ACOUSTIC CONSULTANTS LTD

Noise Impact Assessment

Sites 2-3 Pen-Y-Bryn & Menai Avenue
Croeserw, Port Talbot

Reference: 11925/FD

Client
Tai Tarian Ltd

Document Control					
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The report has been prepared in good faith, with all reasonable skill and care, based on information provided or available at the time of its preparation and within the scope of work agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above. The report is provided for the sole use of the named Client and is confidential to them and their professional advisors. No responsibility is accepted to other parties.

The report limits itself to addressing solely on the noise, acoustic, and vibration aspects as included in this report. We provide advice only in relation to noise, vibration and acoustics. It is recommended that appropriate expert advice is sought on all the ramifications (e.g. CDM, structural, condensation, fire, legal, etc.) associated with any proposals in this report or as advised and concerning the appointment. It should be noted that noise predictions are based on the current information as we understand it and, on the performances noted in this report. Any modification to these parameters can alter the predicted level. All predictions are in any event subject to a degree of tolerance of normally plus or minus three decibels. If this tolerance is not acceptable, then it would be necessary to consider further measures.

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1. Introduction

Tai Tarian Ltd appointed Acoustic Consultants Limited to undertake a noise impact assessment for air source heat pump (ASHP) plant noise on the proposed residential development at sites 2-3 Pen-Y-Bryn & Menai Avenue.

This assessment has been undertaken in accordance with Planning Policy Wales (PPW), Technical Advice Note 11 (TAN11) and British Standard 4142:2014.

The author of the report is a Technician Member of the Institute of Acoustics (MIOA) who has seven years' experience in the field of noise and acoustics.

2. The Sites

2.1. Site 2

Site 2 comprises 10 flats and 6 houses situated on a vacant plot of land between Menai Avenue and Pen-Y-Bryn – each dwelling will be served by its own Air Source Heat Pump (ASHP) for a total of 16 plant units.

The site is located in a semi-rural area with existing dwellings directly to the West, east and along Menai Avenue, the closest of which is approximately 10m from the nearest ASHP.

The proposed site location and drawings are shown on the figures below.

Figure 1: Site 2 Location

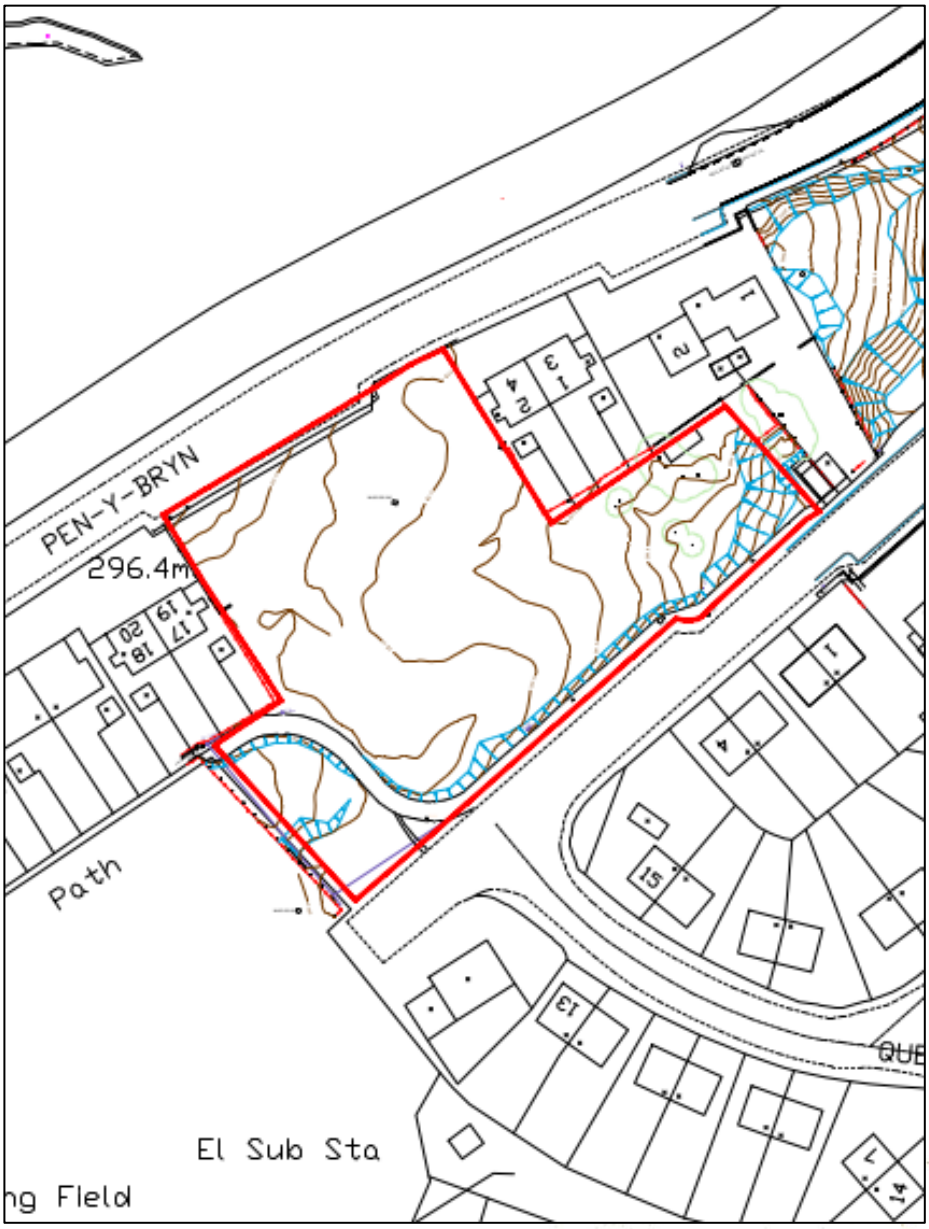

Figure 2: Site 2 Layout

2.2. Site 3

Site 3 comprises 9 flats and is situated on a vacant plot of land south of Menai Avenue, from the information provided there will be no ASHP on this site however it still has the potential to be adversely affected by the proposed heat pumps on site 2.

The site located in a semi-rural area with dwellings immediately to the east and west.

The proposed site location and drawings are shown on the figures below.

Figure 3: Site 3 Location

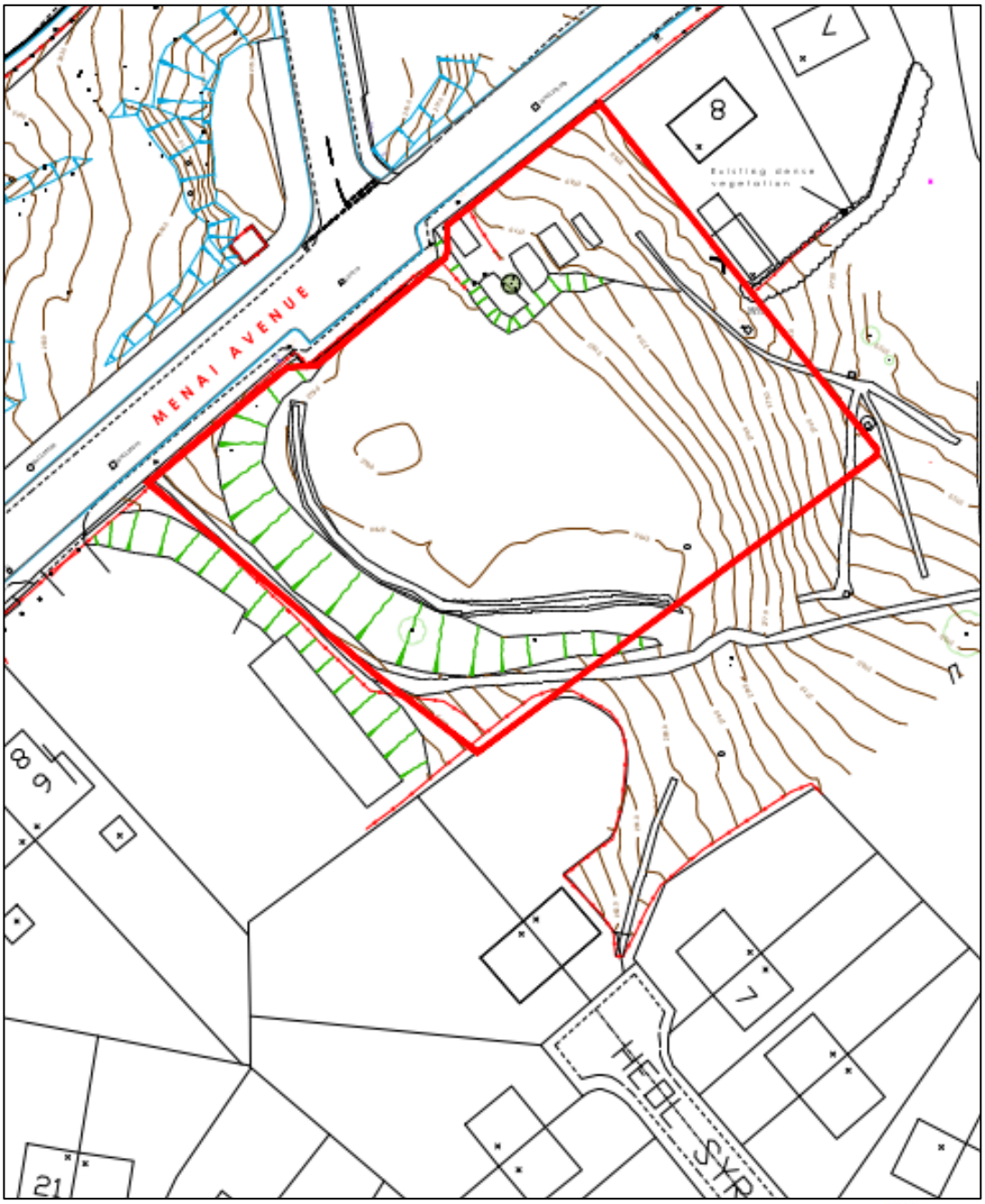

Figure 4: Site 3 Layout

3. Planning and Noise

3.1. Planning Policy Wales (PPW)

Planning Policy Wales (PPW) Edition 12 dated February 2024 sets out the land use planning policies of the Welsh Government. Section 1 states:

1.1 Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. PPW, the TANs1, MTANs2 and policy clarification letters comprise national planning policy.

The most relevant statements for noise affecting a residential use are provided in Section 6.7 and summarised below:

"6.7.1 Clean air and an appropriate soundscape, contribute to a positive experience of place as well as being necessary for public health, amenity and well-being. They are indicators of local environmental quality and integral qualities of place which should be protected through preventative or proactive action through the planning system. Conversely, air, noise and light pollution can have negative effects on people, biodiversity and the resilience of ecosystems and should be reduced as far as possible."

6.7.4 The planning system should maximise its contribution to achieving the well-being goals, and in particular a healthier Wales, by aiming to reduce average population exposure to air and noise pollution alongside action to tackle high pollution hotspots. In doing so, it should consider the long-term effects of current and predicted levels of air and noise pollution on individuals, society and the environment and identify and pursue any opportunities to reduce, or at least, minimise population exposure to air and noise pollution, and improve soundscapes, where it is practical and feasible to do so.

6.7.5 In taking forward these broad objectives the key planning policy principle is to consider the effects which proposed developments may have on air or soundscape quality and the effects which existing air or soundscape quality may have on proposed developments. Air Quality and soundscape influence choice of location and distribution of development and it will be important to consider the relationship of proposed development to existing development and its surrounding area and its potential to exacerbate or create poor air quality or inappropriate soundscapes. The agent of change principle says that a business or person responsible for introducing a change is responsible for managing that change. In practice, for example, this means a developer would have to ensure that solutions to address air quality or noise from nearby pre-existing infrastructure, businesses or venues can be found and implemented as part of ensuring development is acceptable.

6.7.6 In proposing new development, planning authorities and developers must, therefore:

- *address any implication arising as a result of its association with, or location within, air quality management areas, noise action planning priority areas or areas where there are sensitive receptors;*
- *not create areas of poor air quality or inappropriate soundscape; and*
- *seek to incorporate measures which reduce overall exposure to air and noise pollution and create appropriate soundscapes.*

6.7.7 To assist decision making it will be important that the most appropriate level of information is provided and it may be necessary for a technical air quality and noise assessment to be undertaken by a suitably qualified and competent person on behalf of the developer."

6.7.8 Good design, for example setting back buildings from roads to avoid canyon effects and using best practice in terms of acoustic design to ensure the appropriate and intended acoustic environment of completed developments should be incorporated at an early consideration in the design and planning process. Other mitigation measures must be capable of being effectively implemented for their intended purpose, and could include those related to:

- *traffic management and road safety;*
- *ensuring progress towards a shift to low or zero emissions means of road transport, such as electrical charging points;*
- *supporting low or zero emissions public transport;*
- *providing active travel infrastructure; and*
- *incorporating green infrastructure, where it can improve air quality by removing air pollution and aiding its dispersal, reduce real or perceived noise levels by absorbing and scattering noise and introducing natural sounds to soften man-made noise, provide areas of relative tranquillity, and reduce exposure by putting a buffer between sources of pollution and receptors.*

6.7.14 Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur. In circumstances where impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality and the acoustic environment it will be appropriate to refuse permission.

6.7.19 The health imperative of good air quality and appropriate soundscapes in contributing to the overall character and quality of places and the health and well-being of people and wildlife should be fully recognised. It will not be appropriate to locate sensitive uses, such as hospitals, schools, care homes and housing adjacent to busy roads or other transport routes, where there are no connectivity benefits to be gained and where health and amenity impacts associated with increased exposure of people to pollution will be unacceptable. Whilst some uses may be appropriate with

the aid of good design air quality and soundscape considerations can be overriding factors, especially for sensitive uses, if they cannot be adequately mitigated and impacts minimised.

6.7.20 Where sensitive developments need to be located close to existing transportation infrastructure for sustainable movement and access they should be designed, as far as practicable, to limit harmful substances and noise levels within and around those developments both now and in the future. This may include employing the principles of good acoustic design and the inclusion of active travel or travel management measures as part of development proposals. Such development, however, should preferably be located away from existing sources of significant noise, which may include aircraft noise or roads, particularly new roads or those with programmed route improvements.

6.7.21 Regard should be paid to current air quality and noise levels and the quality of the existing soundscape and account taken of any relevant local air quality action plan, noise action plan and/ or local or regional air quality strategy as part of development strategies and proposals in development plans and before determining planning applications.

6.7.24 The potential impacts of noise pollution arising from existing development, be this commercial, industrial, transport related or cultural venues (such as music venues, theatres or arts centres), must be fully considered to ensure the effects on new development can be adequately controlled to safeguard amenity and any necessary measures and controls should be incorporated as part of the proposed new development. This will help to prevent the risk of restrictions or possible closure of existing premises or adverse impacts on transport infrastructure due to noise and other complaints from occupiers of new developments. It will be important that the most appropriate level of information is provided and assessment undertaken.

PPW does not provide any quantifiable criteria and directs you to the Technical Advice Notes (TAN 11).

3.2. Technical Advice Note (Wales) - Noise

Planning Policy Wales (PPW) Edition 11 dated February 2021 sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes. The relevant planning criteria for proposed residential development is in Technical Advice Note (Wales) 11 entitled "Noise" which was published in October 1997. The introduction states:

"This note provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business.

It outlines some of the main considerations which local planning authorities should take into account in drawing-up development plan policies and when determining planning applications for development which will either generate noise or be exposed to existing noise sources".

For noise from industrial and commercial developments, such as plant noise, TAN 11 states:

"B17. The likelihood of complaints about noise from industrial development can be assessed, where the Standard is appropriate, using guidance in BS 4142: 1990. Tonal or impulsive characteristics of the noise are likely to increase the scope for complaints and this is taken into account by the "rating level" defined in BS 4142. This "rating level" should be used when stipulating the level of noise that can be permitted. The likelihood of complaints is indicated by the difference between the noise from the new development (expressed in terms of the rating level) and the existing background noise. The Standard states that, 'A difference of around 10 dB or higher indicates that complaints are likely. A difference of around 5 dB is of marginal significance'. Since background noise levels vary throughout a 24-hour period it will usually be necessary to assess the acceptability of noise levels for separate periods (e.g. day and night) chosen to suit the hours of operation of the proposed development. Similar considerations apply to developments that will emit significant noise at the weekend as well as during the week. In addition, general guidance on acceptable noise levels within buildings can be found in BS 8233: 1987."

4. Assessment Methodology

4.1. British Standard 4142:2014

British Standard 4142:2014 entitled 'Method for rating and assessing industrial and commercial sound' use outdoor sound levels to assess the likely effects of sound upon people who might be inside or outside a dwelling or other premises used for residential purposes. The principle is that of establishing the 'difference' between the 'rating level' and the 'background sound level'.

The 'rating level' is the 'specific sound level' of the source over a period of one hour during the day (07:00 to 23:00 hours) and over a period of 15 minutes during the night (23:00 to 07:00 hours).

Section 9 entitled 'Rating Level' states: *"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, add a character correction to the specific sound level to obtain the rating level."*

An acoustic character correction should be added to the 'specific sound level' if it exhibits any tonality, impulsivity, other specific characteristics and/or intermittency at the assessment location. The value of the character correction varies, dependent on the prominence of the character of the sound source at the assessment location.
In Section 11 of the Standard, entitled 'Assessment of the Impacts', it states: *"Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level (see Clause 8) from the rating level (see Clause 9) and consider the following.*

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

In all instances the context needs to be considered when determining the overall impact. In terms of context BS 4142:2014 states: *"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.*

1) *Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night. Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.*

2) *The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.*

   NOTE 3 Consideration ought to be given to evidence on human response to sound and, in particular, industrial and/or commercial sound where it is available. A number of studies are listed in the "Effects on humans of industrial and commercial sound" portion of the "Further reading" list in the Bibliography.

3) *The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:*
   i) façade insulation treatment;
   ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
   iii) acoustic screening."

In terms of good internal acoustic conditions, the most relevant criteria and methodology is provided in BS8233:2014. This is in accordance with a March 2020 Technical published by the ANC Working Group, which provided comments and guidance to clear any ambiguity in BS414:2014+A1:2019.

The March 2020 Technical Note later states:

"Whilst BS 4142 can be used to assist in the determination of the likelihood of an adverse or significant adverse impact, <u>guidance on internal design criteria and mitigation is provided elsewhere. BS 8233:2014, for example, provides guidance on indoor ambient noise levels</u>."

5. Noise Monitoring

Attended noise monitoring was undertaken at the site between the hours of 22:00 and 01:00 on 24th and 25th of February 2026.

5.1. Monitoring Equipment

Sound Pressure Levels were measured using a Class 1 sound level meter with a half-inch condenser microphone, using the 'fast' setting. The equipment is checked regularly using a Quality System meeting the requirements of British Standard EN ISO/IEC 17025:2017 "General requirements for the competence of testing and calibration laboratories"; in accordance with British Standard EN 10012:2003 "Measurement management systems. Requirements for measurement processes and measuring equipment"; and traceable to the National Standards.

This equipment was checked and calibrated as noted below and the certificates are available for inspection.

Table 1: Equipment and Calibration Status

Equipment Description / Manufacturer / Type	Serial Number	Date of Calibration	Calibration Certification Number
SLM, NTI, XL2	A2A-11041-E0	14/07/2025	1512782-1
Pre-Amp, NTI, MA220	1822	14/07/2025	1512782-1
Microphone, NTI, MC230	9583	14/07/2025	1512782-1
Calibrator, Larson Davis, CAL200	18273	17/03/2026	1511387-2

5.2. Weather Conditions

During the monitoring period weather was suitable, with wind speeds up to 3m/s with a predominantly NW direction and no rain fall.

5.3. Monitoring Procedure

The microphone was placed at approximately 1.5m from the ground in free-field position. The monitoring location (ML) is as shown in the figure below and are considered representative of background noise across the proposed and existing noise sensitive receivers.

Figure 5: Monitoring Locations

The monitoring location is representative of background noise levels at all sites.

5.4. Measured Noise Levels

The A-weighted L_{eq} and L_{90} were measured over 15-minute intervals and are shown in the table below:

Table 2: Measured Range and Modal Background Level Values

Period	$L_{A90,15min}$		$L_{Aeq,15min}$	
	Range	Mode	Range	Typical
Day (22:00 - 23:00)	29 - 29	29	39 - 50	47
Night (23:00 - 01:00)	28 - 30	28	34 - 45	41

6. Plant Noise Modelling

6.1. Proposed Plant Units

The proposed ASHP serving the dwellings are the 5Kw Ideal Logic Air, the noise levels of which are presented in the below figure:

Figure 6: Monitoring: ASHP Specification

Description	Unit	4kW Logic Air	5kW Logic Air	8kW Logic Air	10kW Logic Air
Physical Properties					
Packaged Weight - Gross (Unpackaged Weight (Net))	kg	96 (86)	96 (86)	123 (110)	123 (110)
Height (Unpackaged)	mm	980 (798)	980 (798)	1190 (1008)	1190 (1008)
Width (Unpackaged)	mm	1175 (1095)	1175 (1095)	1175 (1095)	1175 (1095)
Depth (Unpackaged)	mm	600 (521)	600 (521)	600 (518)	600 (518)
Performance Data					
Coefficient of Performance (A+7 at W35 / W55)	COP	*5.34 / 3.00*	*5.15 / 3.04*	5.19 / 3.05	4.88 / 2.98
Coefficient of Performance (A-7 at W35 / W55)	COP	*3.21 / 2.01*	*3.13 / 2.13*	3.19 / 2.14	3.12 / 2.14
Seasonal Coefficient of Performance (W35 / W55)	SCOP	*4.96 / 3.48*	*5.07 / 3.65*	5.16 / 3.70	5.19 / 3.73
Sound Power Level *	dB (A)	52	52	55	55
Sound Pressure Level @ 1m / 3m / 5m	dB (A)	44 / 34.5 / 30	44 / 34.5 / 30	47 / 37.5 / 33	47 / 37.5 / 33

The installed plant should not exceed the above sound power levels. If it does, then a further assessment will be necessary. It is the responsibility of the client to ensure this information is correct.

6.2. Noise Modelling Parameters

The plant noise emission has been modelled in the noise modelling software Cadna:A by DataKustik. The modelling software calculates sound levels based on the inputted sound emission values, source and receiver locations, and primarily distance, barrier and ground attenuation. Calculations are undertaken using the General Method of Calculation from ISO 9613.

The parameters within the Cadna:A model are as follows and are considered reasonable assumptions:

- ASHP noise levels are based on manufacturer's data, as shown above and are included as points sources in the noise map.
- As a worst-case scenario, all heat pumps are assumed to operate constantly and at full power.
- Building heights are based on Google maps observations.
- The order of reflections is 3, and all buildings are reflective.
- The topography of the site is considered to be flat as a worst-case scenario.
- The ground across the site and surrounding area is considered hard and reflective as a worst-case scenario.
- Building evaluation level is maximum at the façade.

6.3. Noise Modelling Results

A noise map of the predicted specific sound level of plant during daytime and night-time are provided below.

Figure 7: Noise Modelling Results

The following table summarises the predicted façade noise levels at each noted receiver for all sites.

Table 3: Predicted Noise Level Summary

Location	NSR	Predicted Specific Level, dB $L_{Aeq,T}$
Site 2	Proposed Dwellings	45
	Existing Dwellings	27
Site 3	Proposed Dwellings	11

7. Plant Noise Assessments

7.1. Estimate of Impact

A noise impact assessment in accordance with British Standard 4142:2014+A:2019 has been undertaken.

7.2. Background Sound Level

From the measured data we have determined the representative background sound levels during the day (07:00 to 23:00 hours) and night (23:00 to 07:00 hours) to be 29 dB $L_{A90,1hour}$ and 28 dB $L_{A90,15min}$ respectively.

7.3. Specific Sound Level

The predicted specific sound level for all receivers is below for both the day (07:00-23:00) and night (23:00-07:00) are shown on the table below:

Table 4: BS 4142:2014 initial estimate of impact

Location	NSR	Predicted Specific Level, dB $L_{Aeq,T}$
Site 2	Proposed Dwellings	45
	Existing Dwellings	27
Site 3	Proposed Dwellings	11

7.4. Character Corrections

Character corrections should be added to the "specific sound level" if the "specific sound level" exhibits any *tonality, impulsivity, other specific characteristics and/or intermittency* at the assessment location. Based on our site visit the character corrections to be applied are as follows:

- *Tonality* – From our experience of these types of units are not usually tonal.
- *Impulsivity* – Plant such as this is not normally impulsive.
- *Intermittency* – We do not expect that the intermittency of the plant will be distinguishable at the sensitive receiver over the residual noise climate and we have not applied correction for intermittency. We have also assumed all plant is running continuously within our noise model.
- *Other Sound Characteristics* – We do not believe any correction is due to other characteristics.

7.5. Estimate of Impact

7.5.1. Existing Dwellings

Site 2

The British Standard 4142:2014 initial estimate at the most sensitive location is as follows:

Table 5: BS 4142:2014 initial estimate of impact

Parameter	Day	Night
Background Level, $L_{A90,T}$	29 dB	28 dB
Specific Sound Level, $L_{Aeq,T}$	27 dB	27 dB
Acoustic Character Correction	+0 dB	
Rating Level, L_{Ar}	27 dB	27 dB
Excess of rating over background level	-2 dB	-1 dB

The predicted rating levels at the nearby noise-sensitive receivers result in a difference of -2 dB during the day, and -1 dB during the night. This indicates that the cumulative plant noise level will have low impact when assessed to BS4142:2014+A1:2019.

7.5.2. Proposed Dwellings

Site 2

The British Standard 4142:2014 initial estimate at the most sensitive location is as follows:

Table 6: BS 4142:2014 initial estimate of impact

Parameter	Day	Night
Background Level, $L_{A90,T}$	29 dB	28 dB
Specific Sound Level, $L_{Aeq,T}$	45 dB	45 dB
Acoustic Character Correction	+0 dB	
Rating Level, L_{Ar}	45 dB	45 dB
Excess of rating over background level	+16 dB	+16 dB

The predicted rating levels at the nearby noise-sensitive receivers result in a difference of +16 dB during the day, and +17 dB during the night. This indicates that the cumulative plant noise level will have a significant impact, however context will be considered below.

Site 3

The British Standard 4142:2014 initial estimate at the most sensitive location is as follows:

Table 7: BS 4142:2014 initial estimate of impact

Parameter	Day	Night
Background Level, $L_{A90,T}$	29 dB	28 dB
Specific Sound Level, $L_{Aeq,T}$	11 dB	11 dB
Acoustic Character Correction	+3 dB	
Rating Level, L_{Ar}	30 dB	30 dB
Excess of rating over background level	-18 dB	-17 dB

The predicted rating levels at the nearby noise-sensitive receivers result in a difference of -18 dB during the day, and -17 dB during the night. This indicates that the cumulative plant noise level will have an no observed effect.

7.6. Context

Please note that the following section addresses the context of the proposed dwellings on site 2 only.

It should be noted that in all instances the context needs to be considered when determining the overall impact. British Standard 4142:2014 states:

"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.

1) *Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night. Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.*

With regard to 'absolute levels', the most relevant guidance is British Standard 8233:2014. Section 7.7.2 Table 4 of the British Standard provides internal ambient noise levels for dwellings. The guideline states that internal noise levels should not exceed 30 dB $L_{Aeq\ (8\ hr)}$ at night and 35 dB $L_{Aeq\ (16\ hr)}$ during the day.

The internal level is approximately 15 dB quieter than the external free-field level, allowing for the attenuation of a partially open window. Therefore, based on the predicted rating levels noted above, the internal absolute levels are as follows.

Table 8: Comparison with British Standard 8233:2014 at Worst Case Receiver

Location	Time	Predicted External Level dB $L_{Ar,T}$	Open Window Correction dB(A)	Predicted Internal Level dB $L_{Ar,T}$	Within Criteria
Site 2	Daytime (07:00 to 23:00)	45	-15	30	YES
	Night-time (2300 to 07:00)	45	-15	30	YES

As can be seen from the table above, the plant rating level is significantly lower than the British Standard 8233:2014 criteria for daytime and night-time rooms once the reduction through a partially open window has been considered.

Therefore, we would consider plant noise to be suitably controlled to the dwellings in the vicinity when absolute levels are considered.

7.7. Summary of British Standard 4142:2014 Assessment

As can be seen above, it is clear that plant noise will result in a low impact at the NSRs when assessed to British Standard 4142:2014+A1:2019 during daytime and night-time hours.

8. Summary and Conclusions

Tai Tarian Ltd appointed Acoustic Consultants Limited to undertake a noise impact assessment for air source heat pump (ASHP) plant noise on the proposed residential development at sites 2-3 Pen-Y-Bryn & Menai Avenue.

This assessment has been undertaken in accordance with Planning Policy Wales (PPW), Technical Advice Note 11 (TAN11) and British Standard 4142:2014.

Noise impact assessments have been carried out at proposed dwellings within the various application sites, along with existing residential receivers in the area.

All assessments demonstrate plant noise to be acceptable with no form of noise control measures required.

We consider the proposed plant to be acceptable according to the aims of TAN11 and PPW.

9. Appendix 1 – Glossary of Acoustic Terminology

A-weighted sound pressure pA – value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network.

A-weighted sound pressure level, L_{pA} - quantity of A-weighted sound pressure given by the following formula in decibels (dBA)

$L_{pA} = 10 \log_{10} (p_A/p_0)^2$

where:

p_A is the A-weighted sound pressure in pascals (Pa);
p_0 is the reference sound pressure (20 µPa)

Background sound level, $L_{A90,T}$– A-weighted sound pressure level that is exceeded by the residual sound assessment location for 90% of a given time interval, T, measured using weighting F and quoted to the nearest whole number of decibels

Break-in - noise transmission into a structure from outside.

Decibel (dB) – The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithms are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

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 = t2 – t1, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

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

where:

p_0 is the reference sound pressure (20 µPa); 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.

Facade level – sound pressure level 1 m in front of the façade. Facade level measurements of L_{pA} are typically 1 dB to 3 dB higher than corresponding free-field measurements because of the reflection from the facade.

Free-field level – sound pressure level away from reflecting surfaces. Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source).

Octave and Third Octave Bands – The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz and is generally more sensitive to medium and high frequencies than to low frequencies within the range. There are many methods of describing the frequency content of a noise. The most common methods split the frequency range into defined bands, in which the mid-frequency is used as the band descriptor and in the case of octave bands is double that of the band lower. For example, two adjacent octave bands are 250 Hz and 500 Hz. Third octave bands provide a fine resolution by dividing each octave band into three bands. For example, third octave bands would be 160 Hz, 250 Hz, 315 Hz for the same 250 Hz octave band.

Sound pressure level – Sound pressure level is stated on many of the charts. It is the amplitude of the acoustic pressure fluctuations in a sound wave, fundamentally measured in Pascals (Pa), typically from 20 micro-Pascals to 100 Pascals, but commonly simplified onto the decibel scale.

Sound reduction index, R – laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.

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.

Structure-borne noise – audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements.

Rating level, $L_{Ar,Tr}$ – Specific sound level plus any adjustment for the characteristic features of the sound.

Reverberation Time, T – The reverberation time is defined as the time taken for a noise level in an enclosed space to decay by 60 dB from a steady level once the noise source has stopped. It is measured in seconds. Often a 60 dB decay cannot be measured so the reverberation time is measured over a lesser range and corrected back to the time for a 60 dB drop assuming a constant decay rate. Common parameters are T20 (time taken for a 20 dB decay multiplied by three) and T30 (time taken for a 30 dB decay multiplied by two).

Vibration Dose Value, VDV – measure of the total vibration experienced over a specified period of time.

Estimated Vibration Dose Value, eVDV – estimation of the total vibration experienced over a specified period of time. This is usually based on the number of events and shortened measurement data.

Weighted sound reduction index, R_w – Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies. The weighted sound reduction index is used to characterize the insulation of a material or product that has been measured in a laboratory (see BS EN ISO 717-1).

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