



Noise Impact Assessment

Former George & Dragon, Reading

Reference: 50-740-R1-5

Date: April 2023



NOISE IMPACT ASSESSMENT

Demolition of existing pub/ restaurant and erection of 1 no Drive Thru retail / bakery unit (Class E) including erection of supporting structures, together with alterations to means of access, car parking, landscaping and associated works

Prepared for:

Greene King Commercial Investments Limited

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EXECUTIVE SUMMARY

BACKGROUND

Site Address	Former George & Dragon, Bath Road, RG30 2HA
National Grid Reference	E 468188 N 172172
Proposed Development	Demolition of existing pub/ restaurant and erection of 1 no Drive Thru retail / bakery unit (Class E) including erection of supporting structures, together with alterations to means of access, car parking, landscaping and associated works
Report Objectives	The objectives of this report are to: Identify, measure, and assess the potential impact of any proposed sound sources associated with the development upon existing and proposed receptors in the immediate vicinity of the Site. The report follows current and relevant British Standards to provide a robust assessment.

ASSESSMENT

Surveys Completed	An unattended background and ambient sound survey has been undertaken during a full weekday and weekend period to the rear of the existing dwellings along Morlands Avenue.
Assessments	A 3D noise model has been constructed to assess potential commercial sound impact. The model has been used to predict the Rating Level at the receptors which has been compared with the typical background sound level, accounting for any acoustic characteristics associated with the sound in accordance with BS 4142:2014+A1:2019.
Mitigation Requirements	The assessment determined that the predicted rating level during the daytime periods, at existing receptors, would fall below the background sound level with the retained and proposed barriers in place. During night-time periods, rating levels achieve or fall below the typical background sound level. Furthermore, acceptable internal noise levels at night can be achieved. It has been shown also that plant noise rating levels fall below the background sound level by more than 5 dB thus satisfying the requirements of the LPA.

CONCLUSIONS

This assessment has shown that no adverse impact is predicted day or night at the receptors due to commercial sound with mitigation measures in place.

As such, noise need not be a material consideration in the granting of planning permission if the recommendations of this report are followed and included within the design stage.



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1. INTRODUCTION

1.1. BACKGROUND

E3P were commissioned by Greene King Commercial Investments Limited to undertake a Noise Impact Assessment for Demolition of existing pub/ restaurant and erection of 1 no Drive Thru retail / bakery unit (Class E) including erection of supporting structures, together with alterations to means of access, car parking, landscaping and associated works at the former George & Dragon in Reading, to be referred to hereafter as '*the Site*'.

This assessment looks to determine the key noise sources associated with the proposed development and to assess their impact, if any, upon existing and proposed residential receptors and to specify mitigation measures, where required.

1.2. PROPOSED DEVELOPMENT

The client intends to demolish the existing buildings and construct a Drive Thru retail / bakery unit (Class E) including erection of supporting structures, together with alterations to means of access, car parking, landscaping and associated works.

The key sources of sound associated with the development will be heavy goods vehicle (HGV) deliveries, car park and drive-thru usage and external plant. The proposed trading hours are 0500-2300 Monday to Sunday, alongside deliveries between 0500-2100 Monday to Sunday.

This assessment has been undertaken in accordance with the following supplied drawings:

-  Proposed Site Plan (Drawing Number 2136-23 Rev D).

The Site Plan is shown in Figure 1 of Appendix II.

1.3. LIMITATIONS

Where a noise or vibration survey is required to inform an assessment, E3P will endeavour to ensure that all noise and vibration measurements taken are robust, representative, and reliable to inform an accurate assessment at the time.

E3P will endeavour to capture all existing and proposed sources of sound and vibration at the time of the surveys and/or assessments. However, should new sources of sound be introduced, existing sources modified/changed, or characteristics of the sound be altered following completion of such, E3P cannot be held accountable for this.

Where mitigation measures are specified in this report, it should be noted that these measures are relative to a specific sound or vibration source, both in terms of the measured sound pressure and vibration level and the character of the sound source. Where either the sound pressure level or the character of the sound varies following completion of the sound survey, E3P cannot be held responsible for any subsequent variations in the proposed mitigation performance, for either absolute levels or frequency content.



2. ASSESSMENT METHODOLOGY

2.1. NATIONAL PLANNING POLICY FRAMEWORK

To prevent unacceptable risks from pollution, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be considered.

The national planning policy framework states that planning policies and decisions should aim to:

- ✿ Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development.
- ✿ Mitigate and reduce to a minimum, other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions.
- ✿ Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established.
- ✿ Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

2.2. NATIONAL PLANNING PRACTICE GUIDANCE

Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. When preparing local or neighbourhood plans, or taking decisions about new development, there may also be opportunities to consider improvements to the acoustic environment.

Local planning authorities' plan-making and decision-making should take account of the acoustic environment and in doing so consider:

- ✿ Whether or not a significant adverse effect is occurring or is likely to occur.
- ✿ Whether or not an adverse effect is occurring or is likely to occur.
- ✿ Whether or not a good standard of amenity can be achieved.

In line with the explanatory note of the NPSE, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase, where applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.



The “observed effect levels” are as follows:

-  **Significant observed adverse effect level:** This is the level of noise exposure above which significant adverse effects on health and quality of life occur.
-  **Lowest observed adverse effect level:** This is the level of noise exposure above which adverse effects on health and quality of life can be detected.
-  **No observed effect level:** This is the level of noise exposure below which no effect at all on health or quality of life can be detected.

Table 2.1 summarises the noise exposure hierarchy, based on the likely average response.

TABLE 2.1 NOISE EXPOSURE HIERARCHY

PERCEPTION	EXAMPLES OF OUTCOMES	INCREASING EFFECT LEVEL	ACTION
Not Noticeable	No effect.	No observed effect	No specific measures required
Noticeable and Not Intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No observed adverse effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and Intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g., turning up volume of television, speaking more loudly, or having to close windows for some of the time because of the noise where there is no alternative ventilation. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and Disruptive	The noise causes a material change in behaviour and/or attitude, e.g., avoiding certain activities during periods of intrusion, having to keep windows closed most of the time because of the noise where there is no alternative ventilation. 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 effect	Avoid
Noticeable and Very Disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g., regular sleep deprivation/awakening, loss of appetite, significant/medically definable harm (auditory and non-auditory).	Unacceptable adverse effect	Prevent



The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any situation.

These factors include the following:

- ✿ The source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day. The adverse effect can also be greater simply because there is less background noise at night.
- ✿ For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise can be important.
- ✿ The spectral content of the noise and the general character of the noise. The local topology and topography should also be considered along with the existing and, where appropriate, the planned character of the area.

More specific factors to consider when relevant:

- ✿ Where applicable, the cumulative impacts of more than one source should be considered along with the extent to which the source of noise is intermittent and of limited duration.
- ✿ Consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases, a suitable alternative means of ventilation is likely to be necessary.
- ✿ If external amenity spaces are an intrinsic part of the overall design, then the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.

2.3. BS 4142: 2014+A1:2019 'METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND'

This standard describes methods for rating and assessing sound of an industrial or commercial nature which includes:

- ✿ Sound from industrial and manufacturing processes.
- ✿ Sound from fixed installations which comprise mechanical and electrical plant and equipment.
- ✿ Sound from the loading and unloading of goods and materials at industrial and / or commercial premises; and
- ✿ Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from processes or premises, such as that from forklift trucks, or that from train or ship movements on or around an industrial or commercial Site.

The procedure detailed in the standard compares the measured or predicted specific noise level from any of the above with the background sound level at a residential dwelling. The measured background sound level at a receptor should be reliable and should not necessarily ascertain a lowest measured background sound level, but to quantify what is typical.

The specific noise level also acknowledges the reference time intervals depending upon whether the noise source operates during daytime (1-hour) or night-time (15-minute) periods.



There are several 'penalties' which can be attributed to the specific sound level depending upon the 'acoustic features' of the sound level under investigation as follows:

Tonality

-  +2 dB: where the tonality is just perceptible.
-  +4 dB: where the tonality is clearly perceptible; and
-  +6 dB: where the tonality is highly perceptible.

Impulsivity

-  +3 dB: where the impulsivity is just perceptible.
-  +6 dB: where the impulsivity is clearly perceptible; and
-  +9 dB: where the impulsivity is highly perceptible.

Intermittency

-  +3 dB: where the intermittency is readily distinctive against the acoustic environment.

In addition to the above, there is a penalty for 'other sound characteristics' of +3 dB where a sound exhibits characteristics that are neither tonal nor impulsive, though are readily distinctive against the acoustic environment. BS 4142 goes on to state that the rating level is equal to the specific sound level if there are no such features present or expected to be present.

Assessment of the rating level relative to the background sound level can yield the following commentary:

-  Typically, the greater this difference (between the rating level and the background sound level), the greater the magnitude of 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; and
-  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. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

It is common that a Local Planning Authority (LPA) will specify their own criterion and, where this is the case, this criterion will usually take precedence over a simple comparison of the rating level against the background sound level.



3. SURVEY RESULTS

The measurement positions are detailed in Figure 1 of Appendix III.

3.1. SOURCE NOISE LEVELS – DELIVERIES

To inform assessments of this and similar sites, E3P have used library source data for similar deliveries that can take place at the proposed site. The following Table details the measured levels for deliveries to be used in the assessment.

The measured levels have been analysed in detail and corrected for façade conditions and residual noise levels, where applicable. Only close measurement distances were possible due to the restricted space at the test site. However, this distance relates to the worst case measured levels, i.e., next to the tailgate where all rattling, motor noise and banging was noted. Operations further from this position only consisted of movements of trolleys across smooth concrete floors with little to no rattling.

TABLE 3.1 DELIVERY NOISE SOURCE LEVELS

DELIVERY	SOURCE	AVERAGE MEASURED SOUND LEVEL, $L_{Aeq,T}$ (dB)	MEASURED ON-TIME (seconds)	MEASURED DISTANCE (m)	HOURLY NOISE LEVEL, $L_{Aeq,1hr}$ (dB)	15 MINUTE NOISE LEVEL, $L_{Aeq,15mins}$ (dB)
Delivery with engine off	Reversing	64.5	16	1	36.5	42.5
	Tailgate Operation	70.4	295	0.5	57.7	63.7
	Unloading Operations	74.6	1400	0.5	69.8	75.9

For the delivery, the tailgate being retracted and the HGV leaving were included in the unloading/loading operations as it was at a low level and of very short duration.

Respective sound power levels to be used in the assessment are given in Section 4.0.

3.2. UNATTENDED BACKGROUND AND AMBIENT SOUND SURVEY

E3P has conducted an unattended Background and Ambient Sound Survey to quantify the existing levels of background and ambient sound at existing receptors in the immediate vicinity of the Site over a full weekday and weekend period. The survey was carried out over the following time period:

🕒 12:00 Friday 20th January to 12:00 Monday 23rd January 2023.

The following noise measurement position was chosen for the Background Sound Survey:

🕒 Noise Measurement Position 1 (NMP1): Located in the north eastern corner of the site adjacent to the closest residential dwelling on Morlands Avenue. The microphone of the sound level meter was set at a height of 2 m above ground level and in free-field conditions. Sound sources consisted of road traffic on the local road network and local sources.

Table 3.1 details the measured background sound levels. The daytime levels correspond to the $L_{A90,1hr}$ and the night-time levels to the $L_{A90,15mins}$.

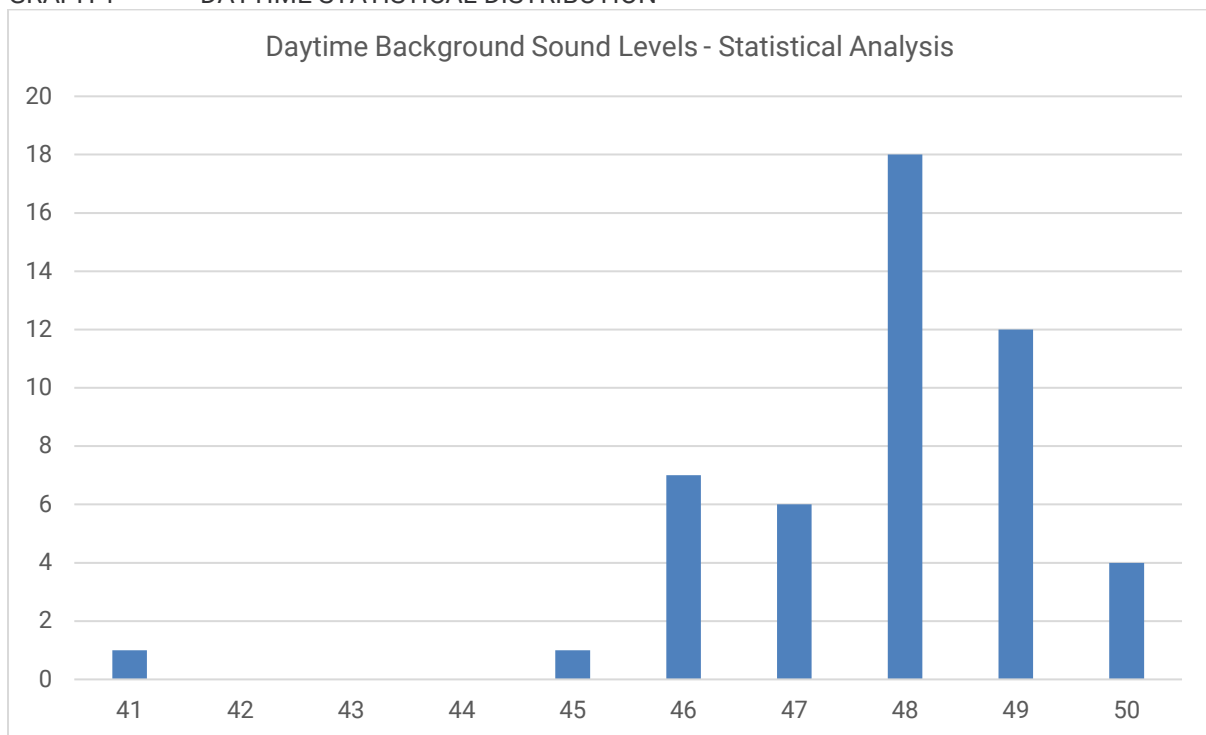


TABLE 3.1 MEASURED BACKGROUND SOUND PRESSURE LEVELS

DATE	TIME PERIOD	RANGE OF MEASURED BACKGROUND SOUND LEVELS, $L_{A90,T}$ (dB)
Friday 1st July 2022	Daytime	45.5-50.3
	Night-time	34.1-47.6
Saturday 2nd July 2021	Daytime	46.1-49.5
	Night-time	35.8-45.7
Sunday 3rd July 2022	Daytime	40.6-48.8
	Night-time	32.9-49.1

E3P have conducted a statistical analysis of the data to determine the typical daytime and night-time background sound levels. Graphs 1 and 2 below detail the daytime and night-time statistical analyses respectively.

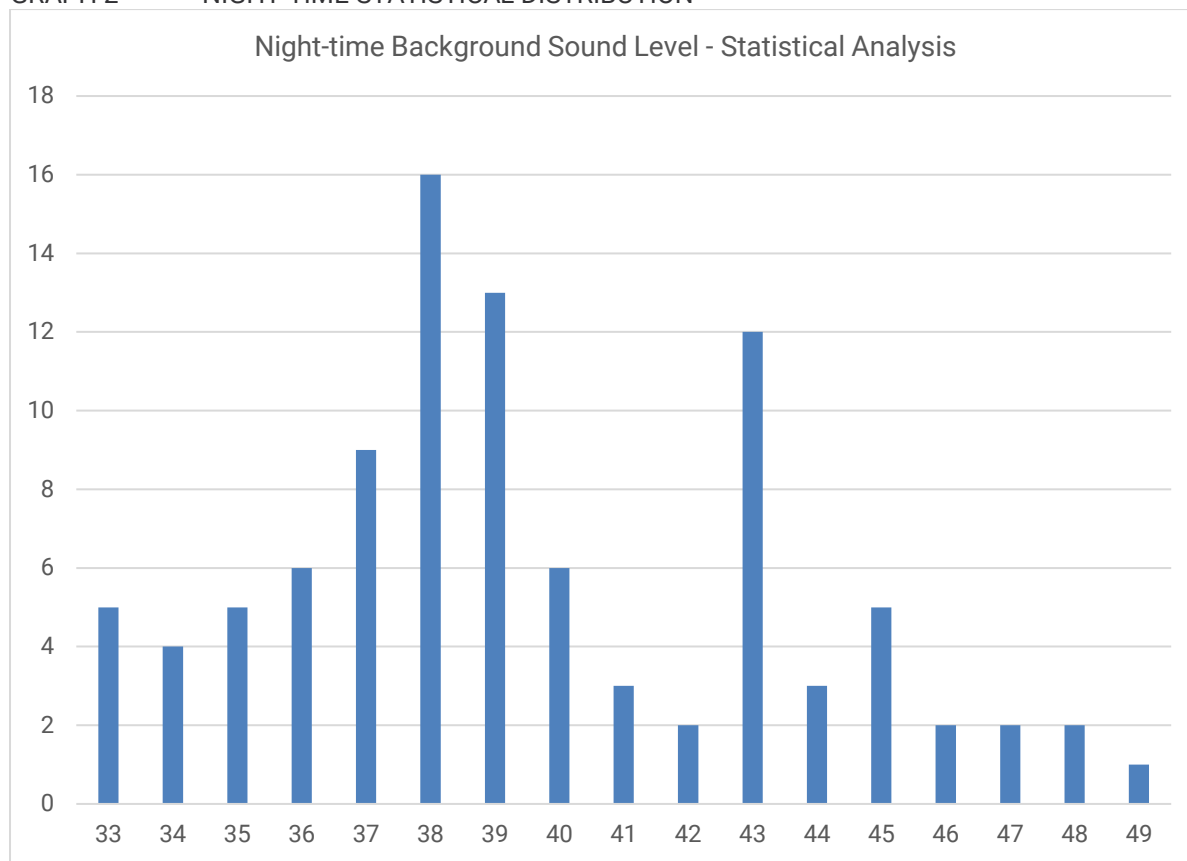
GRAPH 1 DAYTIME STATISTICAL DISTRIBUTION



As can be seen, the most typical background sound level, during daytime periods, is 48 dB. As such, this level will be used to inform the assessment.



GRAPH 2 NIGHT-TIME STATISTICAL DISTRIBUTION



As can be seen, the main distribution, at night, is at 38 and 39 dB. As such, a level of 38 dB is applied to the night-time period.

During the survey, conditions remained dry and wind speeds rarely exceeded 5 m/s.

The equipment outlined in Table 3.2 was used for the noise survey.

TABLE 3.2 NOISE MEASUREMENT EQUIPMENT AND CALIBRATION DATES

MEASUREMENT POSITION	EQUIPMENT DESCRIPTION	MANUFACTURER & TYPE NUMBER	SERIAL NUMBER	CALIBRATION DUE DATE AT TIME OF SURVEY
NMP1	Sound Level Meter	Cirrus CR:171A	G303884	20th September 2024
	Pre-amplifier	Cirrus MV:200F	12731F	
	Microphone	Cirrus MK:224	215899D	
	Calibrator	Cirrus CR:515	99403	20th September 2023

The sound level meter was field calibrated on site using the above-mentioned calibrator prior to and after noise measurements were taken. No significant drift was witnessed as noted above. Calibration certificates are available upon request.



4. NOISE IMPACT ASSESSMENT

For the purposes of this assessment, E3P has used noise modelling software, CadnaA 2022 MR1, to determine the impact of noise from the proposed sound sources associated with the development.

The following inputs have been included in the model:

- ✳ Proposed Site Plan Rev D.
- ✳ Ground elevations have been taken as existing by way of a 2 m grid Digital Terrain Model (DTM) which contains public sector information licensed under the Open Government License v3.0.
- ✳ Existing buildings have been included in the model and assumed to have a structured façade.
- ✳ Retained close boarded fencing at a height of 1.8 m is to be retained to the north and east and is included in the model. Additionally, a 2.1 m high close boarded fence is proposed to the north and is included.
- ✳ With regards commercial/industrial sound, corrections have been applied to the inputted sound power levels to account for acoustic characteristics, as per BS 4142:2014. As such, the model output is the Rating Level, $L_{A,r}$.
- ✳ A reflection order of one has been used in all calculations.
- ✳ Ground absorption is set at 0.5.
- ✳ Noise levels generated using ISO 9613-1 and ISO 9613-2 "*Acoustics – Attenuation of sound during propagation outdoors*" as incorporated into CadnaA software.

E3P has used library source data for deliveries and have been provided with detailed information in relation to the extract and external fixed plant items.

E3P have undertaken duct calculations for the extract, based on the provided sound power levels, duct dimensions and properties of the in line silencer, resulting in an external sound power level of 76 dB at the duct terminus vent. This is located above the east elevation door.

With regards to the external fixed plant, the external plant units are located within a timber louvred enclosure. As such, it is not considered reasonable to undertake internal to external break-out calculations based on this and it is likely that the plant noise would behave as point sources to the receptors, albeit with reduction applied due to partial line of sight through the louvres. Accordingly, the units are inserted as point sources with a reduction of -5 dB applied for any attenuation provided by the louvres but given the open nature of the louvred enclosure the facades of the enclosure would not act as sources themselves. The data used can be seen below:



TABLE 4.1 SOURCE DATA FOR INCLUSION IN NOISE MODEL

SOURCE	OPERATIONAL PERIODS	DAYTIME 1 HOUR SOUND POWER LEVEL, L_w (dB)	NIGHT-TIME 15 MINUTE SOUND POWER LEVEL, L_w (dB)
Toilet Extract	Store Trading Hours (05:00-23:00)	76	-
Air conditioning Units	24/7	70	70
Freezer Condenser	24/7	62	62
Delivery	Daytime and night-time (05:00 – 21:00)	75	78
Order Point*	Store Trading Hours (05:00-23:00)	71	-

*Based on a level of 66 dB at 1 m for a raised voice assuming 50% on time of employee speaking.

With regards to the car park and drive thru aspects, E3P have referred to the Transport Assessment and the predicted peak hour movements. These movements have been split equally between the drive thru, inputted as a road, and the car park. Noise levels late in the evening are likely to be much lower as the peak flows relate to morning or late afternoon periods only.

The resultant sound pressure level is likely to be lower once operational as all processes are unlikely to happen in the same hour period and so any mitigation proposed may overcompensate or could be reviewed at the detailed design stage.

For the BS 4142:2014 assessments, penalties are applied to the specific sound level to provide the rating level. These penalties relate to the acoustic features of the sound source. Accordingly, the following objective and subjective features have been accounted for in the assessment, in accordance with the subjective method detailed in BS 4142:2014, for the Site as a whole operation.

TABLE 4.2 ACOUSTIC FEATURES

ACOUSTIC FEATURE	APPLICABLE?	ATTRIBUTABLE PENALTY	COMMENT
Tonality	No	-	New plant items are not expected to be tonal, especially air conditioning units.
Impulsivity	No	-	It is assumed that no impulsive sounds will exist.
Intermittency	Yes	3 dB	Intermittent delivery operations at the site will be audible and noticeable to the receptors.
Other Sound Characteristics	No	-	Other penalties applied

Figures 2 to 3 determine the rating levels across the Site during the daytime and night-time periods due to commercial sound.



4.1. DAYTIME ASSESSMENT

Figure 2 should be used to view the daytime rating level, $L_{A,r}$, at the existing receptors. To inform a worst-case assessment, the lowest modal measured background sound level has been used, specifically 48 dB.

As can be seen, the highest predicted rating level at existing receptors to the north and east is 43 dB with the retained and proposed barriers in place. This falls below the background sound level by 5 dB. As such, no adverse impact is expected during daytime periods.

4.2. NIGHT-TIME ASSESSMENT – 05:00-07:00

Figure 3 should be used to view the night-time rating level, $L_{A,r}$, at the receptors. To inform the assessment, the modal measured 15-minute background sound level across the above periods has been used, specifically 45 dB. This scenario assumes full operation of the site.

As can be seen, the highest predicted façade rating level at existing receptors is 39 dB to the north and 40 dB to the east, as such, the predicted rating level falls below the background sound level at all receptors by between 5 and 6 dB.

Accordingly, no adverse impact is predicted during night-time periods.

4.3. NIGHT-TIME ASSESSMENT - FIXED PLANT ONLY

E3P note the below criterion, as detailed in the pre-application response, in relation to Fixed Plant:

The noise source specific noise level (plant noise level) should be at least 10dBA below the existing background level as measured at the nearest noise sensitive receptor and the rating level should not exceed the background level (as measured in accordance with BS4142:2014).

As can be seen, the highest predicted rating level is 31 dB at receptors to the east and 29 dB at receptors to the north. Background sound levels during the night are approximately 38 dB. As such, the criterion is achieved for receptors to the north, with the rating level falling below the background sound level by 7 to 9 dB.

Furthermore, internal noise levels, with windows open, would be no more than 18 dB, well below the 30 dB criterion.

Accordingly, no adverse impact is predicted as a result of fixed plant operational noise.

4.4. MAXIMUM NOISE LEVEL ASSESSMENT – DELIVERIES AT NIGHT

When considering instantaneous maximum noise levels, E3P has considered the impact of a delivery at night and the maximum noise level as measured from the source between 05:00 and 07:00 at the receptors. As such, E3P has used measured source data for the delivery which was a level of 95 dB at 0.5 m and was resultant from trolleys rattling and banging on the tail lift. A criterion level of 58 dB $L_{Amax,fast}$ is used which relates to the 45 dB $L_{Amax,fast}$ internal criterion and a reduction of 13 dB afforded by a partially open window.



TABLE 4.2 MAXIMUM NOISE LEVEL ASSESSMENT – DELIVERY 05:00-07:00

RECEPTOR	MEASURED MAXIMUM NOISE LEVEL AT 0.5 m, $L_{Amax,fast}$ (dB)	DISTANCE TO RECEPTOR (m)	CALCULATED EXTERNAL MAXIMUM NOISE LEVEL, $L_{Amax,fast}$ (dB)	WHO GUIDELINES EXTERNAL NOISE LEVEL CRITERION, $L_{Amax,fast}$ (dB)	DIFFERENCE, +/- (dB)
Morlands Avenue	95	34	58	58	0
Bath Road	95	40	52	58	-6

As shown in the Table, the predicted maximum noise levels achieve or fall below the criterion at the closest facades of receptors.



5. MITIGATION

The baseline noise modelling included for the retention of existing close boarded fences and the construction of a 2.1 m high barrier to the north, as noted on the plan.

It is important that the acoustic properties of the barriers are enforced. Any barriers retained and proposed can be of wooden fence or brick wall construction but must be free from holes, sealed at the base and have a minimum mass of 10 kg/m².



6. CONCLUSION AND RECOMMENDATIONS

E3P were commissioned to undertake a Noise Impact Assessment for a proposed drive thru retail / bakery unit at the former George & Dragon in Reading.

An unattended background and ambient sound survey has been undertaken to the rear of the site to quantify the existing levels of background sound at receptors to the immediate north and east during a full weekday and weekend period.

A 3D noise model has been constructed to assess commercial sound impact. The model has been used to predict the rating level at the receptors which has been compared with the typical background sound level, accounting for any acoustic characteristics associated with the sound in accordance with BS 4142:2014+A1:2019.

The assessment determined that the predicted rating level during the daytime and night-time periods would fall below the background sound level at receptors to the north and east.

Considering this, it is concluded that there should be no adverse impact due to the operations of the proposed unit upon existing receptors, day, or night.

As such, noise need not be a material consideration in the granting of planning permission if the recommendations of this report are followed and included within the design stage.

END OF REPORT



APPENDIX I

GLOSSARY OF ACOUSTIC

TERMINOLOGY

NOISE

Noise is defined as unwanted sound. Human ears can respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should consider all these factors when assessing the significance of a noise source. The most widely used weighting mechanism that best corresponds to the response of the human ear is the "A"-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective but, as a general guide, a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is regarded as the minimum difference needed to perceive a change under normal listening conditions. An indication of the range of sound levels commonly found in the environment is given in the following table.

TABLE A1 TYPICAL SOUND PRESSURE LEVELS

SOUND PRESSURE LEVEL	LOCATION/EXAMPLE
0	Threshold of hearing
20–30	Quiet bedroom at night
30–40	Living room during the day
40–50	Typical office
50–60	Inside a car
60–70	Typical high street
70–90	Inside a factory
100–110	Burglar alarm at 1 m away
110–130	Jet aircraft on take off
140	Threshold of pain



ACOUSTIC TERMINOLOGY

TABLE A2 TERMINOLOGY

DESCRIPTOR	EXPLANATION
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2E-05 Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e., "A" weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
L_{Aeq, T}	L _{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.
L_{Amax}	L _{Amax} is the maximum A-weighted sound pressure level recorded over the period stated. L _{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L _{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the "fast" sound level meter response.
L₁₀ and L₉₀	If a non-steady noise is to be described, it is necessary to know both its level and the degree of fluctuation. The L _n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L ₁₀ is the level exceeded for 10% of the time and as such can be regarded as the "average maximum level". Similarly, L ₉₀ is the "average minimum level" and is often used to describe the background noise. It is common practice to use the L ₁₀ index to describe traffic noise.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, as measured outside and away from buildings.
Fast	A time weighting used in the root-mean-square section of a sound level meter with a 125-millisecond time constant.
Slow	A time weighting used in the root-mean-square section of a sound level meter with a 1000-millisecond time constant.



APPENDIX III

MEASURED SOUND PRESSURE LEVELS

TABLE A.1 HOURLY MEASURED BACKGROUND AND AMBIENT SOUND LEVELS

MEASUREMENT START TIME	MEASURED SOUND PRESSURE LEVEL, $L_{Aeq,1hr}$ (dB)	MEASURED BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
20/01/2023 12:00	55.8	50.2
20/01/2023 13:00	54.4	49.3
20/01/2023 14:00	52.7	48.7
20/01/2023 15:00	53.4	49.5
20/01/2023 16:00	56.6	49.0
20/01/2023 17:00	52.7	48.9
20/01/2023 18:00	52.3	48.8
20/01/2023 19:00	53.6	48.9
20/01/2023 20:00	52.7	47.9
20/01/2023 21:00	50.7	45.6
20/01/2023 22:00	54.9	45.5
20/01/2023 23:00	49.1	43.1
21/01/2023 00:00	47.5	40.0
21/01/2023 01:00	45.1	37.7
21/01/2023 02:00	44.1	35.5
21/01/2023 03:00	44.8	36.1
21/01/2023 04:00	45.1	37.1
21/01/2023 05:00	47.7	38.8
21/01/2023 06:00	51.3	45.4
21/01/2023 07:00	54.4	48.0
21/01/2023 08:00	53.3	49.0
21/01/2023 09:00	53.1	49.0
21/01/2023 10:00	52.8	47.9
21/01/2023 11:00	57.9	47.6
21/01/2023 12:00	54.6	46.8
21/01/2023 13:00	55.1	46.8
21/01/2023 14:00	54.3	47.8
21/01/2023 15:00	52.1	46.9
21/01/2023 16:00	54.3	48.5
21/01/2023 17:00	55.5	49.5
21/01/2023 18:00	53.9	49.1
21/01/2023 19:00	52.9	48.6
21/01/2023 20:00	54.0	47.7



MEASUREMENT START TIME	MEASURED SOUND PRESSURE LEVEL, $L_{Aeq,1hr}$ (dB)	MEASURED BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
21/01/2023 21:00	51.0	46.4
21/01/2023 22:00	50.6	46.1
21/01/2023 23:00	51.1	44.3
22/01/2023 00:00	48.3	43.1
22/01/2023 01:00	49.6	39.5
22/01/2023 02:00	46.8	38.5
22/01/2023 03:00	46.0	37.1
22/01/2023 04:00	44.2	36.9
22/01/2023 05:00	46.4	39.0
22/01/2023 06:00	48.8	43.3
22/01/2023 07:00	52.8	46.3
22/01/2023 08:00	51.3	46.0
22/01/2023 09:00	51.5	45.9
22/01/2023 10:00	52.0	47.9
22/01/2023 11:00	58.1	48.8
22/01/2023 12:00	54.8	48.2
22/01/2023 13:00	56.2	47.8
22/01/2023 14:00	53.6	47.7
22/01/2023 15:00	52.4	46.6
22/01/2023 16:00	55.5	48.4
22/01/2023 17:00	53.8	48.3
22/01/2023 18:00	52.3	47.4
22/01/2023 19:00	62.8	48.1
22/01/2023 20:00	52.5	47.5
22/01/2023 21:00	51.7	45.3
22/01/2023 22:00	47.2	40.6
22/01/2023 23:00	45.9	37.7
23/01/2023 00:00	43.2	33.5
23/01/2023 01:00	42.1	33.3
23/01/2023 02:00	43.1	35.3
23/01/2023 03:00	43.2	36.0
23/01/2023 04:00	45.8	38.9
23/01/2023 05:00	48.7	41.8
23/01/2023 06:00	51.7	47.0



Former George & Dragon, Reading

Noise Impact Assessment

April 2023

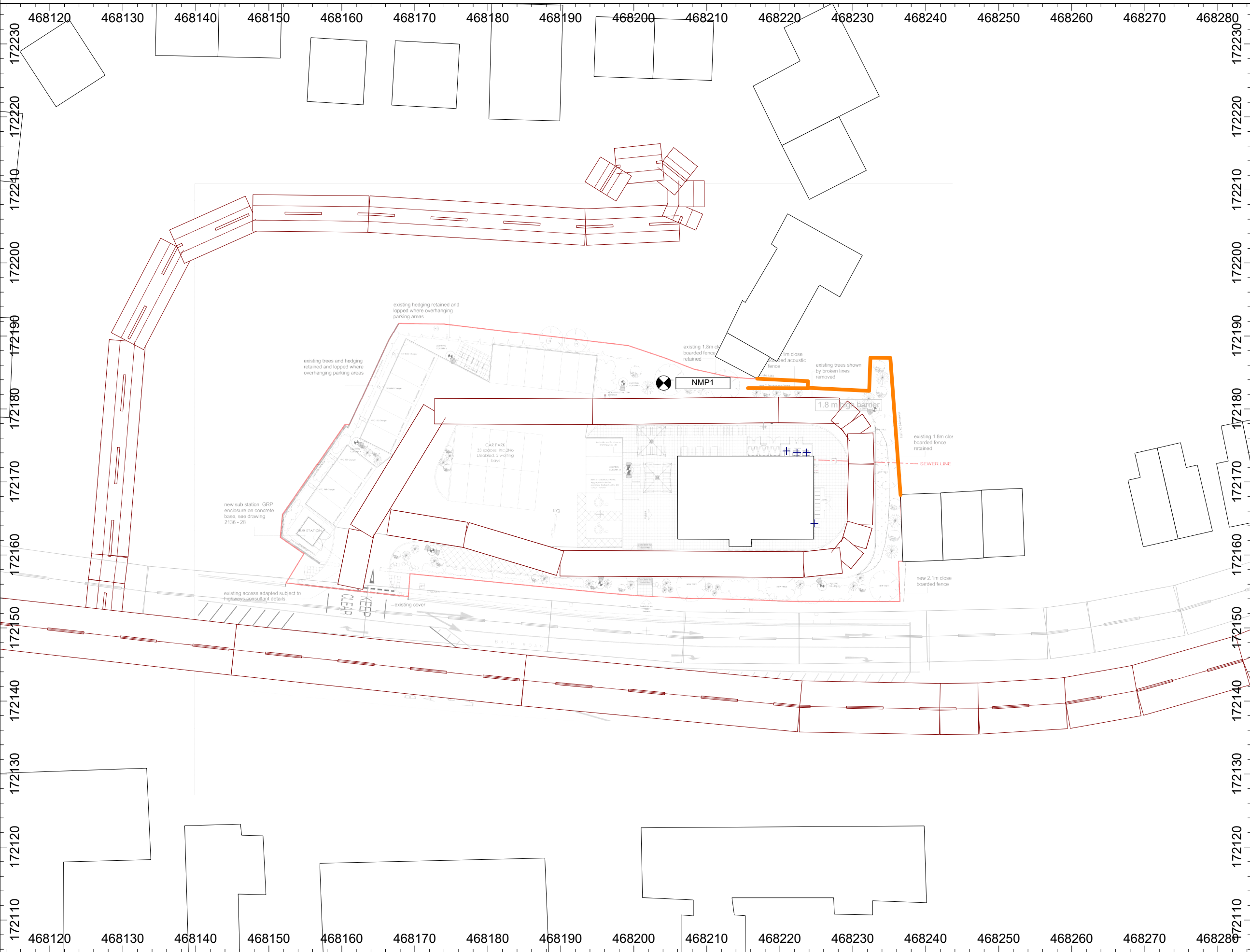
MEASUREMENT START TIME	MEASURED SOUND PRESSURE LEVEL, $L_{Aeq,1hr}$ (dB)	MEASURED BACKGROUND SOUND LEVEL, $L_{A90,1hr}$ (dB)
23/01/2023 07:00	53.2	48.3
23/01/2023 08:00	53.1	47.6
23/01/2023 09:00	55.5	47.8
23/01/2023 10:00	52.2	46.9
23/01/2023 11:00	54.6	47.8



APPENDIX IV

FIGURES

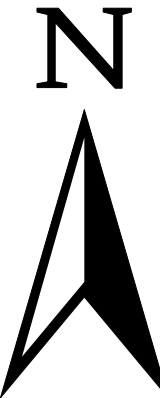
Figure 1 - Noise Survey Measurement Positions



Project:
Former George & Dragon, Reading

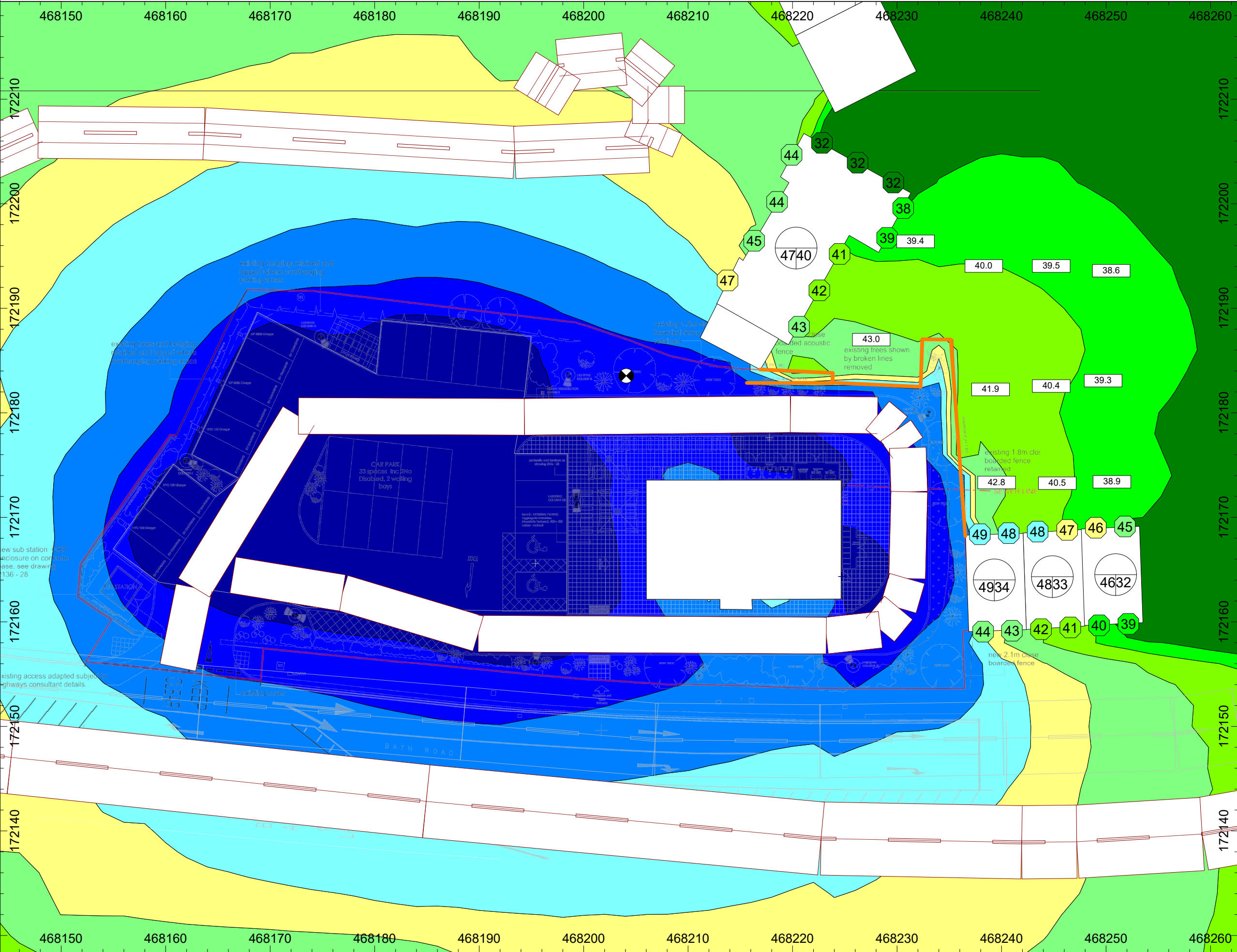
Project-No:
50-740

Client:
Greene King Brewing and Retailing Limited



Project Engineer: L Faulkner
Date: 28/03/2023

Figure 2 - Daytime Grid Noise Map - Calculation at 1.5 m above ground level



Project:
Former George &
Dragon, Reading

Project-No:
50-740

Client:
Greene King Commercial
Investments Ltd

Rating Level,
LA,r (dB)

... <= 38
38 < ... <= 40
40 < ... <= 42
42 < ... <= 45
45 < ... <= 48
48 < ... <= 50
50 < ... <= 52
52 < ... <= 55
55 < ...

Noise Map Objects

+ Point Source
▭ Road
▨ Parking Lot
▭ Building
▭ Barrier
▭ Contour Line
⊙ Receiver
⊙ Building Evaluation
▭ Calculation Area



Project Engineer: L Faulkner
Date: 28/03/2023

Rating Level, LA,r (dB)	
	... ≤ 38
	38 < ... ≤ 40
	40 < ... ≤ 42
	42 < ... ≤ 45
	45 < ... ≤ 48
	48 < ... ≤ 50
	50 < ... ≤ 52
	52 < ... ≤ 55
	55 < ...

Noise Map Objects	
	Point Source
	Road
	Parking Lot
	Building
	Barrier
	Contour Line
	Receiver
	Building Evaluation
	Calculation Area

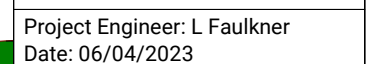
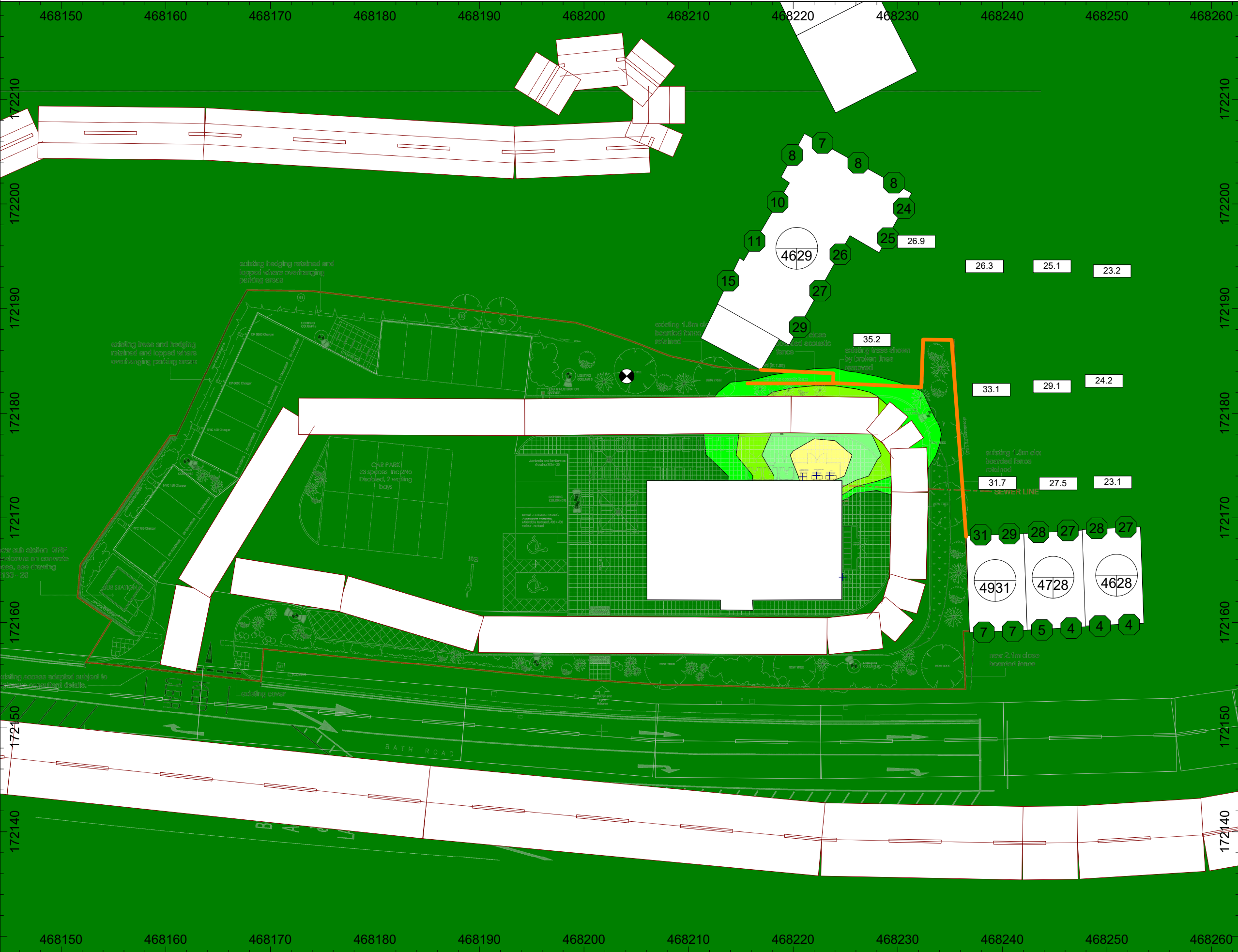


Figure 4 - Night-time Grid Noise Map with Fixed Plant Only - Calculation at 4 m above ground level



Project:
Former George & Dragon, Reading

Project-No:
50-740

Client:
Greene King Commercial Investments Ltd

Rating Level, LA,r (dB)

- ... <= 38
- 38 < ... <= 40
- 40 < ... <= 42
- 42 < ... <= 45
- 45 < ... <= 48
- 48 < ... <= 50
- 50 < ... <= 52
- 52 < ... <= 55
- 55 < ...

Noise Map Objects

- + Point Source
- ▭ Road
- ▨ Parking Lot
- ▭ Building
- ▬ Barrier
- ▽ Contour Line
- ⊗ Receiver
- ⊕ Building Evaluation
- ▭ Calculation Area



Project Engineer: L Faulkner
Date: 28/03/2023