

Acoustic Report.

Noise impact assessment for Caia Park Primary Care
Resource Centre, Prince Charles Road, Wrexham.

Date of Survey: 10th and 11th July 2014



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A Member of The Association of Noise Consultants

Noise Impact Assessment

Site: Caia Park Primary Care Resource Centre
Prince Charles Road
Wrexham
LL13 8TH

Client: Castlemead Developments Ltd
Abenbury House
17 Wilkinson Business Park
Clwydog Road South
Wrexham
LL13 9AE

Date of Survey: 10th and 11th July 2014

Acoustic Consultant: Iain Critchley MIOA MInstSCE for Peninsular Acoustics

1. Introduction.

This report was commissioned by Castlemead Developments Ltd, to determine the likely noise impact from the proposed erection of a two storey health centre and offices on the site of existing health centre.

The purpose of this report is to assess the likely level of noise generated by the air handling plant associated with the development, to comply with Planning Condition 9 which states:

'The rating level of any noise generated by air-handling plant associated with the development shall not exceed the pre-existing background noise level by more than 5 dB(A) at any time. The noise levels shall be determined at the nearest noise sensitive premises and measurements and assessments shall be made in accordance with BS 4142:1997 'Method of Rating Industrial Noise Affecting Mixed Residential and Industrial areas'.

2. Site Description.

The proposed development site is located within the grounds of the existing Princes Road Health Centre and will occupy the area of the former car park.

Following consultation with the environmental health officer at Wrexham Council, it was agreed that the nearest noise sensitive premises, for the purpose of this assessment, are the residential property known as Tan y Bryn and residential property on the nearby Gwenfro estate. While there are schools and a church in the vicinity of the proposed development, it was agreed that these would not be occupied at night and so would not be considered 'sensitive' in terms of a BS 4242 assessment as daytime background noise levels are higher than at night.

It will be assumed that the associated plant and equipment could be operational for 24 hours per day.

2.3 Sensitive Receptors

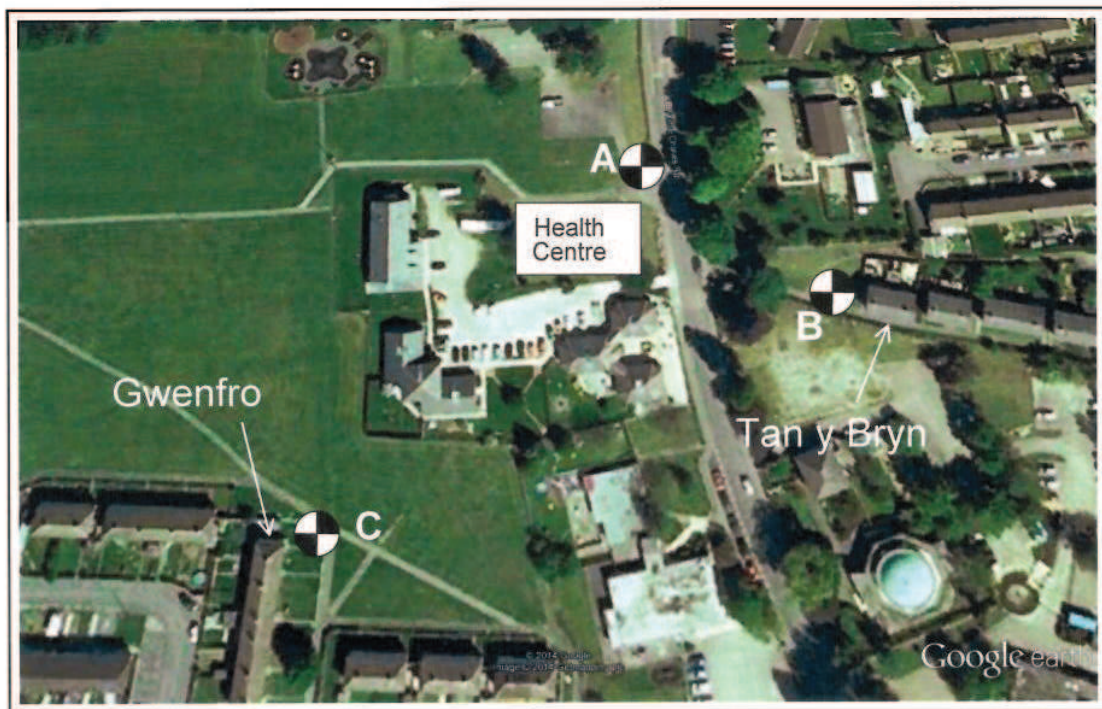
The nearest 'noise sensitive' premises are Tan y Bryn, which is approximately 60 metres from the proposed new building and the rows of terraced houses at Gwenfro, approximately 90 metres from the proposed new building.

2.4 Existing Noise Sources.

Existing noise at the development site is due to local road traffic on Prince Charles Road and more distant road traffic on the A483 (about 3 km to the west) and the A5156 (about 2 km to the north).

There is an athletics stadium approximately 200 metres to the west but there was no noticeable noise from this during either the daytime or night time parts of the noise survey.

Figure 1 - site plan showing noise monitoring points A, B and C (not to scale)



3. Survey Methodology and Results.

This study was in two parts; a) to establish typical weekday ambient and background noise levels on the site and at neighbouring premises, and b) to estimate noise levels from the proposed development due to fixed plant and equipment.

The survey method is broadly in accordance with British Standard BS4142:1997 *'Method for Rating industrial noise affecting mixed residential and industrial areas'*.

3.1 Establishing ambient and background noise levels.

Noise monitoring was carried by taking sample measurements around the development site, at Locations A, B and C on the 10th July 2014 between 12.00 p.m. and 4.00 p.m. to obtain noise levels which are representative of normal daytime, weekday conditions. Location A corresponds to the corner of the proposed building, set back from Prince Charles Road by 5 metres.

Location B was near Tan y Bryn and Location C was on the open parkland near the houses on the Gwenfro estate. Daytime ambient noise at this location was dominated by the noise of children playing, dogs barking and local and distant road traffic.

Further noise measurements were carried out at Locations B and C, between midnight and 1.30 a.m. on the 11th July 2014. Although there was some local traffic using Prince Charles Road late at night, the background noise was mainly driven by distant road traffic, probably the A483 to the west.

Noise logging equipment for the investigation comprised a Norsonic 140 sound level meter (Ser. No.1402728) which was calibrated on site before and after each sequence of measurements. Calibration certificates can be provided on request.

Monitoring positions were at a notional height of 1.5 metres above ground, relative to the ground level of the affected premises, in accordance with the measurement Standards.

For all locations, the sound level meter was preset to record the parameters of LAeq, LAf,max and LA90, in 5 minute periods. Weather conditions were dry and warm throughout the survey period with a daytime air temperature of 17⁰ Celsius and a night time temperature of 13⁰ Celsius.. Wind speeds were 1 to 2 m/sec from the north-west for both surveys.

3.2 Results of ambient and background noise survey.

Daytime and night time ‘average’ noise levels were obtained by taking the energy average of the individual LAeq (ambient) noise measurements at each location, and the lowest of the LA90 (background) noise measurements at each location.

The results of the noise survey are summarised in Table 1.

Table 1 - ‘Average’ noise levels at each location.

Receptor Locations		Daytime		Night time	
		LAeq	LA90	LAeq	LA90
A	Corner of site	57.6 dBA	45.0 dBA	n/a	n/a
B	Tan y Bryn	50.0 dBA	42.8 dBA	35.4 dBA	28.4 dBA
C	Gwenfro	52.4 dBA	42.9 dBA	32.0 dBA	28.2 dBA

3.3 Establishing noise emitted from the proposed development.

3.3.1 Noise breakout from proposed development to noise-sensitive premises.

At the time of writing this report there is no specific information regarding noise levels of the proposed fixed plant and equipment associated with the proposed development.

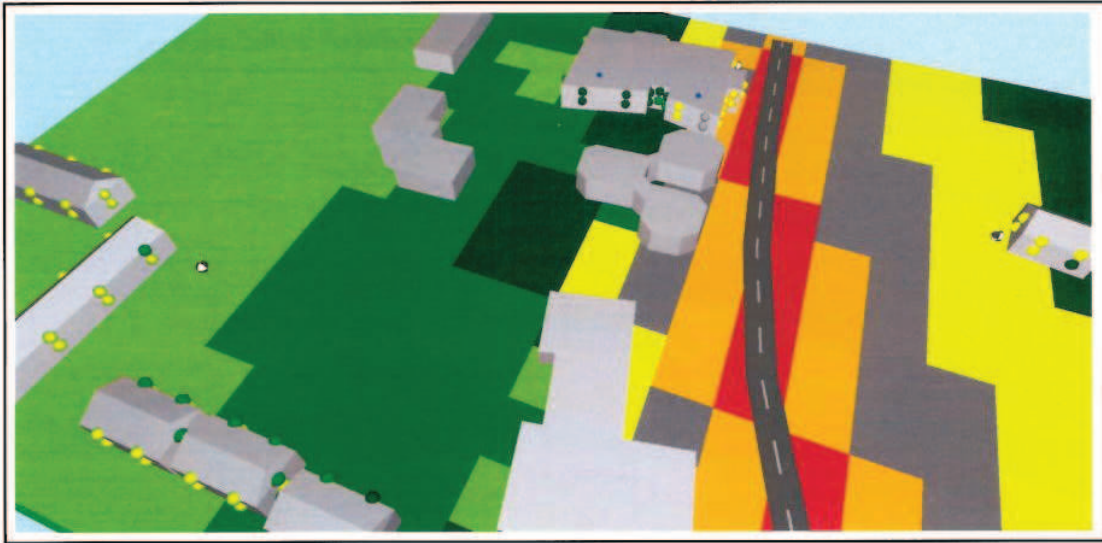
This assessment will therefore set ‘target’ design noise limits for the plant so that appropriate equipment can be selected by others and, if necessary, appropriate mitigation measures incorporated.

Calculations are therefore carried out ‘backwards’ taking the underlying background noise level as the starting point, then applying distance attenuation and finally applying a character correction according to BS4142 to obtain a noise limit in terms of sound power level.

Note that all distance attenuation calculations have been carried out using CADNA noise modelling software, so as to more easily take account of building reflections and screening, ground attenuation etc. Cadna noise model graphics are included in Annex B to this report. The model includes local road traffic noise which dominates the daytime noise climate of the area, but which is insignificant at night.

The night time background noise level at both Tan y Bryn and Gwenfro will be taken to be 28 dB LA90 (from Table 1). The acceptable ‘rating level’ at these locations, due to fixed plant and equipment, should therefore not exceed 33 dB LAeq (5 minutes) i.e. LA90 +5 dB, as stated in planning condition 9.

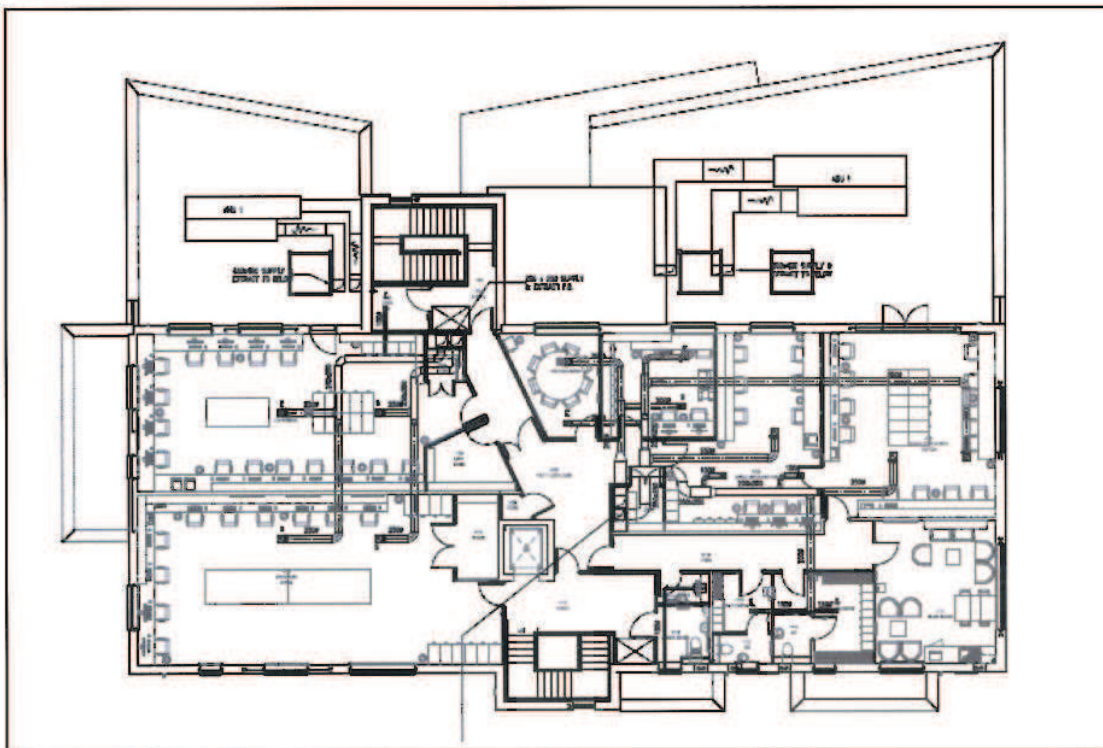
Figure 2 - 3D graphic from noise model.



3.3.2 Air-Handling Plant.

The planning condition refers specifically to the air-handling units and these are located on the roof of the building as shown in the drawing of Figure 3.

Figure 3 - first floor layout showing AHU's on roof.



4. Noise Impact Assessment to BS4142:1997.

4.1 Explanation.

BS4142:1997 assesses the likelihood of noise complaints by comparing the 'rating level' of a specific noise, measured as $L_{Aeq,T}$, with the underlying background noise, measured as LA_{90} . If the rating level exceeds the background by 10 dB or more then the standard considers that 'complaints are likely'. A difference of around 5 dB is considered to be of 'marginal significance' and if the rating level is 10 dB or more below the background level, then this is a positive indication that complaints are unlikely.

Where the noise source is tonal and/or is irregular, then a 5 dBA 'character correction' is added to give the 'rating level' of the noise source.

4.2 Estimating the acceptable noise limit for air-handling units.

By experimenting with different sound power levels for each of the two AHU's shown on the roof plan, it was found that the criteria of the planning conditions are achieved at each of the noise sensitive locations provided the sound power level of each AHU does not exceed 75 dB L_{wA} , or that the combined sound power level for both units, operating together, does not exceed 78 dB L_{wA} .

However, if the noise from the AHU's contains any 'character' such as a whine or hum, or is otherwise likely to attract attention, then it may be subject to a 5 dB penalty as illustrated by the BS4142 assessment of Table 4, taking Tan y Bryn as an example.

Table 4 - BS4142 Assessment - night time 'worst case' at Tan y Bryn

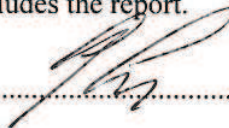
Measurement	Value	Comment
Source Specific Noise Level	33 dBA	Obtained by calculation of attenuation by distance from source of 78 dB L_{wA}
Background Noise	28 dB LA_{90}	Measured at location B
Character correction	0 dBA	At this level, a character correction is not required*
Rating Level	33 dBA	
Excess of rating level over background level	5 dBA	
This indicates a marginal significance of complaints, according to BS4142:1997		

* noise levels are considered 'very low' and BS4142 does not apply.

5. Summary and Conclusions.

1. Noise sensitive locations were agreed through consultation with the environmental health officer for Wrexham Council. These are the house known as Tan-y Bryn, 60 metres from the proposed development site and houses at Gwenfro, 90 metres from the site.
2. Planning condition 9 states that noise from air handling units shall not be more than background + 5 dBA at any time at the noise sensitive locations.
3. The night time background noise level at both of the agreed noise sensitive locations was found, by measurement, to be typically 28 dB LA90.
4. The acceptable 'rating level' due to noise from the air-handling units located on the roof of the proposed development must therefore not exceed 33 dBA to meet the planning condition.
5. Calculations show that this corresponds to a combined sound power level, for both air-handling units, of 78 dB LwA. This is roughly equivalent to a sound pressure level, for both units, of 50 dBA @ 10 metres, meaning that each unit should be no more than 47 dBA @ 10 metres.
6. In addition to ensuring that the air handling equipment meets the 78 dB LwA noise limit, it is recommended that equipment is selected which is neither tonal nor impulsive in character so as not to attract attention. It should be noted, however, that the source and background noise levels are considered to be 'very low' according to BS4142:1997 and so fall outside of the scope of this standard.

This concludes the report.

Signature/name of consultant..........Date: 20/2/2014

For and on behalf of:

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6. Definitions.

1. LAeq (t)

This is a measure of the 'average' noise level, in decibels, which has occurred over a given time period (t) e.g. LAeq (8 hours). The 'eq' stands for equivalent level as its proper definition is "*the equivalent steady sound level containing the same energy as the fluctuating sound level over the same time period*". The 'A' means that the quoted sound level is 'A' - weighted.

2. 'A' - weighting e.g. in dBA.

The sound level has been measured with an instrument whose sensitivity has been 'tailored' to match the typical frequency response of the human ear. Nearly all environmental noise measurements are expressed in dBA.

3. LA90.

This is the sound level, in decibels (dBA), which is exceeded for 90% of the measurement period. LA90 is used to determine the background noise level of an area.

4. LA10.

This is the sound level which is exceeded for 10% of the measurement period and is a traditional unit for the measurement of road traffic noise.

5. LAf,max.

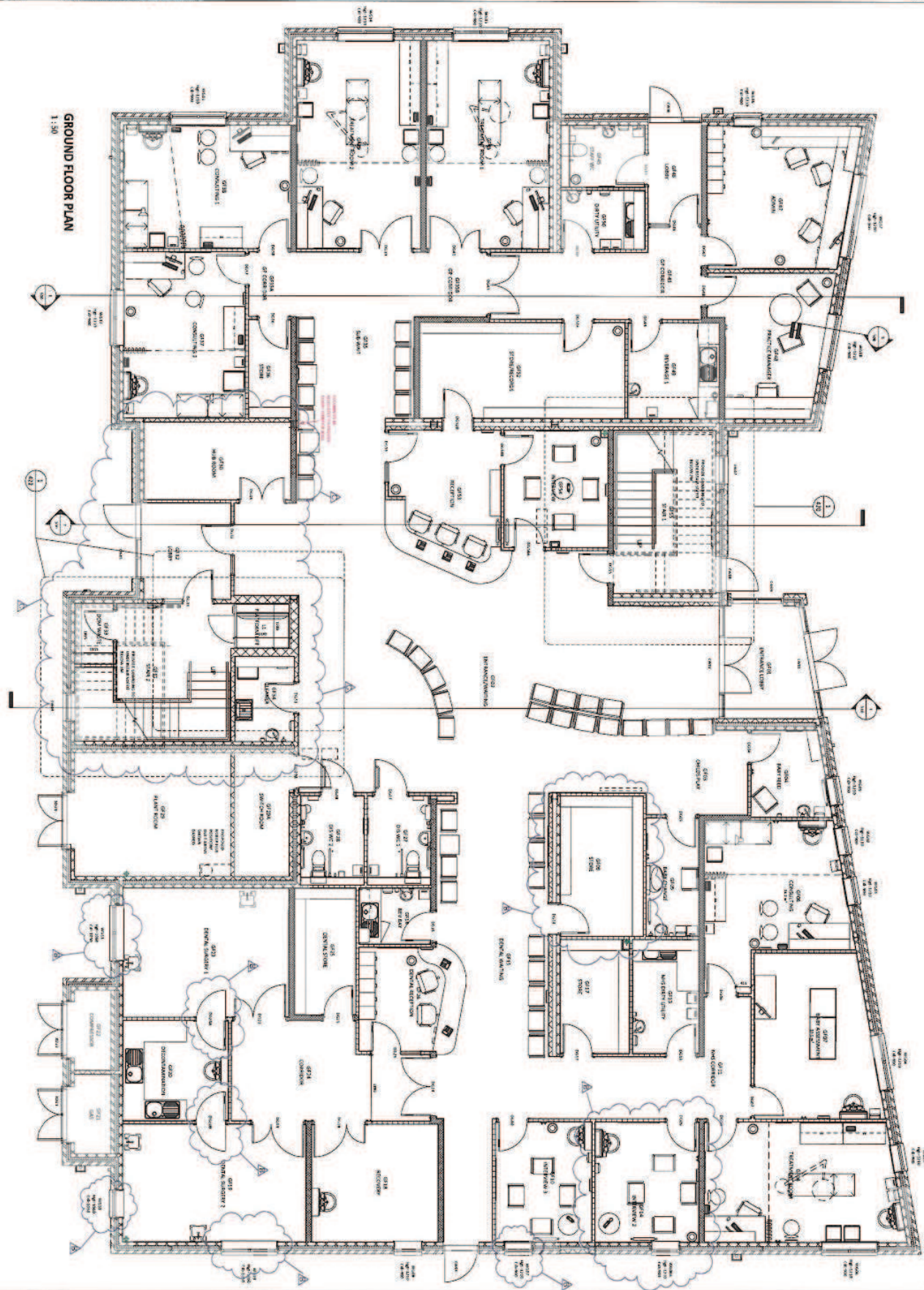
This is the highest level or 'peak' level*, measured with 'fast' time weighting, which is reached by the fluctuating noise level over the stated time period, even if it is only reached for a fraction of a second. Used to describe the highest sound level of short duration individual events such as a vehicle pass-by, which might cause disturbance or wake someone from sleep. It is possible to have high values of LAf,max even where the 'average' noise level, the LAeq, is relatively low.

* Technically, the term 'peak noise level' refers to a different parameter which is not measured as part of a normal noise survey. It is occasionally used in this report as a convenient shorthand for LAf,max as it is a concept which is more easily understood by people who do not have a knowledge of acoustics theory.

Annex A.

Plans of building (general plan and office area shown)

GROUND FLOOR PLAN
1:50



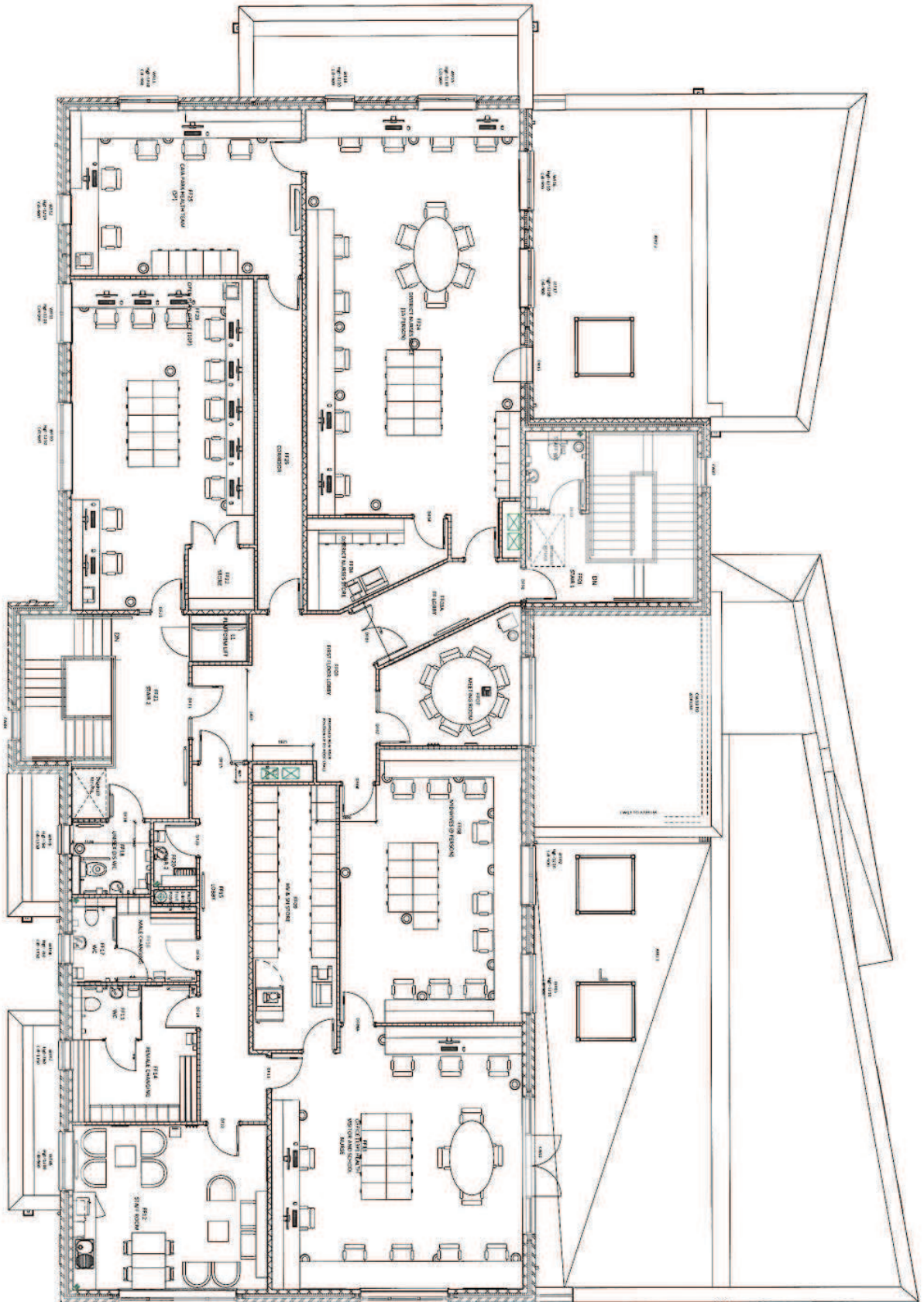
NOTES:
1. ALL WORK TO BE COMPLETED BY 15/03/2024.
2. ALL WORK TO BE COMPLETED BY 15/03/2024.
3. ALL WORK TO BE COMPLETED BY 15/03/2024.
4. ALL WORK TO BE COMPLETED BY 15/03/2024.
5. ALL WORK TO BE COMPLETED BY 15/03/2024.

FOR CONSTRUCTION

CAIA PARK PRIMARY
RESOURCE CENTRE
for CASTLEMEAD

CA13.100C



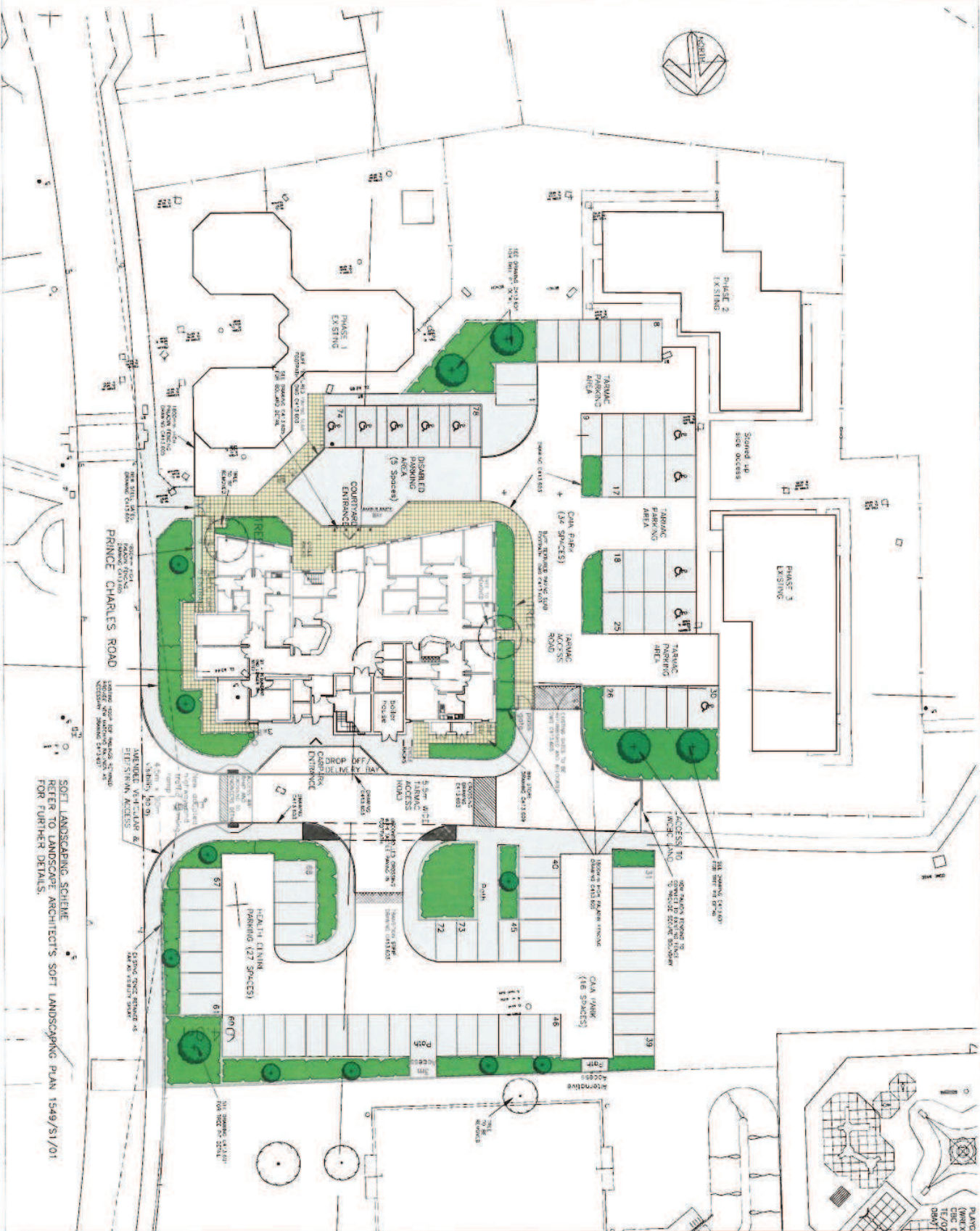


1 FIRST FLOOR PLAN
1:50

FOR CONSTRUCTION

CAIA BANK PRIMARY
RESOURCE CENTRE
for CASTLEHEAD
FIRST FLOOR PLAN

CA13.1018



SOFT LANDSCAPING SCHEME
REFER TO LANDSCAPE ARCHITECT'S SOFT LANDSCAPING PLAN 1549/S1/01
FOR FURTHER DETAILS.

Annex B.

Cadna noise model graphics (day and night)



DAY



NIGHT

Annex C.

Measurement data

Date	Description	Status	LAeq	LAF(max)	LA90
(2014/07/10 12:00:49.00)	Caia Park corner of plot	457088.1896	56.6	69.3	47.4
(2014/07/10 13:05:01.00)	Caia Park corner of plot	831763.7711	59.2	78.8	47.9
(2014/07/10 15:10:01.00)	Caia Park corner of plot	549540.8739	57.4	68.8	46.4
(2014/07/10 15:15:01.00)	Caia Park corner of plot	537031.7964	57.3	70.2	45
(2014/07/10 15:20:01.00)	Caia Park corner of plot	489778.8194	56.9	67.7	47.3
(2014/07/10 12:22:16.00)	Caia Park Tan y Bryn (house)	120226.4435	50.8	68.6	42.8
(2014/07/10 13:25:01.00)	Caia Park Tan y Bryn (house)	64565.4229	48.1	59.6	43.4
(2014/07/10 15:30:01.00)	Caia Park Tan y Bryn (house)	114815.3621	50.6	57.4	47.4
(2014/07/10 15:39:36.00)	Caia Park Gwenfro	123026.8771	50.9	61.4	44.8
(2014/07/10 15:40:01.00)	Caia Park Gwenfro	223872.1139	53.5	69.5	42.9
(2014/07/11 00:42:11.00)	Caia Park Tan y Bryn (house)	5623.413252	37.5	58.1	30.8
(2014/07/11 00:50:01.00)	Caia Park Tan y Bryn (house)	1905.460718	32.8	44.7	30.7
(2014/07/11 00:55:01.00)	Caia Park Tan y Bryn (house)	2754.228703	34.4	53.1	28.4
(2014/07/11 01:00:01.00)	Caia Park Gwenfro	1698.243652	32.3	45.8	29.3
(2014/07/11 01:06:02.00)	Caia Park Gwenfro	1174.897555	30.7	40.7	28.2
(2014/07/11 01:15:01.00)	Caia Park Gwenfro	1905.460718	32.8	43.3	31.2

	<u>Site</u>	<u>Tan y Bryn</u>	<u>Gwenfro</u>
LAeq (day)	57.5818546	49.9943103	52.39173041
LAeq (night)	n/a	35.3500292	32.02179599
LA90 (day)	45	43	43
LA90 (night)	n/a	30	28