



Newtown House Hotel

Manor Road, Hayling Island, PO11 0QR

Planning Reference: APP/17/00613

Noise Impact Assessment

11th February 2021

First Issue



Newtown House Hotel

Manor Road, Hayling Island, PO11 0QR

Planning Reference: APP/17/00613

Noise Impact Assessment

11th February 2021

First Issue

Revision History

Version	Comments	Author	Date
First Issue	First issued version of the report	Chris Parker-Jones Director and Acoustic Consultant BSc (Hons) MSc MIOA	11th February 2021

ParkerJones Acoustics Limited

Bristol

11 Bankside Road
Brislington
Bristol
BS4 4LB

London

7 Bell Yard
Holborn
London
WC2A 2JR

Glasgow

2/1 55 Bellwood Street
Shawlands
Glasgow
G41 3EX

+44 (0)800 830 3338

+44 (0)117 914 6558

info@parkerjonesacoustics.com

www.parkerjonesacoustics.com

Registered in England and Wales

Company No. 12235614

This document has been prepared using all reasonable skill and care. ParkerJones Acoustics Limited (PJA) accepts no liability or responsibility for any third-party data present in this report. The copyright and intellectual property in all drawings, reports, specifications, bills of quantities, calculations and other information set out in this report remain vested in PJA unless the terms of appointment with the Client state otherwise. PJA shall not be liable for the use of or reliance on any information, advice, recommendations, and opinions in this document for any purpose by any person other than the Client. Reliance may be granted to a third party only if PJA and the third party have executed a reliance agreement or collateral warranty.

Executive Summary and Conclusions

This document, a Noise Impact Assessment (NIA), has been written to assess the site suitability in terms of the noise impact from the residual noise environment on the amenity of the future occupants of the proposed development.

In summary, PJA believes that the noise impact on future occupants at the development can be controlled to an acceptably low level equivalent to the LOAEL (Lowest Observed Adverse Effect Level) defined in National Planning Policy, without unreasonable mitigation measures that would significantly impact on residential amenity.

IANL targets can be met with closed windows on the road facing façade and standard double glazing with a low to moderate level of acoustic performance (see **Section 4.4.2 – Table 4.1/Figure 4.1**). Trickle ventilators/air bricks (or mechanical ventilation) can be used to provide background ventilation as an alternative to open windows on the front/side elevations. This does not mean windows are not openable – most people will wish to open windows during the hotter months despite slightly elevated noise levels internally, and external noise levels are not excessively high to mean that that opening the windows would result in unacceptable internal noise conditions.

On the rear façade, IANL targets would be met at most times with open windows.

Noise levels in the rear garden area are in the region of 45 – 50 dB, in the acceptable range – and already employ the best means of noise mitigation in terms of a solid boundary wall and fencing between gardens (see **Section 4.5**).

Providing that the applicant follows the recommendations in **Section 4.4.2** by installing glazing and trickle ventilators with the required minimum sound reduction ratings to protect residents for traffic noise – the relevant planning condition can be discharged.

Contents

Executive Summary and Conclusions	3
1.0 Introduction.....	5
1.1 Scope of Report	5
1.2 Assessment Criteria	5
2.0 Site and Development Description.....	6
3.0 Relevant Guidelines	7
3.1 BS 8233:2014	7
3.2 WHO Guidelines for Community Noise	8
4.0 Assessment	9
4.1 Methodology.....	9
4.2 Environmental Noise Climate	9
4.3 Noise Mapping (Predicted Noise Levels).....	10
4.4 External Noise Ingress	10
4.5 Outdoor Amenity Noise Levels.....	14
4.6 Summary	14
Appendix A – Acoustic Terminology and Concepts.....	15
Appendix B – Relevant Planning Policies	16
Appendix C – Development Plans	18
Appendix D – Noise Mapping	22
Appendix E – Example Façade Constructions.....	30

1.0 Introduction

ParkerJones Acoustics Limited (PJA) has been instructed to undertake a Noise Impact Assessment for the proposed erection of 3 no. 2 bed dwellings with associated landscaping and car parking at the Newtown House Hotel, Manor Road, Hayling Island, PO11 0QR.

1.1 Scope of Report

This report has been written to assess the site suitability in terms of the noise impact from the residual noise environment on the amenity of the future occupants of the proposed development.

The report has been written specifically in response to Condition 11 of the approval (ref APP/17/00613), which states *"No development hereby permitted shall commence until details of measures to attenuate the levels of noise within the dwellings from traffic on Manor Road has been submitted to and approved in writing by the Local Planning Authority. Those dwellings shall not be brought into use until the implementation of all works forming part of such approved noise protection scheme has been completed in full accordance with all detailed components of such scheme."*

The objective is to ensure that the noise impact is being considered and controlled sufficiently to provide suitable living and sleeping conditions for those residing inside. Therefore, where considered necessary, mitigation measures have been suggested to ensure that identified impacts are minimised.

Whilst every attempt has been made to ensure that this report communicates effectively to a reader who might not have much knowledge of acoustics, some parts are necessarily technical. A glossary of acoustic terminology and concepts is provided in **Appendix A**.

1.2 Assessment Criteria

This report takes into consideration national planning policies including the National Planning Policy Framework (NPPF), the Noise Policy Statement for England (NPSE) and the Planning Practice Guidance on Noise (PPG-N) (summarised in **Appendix B**), which outline the purpose and long-term vision of planning policy with respect to noise. More specifically, the assessment has been undertaken with reference to:

- The World Health Organisation (WHO) 'Guidelines for Community Noise' (1999) and 'Night Noise Guidelines for Europe' (2009) documents; and
- BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'.

2.0 Site and Development Description

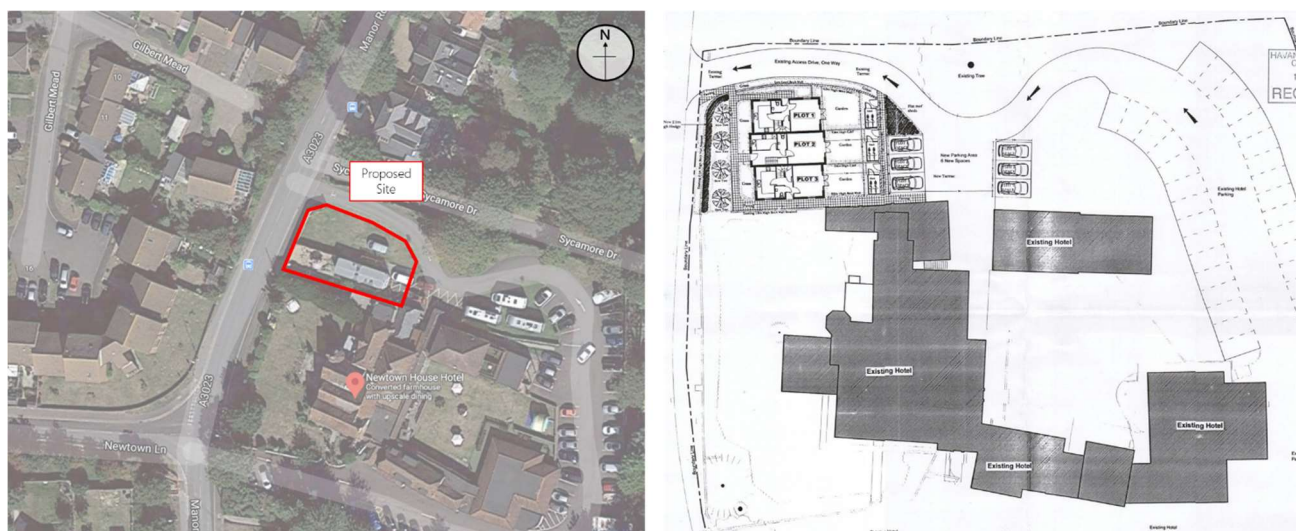
The site of the proposed development is located at the north-west corner of the Newtown House Hotel site, on Manor Road, Hayling Island, PO11 0QR.

As shown in **Figure 2.1**, the site is located on the east side of Manor Road in Hayling Island and includes the Newtown House Hotel and its grounds. A mobile home for staff use has 'temporarily' been placed on this open land. The frontage of this northern part of the site is marked from Manor Road by a 2.1m high brick wall, changing to a low white painted wall in front of the hotel. The site is surrounded on all sides by residential properties and immediately abutting the northern boundary is the private drive called Sycamore Drive - serving residential properties located to the northeast of the site. A one-way car parking system is in operation at the hotel with the road looping around from the south entrance to the north entrance, closed to the proposed development location.

The proposals are for the erection of 3 no. 2 bed terraced dwellings with associated landscaping and car parking - to be located within the open grassed area to the north of the hotel building, adjacent the exit drive (the existing mobile home would be removed). This application is a resubmission of APP/14/00692 which was permitted but never implemented. The terrace would be sited between 7m and 6m back from the front boundary wall and 1m from the northern most facade of the hotel buildings. Gardens are located on the east side of the houses – with the existing frontage boundary wall (2.1m high) extended around and increasing to 2.2m high to provide a secure boundary around the rear gardens. Standard 1.8m high timber fencing would be installed to divide the gardens.

Further drawings of the proposed development and the existing site/location are shown in **Appendix C**.

Figure 2.1 – Aerial view of the site and surrounding area



3.0 Relevant Guidelines

3.1 BS 8233:2014

BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' suggests appropriate criteria and limits for different situations. It is primarily intended to guide the design of new buildings, or refurbished buildings undergoing a change of use.

This includes internal and external noise criteria for residential developments. The limits with BS 8233:2014 are similar to those in the WHO's 'Guidelines for Community Noise' (1999) and 'Night Noise Guidelines for Europe' (2009) documents.

3.1.1 Internal Ambient Noise Levels

Table 4 of BS 8233:2014 provides internal ambient noise level (IANL) limits for dwellings from "steady external noise sources". These are summarised in Table 3.1.

BS 8233:2014 also notes that "where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."

Table 3.1 – BS 8233:2014 internal ambient noise level (IANL) upper limits

Activity	Location	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Resting	Living Room	35 dB L _{Aeq,16hr}	-
Dining	Dining Room/Area	40 dB L _{Aeq,16hr}	-
Sleeping (daytime resting)	Bedroom	35 dB L _{Aeq,16hr}	30 dB L _{Aeq,8hr}
1 - these are the total of structure-borne and airborne noise sources. Ground borne noise is assessed separately and is not included as part of these targets, as human response to ground-borne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity. 2 - these levels assume normal diurnal fluctuation in external noise. 3 - these levels are based on average annual data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events such as bonfire night or New Year's Eve.			

In Annex G.1 of BS 8233:2014 it suggests that "if partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15 dB".

Whilst it is desirable to achieve the recommended IANLs with windows open, this is not stipulated as a mandatory requirement within the guidance of BS 8233:2014 which states "if relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment."

3.1.2 External Amenity Ambient Noise Levels

BS 8233:2014 indicates that in external areas used for amenity space, it is desirable that external noise levels do not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments.

Although in many areas, i.e. next to a strategic transport network, a compromise between elevated noise levels and the convenience of living in these locations may be acceptable. In such a case, the development should be designed to 'achieve the lowest practicable levels' in these external amenity spaces but should not be prohibited.

3.2 WHO Guidelines for Community Noise

The WHO document *Guidelines for Community Noise 1999* ('GCN') sets out guidance as to noise levels at which there will be an unacceptable impact on the occupants of residential developments.

Regarding external noise, the GCN states:

- To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB L_{Aeq} for a steady, continuous noise.
- To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB L_{Aeq} .

4.0 Assessment

4.1 Methodology

This section details the impact the existing noise environment would have on the proposed development, including the implications this has on the ventilation strategy and the construction types required within the façade to reduce external noise ingress to an acceptable level for the future occupants.

The following summarises the main steps of action in the assessment method:

- Firstly, the existing ambient noise environment at the site is assessed.
- A 3D noise map model is then used to predict average noise levels at the site and surrounding area, with the proposed development then added into the model to predict external noise levels incident on the building's facade once it is in place.
- Noise ingress into living spaces are then assessed against the IANL limits of BS 8233:2014, to determine the sound reduction requirements of the building envelope, and determine whether background ventilation can be provided by open windows, trickle ventilators, or mechanical ventilation (to meet IANL limits).
- Noise levels in external amenity areas are assessed in line with BS 8233:2014 targets, advising on possible noise mitigation measures where necessary.

4.2 Environmental Noise Climate

Unfortunately, at the time of writing this report, PJA felt that it was not worthwhile conducting a baseline noise survey at the site due to the restrictions associated with the COVID-19 pandemic. Therefore, any noise survey conducted during this period may have resulted in an underestimate of the noise levels affecting the site due to the vastly decreased levels of road traffic.

Therefore, PJA has taken an alternative approach to quantifying the environmental noise climate at the site and surrounding area. A comprehensive 3D noise map model has been produced for the site and the wider surrounding area. The model parameters have been configured to predict noise levels based on several sources of information:

- Traffic count data available from the Department for Transport (DfT) which includes data for the main road ¹ which affects the site. Traffic data can be input into the model which is able to conduct calculations in accordance with the *Calculation of Road Traffic Noise* (CRTN) methodology.
- Measurements taken by PJA at other sites from similarly sized/trafficked roads.
- Noise mapping data for major transport routes available online ² from the Department for Environmental Food & Rural Affairs (DEFRA), as part of a *Strategic Noise Mapping* exercise – using data from a local A-road and comparing the traffic counts on this road in comparison to the main road affecting the site, to further ensure that the CRTN calculations of noise emissions from Manor Road are accurate.

1 - <https://roadtraffic.dft.gov.uk/manualcountpoints/27621>

2 - <http://www.extrium.co.uk/noiseviewer.html>

4.3 Noise Mapping (Predicted Noise Levels)

The intention of noise modelling/mapping for this assessment is to accurately determine the noise levels across the entire site, at each façade and each floor of the building(s) associated with the proposed development.

The model has been constructed using the CadnaA® software package, a commonly used 3-D noise mapping software which implements a wide range of national and international standards, guidelines and calculation algorithms, including those set out in ISO 9613-2:1996.

Screenshots from the noise model and further information on the model parameters are provided in **Appendix D**.

The noise mapping has accounted for all of the information outlined in **Section 4.2** so that the noise map for the existing site can effectively be 'calibrated' to ensure that the results are accurate. Figures D.1 and D.2 show the predicted noise levels across the *existing* site in terms of the $L_{Aeq,16hr}$ and $L_{Aeq,8hr}$ for the daytime and night-time periods respectively.

The proposed development has then been added into the model.

Figures D.2 to D.6 show the predicted façade exposure levels (right outside of windows) in terms of the $L_{Aeq,16hr}$ and $L_{Aeq,8hr}$ for the daytime and night-time periods respectively, across the ground and first floors.

The external daytime $L_{Aeq,16hr}$ levels within outdoor amenity areas are plotted in **Figure D.7**.

4.4 External Noise Ingress

4.4.1 Internal Ambient Noise Limits

The criteria for internal ambient noise levels (IANLs) are based upon guidance from BS 8233:2014. In summary, the proposed development should seek to control IANLs from external noise sources to no greater than:

- Daytime – 35 dB $L_{Aeq,16hr}$; and
- Night-time – 30 dB $L_{Aeq,8hr}$.

4.4.2 Building Envelope

To assess the required sound reduction performance for the building envelope, façade exposure levels have been defined as shown in **Figure 4.1**. These are based upon the floor-by-floor façade noise levels determined from the noise modelling – screenshots from which are shown in **Appendix D**.

Table 4.1 defines the external façade noise levels for each exposure level in **Figure 4.1**.

The weakest element of a façade in terms of sound reduction is the glazing. This is particularly true when windows are open (as an open window will typically provide around 15 dB reduction). Alternative forms of natural background ventilation (such as trickle vents) can also be a weak point but can be treated to achieve a much higher level of sound reduction than an open window.

Therefore, **Table 4.1** also provides the minimum sound reduction indices for glazing and ventilators (the weakest elements acoustically) on each exposure level.

It is seen that the front facades facing Manor Road will require acoustically treated trickle vents with windows closed.

It is not unusual by any means for IANL targets to not be met using open windows in an urban location. It should also not be assumed that windows have to be sealed shut, as many occupants will favour the ability to open their windows at will during the hotter months of the year, and noise levels are not excessively high (the sound reduction requirements for the glazing are relatively standard). What it does mean, is that an alternative form of background ventilation (i.e. trickle vents) should be provided so that IANL targets can be met whilst providing background ventilation to the dwellings with the windows closed (but openable at the occupants' discretion, rather than through necessity).

On the rear facades, internal noise targets are likely to be met with open windows.

A non-exhaustive list of example glazing constructions and ventilator products such as trickle vents and air bricks have been provided in **Appendix E**, which are capable of achieving the required $R_w + C_{tr}$ and $D_{n,e,w} + C_{tr}$ indices.

PJA recommend that glazing which has two panes of glass that are the same thickness are avoided – as these can resonate together and are usually worse performing than two panes of different thicknesses, even if the second pane is slightly thinner than the first.

Figure 4.1 – Façade exposure levels

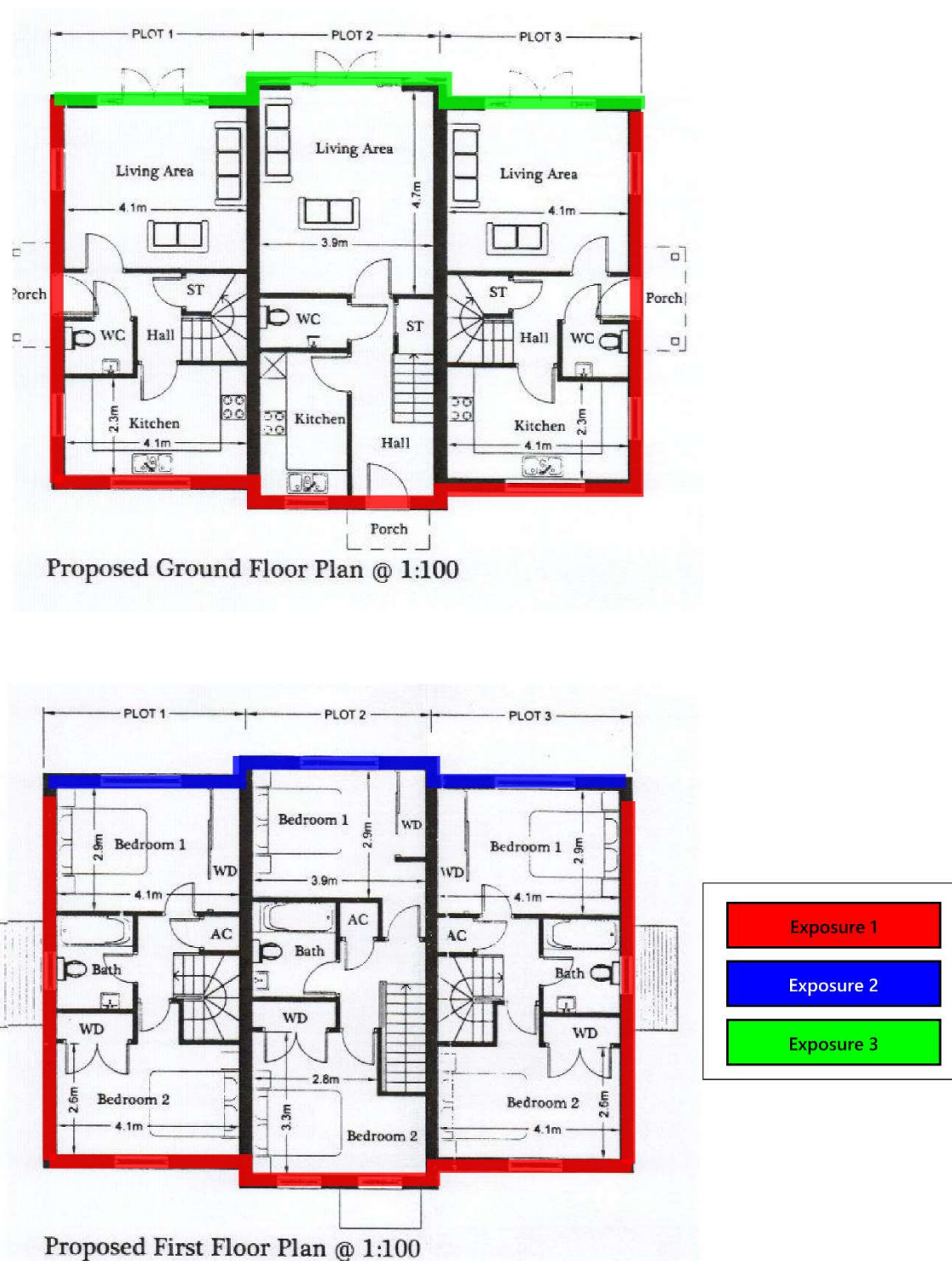


Table 4.1 – Minimum sound reduction requirements of the building envelope

Exposure Category	External Noise Level @ 1m outside of a window		Minimum sound reduction indices/construction examples	
	Daytime average (07:00 – 23:00) dB $L_{Aeq,16hr}$	Night-time average (23:00 – 07:00) dB $L_{Aeq,8hr}$	Glazing ² See Appendix E.1	Ventilators ³ see Appendix E.2
Exposure 1	55 – 62	47 – 54	27 dB $R_w + C_{tr}$ Standard double glazing, i.e. - 4mm standard float - 12mm air cavity - 6mm acoustic laminated glass	30 dB $D_{n,e,w} + C_{tr}$ i.e. Duco DucoTop 60 SR – Alto AK
Criteria ⁴	<35	<30	-	-
Exposure 2	49 – 54	41 – 46	19 dB $R_w + C_{tr}$ Any double glazing	22 dB $D_{n,e,w} + C_{tr}$ Any trickle vent. IANL limits would mostly be met with open windows, and certainly met with a 5 dB relaxation ⁶
Criteria ⁴	<35	<30	-	-
Exposure 3	43 – 47	45	12 dB $R_w + C_{tr}$ Any double glazing	Open windows IANL limits met with open windows,
Criteria ⁵	<35	-	-	-
10th highest value per night. - A non-exhaustive list of suitable glazing products is given in Appendix E.1. Standard double glazing will usually achieve a minimum sound reduction of 26 dB $R_w + C_{tr}$. - A non-exhaustive list of suitable ventilator products is given in Appendix E.2. The acoustic performance should meet these values when the vent is open. They may not be required if the development uses mechanical ventilation. Low performance trickle vents will usually achieve a minimum sound reduction of 25 dB $D_{n,e,w} + C_{tr}$. - Based on the criteria for bedrooms (the most noise-sensitive room type). - Based on the criteria for living rooms/dining rooms. - BS 8233 both suggest a 5 dB relaxation is acceptable in desirable areas for development. 'Reasonable' rather than 'Good' conditions.				

4.5 Outdoor Amenity Noise Levels

The WHO Guidelines imply that noise levels in outdoor amenity spaces should ideally not be above the range 50 – 55 dB L_{Aeq,16hr} for the spaces to be enjoyed as intended.

Figure D.7 in Appendix D shows the predicted external daytime ambient noise level (L_{Aeq,16hr}) across the site.

It is seen that the rear garden area is in the region of 45 – 50 dB, in the acceptable range.

A boundary wall and fencing are already proposed – hence the best means of mitigation is already being proposed.

Therefore, it is not considered that further noise mitigation will be required – as the development provides sufficient external amenity area which can be enjoyed with acceptable noise levels.

4.6 Summary

In summary, PJA believes that the noise impact on future occupants at the proposed development can be controlled to an acceptable level.

IANL targets can be met with closed windows on the road facing façade and standard double glazing with a low to moderate level of acoustic performance. Trickle ventilators/air bricks (or mechanical ventilation) can be used to provide background ventilation as an alternative to open windows on the front/side elevations. This does not mean windows are not openable – most people will wish to open windows during the hotter months despite slightly elevated noise levels internally, and external noise levels are not excessively high to mean that that opening the windows would be unacceptable.

On the rear façade, IANL targets would be met at most times with open windows.

Noise levels in the rear garden area are in the region of 45 – 50 dB, in the acceptable range – and already employ the best means of noise mitigation in terms of a solid boundary wall and fencing between gardens.

Therefore, this aspect of the noise assessment should not pose a constraint to achieving planning permission for the proposed development, providing the recommendations herein are followed.

Appendix A – Acoustic Terminology and Concepts

A.1 – Glossary

Table A.1 – Glossary of acoustic terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio of the root-mean-square pressure of the sound and a reference pressure (2×10^{-5} 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.
C_{tr}	A weighting curve applied to level differences to account for low-frequency noise, typically associated with traffic noise. This is often applied as an addition to $D_{nT,w}$ and R_w ratings used to describe levels of sound insulation.
Frequency	Sound is generally assessed over the frequency range of 63 Hz to 4000 Hz (4 kHz), although humans can potentially hear between 20 Hz and 20 kHz. Frequency is often divided into ('first') octave bands for analysis, with the range above considered within 7-octave bands with centre frequencies at 63 Hz, 125 Hz, 250 Hz, 1 kHz, 2 kHz and 4 kHz. 'Third' octave bands split this further into smaller frequency bands.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period. This parameter is typically considered as a good representation of the 'average' overall noise level. It is referred to technically as the A-weighted equivalent continuous sound level and is a dB(A) as defined above.
$L_{A90,T}$	The A-weighted noise level that is exceeded for 90% of the measurement period T. This parameter is often considered as the 'average minimum level'.
$L_{AFmax,T}$	The maximum A-weighted noise level during the measurement period T.
R_w	Weighted sound reduction index. A single number rating of the sound insulation performance of a specific building element. R_w is measured in a laboratory. R_w is commonly used by manufacturers to describe the sound insulation performance of building elements such as plasterboard and concrete.

A.2 – Subjective Changes in Sound Level

Table A.2 – Subjective loudness from an increase or decrease in sound pressure level

Change in sound pressure level	Relative change in sound power energy (multiplier)		Change in apparent subjective loudness (for mid-frequency range)
	Decrease	Increase	
3 dB	1/2	2	'Just perceptible'
5 dB	1/3	3	'Clearly noticeable'
10 dB	1/10	10	'Half or twice as loud'
20 dB	1/100	100	'Much quieter, or louder'

Appendix B – Relevant Planning Policies

B.1 – National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied. The NPPF provides a framework within which local people and their council can produce their own distinctive local and neighbourhood plans. With explicit reference to noise, the NPPF states that *"Planning policies and decisions should contribute to and enhance the natural and local environment by ... preventing new and existing development from contributing to, being put at unacceptable risk from ... noise pollution"*.

B.2 – Noise Policy Statement for England (NPSE)

The NPPF refers to the Noise Policy Statement for England (NPSE), which applies to most forms of noise including environmental noise. The NPSE sets out the long-term vision of Government policy which 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"*. It aims that *"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life."*

The use of the terms *"significant adverse"* and *"adverse"* are key phrases within the NPSE. The guidance establishes the concept of how the level of adverse effect on health and quality of life can be referenced including:

- **NOEL – No Observed Effect Level** - This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- **LOAEL – Lowest Observed Adverse Effect Level** - This is the level above which *adverse* effects on health and quality of life can be detected.
- **SOAEL – Significant Observed Adverse Effect Level** - This is the level above which *significant adverse* effects on health and quality of life occur.

Under the first aim of the NPSE (*"avoid significant adverse impacts on health and quality of life"*), an impact in line with SOAEL should be avoided. Under the second aim (*"mitigate and minimise adverse impacts on health and quality of life"*), where the impact lies somewhere between LOAEL and SOAEL, requiring that all reasonable steps are taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development, but does not mean that such adverse effects cannot occur.

B.3 - Planning Practice Guidance on Noise (PPG-N)

The Planning Practice Guidance on Noise (PPG-N) is part of a suite of web-based guidance which is intended to support the implementation of the policies in the NPPF and the NPSE.

It aids in expanding on the definitions from the NPSE of NOEL, LOAEL and SOAEL, by linking these terms to 'examples of outcomes', i.e. changes in behaviour and/or attitude to noise. The table below summarises the guidance from PPG-N in this regard.

Table B.1 – Noise exposure hierarchy based on the likely average response – adapted from PPG-N

Perception	Examples of outcomes	Increasing effect level	Action
NOEL - No Observed Effect Level ¹			
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
LOAEL - 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 the 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 area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
SOAEL - 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; 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 a change in the acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent
¹ This line is an assumption of the adverse effect level and is not explicitly referenced by PPG-N, though this appears to be a safe assumption.			

Appendix C – Development Plans

Figure C.1 – Block/location plan

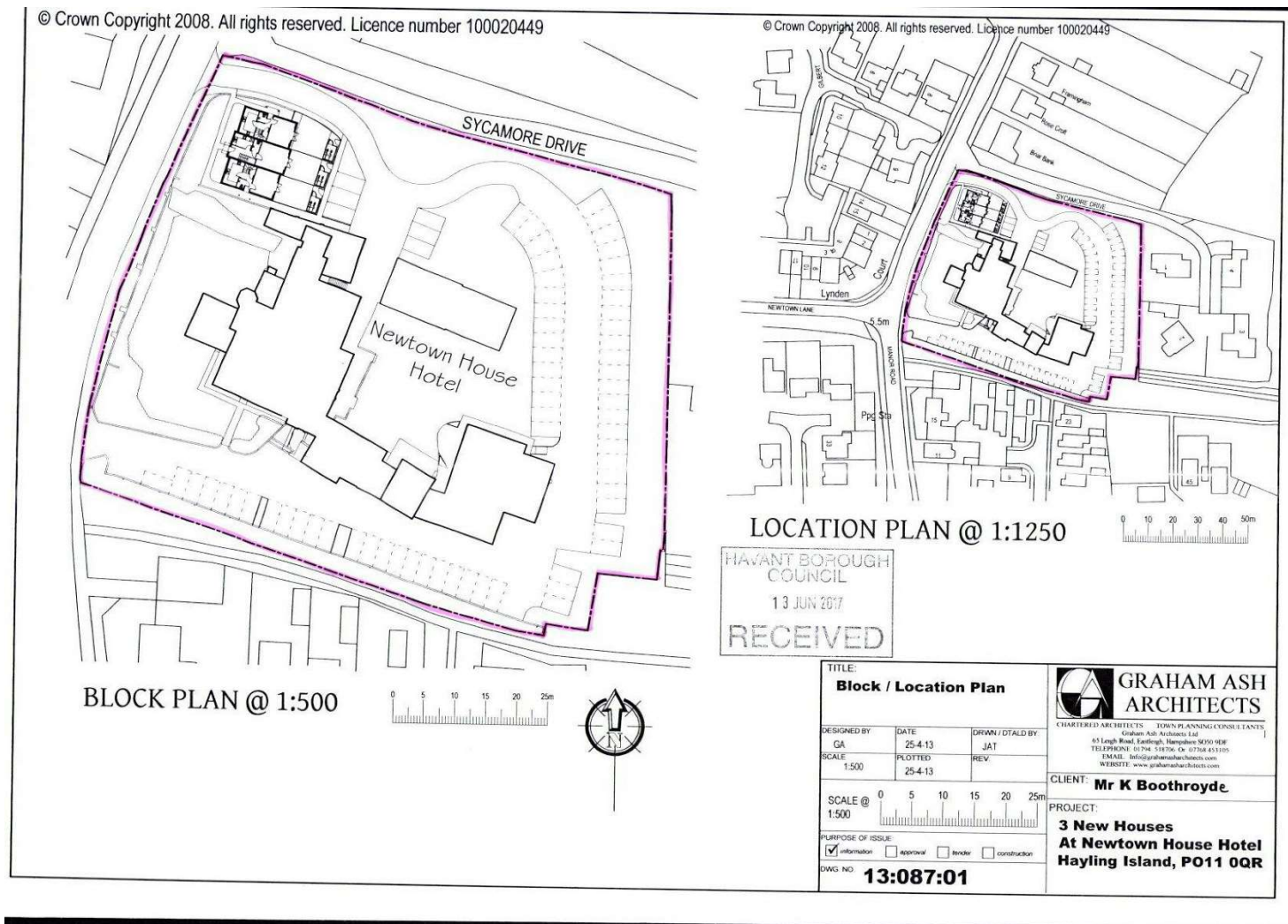
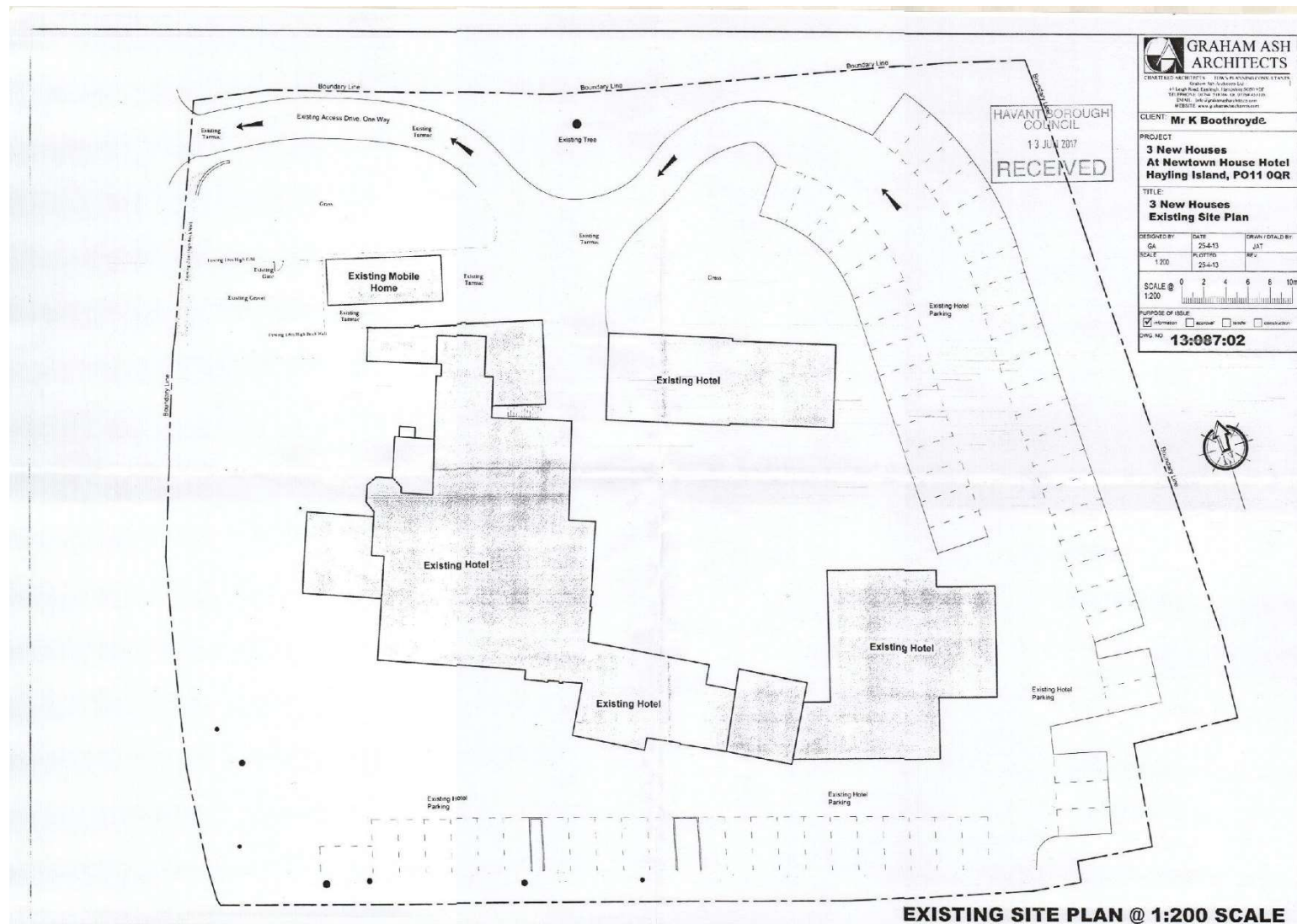


Figure C.2 – Existing site plan



PROPOSED SITE PLAN @ 1:200 SCALE

GRAHAM ASH ARCHITECTS
 101 South Road, Southend-on-Sea, Essex, SS16 5JH
 Tel: 0206 8861111 Fax: 0206 8861112
 Email: graham.ash@grahamash.co.uk Website: www.grahamash.co.uk

CLIENT: Mr K Boothroyde
PROJECT: 3 New Houses At Newtown House Hotel Hayling Island, PO11 0QR
TITLE: 3 New Houses Proposed Site Plan

SCALE: 1:200
SCALE BAR: 0 2 4 6 8 10
SCALE @ 1:200

PURPOSE OF ISSUE:
☒ Information ☐ Approval ☐ Tender ☐ Construction

13:087:03RevA
 Revision A 08.09.2014 R.Ash
 -2.2m high brick wall now surrounds gardens.

RECEIVED
 HAVANT BOROUGH COUNCIL
 13 JUN 2017

Figure C.4 – Proposed floor plans and elevations



Appendix D – Noise Mapping

The noise predictions within this report have been undertaken using the proprietary software CadnaA® by DataKustik, a 3-D noise mapping package which implements a wide range of national and international standards, guidelines and calculation algorithms, including those set out in ISO 9613-2:1996.

The noise model accounts for the topography of the land based on data available from the Ordnance Survey. All of the objects within the model (buildings, roads, barriers, foliage, etc) have been imported from OpenStreetMap. The heights of the buildings and roads have been based upon Google Earth Pro, using the 3D view to be able to measure the elevation heights at the tops of objects, and then inserting this manually into the model. Lastly, the scaled site plan, floor plan, and elevation for the proposed development have been accounted for in the model.

The noise model has been used to predict the resulting daytime (16-hour) and night-time (8-hour) L_{Aeq} noise levels across the site.

The noise map model has assumed:

- downwind propagation, i.e. a wind direction that assists the propagation of sound from source to receptor, as a worst-case.
- a ground absorption factor of 0 in all areas a worst-case;
- a maximum reflection factor of three where buildings and barriers are assumed to have a 'smooth' reflective façade, as a worst-case;
- that noise sources do not have strong radiation patterns and therefore radiate equally in all directions;
- receptor heights representing the windows at each floor of the building(s) in the proposed development when assessing noise ingress.
- atmospheric sound absorption based upon a temperature of 10°C and a humidity level of 70%, as per Table 2 of ISO 9613-2:1996.

The images on the following pages contain the results of the mapping.

Figure D.1 – Existing site - Predicted dB $L_{Aeq,16hr}$ external ambient noise levels – Daytime (07:00 – 23:00)



Figure D.2 – Existing site – Predicted dB $L_{Aeq,8hr}$ external ambient noise levels – Night-time (07:00 – 23:00)

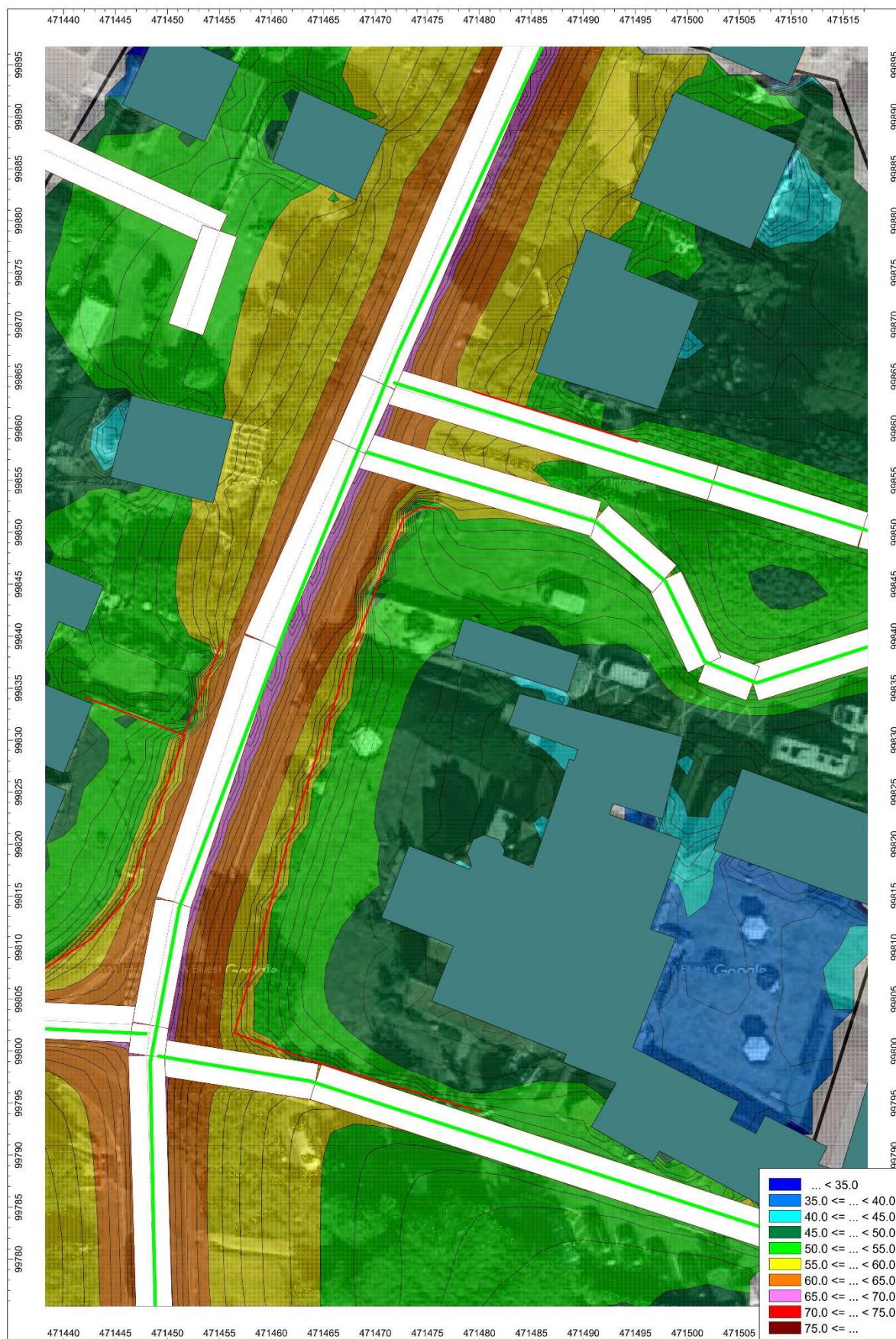


Figure D.3 – Proposed development - Predicted façade dB $L_{Aeq,16hr}$ exposure levels – Daytime (07:00 – 23:00) – Ground floor

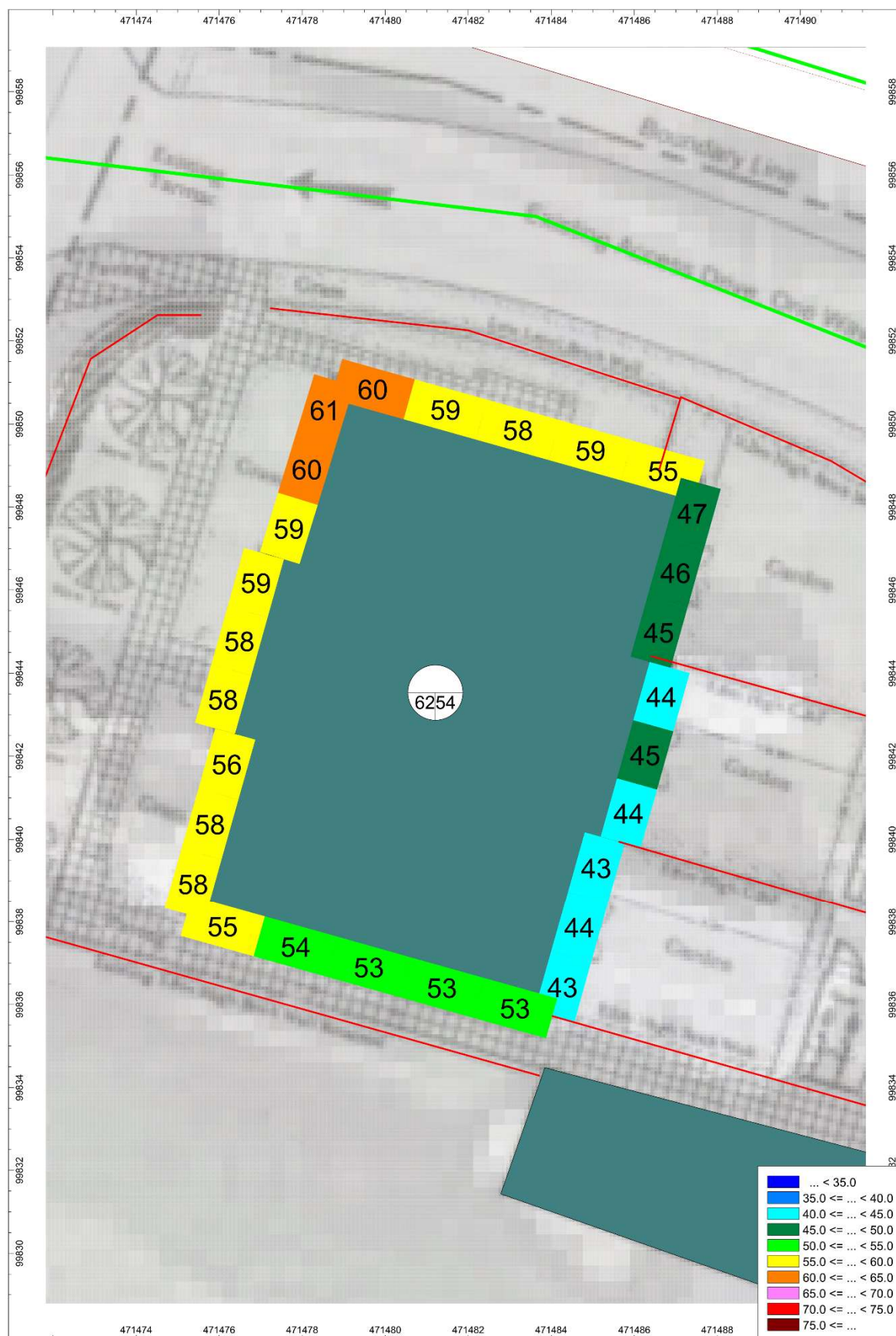


Figure D.4 – Proposed development - Predicted façade dB $L_{Aeq,16hr}$ exposure levels – Daytime (07:00 – 23:00) – First floor

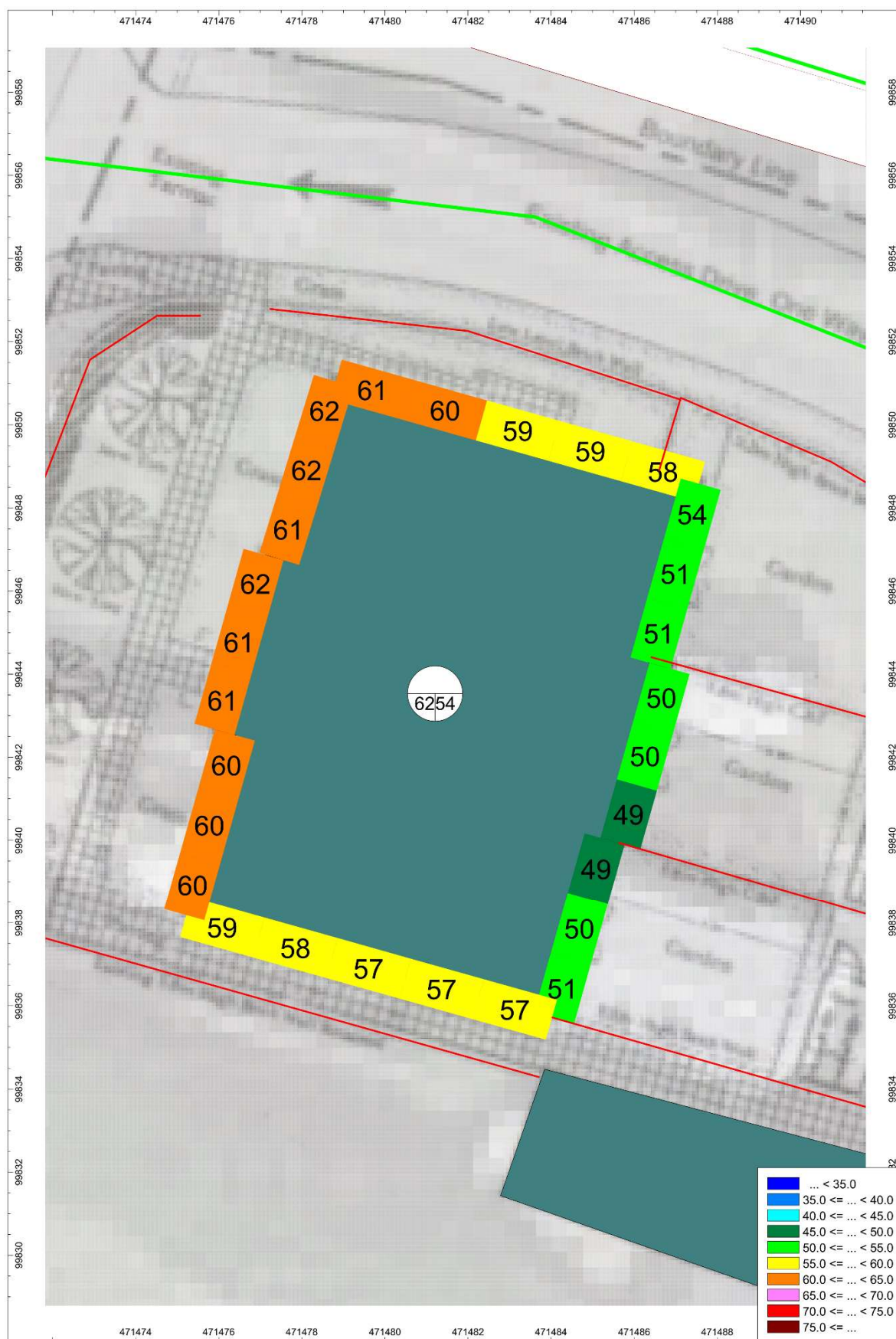


Figure D.5 – Proposed development - Predicted façade dB $L_{Aeq,8hr}$ exposure levels – Night-time (23:00 – 07:00) – Ground floor

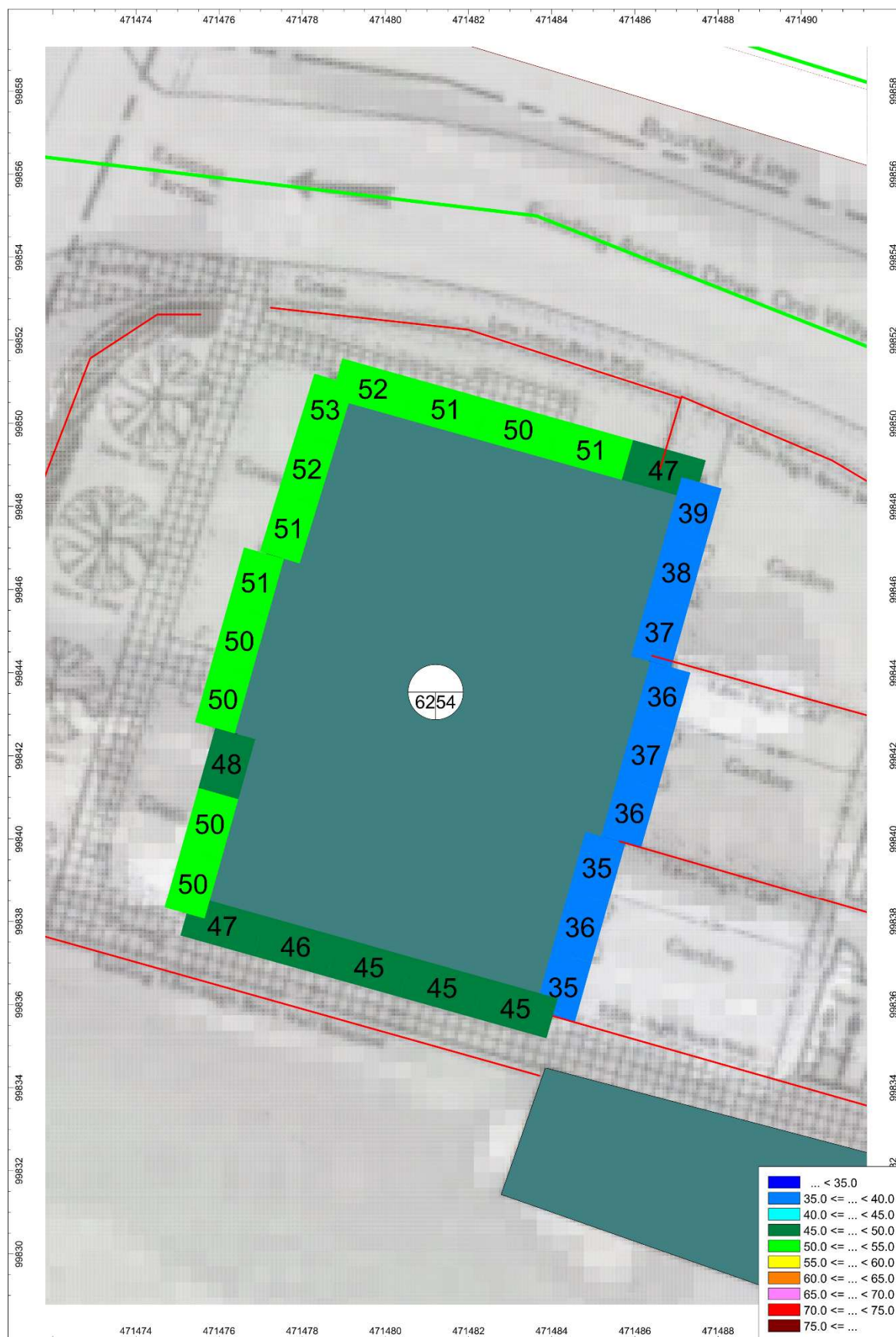


Figure D.6 – Proposed development - Predicted façade dB $L_{Aeq,8hr}$ exposure levels – Night-time (23:00 – 07:00) – First floor

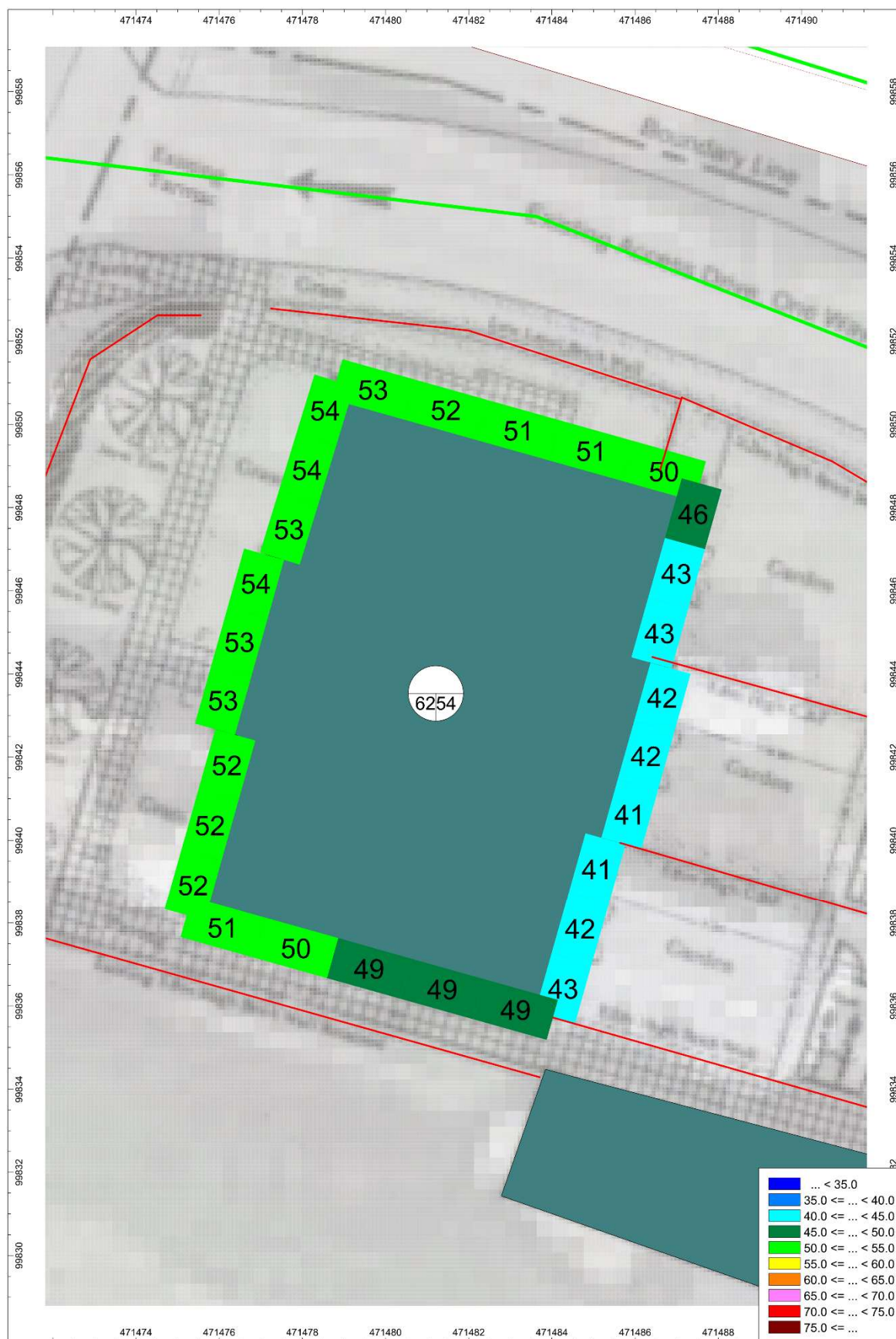
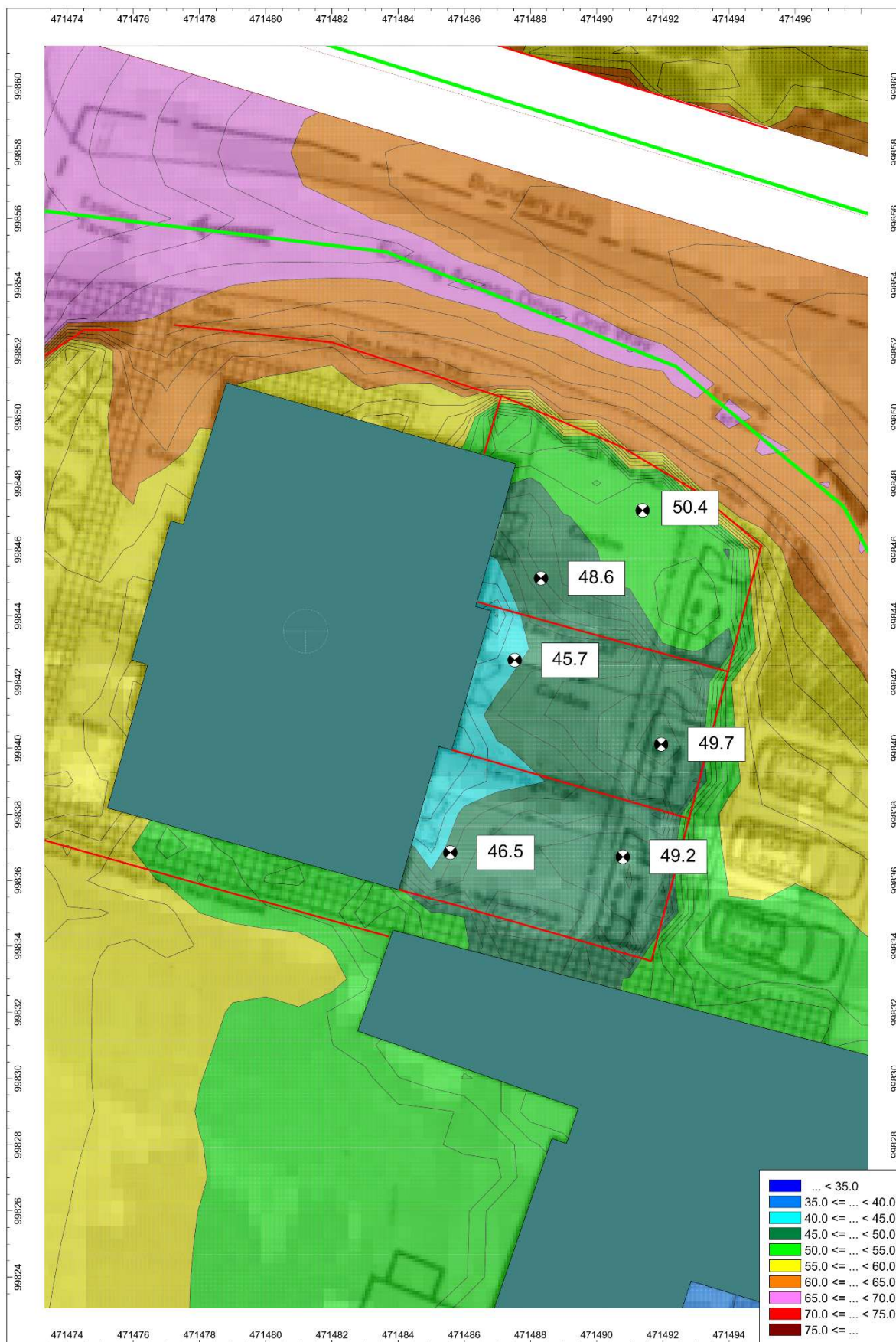


Figure D.7 – Proposed development - Predicted $L_{Aeq,16hr}$ in outdoor amenity areas – Daytime (07:00 – 23:00)



Appendix E – Example Façade Constructions

E.1 - Glazing

Table E.1 – Example glazing constructions and associated sound reduction indices

Single / Double / Triple	Configuration	Manufacturer	R _w + C _{tr} (dB)
Double	4 (12) 4	Saint Gobain	26
Double	4 (12) 6	Saint Gobain	29
Double	5 (12) 4	Saint Gobain	29
Double	4 (16) 8	Saint Gobain	30
Double	4 (12) 6.8P	Pilkington	30
Double	4 (10) 10	Saint Gobain	31
Double	6 (25) 4	Saint Gobain	31
Double	8 (18) 6	Saint Gobain	32
Double	8.8L (12) 8.8P	Pilkington	32
Double	4 (6) 10	Saint Gobain	33
Triple	4 (12) 4 (12) 8.4S	Saint Gobain	33
Double	4 (16) 8.8P	Pilkington	33
Double	10 (15) 6	Saint Gobain	34
Double	8 (6) 8.8S	Saint Gobain	34
Double	6 (16) 8.8P	Pilkington	34
Double	10 (6) 8.8S	Saint Gobain	35
Double	6 (24) 10	Saint Gobain	35
Double	6 (12) 9.5A	Saint Gobain	35
Triple	8 (12) 4 (12) 8.8P	Pilkington	35
Double	8 (12) 8.8A	Saint Gobain	36
Double	10 (12) 8.8A	Saint Gobain	37
Double	8.4A (16) 10.4A	Saint Gobain	38
Double	8.8P (16) 12.8P	Pilkington	39
Double	10 (16) 12.4A	Saint Gobain	40
Double	12.8A (15) 12.8A	Saint Gobain	41
Double	9.1P (20) 13.1P	Pilkington	42
Double	9.1P (20) 17.1P	Pilkington	43
Double	16.8A (15) 16.8A	Saint Gobain	44
Double	9.1P (20Arg) 17.1P	Pilkington	44
NOTATION A = Stadip Silence S = Stadip P = Optiphon L = Optilam Arg = Argon Cavity			
Suitable for:	Exposure 1	Exposure 2 and 3	

E.2 - Ventilators

For each additional ventilator, the required $D_{n,e,w} + C_{tr}$ should be increased by $10\log(n)$, where 'n' is the number of ventilators. The $D_{n,e,w} + C_{tr}$ must be assessed in the **open position**.

Table E.2 – Example ventilator products and associated sound reduction indices

Product	$D_{n,e,w} + C_{tr}$ (dB)
Duco DucoTop 60 SR (over window frame) – Corto STD	25
Duco DucoTop 60 SR (over window frame) – Corto AK	26
Duco DucoTop 60 SR (over window frame) – Grando STD	27
Duco DucoTop 60 SR (over window frame) – Corto AK+	28
Duco DucoTop 60 SR (over window frame) – Alto AK	30
Duco DucoTop 60 SR (over window frame) – Basso AK+	30
Titon Invent	30
Duco DucoTop 60 SR (over window frame) – Grando AK	31
Titon Hit & Miss HM5050	31
Duco DucoTop 60 SR (over window frame) – Medio AK+	32
Duco DucoStrip Slimline	32
Duco GlasMax – Air slot 20mm	32
Ryttons R2700 Window trickle ventilator (412mm wide)	33
Titon SF 3300 EA Vent	33
Greenwood Slotvent 3000S	33
Duco GlasMax – Air slot 10mm	34
Greenwood 2000D	35
Duco DucoTop 60 SR (over window frame) – Largo AK+	35
Duco DucoMax Corto 15	36
Duco DucoTop 60 SR (over window frame) – Grando AK+	37
Duco DucoMax Medio 25	37
Duco DucoMax Alto 25	38
Titon SF Xtra Sound Attenuator	39
Willan Fresh 100dB	40
Greenwood Airvac Acoustic Air Brick AAB-4000	40
Duco DucoMax Corto 10	41
Duco DucoMax Medio 15	42
Greenwood EHA574	42
Duco DucoMax Alto 15	43
Duco DucoMax Alto 10	45
Suitable for:	Exposure 1 Exposure 2 and 3



ParkerJones Acoustics Limited

Bristol

11 Bankside Road
Brislington
Bristol
BS4 4LB

London

7 Bell Yard
Holborn
London
WC2A 2JR

Glasgow

2/1 55 Bellwood Street
Shawlands
Glasgow
G41 3EX

+44 (0)800 830 3338

+44 (0)117 914 6558

info@parkerjonesacoustics.com

www.parkerjonesacoustics.com

Registered in England and Wales

Company No. 12235614