

Appendix B - Air dispersion modelling contour plots (Process contributions and illustrative purposes only).

These contour maps are for illustrative purposes only.

Site layout drawing and location of proposed facility and nearby residences

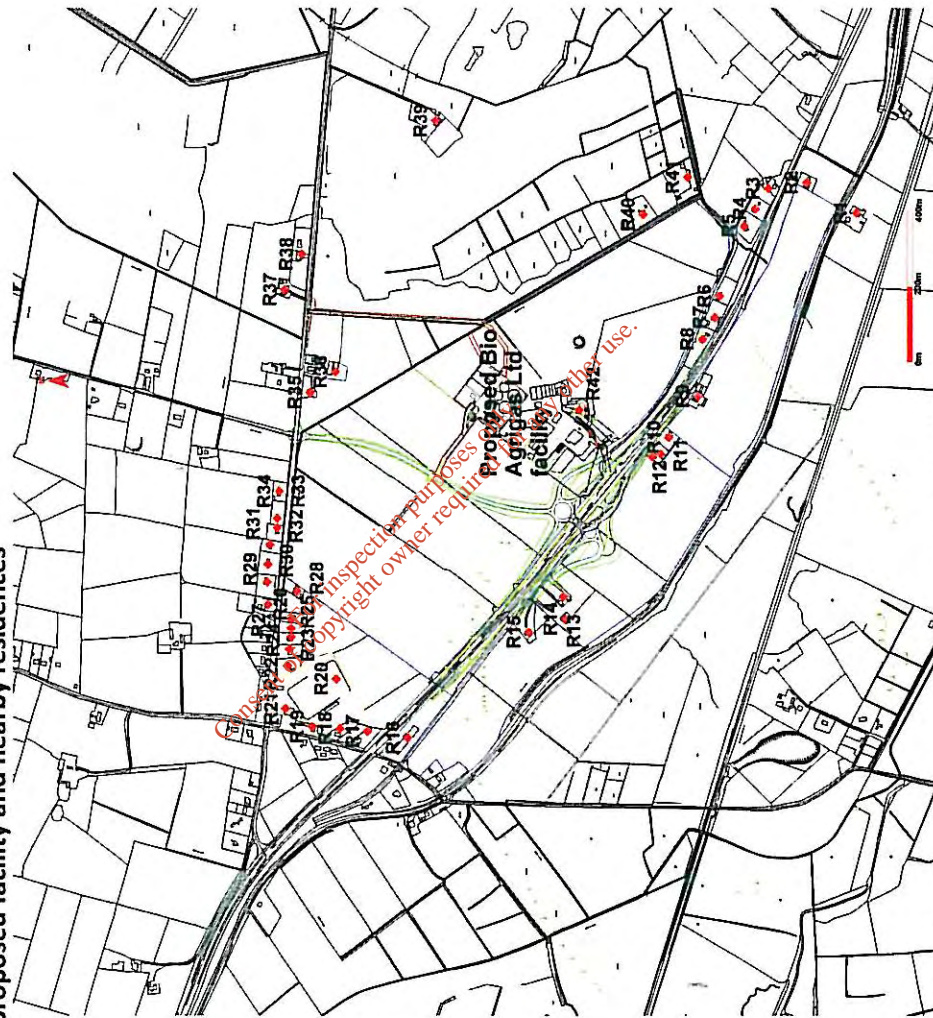


Figure 5.1. Plan view facility layout drawings for Bio Agrigas anaerobic digestion facility including specific location of nearest sensitive receptors Rec 1 to Rec 42.

Dispersion modelling contour plots for Scenarios 1 to 12 – Worst case meteorological year Clones 2004

Scenario 1 - Carbon monoxide

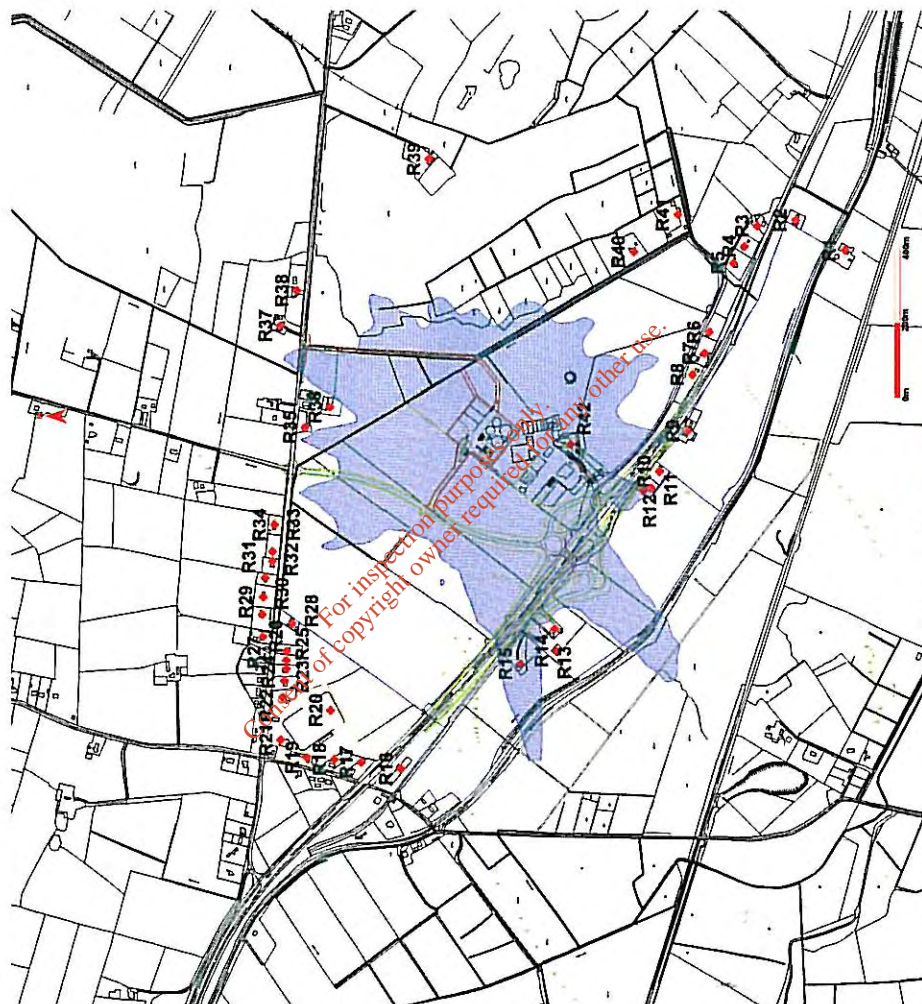


Figure 5-2. Predicted 8 hr average CO ground level concentration of $100 \mu\text{g}/\text{m}^3$ (—) for cumulative emissions from emission points AEP1 to AEP3 for Scenario 1 for Clones meteorological station (worst case year 2004) - 24 hr plant operation.

Scenario 2 and 3 - Oxides of nitrogen

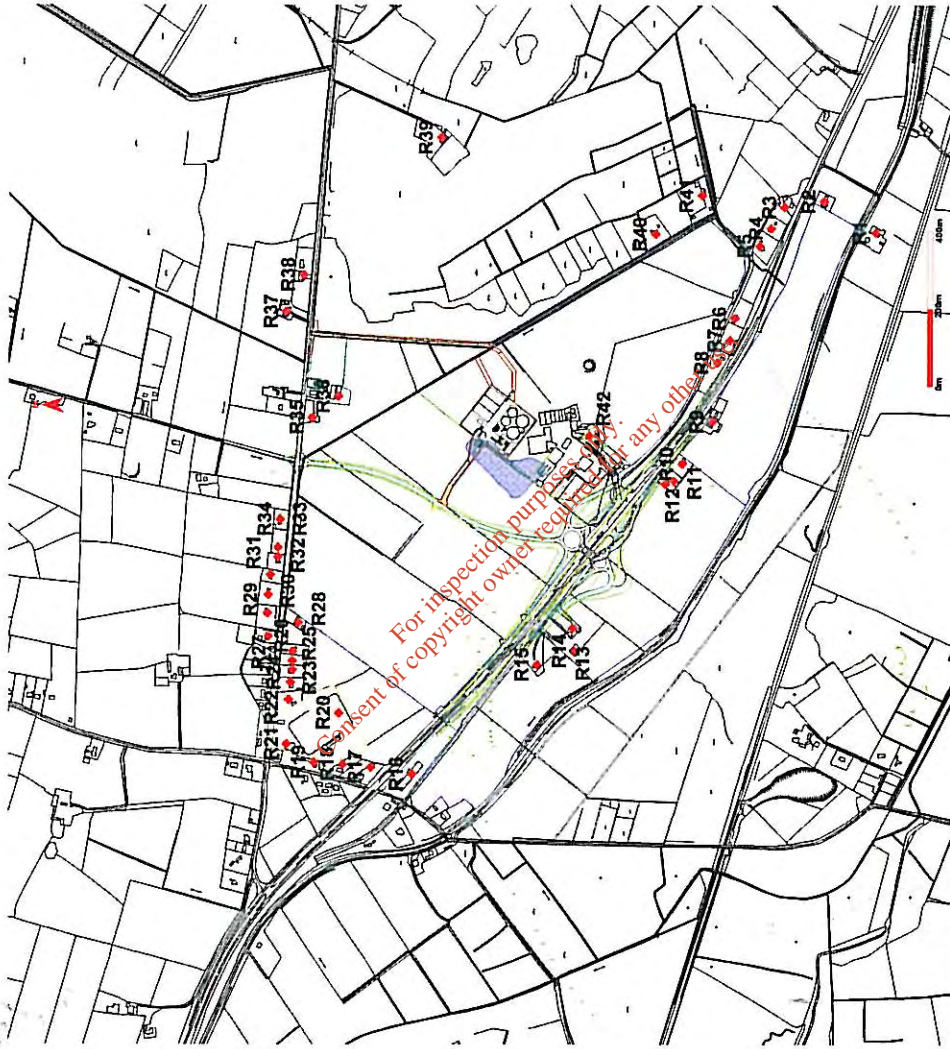


Figure 5.3. Predicted 99.79th percentile of 1 hr averages for NO₂ ground level concentration of 58 µg/m³ (—) for cumulative emission for Scenario 2 for Clones meteorological station (worst case year 2004) - 24 hr plant operation.

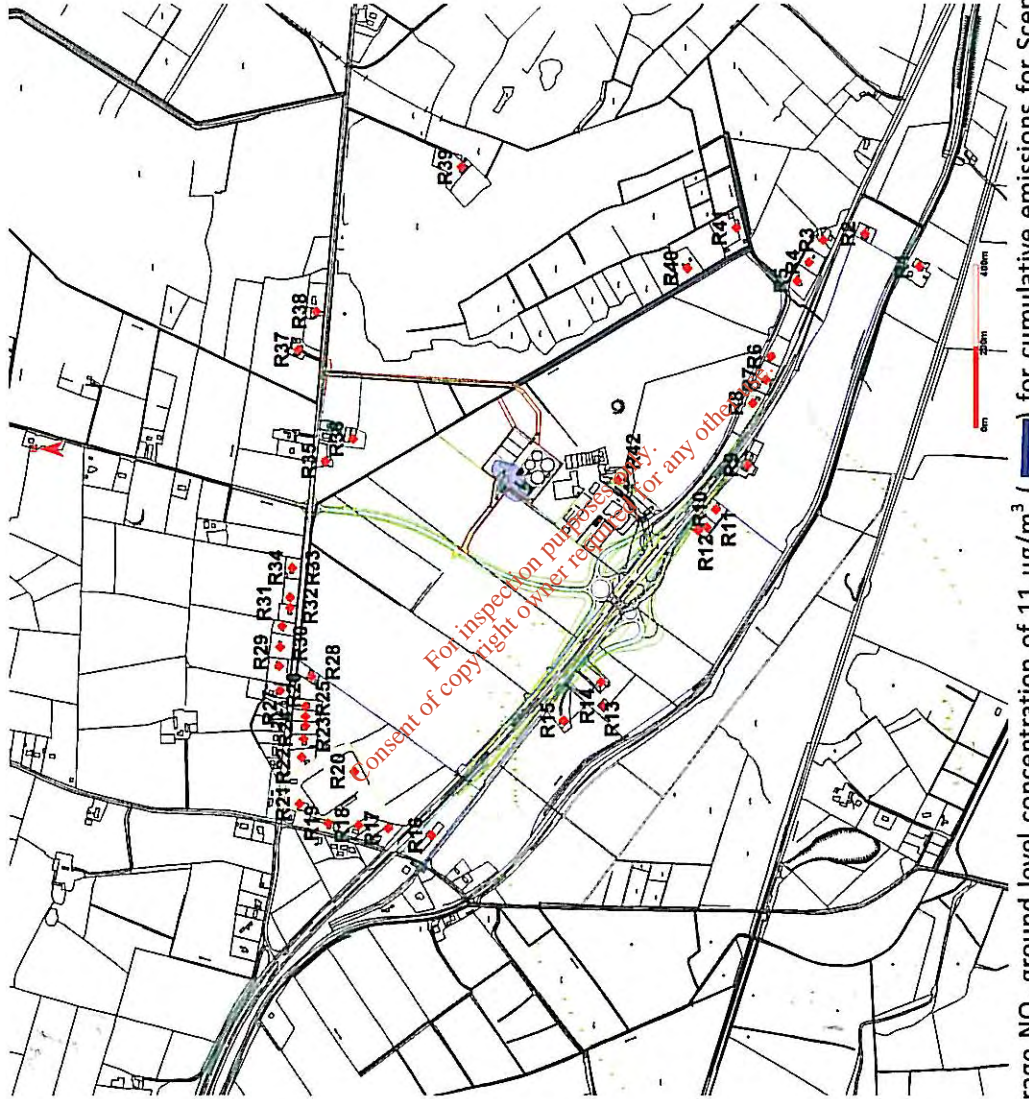


Figure 5.4. Predicted annual average NO₂ ground level concentration of 11 µg/m³ (—) for cumulative emissions for Scenario 3 for Clones meteorological station (worst case year 2004) - 24 hr plant operation.

Scenario 4, 5 and 6 - Sulphur dioxide

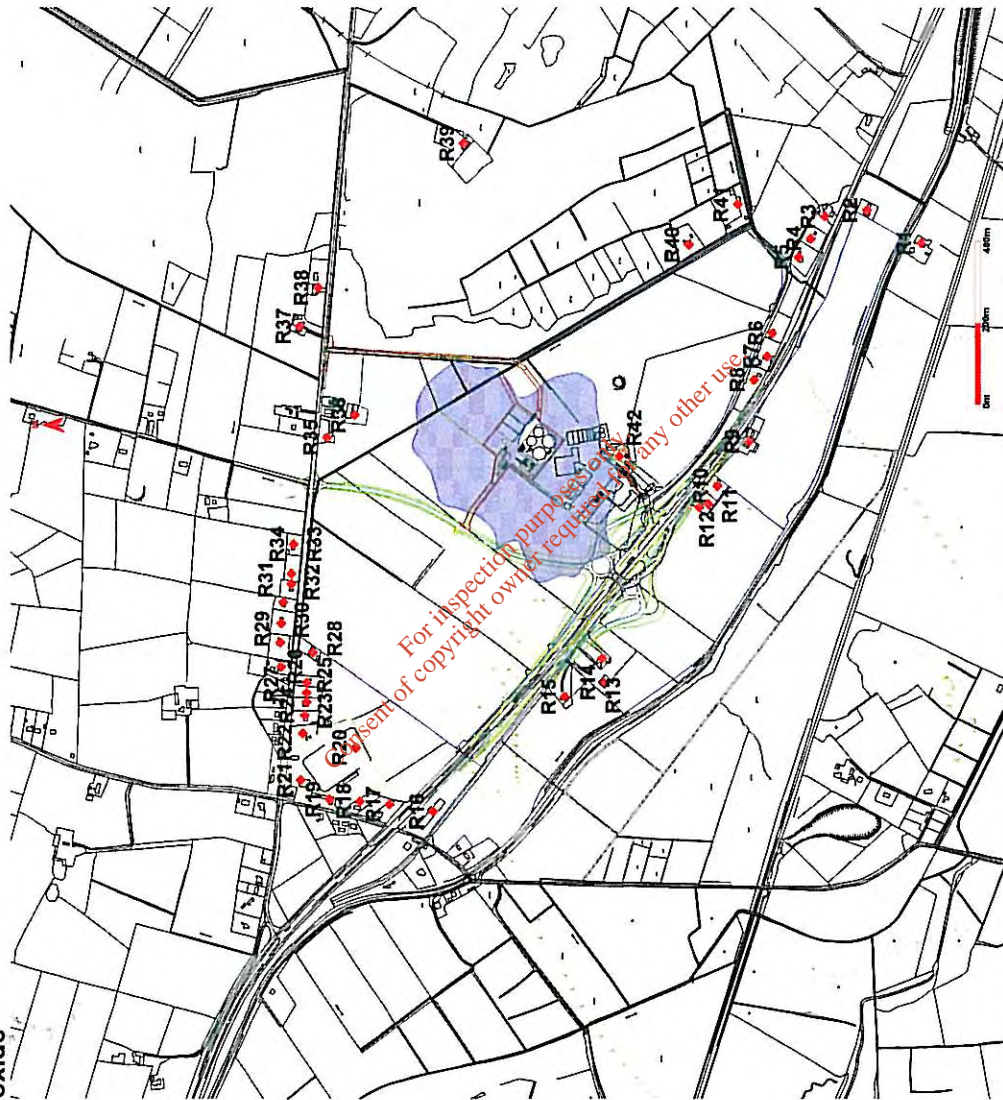


Figure 5.5. Predicted 99.73th percentile of 1 hr averages for SO₂ ground level concentration of 35 µg/m³ () for cumulative emission for Scenario 4 for Clones meteorological station (worst case year 2004) - 24 hr plant operation.

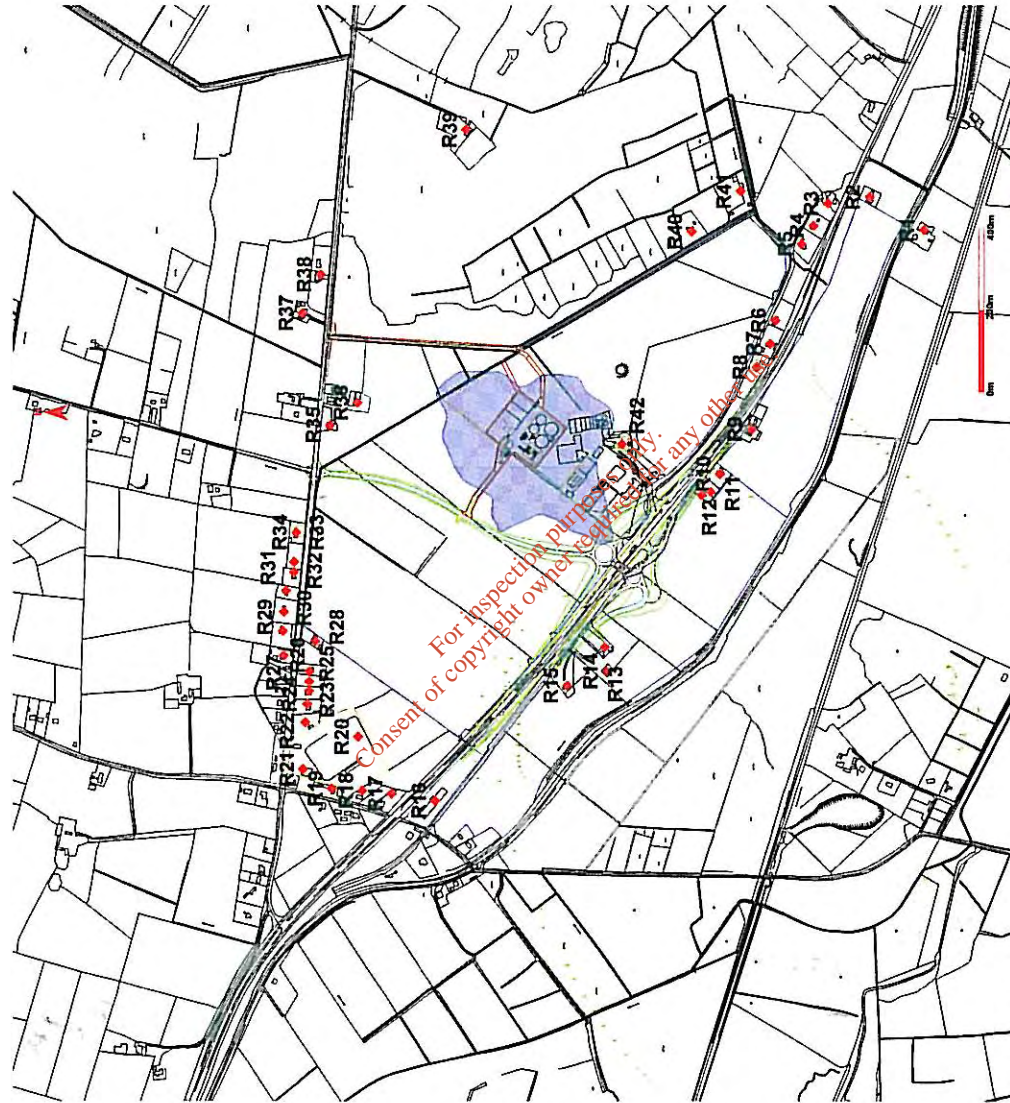


Figure 5.6. Predicted 99.18th percentile of 24 hr averages for SO₂ ground level concentration of 10 µg/m³ (—) for cumulative emission for Scenario 5 for Clones meteorological station (worst case year 2004) - 24 hr plant operation.

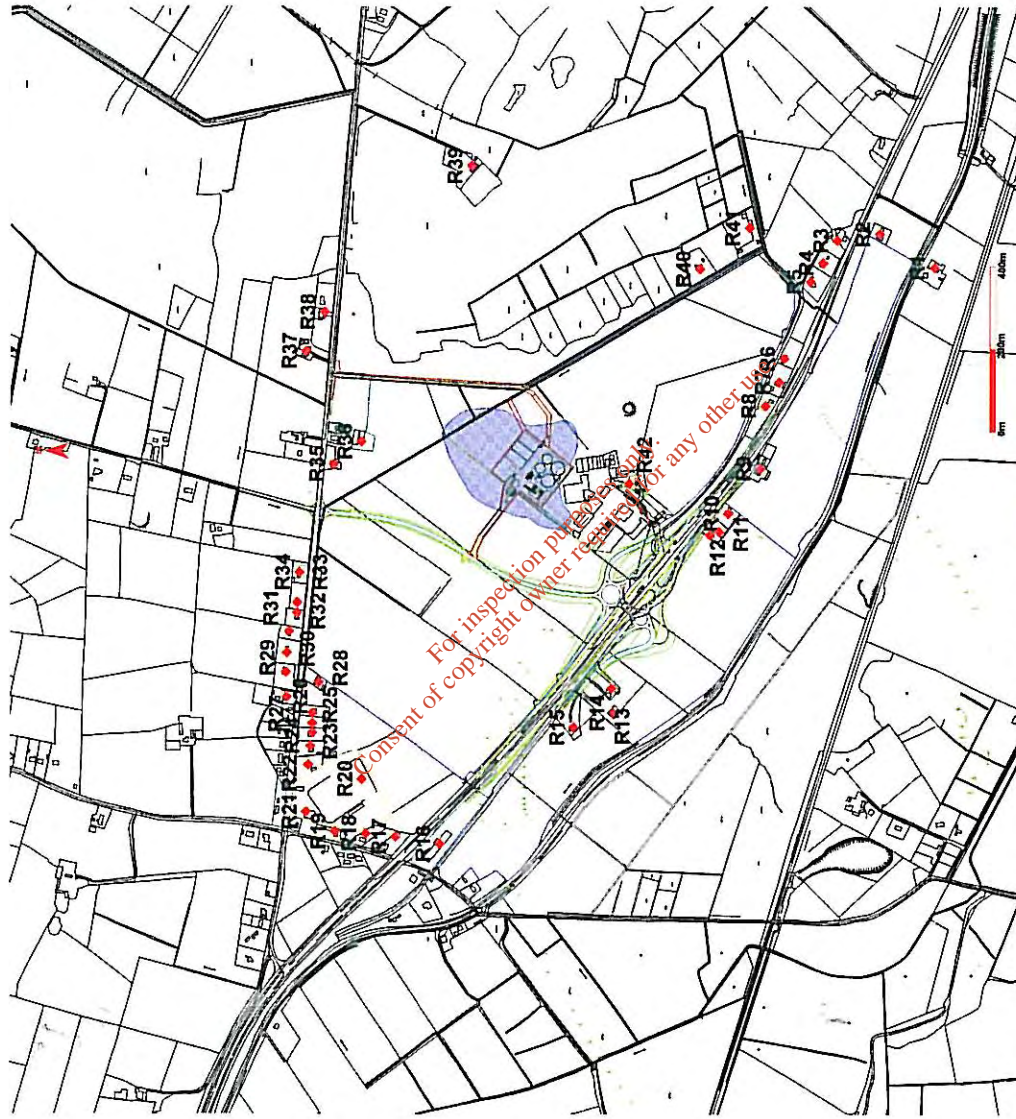


Figure 5.7. Predicted annual average SO₂ ground level concentration of 2 µg/m³ (—) for cumulative emissions for Scenario 6 for Clones meteorological station (worst case year 2004) - 24 hr plant operation.

Scenario 7, 8, 9 and 10 - Total particulates



Figure 5.8. Predicted 98.08th percentile of 24 hr averages for Total particulates ground level concentration of 10 µg/m³ (—) for cumulative emission for Scenario 7 for Clones meteorological station (worst case year 2004) - 24 hr plant operation.

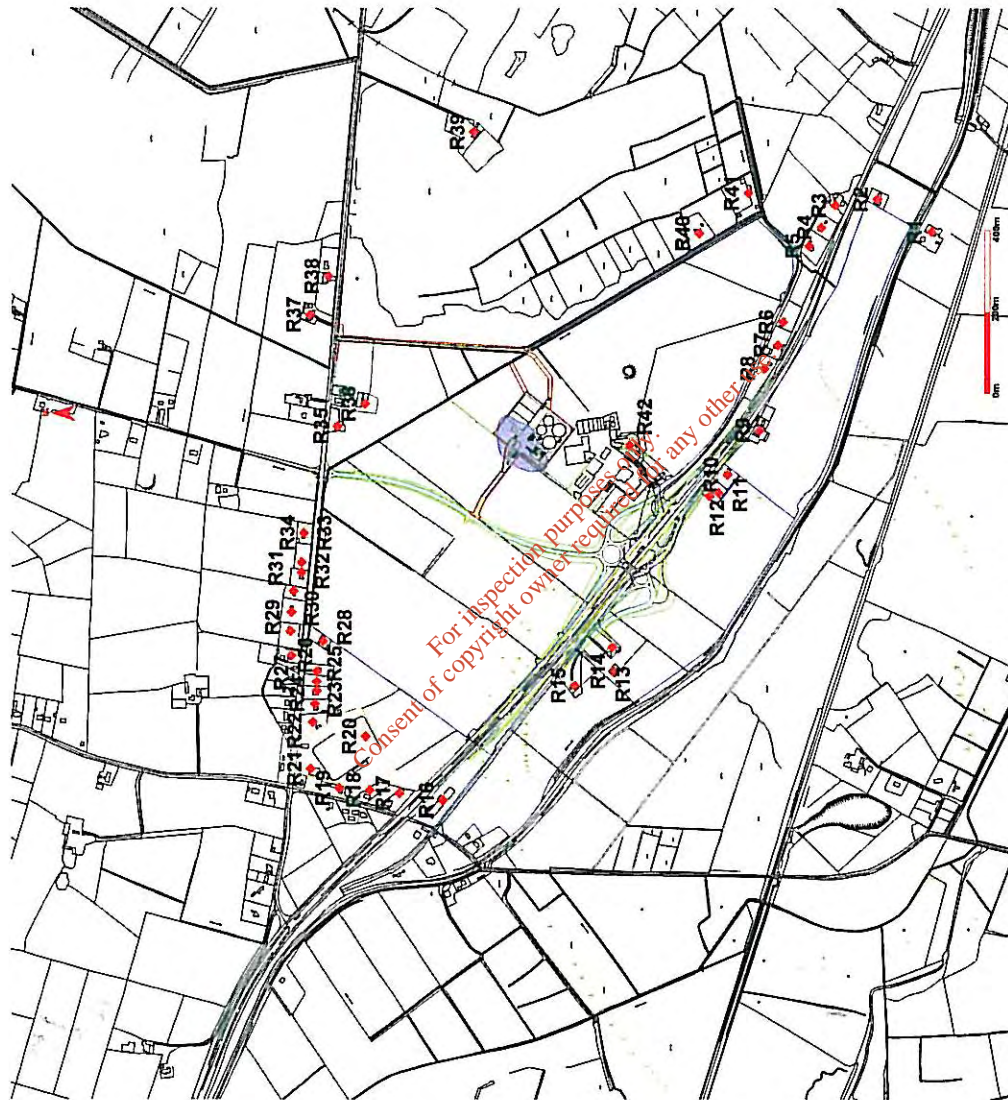


Figure 5.9. Predicted 90.40th percentile of 24 hr averages for Total particulates ground level concentration of 10 µg/m³ (—) for cumulative emission for Scenario 8 for Clones meteorological station (worst case year 2004) - 24 hr plant operation.

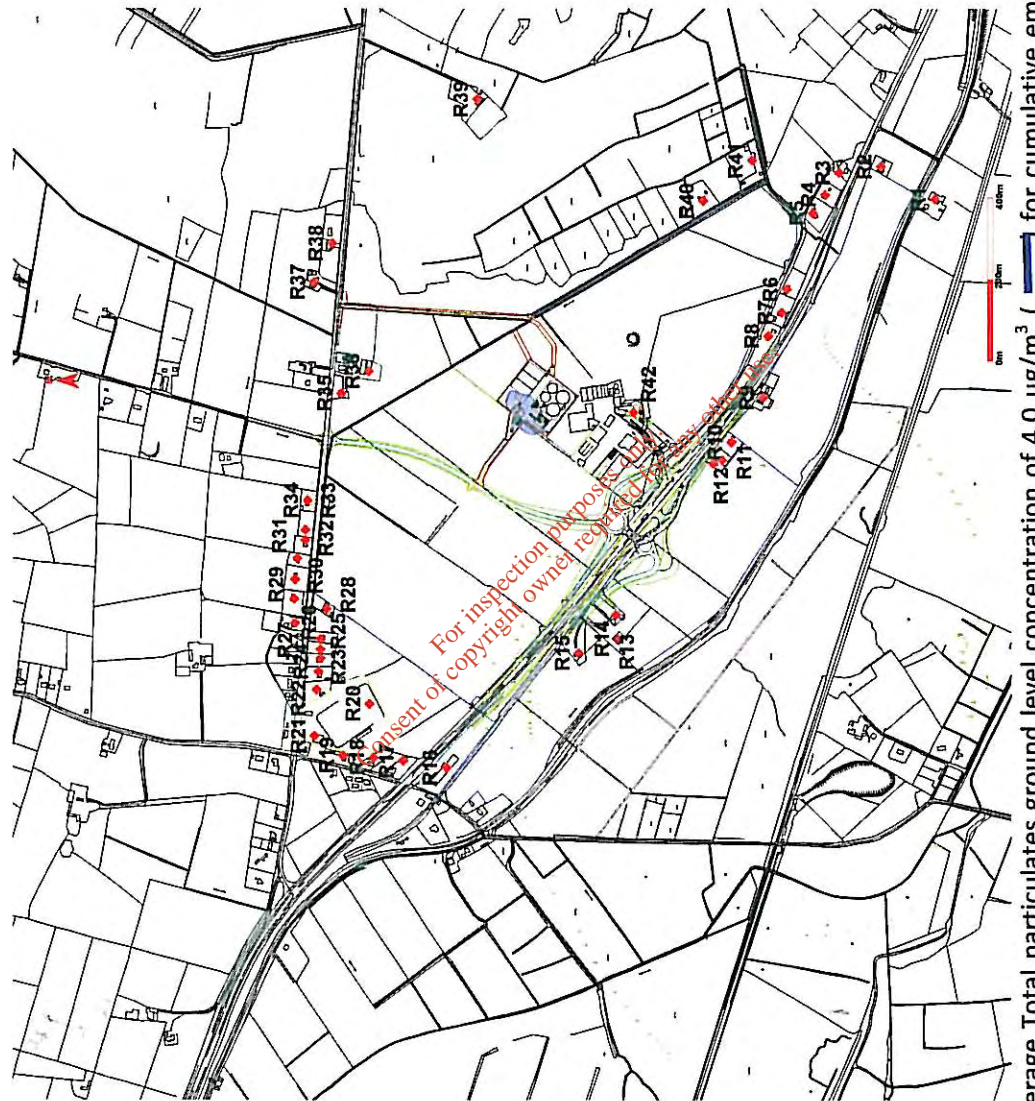


Figure 5.10. Predicted annual average Total particulates ground level concentration of $4.0 \mu\text{g}/\text{m}^3$ () for cumulative emissions for Scenario 9 for Clones meteorological station (worst case year 2024) - 24 hr plant operation.

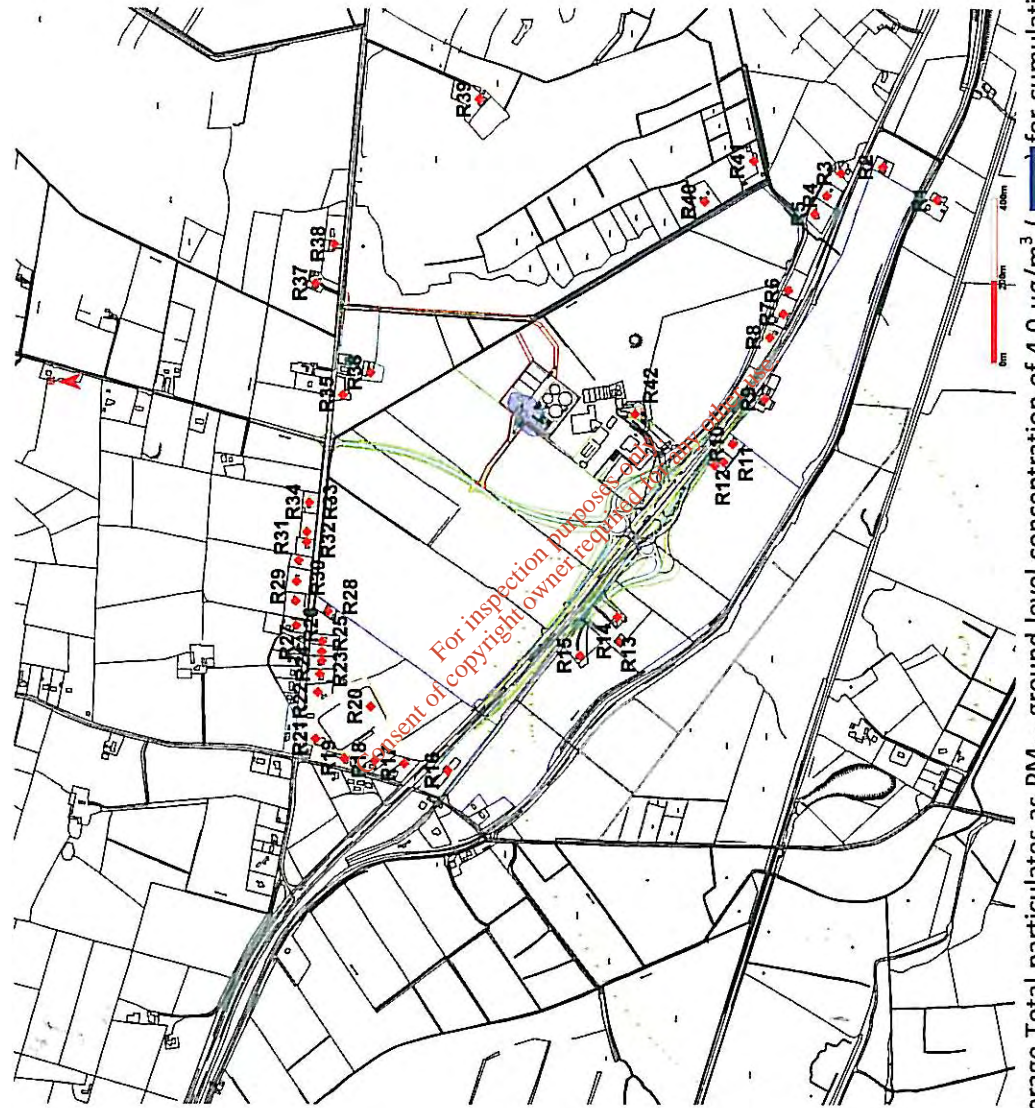


Figure 5.11. Predicted annual average Total particulates as PM_{2.5} ground level concentration of 4.0 µg/m³ (—) for cumulative emissions for Scenario 10 for Clones meteorological station (worst case year 2004) - 24 hr plant operation.

Scenario 11 – TNMVOC as Benzene

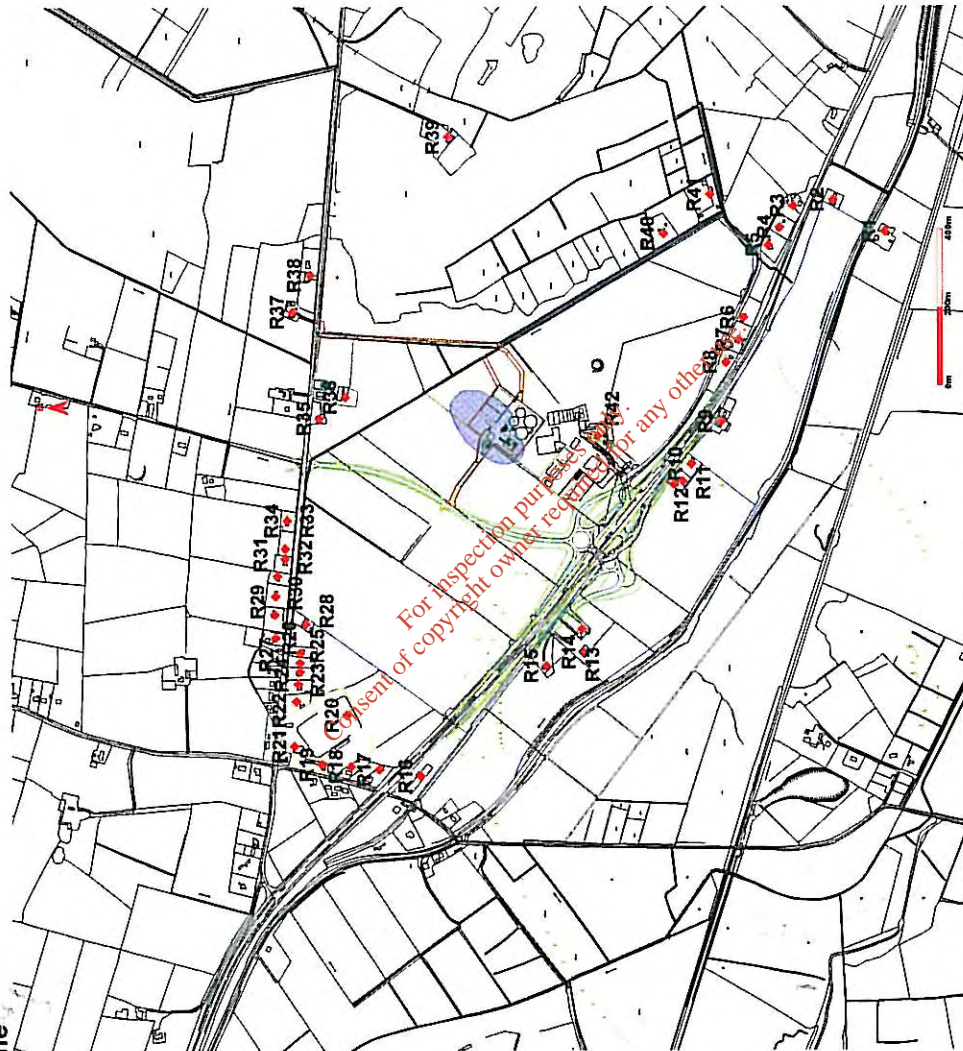


Figure 5.12. Predicted annual averages for TNMVOC as Benzene ground level concentration of $1.0 \mu\text{g}/\text{m}^3$ () for cumulative emission for Scenario 11 for Clones meteorological station (worst case year 2004) - 24 hr plant operation.

Scenario 12 – Odour

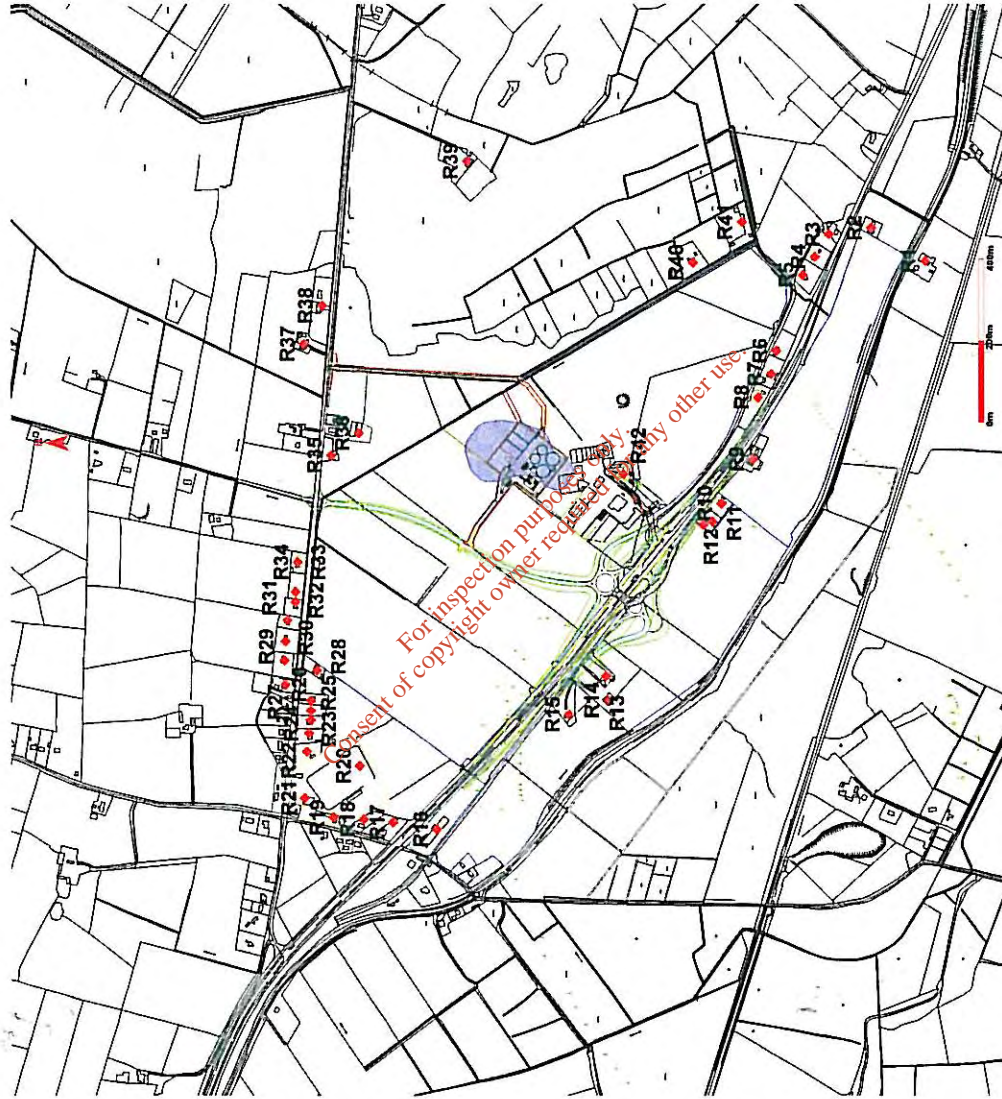


Figure 5.13. Predicted 98th percentile of 1 hr averages for an Odour ground level concentration of less than or equal to 1.0 Ou_E/m³ (—) for cumulative emission for Scenario 13 for Clones meteorological station (worst case year 2004) - 24 hr plant operation.

Meteorological data used within the Dispersion modelling study.

Meteorological file Clones 2002 to 2006 inclusive

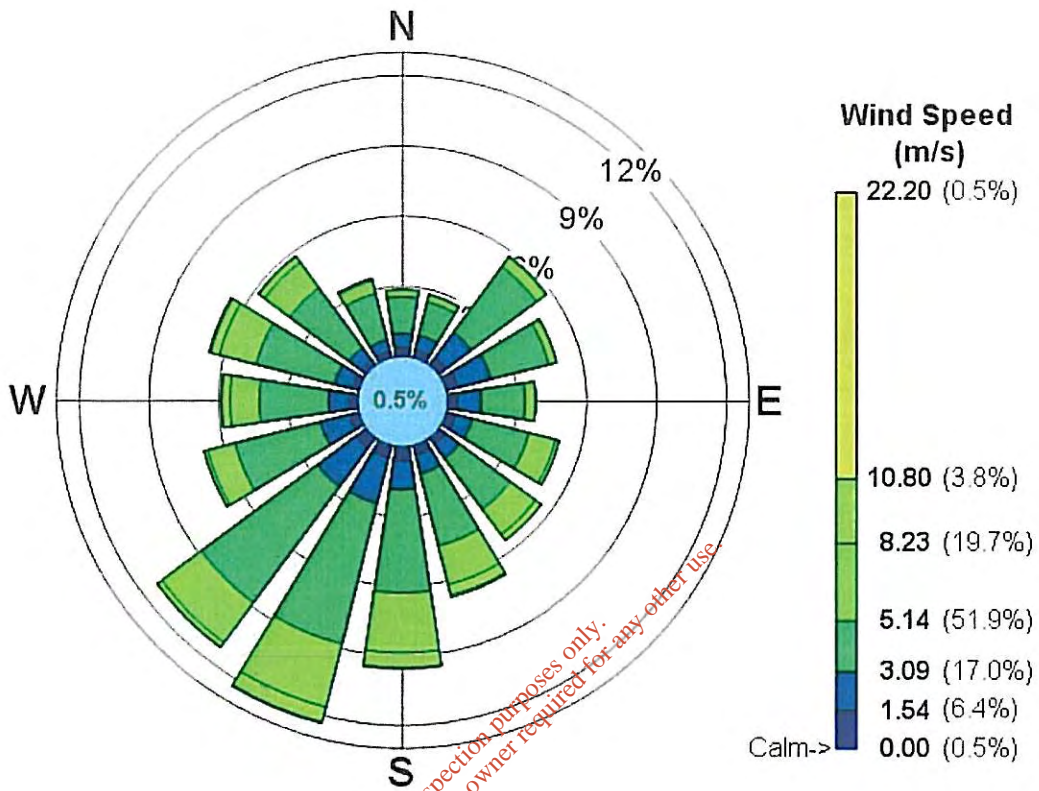


Figure 5.14. Schematic illustrating windrose for meteorological data used for atmospheric dispersion modelling, Clones 2002 to 2006 inclusive.

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Table 5.10. Cumulative wind speed and direction for meteorological data used for atmospheric dispersion modelling Clones 2002 to 2006 inclusive.

Cumulative Wind Speed Categories							
Relative Direction	> 1.54	>3.09	>5.14	>8.23	> 10.80	< 10.80	Total
0	0.36	0.62	1.57	0.30	0.02	0.00	2.87
22.5	0.34	0.65	1.49	0.31	0.02	0.00	2.79
45	0.39	1.36	3.49	0.50	0.03	0.00	5.77
67.5	0.52	1.47	2.56	0.35	0.01	0.00	4.90
90	0.41	1.04	1.89	0.44	0.02	0.00	3.79
112.5	0.40	0.76	2.51	1.20	0.16	0.00	5.02
135	0.35	0.75	2.74	1.34	0.30	0.02	5.50
157.5	0.40	0.84	3.20	1.72	0.47	0.09	6.73
180	0.59	1.24	4.45	2.58	0.63	0.06	9.56
202.5	0.53	2.03	6.24	2.82	0.67	0.06	12.35
225	0.55	2.06	6.24	2.14	0.24	0.03	11.26
247.5	0.41	1.29	3.80	1.23	0.14	0.01	6.88
270	0.35	0.90	2.98	1.27	0.35	0.05	5.89
292.5	0.26	0.81	3.48	1.65	0.39	0.08	6.67
315	0.27	0.67	3.20	1.34	0.29	0.05	5.81
337.5	0.26	0.51	2.05	0.56	0.08	0.01	3.48
Total	6.39	17.00	51.87	19.74	3.80	0.47	99.28
Calms	--	-	-	-	-	-	0.48
Missing	-	-	-	-	-	-	0.24
Total	-	-	-	-	-	-	100.00

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Checklist for EPA requirements for air dispersion modelling reporting**Table 5.11.** EPA checklist as taken from their air dispersion modelling requirements report.

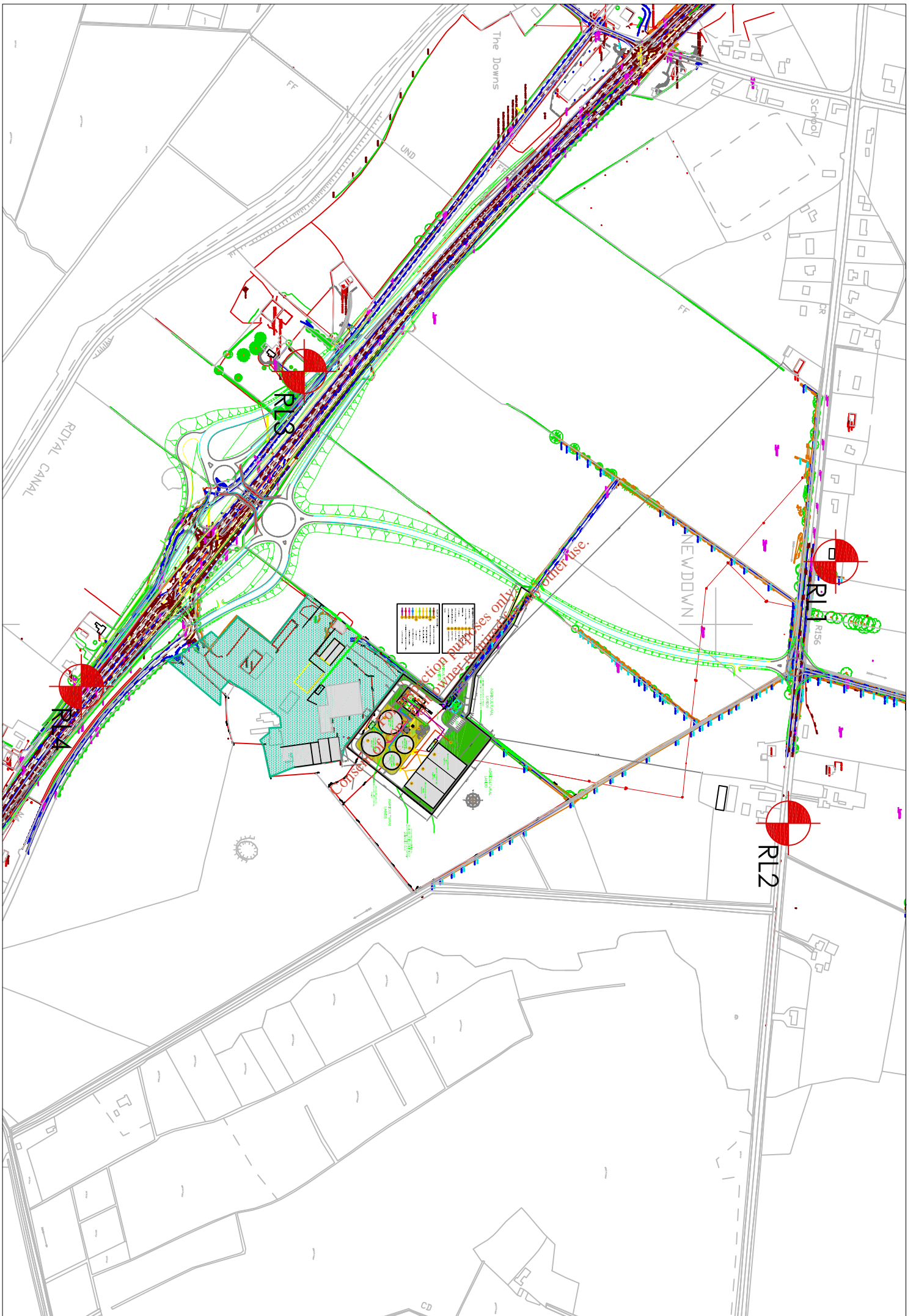
Item	Yes/No	Reason for omission/Notes
Location map	Section 6	-
Site plan	Section 6	-
List of pollutants modelled and relevant air quality guidelines	Yes	-
Details of modelled scenarios	Yes	-
Model description and justification	Yes	-
Special model treatments used	Yes	-
Table of emission parameters used	Yes	-
Details of modelled domain and receptors	Yes	-
Details of meteorological data used (including origin) and justification	Yes	-
Details of terrain treatment	Yes	-
Details of building treatment	Yes	-
Details of modelled wet/dry deposition	N/A	-
Sensitivity analysis	Yes	Five years of hourly sequential data screened from nearest valid met station-Clones 2002 to 2006.
Assessment of impacts	Yes	Pollutant emissions assessment from process identified.
Model input files	No	DVD will be sent upon request. Files are a total of 3.1 GB in size.

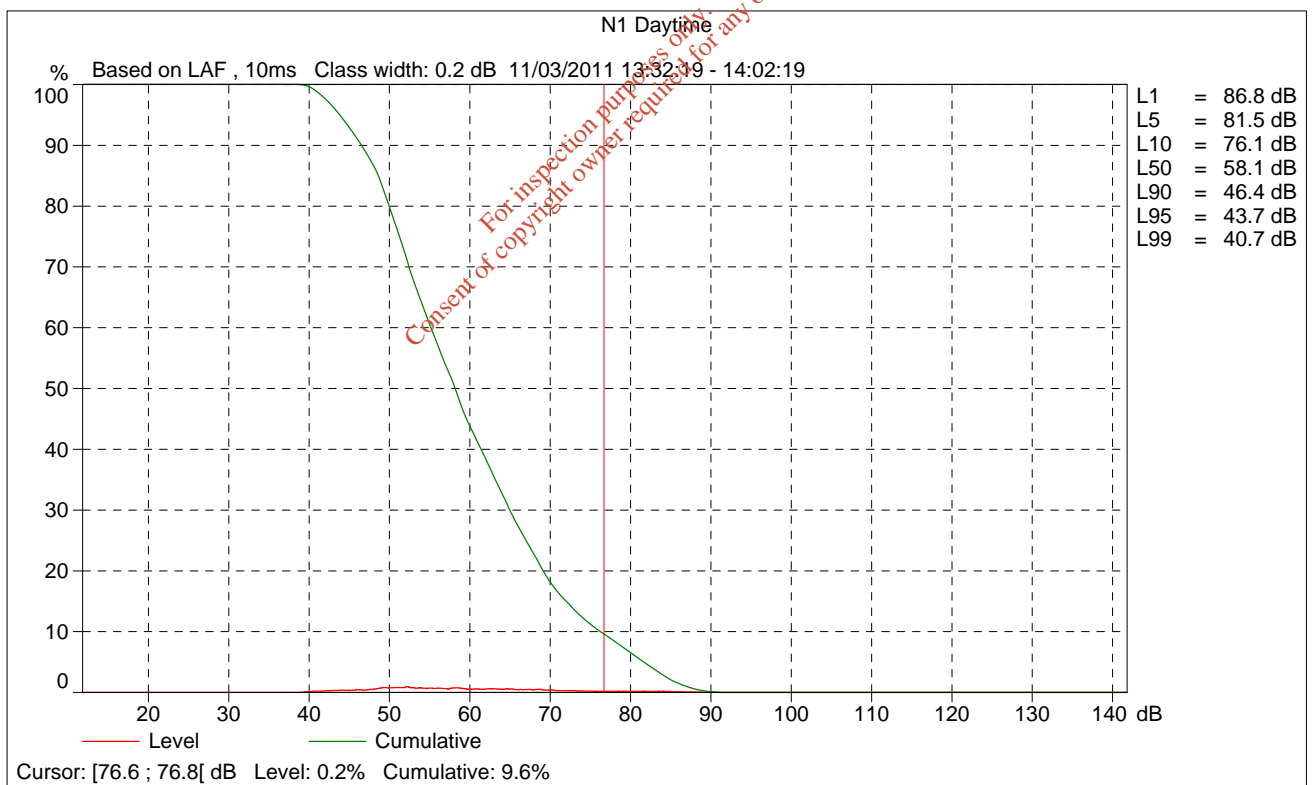
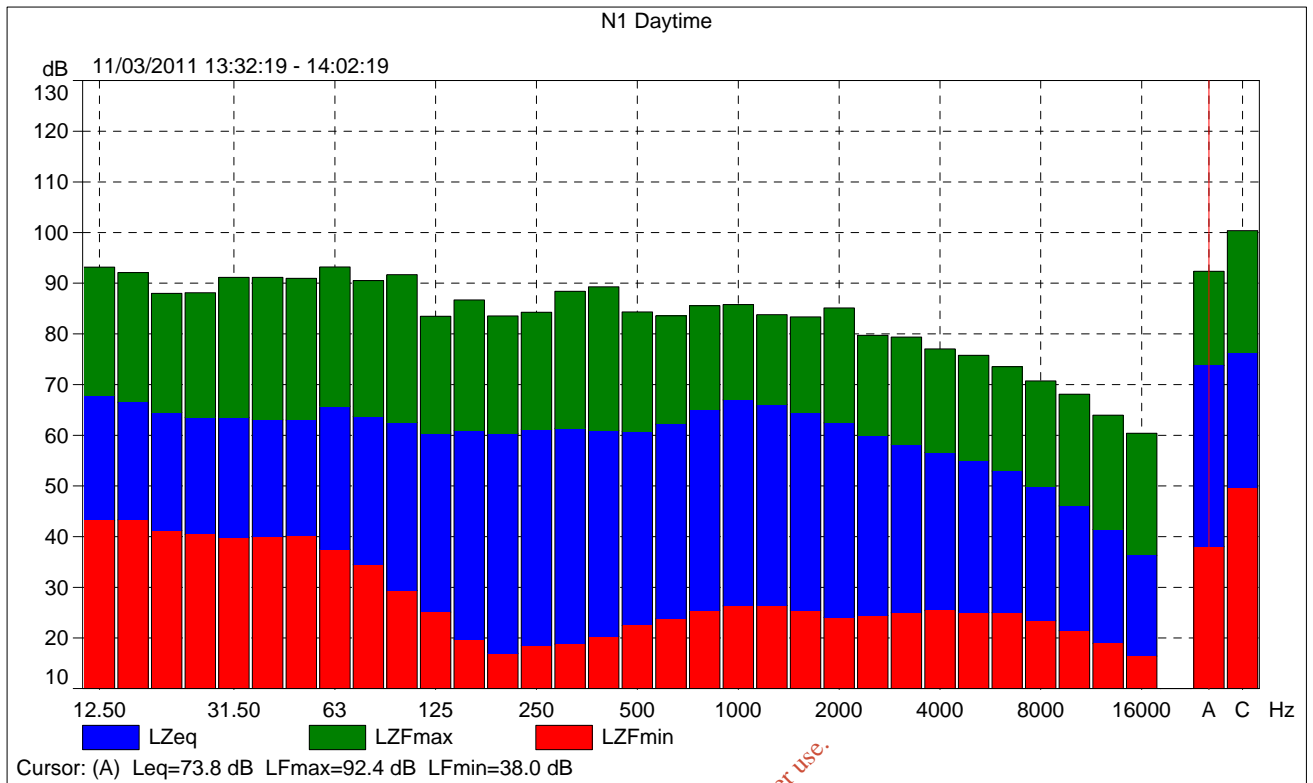
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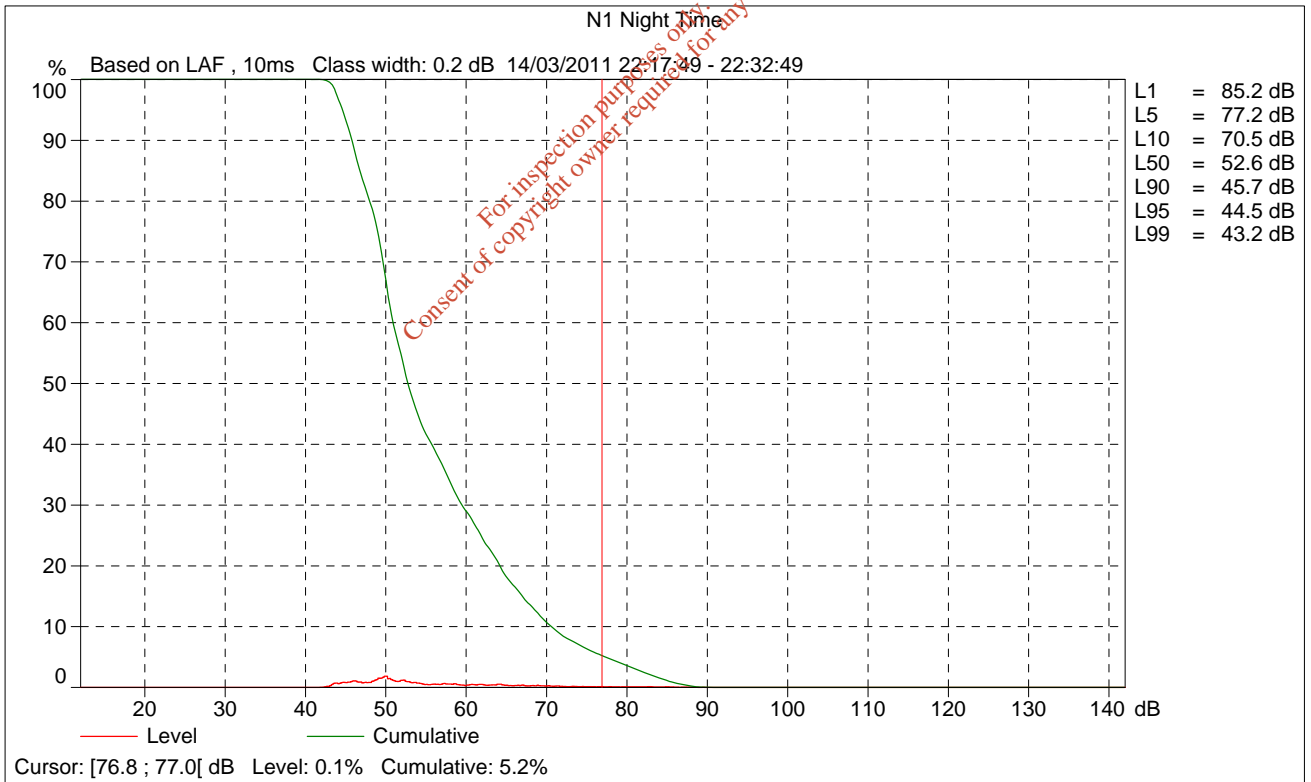
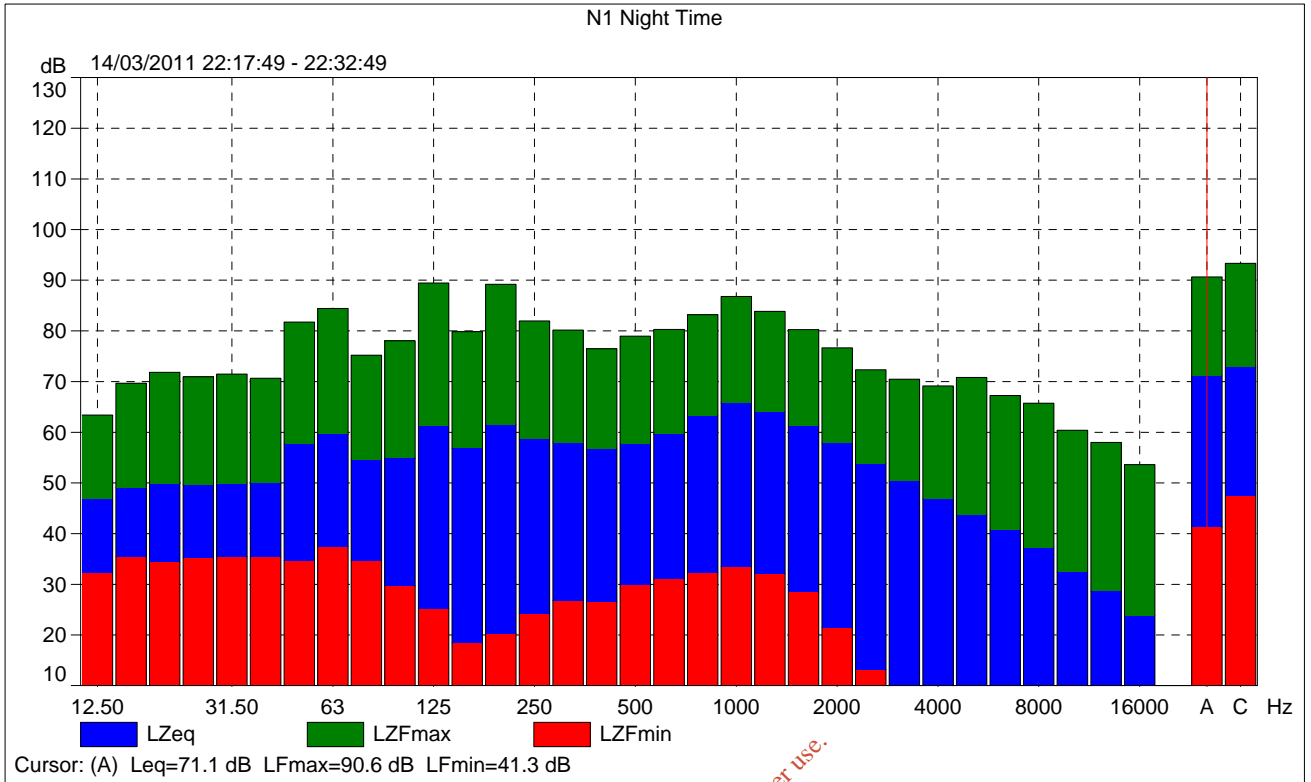
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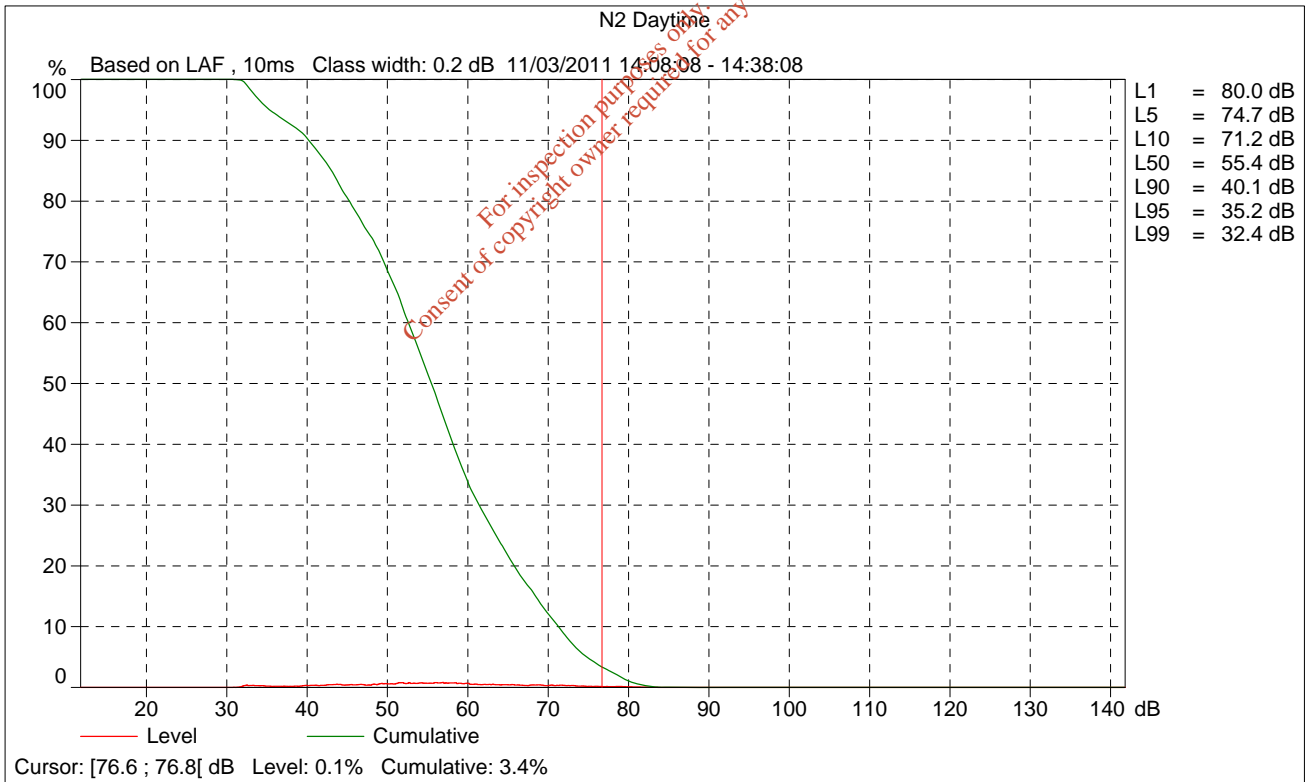
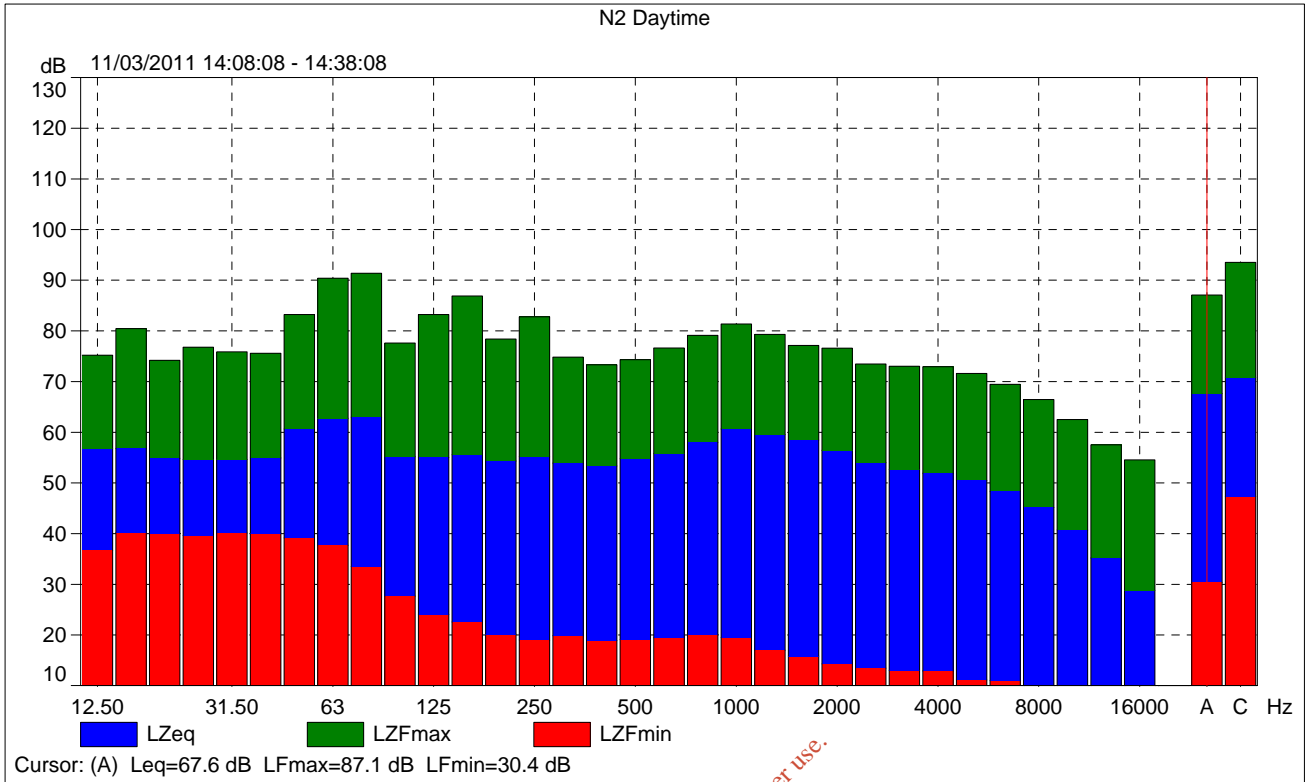
Appendix C

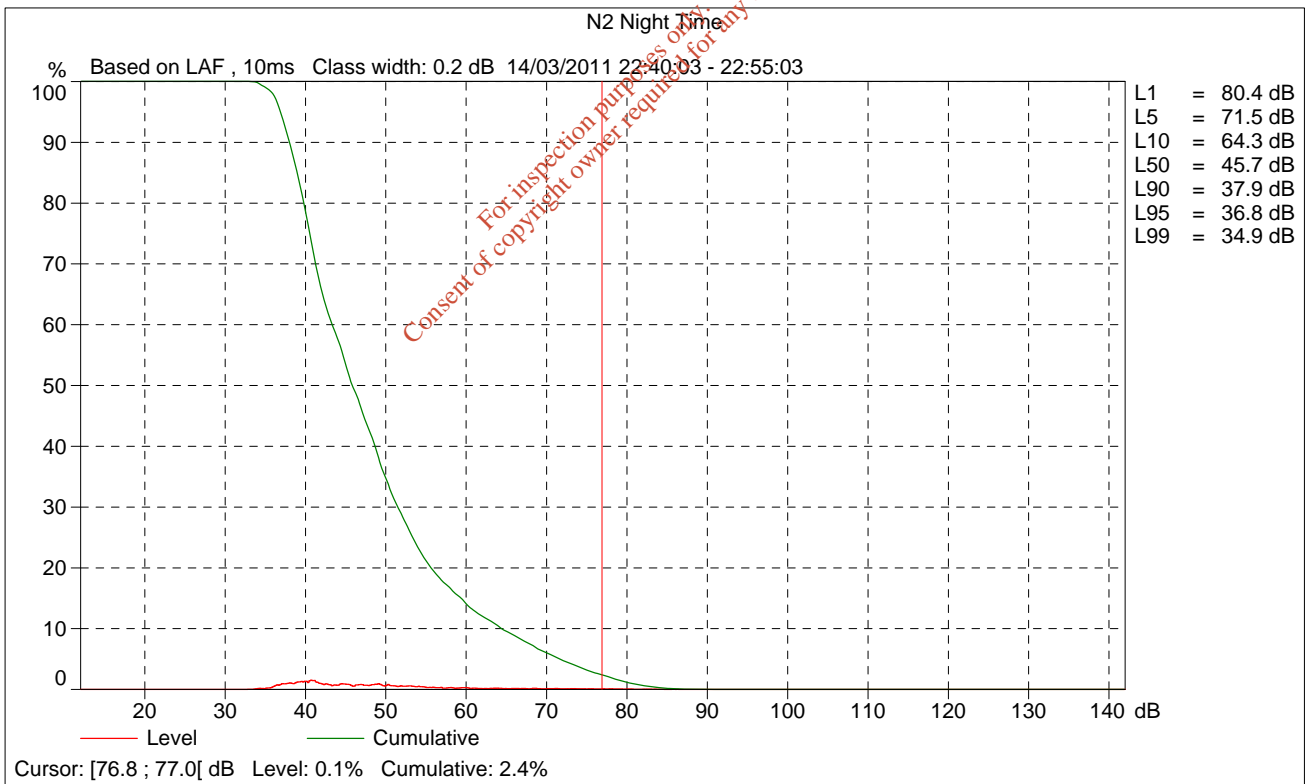
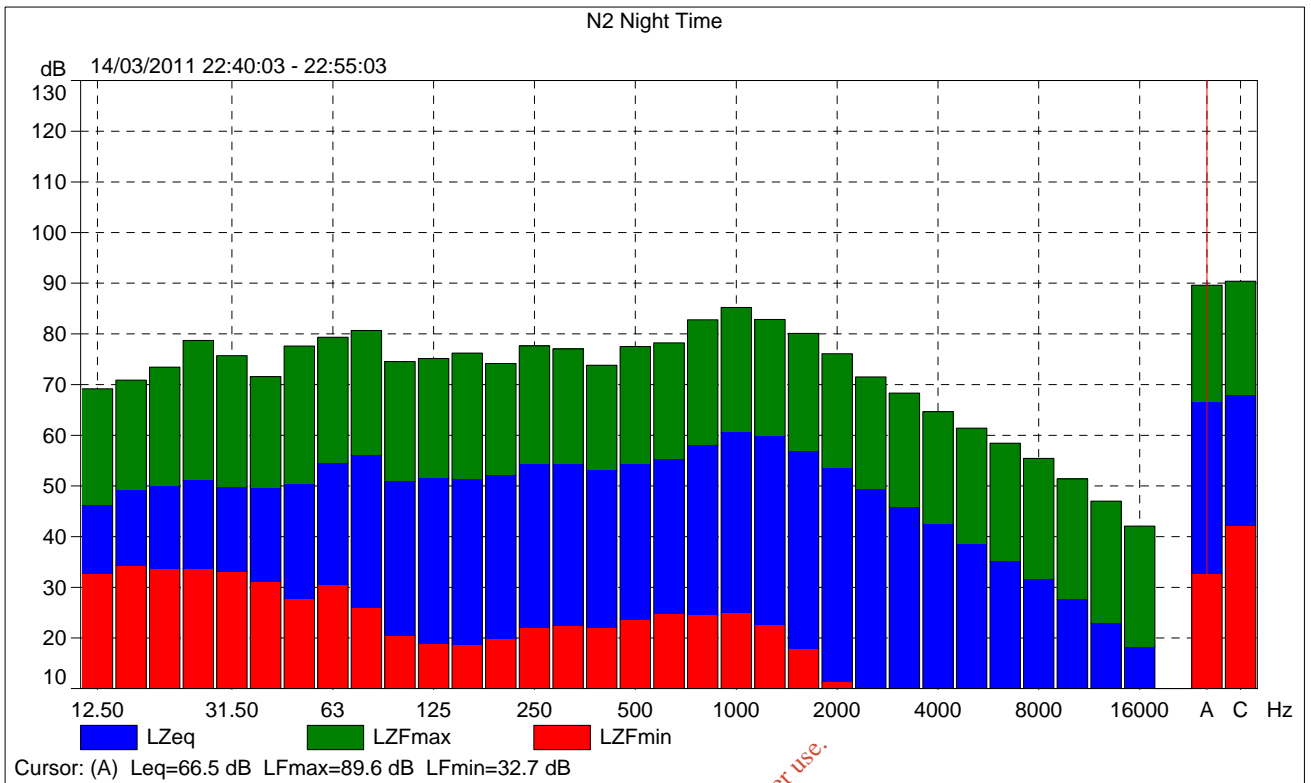
**Receiver Locations
Noise Measurement Graphs
Predicted Worst Case Scenario (No Attenuation)
Calibration Certificates
Further Information Report October – December 2011**

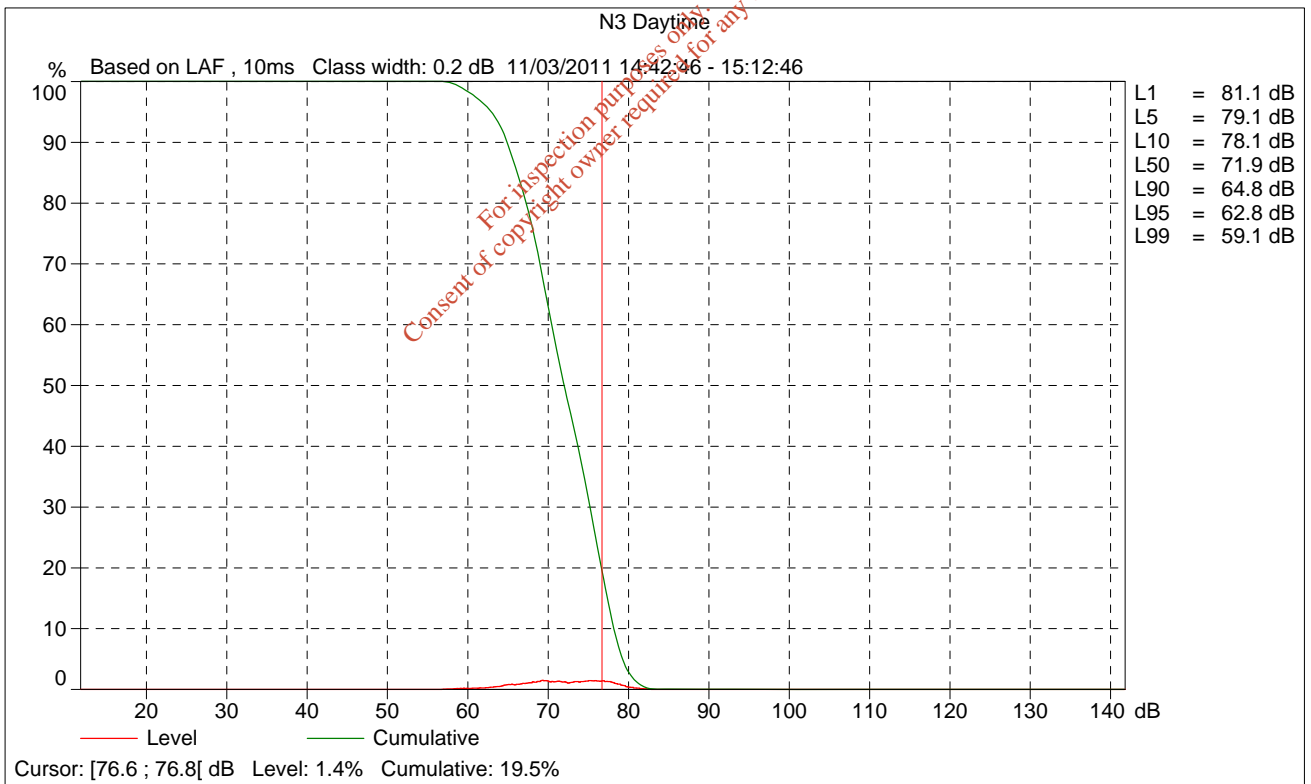
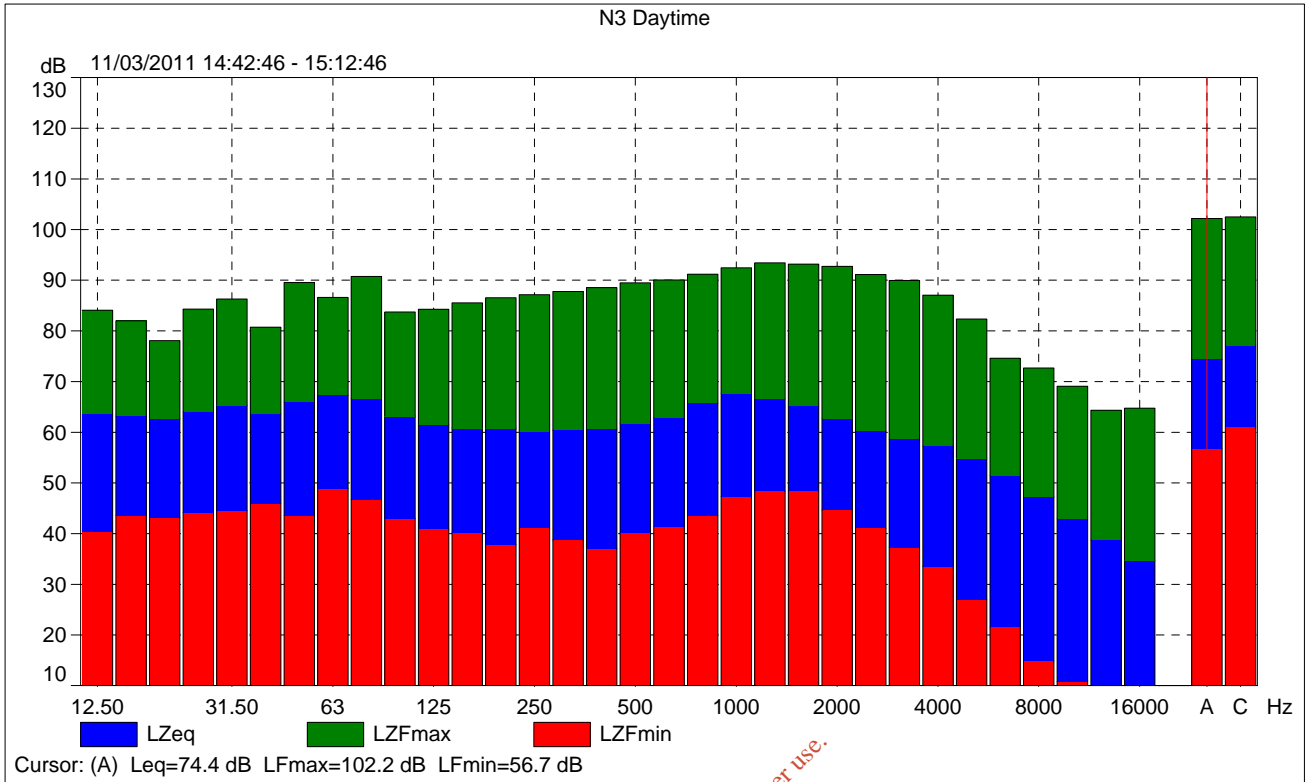


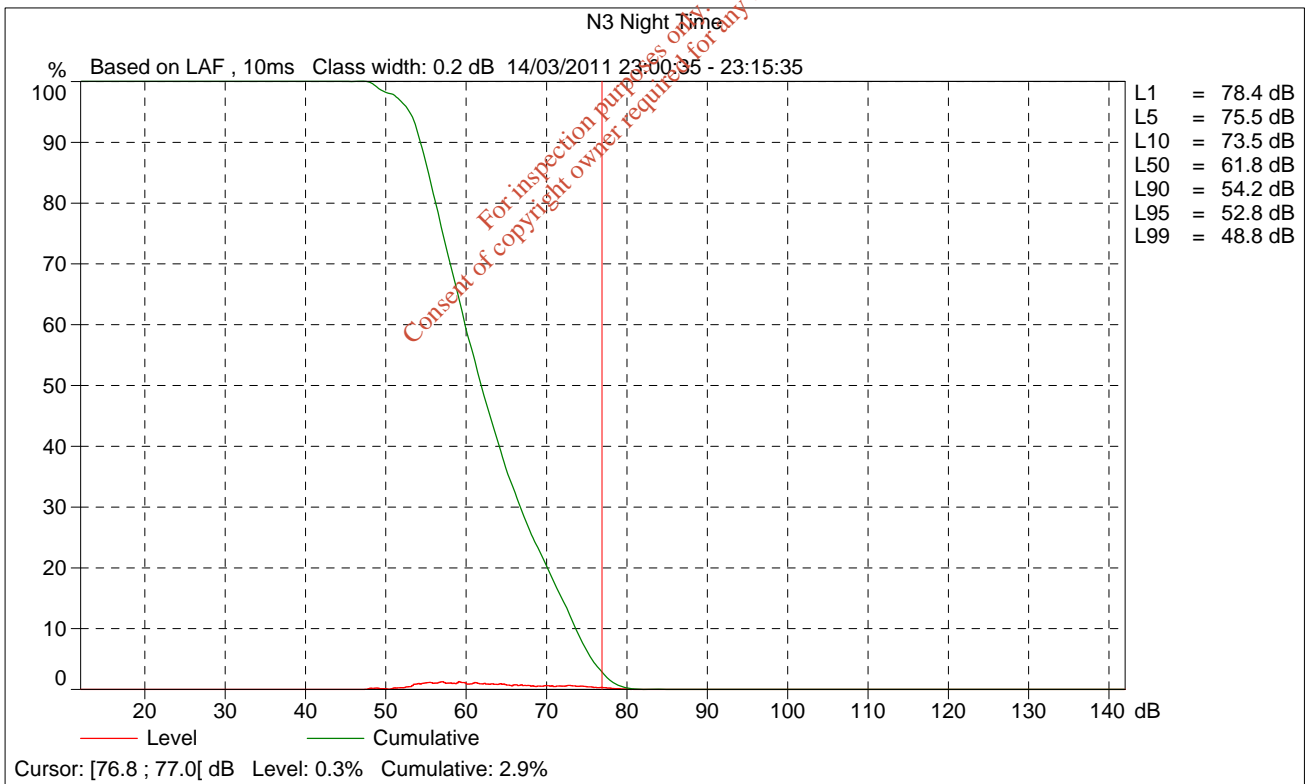
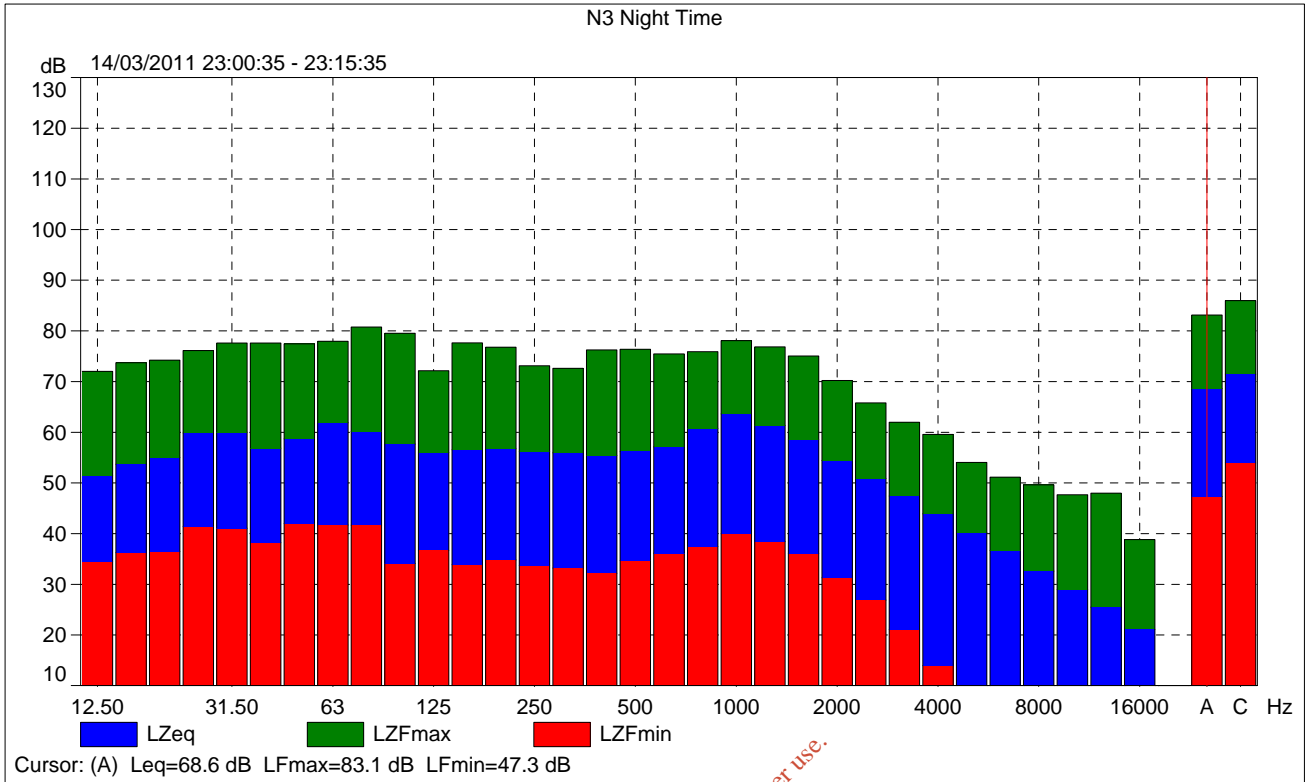


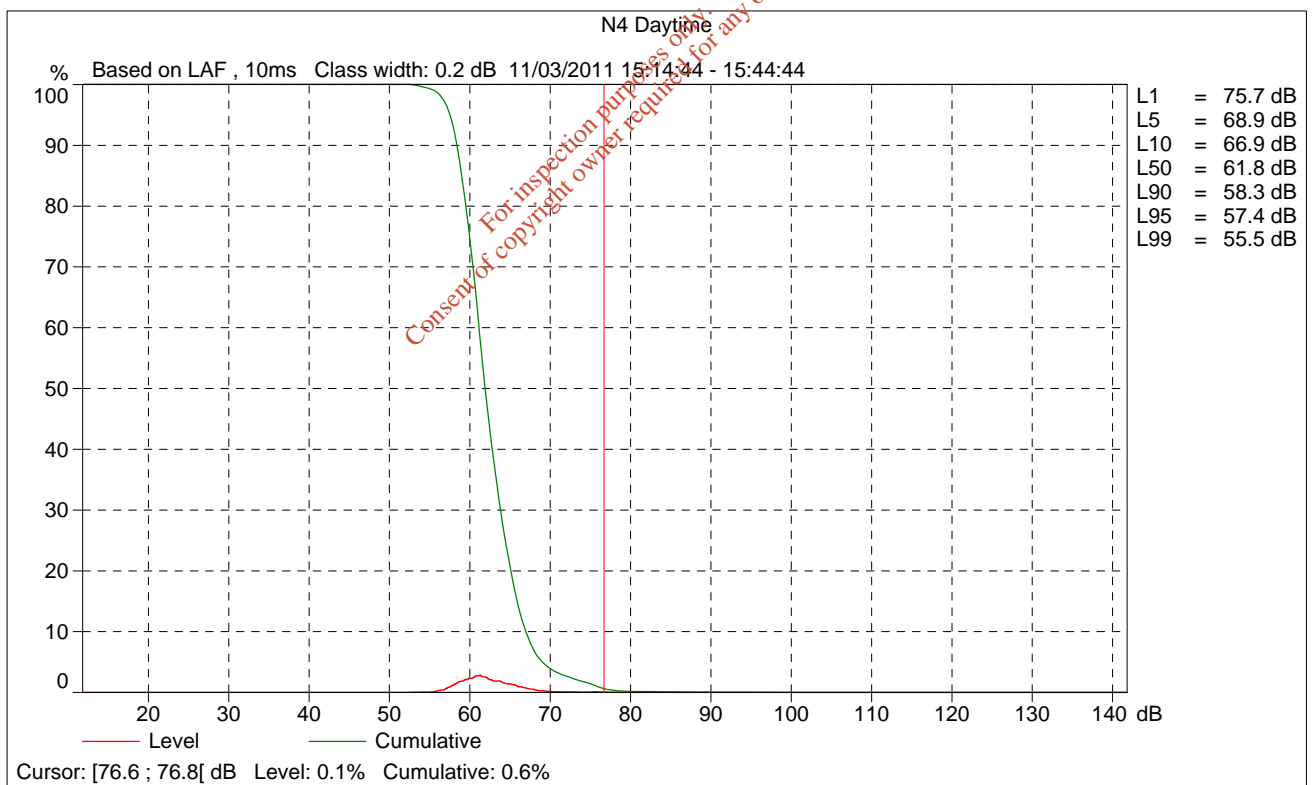
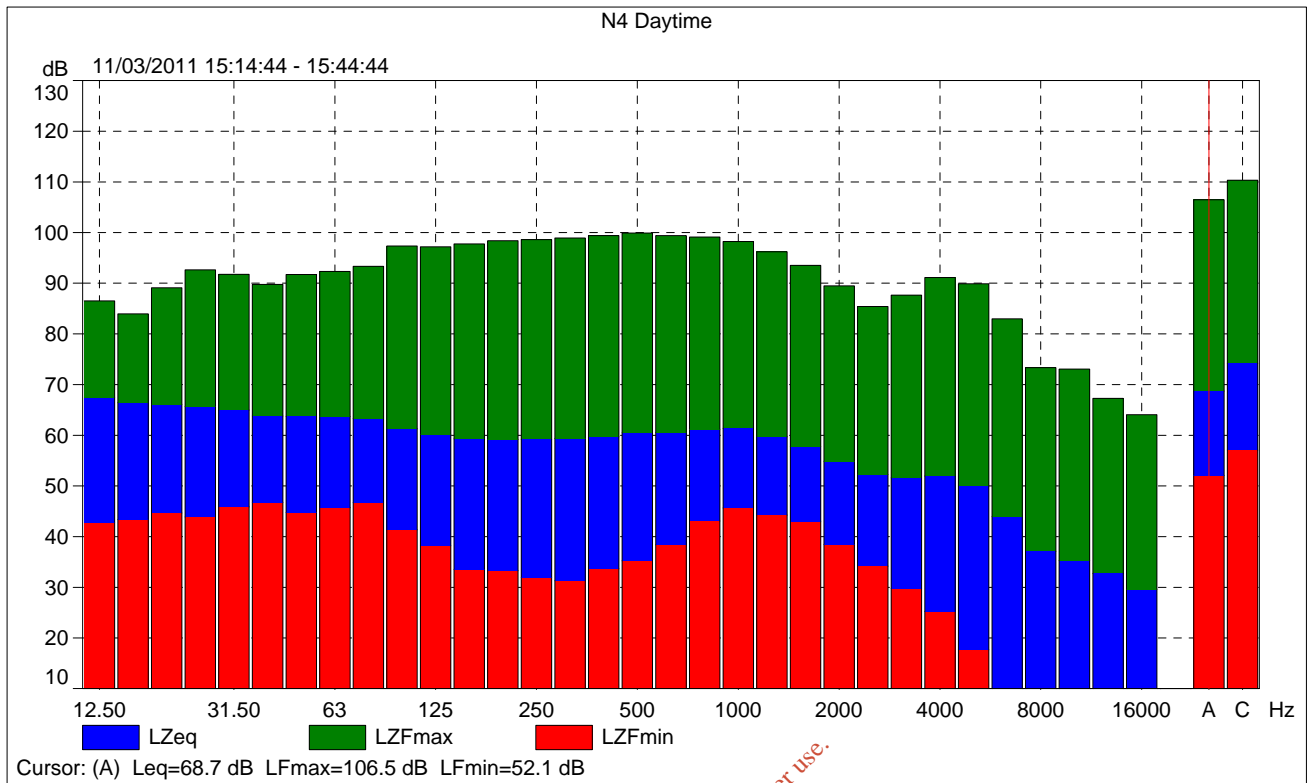


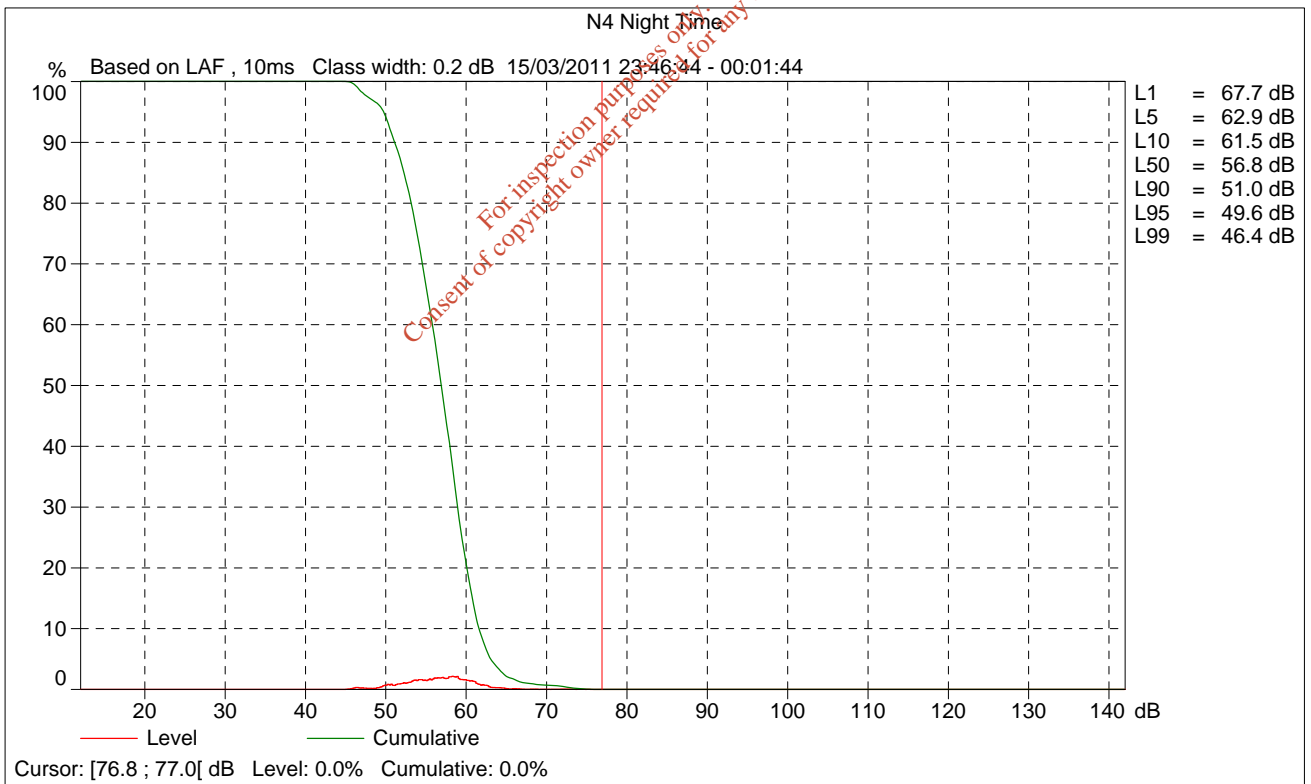
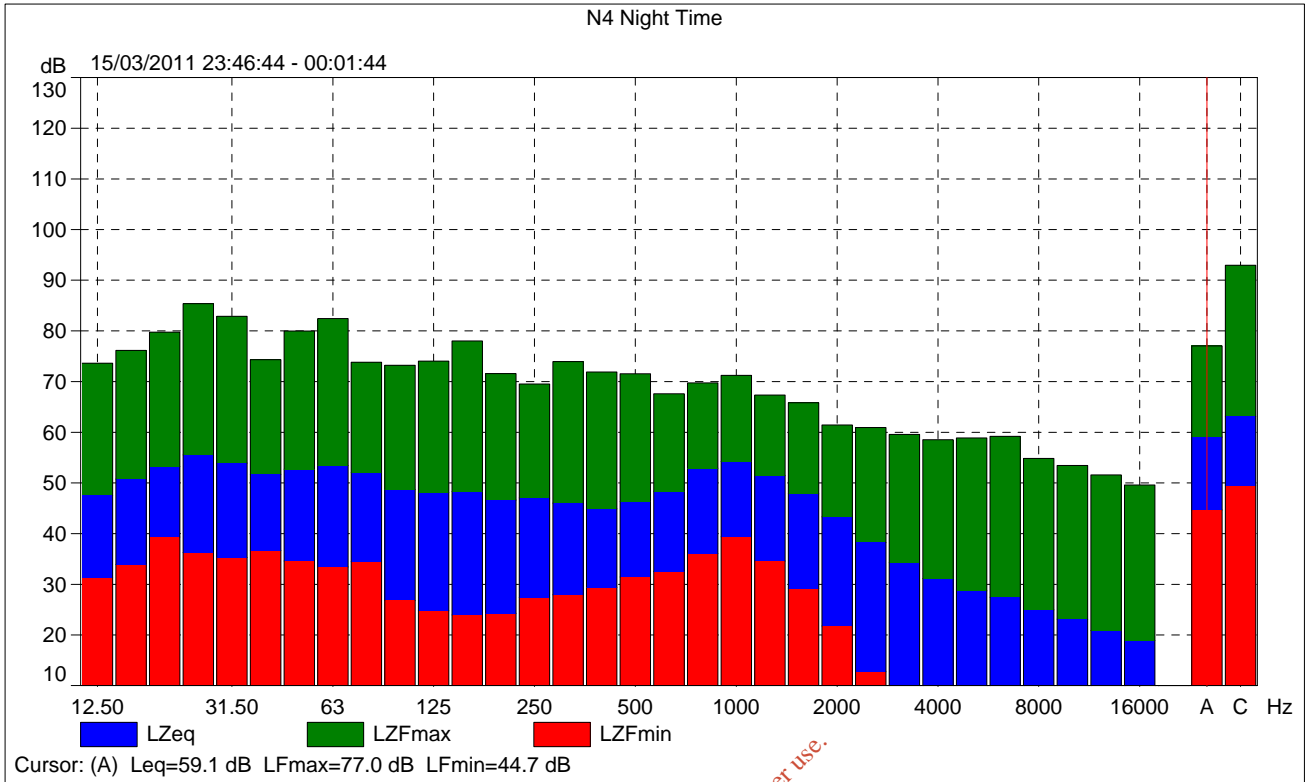














CERTIFICATE OF CALIBRATION

No: C0908326

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CALIBRATION OF:

Sound Level Meter:	Brüel & Kjær	2250-L	No: 2602719
Microphone:	Brüel & Kjær	4950	No: 2600864
Preamplifier:	Brüel & Kjær	ZC-0032	No: 6365
Supplied Calibrator:	Brüel & Kjær	4231	No: 2605825
Software version:	BZ7130 Version 2.1	Instruction manual:	BE-1774-11
Date of receipt:	2009-10-01	Identification:	
Pattern Approval:	PTB	1.72-4031982	

CUSTOMER:

ORS Consulting Engineers
Marlinstown Office Park
Mullingar
Co. Westmeath
Ireland

CALIBRATION CONDITIONS:

Preconditioning: 4 hours at 23 °C
Environment conditions: *see actual values in Environmental conditions sections*

SPECIFICATIONS:

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC61672-3:2006 class 1. Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

PROCEDURE:

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 4.1 - DB: 4.10) and test collection 2250-L/M-4950

RESULTS:

	Initial calibration		Calibration prior to repair/adjustment
X	Calibration without repair/adjustment		Calibration after repair/adjustment

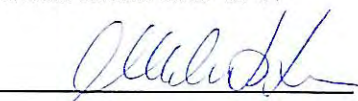
The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of Calibration: 2009-10-07

Certificate issued: 2009-10-07



Trine Madsen
Calibration Technician



Morten Høngaard Hansen
Approved signatory

Reproduction of the complete certificate is allowed. Part of the certificate may only be reproduced after written permission.

CERTIFICATE OF CALIBRATION

No.: C0908322

Page 1 of 3

CALIBRATION OF:

Calibrator Identification: 4231 No: 2605825
Date of receipt: 2009-10-01

CUSTOMER:

ORS Consulting Engineers
Marlinstown Office Park
Mullingar
Co. Westmeath
Ireland

CALIBRATION CONDITIONS:

Preconditioning: 4 hours at 23° C ± 3° C
Environment conditions: Air Temperature: 23° C ± 3° C
Air Pressure: 101.3 kPa ± 5 kPa
Relative Humidity: 50% RH ± 25% RH

PROCEDURE:

The instrument has been calibrated in accordance with the requirements as specified in Product Data and IEC 60942 : 2003 Class 1 and Class LS, using Calibration Procedure No. P4231A17


RESULTS:

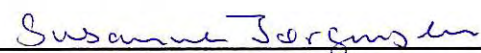
- Initial calibration Calibration prior to repair/adjustment
 Calibration without repair/adjustment Calibration after repair/adjustment

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA-4/02.

Date of Calibration: 2009-10-07

Certificate issued: 2009-10-07


Trine Madsen
Calibration Technician


Susanne Jørgensen
Approved signatory

MEASURED VALUES:
1. Sound Pressure Level 94dB

Nominal Value dB	Accept Level Lower dB	Accept Level Upper dB	Measured Value dB	Measurement Uncertainty dB
94,00	93,80	94,20	94,07	0,09

2. Sound Pressure Level 114dB

Nominal Value dB	Accept Level Lower dB	Accept Level Upper dB	Measured Value dB	Measurement Uncertainty dB
114,00	113,80	114,20	114,09	0,09

3. Frequency

Nominal Value Hz	Accept Level Lower Hz	Accept Level Upper Hz	Measured Value Hz	Measurement Uncertainty Hz
1000,0	999,0	1001,0	1000,0	0,1

4. Distortion (THD)

Measured with bandwidth 20Hz to 20kHz ("Audio Band Pass", A-weighted).

Level in dB	Accept Limit %	Measured Value	Measurement Uncertainty %
94	1,0	0,5	0,2
114	1,0	0,2	0,2

CALIBRATION EQUIPMENT:

Description	Type	Serial No.
Pistonphone	4228	2399336
Measuring Amplifier	2636	812851
Precision Attenuator	5936	2058925
Frequency Counter HP	5316A	2632A10087
Transducer Assembly	159545	006
Dist. Ana. Hameg	HM8027	03982
Vaisala Barometer	PTB100A	U2450020
Voltmeter Agilent	34401A	US36074161
Sound Level Meter	2238	2231703

CERTIFICATE OF CALIBRATION

Date of issue: 28 September 2010

Certificate Number: C1008230



0174

Page 1 of 2 pages

Brüel & Kjær

The Calibration Laboratory
Skodsborgvej 307, DK-2850 Nærum, Denmark
E-Mail: ukservice@bksv.com

Approved signatory

Henrik Nyholt

Customer:	ORS Consulting Engineers Marlinstown Office Park Mullingar Co. Westmeath Ireland	Manufacturer:	Brüel & Kjær
Inventory ID:	-	Description:	Sound Level Calibrator
Customer Ref:	Service Contract	Type:	4231
		Serial No:	2605825
		Date of receipt:	24 September 2010
		Calibration Date:	28 September 2010

The calibration was performed to laboratory procedure TWI-104-DK.

Sound pressure level in the coupler of this calibrator was measured with a calibrated, laboratory grade condenser microphone specified in the certificate. In the case of 1/2 inch microphone, the 1/2 inch adaptor supplied with the calibrator was used. Choice of 1 or 1/2 inch microphone is specified in the customers order.

Sound pressure level measured was compared with sound pressure level generated in the coupler of a working standard pistonphone calibrated by the National Physical Laboratory using the same microphone and at the same ambient conditions.

Appropriate corrections for atmospheric pressure during calibration and for measurement system frequency and level response were taken into account.

Sound pressure level results given in the certificate are the mean of 5 measurements.

Calibration results apply at ambient conditions during the process of calibration, which are given in the certificate.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%.

The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Note: Calibration after adjustment

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognised national standards, and to units of measurements realised at the National Physical Laboratory or other recognised national standards laboratories.

This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory

CUBK4231A10

CERTIFICATE OF CALIBRATION

Certificate Number

C1008230

UKAS Accredited Calibration Laboratory No. 0174

Page 2 of 2 pages

1. ACOUSTIC MEASUREMENTS

Coupler Configuration	Microphone Type (without grid)	Output Level, dB re 20 μ Pa at ambient test conditions	+20 dB Level Step in dB	Frequency Hz *	Total Harmonic Distortion % *
1/2"	4180	94.00	20.01	1000.0	0.5
1"	-	-	-	-	-
Measurement Uncertainty	-	0.15	0.04	0.1	0.3

* Frequency and Distortion measurements are not covered by the UKAS accreditation.

Ambient conditions during calibration were:

Atmospheric Pressure: 100.92 kPa
Temperature: 24.3 °C
Relative Humidity: 49 %

Note:

Manufacturers manual should be consulted when the calibrator is used with free field microphones which are normally supplied with sound level meters.

This instrument was calibrated by: Lene Petersen

— END —