

Noise Impact Assessment

Site: The Old Registry, Wrexham
Reference: 51-195-R1-2
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EXECUTIVE SUMMARY

Site Address	The Old Registry, 23 Chester Street, Wrexham LL13 8BG
National Grid Reference	E 333594, N 350474
Proposed Development	Proposed residential development of 13 apartments with associated access and landscaping.
Surveys Completed	E3P have conducted two full weekday and weekend sound surveys to capture ambient noise levels at both eastern and western facades. The noise sources present were road traffic sound along Chester Street and car park usage within the Guild Hall car park.
Assessments Completed	A 3D noise model has been constructed to assess road traffic and car park sound impact across the site and incident upon all facades and floors. Road traffic and car park sound has been assessed in accordance with the criterion set out in BS 8233:2014.
Mitigation Recommendations	The assessment determined that certain facades require higher specification glazing to control internal noise levels across the development. A whole dwelling ventilation system is assumed to be installed across the site as per approved document F. A full overheating assessment in accordance with the guidelines indicated in Part O is required to allow for the provision of an alternative method of providing the mitigation of overheating without the need for opening windows.
Conclusion and Discussion	With mitigation measures in place, this assessment has shown that no adverse impact is predicted day or night at the receptors due to road traffic and car park sound.



TABLE OF CONTENTS

EXECUTIVE SUMMARY	2
1. INTRODUCTION	4
1.1. Background	4
1.2. Report Objectives	4
1.3. Proposed Development.....	5
2. ASSESSMENT METHODOLOGY	6
2.1. Planning Policy Wales (2021)	6
2.1.1. Air Quality and Soundscape	6
2.2. Noise and Soundscape Action Plan 2018-2023	7
2.3. Planning Guidance (Wales), Technical Advice Noise (Wales) 11, Noise (1997)	7
2.4. Building Regulations: Approved Document F – Volume 1: Dwellings (June 2022)	9
2.5. Building Regulations: Approved Document O – Overheating (June 2022)	10
2.6. British Standard BS 8233:2014+A1:2019 – Guidance on sound insulation and noise reduction for buildings	10
3. SURVEY RESULTS.....	12
3.1. Ambient Sound Measurement – Chester Street	12
3.2. Road Traffic Measurement – Guild Hall Car Park	13
4. NOISE IMPACT ASSESSMENT	15
4.1. Initial Site Risk Assessment	15
4.2. Internal Noise Level Assessment	16
4.2.1. Ventilation Condition	16
4.2.2. Overheating Condition	17
5. MITIGATION	18
5.1. Façade Insulation and Ventilation	18
6. INTERNAL SOUND INSULATION	19
7. CONCLUSIONS AND DISCUSSION.....	20
APPENDIX I LIMITATIONS.....	21
APPENDIX II GLOSSARY	23
APPENDIX II MEASURED NOISE LEVEL	1
APPENDIX III FIGURES	6

Figure List

- Figure 1—Snapshot of Proposed Development
- Figure 2—Noise Measurement Positions
- Figure 3—Daytime Grid Noise Map
- Figure 4—Night-time Grid Noise Map
- Figure 5—Part O Night-time Noise Levels
- Figure 6—10th Highest Maximum Noise Levels



1. INTRODUCTION

1.1. BACKGROUND

E3P were commissioned by Onyx Residential Real Estate Limited to undertake a Noise Impact Assessment for a proposed residential development at the Old Registry Wrexham, to be referred to hereafter as 'the site'.

This assessment looks to determine the key noise sources that have potential to impact upon the noise sensitive development and to assess their impact, if any, upon proposed receptors and to specify mitigation measures, where required.

1.2. REPORT OBJECTIVES

The objectives of this report are as follows.

- ✳ Establish and measure the existing sound levels across the site, day and night.
- ✳ Consider the potential sources of sound impacting the site and to measure source sound levels of all applicable sources.
- ✳ Assess internal and external noise levels associated with road traffic in accordance with criteria given in BS 8233.
- ✳ Provide advice on mitigation measures, where required.

Onyx Residential Real Estate Limited propose a change of use from a former office to 13 residential apartments.

Figure 1 **Snapshot of Proposed Development (Ground Floor)**





2. ASSESSMENT METHODOLOGY

2.1. PLANNING POLICY WALES (2021)

2.1.1. AIR QUALITY AND SOUNDSCAPE

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.

Certain sounds, such as those created by trees, birds or water features, can contribute to a sense of tranquillity whilst others can be reassuring as a consequence of their association with the normality of everyday activities. Problematic forms of sound are generally experienced as noise pollution and can affect amenity and be prejudicial to health or a nuisance. Noise action plans drawn up by public bodies aim to prevent and reduce noise levels where necessary and preserve soundscape quality where it is good. Noise levels used to identify priority areas contained in noise action plans are usually set quite high in order to focus resources on the most polluted areas and noise must meet a number of tests before it qualifies as a statutory nuisance. Lower levels of noise, however, can still be annoying or disruptive and impact on amenity and as such should be protected through the planning process wherever necessary. The planning system must protect amenity and it is not acceptable to rely on statutory nuisance under the Environmental Protection Act 1990 to do so.

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.

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.

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.



2.2. NOISE AND SOUNDSCAPE ACTION PLAN 2018-2023

The noise action plan for Wales has a broader focus than simply controlling the level of noise. It links to the notion of creating appropriate soundscapes, meaning the right acoustic environment in the right time and place. The towns and cities serve us in a variety of ways, and it is believed should therefore contain a variety of soundscapes appropriate to the land use.

The Action Plan draws from information provided in Professional Practice Guidance (ProPG) and the relevant British Standards to recommend that placemaking, soundscapes and good acoustic design are considered and incorporated into the design and development of any new sites. It provides guidance on numerous sources of sound but does not set any guidelines, beyond those given in the British Standards.

It does relate to the European noise indices of the day-evening-night level, L_{den} , and the night level, L_{night} , which are used in the World Health Organisation's Environmental Noise Guidelines for the European Region (2018) but does not go so far as to stipulate the criterion from the guidelines. As such, the assessment that follows will primarily focus on the British Standards.

2.3. PLANNING GUIDANCE (WALES), TECHNICAL ADVICE NOISE (WALES) 11, NOISE (1997)

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 consider 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.

Noise Exposure Categories (NECs) have been derived to assist local planning authorities in their consideration of planning applications for residential development near transport related noise sources.

A recommended range of noise levels is given in Table 2.1 for each of the NECs for dwellings exposed to noise from road, rail, air and mixed sources. However, in some cases, it may be appropriate for local planning authorities to determine the range of noise levels they wish to attribute to the various NECs. Where there is a clear need for new residential development in an already noisy area some or all NECs might be increased by up to 3 dB(A) above the recommended levels. In other cases, a reduction of up to 3 dB(A) may be justified.



Table 1 Noise Exposure Categories for Dwellings

Noise Source	Assessment Period	Noise Exposure Category, $L_{Aeq,t}$ dB (A) ⁽¹⁾			
		A	B	C	D
Road Traffic	Daytime 07:00-23:00	<55	55-63	63-72	>72
	Night-time 23:00-07:00 ⁽²⁾	<45	45-57	57-66	>66
Rail Traffic	Daytime 07:00-23:00	<55	55-66	66-74	>74
	Night-time 23:00-07:00 ⁽²⁾	<45	45-59	59-66	>66
Air Traffic ⁽³⁾	Daytime 07:00-23:00	<57	57-66	66-72	>72
	Night-time 23:00-07:00 ⁽²⁾	<48	48-57	57-66	>66
Mixed Sources ⁽⁴⁾	Daytime 07:00-23:00	<55	55-63	63-72	>72
	Night-time 23:00-07:00 ⁽²⁾	<45	45-57	57-66	>66

Notes:

⁽¹⁾ **Noise levels:** the noise level(s) ($L_{Aeq,T}$) used when deciding the NEC of a site should be representatives of typical conditions.

⁽²⁾ **Night-time noise levels (2300-0700):** sites where individual noise events regularly exceed $82dB_{LAmax}$ (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq,8H}$ (except where the $L_{Aeq,8H}$ already puts the site in NEC D).

⁽³⁾ **Aircraft noise:** daytime values accord with the contour values adopted by the Department of Transport which relate to levels measured 1.2m above open ground. For the same amount of noise energy, contour values can be up to 2 dB(A) higher than those of other sources because of ground reflection effects.

⁽⁴⁾ **Mixed sources:** this refers to any combination of road, rail, air and industrial noise sources. The "mixed source" values are based on the lowest numerical values of the single source limits in the table. The "mixed source" NECs should only be used where no individual noise source is dominant.

To check if any individual noise source is dominant (for the purposes of this assessment) the noise level from the individual sources should be determined and then combined by decibel addition (remembering first to subtract 2 dB(A) from any aircraft noise contour values). If the level of any one source then lies within 2 dB(A) of the calculated combined value, that source should be taken as the dominant one and the site assessed against the appropriate NEC for that source, rather than using the "mixed source" NECs. If the dominant source is industrial noise see paragraph B17 of Annex B.

If the contribution of the individual noise sources to the overall noise level cannot be determined by measurement and/or calculation, then the overall measured level should be used and the site assessed against the NECs for "mixed sources".

When assessing a proposal for residential development near a source of noise, local planning authorities should determine into which of the four NECs the proposed site falls, taking account of both day and night-time noise levels. Local planning authorities should then have regard to the advice in the appropriate NEC, as below:

- ✳ **A** - Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.
- ✳ **B** - Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.
- ✳ **C** - Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
- ✳ **D** - Planning permission should normally be refused.



2.4. BUILDING REGULATIONS: APPROVED DOCUMENT F – VOLUME 1: DWELLINGS (JUNE 2022)

Approved document F Volume 1: Dwellings (ADF) provides guidance set by the Department for Levelling Up, Housing and Communities, that relates to means of ventilation within dwellings. The ventilation strategy specified within the ADF are as follows.

1.9 The ventilation strategy in this approved document relies on a combination of all of the following.

a. Extract ventilation from rooms where water vapour or pollutants are likely to be released (e.g. bathrooms and kitchens), to minimise their spread to the rest of the building. Ventilation fans may be either intermittent operation or continuous operation.

b. Whole dwelling ventilation to provide fresh air to the building and to dilute, disperse and remove water vapour and pollutants not removed by extract ventilation.

c. Purge ventilation to remove high concentrations of pollutants and water vapour. Purge ventilation is used intermittently and required only for pollutants produced by occasional activities (e.g. fumes from painting).

1.10 Ventilation may be delivered through natural ventilation, mechanical ventilation or a combination of both.

1.11 The ventilation systems in this approved document are examples of systems that comply with Part F of the Building Regulations. Other ventilation systems may be acceptable if they can be shown to meet an equal level of performance.

Within the ADF there are three system specific ventilation systems that can be utilised to provide sufficient ventilation. These methods are as follow.

1. Natural ventilation with background ventilators and intermittent extract fans (guidance suitable only for less airtight dwellings) - Ventilation provided by thermal, wind or diffusion effects through doors, windows or other intentional openings without the use of mechanically driven equipment. For the purposes of this approved document, natural ventilation refers to a ventilation strategy using background ventilators and intermittent extract ventilation.

2. Continuous mechanical extract ventilation - Mechanically driven ventilation that continuously extracts indoor air and discharges it to the outside.

3. Mechanical ventilation with heat recovery - A mechanically driven ventilation system that both continuously supplies outdoor air to the inside of the dwelling and continuously extracts indoor air and discharges it to the outside. For the purposes of this approved document, the guidance for mechanical ventilation with heat recovery applies to centralised or decentralised supply and extract systems, with or without heat recovery.



2.5. BUILDING REGULATIONS: APPROVED DOCUMENT O – OVERHEATING (JUNE 2022)

Approved document O - Overheating (ADO) provides guidance set by the Department for Levelling Up, Housing and Communities, that relates to the mitigation of overheating. In relation to noise the ADO provides the following guidance.

3.2 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

3.3 Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- a. 40dB LAeq,T, averaged over 8 hours (between 11pm and 7am).*
- b. 55dB LAFmax, more than 10 times a night (between 11pm and 7am).*

3.4 Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants'

Measurement of Sound Levels in Buildings with the overheating mitigation strategy in use.

NOTE: Guidance on reducing the passage of external noise into buildings can be found in the National Model Design Code: Part 2 – Guidance Notes (MHCLG, 2021) and the Association of Noise Consultants' Acoustics, Ventilation and Overheating: Residential Design Guide (2020)

2.6. BRITISH STANDARD BS 8233:2014+A1:2019 – GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

The scope of this standard is the provision of recommendations for the control of noise in and around buildings including residential dwellings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new buildings or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate.

The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings, as shown in Table 2.

Table 2 BS 8233:2014 Recommended Internal Noise Levels

Criterion	Typical Situation	Design Criterion, LAeq,T (dB)
Suitable resting and sleeping conditions	Living Room	35
	Bedroom	30

BS 8233 goes on to recommend noise levels for gardens:



It is desirable that the external noise level does not exceed 50 dB LAeq,T, with an upper guideline value of 55 dB LAeq,T which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors might be warranted.

BS 8233 goes on to say:

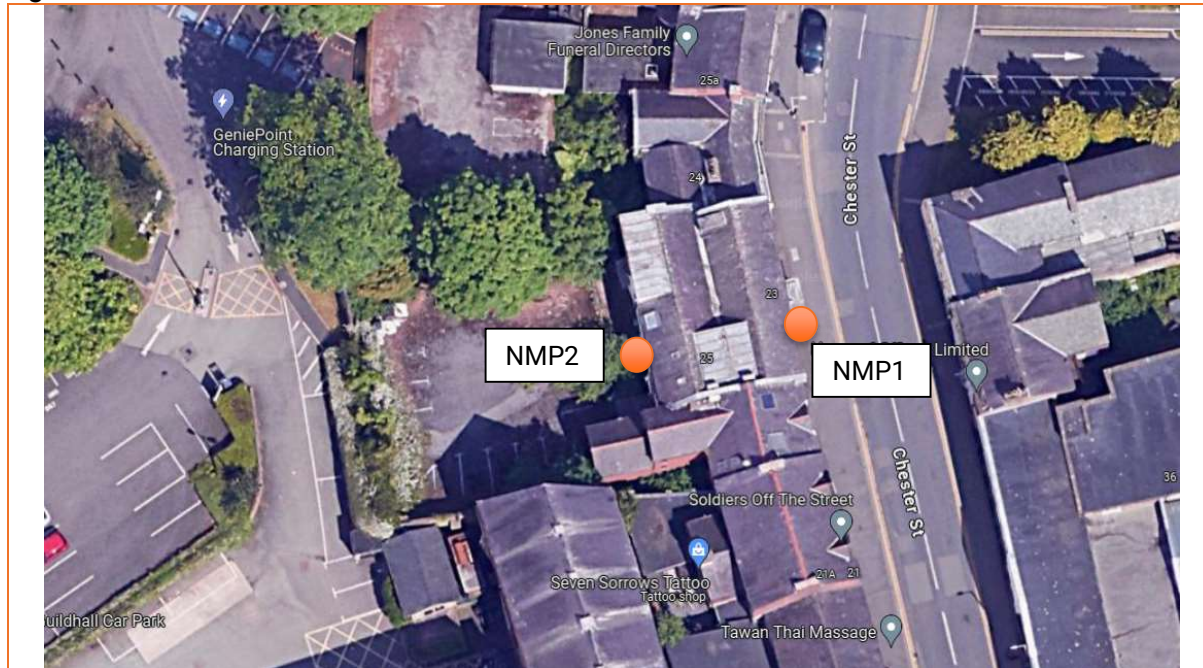
In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.



3. SURVEY RESULTS

The surveys were conducted in the following locations:

Figure 2 Noise Measurement Positions



E3P have had correspondence with the LPA with the following commentary given in relation to the survey aspects of the Noise Impact Assessment.

Note that a noise survey is proposed for environmental noise. My main concern with this application is potential impact from the night time economy and whereas I accept the application area is on the outskirts of the city centre there are also two nearby pubs. As the weekend is the busiest period for the night time economy, for any survey to be robust it should be carried out at some point during this period.

As such, E3P endeavoured to install noise monitoring equipment at the site to be left unattended over a full weekday and weekend time period. E3P note the two public houses referenced by the LPA are over 30 m away from the proposed development.

3.1. AMBIENT SOUND MEASUREMENT – CHESTER STREET

E3P has conducted an unattended ambient sound measurement to capture noise from Chester Street and noise from other external sources. The measurement was conducted in accordance with the measurement procedure given in Calculation of Road Traffic Noise (CRTN) given that the dominate noise source is road traffic. The survey was carried out over the following periods:

 12:00 Thursday 13th June 2024 until 10:00 Monday 17th June 2024.

The following noise measurement position was chosen for the Road Traffic Noise Survey:



- Noise Measurement Position 1 (NMP1): Located out of a second-floor window overlooking Chester Street. The microphone was located at a height of approximately 6 m above ground level and under façade conditions.

A summary of the measured sound pressure levels from the Ambient Noise Survey is presented in Table 3. The $L_{Amax,fast}$ is expressed as a 10th highest 1-minute maximum noise level during the night-time period.

Table 3 Range of Ambient Sound Pressure Levels and derived 16- and 8-hour Sound levels (façade conditions)

Date	Assessment Period	Range Of Measured Ambient Sound Levels, $L_{Aeq,T}$ (dB)	Derived Daytime and Night-Time Sound Levels, $L_{Aeq,T}$ (dB)	10th Highest Maximum Noise Level $L_{Amax,1min}$ (dB)
Thursday 13th June 2024	Day (12:00-23:00)	57.6-67.9	-	-
	Night (23:00-07:00)	44.7-65.0	59.9	75.8
Friday 14th June 2024	Day (07:00-23:00)	62.7-67.3	65.3	-
	Night (23:00-07:00)	54.1-63.7	58.2	76.9
Saturday 15th June 2024	Day (07:00-23:00)	62.1-70.8	66.1	-
	Night (23:00-07:00)	50.2-63.3	58.6	77.4
Sunday 15th June 2024	Day (07:00-23:00)	58.2-64.8	62.3	-
	Night (23:00-07:00)	46.5-62.7	57.4	73.9

The derived 16- and 8-hour sound levels were achieved by logarithmically averaging each daytime and night-time period. The highest 16- and 8-hour periods will be used for the assessment.

3.2. ROAD TRAFFIC MEASUREMENT – GUILDHALL CAR PARK

E3P has conducted an unattended ambient sound measurement to capture noise at the rear of the property, the dominate noise source here was vehicle movements in the Guildhall car park. The survey was carried out over the following periods:

- 12:00 Thursday 13th June 2024 until 10:00 Monday 17th June 2024.

The following noise measurement position was chosen for the Road Traffic Noise Survey:

- Noise Measurement Position 2 (NMP2): Located out of a first-floor window overlooking the Guildhall Car Park. The microphone was located at a height of approximately 3.5 m above ground level and under façade conditions.

A summary of the measured sound pressure levels from the Road Traffic Noise Survey is presented in Table 4. The $L_{Amax,fast}$ is expressed as a 10th highest 1-minute maximum noise level during the night-time period.



Table 4 Range of Ambient Sound Pressure Levels and derived 16- and 8-hour Sound levels (façade conditions)

Date	Assessment Period	Range Of Measured Ambient Sound Levels, $L_{Aeq,T}$ (dB)	Derived Daytime and Night-Time Sound Levels, $L_{Aeq,T}$ (dB)	10th Highest Maximum Noise Level $L_{A_{fmax,1min}}$ (dB)
Thursday 13th June 2024	Day (12:00-23:00)	40.3-53.7	-	-
	Night (23:00-07:00)	33.9-48.3	42.6	62.3
Friday 14th June 2024	Day (07:00-23:00)	42.8-50.1	47.6	-
	Night (23:00-07:00)	37.5-45.7	42.8	64.1
Saturday 15th June 2024	Day (07:00-23:00)	38.4-53.3	50.1	-
	Night (23:00-07:00)	37.5-46.8	43.1	65.6
Sunday 15th June 2024	Day (07:00-23:00)	44.8-49.2	47.1	-
	Night (23:00-07:00)	39.0-47.3	44.4	64.2

The derived 16- and 8-hour sound levels were achieved by logarithmically averaging each daytime and night-time period. The highest 16- and 8-hour periods will be used for the assessment.

The equipment outlined in Table 5 was used for the noise survey. The sound level meter was calibrated before and after measurements with no significant drift witnessed.

Table 5 Noise Measurement Equipment and Calibration Dates

Measurement Position	Equipment Description	Manufacturer & Type Number	Serial Number	Calibration Due Date
NMP1	Sound Level Meter	01dB Fusion	12039	28th July 2025
	Pre-amplifier	01dB Pre22	1805124	
	Microphone	GRAS 40CE	330832	
	Calibrator	01dB Cal31	87281	19th January 2025
NMP2	Sound Level Meter	Cirrus CR:171A	G303884	15th September 2025
	Pre-amplifier	Cirrus MV:200F	12731F	
	Microphone	Cirrus MK:224	215899D	
	Calibrator	Cirrus CR:515	99403	15th September 2024



4. NOISE IMPACT ASSESSMENT

For the purposes of this assessment, E3P has used noise modelling software, CadnaA 2023 MR1, to determine the impact of noise from road traffic and car park sound.

E3P note that the LPA had concerns regarding night-time noise levels due to the night-time economy of the area. E3P have conducted analysis of the data and determined that the dominant noise source was due to road traffic movements along Chester Street during the night-time period. From analysis of the data, it is clear the road traffic movements are the main source of sound. As such the highest 16- and 8-hour noise levels have been used for the assessment.

The highest daytime (16-hour noise level) was found to occur on Saturday 15th June 2024, with the highest night-time (8-hour noise level) occurring on Thursday 13th June 2024. The survey has accounted for increased activity due to weekend increases in traffic flows and evening activity. As such the following assessment can be considered robust.

The following inputs have been included in the model:

- ✳ Chester Street is calibrated using NMP1.
- ✳ The Guildhall Car Park is calibrated using NMP2.
- ✳ Site 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 are included.
- ✳ A reflection order of 2 has been used in all calculations.
- ✳ Noise levels generated using ISO 9613-1 and ISO 9613-2 "*Acoustics – Attenuation of sound during propagation outdoors*" as incorporated into CadnaA software.

Figures 3 and 4 determine the noise levels across the Site during the daytime and night-time periods, respectively, due to road traffic and car park sound.

4.1. INITIAL SITE RISK ASSESSMENT

Figures 3 and 4 determine the noise levels across the Site during the daytime and night-time periods, respectively, due to all sources in accordance with the Welsh Government NECs.

The grids determine that, during the daytime periods, the worst-case façades are subject to noise levels of up to 64 dB which falls within NEC C. During the night, the worst-case facades would experience noise levels of up to 58 dB which falls within NEC C for facades fronting Chester Street.

As such, noise should be considered when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.

Rear facades fall within NEC A, with levels of 48 dB and 43 dB during the daytime and nighttime respectively. As such for rear facades, noise need not be considered as a determining factor in granting planning permission.

Given the above, the assessment will ensure all appropriate criteria are achieved with mitigation measures recommended where required.



4.2. INTERNAL NOISE LEVEL ASSESSMENT

With regards internal noise levels, E3P has assumed a standard glazing specification of 4 mm glass/20 mm air space/4 mm glass which affords a sound insulation performance in the order of 29 dB R_w (C_{tr} -1; C_{tr} -4). The primary noise impact here is road traffic sound, as such, the C_{tr} correction is applied.

The model has been used to predict façade noise levels at all floor levels and orientations. To determine any requirements for mitigation, E3P has added the reduction provided by the glazing (25 dB) to the relevant criterion for day (35 dB) and for night (30 dB). As such, any facades subject to noise levels higher than 60 dB during the day and/or 55 dB during the night will require higher specification glazing.

The highest predicted day and night façade levels here are 64 dB and 58 dB respectively. As such, facades that front Chester Street will require higher specification glazing. The exact specifications of the units will be given in section 5.

It is also important to consider the maximum noise levels during the night-time period. Figure 6 has been produced using the 10th Highest maximum noise levels for each road. The worst affected plots in relation to maximum noise levels have a level of 74 dB at the worst affected façade. As such internal noise levels with standard glazing in place would achieve 45 dB internally achieving the criterion. As such, facades will require higher specification glazing to mitigate maximum noise levels. Further details will be given in Section 5.

With regards opening windows, there is a requirement to consider the need to open windows for ventilation and the mitigation of overheating. At this stage, the assessment assumes that ventilation would be provided by way of extract fans in kitchens and bathrooms and openable windows.

4.2.1. VENTILATION CONDITION

It is assumed that the developer would be installing a whole dwelling ventilation system in accordance with Part F of the Building Regulations as it is assumed Natural Ventilation will not be applicable here.

Where background ventilators form part of the system, consideration is required to the sound reduction provided by these when in the open position and, as such, are discussed in Section 5.0.



4.2.2. OVERHEATING CONDITION

E3P has considered the potential impact of noise, internally, should windows be opened to mitigate overheating, as per the criteria stipulated in ADO. Any plots/facades that pass this test can open windows for this without resulting in unacceptable internal noise levels. Those that fail the test would be subject to a Part O Overheating Assessment by a suitably qualified consultant.

Part O only applies to bedrooms at night in relation to the average 8-hour noise level and 10th highest maximum noise level.

Given that the site is within a moderate risk location, as per guidance within Approved Document O the external noise limit threshold is 49 dB during the night-time ($L_{Aeq,8hr}$) and 64 dB more than 10 times a night ($L_{Af,max}$).

As can be seen from Figure 5 & 6, both facades experience an exceedance of the above criterion. As such, a full overheating assessment in accordance with the guidelines indicated in Part O is required for all habitable rooms as when windows are open to mitigate overheating internal noise levels are not acceptable. A full overheating assessment should be carried out by a suitable qualified consultant and a method of mitigating overheating without the need for opening windows will be required.

The above outcome should not be a determining factor for the planning application as Part O requirements is relevant to building regulation consent only. The above assessment seeks to provide the required detail to allow the whole dwelling ventilation system to be designed to achieve the mitigation of overheating without the need for opening windows for apartments where internal noise levels are not acceptable with windows open.



5. MITIGATION

5.1. FAÇADE INSULATION AND VENTILATION

The previous section determined that a whole dwelling ventilation system in accordance with Part F would be installed across the site as it is assumed natural ventilation is not appropriate. Higher specification glazing will be required for across certain facades. Standard thermal double glazing being sufficient across the rest of the site.

Tables 6 the required glazing per façade. The worst-case required glazing is chosen per facade. For example, where a glazing needed due to night-time noise is higher than for daytime periods, the night-time requirements are recommended. Where maximum noise levels need mitigation the R_w value is provided.

It is recommended that a glazier is consulted to ensure any system installed achieves the above reduction as a minimum. These specifications should be reviewed by an acoustician.

Table 6 Glazing Requirements – Dwellings located on the eastern façade overlooking Chester Street

Façade	Required Glazing Reduction (dB)	Example Glazing (Glass/Air Space/Glass) (mm)
Eastern	$29 R_w + C_{tr}$	8 / 6 to 16 / 4



6. INTERNAL SOUND INSULATION

In the absence of any details of the current existing or proposed separating wall and floor build-ups E3P cannot carry out any assessment of these structures.

However, these separating elements will need to achieve the Building Regulation requirements within the approved document E.

Table 7 details the sound insulation requirements required between spaces for dwellings-houses and flats formed by material change of use as outlined in Approved Document E.

Table 7 Approved Document E – Separating Wall And Floor Criteria For Dwellings And Flats Formed By Material Change Of Use

	Airborne Sound Insulation $D_{nt,w} + C_{tr}$ dB (Minimum values)	Impact Sound insulation $L'_{nT,w}$ dB (Maximum values)
Dwelling-houses and flats formed by material change of use		
Walls	43	-
Floors	43	64

Pre-completion testing be required to be carried out by a suitably qualified acoustician to check compliance with the above requirements.



7. CONCLUSIONS AND DISCUSSION

E3P were commissioned by Onyx Residential Real Estate Limited to undertake a Noise Impact Assessment for a proposed residential development at The Old Registry, Wrexham.

E3P have conducted two full weekday and weekend sound surveys to capture ambient noise levels at both eastern and western facades. The noise sources present were road traffic sound along Chester Street and car park usage within the Guild Hall car park.

A 3D noise model has been constructed to assess road traffic and car park sound impact across the site and incident upon all facades and floors. Road traffic and car park sound has been assessed in accordance with the criterion set out in BS 8233:2014.

The assessment determined that certain facades require higher specification glazing to control internal noise levels across the development.

A whole dwelling ventilation system is assumed to be installed across the site as per approved document F. A full overheating assessment in accordance with the guidelines indicated in Part O is required to allow for the provision of an alternative method of providing the mitigation of overheating without the need for opening windows.

With mitigation measures in place, this assessment has shown that no adverse impact is predicted day or night at the receptors due to road traffic and car park sound.

END OF REPORT

APPENDIX I

LIMITATIONS



GENERAL

1. This report and any associated works (together comprising the "Services") were compiled and carried out by E3P for the client (as present in Section 1) under the E3P "Terms of Business" or with those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.
2. Unless explicitly agreed otherwise, in writing, this report has been prepared under E3P Standard Terms and Business as included within our proposal to the Client.
3. Project-specific appointment documents may be agreed upon at our discretion and a charge may be levied for both the time to review and finalise appointment documents and also for associated changes to the appointment terms. E3P reserves the right to amend the fee should any changes to the appointment terms create an increased risk to E3P.
4. The report needs to be considered in light of the proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

NOISE AND VIBRATION IMPACT ASSESSMENTS

5. 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 in order to inform an accurate assessment.
6. 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.
7. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walkover inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects' responses may not have been received from all parties. E3P cannot be held responsible for any disclosures that are provided post-production of our report and will not automatically update our report.
8. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, E3P reserves the right to review such information and, if warranted, to modify the opinions accordingly.
9. E3P does not warrant work/data undertaken/provided by others.

APPENDIX II

GLOSSARY



NOISE

Noise is defined as unwanted sound. Human ears are able to 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 give due consideration to all of 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 LAeq, LA90 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 generally 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 8 **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 9 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.
LAeq, T	LAeq 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.
LAmx	LAmx is the maximum A-weighted sound pressure level recorded over the period stated. LAmx is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall Leq 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 Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L10 is the level exceeded for 10% of the time and as such can be regarded as the "average maximum level". Similarly, L90 is the "average minimum level" and is often used to describe the background noise. It is common practice to use the L10 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.
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.

APPENDIX II

MEASURED NOISE LEVEL



Table 10 Measured Background and Ambient Sound Pressure Levels (NMP1)

MEASUREMENT START TIME	AMBIENT SOUND LEVEL, $L_{Aeq,T}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,T}$ (dB)
13/06/2024 12:00	64.8	51.9
13/06/2024 13:00	65.7	52.0
13/06/2024 14:00	64.9	52.4
13/06/2024 15:00	65.7	51.9
13/06/2024 16:00	66.0	53.2
13/06/2024 17:00	67.9	54.2
13/06/2024 18:00	66.7	51.2
13/06/2024 19:00	66.2	48.9
13/06/2024 20:00	64.2	45.8
13/06/2024 21:00	61.1	43.1
13/06/2024 22:00	57.6	38.9
13/06/2024 23:00	65.0	36.4
14/06/2024 00:00	52.3	34.8
14/06/2024 01:00	45.7	34.5
14/06/2024 02:00	44.7	34.5
14/06/2024 03:00	46.8	36.2
14/06/2024 04:00	49.7	37.6
14/06/2024 05:00	62.4	38.3
14/06/2024 06:00	63.9	40.9
14/06/2024 07:00	64.8	45.9
14/06/2024 08:00	66.2	49.9
14/06/2024 09:00	65.6	50.4
14/06/2024 10:00	65.2	51.7
14/06/2024 11:00	65.8	53.6
14/06/2024 12:00	65.5	53.4
14/06/2024 13:00	65.6	52.5
14/06/2024 14:00	64.9	52.3
14/06/2024 15:00	67.1	52.6
14/06/2024 16:00	64.8	52.5
14/06/2024 17:00	65.9	52.4
14/06/2024 18:00	67.3	51.0
14/06/2024 19:00	64.9	48.5
14/06/2024 20:00	63.1	46.5
14/06/2024 21:00	62.7	43.9
14/06/2024 22:00	64.0	42.5
14/06/2024 23:00	59.6	37.1
15/06/2024 00:00	63.7	35.5
15/06/2024 01:00	54.1	35.0
15/06/2024 02:00	56.0	35.3
15/06/2024 03:00	55.5	36.3
15/06/2024 04:00	54.3	36.6
15/06/2024 05:00	55.6	37.6
15/06/2024 06:00	56.9	39.1
15/06/2024 07:00	63.7	40.2
15/06/2024 08:00	62.9	43.1
15/06/2024 09:00	66.2	50.0
15/06/2024 10:00	67.6	53.8
15/06/2024 11:00	67.4	54.2
15/06/2024 12:00	66.0	54.8



MEASUREMENT START TIME	AMBIENT SOUND LEVEL, $L_{Aeq,T}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,T}$ (dB)
15/06/2024 13:00	66.6	54.0
15/06/2024 14:00	66.2	53.7
15/06/2024 15:00	70.8	54.3
15/06/2024 16:00	65.5	51.3
15/06/2024 17:00	65.7	51.0
15/06/2024 18:00	64.1	48.5
15/06/2024 19:00	63.7	47.8
15/06/2024 20:00	65.3	48.0
15/06/2024 21:00	64.9	52.5
15/06/2024 22:00	62.1	49.0
15/06/2024 23:00	63.3	47.4
16/06/2024 00:00	60.0	36.3
16/06/2024 01:00	56.8	36.2
16/06/2024 02:00	55.7	36.9
16/06/2024 03:00	51.7	37.0
16/06/2024 04:00	50.2	37.5
16/06/2024 05:00	59.8	38.7
16/06/2024 06:00	57.8	39.7
16/06/2024 07:00	59.6	41.0
16/06/2024 08:00	58.2	40.2
16/06/2024 09:00	60.9	40.3
16/06/2024 10:00	62.9	46.6
16/06/2024 11:00	63.8	48.6
16/06/2024 12:00	64.3	48.1
16/06/2024 13:00	64.8	48.7
16/06/2024 14:00	63.9	48.5
16/06/2024 15:00	63.0	47.4
16/06/2024 16:00	63.4	46.4
16/06/2024 17:00	62.1	46.2
16/06/2024 18:00	62.1	46.0
16/06/2024 19:00	62.5	44.3
16/06/2024 20:00	61.6	42.5
16/06/2024 21:00	58.7	40.8
16/06/2024 22:00	58.5	40.1
16/06/2024 23:00	62.7	39.2
17/06/2024 00:00	55.8	37.6
17/06/2024 01:00	48.9	35.9
17/06/2024 02:00	54.1	35.6
17/06/2024 03:00	46.5	35.6
17/06/2024 04:00	56.7	36.3
17/06/2024 05:00	56.6	38.1
17/06/2024 06:00	59.5	38.3
17/06/2024 07:00	62.9	44.1
17/06/2024 08:00	64.5	49.8
17/06/2024 09:00	64.9	51.1



Table 11 Measured Background and Ambient Sound Pressure Levels

MEASUREMENT START TIME	AMBIENT SOUND LEVEL, $L_{Aeq,T}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,T}$ (dB)
13/06/2024 12:00	46.2	41.7
13/06/2024 13:00	50.0	42.7
13/06/2024 14:00	49.7	43.7
13/06/2024 15:00	51.7	44.5
13/06/2024 16:00	53.7	46.8
13/06/2024 17:00	50.8	44.9
13/06/2024 18:00	52.1	46.0
13/06/2024 19:00	49.6	43.3
13/06/2024 20:00	46.5	42.4
13/06/2024 21:00	46.1	41.8
13/06/2024 22:00	40.3	36.0
13/06/2024 23:00	39.4	34.5
14/06/2024 00:00	36.1	32.6
14/06/2024 01:00	33.9	32.1
14/06/2024 02:00	36.3	32.9
14/06/2024 03:00	43.2	35.4
14/06/2024 04:00	43.7	36.5
14/06/2024 05:00	41.9	37.9
14/06/2024 06:00	48.3	39.6
14/06/2024 07:00	46.4	40.6
14/06/2024 08:00	48.1	43.9
14/06/2024 09:00	49.7	46.1
14/06/2024 10:00	49.3	44.5
14/06/2024 11:00	49.3	45.1
14/06/2024 12:00	48.7	45.2
14/06/2024 13:00	50.1	45.8
14/06/2024 14:00	48.9	45.7
14/06/2024 15:00	48.4	44.1
14/06/2024 16:00	47.6	43.5
14/06/2024 17:00	46.4	40.8
14/06/2024 18:00	46.2	40.4
14/06/2024 19:00	45.4	41.4
14/06/2024 20:00	43.2	38.9
14/06/2024 21:00	42.8	38.8
14/06/2024 22:00	43.0	39.8
14/06/2024 23:00	41.4	36.5
15/06/2024 00:00	38.8	32.3
15/06/2024 01:00	37.5	32.8
15/06/2024 02:00	45.7	34.7
15/06/2024 03:00	40.3	34.9
15/06/2024 04:00	43.0	34.8
15/06/2024 05:00	43.4	36.5
15/06/2024 06:00	45.7	39.3
15/06/2024 07:00	44.9	37.8
15/06/2024 08:00	48.6	38.2
15/06/2024 09:00	47.2	40.6
15/06/2024 10:00	47.9	42.7
15/06/2024 11:00	50.8	42.4
15/06/2024 12:00	50.0	39.6

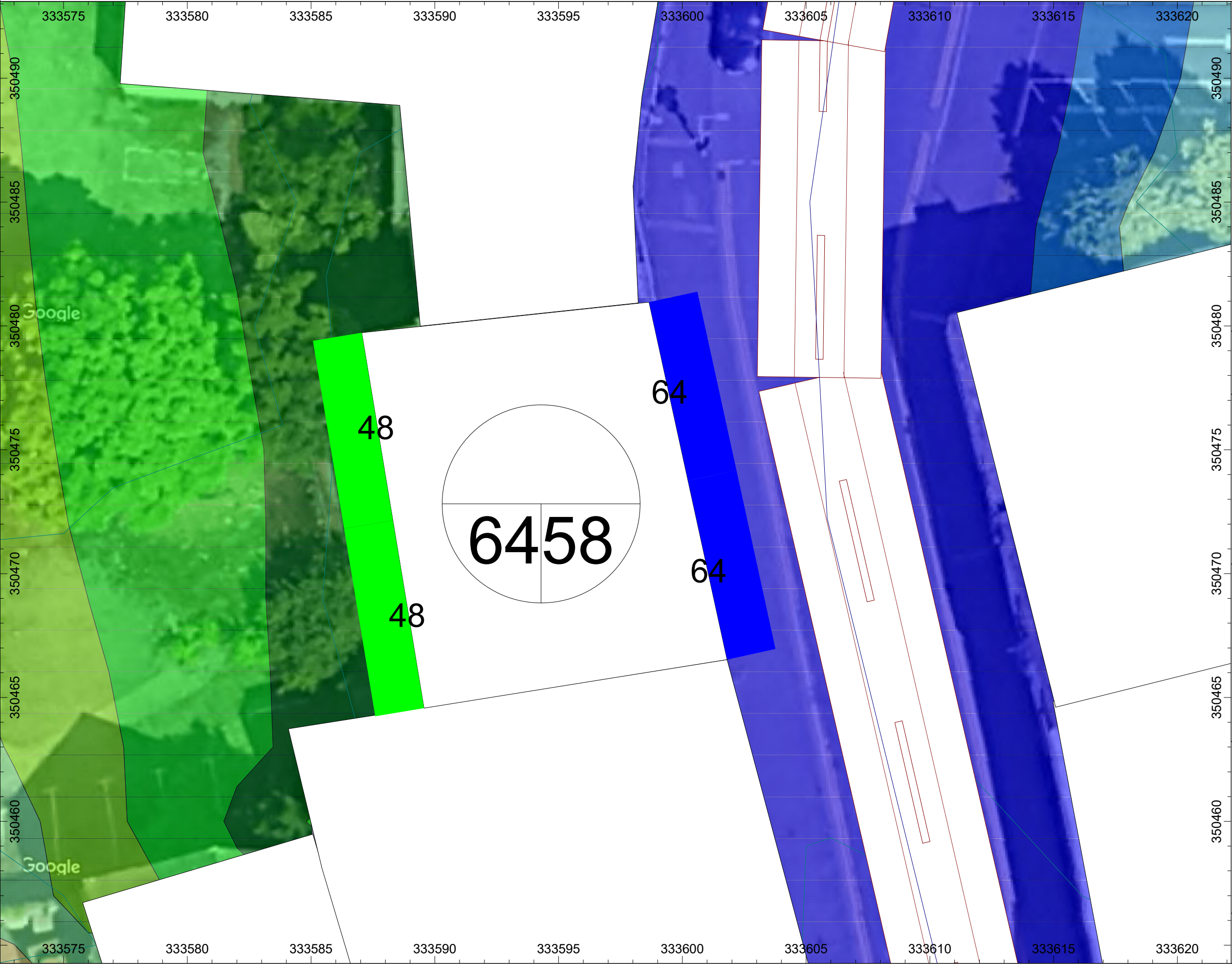


MEASUREMENT START TIME	AMBIENT SOUND LEVEL, $L_{Aeq,T}$ (dB)	BACKGROUND SOUND LEVEL, $L_{A90,T}$ (dB)
15/06/2024 13:00	47.2	41.0
15/06/2024 14:00	52.0	46.1
15/06/2024 15:00	53.0	46.9
15/06/2024 16:00	51.0	46.6
15/06/2024 17:00	50.4	45.6
15/06/2024 18:00	51.4	46.5
15/06/2024 19:00	50.1	46.9
15/06/2024 20:00	53.3	46.5
15/06/2024 21:00	50.0	39.9
15/06/2024 22:00	40.4	37.7
15/06/2024 23:00	43.9	39.2
16/06/2024 00:00	38.1	35.5
16/06/2024 01:00	37.5	34.6
16/06/2024 02:00	41.4	36.0
16/06/2024 03:00	40.5	36.9
16/06/2024 04:00	43.0	38.2
16/06/2024 05:00	45.6	39.5
16/06/2024 06:00	46.8	40.5
16/06/2024 07:00	47.8	42.6
16/06/2024 08:00	45.3	41.0
16/06/2024 09:00	45.2	40.4
16/06/2024 10:00	49.2	41.6
16/06/2024 11:00	47.8	43.7
16/06/2024 12:00	46.9	42.7
16/06/2024 13:00	47.9	42.2
16/06/2024 14:00	47.6	44.7
16/06/2024 15:00	47.7	44.7
16/06/2024 16:00	48.3	44.4
16/06/2024 17:00	47.4	43.8
16/06/2024 18:00	47.3	43.3
16/06/2024 19:00	47.7	43.5
16/06/2024 20:00	45.7	42.6
16/06/2024 21:00	44.8	41.5
16/06/2024 22:00	45.0	41.6
16/06/2024 23:00	47.3	41.3
17/06/2024 00:00	46.5	40.9
17/06/2024 01:00	42.5	37.7
17/06/2024 02:00	42.8	37.1
17/06/2024 03:00	39.0	34.3
17/06/2024 04:00	43.9	36.5
17/06/2024 05:00	44.2	38.8
17/06/2024 06:00	44.9	36.1
17/06/2024 07:00	48.0	40.2
17/06/2024 08:00	49.8	44.0
17/06/2024 09:00	48.1	41.7

APPENDIX III

FIGURES

Figure 3 - Daytime Grid Noise Map (BS 8233) - Calculation at 1.5 m above ground level



Project:
The Old Registry,
Wrexham

Project-No:
51-195

Client:
Onyx Residential
Real Estate Limited

**Daytime Noise Level,
LAeq, 16hr (dB)**

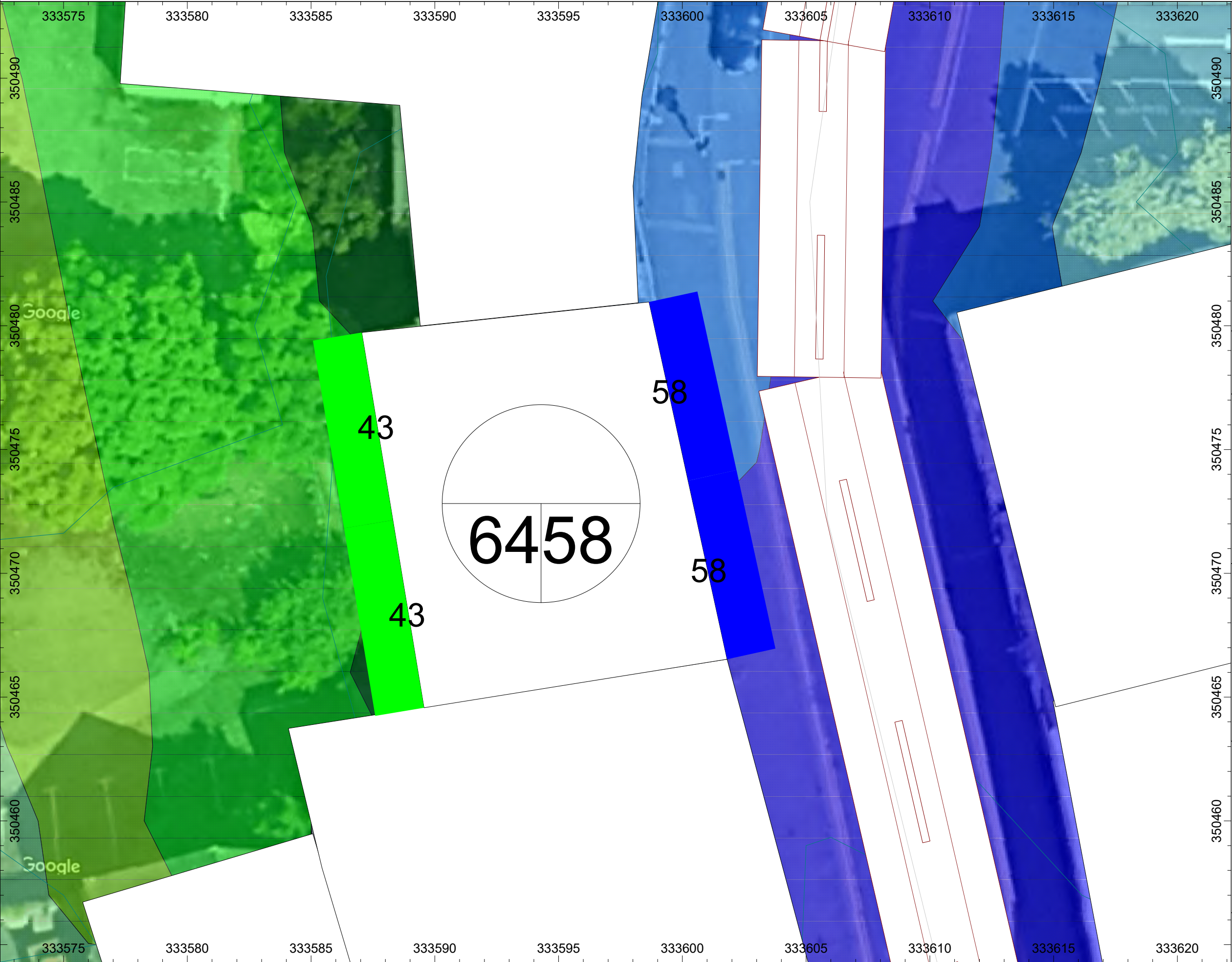
...	<= 48
48 < ...	<= 50
50 < ...	<= 52
52 < ...	<= 56
56 < ...	<= 58
58 < ...	<= 60
60 < ...	<= 62
62 < ...	<= 65
65 < ...	

Noise Map Objects

- + Point Source
- Line Source
- Road
- ▨ Parking Lot
- ▭ Building
- Barrier
- Embankment
- Contour Line
- ⊕ Building Evaluation
- Calculation Area

Project Engineer: Scott Boughton
Date: 19/06/2024

Figure 4 - Night-time Grid Noise Map (BS 8233) - Calculation at 4.5 m above ground level



Project:
The Old Registry,
Wrexham

Project-No:
51-195

Client:
Onyx Residential
Real Estate Limited

**Night-time Noise Level,
LAeq, 8hr (dB)**

...	<= 42
42 < ...	<= 45
45 < ...	<= 47
47 < ...	<= 50
50 < ...	<= 52
52 < ...	<= 55
55 < ...	<= 57
57 < ...	<= 60
60 < ...	

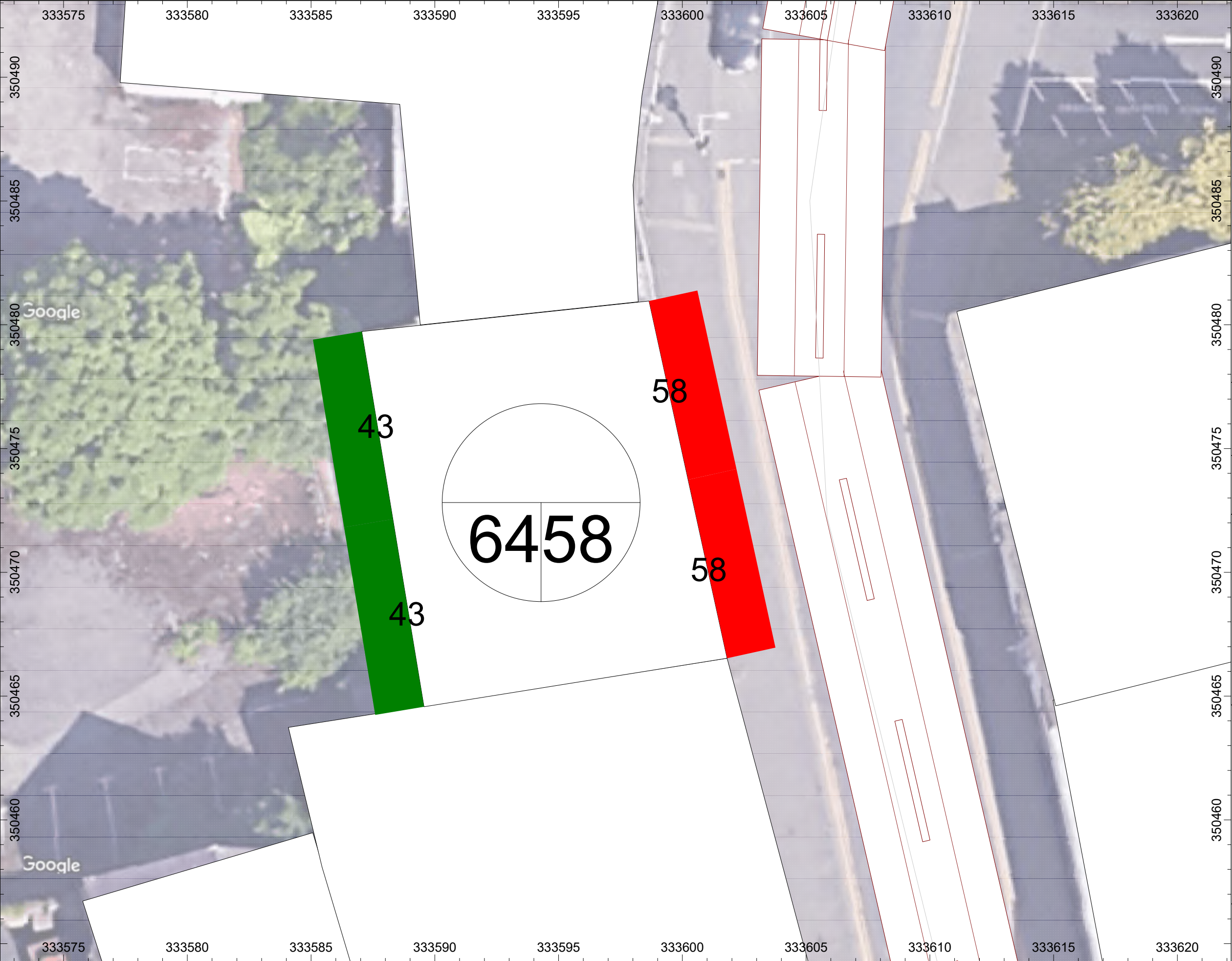
Noise Map Objects

- + Point Source
- Line Source
- Road
- ▨ Parking Lot
- Building
- Barrier
- Embankment
- Contour Line
- ⊕ Building Evaluation
- Calculation Area



Project Engineer: Scott Boughton
Date: 19/06/2024

Figure 5 - Night-time Grid Noise Map (Part 0 - 8 hour night-time criterion) - Calculation at 4.5 m above ground level



Project:
The Old Registry,
Wrexham

Project-No:
51-195

Client:
Onyx Residential
Real Estate Limited

**Night-time Noise Level,
LAeq, 8hr (dB)**

... ≤ 49
49 < ...

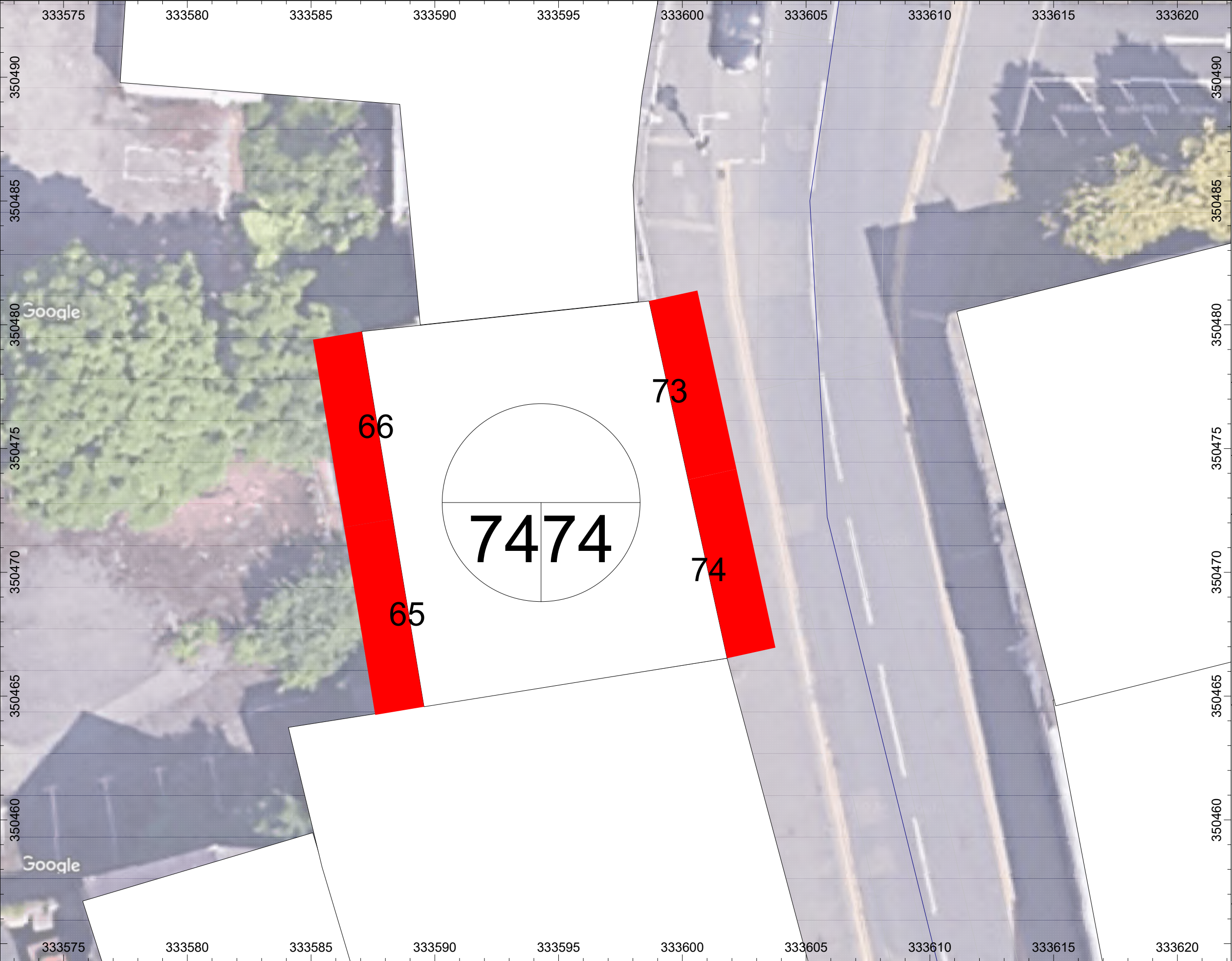
Noise Map Objects

- + Point Source
- Line Source
- Road
- Parking Lot
- Building
- Barrier
- Embankment
- Building Evaluation
- Calculation Area



Project Engineer: Scott Boughton
Date: 19/06/2024

Figure 6 - Night-time Grid Noise Map (Part O - 10th Highest Maximum night-time criterion) - Calculation at 4.5 m above ground level



Project:
The Old Registry,
Wrexham

Project-No:
51-195

Client:
Onyx Residential
Real Estate Limited

**Night-time Noise Level,
LAfmax, 1min (dB)**

...

 ... <= 49

49 < ...

Noise Map Objects

+

 Point Source

Line Source

Road

Parking Lot

Building

Barrier

Embankment

Building Evaluation

Calculation Area

e3p

Project Engineer: Scott Boughton
Date: 19/06/2024