Camden Town Brewery

55-65 Wilkin Street Mews
London
NW5 3ED

Plant Noise
Impact Assessment

On behalf of

chapman ventilation

Project Reference: 90189 | Revision: 0 | Date: 11th October 2022
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Document Information

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	Name	Qualifications	Initials	Date
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For and on behalf of Noise Solutions Ltd				

Revision	Date	Description	Prepared	Reviewed/ Approved
1	24/10/2022	Small revisions to text, amendment to AC unit locations, fan casings no longer require consideration	AQ	JS
2	26/10/2022	Revision to site overlay and proposed plant layout	AQ	JS
3	26/10/2022	Revision to site overlay	AQ	JS
4	25/11/2022	Revision to plant and fan discharge and supply locations	AQ	NAC

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Appendices

1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been commissioned by Chapman Ventilation to undertake a noise impact assessment for new plant serving Camden Town Brewery at 55-65 Wilkin Street Mews, London.

1.2. An environmental sound survey has been undertaken to establish the prevailing background sound pressure levels at a location representative of the sound levels outside the nearest noise sensitive receptors to the site.

1.3. Cumulative plant noise emission levels for the proposed plant have been predicted at the most affected noise sensitive receptors and assessed following London Borough of Camden's usual requirements.

1.4. To assist with the understanding of this report a glossary of acoustic terms can be found in **Appendix A**. An in-depth glossary of acoustic terms can be viewed online at www.acoustic-glossary.co.uk.

2.0 Details of development proposals

2.1. Camden Town Brewery occupies railway arches along the east side of Wilkin Street Mews, London.

2.2. All new fans are to be located internally. New fans will comprise five supply fans (SF1-5), five general extract fans (EF1-5) and five toilet extract fans (TEF1-5). The associated intake and discharge vents are to be located on the roof and eastern facade of the proposed extension to the east of the brewery. Furthermore, two air conditioning units (ACU1/2) will be located at ground level to the east (rear) of arch 63.

2.3. Mitigation is to be installed in the form of attenuators and acoustic enclosures.

2.4. The proposed plant will operate within the daytime hours of 07.00 to 23.00, daily. None of the proposed plant is expected to operate outside of this period.

2.5. **Appendix B** contains a table with the manufacturer's published sound pressure levels for the proposed plant.

4.0 Nearest noise sensitive receptors

4.1. The area surrounding the site is a mix of commercial, light industrial office and residential properties.

4.2. The nearest properties are a mix of both residential dwellings (Receptor R1 and Receptor R3) and, light industrial and office properties (Receptor R2) all of which are located east of Camden Town Brewery, its proposed extension, and its proposed plant.

4.3. In some instances, screening is afforded to Receptor R2 and R3 as a result of the geometry of the building to the east and the proposed extension itself.

4.4. An aerial view showing the site and surrounding area, the nearest noise sensitive properties and noise monitoring location used in this assessment is presented in **Appendix C**.

5.0 Existing noise climate

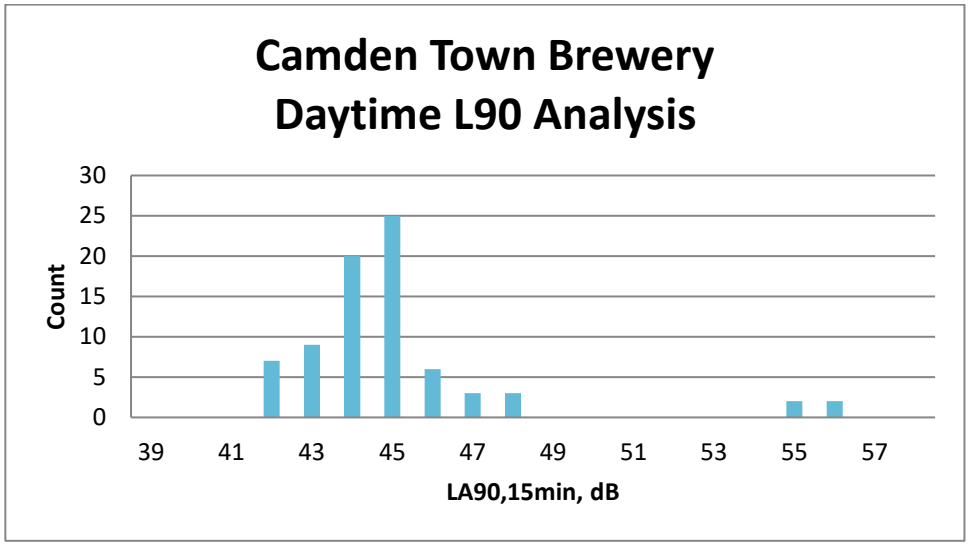
5.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise sensitive receptors to the proposed plant area during the quietest times at which the plant will operate.

5.2. The results of the environmental sound survey are summarised in Table 1 below. The full set of measurement results and details of the survey methodology are presented in **Appendix D**.

Table 1 Summary of survey results

Measurement period	Range of recorded sound pressure levels (dB)			
	$L_{Aeq(15mins)}$	$L_{Amax(15mins)}$	$L_{A10(15mins)}$	$L_{A90(15mins)}$
Daytime (07.00 – 23.00 hours)	46-71	59-95	49-68	42-56
Night-time (23.00 – 07.00 hours)	45-69	59-88	48-68	41-56

Figure 1 Histogram of daytime L_{A90} background sound pressure levels



5.3. Additional statistical analysis has been undertaken. As shown in Table 2, the mean, median, and modal values have been calculated:

Table 2 Statistical analysis of $L_{A90,5min}$ levels during the proposed plant operating period

	dB, L_{A90} daytime period
Mean	45
Modal	45
Median	45

5.4. From review of the histogram in Figure 1 it is considered that 44dB(A) is a robust representation of the background sound level outside the nearest premises, within intended operating hours of the plant.

5.5. The proposed plant is not expected to operate outside of the daytime hours of 07.00 – 23.00.

6.0 Plant noise design criteria

National Planning Policy Framework

6.1. A new edition of NPPF was published in July 2021 and came into effect immediately. The original National Planning Policy Framework (NPPF[1]) was published in March 2012, with revisions in July 2018 and February 2019 - this document replaced the existing Planning Policy Guidance Note 24 (PPG 24) "Planning and Noise." The 2021 revised edition contains no new directions or guidance

[1] National Planning Policy Framework, DCLG, March 2012

with respect to noise, and hence, all previous references remain extant. The paragraph references quoted below relate to the July 2021 edition.

6.2. Paragraph 174 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by (amongst others) *"preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land stability."*

6.3. The NPPF goes on to state in Paragraph 185:

" planning policies and decisions should ...

a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development, - and avoid noise giving rise to significant adverse impacts on health and quality of life;
b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason ...

6.4. The NPPF document does not refer to any other documents or British Standards regarding noise other than the Noise Policy Statement for England (NPSE[2]).

6.5. Paragraph 2 of the NPPF states that *"planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise."*

6.6. Paragraph 12 of the NPPF states that *"The presumption in favour of sustainable development does not change the statutory status of the development plan as the starting point for decision making. Where a planning application conflicts with an up-to-date development plan (including any neighbourhood plans that form part of the development plan), permission should not usually be granted. Local planning authorities may take decisions that depart from an up-to-date development plan, but only if material considerations in a particular case indicate that the plan should not be followed"*.

6.7. Paragraph 119 states that *"Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or 'brownfield' land"*.

[2] Noise Policy Statement for England, DEFRA, March 2010

London Borough of Camden

6.8. Section 6 of the Camden Planning Guidance Amenity, published March 2018, gives guidance on noise and vibration.

6.9. Clause 6.8 refers to noise thresholds within Appendix 3 of the Local Plan and to the principles of No observed effect level (NOEL), Lowest observable adverse effect level (LOAEL) and Significant observed adverse effect level (SOAEL) and defines their meanings. Specifically, in the context of this report, LOAEL is defined as:

> *The level above which changes in behaviour (e.g. closing windows for periods of the day) and adverse effects on health (e.g. sleep disturbance) and quality of life can be detected.*

6.10. SOEAL is defined as:

> *The level above which adverse effects on health and quality of life occur. This could include psychological stress, regular sleep deprivation and loss of appetite.*

6.11. Clause 6.27 states that:

> *Developments proposing plant, ventilation, air extraction or conditioning equipment and flues will need to provide the system's technical specifications to the council accompanying any acoustic report. "BS4142 Method for rating Industrial and Commercial Sound' contains guidance and standards which should also be considered within the acoustic report.*

6.12. Appendix 3 within the Camden Local Plan published 2017 states:

> *"A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion)."*

6.13. Table C of the appendix states the criteria at which development related noise levels will be acceptable:

Table C: Noise levels applicable to proposed industrial and commercial development (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dBL_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

**10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.*

***levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.*

BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

6.14. BS 4142:2014+A1:2019 is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS 4142:2014 includes "sound from fixed plant installations which comprise mechanical and electrical plant and equipment".

6.15. The procedure contained in BS 4142:2014 is to quantify the "specific sound level", which is the measured or predicted level of sound from the source in question over a one hour period for the daytime and a 15 minute period for the night-time. Daytime is defined in the standard as 07:00 to 23:00 hours, and night-time as 23:00 to 07:00 hours.

6.16. The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal or impulsive elements. The standard sets out objective

methods for determining the presence of tones or impulsive elements, but notes that it is acceptable to subjectively determine these effects.

6.17. The penalty for tonal elements is between 0dB and 6dB, and the standard notes: "Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible."

6.18. The penalty for impulsive elements is between 0dB and 9dB, and the standard notes: "Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."

6.19. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:

- *Typically, the greater this difference, the greater the magnitude of the impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

6.20. The standard does state that "adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."

6.21. The standard goes on to note that: "Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."

6.22. In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014 edition places emphasis upon an appreciation of the context, as follows:

> *"An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."*

6.23. BS 4142:2014 requires uncertainties in the assessment to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

Summary of criteria

6.24. The local authority's usual requirement is that the plant noise level at the nearest noise-sensitive windows should be at least 10dB below the representative L_{A90} background sound level.

6.25. For the nearest non-residential receptor (R2 light industrial and office use), BS 8233:2014 *'Guidance on sound insulation and noise reduction for buildings'* notes that a typical internal sound level for noise-sensitive offices where concentration is required is 35 dB(A). The Standard also suggests a typical façade sound reduction of 15dB for partially opened windows. It is therefore proposed that cumulative plant noise levels at the nearest light industrial and office windows should not exceed 50 dB(A), to give an internal sound below the guidance values in BS 8233:2014.

6.26. Noise from the new plant should therefore not exceed the limits shown in the table below:

Table 3 Proposed plant noise emissions level limits at nearest receptor

Period	Receptor Type	Cumulative plant noise level, dB(A)
All proposed plant operating (07.00 hrs to 23.00)	Residential	34
	Light industrial and office use	50

7.0 Plant noise impact assessment

7.1. The cumulative plant noise levels at the nearest noise sensitive receptors have been predicted. The assessment has considered attenuation, directivity, any screening between source and receivers and distance attenuation. The predictions during the proposed operating period (07.00 hours to 23.00) have been based on the proposed plant all operating at full capacity.

7.2. Predictions are inclusive of; acoustic enclosures housing the two proposed AC units and the following atmospheric-side attenuators as shown in the tables below:

Table 4 Proposed cylindrical atmospheric side attenuators to ventilation systems

Attenuator	Insertion losses dB, at octave band centre frequencies (Hz)							
	63	125	250	500	1k	2k	4k	8k
EF1, SF1, SF2	2	5	7	19	31	22	20	16
EF3, SF3	3	4	7	14	23	16	14	12
EF2, EF4, EF5, SF4, SF5	2	4	6	16	26	19	17	13
TEF3, TEF4, TEF5	2	5	7	27	37	32	28	19

Table 5 Proposed rectangular atmospheric side attenuator to ventilation systems

Attenuator	Insertion losses dB, at octave band centre frequencies (Hz)							
	63	125	250	500	1k	2k	4k	8k
TEF1, TEF2	5	8	15	25	32	31	28	22

7.3. It should be noted that all proposed plant is high-quality and no impulsive characteristics are anticipated provided the equipment is well maintained. The extract and supply systems are expected to operate continuously during intended plant operating hours and the AC unit is inverter driven, which means the fan gently ramps to cope with system demands. As a result, the plant items are not considered to operate intermittently.

7.4. Table 6 summarises the results of the assessment at the most affected properties. All other nearby receptors benefit from increased distance/screening to the plant such that resulting noise levels will be lower than at the receptors considered. The full set of calculations can be found in **Appendix E**.

Table 6 Assessment of predicted noise levels at the nearest noise sensitive receptors

Receptor	Period	Predicted sound level at receptor, L_{Aeq} (dB)	Design criterion (dB(A))	Difference (dB)
R1. Residential	Daytime	34	34	0
R2. Light industrial and office use	Daytime	48	50	-2
R3. Residential	Daytime	30	34	-4

7.5. The noise level predictions demonstrate that cumulative noise emissions from the proposed plant will comply with the proposed limits at the nearest residential and, light industrial and office use windows.

Context and uncertainties

7.6. Where possible uncertainty in the above assessments has been minimised by taking the following steps:

- The meter and calibrator used have a traceable laboratory calibration and the meter was field calibrated before and after the measurements.
- Uncertainty in the calculated impacts has been reduced by the use of a well-established calculation method.
- Care was taken to ensure that the measurement position was representative of the noise climate outside the nearby noise sensitive receptors and not in a position where higher noise levels were present.

7.7. As BS 4142:2014 advises, the impact must be considered within the context of the site and the surrounding acoustic environment. The following must, therefore, also be taken into consideration when determining the potential impact that may be experienced:

- The assessment is undertaken at the nearest residential and, light industrial and office use windows. The impact on all other nearby windows will be lower due to screening and distance attenuation.

- It should be noted that the above assessment is based on all plant operating at maximum duty. Given that the plant will not operate at maximum design duty all of the time the above assessment is considered to be representative of the worst case.

8.0 Summary

8.1. Noise Solutions Ltd (NSL) has been commissioned by Chapman Ventilation to undertake a noise impact assessment for new plant serving Camden Town Brewery at 55-65 Wilkin Street Mews, London.

8.2. An environmental noise survey has been undertaken to establish the existing prevailing noise levels at locations representative of the noise climate outside the nearest noise sensitive receptors to the proposed plant area.

8.3. The cumulative plant noise emission levels for the proposed plant have been predicted at the most affected noise sensitive receptor locations and determined to be in compliance with London Borough of Camden's usual requirements. Therefore, the plant proposals should not be a reason for refusal of planning permission.

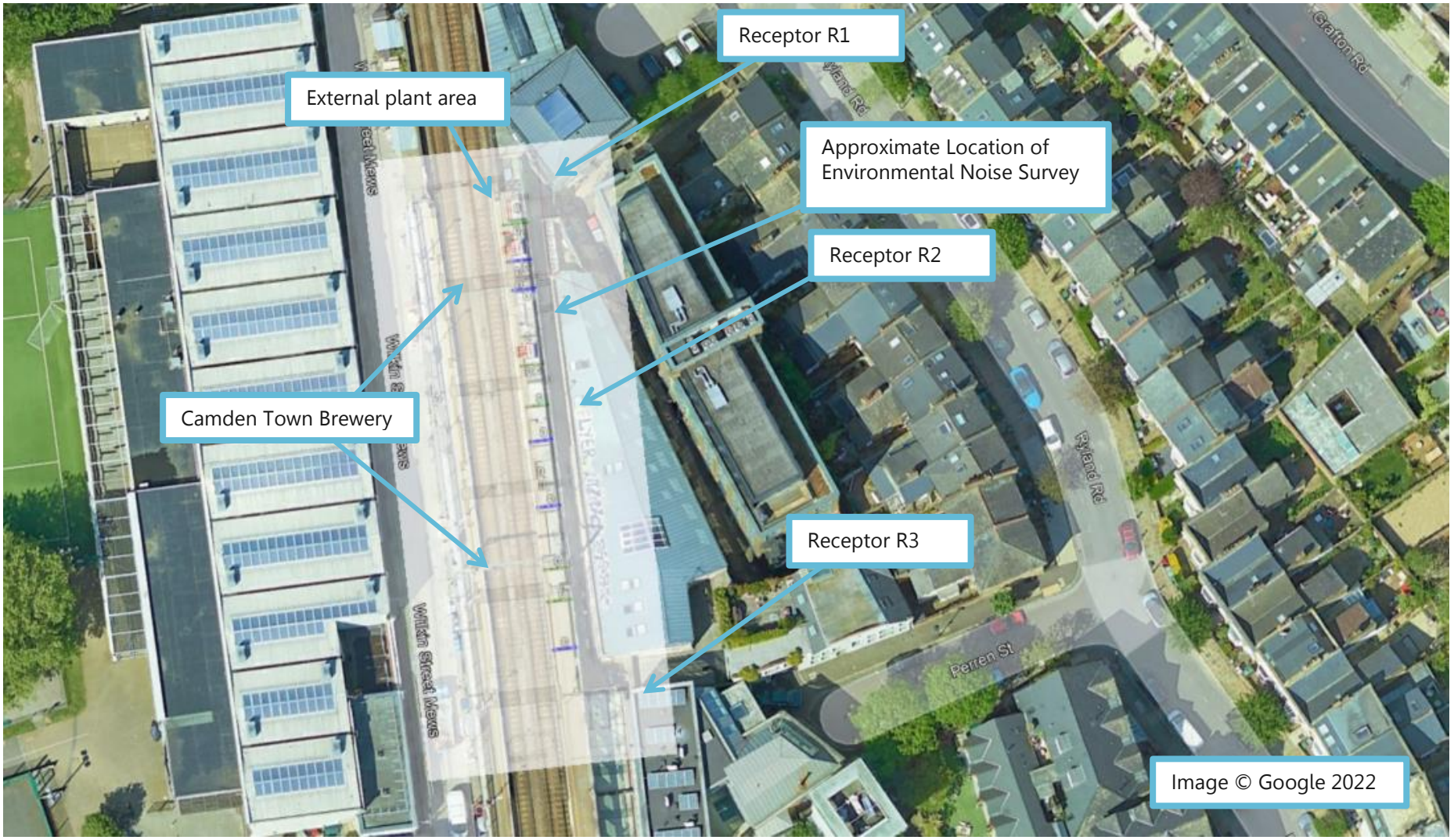
Appendix A Acoustic terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 $\log_{10}$ (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A –weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example

Appendix B Plant information and manufacturer published sound pressure levels

Plant Reference	Unit/Model	No. of units	Description	Sound power level (dB) at octave band centre frequencies (Hz)								dBA (dB)
				63	125	250	500	1k	2k	4k	8k	
General Extract/ Supply Fan	Systemair/ Prio Silent XP 250EC	8	Inlet L_w	47	54	61	60	65	57	50	47	
			Outlet L_w	48	56	63	61	67	59	52	47	
			Casing L_w	39	36	39	44	54	44	31	39	
General Extract/ Supply Fan	Systemair/ Prio Silent XP 315EC	2	Inlet L_w	54	57	63	65	74	64	56	53	
			Outlet L_w	56	58	64	67	76	66	58	55	
			Casing L_w	42	37	38	48	59	50	38	31	
Toilet Extract Fan	Systemair/ K 100 EC	5	Outlet L_w	86	89	79	75	72	66	60	51	
Air Conditioning Condensers (CU1-CU2)	Toshiba/ RAV-GM1401ATP-E	2	Sound pressure level at 1m (each)									55

Appendix C Aerial photograph site showing areas of interest



Appendix D Environmental sound survey

Details of sound surveys

D.1 Measurements of the existing background sound levels were undertaken between 09.15 hours on Thursday 1st September and 12.30 hours on Friday 2nd September 2022.

D.2 The sound level meter was programmed to record the A-weighted L_{eq}, L_{90}, L_{10} and L_{max} noise indices for consecutive 15-minute sample periods for the duration of the noise survey.

Measurement position

D.3 The representative measurement position was located in the courtyard to east of Camden Town Brewery and west of the nearest receptors (location indicated on the site plan in **Appendix C**).

D.4 In accordance with BS 7445-2:1991 *'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use'*, the measurements were undertaken under free-field conditions.

Equipment

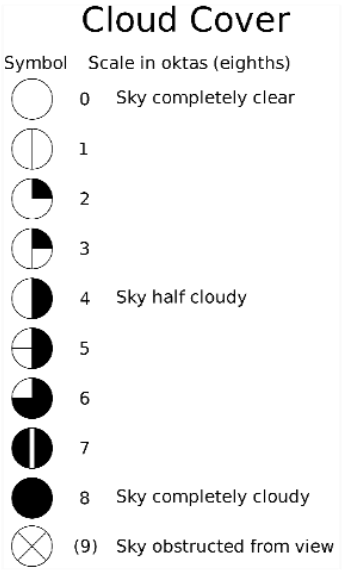
D.5 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (+/-0.2 dB) in the calibration level was noted.

Environmental noise survey

Description	Model / serial no.	Calibration date	Calibration certificate no.
Class 1 Sound level meter	Svantek 977/ 97446	12/02/2021	Factory conformation certificate
Condenser microphone	Microtech MK255 / 20194		
Preamplifier	Svantek SV12L / 106487		
Calibrator	Svantek SV 30A / 10847	06/06/2022	1500577-1

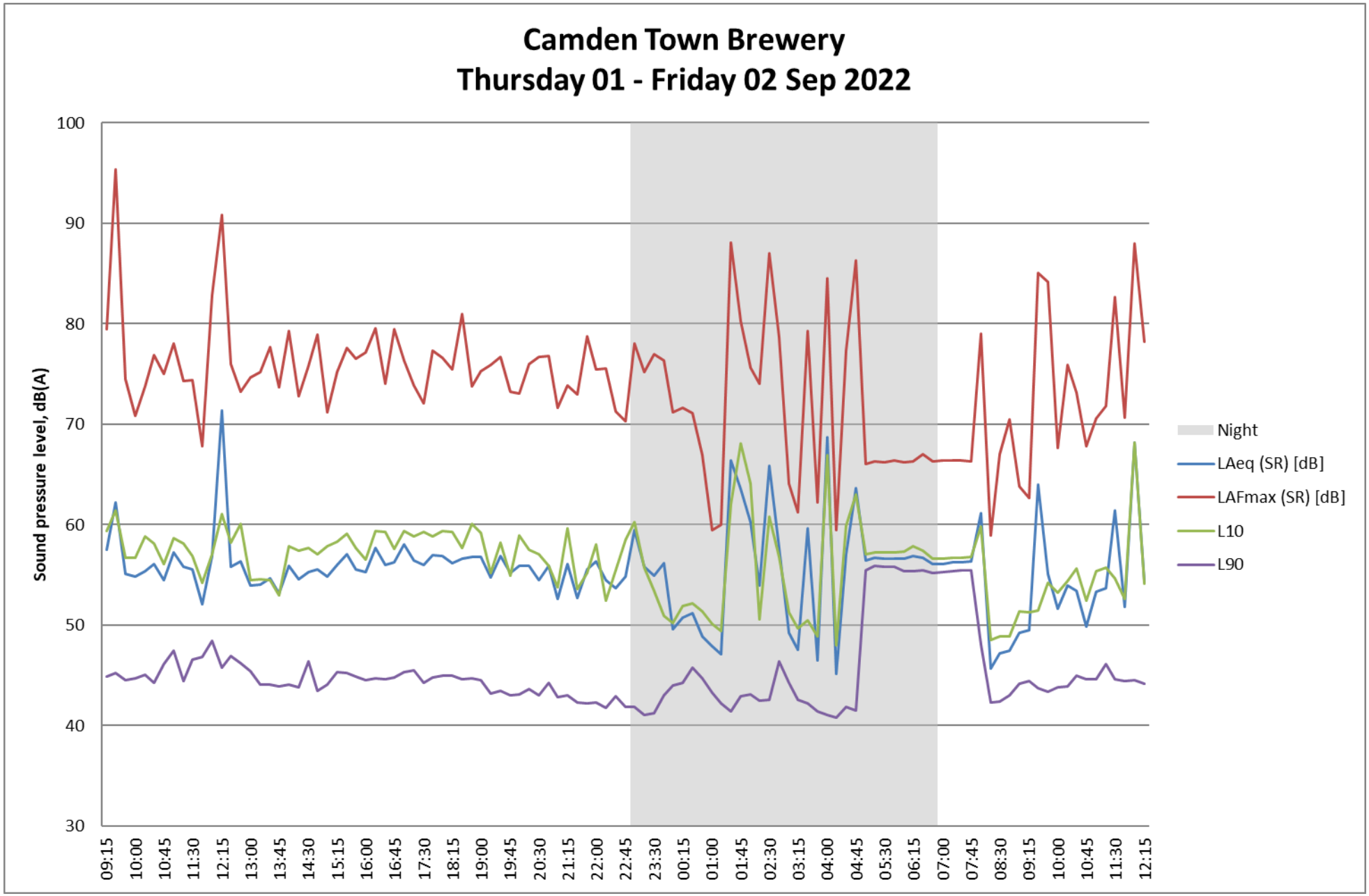
Weather Conditions

D.6 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

<table>
<tr><th colspan="5">Weather Conditions</th></tr>
<tr><th>Measurement Location</th><th>Time/Date</th><th>Description</th><th>Beginning of Survey</th><th>End of Survey</th></tr>
<tr><td>As indicated on Appendix C</td><td>09.15 1 Sep - 12.30 2 Sep 2022</td><td>Temperature (°C)</td><td>21</td><td>23</td></tr>
<tr><td colspan="2" rowspan="8"> 
</td><td>Precipitation:</td><td>None</td><td>None</td></tr>
<tr><td>Cloud cover (oktas - see guide)</td><td>6</td><td>5</td></tr>
<tr><td>Presence of fog/snow/ice</td><td>No</td><td>No</td></tr>
<tr><td>Presence of damp roads/wet ground</td><td>No</td><td>No</td></tr>
<tr><td>Wind Speed (m/s)</td><td>N/A (Courtyard)</td><td>N/A (Courtyard)</td></tr>
<tr><td>Wind Direction</td><td>N/A (Courtyard)</td><td>N/A (Courtyard)</td></tr>
<tr><td>Conditions that may cause temperature inversion (i.e. calm nights with no cloud)</td><td>No</td><td>No</td></tr>
</table>

Results

D.7 The results of the environmental survey are considered to be representative of the background sound pressure levels at the façades of the nearest noise sensitive receptors during the quietest times at which the plant will operate. The noise climate during the survey period was dominated by existing plant, trains passing, the train station PA system, local traffic and emergency vehicles sirens. The results of the survey are presented in a time history graph overleaf.


Camden Town Brewery
Thursday 01 - Friday 02 Sep 2022
Sound pressure level, dB(A)
100
90
80
70
60
50
40
30
09:15
10:00
10:45
11:30
12:15
13:00
13:45
14:30
15:15
16:00
16:45
17:30
18:15
19:00
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01:45
02:30
03:15
04:00
04:45
05:30
06:15
07:00
07:45
08:30
09:15
10:00
10:45
11:30
12:15
Night
LAeq (SR) [dB]
LAFmax (SR) [dB]
L10
L90

Appendix E Noise level predictions

Summary of predictions

Plant	Resultant at receptor (dBA)	Resultant at receptor (dBA)	Resultant at receptor (dBA)
	R1	R2	R3
EF1	25	12	-1
EF2	14	30	6
EF3	23	47	16
EF4	7	18	19
EF5	7	16	20
SF1	19	14	-3
SF2	16	16	-2
SF3	15	29	17
SF4	6	20	14
SF5	4	10	24
TEF1	26	24	9
TEF2	25	25	8
TEF3	24	38	15
TEF4	21	34	23
TEF5	20	32	23
Condenser 1	27	10	-3
Condenser 2	26	10	-3
Intended Plant Operating Hours: Cumulative	**34**	**48**	**30**
Outside Intended Plant Operating Hours: Cumulative	**0**	**0**	**0**

Condensers

Receptor R1

Unit	Distance				Directivity	Screening	Attenuation*	Result
	L_{pA}	at / m	m	dB				
ACU-1	55	1	5	-14	6	0	-20	27
ACU-2	55	1	5.4	-15	6	0	-20	26

**Attenuation to be provided by acoustic enclosures*

Receptor R2

Unit	Distance				Directivity	Screening	Attenuation*	Result
	L_{pA}	at / m	m	dB				
ACU-1	55	1	21	-26	6	-5	-20	10
ACU-2	55	1	20	-26	6	-5	-20	10

**Attenuation to be provided by acoustic enclosures*

Receptor R3

Unit	Distance				Directivity	Screening	Attenuation*	Result
	L_{pA}	at / m	m	dB				
ACU-1	55	1	52	-34	6	-10	-20	-3
ACU-2	55	1	51	-34	6	-10	-20	-3

**Attenuation to be provided by acoustic enclosures*

EF1 - Extract Exhaust

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	48	56	63	61	67	59	52	47	**69**
System losses		-13	-9	-5	-1	0	0	0	0	
Atmospheric side attenuator	I.L.	-2	-5	-7	-19	-31	-22	-20	-16	
Sound power level leaving terminal		**33**	**42**	**51**	**41**	**36**	**37**	**32**	**31**	**46**
Receptor 1										
Directivity correction	250 x 250 (0,65)	1	1	2	2	2	2	2	2	
Distance correction	5.5 m	-23	-23	-23	-23	-23	-23	-23	-23	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R1	**Lp**	**11**	**20**	**30**	**20**	**15**	**16**	**11**	**10**	**25**
Receptor 2										
Directivity correction	250 x 250 (0,80)	0	1	1	1	-1	-5	-5	-5	
Distance correction	19 m	-34	-34	-34	-34	-34	-34	-34	-34	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R2	**Lp**	**-1**	**9**	**18**	**8**	**1**	**-2**	**-7**	**-8**	**12**
Receptor 3										
Directivity correction	250 x 250 (0,80)	0	1	1	1	-1	-5	-5	-5	
Distance correction	53 m	-42	-42	-42	-42	-42	-42	-42	-42	
Screening Correction		-5	-5	-5	-5	-5	-5	-5	-5	
Resultant at Receptor R3	**Lp**	**-14**	**-4**	**5**	**-5**	**-12**	**-15**	**-20**	**-21**	**-1**

EF2 - Extract Exhaust

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	48	56	63	61	67	59	52	47	**69**
System losses		-13	-9	-5	-1	0	0	0	0	
Atmospheric side attenuator	I.L.	-2	-4	-6	-16	-26	-19	-17	-13	
Sound power level leaving terminal		**33**	**43**	**52**	**44**	**41**	**40**	**35**	**34**	**48**
Receptor 1										
Directivity correction	250 x 250 (0,80)	0	1	1	1	-1	-5	-5	-5	
Distance correction	20 m	-34	-34	-34	-34	-34	-34	-34	-34	
Screening Correction		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Resultant at Receptor R1	**Lp**	**-1**	**10**	**19**	**11**	**6**	**1**	**-4**	**-5**	**14**
Receptor 2										
Directivity correction	250 x 250 (0,50)	1	2	2	3	3	4	4	4	
Distance correction	4.6 m	-21	-21	-21	-21	-21	-21	-21	-21	
Screening Correction		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Resultant at Receptor R2	**Lp**	**13**	**24**	**33**	**26**	**23**	**23**	**18**	**17**	**30**
Receptor 3										
Directivity correction	250 x 250 (0,70)	1	1	2	2	2	2	2	2	
Distance correction	37 m	-39	-39	-39	-39	-39	-39	-39	-39	
Screening Correction		-5	-5	-5	-5	-5	-5	-5	-5	
Resultant at Receptor R3	**Lp**	**-10**	**0**	**10**	**2**	**-1**	**-2**	**-7**	**-8**	**6**

EF3 - Extract Exhaust

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	56	58	64	67	76	66	58	55	**77**
System losses		-12	-8	-4	-1	0	0	0	0	
Atmospheric side attenuator	I.L.	-3	-4	-7	-14	-23	-16	-14	-12	
Sound power level leaving terminal		**41**	**46**	**53**	**52**	**53**	**50**	**44**	**43**	**57**
Receptor 1										
Directivity correction	315 x 315 (0,70)	1	1	2	2	2	2	2	2	
Distance correction	25 m	-36	-36	-36	-36	-36	-36	-36	-36	
Screening Correction		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Resultant at Receptor R1	**Lp**	**6**	**11**	**19**	**18**	**19**	**16**	**10**	**9**	**23**
Receptor 2										
Directivity correction	315 x 315 (0,0)	1	2	3	4	5	6	6	6	
Distance correction	2.3 m	-15	-15	-15	-15	-15	-15	-15	-15	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R2	**Lp**	**27**	**33**	**41**	**41**	**43**	**41**	**35**	**34**	**47**
Receptor 3										
Directivity correction	315 x 315 (0,70)	1	1	2	2	2	2	2	2	
Distance correction	33 m	-38	-38	-38	-38	-38	-38	-38	-38	
Screening Correction		-5	-5	-5	-5	-5	-5	-5	-5	
Resultant at Receptor R3	**Lp**	**-1**	**4**	**12**	**11**	**12**	**9**	**3**	**2**	**16**

EF4 - Extract Exhaust

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	48	56	63	61	67	59	52	47	**69**
System losses		-13	-9	-5	-1	0	0	0	0	
Atmospheric side attenuator	I.L.	-2	-4	-6	-16	-26	-19	-17	-13	
Sound power level leaving terminal		**33**	**43**	**52**	**44**	**41**	**40**	**35**	**34**	**48**
Receptor 1										
Directivity correction	250 x 250 (0,80)	0	1	1	1	-1	-5	-5	-5	
Distance correction	43 m	-41	-41	-41	-41	-41	-41	-41	-41	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R1	**Lp**	**-8**	**3**	**12**	**4**	**-1**	**-6**	**-11**	**-12**	**7**
Receptor 2										
Directivity correction	250 x 250 (0,75)	1	1	2	2	2	2	2	2	
Distance correction	16 m	-32	-32	-32	-32	-32	-32	-32	-32	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R2	**Lp**	**2**	**12**	**22**	**14**	**11**	**10**	**5**	**4**	**18**
Receptor 3										
Directivity correction	250 x 250 (0,50)	1	2	2	3	3	4	4	4	
Distance correction	16 m	-32	-32	-32	-32	-32	-32	-32	-32	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R3	**Lp**	**2**	**13**	**22**	**15**	**12**	**12**	**7**	**6**	**19**

EF5 - Extract Exhaust

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	48	56	63	61	67	59	52	47	**69**
System losses		-13	-9	-5	-1	0	0	0	0	
Atmospheric side attenuator	I.L.	-2	-4	-6	-16	-26	-19	-17	-13	
Sound power level leaving terminal		**33**	**43**	**52**	**44**	**41**	**40**	**35**	**34**	**48**
Receptor 1										
Directivity correction	250 x 250 (0,85)	0	1	1	1	-1	-5	-5	-5	
Distance correction	47 m	-41	-41	-41	-41	-41	-41	-41	-41	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R1	**Lp**	**-8**	**3**	**12**	**4**	**-1**	**-6**	**-11**	**-12**	**7**
Receptor 2										
Directivity correction	250 x 250 (0,75)	1	1	2	2	2	2	2	2	
Distance correction	19.5 m	-34	-34	-34	-34	-34	-34	-34	-34	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R2	**Lp**	**0**	**10**	**20**	**12**	**9**	**8**	**3**	**2**	**16**
Receptor 3										
Directivity correction	250 x 250 (0,60)	1	1	2	2	2	2	2	2	
Distance correction	12 m	-30	-30	-30	-30	-30	-30	-30	-30	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R3	**Lp**	**4**	**14**	**24**	**16**	**13**	**12**	**7**	**6**	**20**

SF1 - Supply Fan Intake

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	47	54	61	60	65	57	50	47	**67**
System losses		-13	-9	-5	-1	0	0	0	0	
Atmospheric side attenuator	I.L.	-2	-5	-7	-19	-31	-22	-20	-16	
Sound power level leaving terminal		**32**	**40**	**49**	**40**	**34**	**35**	**30**	**31**	**44**
Receptor 1										
Directivity correction	250 x 250 (0,60)	1	1	2	2	2	2	2	2	
Distance correction	9 m	-27	-27	-27	-27	-27	-27	-27	-27	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R1	**Lp**	**6**	**14**	**24**	**15**	**9**	**10**	**5**	**6**	**19**
Receptor 2										
Directivity correction	250 x 250 (0,75)	1	1	2	2	2	2	2	2	
Distance correction	15 m	-32	-32	-32	-32	-32	-32	-32	-32	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R2	**Lp**	**1**	**9**	**19**	**10**	**4**	**5**	**0**	**1**	**14**
Receptor 3										
Directivity correction	250 x 250 (0,80)	0	1	1	1	-1	-5	-5	-5	
Distance correction	49 m	-42	-42	-42	-42	-42	-42	-42	-42	
Screening Correction		**-5**	**-5**	**-5**	**-5**	**-5**	**-5**	**-5**	**-5**	
Resultant at Receptor R3	**Lp**	**-15**	**-6**	**3**	**-6**	**-14**	**-17**	**-22**	**-21**	**-3**

SF2 - Supply Fan Intake

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	47	54	61	60	65	57	50	47	**67**
System losses		-13	-9	-5	-1	0	0	0	0	
Atmospheric side attenuator	I.L.	-2	-5	-7	-19	-31	-22	-20	-16	
Sound power level leaving terminal		**32**	**40**	**49**	**40**	**34**	**35**	**30**	**31**	**44**
Receptor 1										
Directivity correction	250 x 250 (0,75)	1	1	2	2	2	2	2	2	
Distance correction	12.5 m	-30	-30	-30	-30	-30	-30	-30	-30	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R1	**Lp**	**3**	**11**	**21**	**12**	**6**	**7**	**2**	**3**	**16**
Receptor 2										
Directivity correction	250 x 250 (0,70)	1	1	2	2	2	2	2	2	
Distance correction	12.3 m	-30	-30	-30	-30	-30	-30	-30	-30	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R2	**Lp**	**3**	**11**	**21**	**12**	**6**	**7**	**2**	**3**	**16**
Receptor 3										
Directivity correction	250 x 250 (0,80)	0	1	1	1	-1	-5	-5	-5	
Distance correction	46 m	-41	-41	-41	-41	-41	-41	-41	-41	
Screening Correction		-5	-5	-5	-5	-5	-5	-5	-5	
Resultant at Receptor R3	**Lp**	**-14**	**-5**	**4**	**-5**	**-13**	**-16**	**-21**	**-20**	**-2**

SF3 - Supply Fan Intake

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	54	57	63	65	74	64	56	53	**75**
System losses		-12	-8	-4	-1	0	0	0	0	
Atmospheric side attenuator	I.L.	-3	-4	-7	-14	-23	-16	-14	-12	
Sound power level leaving terminal		**39**	**45**	**52**	**50**	**51**	**48**	**42**	**41**	**55**
Receptor 1										
Directivity correction	315 x 315 (0,80)	0	1	1	1	-1	-5	-5	-5	
Distance correction	36 m	-39	-39	-39	-39	-39	-39	-39	-39	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R1	**Lp**	**0**	**7**	**14**	**12**	**11**	**4**	**-2**	**-3**	**15**
Receptor 2										
Directivity correction	315 x 315 (0,70)	1	1	2	2	2	2	2	2	
Distance correction	9.5 m	-28	-28	-28	-28	-28	-28	-28	-28	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R2	**Lp**	**12**	**18**	**26**	**24**	**25**	**22**	**16**	**15**	**29**
Receptor 3										
Directivity correction	315 x 315 (0,70)	1	1	2	2	2	2	2	2	
Distance correction	22 m	-35	-35	-35	-35	-35	-35	-35	-35	
Screening Correction		-5	-5	-5	-5	-5	-5	-5	-5	
Resultant at Receptor R3	**Lp**	**0**	**6**	**14**	**12**	**13**	**10**	**4**	**3**	**17**

SF4 - Supply Fan Intake

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	47	54	61	60	65	57	50	47	**67**
System losses		-13	-9	-5	-1	0	0	0	0	
Atmospheric side attenuator	I.L.	-2	-4	-6	-16	-26	-19	-17	-13	
Sound power level leaving terminal		**32**	**41**	**50**	**43**	**39**	**38**	**33**	**34**	**46**
Receptor 1										
Directivity correction	250 x 250 (0,80)	0	1	1	1	-1	-5	-5	-5	
Distance correction	39 m	-40	-40	-40	-40	-40	-40	-40	-40	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R1	**Lp**	**-8**	**2**	**11**	**4**	**-2**	**-7**	**-12**	**-11**	**6**
Receptor 2										
Directivity correction	250 x 250 (0,70)	1	1	2	2	2	2	2	2	
Distance correction	9.5 m	-28	-28	-28	-28	-28	-28	-28	-28	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R2	**Lp**	**5**	**14**	**24**	**17**	**13**	**12**	**7**	**8**	**20**
Receptor 3										
Directivity correction	250 x 250 (0,70)	1	1	2	2	2	2	2	2	
Distance correction	19 m	-34	-34	-34	-34	-34	-34	-34	-34	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R3	**Lp**	**-1**	**8**	**18**	**11**	**7**	**6**	**1**	**2**	**14**

SF5 - Supply Fan Intake

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	47	54	61	60	65	57	50	47	**67**
System losses		-13	-9	-5	-1	0	0	0	0	
Atmospheric side attenuator	I.L.	-2	-4	-6	-16	-26	-19	-17	-13	
Sound power level leaving terminal		**32**	**41**	**50**	**43**	**39**	**38**	**33**	**34**	**46**
Receptor 1										
Directivity correction	250 x 250 (0,80)	0	1	1	1	-1	-5	-5	-5	
Distance correction	52 m	-42	-42	-42	-42	-42	-42	-42	-42	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R1	**Lp**	**-10**	**0**	**9**	**2**	**-4**	**-9**	**-14**	**-13**	**4**
Receptor 2										
Directivity correction	250 x 250 (0,80)	0	1	1	1	-1	-5	-5	-5	
Distance correction	24.5 m	-36	-36	-36	-36	-36	-36	-36	-36	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R2	**Lp**	**-4**	**6**	**15**	**8**	**2**	**-3**	**-8**	**-7**	**10**
Receptor 3										
Directivity correction	250 x 250 (0,55)	1	2	2	3	3	4	4	4	
Distance correction	8 m	-26	-26	-26	-26	-26	-26	-26	-26	
Screening Correction		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Resultant at Receptor R3	**Lp**	**7**	**17**	**26**	**20**	**16**	**16**	**11**	**12**	**24**

TEF1 – Toilet Extract Exhaust

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	86	89	79	75	72	66	60	51	**78**
System losses		-19	-14	-10	-5	-2	0	0	0	
Atmospheric side attenuator	I.L.	-5	-8	-15	-25	-32	-31	-28	-22	
Sound power level leaving terminal		**62**	**67**	**54**	**45**	**38**	**35**	**32**	**29**	**53**
Receptor 1										
Directivity correction	100 x 100 (40,0)	1	2	2	3	4	5	5	5	
Distance correction	11 m	-29	-29	-29	-29	-29	-29	-29	-29	
Screening Correction		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Resultant at Receptor R1		**34**	**40**	**27**	**19**	**13**	**11**	**8**	**5**	**26**
Receptor 2										
Directivity correction	100 x 100 (40,0)	1	2	2	3	4	5	5	5	
Distance correction	14.3 m	-31	-31	-31	-31	-31	-31	-31	-31	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R2	**Lp**	**32**	**38**	**25**	**17**	**11**	**9**	**6**	**3**	**24**
Receptor 3										
Directivity correction	100 x 100 (40,0)	1	2	2	3	4	5	5	5	
Distance correction	47 m	-41	-41	-41	-41	-41	-41	-41	-41	
Screening Correction		-5	-5	-5	-5	-5	-5	-5	-5	
Resultant at Receptor R3	**Lp**	**17**	**23**	**10**	**2**	**-4**	**-6**	**-9**	**-12**	**9**

TEF2 – Toilet Extract Exhaust

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	86	89	79	75	72	66	60	51	**78**
System losses		-19	-14	-10	-5	-2	0	0	0	
Atmospheric side attenuator	I.L.	-5	-8	-15	-25	-32	-31	-28	-22	
Sound power level leaving terminal		**62**	**67**	**54**	**45**	**38**	**35**	**32**	**29**	**53**
Receptor 1										
Directivity correction	100 x 100 (40,0)	1	2	2	3	4	5	5	5	
Distance correction	12 m	-30	-30	-30	-30	-30	-30	-30	-30	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R1		**33**	**39**	**26**	**18**	**12**	**10**	**7**	**4**	**25**
Receptor 2										
Directivity correction	100 x 100 (40,0)	1	2	2	3	4	5	5	5	
Distance correction	13.2 m	-30	-30	-30	-30	-30	-30	-30	-30	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R2	**Lp**	**33**	**39**	**26**	**18**	**12**	**10**	**7**	**4**	**25**
Receptor 3										
Directivity correction	100 x 100 (40,0)	1	2	2	3	4	5	5	5	
Distance correction	47.5 m	-42	-42	-42	-42	-42	-42	-42	-42	
Screening Correction		-5	-5	-5	-5	-5	-5	-5	-5	
Resultant at Receptor R3	**Lp**	**16**	**22**	**9**	**1**	**-5**	**-7**	**-10**	**-13**	**8**

TEF3 – Toilet Extract Exhaust

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	86	89	79	75	72	66	60	51	**78**
System losses		-19	-14	-10	-5	-2	0	0	0	
Atmospheric side attenuator	I.L.	-2	-5	-7	-27	-37	-32	-28	-19	
Sound power level leaving terminal		**65**	**70**	**62**	**43**	**33**	**34**	**32**	**32**	**57**
Receptor 1										
Directivity correction	100 x 100 (40,0)	1	2	2	3	4	5	5	5	
Distance correction	22 m	-35	-35	-35	-35	-35	-35	-35	-35	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R1	**Lp**	**31**	**37**	**29**	**11**	**2**	**4**	**2**	**2**	**24**
Receptor 2										
Directivity correction	100 x 100 (40,0)	1	2	2	3	4	5	5	5	
Distance correction	4.5 m	-21	-21	-21	-21	-21	-21	-21	-21	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R2	**Lp**	**45**	**51**	**43**	**25**	**16**	**18**	**16**	**16**	**38**
Receptor 3										
Directivity correction	100 x 100 (40,0)	1	2	2	3	4	5	5	5	
Distance correction	36.5 m	-39	-39	-39	-39	-39	-39	-39	-39	
Screening Correction		-5	-5	-5	-5	-5	-5	-5	-5	
Resultant at Receptor R3	**Lp**	**22**	**28**	**20**	**2**	**-7**	**-5**	**-7**	**-7**	**15**

TEF4 – Toilet Extract Exhaust

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	86	89	79	75	72	66	60	51	**78**
System losses		-19	-14	-10	-5	-2	0	0	0	
Atmospheric side attenuator	I.L.	-2	-5	-7	-27	-37	-32	-28	-19	
Sound power level leaving terminal		**65**	**70**	**62**	**43**	**33**	**34**	**32**	**32**	**57**
Receptor 1										
Directivity correction	100 x 100 (40,0)	1	2	2	3	4	5	5	5	
Distance correction	33 m	-38	-38	-38	-38	-38	-38	-38	-38	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R1		**28**	**34**	**26**	**8**	**-1**	**1**	**-1**	**-1**	**21**
Receptor 2										
Directivity correction	100 x 100 (40,0)	1	2	2	3	4	5	5	5	
Distance correction	7.3 m	-25	-25	-25	-25	-25	-25	-25	-25	
Screening Correction		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Resultant at Receptor R2	**Lp**	**41**	**47**	**39**	**21**	**12**	**14**	**12**	**12**	**34**
Receptor 3										
Directivity correction	100 x 100 (40,0)	1	2	2	3	4	5	5	5	
Distance correction	26 m	-36	-36	-36	-36	-36	-36	-36	-36	
Screening Correction		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Resultant at Receptor R3	**Lp**	**30**	**36**	**28**	**10**	**1**	**3**	**1**	**1**	**23**

TEF5 – Toilet Extract Exhaust

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	86	89	79	75	72	66	60	51	**78**
System losses		-19	-14	-10	-5	-2	0	0	0	
Atmospheric side attenuator	I.L.	-2	-5	-7	-27	-37	-32	-28	-19	
Sound power level leaving terminal		**65**	**70**	**62**	**43**	**33**	**34**	**32**	**32**	**57**
Receptor 1										
Directivity correction	100 x 100 (40,0)	1	2	2	3	4	5	5	5	
Distance correction	35 m	-39	-39	-39	-39	-39	-39	-39	-39	
Screening Correction		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Resultant at Receptor R1		**27**	**33**	**25**	**7**	**-2**	**0**	**-2**	**-2**	**20**
Receptor 2										
Directivity correction	100 x 100 (40,0)	1	2	2	3	4	5	5	5	
Distance correction	8.5 m	-27	-27	-27	-27	-27	-27	-27	-27	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R2	**Lp**	**39**	**45**	**37**	**19**	**10**	**12**	**10**	**10**	**32**
Receptor 3										
Directivity correction	100 x 100 (40,0)	1	2	2	3	4	5	5	5	
Distance correction	24 m	-36	-36	-36	-36	-36	-36	-36	-36	
Screening Correction		0	0	0	0	0	0	0	0	
Resultant at Receptor R3	**Lp**	**30**	**36**	**28**	**10**	**1**	**3**	**1**	**1**	**23**

Appendix F Proposed plant layout