/ dB	Total Lp at 10 m dB(A)
	Plant Ref	Type	Lp (at 10 m) dB(A)					
75t Crane	C.4.39	Wheeled mobile crane	77	20	1	0	-7	70
40t Crane	C.4.43	Wheeled mobile crane	70	20	1	0	-7	63
Forklift	D.7.94	Site forklift trucks	88	20	1	0	-7	81
MEWP	C.4.57	Lifting Platform 8t	67	25	2	0	-3	64
Low loader lorry	C.2.34	4-axle lorry	80	10	1	0	-10	70
							TOTAL	**82**

Table A5.5 – Installation of Dense Conveyor

Task 5 Installation of Dense Conveyor								
Plant	Noise Data			On time, %	Number of plant items	Screening/dB	Total Correction/ dB	Total Lp at 10 m dB(A)
	Plant Ref	Type	Lp (at 10 m) dB(A)					
75t Crane	C.4.39	Wheeled mobile crane	77	20	1	0	-7	70
40t Crane	C.4.43	Wheeled mobile crane	70	20	1	0	-7	63
Forklift	D.7.94	Site forklift trucks	88	25	1	0	-6	82
MEWP	C.4.57	Lifting Platform 8t	67	15	2	0	-5	62
Low loader lorry	C.2.34	4-axle lorry	80	10	2	0	-7	73
							TOTAL	**83**

Table A5.6 – Installation of Air Compressors & Room

Task 6 Installation of Air Compressors & Room								
Plant	Noise Data			On time, %	Number of plant items	Screening/dB	Total Correction/ dB	Total Lp at 10 m dB(A)
	Plant Ref	Type	Lp (at 10 m) dB(A)					
Telehandler	Genie telehandler	Manufacturer's Data	77	20	1	0	-7	70
40t mobile Crane	C.4.43	Wheeled mobile crane	70	20	1	0	-7	63
Low loader lorry	C.2.34	4-axle lorry	80	10	1	0	-10	70
							TOTAL	**73**

Table A5.7 – Post-activity ground works

Task 7 Post-activity ground works								
Plant	Noise Data			On time, %	Number of plant items	Screening/dB	Total Correction/ dB	Total Lp at 10 m dB(A)
	Plant Ref	Type	Lp (at 10 m) dB(A)					
Telehandler	Genie telehandler	Manufacturer's Data	77	50	1	0	-3	74
							TOTAL	**74**

Table A5.8 – Removal of existing de-dust facilities

Task 8 Removal of existing de-dust facilities								
Plant	Noise Data			On time, %	Number of plant items	Screening/dB	Total Correction/ dB	Total Lp at 10 m dB(A)
	Plant Ref	Type	Lp (at 10 m) dB(A)					
75t Crane with man basket	C.4.39	Wheeled mobile crane	77	55	1	0	-3	74
Forklift	D.7.94	Site forklift trucks	88	25	1	0	-6	82
Telehandler	Genie telehandler	Manufacturer's Data	77	50	1	0	-3	74
Dumper Truck	C.4.4	9 t	76	25	1	0	-6	70
Excavator (with hydraulic breaker)	C.9.12	23 t	85	75	1	0	-1	84
Excavator	C.4.8	18t excavator	66	75	1	0	-1	65
Nibbler	C4.93	4.7 kg grinder	80	75	1	-5	-6	74
Hydraulic compactor	C.2.42	225 kg / 193 bar / 17 500 N	78	5	1	0	-13	65
MEWP	C.4.57	Lifting Platform 8t	67	15	2	0	-5	62

Inspection MEWP	C.4.57	Lifting Platform 8t	67	5	1	0	-13	54
Low loader lorry	C.2.34	4-axle lorry	80	10	2	0	-7	73
Lighting Tower	C4.87	6 kVA / 3 000 rpm	65	95	4	-10	-4	61
Diesel Generator	C4.87	6 kVA / 3 000 rpm	65	80	1	-10	-11	54
							TOTAL	**87**

APPENDIX 6: PROGRAM OF WORKS

Table A6.1 – Program of Works

	Week Commencing	03-Feb-20	10-Feb-20	17-Feb-20	24-Feb-20	02-Mar-20	09-Mar-20	16-Mar-20	30-Mar-20	06-Apr-20	13-Apr-20	20-Apr-20	27-Apr-20	04-May-20	11-May-20
	Activity	Daytime	Daytime	Daytime	Daytime	Daytime	Daytime	Daytime	Daytime	Daytime	Daytime	Daytime	Daytime	Daytime	Daytime
1	Initial Site clearance														
2	Civil Enabling Works														

Table A6.2 – Program of Works (cont.)

	Week Commencing	18-May-20		25-May-20		01-Jun-20		08-Jun-20		15-Jun-20		22-Jun-20		29-Jun-20		06-Jul-20	
	Activity	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night
3	Construction of Bagfilter																
4	Construction of External Duct																

Table A6.3 – Program of Works (cont.)

	Week Commencing	13-Jul-20		20-Jul-20		27-Jul-20		03-Aug-20		10-Aug-20		17-Aug-20		24-Aug-20		31-Aug-20	
	Activity	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night
3	Construction of Bagfilter																
4	Construction of External Duct																
5	Installation of Dense Conveyor																

Table A6.4 – Program of Works (cont.)

Week Commencing		31-Aug-20		07-Sep-20		14-Sep-20		21-Sep-20		28-Sep-20		05-Oct-20		12-Oct-20		19-Oct-20	
Activity		Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night
3	Construction of Bagfilter																
5	Installation of Dense Conveyor																
6	Installation of Air Compressor & room																

Table A6.5 – Program of Works (cont.)

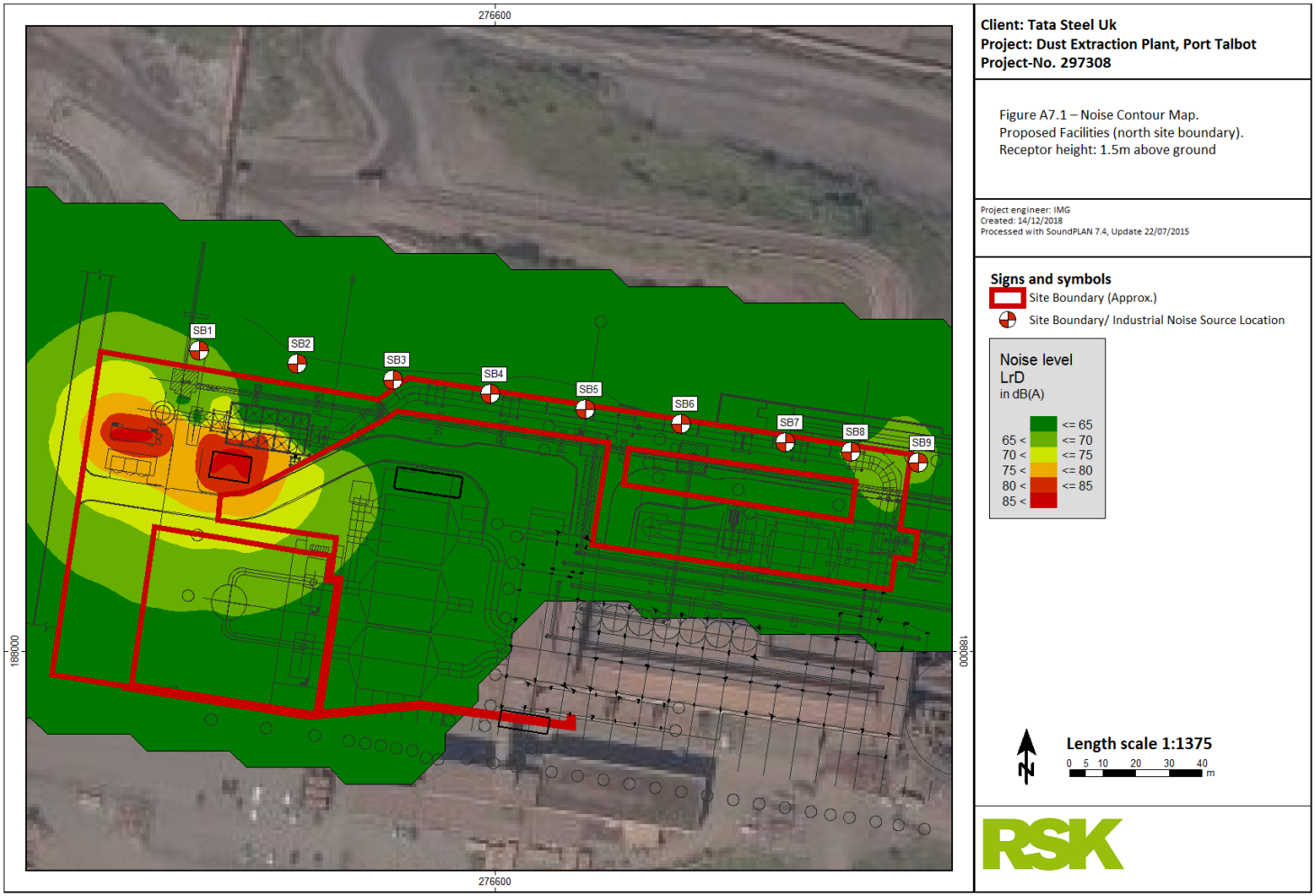
Week Commencing		26-Oct-20		02-Nov-20		09-Nov-20		16-Nov-20		23-Nov-20	30-Nov-20	07-Dec-20	14-Dec-20	21-Dec-20	28-Dec-20
Activity		Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Eve., Weekend & Night	Daytime	Daytime	Daytime	Daytime	Daytime	Daytime
3	Construction of Bagfilter														
5	Installation of Dense Conveyor														
7	Post activity ground works														
8	Removal of Existing De-Dust ESP, Stack, Ducting, ID fan, Ladders/stairs/access gantry														

Table A6.6 – Program of Works (cont.)

Week Commencing		04-Jan-21	11-Jan-21	18-Jan-21	25-Jan-21	01-Feb-21	08-Feb-21	15-Feb-21
Activity		Daytime	Daytime	Daytime	Daytime	Daytime	Daytime	Daytime
8	Removal of Existing De-Dust ESP, Stack, Ducting, ID fan, Ladders/stairs/access gantry							

APPENDIX 7: NOISE CONTOUR MAPS

Figure A7.1 – Noise Contour Map – Proposed Facilities (north site boundary) (to scale when printed at A4).



APPENDIX 8: GLOSSARY

L_p - Sound Pressure Level

The basic unit of sound measurement is the sound pressure level, which is measured on a logarithmic scale and expressed in decibels (dB). The logarithmic scale makes it easier to manage the large range of audible sound pressures, and also more closely represents the way the human ear responds to differences in sound pressure:

$L_p = 20 \log_{10} (p/p_0)$

where p = RMS (root mean square) sound pressure; and

p_0 = reference sound pressure 2×10^{-5} Pa.

Frequency Weighting Networks

Frequency weighting networks, which are generally built into sound level meters, attenuate the signal at some frequencies and amplify it at others. The A-weighting network approximately corresponds to human frequency response to sound. Sound levels measured with the A-weighting network are expressed in dBA. Other weighting networks also exist, such as C-weighting which is nearly linear (i.e. un-weighted) and other more specialised weighting networks. Variables such as L_p and L_{eq} that can be measured using such weightings are expressed as L_{pA} / L_{pC}, L_{Aeq} / L_{Ceq} etc.

Time Weighting

Sound level meters use various averaging times for the measurement of RMS sound pressure level. The most commonly used are fast (0.125 s averaging time), slow (1 s averaging time) and impulse (0.035 s averaging time). Variables that are measures with time weightings are expressed as L_{AFmax} etc.

L_{Aeq} – Equivalent Continuous Sound Pressure Level

Sound levels tend to fluctuate, and as such an 'instantaneous' measurement like sound pressure level cannot fully describe many real-world situations. A summation can be made of the measured sound energy over a certain period, and a notional steady level can be calculated which would contain the same total energy as the fluctuating sound. This notional level is termed the equivalent continuous sound level L_{eq}. L_{eq} can be determined over any time period, which is indicated as $L_{eq,T}$ where T is the time period (e.g. $L_{eq,24h}$).

In mathematical terms, for n discrete sound level measurements, Leq is given by:

$L_{eq,T} = 10 \log10 (t_1 \times 10^{L1/10} + t_2 \times 10^{L2/10} + \ldots t_n \times 10^{Ln/10})/T$

where t_1 = time at level L_1 dB;

t_2 = time at level L_2 dB etc.

and T = total time

L_{max} - Maximum Sound Pressure Level or Maximum Noise Level

This is the maximum RMS sound pressure level occurring within a specified period. The time weighting is usually specified, such as in L_{Fmax}.

L_N - Percentile or Statistical Levels

Sometimes it is useful to calculate the level which is exceeded for a certain percent of a total period. Background noise is often defined as the A-weighted sound pressure level exceeded for 90% of the specified period T, expressed $L_{90,T}$. Road traffic noise is often characterised in terms of $L_{A10,18hr.}$

R – Sound Reduction Index

The sound reduction index is a weighted sound reduction index in decibels which uses the specific transmission coefficient for a partition or single component to produce an accurate and repeatable measurement of the sound reduction performance for the partition or component.

R_W – Weighted Sound Reduction Index

This index described the airborne insulation features of a building element. This value in dB is measured in laboratory over a frequency range 100 to 3150 Hz.

L_a - Ambient Sound Level

Ambient sound level as defined in Section 3 of BS4142:2014 is the equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time. The ambient sound level comprises the residual sound level and the specific sound.

L_r – Residual Sound Level

Residual sound level as defined in Section 3 of BS4142:2014 is the equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval

L_S – Specific Sound Level

Specific sound level is the equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval.

$L_{Ar,T}$ – Rating Level

Specific sound level plus any adjustment for the characteristic features of the sound (impulsivity, tonality, intermittency), as defined in BS4142:2014.