



ASSUREDACOUSTICS

SOUND ADVICE FOR THE BUILT ENVIRONMENT



Beeches Farm access road with neighbouring Beeches Bungalow (left)

Beeches Farm, Tring

Noise Impact Assessment

AAL-21-0199 Report R1

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Prepared for:

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1. Introduction

- 1.1. A new office development with associated parking is proposed, replacing existing agricultural buildings now in office/storage use at Beeches Farm, Icknield Way, Tring.
- 1.2. Assured Acoustics Ltd have been commissioned to undertake an acoustic assessment of the proposed development to assess whether the use of the access road, and a new plant area would impact upon the residential amenity of an existing adjacent residential property (Beeches Bungalow) owned by the applicant.
- 1.3. This report provides the results of a noise survey at the site, an assessment of noise from vehicles accessing the site and sets appropriate plant noise limits for the nearest neighbouring residential property.
- 1.4. Scope of work:
 - Determine minimum existing external daytime and night-time ambient and background noise levels.
 - Assess noise levels at 1m from the nearest residential window to the access road.
 - Propose plant noise limits at the nearest residential window, based on the results of the survey and guidance given in BS4142.

2. Requirements

- 2.1. A pre-planning statement has been issued by Aylesbury Vale District Council, which states:

"In accordance with AVDLP Policy GP.8 and emerging VALP Policy BE3 it will be necessary to demonstrate that the proposed development would not unreasonably harm any aspect of the amenity of existing residents. There is an existing dwelling in the centre of the site, which would remain in place".

There could be additional disturbance to the occupiers from the increased amount of traffic using the site, especially as the access road and car park would be close to the dwelling. The impact upon the amenity of the residents of the dwelling would need to be examined in more detail if an application were submitted; in particular the impact of significantly more traffic passing the residential property.'

- 2.2. The above statement suggests a potential for disturbance to the occupiers of Beeches Bungalow due to an increase in the number of vehicles using the site.
- 2.3. In addition to vehicles accessing the site we propose that any new plant installed at the property does not significantly impact on the amenity of the adjacent property.

National Planning Policy Framework (NPPF)

- 2.4. Planning guidance with respect to noise impact is given in the National Planning Policy Framework (NPPF)
- 2.5. The NPPF (Revised February 2019) defines the national policy toward noise sensitive development. With regards to noise, Paragraph 180 of Section 15 of NPPF states:

Planning policies and decisions should:

- *Mitigate and reduce to a minimum, potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant impacts on health and the quality of life.*
- *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for the recreational and amenity value for this reason.*

- 2.6. Paragraph 180 references the Noise Policy Statement for England 2010 (NPSE), as discussed below:

Noise Policy Statement for England (NPSE)

- 2.7. The vision of the Noise Policy Statement for England is to:

"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."

2.8. NPSE does not set quantitative guidelines for the suitability of noise sensitive development in an area depending on the prevailing levels of noise. It sets out three aims:

- *Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.*
- *Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.*
- *Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.*

2.9. A development site must therefore be judged on its ability to deliver on each of these aims.

2.10. NPSE introduces three concepts (NOEL, LOAEL and SOAEL) for the assessment of noise. The following table, taken from the National Planning Practice Guidance (2014) explains the concepts.

TABLE 2.1 NPSE GUIDANCE

Response	Examples of outcomes	Increasing effect level	Action
No Observable Effect Level (NOEL)			
Not present	No Effect	No Observable Effect	No specific measures required
No Observed Adverse Effect Level (NOAEL)			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the	Observed Adverse Effect	Mitigate and reduce to a minimum

	area such that there is a small actual or perceived change in the quality of life		
Significant Observed Adverse Effect Level (SOAEL)			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Significant Observed Adverse Effect	Prevent

2.11. In terms of noise impact, a NOEL or NOAEL scenario should be sought. As NPSE does not provide target noise levels to measure against, we propose the following assessment guidelines based on IEMA Guidelines for Environmental Noise Impact Assessment 2014.

TABLE 2.2 NOISE IMPACT LEVEL GUIDANCE

Change in sound level (LAeq)	Subjective Impression	IEMA Effect Descriptor	NPSE equivalent
0dB	No change	None	NOEL (no action)
0.1dB to 2.9dB	Imperceptible	Not significant	NOAEL (no action)
3.0 to 4.9dB	Perceptible	Slight	LOAEL (mitigate)
5.0 to 9.9dB	Significant	Moderate	SOAEL (avoid)
>10dB	Substantial	Substantial	SOAEL (prevent)

2.12. From the above we can deduce that where the ambient noise level due to road usage increases by less than 3dB, there will be an imperceptible change in the subjective impression of environmental noise such that the impact is not significant and thus no action will be required.

BS 4142:2014 Methods for Rating Industrial and Commercial Sound

- 2.13. BS4142:2014 uses a comparison between the Rating and Background sound levels at the receiver position to establish an estimate of the likely significance of impact.
- 2.14. The context of the assessment should also be considered. For this BS4142 recommends penalties ranging between 2 and 9dB, to account for a variety of different source characteristics such as tonality and intermittency.
- 2.15. BS4142 states that a noise rating +5dB above the background noise level (LA90) is likely to be an indication of an adverse impact. Where the difference is +10dB or more, then this is an indicator of a significant adverse impact. Where the rating level does not exceed the background noise level this is positive indication that the sound has a low impact.
- 2.16. We have not been given details of any proposed plant. Assuming a worst case of office plant having slight distinguishing features such as tonality (+2 penalty) and intermittency (+3dB penalty), we propose plant noise limits which are 5dB below the relevant background LA90 level. Given that some or all of the plant would be switched off between 19h00 and 07h00, we propose two sets of plant noise limits: one during operational hours; and one for evening and night-time in the case of any plant items operating for 24 hours a day.

3. Site Description

- 3.1. Beeches Farm, Icknield Way, Tring HP23 4LA is located on the north side of the B488 (Icknield Way) and east of the junction with B4009 and A41. The existing site consists of former agricultural buildings, now an employment site, which will be demolished to make way for two new office/business buildings (Use Class E). A site plan is shown in Appendix A and survey photographs are shown in Appendix D.
- 3.2. The existing site entrance from Icknield Way will provide the main vehicular access to the proposed site.
- 3.3. Beeches Bungalow is a residential dwelling located 9m north from the access road and 45m from B488 main road. Cars accessing Beeches Farm pass by in sight of Beeches Bungalow.
- 3.4. There will be provision for up to 51 cars parking spaces at the site, including 7 electric car charging points.
- 3.5. Noise sources in the area observed during the survey were road traffic on B488 (dominant source), road traffic on the A41, occasional aircraft and birdsong. During the early part of our survey (12h00-15h00), the large lawn at Beeches Farm was being cut. Noise from this activity is shown on time history graphs TH01 and TH02 but has been eliminated from our calculations. There was no audible noise coming from the existing offices at Beeches Farm. Approximately 6 cars were parked at the offices and 3 or 4 cars were observed arriving or leaving the property between 9am and 1pm at the start and end of the survey.
- 3.6. Road traffic was counted on B488 at the start and end of the survey on 25th May and 27th May. The results are as follows,

TABLE 3.1 ROAD TRAFFIC COUNTS

Date	Time	Cars	HGV	Total Vehicles	VPH
25/05/21	10h00-10h15	107	7	114	456
25/05/21	11h00-11h15	128	11	139	556
27/05/21	10h45-11h00	113	5	118	472
27/05/21	11h00-11h15	126	9	135	540
27/05/21	12h15-12h30	137	9	146	584
Average Vehicles per hour (10h00-13h00)					522

- 3.7. The stretch of the B488 in front of Beeches Bungalow changes between national speed limit (west) and a 40mph limit (east). Cars travelling on Beeches farm access road are not expected to exceed 15mph.

4. Survey Details

- 4.1. An environmental noise survey was carried out between 09h00 on Tuesday 25th May and 09h00 on Thursday 27th May 2021. The length of the survey ensured that representative daytime and night-time noise levels were obtained for comparison with relevant noise criteria. The weather throughout the survey was warm and dry with moderate winds (Day 1) or gentle winds (Day 2). The wind direction varied between the north-westerly and south westerly.
- 4.2. Unattended logging sound level meters were set up 1m from the front (U1) and side (U2) façades of Beeches Bungalow to record noise levels at height of 1.5m above local ground at continuous 15-minute intervals.
- 4.3. The microphone locations are indicated on site plan SP1 in Appendix A. Survey photographs are shown in Appendix C.
- 4.4. Additional measurements at repeated 1-second intervals were carried out 1m from the front façade of Beeches Bungalow adjacent to long-term measurement microphone U1, to measure individual vehicle pass-by's on the access road, when no cars were passing on the B488, as well as a sample of vehicles passing on the B488. For each pass-by measurement, a single car travelled between the entrance gates to Beeches Farm and Beeches Bungalow.
- 4.5. Measurements of firm door slams were also made at a distance of 10m (see photo in Appendix C). Adjustments for attenuation due to distance in each car parking space have been applied to our calculations.
- 4.6. The long-term survey used Norsonic 140 logging sound level meters with a fitted outdoor microphone shield. The short-term measurements used a Norsonic 139 logging sound level meter fitted with a wind shield. All meters were calibrated before and after the survey using a B&K 4231 calibrator. Details of the equipment and measurements are listed in Appendix F.

5. Survey Results

- 5.1. A time history graph of measurements at Beeches Bungalow over the entire 2-day period is given in graphs TH01 and TH02, of Appendix B.
- 5.2. A summary of the results is given in Table 1 below:

TABLE 5.1 SURVEY RESULTS SUMMARY

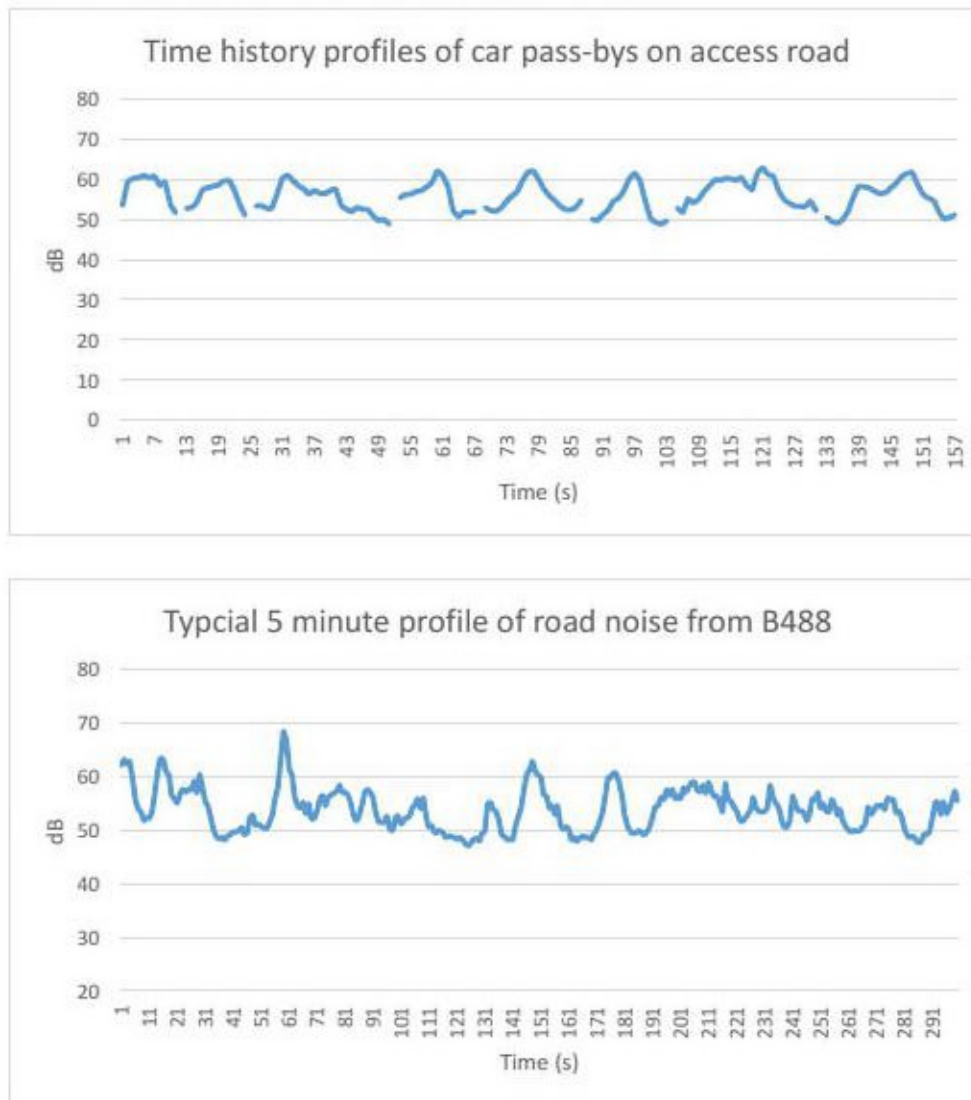
Period	Position U1 L_{Aeq} (dB)	Position U2 L_{Aeq} (dB)	U1 Minimum $L_{A90,15min}$ (dB)	U2 Minimum $L_{A90,15min}$ (dB)
Day 1 Daytime (07h00-19h00)	58	52	48	47
Day 1 Evening (19h00-23h00)	56	48	41	41
Day 1 Night-time (07h00-19h00)	51	47	27	28
Day 2 Daytime (07h00-19h00)	56	49	41	40
Day 2 Evening (19h00-23h00)	52	45	38	37
Day 2 Night-time (07h00-19h00)	51	46	26	26

- 5.3. The lowest ambient and background noise levels occurred on Day 2 of the survey. During this period, average ambient levels during office hours (07h00-19h00) at positions U1 and U2 were 56dB and 49dB L_{Aeq} respectively. Minimum background values during office hours were 38dB and 37dB $L_{A90,15min}$ respectively. Minimum background values outside office hours were 26dB and 26dB $L_{A90,15min}$ respectively.

6. Noise Assessment

- 6.1. Car event data was obtained by measuring cars passing in front of Beeches Bungalow in both directions, during quiet periods when no cars were passing on the B488. Cars measured were a family estate, an SUV and an electric car. The vehicle speed on the access road was estimated at 15mph.
- 6.2. Sample profiles of car pass-by's on both the access road and B488 are given on the graphs below. Both show comparable noise levels.

FIGURE 6.1 TIME HISTORY NOISE PROFILE OF PASSING VEHICLES



6.3. A summary of car-pass by and car door slam noise measurements is shown below:

TABLE 6.1 RESULTS OF CAR EVENTS

Activity	L _{Aeq} , dB	L _{AE} , dB	L _{Amax} , dB
Car pass by	56-59	70	61-63
Car door slam @ 10m	n/a	64	64

- 6.4. Average daytime noise levels (07h00-19h00) 1m from the front façade (i.e. most exposed façade) of Beeches Bungalow have been calculated using the data presented in the above table. Calculations are in accordance with methodology contained in the document "Calculation of Road Traffic Noise" (DoT 1988).
- 6.5. We have assumed flexible working hours at the offices including working from home. For our assessment we assume staggered arrivals and departures throughout the working day.
- 6.6. Based on 51 parking spaces, we present a worst-case scenario of 50 vehicles arriving and departing the offices (100 car events) throughout the day, including car door slams in the car park during arrival and departure.
- 6.7. Applying the above data over 12-hour working day, we assess noise levels at 1m from the front façade of Beeches Bungalow.

TABLE 6.2 NOISE IMPACT ASSESSMENT

Assessment	Sum LAE	Contribution $L_{Aeq,12h}$	Existing $L_{Aeq,12h}$	Resultant $L_{Aeq,12h}$	Difference	Impact
Cars using access road	87.2	40.8	55.5	55.8	+0.3	Slight
Car door slams in car park	72.8	26.4	55.5	55.5	0	Negligible

- 6.8. From the results given in the table above it can be seen that in the assessment position at Beeches Bungalow, noise from vehicles driving on the site would cause a +0.3 increase in existing ambient noise levels, corresponding to a slight noise impact. It should also be noted that the assessment is based upon a worst-case schedule of vehicle movements. If, say, half of the number of vehicles were to use the driveway, as seems more likely, the assessed noise levels would reduce by 3dB, resulting in a +0.1 increase in noise level.
- 6.9. In summary, the assessed noise impact at Beeches Bungalow is considered slight in all situations, therefore we can conclude that the use of the access road driveways and parking will have no significant detrimental effect upon the amenity of the existing properties on the neighbouring plots and no further action or mitigation is required.

7. Plant Noise limits

- 7.1. Appropriate plant noise limits at the neighbouring residential premises will ensure that the impact of noise caused by any new plant will be minimised.
- 7.2. Based on guidance given in BS4142 whilst allowing for slight acoustic features such as tonality and intermittency we propose that any external plant associated with the new offices, running simultaneously, should not exceed a level of 5dBA below the existing background LA90 level measured over a relevant time period.
- 7.3. The LA90 level varies throughout the day and night. The offices will not be operating outside the hours of 07h00 and 19h00 however, some plant, may operate on a night-time mode outside of these hours.
- 7.4. We therefore propose two sets of plant noise limits, one for daytime office hours (07h00-19h00) and the other for evening and night-time hours (19h00-07h00)
- 7.5. Based on the results of our noise survey, we propose the following plant noise limits at 1m from the nearest residential window to the proposed plant.

Period	L_{Aeq} (dB)	Minimum $L_{A90,15min}$ (dB)	Plant noise limit $L_{Aeq,15min}$ (dB)
Daytime (07h00-19h00)	49	40	35
Evening & Night-time (07h00-19h00)	46	26	21

8. Conclusions

- 8.1. A new office development with associated parking is proposed, replacing existing agricultural buildings now in office/storage use at Beeches Farm, Icknield Way, Tring.
- 8.2. Assured Acoustics Ltd have been commissioned to undertake an acoustic assessment of the proposed development to assess whether the use of the access road, and a new plant area would impact upon the residential amenity of an existing adjacent residential property (Beeches Bungalow) which is owned by the applicant.
- 8.3. Following our survey and measurements of individual vehicles passing by on the access road, we assess the noise impact at Beeches Bungalow to be slight in all situations. We conclude that use of the access road driveways and parking will have no significant detrimental effect upon the amenity of the existing properties on neighbouring plots and that no further action or mitigation is necessary.
- 8.4. In addition to vehicles accessing the site we propose that any new plant installed at the property should not significantly impact on the amenity of the adjacent property. To minimise this impact, based on guidance given in BS4142:2014 and minimum background L_{A90} measurements measured during our survey, we have proposed suitable plant noise limits at the nearest residential window during office hours (07h00-19h00) and outside office hours (19h00-07h00).

9. References

- 1) BS 7445-1: Description and measurement of environmental noise. Guide to quantities and procedures
- 2) BS 4142:2014: Methods for rating and assessing industrial and commercial sound.
- 3) Calculation of Road Traffic Noise (Department of Transport, 1988)
- 4) Revised National Planning Policy Framework (2019)
- 5) Noise policy statement for England (2010)
- 6) IEMA Guidelines for Environmental Noise Impact Assessment (2014)
- 7) National Planning Practice Guidance (2014)
- 8) BS 8233:2014 Guidance on sound insulation and noise reduction for buildings
- 9) Professional Practice Guidance on Planning and Noise (ProPG) (May 2017)

10. Glossary of Terms

Term	Meaning
$L_{Aeq,T}$	Measured A-weighted sound pressure level over time period T with A-weighting
$L_{Amax(Fast)}$	Measured maximum A-weighted sound pressure level (125ms fast time weighting)
$L_{A10,T}$	A-weighted sound pressure level measured exceeded for 10% of the time over period T
$L_{A90,T}$	A-weighted sound pressure level measured exceeded for 90% of the time over period T
L_{AE}	The single event noise exposure level which, when maintained for 1 second, contains the same quantity of sound energy as the actual time varying level of one noise event. These values can be summed to calculate the value of L_{Aeq} for a chosen period,
$L_{eq, (freq)}$	Measured unweighted sound pressure level at specified frequency bands
Frequency band	A range of frequencies over a specified bandwidth (usually one octave or one-third octave)
A-weighting	A frequency dependent correction applied to a measured noise level, to correlate with the sensitivity of the human ear
dB	Decibel - a logarithmic scale referenced to the sensitivity threshold of the human ear

Appendices

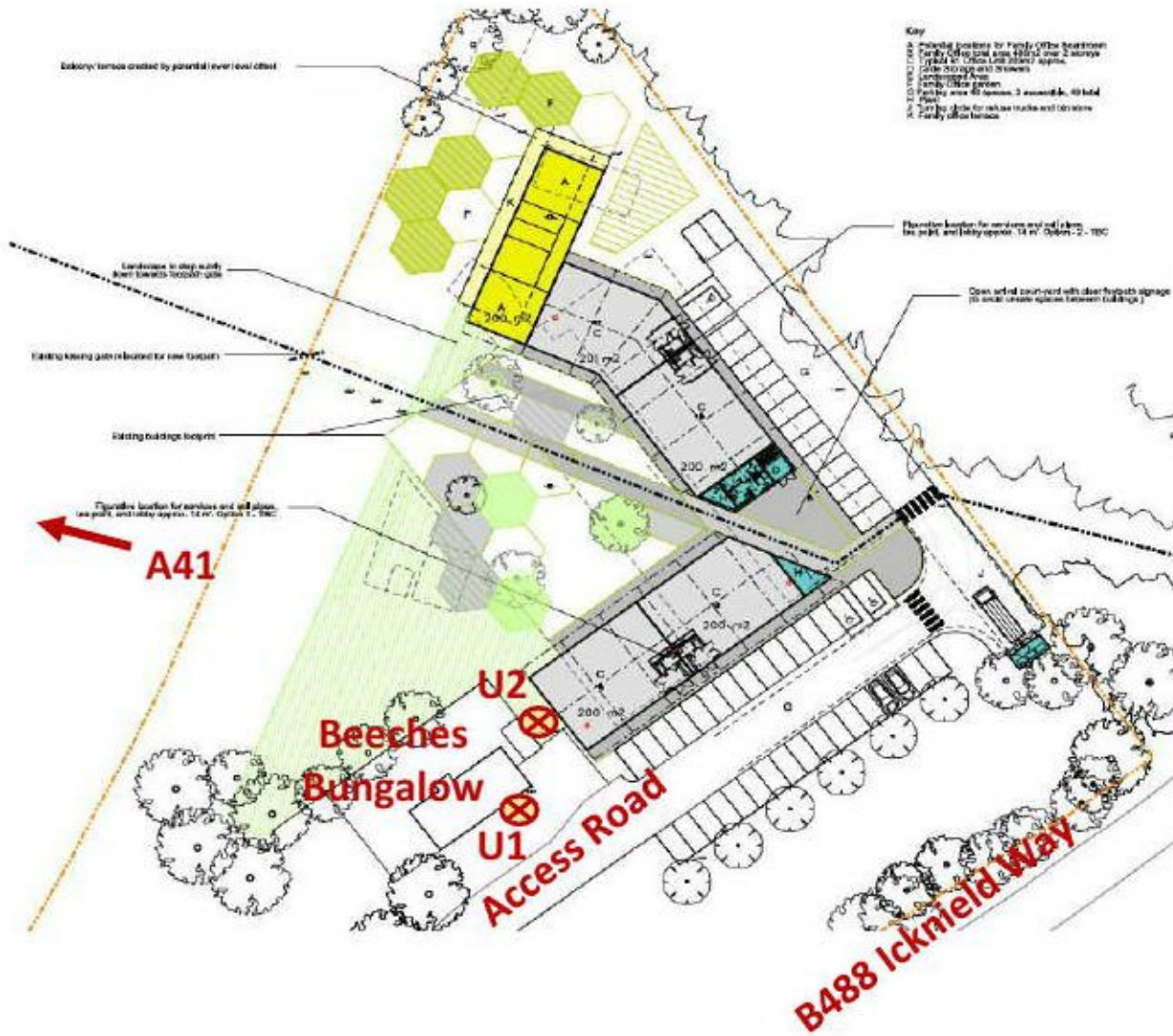
- A Site Plans
- B Survey Data
- C Site Photographs
- D Survey Equipment

Site Image SP1 showing survey locations

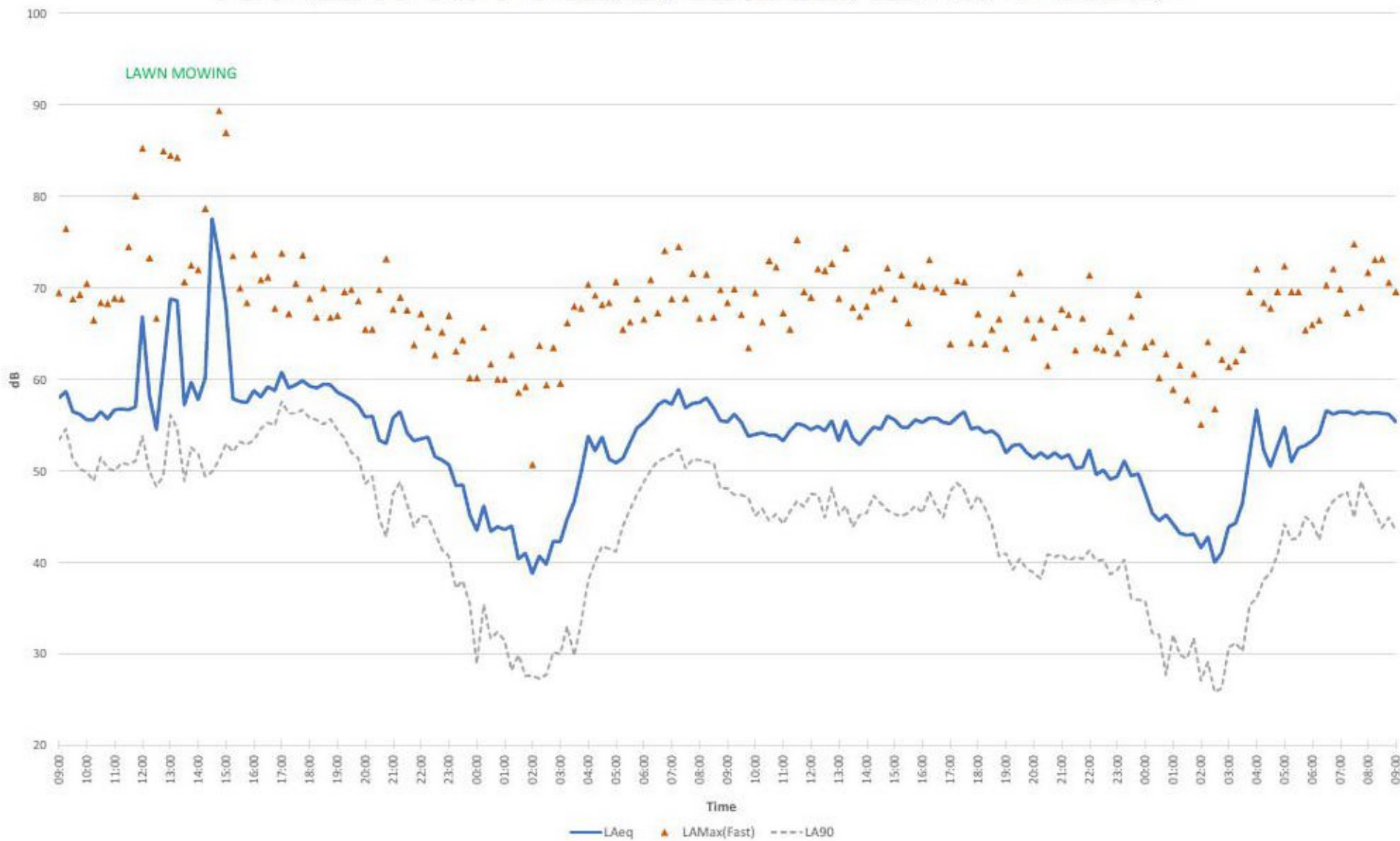
Image from Google Earth



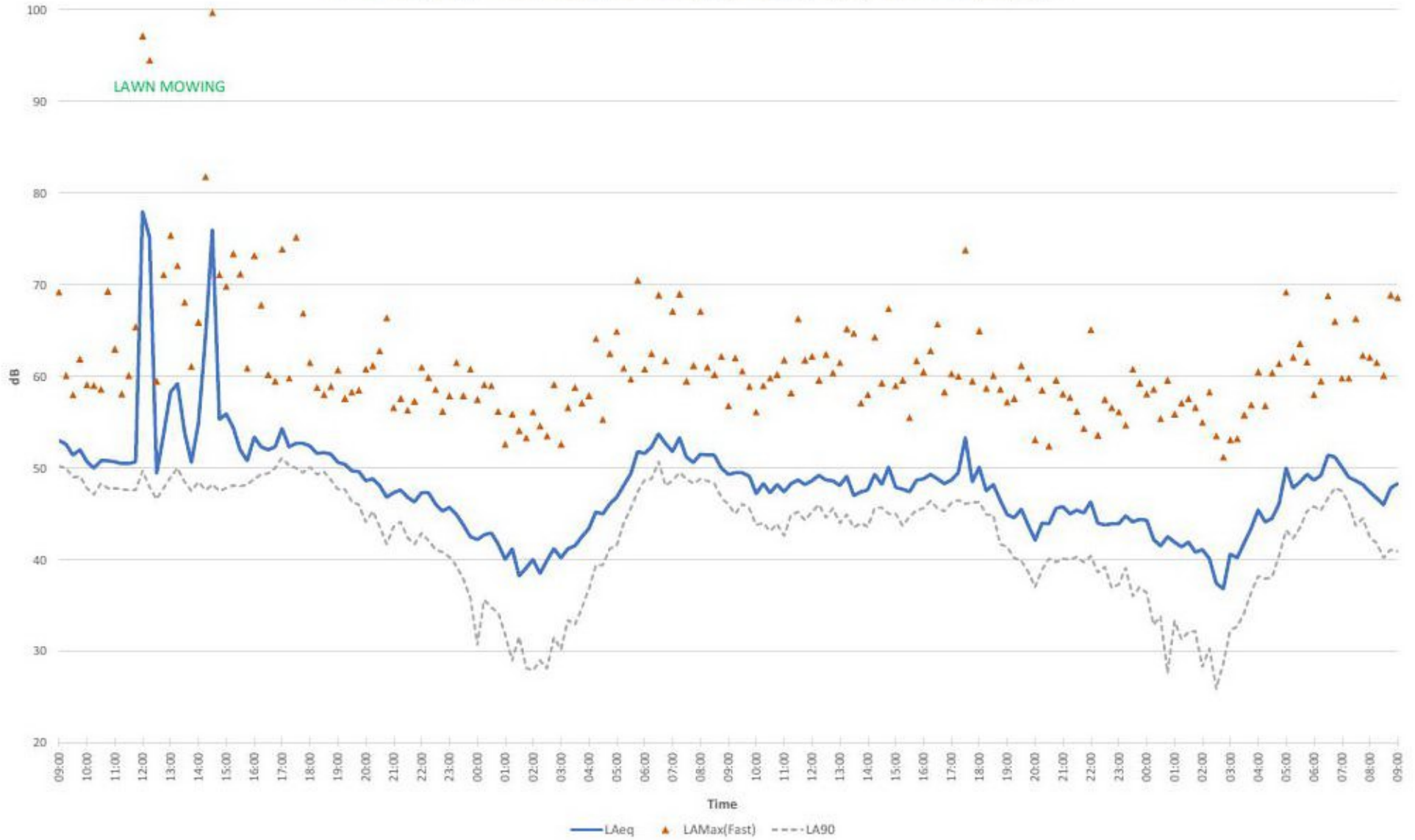
Site Plan SP2 showing survey locations



Time History Graph TH01: Location U1 Front façade, facing B488 and access road , Tuesday 25/05/21 to Thursday 27/05/21



Time History Graph TH02: Location U2 Side façade, Tuesday 25/05/21 to Thursday 27/05/21



Survey Photographs

Locations

Survey Position U1



Survey Position U1, looking south towards B488



Survey Position U2, looking west



Survey Position U2, looking east



Car door measurement



View from existing car park and access road



Survey Equipment

Manufacturer	Description	Type	Serial No.	Calibration issue date	Calibration due date	Calibration Laboratory	Certificate No.
Bruel & Kjaer	Calibrator	4231	2463721	21/07/2020	20/07/2021	ANV	UCRT20/1677
Norsonic	Sound Analyser	139	1392708	24/05/2021	24/05/2023	ANV	TCRT21/1355
Norsonic	Microphone	1228	2600	24/05/2021	24/05/2023	ANV	TCRT21/1355
Norsonic	Pre-amplifier	1207	20077	24/05/2021	24/05/2023	ANV	TCRT21/1355
Norsonic	Sound Analyser	140	1405866	12/03/2020	12/03/2022	ANV	TCRT20/1154
Norsonic	Microphone	1225	118572	12/03/2020	12/03/2022	ANV	TCRT20/1154
Norsonic	Pre-amplifier	1209	15732	12/03/2020	12/03/2022	ANV	TCRT20/1154
Norsonic	Sound Analyser	140	1405869	12/03/2020	12/03/2022	ANV	TCRT20/1155
Norsonic	Microphone	1225	180289	12/03/2020	12/03/2022	ANV	TCRT20/1155
Norsonic	Pre-amplifier	1209	15735	12/03/2020	12/03/2022	ANV	TCRT20/1155
Norsonic	Wind Shield	1217	12175092	n/a	n/a	n/a	n/a
Norsonic	Wind Shield	1217	12175110	n/a	n/a	n/a	n/a
Norsonic	Wind Shield	1218	12182524	n/a	n/a	n/a	n/a

Survey meters settings

Norsonic 140

Descriptor	Time Periods	Comments
LAeq	15 minutes, 1 minute	Repeat measuerment synchronised to internal clock
LAMax	15 minutes, 1 minute	Fast time weighting
LA90	15 minutes	Repeat measurement synchronised to internal clock
Leq(freq)	15 minutes, 1 minute	Octave bands
LMax(freq)	15 minutes	Octave band, fast time weighting

Norsonic 139

Descriptor	Time Periods	Comments
LAeq	5 minutes, 1 second	Repeat measuerment synchronised to internal clock
LAMax	5 minutes, 1 second	Fast time weighting
LA90	5 minutes	Repeat measurement synchronised to internal clock
Leq(freq)	5 minutes, 1 second	Octave bands
LMax(freq)	5 minutes, 1 second	Octave band, fast time weighting

About Assured Acoustics

Assured Acoustics was formed in 2016 by Peter Turner MIOA. Peter has worked in the fields of acoustic research, consultancy, design, compliance and warranty for over 20 years, with first-hand experience of building concept through to end user experience. Prior to Assured Acoustics, Peter was the Principal Acoustic Consultant at the National House Building Council.