



ENVIRONMENTAL NOISE ASSESSMENT

March 2019

Prepared for:

TSL Projects Ltd

At:

**ConvaTec Ltd
Rhymney**

ECL Report Reference: P3834/R001

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ConvaTec Ltd, Rhymney**

Report Reference Number		P3834/R001	
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Date	May 2019	Date	May 2019

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ConvaTec Ltd, Rhymney**

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ConvaTec Ltd, Rhymney**

EXECUTIVE SUMMARY OF FINDINGS

Environmental Compliance Ltd (ECL) was commissioned by TSL Projects Ltd to carry out an environmental noise survey to investigate the cause of potential noise affecting residential housing around the ConvaTec Ltd, Rhymney site.

The potential noise source of concern is the new regenerative thermal oxidiser (RTO) that has recently been installed. This has replaced a wet scrubber.

This is a continuation of work that started in September 2005, there have been 5 previous surveys. This is the first survey to be carried out since the removal of the old scrubber and the installation of the new RTO.

TSL Projects Ltd have asked ECL to carry out an environmental noise survey to assess the likelihood that the noise, as it is, is causing an adverse impact at the site boundary and on local residential properties.

The study was undertaken by Mike Mullett of ECL on during three different time periods:

- Daytime – 10:02 to 13:51 on 5th March
- Evening – 16:33 to 19:42 on 21st March
- Night-time – 23:57 on 21st March to 03:06 on 22nd March

Measurement and subsequent analysis were undertaken according to methodology described in BS4142:2014.



Findings

Based on the calculations contained within BS4142:2014, the Excess of Rating Levels are shown below, the 2017 results are displayed in brackets:

Location	Excess of Rating Level (dB)		
	Daytime Measurements	Evening Measurements	Night-time Measurements
1 East of tank farm	3 (4)	4 (2.3)	-3 (3.3)
2 South east of tank farm	2 (3.9)	7 (3.1)	4 (3.5)
3 West of tank farm	6 (4.3)	8 (7.8)	4 (1.1)
4 North of tank farm	2 (4.4)	2 (1.5)	-5 (0.8)
5 Turning circle of tank farm	-1 (0.5)	-1 (0.6).	1 (0.5)
6 External road by RTO	14 (10.1)	14 (13.6)	20 (1.1)
7 Entrance to cemetery	0 (3.1)	-2 (2.7)	-4 (1.1)
8 Glan Yr Afon	6 (8.1)	6 (5.9)	3 (2.2)
9 Corner of Gladstone Terrace & Harcourt Place	-1 (17)	-2 (2.8)	9 (6.3)
10 B4257 Road	5 (16.7)	3 (8.4)	4 (7.8)

BS4142 advises that a difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.

A difference of around +5dB 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.

Recommendations

Points 6 and 9 should be retested to confirm excess of rating levels. If possible, both the specific / ambient (RTO on) noise and residual / background (RTO off) noise levels should be tested.



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1. Introduction

- 1.1. Environmental Compliance Ltd was commissioned by TSL Projects Ltd to investigate the potential environmental noise affecting local residents around the ConvaTec Ltd, Rhymney site. The noise source is coming from the new regenerative thermal oxidiser (RTO) that has been installed on site. Please note that this has replaced an existing wet scrubber. The RTO runs twenty-four hours a day, seven days a week.
 - 1.2. The facility at ConvaTec Ltd, Rhymney undertakes the production of Aquacel and AquacelExtra for use in medical supplies.
 - 1.3. This report gives the assessment using British Standard BS4142:2014, Assessment of industrial noise in mixed residential and industrial areas) and suggests remedial treatments to reduce the noise to a reasonable level.
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2. Details of the Site

- 2.1. Sound measurements were taken from ten locations (see Appendix A). These are the same locations that were selected during the most recent survey (November 2017):

- Location 1 – East of tank farm
- Location 2 – South east of tank farm
- Location 3 – West of tank farm
- Location 4 – North of tank farm
- Location 5 – Turning circle of tank farm
- Location 6 – External road by RTO
- Location 7 – Entrance to cemetery
- Location 8 – Glan Yr Afon
- Location 9 – Corner of Gladstone Terrace & Harcourt Place
- Location 10 – B4257 Road

Locations 1 to 6 are within or at the site boundary. Locations 7 to 10 were identified as sensitive receptors as they include locations within residential areas.



3. Noise Source Investigation

- 3.1. The potential noise source is located at the RTO, situated within the ConvaTec Ltd, Rhymney site. The actual RTO can't be seen at all the locations, however the exhaust stack can be. The RTO along with the rest of the ConvaTec Ltd, Rhymney site runs twenty-four hours a day, seven days a week.
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4. Subjective Impressions

- 4.1. The noise from the RTO is audible from all the on-site sample locations. It can be heard intermittently / very faintly at the off-site locations. Please note that there are other significant noise sources, especially at the non-site locations, including road traffic from the A465 and A469.
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5. Locations of the Measurement Positions

- 5.1. Appendix A contains a map with all sample locations marked.
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6. Noise Measuring Instruments

- 6.1 Noise levels were measured using the following instrumentation:

Instrument	Make / Model	Serial Number	Accreditation	Date of Certificate
Sound Level Meter	Casella CEL-633C	4637948	Casella	17/02/2018
Microphone	Casella CEL-251	1295	Casella	17/02/2018
Calibrator	Casella CEL-120/1	5139241	Casella	02/02/2019
Anemometer	Airflow LCA301	ECL/ID/607	Airflow	06/04/2018
Weather Station	Oregon Scientific BAA913HG	ECL/ID/204	ECL (internal)*	25/05/2018

* Unit calibrated against UKAS accredited Master Unit (ECL/ID/111).



7. **Operational Test**

- 7.1 The sound level meter was field calibrated at 94dB @ 1000Hz prior to the measurements.
- 7.2 The calibration level was unchanged when checked after the measurements were completed.



8 Weather Conditions

8.1. Daytime Measurements (5th March 2019)

Location	General Weather Conditions	Wind Speed (max) / Direction	Barometric Pressure	Precipitation / Humidity	Fog	Wet Ground	Frozen Ground / snow coverage	Temperature (°C)	Cloud cover (%)
1	Dry, calm & cloudy	0.4 South-East	968	None / 41% – 45%	None	Damp	No	19.8 – 19.9	75 – 85
2	Dry, calm & cloudy	No wind	968	None / 45%	None	Damp	No	18.1	50
3	Dry, calm, cloudy & sunny	4.2 South	968	None / 51% - 54%	None	Damp	No	10.9 – 11.6	60
4	Dry, calm & cloudy	0.4	968 – 969	None / 41%	None	Damp	No	18.9 – 19.0	90 - 95
5	Dry, calm, & sunny	2.6 South	968	None / 49%	None	Damp	No	11.3	40
6	Dry, calm, & cloudy	No Wind	968	None / 54%	None	Damp	No	16.9	80
7	Dry, calm, & cloudy	No Wind	968	None / 59%	None	Damp	No	16.1	90
8	Dry, calm, sunny then cloudy	No wind	968	None / 40%	None	No	No	16.4	50 - 99
9	Dry, calm, & overcast	No wind	993	None / 45%	None	No	No	12.5	100%



10	Dry, calm, & cloudy	1.6 South	968	None / 44	None	No	No	15.3	99
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8.2. Evening Measurements (21st March 2019)

Location	General Weather Conditions	Wind Speed (max) / Direction	Barometric Pressure	Precipitation / Humidity	Fog	Wet Ground	Frozen Ground / snow coverage	Temperature (°C)	Cloud cover
1	Dry, calm & overcast	No wind	993	None / 56% - 59%	None	Damp	No	12.3	100%
2	Dry, calm & overcast	No wind	993	None / 58%	None	Damp	No	12.3 – 12.4	100%
3	Dry, calm & overcast	No wind	993	None / 56%	None	Damp	No	12.6 – 12.9	100%
4	Dry, calm & overcast	No wind	993	None / 60% - 62%	None	Damp	No	12.1 – 12.3	100%
5	Dry, calm & overcast	No wind	993	None / 56% - 62%	None	Damp	No	12.4 – 12.6	100%
6	Dry, calm & overcast	No wind	993	None / 64%	None	Damp	No	12.0	100%
7	Dry, calm & overcast	No wind	993	None / 66% - 68%	None	Damp	No	12.2 – 12.8	100%
8	Dry, calm & overcast	No wind	993	None / 54%	None	Damp	No	12.5 – 12.7	100%
9	Dry, calm & overcast	No wind	993	None / 61% - 64%	None	Damp	No	12.6 – 12.9	100%
10	Dry, calm & overcast	No wind	993	None / 64%	None	Damp	No	13.0 – 13.2	100%



8.3. Night-time Measurements (21st & 22nd March 2019)

Location	General Weather Conditions	Wind Speed (max) / Direction	Barometric Pressure	Precipitation / Humidity	Fog	Wet Ground	Frozen Ground / snow coverage	Temperature (°C)	Cloud cover
1	Dry, calm & overcast	No wind	995	None / 72% - 83%	None	Damp	No	10.4 – 10.7	100%
2	Dry, calm & overcast	No wind	995	None / 73% - 80%	None	Damp	No	10.6 – 10.9	100%
3	Dry, calm & overcast	No wind	995	None / 52% - 63%	None	Damp	No	12.5	100%
4	Dry, calm & overcast	No wind	995	None / 75% - 78%	None	Damp	No	9.9 – 10.3	100%
5	Dry, calm & overcast	No wind	995	None / 68%	None	Damp	No	12.1	100%
6	Dry, calm & overcast	No wind	995	None / 84%	None	Damp	No	10.0 – 10.3	100%
7	Dry, calm & overcast	No wind	995	None / 89%	None	Damp	No	9.8 – 9.9	100%
8	Dry, calm & overcast	No wind	995	None / 87 – 89%	None	Damp	No	9.8	100%
9	Dry, calm & overcast	No wind	995	None – 89%	None	Damp	No	8.7 – 9.0	100%
10	Dry, calm & overcast	No wind	995	None / 88% – 89%	None	Damp	No	9.0 – 9.2	100%

9 Date and Time of Measurements

- 9.1 The measurements were carried out over several days. The daytime measurements were carried out on 5th March 2019. Evening Measurements were carried out on 21st March 2019. Night-time measurements were taken on 21st & 22nd March 2019.

10 Noise Levels

10.1. Specific Noise Source

- 10.1.1. The new RTO, along with site operates twenty-four hours a day, seven days a week.
- 10.1.2. As the RTO was only recently installed, the L90 values from the November 2017 survey will be used to calculate the excess of rating level.

10.2. Ambient Noise Level

- 10.2.1. 15-minute measurements were taken at all locations and during all time periods, with the RTO in operation, giving the below ambient noise level:

Location	Daytime Measurements (dB LAeq)	Evening Measurements (dB LAeq)	Night-time Measurements (dB LAeq)
1	56.7 (10:53 – 11:05)	59.9 (17:23 – 17:38)	48.2 (00:48 – 01:03)
2	56.3 (10:37 – 10:52)	60.7 (17:07 – 17:22)	49.7 (00:32 – 00:47)
3	61.5 (10:02 – 10:17)	62.9 (16:33 – 16:48)	58.8 (23:57 – 00:12)
4	56.6 (11:10 – 11:25)	60.0 (17:39 – 17:54)	51.2 (01:05 – 01:20)
5	59.7 (10:19 – 10:34)	60.7 (16:49 – 17:04)	59.3 (00:14 – 00:29)
6	65.1 (11:45 – 12:00)	64.9 (18:02 – 18:17)	66.5 (01:39 – 01:54)
7	57.1 (12:03 – 12:18)	54.1 (18:19 – 18:34)	46.2 (01:56 – 02:11)
8	64.2 (12:52 – 13:07)	61.2 18:46 – 19:01	47.5 (02:15 – 02:30)
9	50.9 (13:14 – 13:29)	49.1 (19:27 – 19:42)	42.0 (02:51 – 03:06)
10	53.7 (13:36 – 13:51)	50.0 (19:04 – 19:19)	38.1 (02:33 – 02:48)



10.3. Residual Noise Level

10.3.1. 15-minute measurements were recorded in November 2017 before the installation of the RTO. These are recorded below:

Location	Daytime Measurements	Evening Measurements	Night-time Measurements
1	60.8 (13:02 – 13:17 20/11/2017)	61.3 (16:19 – 16:34 20/11/2017)	57.2 (00:08 – 00:23 24/11/2017)
2	60.6 (13:19 – 13:34 20/11/2017)	60.3 (16:35 – 16:50 20/11/2017)	52.9 (00:23 – 00:38 24/11/2017)
3	63.2 (13:43 – 16:58 20/11/2017)	66.1 (16:57 – 17:12 20/11/2017)	59.2 (00:59 – 01:14 24/11/2017)
4	62.8 (12:44 – 12:59 20/11/2017)	62.3 (16:04 – 16:19 20/11/2017)	60.0 (23:52 – 00:07 23/11/2017)
5	62.8 (12:22 – 12:37 20/11/2017)	63.5 (15:48 – 16:03 20/11/2017)	63.0 (00:36 – 00:51 23/11/2017)
6	64.2 (14:02 – 14:17 20/11/2017)	67.8 (15:55 – 16:10 23/11/2017)	51.1 (01:16 – 01:31 24/11/2017)
7	59.8 (14:20 – 14:35 20/11/2017)	58.6 (16:13 – 16:28 23/11/2017)	51.0 (01:33 – 01:48 24/11/2017)
8	66.2 (14:39 – 14:54 20/11/2017)	61.3 (16:33 – 16:48 23/11/2017)	47.4 (00:15 – 00:30 24/11/2017)
9	69.2 (14:57 – 15:12 20/11/2017)	53.8 (16:52 – 17:07 23/11/2017)	39.1 (02:08 – 02:23 24/11/2017)
10	65.8 (15:21 – 15:36 20/11/2017)	55.7 (15:21 – 15:36 20/11/2017)	41.5 (02:25 – 02:40 24/11/2017)



10.4. Specific Noise Level

10.4.1. In this case, during all 2019 measurements, the noise measurements were made with the RTO in operation, giving the specific noise levels below.

10.4.2. This gives a specific noise level of:

Location	Noise Level (dB)		
	Daytime Measurement	Evening Measurement	Night-time Measurement
1	57	60	48
2	56	61	50
3	62	63	59
4	57	60	51
5	60	61	59
6	65	65	67
7	57	54	46
8	64	61	48
9	51	49	42
10	54	50	38

11 Measurement Time Intervals

- 11.1 The ambient and specific noise levels were measured for 15 minutes for night-time measurements and 1 hour for day-time measurements. The background and residual noise levels were measured 15 minutes each.

12 Reference Time Interval

- 12.1 The reference time interval for a night-time assessment is 15 minutes and day-time assessments are 1 hour.
- 12.2 For the purposes of BS4142: 2014, night-time is typically between 23:00 and 07:00, and accordingly daytime is between 07:00 and 23:00. For the purposes of this report and in keeping with previous readings, an evening measurement was taken. These measurements were taken between 16:33 and 19:42.
- 12.3 This equates to a time corrected night-time specific noise level $L_{Aeq,15mins}$ and day-time specific noise level $L_{Aeq,1hour}$ of:

Location	Noise Level (dB)		
	Daytime Measurement ($L_{Aeq,1hour}$)	Evening Measurement ($L_{Aeq,1hour}$)	Night-time Measurement ($L_{Aeq,15mins}$)
1	57	60	48
2	56	61	50
3	62	63	59
4	57	60	51
5	60	61	59
6	65	65	67
7	57	54	46
8	64	61	48
9	51	49	42
10	54	50	38



13 Rating Level

- 13.1 Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, a character correction can be added to the specific sound level to obtain the rating level.



- 13.2 Using the subjective method, acoustic feature correction is +3dB for all on site locations due to the noise containing a discrete continuous hum. All off-site locations are not subject to this acoustic correction.

Location		Daytime Measurement (dB LAeq)	Evening Time Measurement (dB LAeq)	Night-time Measurement (dB LAeq)
1	Reference Time Interval Noise Level	57	60	48
	Rating Noise Level	60	63	51
2	Reference Time Interval Noise Level	56	61	50
	Rating Noise Level	59	64	53
3	Reference Time Interval Noise Level	62	63	59
	Rating Noise Level	65	66	62
4	Reference Time Interval Noise Level	57	60	51
	Rating Noise Level	60	63	54
5	Reference Time Interval Noise Level	60	61	59
	Rating Noise Level	63	64	62
6	Reference Time Interval Noise Level	65	65	67
	Rating Noise Level	68	68	70
7	Reference Time Interval Noise Level	57	54	46
	Rating Noise Level	57	54	46
8	Reference Time Interval Noise Level	64	61	48
	Rating Noise Level	64	61	48
9	Reference Time Interval Noise Level	51	49	42
	Rating Noise Level	51	49	42
10	Reference Time Interval Noise Level	54	50	38
	Rating Noise Level	54	50	38

14 Background Noise Level

- 14.1 The background sound level is an underlying level of sound over a period, T, and might in part be an indication of relative quietness at a given location. It does not reflect the occurrence of transient and / or higher sound level events and is generally governed by continuous or semi-continuous sounds. A 15-minute measurement was recorded giving a background noise level $LA_{90,15mins}$ of:

Location	Daytime Measurement dB $LA_{90,15mins}$	Evening Measurement dB $LA_{90,15mins}$	Night-time Measurement dB $LA_{90,15mins}$
1	56.8	59.0	53.9
2	56.7	57.2	49.4
3	58.9	58.3	58.0
4	58.4	60.8	59.2
5	62.3	62.9	62.5
6	54.1	54.2	50.0
7	56.7	55.9	49.9
8	58.1	55.4	45.2
9	52.2	51.0	32.8
10	49.1	47.3	33.7

15 Excess of Rating Level

15.1 Excess of Rating Noise Level = Rating Noise Level – Background Noise Level
(n) = November 2017 excess of rating level (dB)

Location		Daytime Measurement	Evening Measurement	Night-time Measurement
1	Rating Noise Level (dB L _{Aeq})	60	63	51
	Background Noise Level (dB L _{A90,15mins})	57	59	54
	Excess of Rating Level (dB)	3 (4)	4 (2)	-3 (3)
2	Rating Noise Level (dB L _{Aeq})	59	64	53
	Background Noise Level (dB L _{A90,15mins})	57	57	49
	Excess of Rating Level (dB)	2 (4)	7 (3)	4 (4)
3	Rating Noise Level (dB L _{Aeq})	65	66	62
	Background Noise Level (dB L _{A90,15mins})	59	58	58
	Excess of Rating Level (dB)	6 (4)	8 (8)	4 (1)
4	Rating Noise Level (dB L _{Aeq})	60	63	54
	Background Noise Level (dB L _{A90,15mins})	58	61	59
	Excess of Rating Level (dB)	2 (5)	2 (1)	-5 (1)
5	Rating Noise Level (dB L _{Aeq})	63	64	62
	Background Noise Level (dB L _{A90,15mins})	62	63	63
	Excess of Rating Level (dB)	-1 (1)	-1 (1)	1 (0)
6	Rating Noise Level (dB L _{Aeq})	68	68	70
	Background Noise Level (dB L _{A90,15mins})	54	54	50
	Excess of Rating Level (dB)	14 (10)	14 (14)	20 (1)



Location		Daytime Measurement	Evening Measurement	Night-time Measurement
7	Rating Noise Level (dB LAeq)	57	54	46
	Background Noise Level (dB LA90,15mins)	57	56	50
	Excess of Rating Level (dB)	0 (3)	-2 (3)	-4 (1)
8	Rating Noise Level (dB LAeq)	64	61	48
	Background Noise Level (dB LA90,15mins)	58	55	45
	Excess of Rating Level (dB)	6 (8)	6 (6)	3 (2)
9	Rating Noise Level (dB LAeq)	51	49	42
	Background Noise Level (dB LA90,15mins)	52	51	33
	Excess of Rating Level (dB)	-1 (17)	-2 (3)	9 (6)
10	Rating Noise Level (dB LAeq)	54	50	38
	Background Noise Level (dB LA90,15mins)	49	47	34
	Excess of Rating Level (dB)	5 (17)	3 (9)	4 (8)

- 15.2 Typically, the greater the difference between the rating noise level and the background noise level, the greater the magnitude of the impact.
- 15.3 BS4142 advises that a difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- 15.4 A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- 15.5 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.

16 Discussion of Results

16.1 The difference between the 2017 and 2019 excess of rating levels are displayed below:

Location		Daytime Measurement	Evening Measurement	Night-time Measurement
1	2017 Excess of Rating Level (dB)	4	2	3
	2019 Excess of Rating Level (dB)	3	4	-3
	Difference in Excess of Rating Level (dB)	-1	2	-6
2	2017 Excess of Rating Level (dB)	4	3	4
	2019 Excess of Rating Level (dB)	2	7	4
	Difference in Excess of Rating Level (dB)	-2	4	0
3	2017 Excess of Rating Level (dB)	4	8	1
	2019 Excess of Rating Level (dB)	6	8	4
	Difference in Excess of Rating Level (dB)	2	0	3
4	2017 Excess of Rating Level (dB)	5	1	1
	2019 Excess of Rating Level (dB)	2	2	-5
	Difference in Excess of Rating Level (dB)	-3	1	-6
5	2017 Excess of Rating Level (dB)	1	1	0
	2019 Excess of Rating Level (dB)	-1	-1	1
	Difference in Excess of Rating Level (dB)	-2	-2	1
6	2017 Excess of Rating Level (dB)	10	14	1
	2019 Excess of Rating Level (dB)	14	14	20
	Difference in Excess of Rating Level (dB)	4	0	19



Location		Daytime Measurement	Evening Measurement	Night-time Measurement
7	2017 Excess of Rating Level (dB)	3	3	1
	2019 Excess of Rating Level (dB)	0	-2	-4
	Difference in Excess of Rating Level (dB)	-3	-5	-5
8	2017 Excess of Rating Level (dB)	8	6	2
	2019 Excess of Rating Level (dB)	6	6	3
	Difference in Excess of Rating Level (dB)	-2	0	1
9	2017 Excess of Rating Level (dB)	17	3	6
	2019 Excess of Rating Level (dB)	-1	-2	9
	Difference in Excess of Rating Level (dB)	-18	-5	3
10	2017 Excess of Rating Level (dB)	17	9	8
	2019 Excess of Rating Level (dB)	5	3	4
	Difference in Excess of Rating Level (dB)	-12	-6	-4

A positive result would indicate in an increase in the difference in excess or rating level. A negative result would indicate a decrease in the difference in excess or rating level.

- 16.2 At Location 1, all the excess in rating levels are below +5dB, though during the evening, the value does approach +5dB and is an increase from the 2017 level. Based on these levels, during the daytime and night time these results do not indicate a significant adverse impact. During the evening, when taking into account noise from road traffic, this is also not likely to indicate a significant adverse impact.
- 16.3 At Location 2, all the daytime and night-time excess in rating levels are below +5dB, the evening level exceeds 5dB, but not 10dB. Based on these levels, during the daytime result does not indicate a significant adverse impact. During the evening and night-time, this is also not likely to indicate a significant adverse impact.
- 16.4 At Location 3, all the excess in rating levels are above or approach +5dB. These results indicate that noise would likely be a significant adverse impact at this location.
- 16.5 At Location 4 & 5, all the excess in rating levels are well below +5dB indicating that, at this location, noise is not likely to indicate an adverse impact.
- 16.6 At Location 6, all the excess in rating levels are above +10dB. This would indicate a significant adverse impact at this location. This is the closest sample location to the new RTO which would explain the high results.



- 16.7 At Location 7, all the excess in rating levels are well below + 5dB indicating that, at this location, noise is not likely to indicate a significant adverse impact.
- 16.8 At Location 8, both the daytime and evening measurements are in excess of + 5dB. This is likely to indicate an adverse impact at this location. The night-time result is below + 5dB. These are comparable to the 2017 results.
- 16.9 At Location 9, the excess in rating levels during the day and evening are < 0dB. This is a significant improvement from the 2017 results. The night-time measurement approaches + 10dB, and increase on the 2017 results, and taking into consideration that this is at night, this is likely to indicate a significant adverse impact.
- 16.10 At Location 10, the daytime level is at + 5dB. During the remain times, the level was below + 5dB. There has been a large reduction in rating levels since 2017.
- 16.11 In general, the onsite locations have seen an increase in the excess of rating levels, particularly at Location 6, the closest location to the new RTO.
- 16.12 In contrast, the offsite locations, in general have seen a decrease in the excess of rating levels.
-

17 Recommendations

- 17.1 Points 6 and 9 should be retested to confirm excess of rating levels. If possible, both the specific / ambient (RTO on) noise and residual / background (RTO off) noise levels should be tested.



APPENDIX A

MAP OF SAMPLE LOCATIONS



Map showing sample locations



Image taken from Google Maps



APPENDIX B

HISTORIC RESULTS



Daytime Monitoring

Location	September 2005		December 2005		September 2007		October 2007		November 2017		March 2019	
	LAeq	L90	LAeq	L90	LAeq	L90	LAeq	L90	LAeq	L90	LAeq	L90
1	67.4	66.7	65.0	63.8	...	...	...	...	60.8	56.8	56.7	53.0
2	65.8	62.5	61.1	59.0	...	...	...	...	60.6	56.7	56.3	52.5
3	73.1	72.2	67.6	62.8	...	...	...	...	63.2	58.9	61.5	55.0
4	62.6	61.3	62.3	59.9	...	...	...	...	62.8	58.4	56.6	53.5
5	...	...	...	...	...	...	...	...	62.8	62.3	59.7	59.0
6	...	...	...	...	...	...	...	...	64.2	54.1	65.1	61.0
7	55.5	51.7	57.8	54.1	...	...	...	...	59.8	56.7	57.1	53.0
8	62.2	51.4	64.0	55.0	...	...	...	...	66.2	58.1	64.2	53.0
9	57.0	45.3	57.0	45.3	...	...	...	...	69.2	52.2	50.9	47.0
10	53.4	49.4	53.4	49.4	...	...	...	...	65.8	49.1	53.7	49.5



Evening Monitoring

Location	September 2005		December 2005		September 2007		October 2007		November 2017		March 2019	
	LAeq	L90	LAeq	L90	LAeq	L90	LAeq	L90	LAeq	L90	LAeq	L90
1	68.6	68.0	64.3	63.5	61.8	60.8	61.8	60.1	61.3	59.0	59.9	56.5
2	66.6	65.9	61.0	59.0	61.0	58.7	60.5	58.4	60.3	57.2	60.7	58.0
3	74.6	73.9	63.0	62.5	65.5	60.6	63.0	58.5	66.1	58.3	62.9	57.5
4	36.9	63.0	50.6	59.2	60.0	58.3	59.6	57.1	62.3	60.8	60.0	57.5
5	...	...	...	...	...	...	...	...	63.5	62.9	60.7	60.0
6	...	...	...	...	...	...	...	...	67.8	54.2	64.9	63.0
7	54.0	50.7	58.2	54.5	...	...	...	...	58.6	55.9	54.1	50.0
8	59.2	52.2	67.3	52.8	...	...	...	...	61.3	55.4	61.2	52.5
9	48.9	45.2	52.0	47.5	...	...	...	...	53.8	51.0	49.1	44.5
10	51.6	44.6	53.4	48.4	...	...	...	...	55.7	47.3	50.0	43.5



Night-time Monitoring

Location	September 2005		December 2005		September 2007		October 2007		November 2017		March 2019	
	LAeq	L90	LAeq	L90	LAeq	L90	LAeq	L90	LAeq	L90	LAeq	L90
1	64.1	62.1	63.8	63.1	...	...	...	...	57.2	53.9	48.2	45.0
2	54.3	53.9	59.3	57.5	...	...	...	...	52.9	49.4	49.7	45.5
3	75.0	74.2	63.1	62.7	...	...	...	...	59.1	58.0	58.8	57.5
4	63.3	62.6	58.9	58.4	...	...	...	...	60.0	59.2	51.2	49.0
5	...	...	...	...	...	...	...	...	63.0	62.5	59.3	59.0
6	...	...	...	...	...	...	...	...	51.1	50.0	66.5	66.0
7	50.1	48.9	52.0	50.2	...	...	...	...	51.0	49.9	46.2	44.0
8	50.9	49.2	48.3	45.3	...	...	...	...	47.4	45.2	47.5	42.0
9	44.8	42.7	46.6	41.6	...	...	...	...	39.12	32.8	42.0	36.5
10	43.4	41.9	44.3	40.8	...	...	...	...	41.5	33.7	38.1	31.5



APPENDIX C

TERMS AND DEFINITIONS

(Taken from Section 3 of BS4142: 2014)



Acoustic Environment

Sound from all sound sources as modified by the environment

Ambient Sound

Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far. The ambient sound comprises the residual sound and the specific sound when present.

Ambient Sound Level, $L_a = L_{Aeq,T}$

Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T. The ambient sound level is a measure of the residual sound and the specific sound when present.

Background Sound Level, $L_{A90,T}$

A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels

Equivalent Continuous A-weighted Sound Pressure Level, $L_{Aeq,T}$

Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

$$L_{Aeq,T} = 10 \lg_{10} \left\{ (1/T) \int_{t_1}^{t_2} [p_A(t)^2 / p_0^2] dt \right\}$$

where:

p_0 is the reference sound pressure (20 μ Pa); and

$p_A(t)$ is the instantaneous A-weighted sound pressure (Pa) at time t

NOTE: The equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number of decibels.

Measurement Time Interval, T_m

Total time over which measurements are taken

NOTE: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.

Rating Level, $L_{Ar,Tr}$

Specific sound level plus any adjustment for the characteristic features of the sound

Reference time interval, T_r

Specified interval over which the specific sound level is determined

NOTE: This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h.

Residual Sound

Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.





Residual Sound Level, $L_r = L_{Aeq,T}$

Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T.

Specific Sound Level, $L_s = L_{Aeq,Tr}$

Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r .

Specific Sound Source

Sound source being assessed.