

EXTERNAL NOISE ASSESSMENT

BS 4142 : 1997

CLIENT

Chrisaria Investments Ltd
1 Turnpike Lane
London
N8 0EP

SITE

9 – 13 Grape Street
London

SURVEY DATE (S)

5th – 9th October 2012

Report By



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FIGURE 4	DOWNLOADED DATA FROM POSITION 1 8 TH – 9 TH OCTOBER 2012

Introduction:

Sound Advice Acoustics Ltd has been instructed by Chrisaria Investments Ltd to carry out the relevant noise assessments and calculations at their existing site at 9 – 13 Grape Street London.

A proposal has been made to add an additional floor to the existing premises and re-site the existing AC units on the new flat roof section. However, it is understood that the existing AC units may not have been granted planning permission when the building was refurbished some years ago. Therefore this noise assessment is to be carried out in order to determine the background noise levels associated with this area and the surrounding premises, together with the calculations associated with re-positioning of the existing units.

There are currently a total of 5 x Fujitsu AC units located on the roof with a manufacturers specified sound pressure level of 64 dB(A) @ 1.0m. Of the five units it is believed that two would be master units with three slave units in support. In addition, it is normal practice for these units to have a night time operational mode with the potential to operate at a lesser capacity during night time hours as the building is unlikely to be in use during these hours.

Calculations and assessments have been made on this basis as this is the most realistic operational pattern for a system of this type in order to give an indication into typical operational levels.

This noise assessment is to accompany a planning application.

The assessment will be made between the hours of operation and references and assessments made in accordance with British Standard 4142:1997 'Method for Rating Industrial Noise Affected Mixed Residential and Industrial Areas'.

British Standard 4142 : 1997 'Method for rating Industrial Noise Affecting Mixed Residential and Industrial Areas' is to be adopted for the basis of this background noise level assessment. A BS 4142 : 1997 noise assessment will also be carried out in order to demonstrate if any externally mounted plant currently have or are likely to have a detrimental effect on existing nearby premises should the proposed development proceed.

External noise levels are to be recorded over, what has been considered for the site, an average / typical time period in order to assess the lowest daytime and night time levels and therefore assess worse case scenario.

The purpose of this assessment is to ensure the acoustic protection of the existing commercial and residential premises and mitigate the possibility of potential noise complaints from the operations of the existing re-located units.

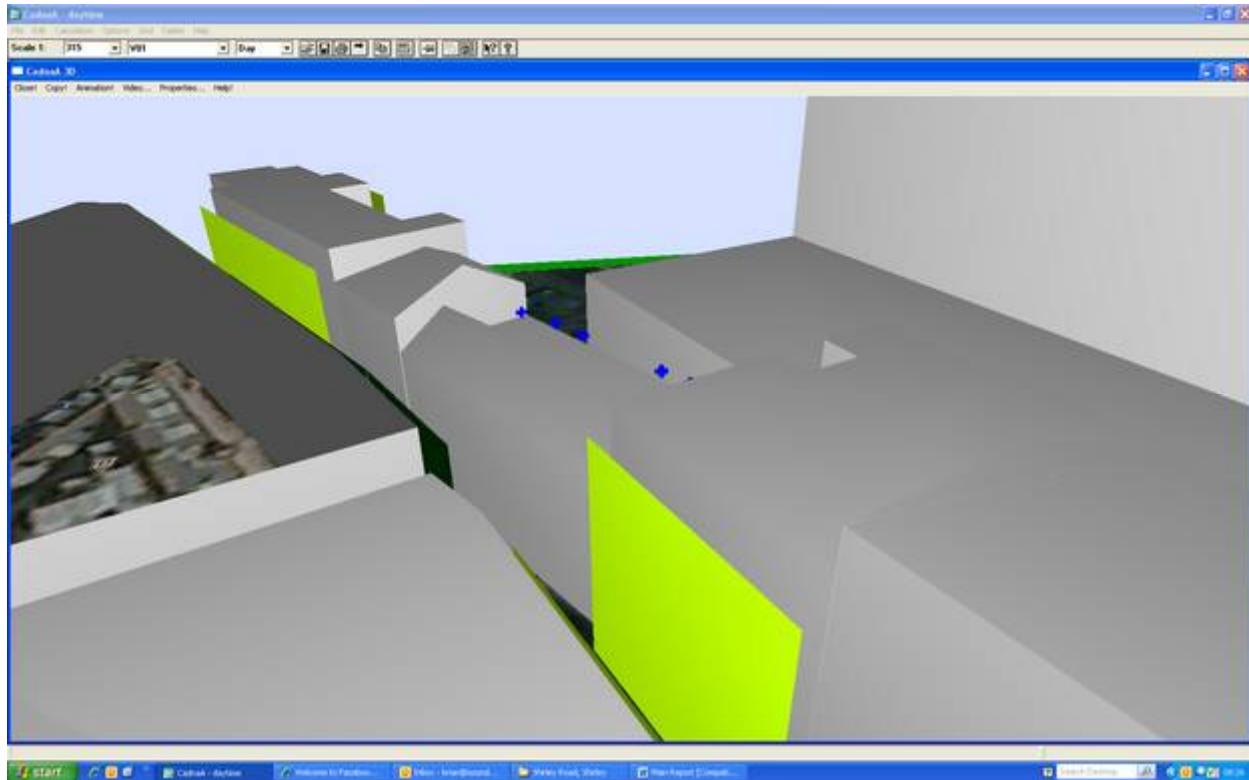
Noise sensitive premises are not restricted to residential dwellings as offices can be affected by unwanted external noise. Due to the high number of buildings within the area residential premises could not be confirmed or denied. The area may consist solely of commercial offices. However, in order to safeguard against ever eventuality the assessments will be made with the assumption that the nearest affected façade is residential.

In order to ensure accurate results and assessments are conducted, the 3D acoustic modelling software CADNA A is to be used in order to generate a working model to accurately calculate the resultant sound pressure levels at each of the noise sensitive facades.

With regards to design criteria, BS 4142 : 1997 is to be used. However, each local council has a different criteria and therefore the assessments are also to be made to a criteria of -10 dB below the lowest $L_{Aeq\ 1\ HOUR}$ dB daytime and $L_{Aeq\ 5\ MINUTE}$ dB night time background noise levels. Therefore, this assessment will be made to the worst case scenario.

Finally, if required, further acoustic recommendations are to be made within this report in order to ensure compliance with the relevant standard and local council criteria.

View of 3D model generated with existing roof mounted units.



Procedure:

BACKGROUND NOISE LEVEL ASSESSMENT

External noise levels were recorded over a typical period 5th – 9th October 2012 at representative available position 1 where the operations of the existing units were not influential to the recorded background noise level data. (see plan sketch layout).

Sample measurements were recorded over continuous 5 minute samples and from this data the $L_{Aeq,t}$ dB values for have been evaluated for daytime and night time periods. Sound Pressure Levels were recorded on the following setting along with a full octave band frequency analysis measured simultaneously and between 31.5 Hz and 16.0 kHz.

Daytime 07:00 – 23:00 hrs

L_{Aeq} 1 HOUR dB L_{A10} 1 HOUR dB
 L_{AMAX} 1 HOUR dB L_{A50} 1 HOUR dB
 L_{AMIN} 1 HOUR dB L_{A90} 1 HOUR dB

Night time 07:00 – 23:00 hrs

L_{Aeq} 5 MINUTE dB L_{A10} 5 MINUTE dB
 L_{AMAX} 5 MINUTE dB L_{A50} 5 MINUTE dB
 L_{AMIN} 5 MINUTE dB L_{A90} 5 MINUTE dB

From the downloaded recorded results the daytime and night time lowest recorded background noise levels have been evaluated and are summarised within this report.

Apparatus:

The above equipment was calibrated using a sound pressure level of 113.9 dB at an octave band centre frequency of 1000Hz with reference to 2×10^{-5} Nm⁻² before and after the tests and the equipment set to have no inaccuracy greater than 0.2 dB.

All the following equipment was all calibrated by an accredited or certified testing laboratory in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service (UKAS) on the following dates.

Calibration schedules are implemented within Sound Advice Acoustics Ltd in accordance with UKAS directive LAB 23.

POSITION 1

Description	Make	Type	Serial No.	Calibration Intervals	Last Calibrated	Next Due Calibration
Integrated Sound Level Meter	Norsonic	118	31471	2 YEARS	08.08.12	08.08.14
12.5mm Microphone (with windshield)	Norsonic	1225	41075	2 YEARS	08.08.12	08.08.14
Microphone Pre – Amplifier	Norsonic	1201	30327	2 YEARS	08.08.12	08.08.14
Calibrator	Norsonic	1251	31963	1 YEAR	01.05.12	01.05.13
The above equipment was calibrated using a sound pressure level of 113.9 dB at an octave band centre frequency of 1000Hz with reference to 2×10^{-5} Nm ⁻² before and after the tests and the equipment set to have no inaccuracy greater than 0.5 dB.						

Environmental Conditions:

START OF TEST - 5th October 2012

Temperature: 15⁰C
Relative Humidity 76%
Average Wind Speed: <0.5 m/s
Cloud Cover: None
Road Surface Dry
Atmospheric Pressure: 1007 mbar

END OF TEST - 9th October 2012

Temperature: 15⁰C
Relative Humidity 71%
Average Wind Speed: <0.5 m/s
Cloud Cover: Moderate
Road Surface Dry
Atmospheric Pressure: 1017 mbar

* Wind speed, temperature and relative humidity were all recorded using standard equipment supplied by RS Components, Hedge End, Southampton and are taken as an average over the designated time period.

Results:

- $L_{Aeq,t}$ - The equivalent A weighted sound pressure level recorded over a time interval of 10 minutes night time and 10 minutes daytime.
 $L_{A90,t}$ - The A weighted sound pressure level that is exceeded for 90% of the time period 10 minutes night time and 10 minutes daytime.
 $L_{A50,t}$ - The A weighted sound pressure level that is exceeded for 50% of the time period 10 minutes night time and 10 minutes daytime.
 $L_{A10,t}$ - The A weighted sound pressure level that is exceeded for 10% of the time period 10 minutes night time and 10 minutes daytime.
 L_{Amax} - The maximum A weighted sound pressure level recorded over a time interval of 10 minutes night time and 10 minutes daytime.
 L_{Amin} - The minimum A weighted sound pressure level recorded over a time interval of 10 minutes night time and 10 minutes daytime.

POSITION 1 – 5 th – 6 th October 2012						
Date / Time	LAeq	Lmax	Lmin	LA10	LA50	LA90
07:00 – 23:00 DAYTIME LOWEST	57.8	70.7	52.5	59.6	56.3	54.0
23:00 - 07:00 NIGHT TIME LOWEST	52.2	57.9	48.3	54.5	51.3	49.4

POSITION 1 – 6 th – 7 th October 2012						
Date / Time	LAeq	Lmax	Lmin	LA10	LA50	LA90
07:00 – 23:00 DAYTIME LOWEST	59.2	74.1	51.6	59.5	54.3	52.2
23:00 - 07:00 NIGHT TIME LOWEST	52.1	59.6	46.9	54.7	50.8	48.0

POSITION 1 – 7th – 8th October 2012						
Date / Time	LAeq	Lmax	Lmin	LA10	LA50	LA90
07:00 – 23:00 DAYTIME LOWEST	53.6	64.2	49.1	55.3	52.3	50.4
23:00 - 07:00 NIGHT TIME LOWEST	51.0	57.8	45.7	53.7	49.9	46.9

POSITION 1 – 8th – 9th October 2012						
Date / Time	LAeq	Lmax	Lmin	LA10	LA50	LA90
07:00 – 23:00 DAYTIME LOWEST	54.3	61.8	50.9	56.2	53.7	52.0
23:00 - 07:00 NIGHT TIME LOWEST	51.1	64.4	46.6	52.9	49.7	47.7

See the attached figures 1 – 4 inclusive for full downloaded results, averages and graphs.

Calculations:

Calculations have been carried out for both daytime and night time operations as the AC units could kick in at any point within a 24 hour period.

Calculations and models have been generated for both existing and proposed layouts in order to assess both scenarios.

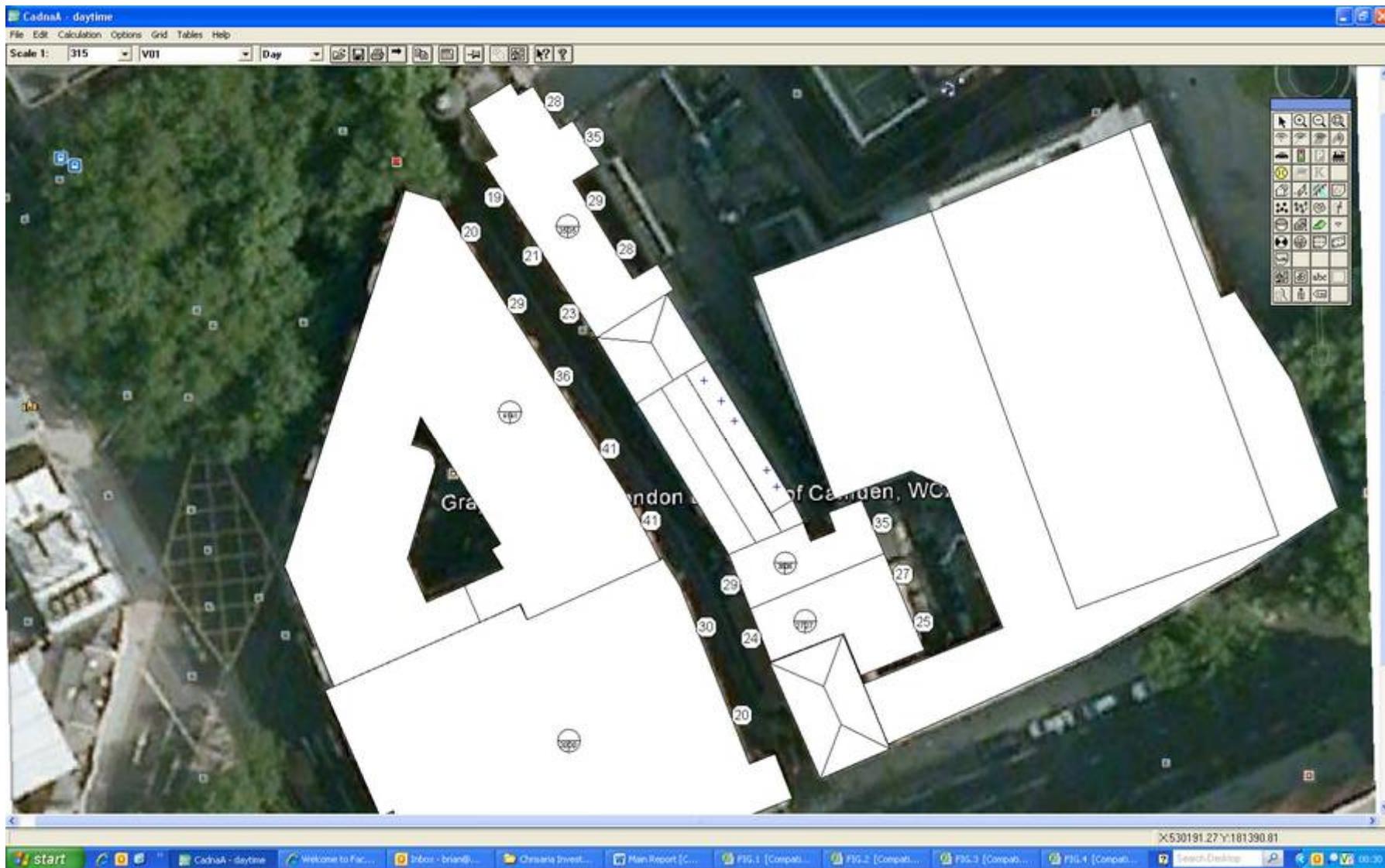
The following 3D acoustic model has been built in order to calculate the resultant sound pressure levels at each of the nearest related facades.

Existing Layout Assessments	Pages 12 – 15
Proposed Layout Assessments	Pages 16 – 19
Proposed Layout Assessments with 1.2m Acoustic Screen	Pages 20 – 23

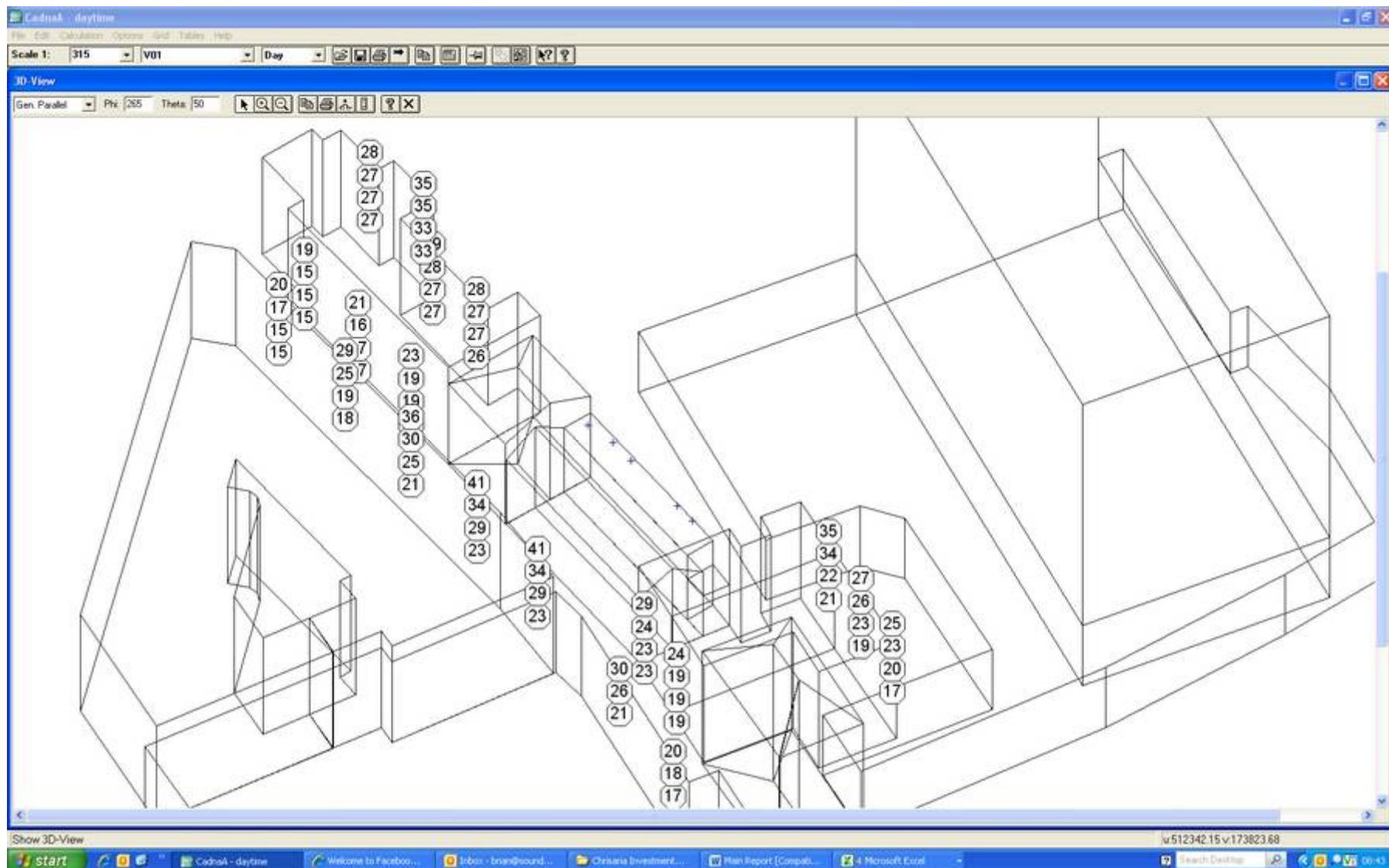
The 1.2m acoustic screen is required in order to meet the anticipated council -10 dB below lowest recorded background noise level criteria, as demonstrated within the assessments made within this report.

The acoustic screen is to be 1.2m high of a solid continuous construction with a minimum density of 13 Kg/m² in order to ensure the screening effect occurs. The screen should run in front of the units with return either end inline with the unit, generally as detailed on the calculations on page 22 of this report.

EXISTING DAYTIME ASSESSMENT



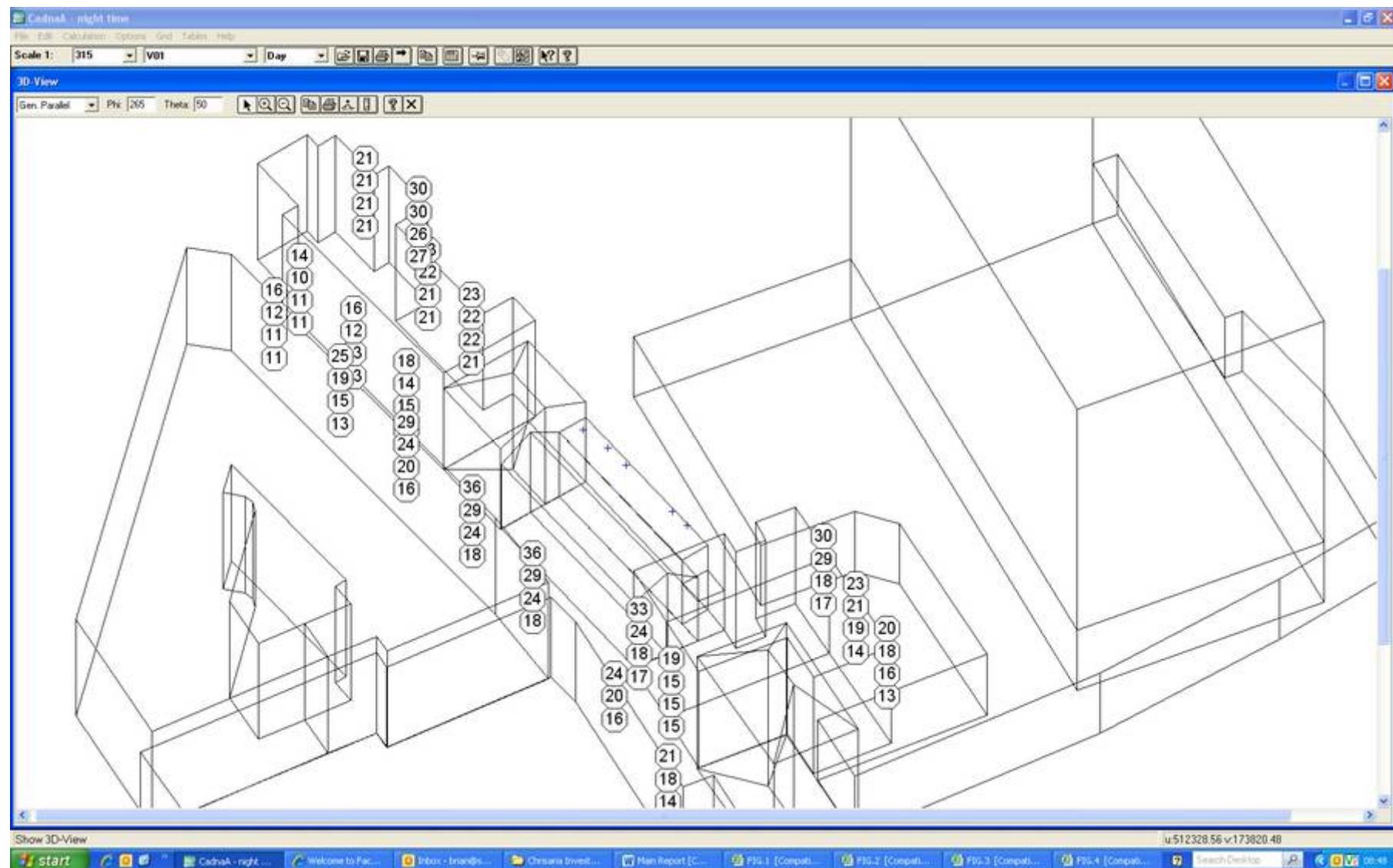
3D VIEW



EXISTING NIGHT TIME ASSESSMENT



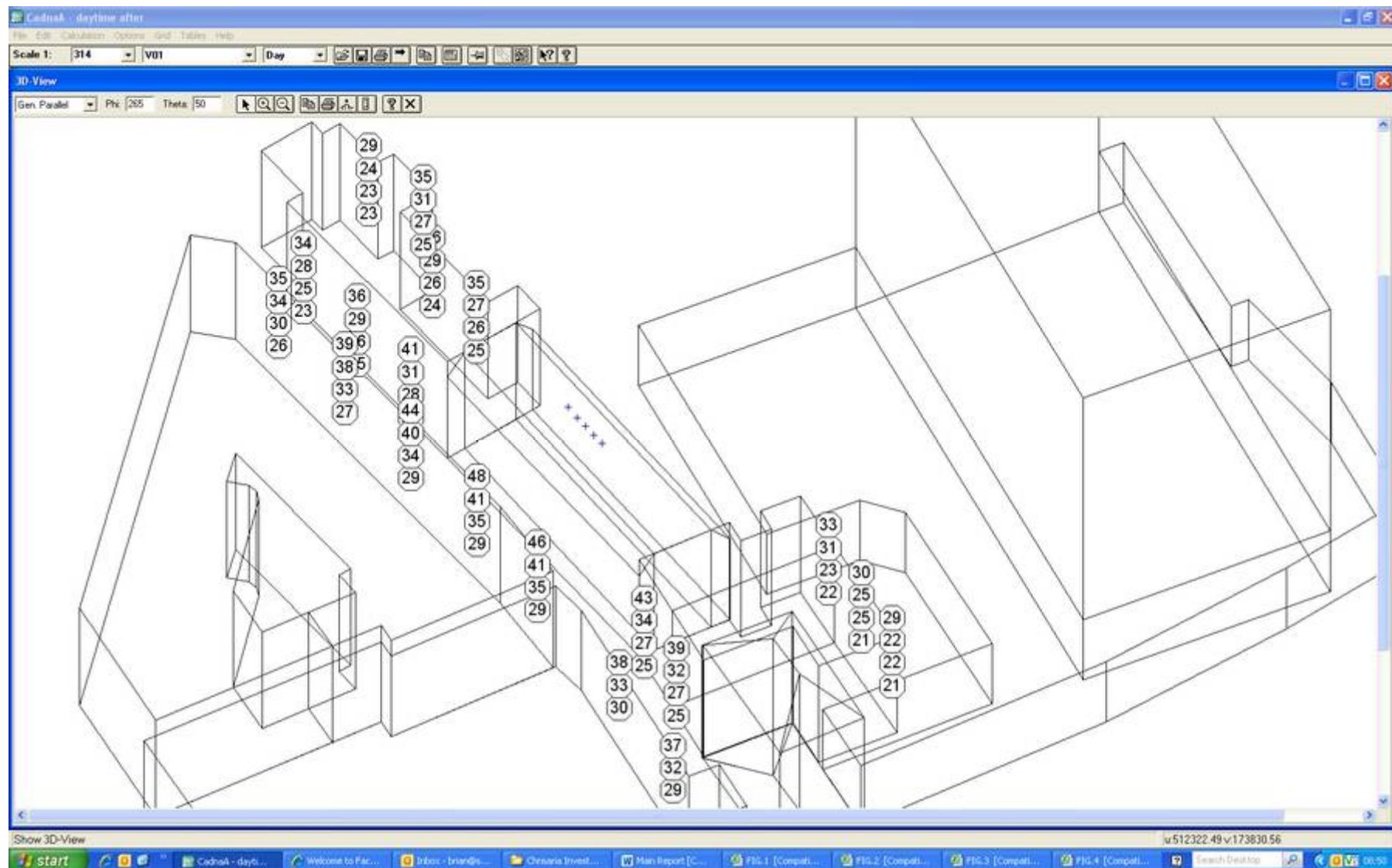
3D VIEW



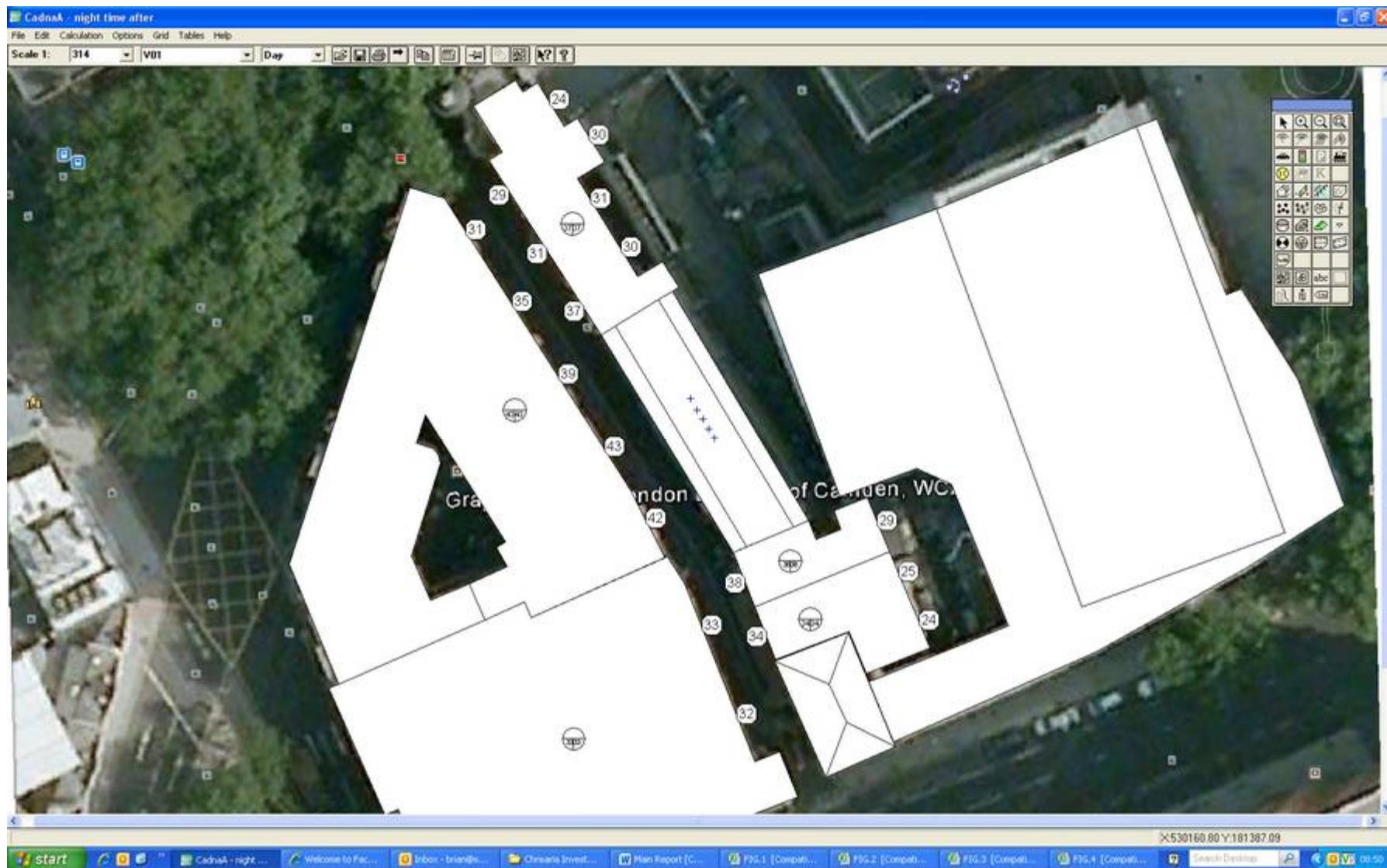
PROPOSED DAYTIME ASSESSMENT



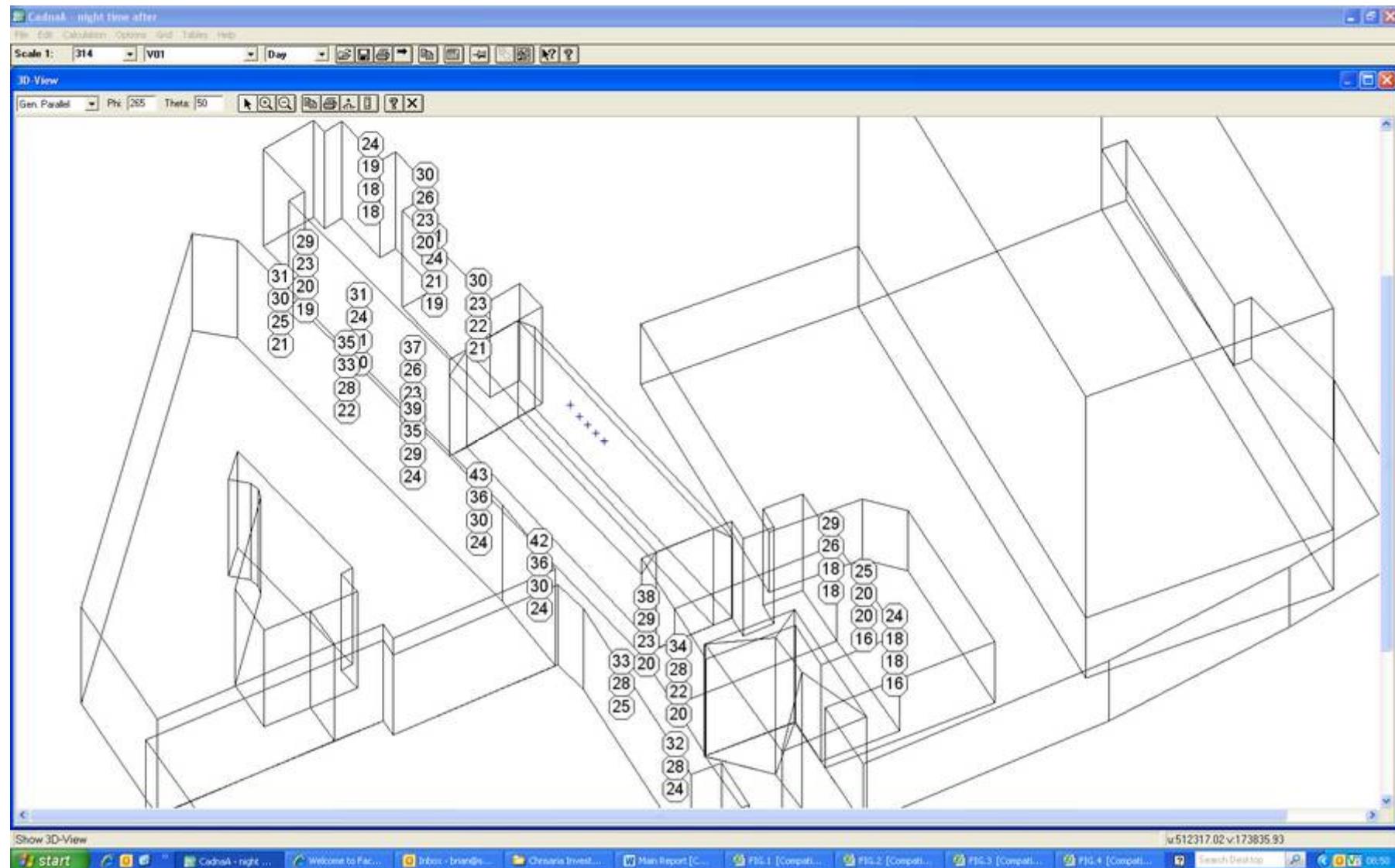
3D VIEW



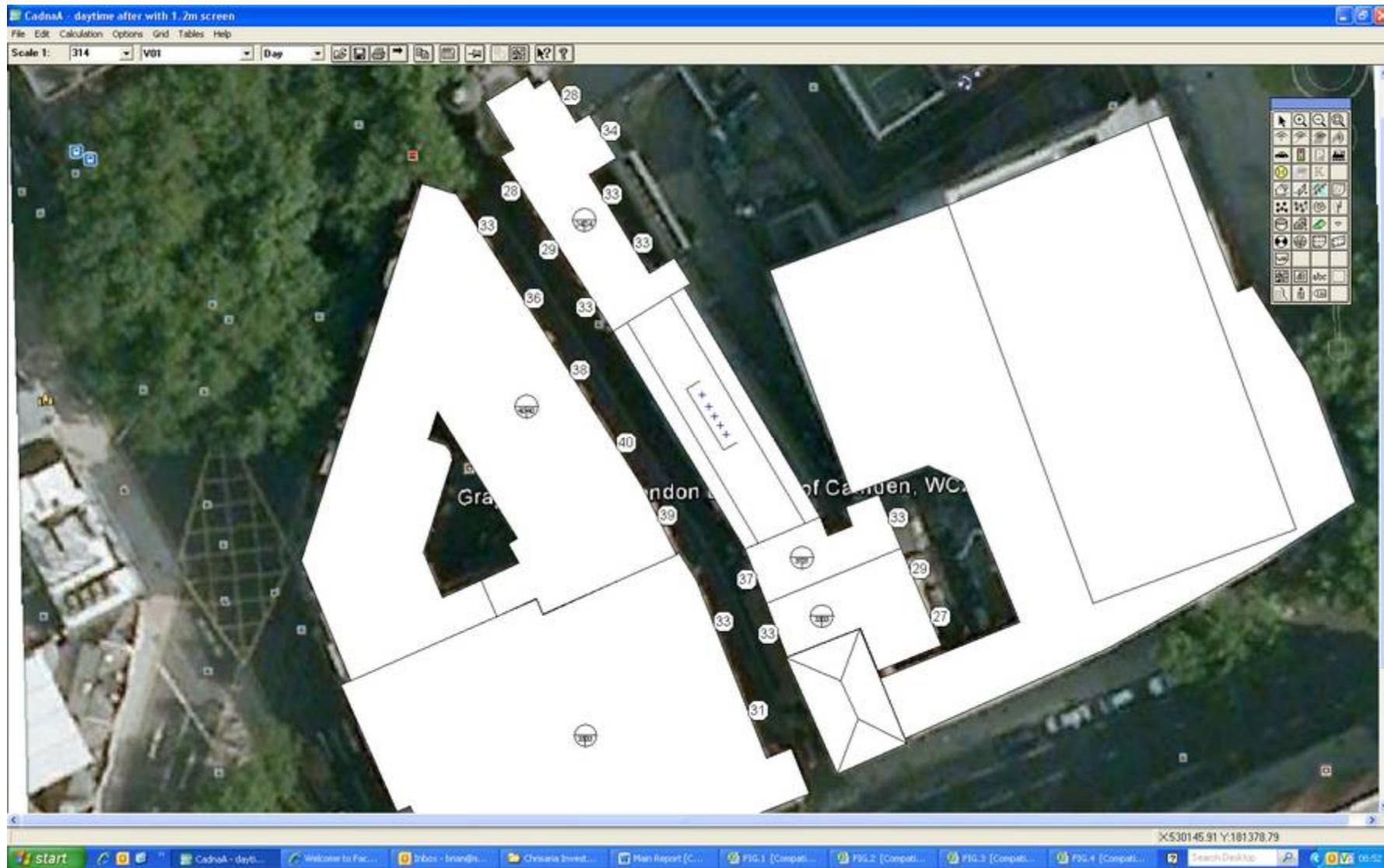
PROPOSED NIGHT TIME ASSESSMENT



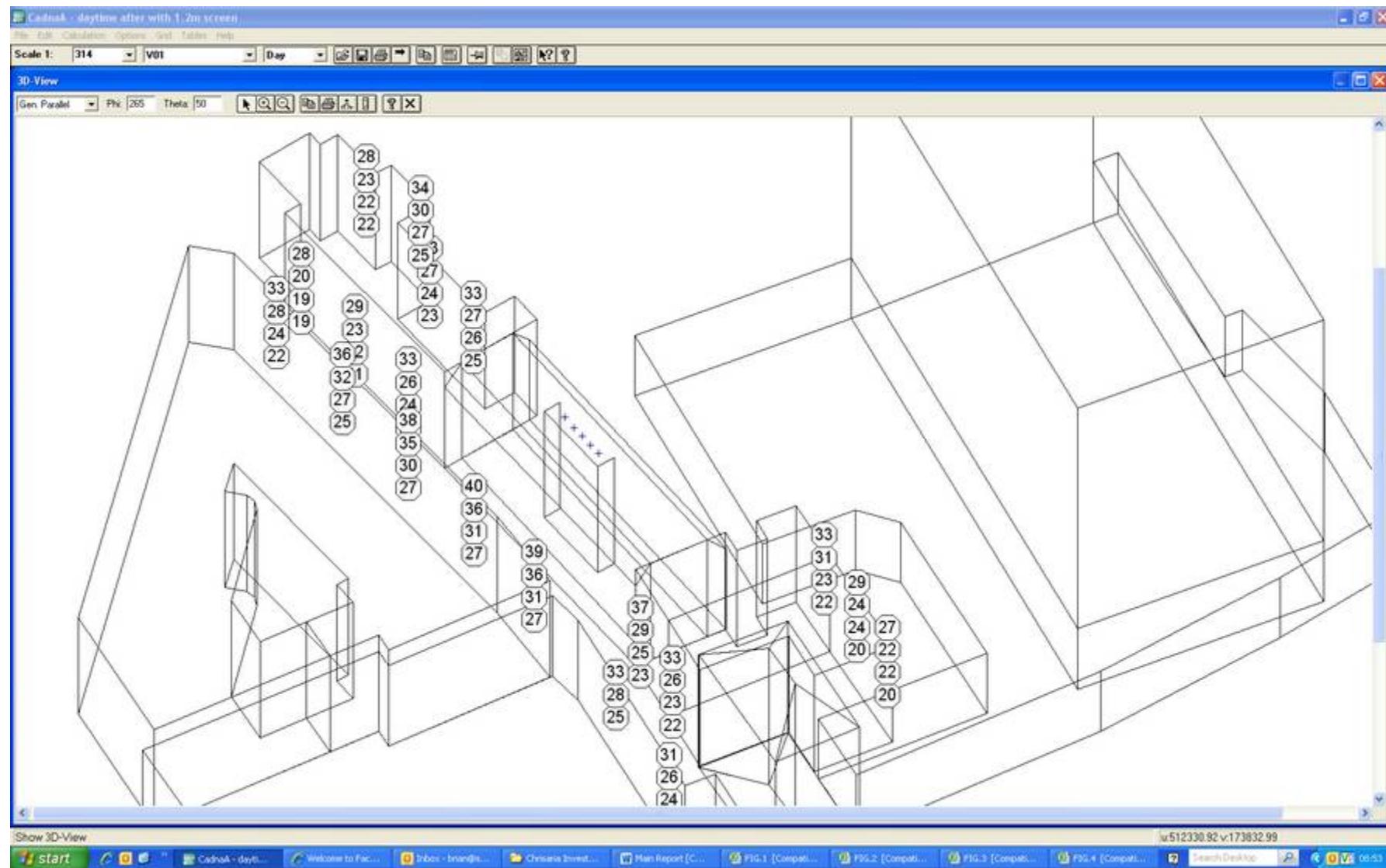
3D VIEW



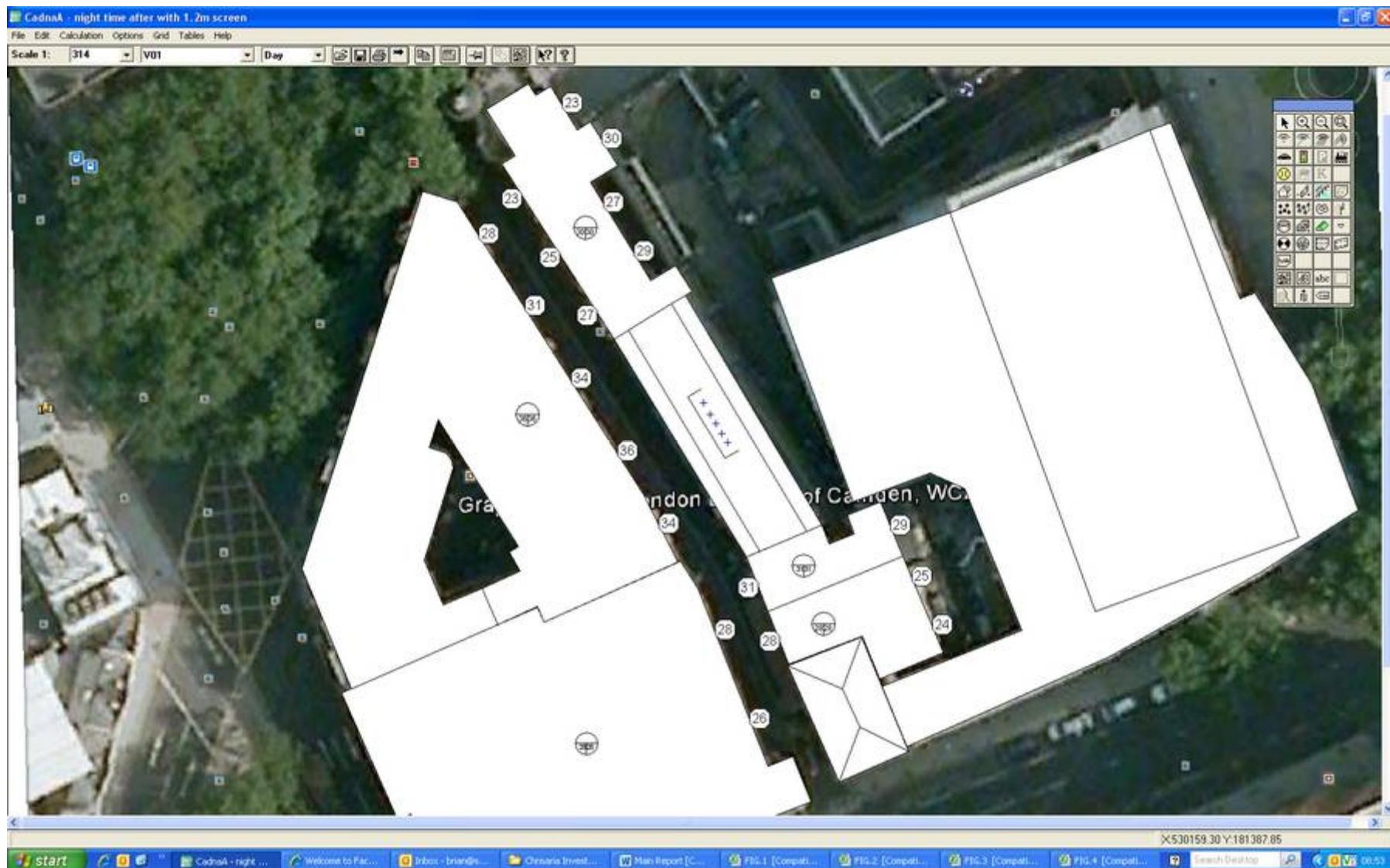
PROPOSED DAYTIME ASSESSMENT WITH 1.2M SCREEN



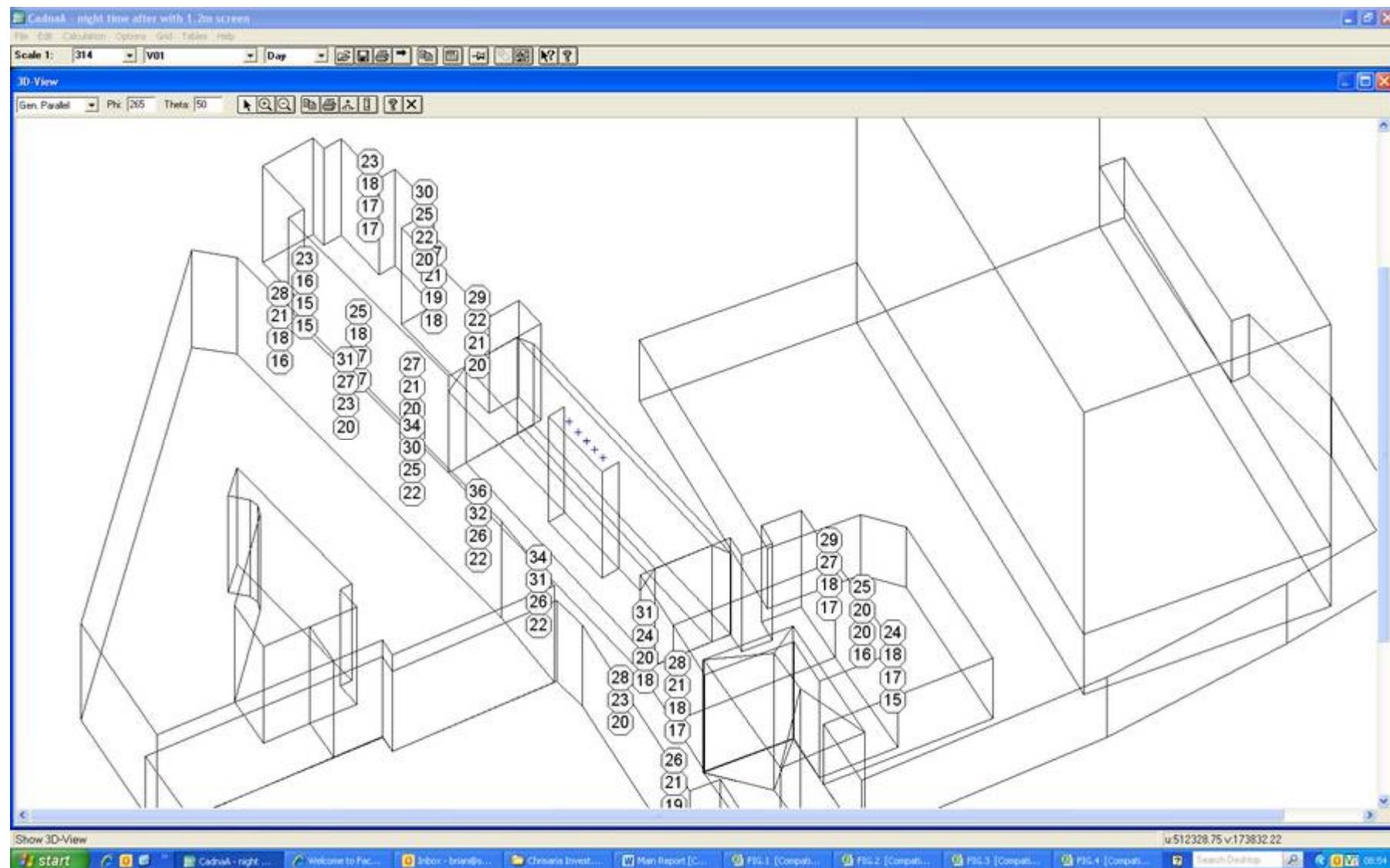
3D VIEW



PROPOSED NIGHT TIME ASSESSMENT WITH 1.2M SCREEN



3D VIEW



BS 4142 : 1997 Noise Assessment:

This standard provides a method for measurement and rating of industrial and background noise levels outside dwellings in mixed residential and industrial areas. The rating level (defined in BS 4142:1997) is used to rate the industrial noise source outside residential dwellings (this is defined as the “specific noise source”). This level is obtained by adding a 5dB correction for tonal or impulsive characteristics to the equivalent continuous A-weighted sound pressure level of the specific noise source.

The procedure defined in BS 4142: 1997 for predicting the likelihood of complaints is based on establishing the difference between the rating level and the background noise level outside the residential property of interest. The greater the difference the greater the likelihood of complaints and more specifically:-

Assessment Indicator

1. A difference of +10dB or more indicates that complaints are likely.
2. A difference of +5dB is of marginal significance.
3. If the rating is more than 10 dB below the measured background noise level then this is a positive indication that complaints are unlikely.

The assessment of noise nuisance explicitly falls outside the scope of BS 4142 : 1997. A statutory noise nuisance requires the consideration of both relative and absolute noise levels, material loss of amenity, mitigation options and other non acoustic factors. Section 80, part III of the Environmental Protection Act 1990 provides a defence of “best practicable means” against any nuisance proceedings.

However, it must also be recognised that the simple use of an overall A-weighted noise level can underestimate the degree of disturbance caused by relatively low levels of environmental noise with low frequency components or other discrete characteristics such as tonal, impulsive and / or irregular temporal features. Therefore the overall approach suggested in BS 4142 : 1997 is an important indicator of the acceptability of noise from industrial premises.

The lowest background noise level recorded has been considered to be representative of the lowest recorded background noise level associated with this site at the nearest noise sensitive premises and therefore, the following BS 4142 : 1997 assessment could be expected.

Existing Layout	Time Periods	
	Daytime 07:00 – 23:00	Night Time 23:00 – 07:00
Calculated Level at Residential L _{Aeq 10 MIN} dB	41.0	36
Residual Noise Level L _{Aeq 10 MIN} dB	53.6	51.0
Specific Noise Level	41.0	36.0
Character Correction	0.0	0.0
Rating Level	41.0	36.0
Background Noise Level L _{A90 10 MIN} dB	50.4	46.9
Excess Over Background	-9.4	-10.9
Assessments Indicates	*2	*3

*Refer to assessment indicator above

Proposed Layout	Time Periods	
	Daytime 07:00 – 23:00	Night Time 23:00 – 07:00
Calculated Level at Residential L _{Aeq 10 MIN} dB	48.0	43.0
Residual Noise Level L _{Aeq 10 MIN} dB	53.6	51.0
Specific Noise Level	48.0	43.0
Character Correction	0.0	0.0
Rating Level	48.0	43.0
Background Noise Level L _{A90 10 MIN} dB	50.4	46.9
Excess Over Background	-2.4	-3.9
Assessments Indicates	*2	*2

*Refer to assessment indicator above

Proposed Layout with 1.2m Screen	Time Periods	
	Daytime 07:00 – 23:00	Night Time 23:00 – 07:00
Calculated Level at Residential L _{Aeq 10 MIN} dB	40.0	36.0
Residual Noise Level L _{Aeq 10 MIN} dB	53.6	51.0
Specific Noise Level	40.0	36.0
Character Correction	0.0	0.0
Rating Level	40.0	36.0
Background Noise Level L _{A90 10 MIN} dB	50.4	46.9
Excess Over Background	-10.4	-10.9
Assessments Indicates	*3	*3

*Refer to assessment indicator above

The above BS 4142 : 1997 noise assessments have indicated that in accordance with the British Standard the AC units return a conclusion of 'Marginal Significance' for daytime & 'Complaints Unlikely' for night time periods for the existing positioned units.

The proposed layout with the unit raised and positioned on the new flat roof section return conclusions of 'Marginal Significance' for both daytime and night time periods. Whilst this is compliant with the British Standard, the local council are likely to require a design criteria of -10 dB below lowest recorded background and therefore the additional screen is required.

With the addition screen in place, the assessment concludes 'Complaints Unlikely' and the assessments levels greater than -10 dB below the lowest recorded background noise levels for each time period.

In addition to the acoustic screen it is recommended that checks be made to the units to ensure they are fitted with a night time operational mode. With regards to the units mountings, suitable anti-vibration mounts should be fitted in order to minimise structure borne noise transfer into the existing & new development.

Conclusion:

A full external noise assessment, report and recommendations have been carried on behalf of Chrisaria Investments Ltd at their premises at 9 – 13 Grape Street, London.

A proposal has been made to re-position the existing AC units on top of the proposed roof extension, thus raising the units an additional floor. The units will be re-located on the new flat roof section of the extension and this assessment has been undertaken in order to demonstrate the existing and proposed acoustic impacts on the nearest noise sensitive premises.

Calculations and assessments have been made to BS 4142 : 1997 and an anticipated council criteria of -10 dB below the lowest recorded background noise level. These calculations have demonstrated that the existing position of the units is unlikely generating the possibility of noise complaints from nearby noise sensitive premises.

Further calculations regarding the proposed layout have identified that the units in the proposed position operating under normal conditions are likely to comply with BS 4142 : 1997 but unlikely to comply with the council requirement of -10 dB below the lowest recorded background noise level. Therefore, additional calculations and assessments were carried out and in order to meet the requirement of the council, a 1.2m high acoustic screen has been proposed and should be implemented accordingly.

On the basis of the calculations, assessments and recommendations made within this report it is the professional opinion of Sound Advice Acoustics Ltd that planning permission should be granted subject to suitable conditions relating to any council requirements.

Plan Sketch Layout:



NOISE LEVEL SUMMARY ASSESSMENT																
Date / Time	LAeq	Lmax	Lmin	LA10	LA50	LA90	Octave Band Centre Frequency (Hz)									
							31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 23:00 DAYTIME LOWEST L_{A90} 1 HOUR & Corresponding L_{Aeq} 1 HOUR	57.8	70.7	52.5	59.6	56.3	54.0	62.5	66.0	68.0	67.2	59.5	56.4	53.6	53.0	50.7	45.6
	60.9	72.6	57.2	62.2	59.2	58.0	70.2	67.3	60.1	57.3	56.4	56.7	54.3	47.1	40.3	29.5
	59.4	71.0	55.0	61.4	57.5	55.9	70.2	67.6	61.3	59.0	55.3	55.1	52.8	48.1	43.4	36.2
23:00 - 07:00 NIGHT TIME LOWEST L_{A90} 5 MIN & Corresponding L_{Aeq} 5 MIN	52.2	57.9	48.3	54.5	51.3	49.4	62.3	62.2	53.8	50.8	47.9	48.0	44.6	38.6	28.8	13.8
	60.6	63.4	58.2	62.0	60.4	59.1	66.6	66.1	55.1	55.8	57.4	56.3	53.5	48.7	40.7	29.7
	58.1	66.7	54.6	59.7	57.2	55.6	65.8	64.9	55.9	53.9	53.9	53.8	51.2	46.2	37.0	24.3

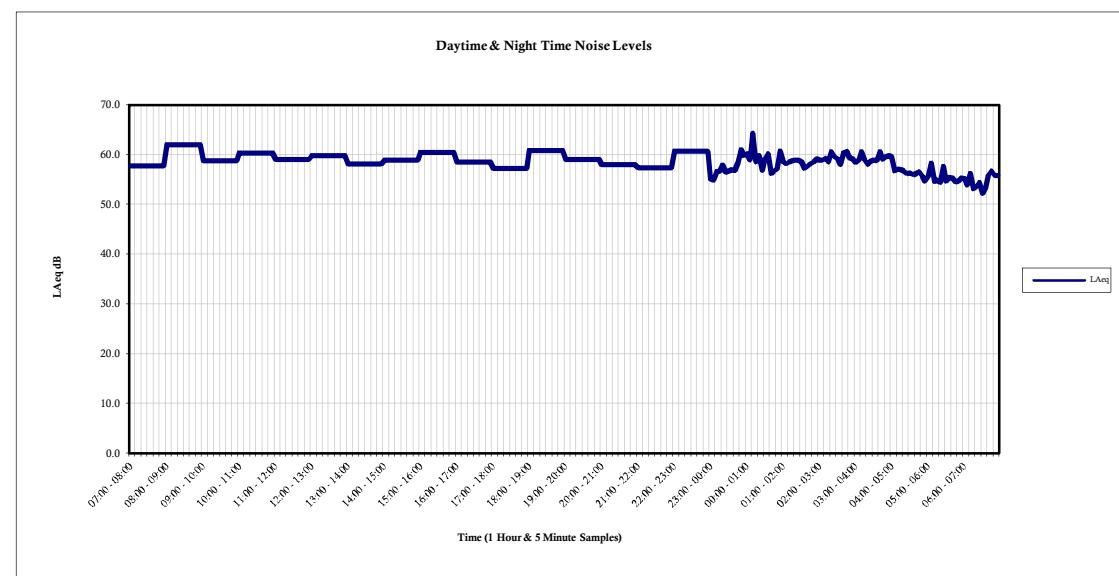
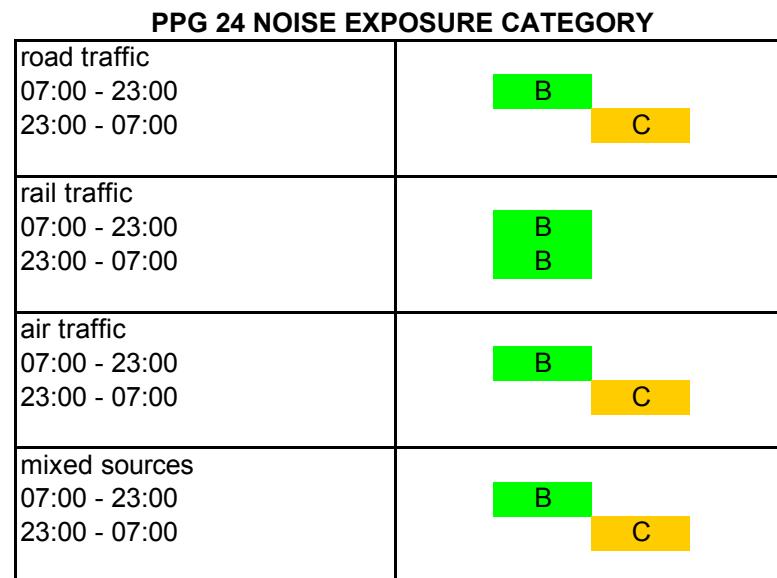


FIGURE 1
PAGE 1

NIGHT TIME NOISE LEVELS 23:00 - 07:00																
Date / Time	LAeq	Lmax	Lmin	LA10	LA50	LA90	Octave Band Centre Frequency (Hz)									
							31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
05:00 - 06:00 <i>Continued</i>	54.7	62.2	50.3	57.4	53.7	51.0	62.7	63.3	53.3	51.8	49.3	50.4	48.0	43.7	33.8	18.7
	55.5	62.4	51.2	57.9	54.7	52.0	64.1	64.2	54.7	53.6	51.2	50.8	48.7	44.1	34.7	19.0
	55.4	60.1	51.5	57.1	55.0	52.8	64.8	64.0	54.9	53.5	51.4	50.7	48.4	43.2	33.7	19.4
	54.6	60.7	50.7	57.3	53.5	51.4	64.4	63.5	54.3	52.5	50.2	50.2	47.8	42.4	32.9	17.9
06:00 - 07:00	54.7	59.0	51.0	57.1	53.9	52.0	63.6	63.2	53.6	52.3	49.9	50.4	47.9	42.8	33.5	19.4
	55.3	60.9	51.1	58.0	54.5	52.3	65.2	64.4	55.1	54.1	51.5	50.6	48.1	43.0	34.1	18.3
	55.2	64.9	50.3	57.5	53.9	51.7	67.0	65.7	55.5	52.9	50.3	50.7	48.3	43.3	34.3	18.6
	53.9	59.6	49.4	55.8	53.4	50.8	64.1	61.7	54.1	52.1	49.7	49.6	46.7	41.3	31.8	15.9
	56.2	62.1	52.5	58.4	55.4	53.7	65.0	64.1	56.5	56.0	53.5	51.4	47.9	42.5	33.2	18.4
	53.1	58.3	47.8	55.6	52.2	49.4	62.5	63.0	53.1	51.0	48.5	48.6	46.0	41.3	32.5	16.5
	53.7	60.2	48.9	56.5	52.4	50.1	63.5	63.4	56.2	53.8	50.3	49.0	45.7	39.8	30.7	19.6
	54.4	62.2	49.0	56.8	53.0	50.7	64.8	64.3	55.0	52.9	50.6	49.8	47.0	41.5	32.0	15.6
	52.2	57.9	48.3	54.5	51.3	49.4	62.3	62.2	53.8	50.8	47.9	48.0	44.6	38.6	28.8	13.8
	53.5	58.4	47.9	55.9	52.8	50.8	62.3	62.3	58.4	52.3	49.2	49.2	46.0	39.7	29.6	14.2
	55.9	61.6	50.3	58.2	55.1	51.7	64.7	65.1	56.1	54.5	52.2	51.5	48.4	43.0	34.3	17.5
	56.8	60.7	53.3	58.6	56.2	54.4	68.2	64.9	55.3	54.7	52.8	52.6	49.4	43.7	34.9	19.3
	55.8	62.8	51.3	57.7	55.0	52.7	62.8	63.3	55.3	54.2	52.3	51.6	48.3	41.6	31.3	15.5

NOISE LEVEL SUMMARY ASSESSMENT																
Date / Time	L _{Aeq}	L _{max}	L _{min}	LA10	LA50	LA90	Octave Band Centre Frequency (Hz)									
							31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 23:00 DAYTIME LOWEST L_{A90} 1 HOUR & Corresponding L_{Aeq} 1 HOUR	59.2	74.1	51.6	59.5	54.3	52.2	68.4	66.2	59.9	57.2	52.7	55.2	53.3	42.7	30.4	17.8
DAYTIME HIGHEST L_{A90} 1 HOUR & Corresponding L_{Aeq} 1 HOUR	63.2	69.1	56.7	66.2	62.1	58.7	67.1	67.5	61.0	59.3	57.3	58.7	56.9	52.6	45.4	24.7
DAYTIME AVERAGE L_{A90} 16 HOUR & Corresponding L_{Aeq} 16 HOUR	60.2	70.3	53.8	63.2	57.6	55.1	67.6	66.9	61.0	58.9	55.2	56.2	53.5	48.6	44.7	37.3
23:00 - 07:00 NIGHT TIME LOWEST L_{A90} 5 MIN & Corresponding L_{Aeq} 5 MIN	52.1	59.6	46.9	54.7	50.8	48.0	63.3	63.9	55.7	52.3	47.9	47.7	43.8	36.1	25.5	11.7
NIGHT TIME HIGHEST L_{A90} 5 MIN & Corresponding L_{Aeq} 5 MIN	58.2	72.0	51.7	58.9	55.3	53.6	67.7	66.7	60.7	58.4	55.1	53.6	49.5	43.8	33.4	16.2
NIGHT TIME AVERAGE L_{A90} 8 HOUR & Corresponding L_{Aeq} 8 HOUR	55.1	66.3	49.8	57.1	53.1	51.0	65.6	64.4	56.1	53.3	50.7	51.3	47.7	40.3	29.3	14.7

PPG 24 NOISE EXPOSURE CATEGORY	
road traffic 07:00 - 23:00 23:00 - 07:00	B B
rail traffic 07:00 - 23:00 23:00 - 07:00	B B
air traffic 07:00 - 23:00 23:00 - 07:00	B B
mixed sources 07:00 - 23:00 23:00 - 07:00	B B

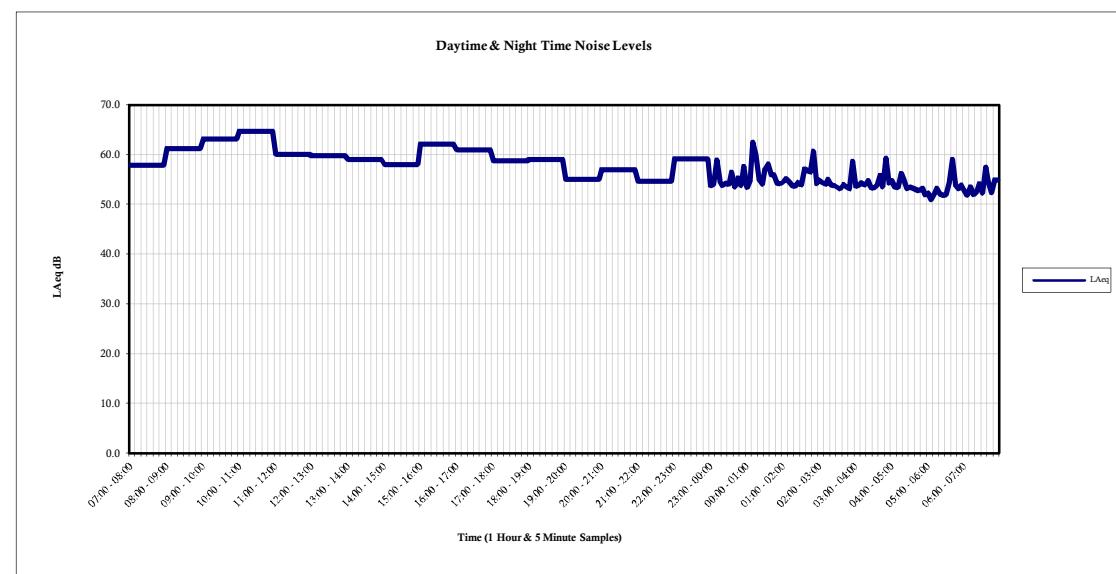


FIGURE 2
PAGE 1

NIGHT TIME NOISE LEVELS 23:00 - 07:00																
Date / Time	LAeq	Lmax	Lmin	LA10	LA50	LA90	Octave Band Centre Frequency (Hz)									
							31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
05:00 - 06:00 <i>Continued</i>	52.0	58.2	46.8	54.3	51.3	48.5	63.3	62.2	53.4	50.9	47.6	48.1	44.2	36.9	26.6	11.7
	54.4	65.9	47.4	55.8	51.4	48.7	61.6	62.7	54.8	50.9	48.2	51.7	46.7	35.7	23.9	10.7
	59.1	77.0	47.3	54.4	50.4	48.5	63.4	61.6	52.5	50.7	47.4	54.4	53.9	50.7	38.6	16.3
	53.8	68.0	48.6	55.7	52.3	49.3	64.7	63.0	53.9	52.2	49.4	49.3	46.9	40.3	29.4	12.0
06:00 - 07:00	53.2	58.1	48.1	55.5	52.5	49.0	64.2	61.9	53.9	53.7	50.9	48.2	44.6	38.3	30.6	14.3
	53.9	57.7	47.4	56.4	53.7	49.0	63.2	61.0	53.0	53.6	51.3	49.6	45.3	38.4	28.1	11.7
	52.8	60.5	49.4	54.3	52.3	50.3	63.1	62.9	54.0	52.6	49.4	48.7	44.5	37.2	24.7	11.1
	51.8	58.0	48.9	53.4	51.2	49.8	60.5	60.3	52.6	51.5	48.2	47.8	43.7	35.4	24.1	10.9
	53.5	66.0	49.1	55.2	51.5	49.8	62.6	62.3	53.4	52.1	49.6	49.8	45.5	37.5	27.5	11.9
	52.0	58.2	49.0	53.6	51.6	49.9	62.5	62.5	53.6	51.1	48.2	47.8	44.2	36.4	25.6	11.4
	52.6	56.7	49.1	54.4	52.2	50.0	63.0	61.4	53.4	52.2	49.5	48.3	44.3	36.6	27.7	17.1
	54.2	58.8	50.7	56.7	53.4	51.5	64.7	63.0	55.0	54.4	51.3	49.6	45.9	38.9	30.3	15.7
	52.3	56.2	49.7	54.2	51.7	50.4	62.6	62.8	54.0	52.1	48.7	48.0	44.2	36.2	26.0	14.3
	57.5	67.8	50.0	61.0	52.6	50.6	64.0	63.9	61.0	58.9	56.1	52.6	46.4	37.7	27.8	14.5
	54.6	58.2	51.1	56.2	54.3	52.7	63.5	63.3	55.3	54.4	52.1	50.0	46.0	39.0	31.7	18.0
	52.4	58.1	49.0	54.5	51.7	49.9	63.6	62.0	54.3	52.4	49.0	48.0	44.2	36.3	26.1	12.3
	55.0	72.5	48.5	53.4	51.0	49.5	63.0	64.3	53.8	51.7	47.8	49.7	49.3	45.8	34.4	19.2

NOISE LEVEL SUMMARY ASSESSMENT																
Date / Time	L _{Aeq}	L _{max}	L _{min}	LA10	LA50	LA90	Octave Band Centre Frequency (Hz)									
							31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 23:00 DAYTIME LOWEST <small>L_{A90} 1 HOUR & Corresponding L_{Aeq} 1 HOUR</small>	53.6	64.2	49.1	55.3	52.3	50.4	65.7	64.5	56.4	53.6	49.8	49.2	45.3	38.0	28.0	12.5
DAYTIME HIGHEST <small>L_{A90} 1 HOUR & Corresponding L_{Aeq} 1 HOUR</small>	57.1	64.4	52.3	59.8	55.8	53.3	65.6	65.5	58.4	56.1	52.6	53.3	49.3	43.8	33.3	16.6
DAYTIME AVERAGE <small>L_{A90} 16 HOUR & Corresponding L_{Aeq} 16 HOUR</small>	56.1	68.6	50.6	57.7	53.8	51.7	66.0	64.9	58.4	56.4	52.2	52.1	49.3	42.7	36.8	29.1
23:00 - 07:00 NIGHT TIME LOWEST <small>L_{A90} 5 MIN & Corresponding L_{Aeq} 5 MIN</small>	51.0	57.8	45.7	53.7	49.9	46.9	63.2	62.9	51.6	50.6	46.5	46.7	43.5	37.1	26.1	13.1
NIGHT TIME HIGHEST <small>L_{A90} 5 MIN & Corresponding L_{Aeq} 5 MIN</small>	56.1	63.0	51.4	57.5	55.9	53.7	65.9	65.1	57.5	56.2	53.2	51.3	48.1	41.8	32.8	15.9
NIGHT TIME AVERAGE <small>L_{A90} 8 HOUR & Corresponding L_{Aeq} 8 HOUR</small>	55.0	66.2	48.7	57.6	52.8	50.1	64.3	63.3	54.8	53.2	50.9	50.6	47.6	41.3	40.3	24.5

PPG 24 NOISE EXPOSURE CATEGORY	
road traffic 07:00 - 23:00	B
23:00 - 07:00	B
rail traffic 07:00 - 23:00	B
23:00 - 07:00	B
air traffic 07:00 - 23:00	A
23:00 - 07:00	B
mixed sources 07:00 - 23:00	B
23:00 - 07:00	B

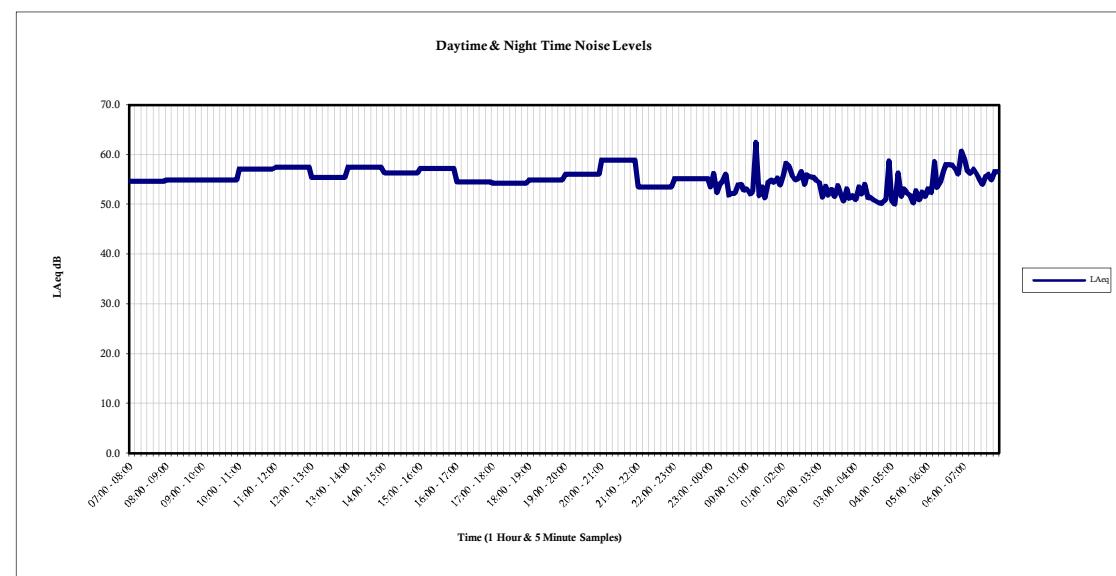


FIGURE 3
PAGE 1

NIGHT TIME NOISE LEVELS 23:00 - 07:00											
Date / Time	L _{Aeq}	L _{max}	L _{min}	LA10	LA50	LA90	31.5	63	125	250	Octave Band Centre Frequency (Hz)
	300	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k				
01:00 - 02:00 Continued	55.0	65.7	50.3	57.0	53.4	51.1	63.1	63.5	54.0	52.5	52.1
	55.2	65.2	49.0	58.0	53.1	50.2	61.6	63.0	53.2	52.8	52.3
	56.6	70.8	48.4	58.7	53.6	50.0	66.6	64.0	55.9	55.0	52.4
	54.1	63.6	48.2	57.1	52.2	49.6	63.3	62.6	53.5	52.3	50.6
	56.0	70.3	47.8	58.9	53.4	49.4	62.6	62.5	53.3	52.7	52.5
	55.6	65.8	48.1	59.2	52.6	49.6	60.8	60.3	52.5	52.7	52.9
	55.5	66.4	47.5	58.7	52.1	49.3	60.5	60.4	52.1	52.0	52.5
02:00 - 03:00	54.8	63.4	48.4	57.8	52.8	49.7	64.9	62.6	54.3	53.1	51.0
	54.4	66.3	47.0	57.2	50.6	48.3	61.2	61.2	52.1	51.3	50.9
	51.5	57.1	47.3	53.6	50.6	48.7	62.3	61.8	53.0	51.8	48.4
	53.7	69.5	48.7	54.8	51.4	49.7	65.3	62.7	53.8	53.1	50.0
	51.9	57.8	46.8	54.2	50.9	48.9	62.2	61.0	52.4	51.4	48.4
	53.0	70.1	48.7	53.7	51.2	49.6	62.4	60.9	52.8	51.9	49.4
	51.6	60.5	46.4	53.8	50.6	48.1	62.5	61.7	52.9	51.5	48.5
	53.8	61.3	46.4	56.3	52.3	48.8	63.3	62.5	54.5	52.3	50.2
	52.3	65.0	46.5	54.2	51.0	48.1	62.8	61.3	53.1	51.6	48.5
	50.7	56.4	46.7	52.6	50.2	47.8	62.9	62.6	53.5	50.3	46.6
	53.2	63.8	46.3	55.8	51.4	48.3	62.2	62.4	54.0	51.1	50.1
03:00 - 04:00	51.2	57.3	47.0	53.6	50.1	47.7	60.2	61.0	52.1	49.9	47.0
	51.7	57.1	47.2	54.1	50.8	48.6	63.5	62.9	51.7	50.7	48.0
	50.9	57.1	48.3	52.5	50.4	48.9	61.6	60.8	50.7	49.3	46.9
	53.6	62.8	47.7	56.9	51.1	49.0	62.0	60.1	51.5	51.3	50.0
	52.1	63.3	47.1	54.9	50.4	48.2	64.2	62.8	53.6	51.3	47.7
	54.0	64.0	48.2	56.8	52.1	49.5	65.7	63.9	54.7	53.1	50.5
	51.4	57.5	46.8	54.0	50.4	47.6	60.1	60.3	53.5	51.2	47.8
	51.5	60.2	46.5	53.7	50.3	48.0	63.0	61.4	52.0	50.3	47.0
	50.9	56.5	47.2	52.8	50.4	48.2	63.0	61.6	52.3	50.5	46.7
	50.6	58.3	45.8	53.1	49.3	47.2	61.8	60.9	51.9	49.8	46.0
	50.2	56.1	46.8	52.7	49.3	47.6	64.4	62.0	51.5	49.6	46.1
	50.4	60.0	45.9	52.8	49.4	47.4	64.7	61.4	51.0	50.0	46.1
	51.0	57.8	45.7	53.7	49.9	46.9	63.2	62.9	51.6	50.6	46.5
	58.8	70.9	46.9	61.4	52.6	49.0	62.7	63.5	54.2	54.2	51.2
04:00 - 05:00	50.8	56.7	46.4	53.4	50.0	47.2	62.1	62.2	52.0	50.6	46.3
	50.1	55.6	46.4	52.3	49.5	47.2	62.3	59.7	50.8	49.2	45.6
	56.4	72.4	46.4	56.1	52.1	48.3	67.5	64.5	53.7	53.1	49.0
	51.6	57.0	46.1	54.4	50.4	47.5	63.0	61.8	53.0	52.3	47.1
	53.2	66.1	46.8	55.6	50.7	47.9	61.9	62.1	52.6	51.3	49.3
	52.4	62.9	47.5	54.9	50.5	48.3	62.6	61.1	52.5	51.6	49.1
	51.8	60.1	48.1	53.9	50.8	49.0	63.2	61.4	53.1	51.7	48.4
	50.3	59.4	46.8	52.4	49.6	47.5	63.0	61.7	52.9	50.5	46.7
	52.7	61.0	48.0	55.1	51.5	49.0	63.7	63.0	53.7	52.8	49.0
	50.9	59.5	46.2	53.1	49.5	47.5	62.4	61.6	52.6	50.1	47.1
	52.5	57.8	49.0	55.0	51.5	49.8	64.0	62.4	54.6	53.1	48.6
	51.6	58.8	47.8	54.2	50.5	48.7	63.8	62.2	53.1	51.3	47.3
05:00 - 06:00	53.1	63.9	46.3	55.4	50.6	47.4	61.1	61.8	52.5	51.5	49.7
	52.4	61.6	46.2	54.4	51.5	48.6	62.1	62.2	53.8	51.3	47.8
	58.7	70.5	48.4	60.6	53.5	49.8	68.8	67.0	57.5	55.1	49.6
	53.4	63.6	48.2	56.1	52.0	49.1	63.8	64.1	54.3	52.7	49.3
	54.4	63.1	47.6	57.5	52.7	49.2	62.7	61.5	53.6	52.0	49.6
	56.8	63.6	51.0	59.4	55.7	52.1	66.8	65.6	55.5	54.6	53.0

NIGHT TIME NOISE LEVELS 23:00 - 07:00																
Date / Time	LAeq	Lmax	Lmin	LA10	LA50	LA90	Octave Band Centre Frequency (Hz)									
							31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
05:00 - 06:00 <i>Continued</i>	58.0	66.3	50.4	60.6	56.5	52.6	66.1	64.1	56.8	55.8	54.6	53.0	50.6	45.2	47.1	31.0
	58.1	65.8	51.5	61.2	56.3	52.3	65.5	63.3	56.6	56.1	54.5	53.4	50.4	44.6	48.1	31.9
	57.9	65.1	49.8	60.9	56.0	52.2	64.2	65.2	56.3	55.4	54.2	53.0	50.0	45.5	48.5	32.0
	57.0	68.6	49.9	59.6	54.5	51.7	62.7	62.4	54.9	54.1	52.8	51.9	49.8	46.2	46.6	30.3
	56.1	68.5	50.0	58.0	53.9	51.2	65.9	64.2	56.5	54.7	51.9	51.3	48.8	43.4	41.6	25.7
06:00 - 07:00	60.7	71.3	51.5	64.3	57.1	52.2	68.4	67.6	57.9	58.5	57.8	56.7	52.6	46.4	44.9	28.7
	59.1	68.7	51.1	62.1	55.3	52.0	67.1	64.7	57.0	56.8	56.1	54.9	51.1	44.4	44.6	29.0
	56.9	68.9	52.1	59.0	55.4	52.9	65.4	65.2	56.0	55.0	53.1	52.3	49.5	43.2	45.6	28.6
	56.3	62.4	51.8	58.4	55.6	53.4	65.2	64.3	56.0	55.5	53.2	51.7	48.4	42.0	42.1	25.1
	57.1	68.5	51.6	59.2	55.6	52.7	65.2	65.0	56.0	55.9	54.4	51.6	49.4	43.7	45.1	28.2
	56.1	63.0	51.4	57.5	55.9	53.7	65.9	65.1	57.5	56.2	53.2	51.3	48.1	41.8	32.8	15.9
	55.2	67.5	51.1	56.5	54.4	52.3	65.7	65.5	57.2	54.6	51.2	50.1	47.0	45.6	31.5	15.0
	54.1	59.9	51.1	55.6	53.6	52.0	65.6	64.4	56.1	53.5	50.3	49.7	46.2	39.7	29.8	13.9
	55.7	61.8	50.6	58.2	54.7	52.0	65.3	66.1	59.5	54.7	51.6	51.2	47.8	41.3	31.2	14.6
	56.1	64.1	52.0	58.3	55.0	53.0	67.9	66.0	57.6	55.3	52.3	51.7	48.7	41.8	32.8	16.4
	55.0	59.2	51.3	56.9	54.4	52.7	67.3	66.2	57.7	54.3	50.8	50.5	47.4	40.6	31.0	15.7
	56.6	66.9	50.9	58.9	54.8	52.9	65.1	64.8	58.2	56.0	54.0	51.9	48.4	41.6	32.0	17.2

NOISE LEVEL SUMMARY ASSESSMENT																
Date / Time	L _{Aeq}	L _{max}	L _{min}	LA10	LA50	LA90	Octave Band Centre Frequency (Hz)									
							31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
07:00 - 23:00 DAYTIME LOWEST <small>L_{A90} 1 HOUR & Corresponding L_{Aeq} 1 HOUR</small>	54.3	61.8	50.9	56.2	53.7	52.0	65.4	64.6	56.2	53.2	49.9	49.9	46.9	41.2	32.9	17.1
DAYTIME HIGHEST <small>L_{A90} 1 HOUR & Corresponding L_{Aeq} 1 HOUR</small>	62.4	77.5	58.1	62.3	60.2	58.8	69.6	68.7	60.1	58.1	57.5	57.8	56.7	49.0	45.4	39.4
DAYTIME AVERAGE <small>L_{A90} 16 HOUR & Corresponding L_{Aeq} 16 HOUR</small>	59.0	70.9	54.5	60.7	57.4	55.5	68.8	67.8	62.0	59.2	55.5	54.7	52.1	47.2	43.1	36.6
23:00 - 07:00 NIGHT TIME LOWEST <small>L_{A90} 5 MIN & Corresponding L_{Aeq} 5 MIN</small>	51.1	64.4	46.6	52.9	49.7	47.7	63.8	62.0	53.1	49.9	47.0	46.6	43.9	36.5	27.2	12.7
NIGHT TIME HIGHEST <small>L_{A90} 5 MIN & Corresponding L_{Aeq} 5 MIN</small>	56.4	62.9	52.5	58.2	55.6	53.7	65.9	65.9	56.5	55.3	53.9	51.5	48.5	42.8	39.5	23.2
NIGHT TIME AVERAGE <small>L_{A90} 8 HOUR & Corresponding L_{Aeq} 8 HOUR</small>	54.7	65.9	49.1	57.0	53.0	50.5	64.6	64.0	55.4	52.9	50.7	50.3	47.1	41.4	40.2	24.9

PPG 24 NOISE EXPOSURE CATEGORY	
road traffic 07:00 - 23:00 23:00 - 07:00	B B
rail traffic 07:00 - 23:00 23:00 - 07:00	B B
air traffic 07:00 - 23:00 23:00 - 07:00	B B
mixed sources 07:00 - 23:00 23:00 - 07:00	B B

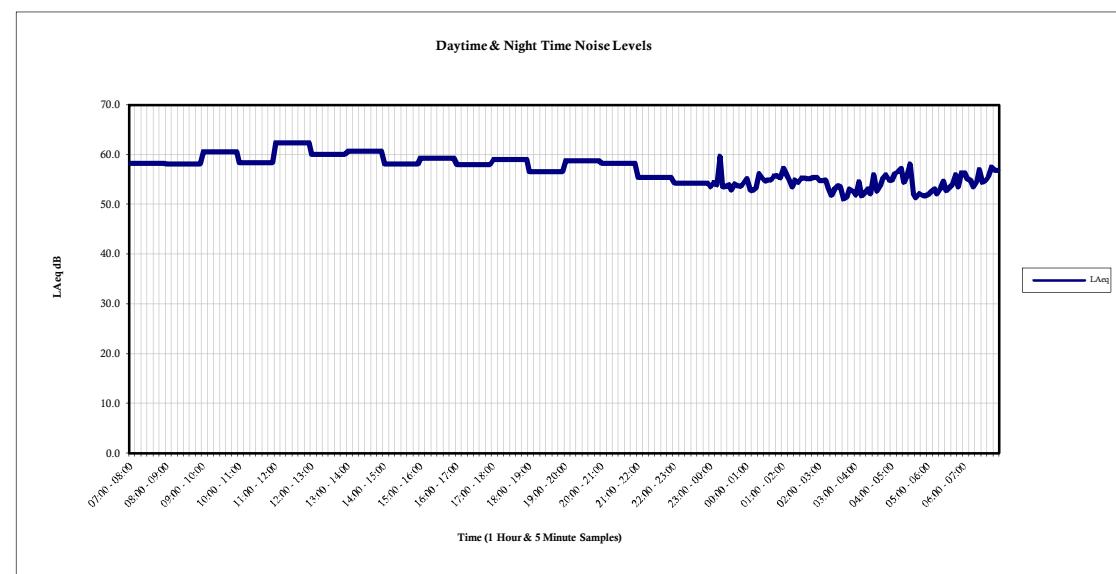


FIGURE 4
PAGE 1

NIGHT TIME NOISE LEVELS 23:00 - 07:00							Octave Band Centre Frequency (Hz)									
Date / Time	LAeq	Lmax	Lmin	LA10	LA50	LA90	31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
05:00 - 06:00 <i>Continued</i>	52.8	61.1	47.8	55.6	51.5	49.2	64.0	62.6	54.6	52.2	48.6	48.6	45.1	38.5	29.0	13.7
	53.4	61.7	48.5	55.6	52.1	49.7	63.8	64.7	54.7	51.8	49.4	49.0	45.8	39.9	29.9	14.6
	54.1	59.0	49.9	56.6	53.1	51.0	63.8	62.0	54.8	52.8	50.5	49.9	46.3	40.2	29.2	13.8
	56.0	74.2	49.3	56.4	52.8	49.9	65.7	64.8	54.5	52.5	50.1	51.5	50.0	43.9	33.3	15.5
06:00 - 07:00	53.5	59.2	49.2	55.8	52.7	50.6	63.7	64.8	55.0	52.5	49.7	49.3	45.5	39.0	30.2	13.7
	56.4	62.9	52.5	58.2	55.6	53.7	65.9	65.9	56.5	55.3	53.9	51.5	48.5	42.8	39.5	23.2
	56.4	64.4	51.8	57.8	55.5	53.4	66.3	66.6	57.7	55.7	53.4	51.8	48.3	42.5	33.4	17.7
	55.2	60.0	50.6	57.5	54.6	52.1	64.4	65.4	57.0	55.1	52.9	50.4	46.6	40.0	30.6	16.1
	54.9	64.2	49.0	57.5	53.7	50.8	65.7	65.2	56.9	53.8	50.6	50.5	47.6	41.0	30.0	14.0
	53.6	58.4	49.7	55.7	52.9	51.0	64.5	65.1	56.6	53.3	49.8	49.3	45.4	38.8	29.2	12.4
	54.6	62.0	51.0	56.7	53.4	51.5	67.1	65.7	56.7	53.3	50.6	50.2	46.9	39.8	30.9	14.4
	57.0	73.4	49.4	57.6	53.7	50.9	65.3	65.6	58.9	55.1	53.2	52.6	49.7	43.2	32.9	15.6
	54.5	58.1	50.7	56.6	54.0	51.8	65.8	64.8	56.9	53.5	50.4	50.2	46.5	40.5	30.4	13.8
	54.8	59.4	50.5	57.0	54.2	52.1	65.8	66.1	57.6	53.7	50.7	50.5	47.1	39.8	29.2	13.2
	55.6	62.6	50.7	58.1	54.4	51.8	66.3	65.3	59.3	54.8	51.9	51.2	47.3	41.7	33.7	18.0
	57.5	68.1	52.0	59.3	55.9	53.3	68.0	67.2	59.0	56.2	53.4	53.1	49.5	45.2	38.6	25.2
	56.9	64.1	51.4	60.2	55.2	53.0	65.8	65.7	58.9	56.0	53.0	52.4	49.4	42.9	36.2	18.6