



Barratt Homes

Sinah Lane, Hayling Island

Noise Assessment

July 2018

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Document Control

Project: Sinah Lane, Hayling Island
Client: Barratt Homes
Job Number: A100655
File Origin: O:\Acoustics Air Quality and Noise\Active Projects\A100655

Document Checking:

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Initialled:	NM
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Issue	Date	Status
1	6 th July 2018	First Issue
2		
3		
4		



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1.0 Introduction

1.1 Noise Assessment Criteria

This report presents the findings of a noise assessment in support of a planning application for a residential development on land north of Sinah Lane, Hayling Island.

A description of the existing noise environment in and around the site is provided. Noise surveys have been undertaken and the results used to verify predictions of the short-term and long-term effects of noise. The noise levels from the proposed development have been predicted at local representative receptors using CADNA noise modelling software which incorporates ISO 9613 and CRTN methodologies and calculations.

A list of acoustic terminology and abbreviations used in this report is provided in Appendix A and a set of location plans and noise contour plots relevant to the assessment are presented in Appendix B.

1.2 Legislative Context (England)

PPG24 was replaced by the National Planning Practice Framework (NPPF) on 27 March 2012. With regard to noise and planning NPPF contains the following 4 short statements (section 123):

- A. Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- B. 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;
- C. 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; and
- D. 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.

The national Planning Practice Guidance (PPG) web-based resource was launched by the Department for Communities and Local Government (DCLG) on 6 March 2014 to support the National Planning Policy Framework and make it more accessible. The overall aim of the guidance, tying in with the principles of the NPPF and the Explanatory Note of the Noise Policy Statement for England (NSPE), is to identify whether the overall effect of noise exposure is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.

A summary of the effects of noise exposure associated with both noise generating developments and noise sensitive developments is presented within the PPG: Noise and repeated as follows:

Table 1.1 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 (NOAEL)	No Specific Measures Required
Lowest Observed Adverse Effect Level (LOAEL)			
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; closing windows for some of the time because of the noise. Potential for non-awakening 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 (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
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, e.g. auditory and non-auditory	Unacceptable Observed Adverse Effect	Prevent

The NPPF, NSPE and PPG: Noise do not, however, present absolute noise level criteria which define SOAEL, LOAEL and NOAEL which is applicable to all sources of noise in all situations. Therefore, within the context of the Proposed Development, national planning policy and appropriate guidance documents including the 'World Health Organisation Community Noise Guidelines' (1999) and BS 8233 'Guidance on Sound Insulation and Noise Reduction for Buildings' (2014), Section 2.0 presents the noise level criteria used as a basis of this assessment.

The PPG: Noise also states that *neither the NPSE nor the NPPF (which reflects the Noise Policy Statement) expects noise to be considered in isolation, separately from the economic, social and other environmental dimensions of the proposed development.*

1.3 Acoustic Consultants' Qualifications, Professional Memberships

The project Acoustic Consultant is Graham Davis. The report has been checked and verified by Nigel Mann. Relevant qualifications, membership and experience are summarised below.

Table 1.2 Acoustic Consultants' Experience

Name	Education	Institute of Acoustics Post Graduate Diploma in Acoustic and Noise Control (Pass Date)	Experience in Undertaking Noise Assessments (Start date of working in noise & acoustics)	Attained Associate Membership of the Institute of Acoustics (date)	Attained Membership of the Institute of Acoustics (date)
Emma Aspinall	MGeol (2017)	-	July 2017	-	-
Nigel Mann	BSc, (1997) MSc (1999)	Nov 2001	Nov 1998	Nov 2001	Jul 2005

1.4 ProPG Planning and Noise – New Residential Development

Professional Practice Guidance on Planning and Noise for new residential development (ProPG) was launched on 22 June 2017 by the Chartered Institute of Environmental Health (CIEH), the Association of Noise Consultants (ANC) and the Institute of Acoustics (IOA). The guidance has been published to provide practitioners with guidance on the management of noise within the planning system in England.

The guidance is specifically for 'new residential development that would be exposed predominantly to noise from existing transport sources' and reflects the Government's overarching Noise Policy Statement for England (NPSE), the National Planning Policy Framework (NPPF), and Planning Practice Guidance (including PPG-Noise), as well as other authoritative sources of guidance.

The guidance provides advice for Local Planning Authorities (LPAs) and developers, and their respective professional advisers which complements Government planning and noise policy and guidance and, in particular, aims to:

- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;



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- Encourage the process of good acoustic design in and around new residential developments;
- Outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- Promote appropriate noise exposure standards; and
- Assist the delivery of sustainable development.

There are two stages of the overall approach outlined in the ProPG:

- Stage 1 – an initial noise risk assessment of the proposed development site; and
- Stage 2 – a systematic consideration of 4 key elements which is underpinned by an Acoustic Design Statement (ADS).

With regard to Stage 1, ProPG provides guidance for the production of an initial site risk assessment, pre-mitigation, with regards to noise based on the prevailing daytime and night time noise levels across the site, from which the site (or areas thereof) can be allocated a Noise Risk as shown in Figure 1.1 below.

Figure 1.1 ProPG Stage 1, Noise Risk Assessment

Noise Risk Assessment	Potential Effect Without Noise Mitigation	Pre-Planning Application Advice
Indicative Daytime Noise Levels $L_{Aeq,16hr}$ Indicative Night-Time Noise Levels $L_{Aeq,8hr}$ 70 dB 65 dB 60 dB 55 dB 50 dB 60 dB 55 dB 50 dB 45 dB 40 dB High Medium Low Negligible	 Increasing risk of adverse effect	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. The risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice. As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigate and minimised, and which clearly demonstrates that a significant adverse noise impact will be avoided in the finished development. At low noise levels, the site is likely to be acceptable from a noise perspective ~~provided that~~ a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
	No adverse effect	These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.

2.0 Assessment Criteria

2.1 Internal Noise Assessment Criteria

In order to enable the assessment of the proposed development in terms of LOAEL and SOAEL, Table 2.1 presents equivalent noise levels and associated actions with the target noise level criteria identified. The noise level criteria detailed below have been derived from standards and design guidance:

BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'

World Health Organisation 'Guidelines on Community Noise' (1999)

Table 2.1 Noise Level Criteria and Actions (Noise Intrusion Assessment)

Effect Level	Assessment	Noise Level Criteria	Action / Justification
No Observed Adverse Effect Level	Internal Noise intrusion assessment for proposed residential	Noise levels below: Bedrooms – 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax} Living Rooms – 35 dB $L_{Aeq,16hours}$ External Amenity Space – 50 dB $L_{Aeq,16hours}$	No Action Required Lower is an indication of the sound source having a low impact Within BS8233 / WHO
Lowest Observed Adverse Effect Level	Internal Noise intrusion assessment for proposed residential	Noise levels exceed: Bedrooms – 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax} Living Rooms – 35 dB $L_{Aeq,16hours}$ External Amenity Space – 55 dB $L_{Aeq,16hours}$	Mitigate to achieve: <i>Bedrooms – 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax}</i> <i>Living Rooms – 35 dB $L_{Aeq,16hours}$</i> <i>External Amenity Space – 55 dB $L_{Aeq,16hours}$</i> Open Plan Office (daytime) – 45 dB $L_{Aeq,16hours}$ Within BS8233 / WHO
Significant Observed Adverse Effect	Internal Noise intrusion assessment for proposed residential	Noise levels exceed: Bedrooms – 30 dB $L_{Aeq,8hours}$ Living Rooms – 35 dB $L_{Aeq,16hours}$ External Amenity Space – 55 dB $L_{Aeq,16hours}$	Mitigate to achieve: <i>Bedrooms – 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax}</i> <i>Living Rooms – 35 dB $L_{Aeq,16hours}$</i> <i>External Amenity Space – 55 dB $L_{Aeq,16hours}$</i> Within BS8233 / WHO criteria
Unacceptable Observed Adverse Effect	Internal Noise intrusion assessment for proposed residential	Noise levels with mitigation exceed: Bedrooms – 35 dB $L_{Aeq,8hours}$ Living Rooms – 40 dB $L_{Aeq,16hours}$ External Amenity Space – 60 dB $L_{Aeq,16hours}$	Prevent

3.0 Assessment Methodology

3.1 Noise Modelling Methodology

Three-dimensional noise modelling will be undertaken based on the monitoring data to predict source noise levels at a large number of locations both horizontally and vertically. CADNA noise modelling software has been used. This model is based on the Department of Transport Calculation of Road Traffic Noise (CRTN) and ISO 9613 noise propagation methodology and allows for detailed prediction of noise levels to be undertaken for large numbers of receptor points and different noise emission scenarios both horizontally and vertically. The modelling software calculates noise levels based on the emission parameters and spatial settings that are entered. Input data, assumptions and model settings as given in the table below have been used.

Table 3.1 Modelling Parameters Sources and Assumptions

Parameter	Source	Details
Horizontal distances – around site	Ordnance Survey	Ordnance Survey
Ground levels – around site	Ordnance Survey	Ordnance Survey
Ground levels – other areas	Site Observations and Ordnance Survey	OS 1:25,000 contours and OS 1:10,000 spot heights.
Traffic data – main surrounding roads	WYG	Traffic flows for local roads based on WYG observations and verification of measured noise levels.
Building heights – around site	WYGE Observations	8 m height for two storey residential properties, and 4 m for Bungalow. Barrier heights for the proposed development are 1.8m high.
Receptor positions	WYG	1 m from façade, height of 1.5 m for ground floor, 4 m for first floor properties with ground floor or bungalow dormer windows. 7 m for dormer windows on two storey properties. 1.5 m height for model grid and monitoring locations for validation.
Reflections	WYG	First order reflections have been applied based on mirror image sources
Absorbent Ground	CADNA	Frequency dependant ground absorption has been applied based on values specified in VDI 2714/16 clause 6.3.
Plans	IDPartnership Northern	Drawing Title: Proposed Site Layout Drawing Number: SL-02 (Date: May 2018)

It is acknowledged that a number of these assumptions will affect the overall noise levels presented in this report. However, it should be noted that certain assumptions made, as identified above, are worst-case.

3.1.1 Model Verification (Monitored Noise Levels)

The model was verified by modelling the monitoring locations detailed in Section 4 of this report. The comparison between the monitoring and modelling results for L_{Aeq} daytime and night-time and L_{Amax} night-time scenarios are shown in Tables 3.2 – Table 3.4 below.

Table 3.2 Modelled vs. Monitored Results L_{Aeq} ; daytime 07:00 – 23:00

Location	Monitored L_{Aeq} , 16hour	Modelled L_{Aeq} , 16hour	Difference between Monitored and Modelled Results
LT1	48.2	48.8	0.6
LT2	44.5	44.5	0.0
LT3	45.0	43.6	-1.4
MT1	44.7	49.4	4.7
MT2	61.7	61.6	-0.1

Table 3.3 Modelled vs. Monitored Results L_{Aeq} ; night-time 23:00– 07:00

Location	Monitored L_{Aeq} , 8 hour	Modelled L_{Aeq} , 8 hour	Difference between Monitored and Modelled Results
LT1	38.1	40.9	2.8
LT2	38.9	38.0	-0.9
LT3	35.7	35.7	0.0
MT1	40.6	39.8	-0.8
MT2	52.7	55.1	2.4

Table 3.4 Modelled vs. Monitored Results L_{Amax} ; night-time 23:00– 07:00

Location	Monitored L_{Amax}	Modelled L_{Amax}	Difference between Monitored and Modelled Results
LT1*	64.2	64.2	0.0
LT2*	61.1	61.6	0.5
LT3*	60.0	60.0	0.0
MT1	69.8	70.1	0.3
MT2	81.5	79.3	-2.2

*Excluding L_{Amax} associated with birdsong

All values are sound pressure levels in dB re: 2×10^{-5} Pa

Within the verification exercise, greater weight and confidence has been given to the long-term measurements due to a longer exposure time, which show a divergence between monitored and modelled results of no more than ± 3.0 dB. The only exception is location MT1 during the daytime L_{Aeq} scenario, which is predicting higher noise levels than were measured on site, which is attributable to fewer passing vehicles during this monitoring than the long-term monitoring. The model is therefore considered suitably verified.



3.2 Model Input Data

3.1.2 Commercial Noise from Hayling Billy Business Centre

Although the development site is located within Negligible to Medium ProPG risk categories (see section 5.1 below) and noise from the use of Hayling Billy Business Centre to the east of the development site was not considered to be dominant and no activity was observed during the night-time period during the survey.

However, the following source noise data have been added to the noise model used within the assessment to represent the worst-case noise from HGV movements and unloading within service yards in the Hayling Billy Business Centre during both daytime and night-time periods.

Noise from a HGV delivery event has been known to vary from site to site by as much as 22 dB L_{Aeq} at 3 m distance even with the same vehicle type. Similarly, individual events using the same vehicle and at the same location have been recorded to vary by as much as 14 dB.

As such, the following worst-case calculations have been based on measurements of HGVs delivering goods. All measurements were undertaken in free-field conditions. In addition to noise from the unloading process, the levels used in the assessment include noise from the vehicle pulling up to and manoeuvring into position and then pulling away once unloading is complete, together with other sources such as reversing alarms. The calculations are based on a maximum of one event per hour.

Service Yard Unloading

The following calculations have been used to represent this as a point source in the model.

- Daytime:*

2 minutes at L_p 79 dB at 3 m distance	(vehicle arriving and manoeuvring)
36 minutes at L_p 72 dB at 3 m distance	(vehicle unloading)
2 minutes at L_p 79 dB at 3 m distance	(vehicle leaving)
20 minutes of quiet (associated with documentation and waiting with engine off)	

$$L_{Aeq}(60 \text{ mins}) = 10\log(1/60)(2\text{mins} \times 10^{0.1 \times 79.0\text{dB}} + 36\text{mins} \times 10^{0.1 \times 72.0\text{dB}} + 2\text{mins} \times 10^{0.1 \times 79.0\text{dB}})$$

$$= 71.7 \text{ dB at 3 m distance}$$

- Night-time:*

1 minutes at L_p 79 dB at 3 m distance	(vehicle arriving and manoeuvring)
14 minutes at L_p 72 dB at 3 m distance	(vehicle unloading)
1 minutes at L_p 79 dB at 3 m distance	(vehicle leaving)

$$L_{Aeq}(15 \text{ mins}) = 10\log(1/15)(1\text{mins} \times 10^{0.1 \times 79.0\text{dB}} + 14\text{mins} \times 10^{0.1 \times 72.0\text{dB}} + 1\text{mins} \times 10^{0.1 \times 79.0\text{dB}})$$

= 74.0 dB at 3 m distance

- *L_{Amax} Noise Levels*

L_{Amax} used is as 85.4 dB at 3 m distance

3.3 Sensitive Receptors

Proposed residential receptors have been assessed against the existing noise levels with respect to direct noise from road traffic noise and commercial noise surrounding the site. The locations of the receptors are described in Tables 3.5 and 3.6 below; whilst the locations of the receptors are shown illustratively on SK02 of Appendix B.

Table 3.5 Proposed Residential Receptors

Ref.	Description	Closest Source	Approximate Distance To Source (m)	Height (m) Daytime/Night-time
R01	Southeast of site	Sinah Lane	47	1.5 / 4.0
R02	South of site	Sinah Lane	46	1.5 / 4.0
R03	South of site	Sinah Lane	51	1.5 / 4.0
R04	Southwest of site	Sinah Lane	66	1.5 / 4.0
R05	Southwest of site	North Shore Road	63	1.5 / 4.0
R06	West of site	North Shore Road	60	1.5 / 4.0
R07	West of site	North Shore Road	85	1.5 / 4.0
R08	North of site	North Shore Road	60	1.5 / 4.0
R09	North of site	North Shore Road	60	1.5 / 4.0
R10	North of site	North Shore Road	53	1.5 / 4.0
R11	North of site	North Shore Road	88	1.5 / 4.0
R12	Northeast of site	North Shore Road	100	1.5 / 4.0
R13	Northeast of site	North Shore Road	146	1.5 / 4.0
R14	East of site	Service Yard Activity	35	1.5 / 4.0
R15	East of site	Service Yard Activity	92	1.5 / 4.0
R16	Southeast of site	Service Yard Activity	27	1.5 / 4.0
R17	Centre of site	Sinah Lane	117	1.5 / 4.0
R18	Centre of site	Sinah Lane	160	1.5 / 4.0

Table 3.6 Proposed Private External Amenity Area Receptor Locations

Ref.	Description	Closest Source	Approximate Distance To Source (m)	Height (m)
G01	Southeast of site	Service Yard Activity	31	1.2
G02	Southwest of site	Sinah Lane	45	1.2
G03	Southwest of site	North Shore Road	50	1.2
G04	North of site	North Shore Road	50	1.2
G05	North of site	North Shore Road	111	1.2



Ref.	Description	Closest Source	Approximate Distance To Source (m)	Height (m)
G06	South of site	Sinah Lane	100	1.2
G07	East of site	Service Yard Activity	29	1.2
G08	Southeast of site	Service Yard Activity	31	1.2

3.4 Tranquillity Rating

An assessment of the existing tranquillity level of the site has been based on the mapping data published by Campaign to Protect Rural England (CPRE). This uses a colour coded system and a 500m assessment grid for the whole of England, and a tranquillity rating of between 1 and 10 is assigned (1 being least tranquil and 10 being most). By reference to these maps the development is assessed as falling into Zone 3.



4.0 Noise Survey

4.1 Noise Survey Methodology

Noise Survey

Noise Survey Methodology

A monitoring survey was undertaken to characterise baseline ambient noise levels currently experienced on the site and to establish the relative local background and traffic noise levels. Equipment used during the survey included:

Rion NL-32	Environmental Noise Analyser	s/n	213442
Rion NL-52	Environmental Noise Analyser	s/n	1043466
Rion NL-52	Environmental Noise Analyser	s/n	1176464
Rion NL-52	Environmental Noise Analyser	s/n	264488
Rion NL-52	Environmental Noise Analyser	s/n	732146
Rion NC-74	Sound Calibrator	s/n	35046823

The measurement equipment was checked against the appropriate calibrator at the beginning and end of the measurements, in accordance with recommended practice, and no drift was observed. The accuracy of the calibrators can be traced to National Physical Laboratory Standards, calibration certificates for which are available on request.

A baseline monitoring survey was undertaken at six locations (as specified in the following table and shown in SK01 of Appendix B) from Thursday 21st June 2018 to Tuesday 26th June 2018. Attended short term measurements were undertaken at five locations during day, evening and night-time periods with three additional locations being measured unattended over a 134-hour period. Furthermore, two medium term periods were also measured over a 36-hour period. The raw data collected from the long-term monitoring is available upon request.

Measurements were taken in general accordance with BS 7445-1:2003 *The Description and Measurement of Environmental Noise: Guide to quantities and procedures*. Weather conditions during the survey period were observed as being dry. Anemometer readings confirmed that wind speeds were less than 5 ms⁻¹ at all times during the survey, with a predominant westerly wind direction, during the survey. It is considered that the long-term measurements may be artificially lowered by night-time upward heat radiation from prolonged periods of baked ground and still condition. However, the glazing mitigation has been based on the worst

case L_{max} measurements of passing vehicles and potential worst case noise from Hayling Billy Business Centre rather than the potentially lowered L_{Aeq} or L₉₀ levels.

Table 4.1 Noise Monitoring Locations

Ref	Description
LT1	Eastern corner of the site, behind Global Insulation Ltd.
LT2	South of the site, behind 20 Sinah Lane.
LT3	On the Western side of the site, behind 36 North Shore Road.
MT1	East of the site, behind Unit 6 of Hayling Island Business Centre.
MT2	To the south of the site, left of 6 Sinah Lane.
ST1	Behind Unit 6 of Hayling Billy Business Centre, just off Hayling Billy Coastal Path.
ST2	To the south of the site, right of 10 Sinah Lane.
ST3	Western side of the site, behind 36 North Shore Road.
ST4	Corner of 2 Park Road, off Sinah Lane.
ST5	Corner of Furniss Way, in front of 82 Station Road opposite the theatre.

Noise Survey Results

The predominant noise source found in the area was road traffic from Sinah Lane. Other dominant noise sources included distant noise from the docks and occasional traffic along Park Road.

Ambient and background noise levels are usually described using the L_{Aeq} index (a form of energy average) and the L_{A90} index (i.e. the level exceeded for 90% of the measurement period) respectively. Road traffic noise is generally described using the L_{A10} index (i.e. the level exceeded for 10% of the measurement period).

Table 4.2 Meteorological Conditions during the Survey

Survey Location	Date & Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
Daytime ST1	26/06/2018 10:01	26.0 °C	0-1	W	0	Traffic along Sinah Lane, pedestrians talking/walking along Hayling Billy Trail.
Daytime ST2	26/06/2018 10:23	27.0 °C	0-1	W	0	Occasional traffic along Sinah Lane.
Daytime ST3	26/06/2018 10:58	27.0 °C	0-1	W	0	Occasional traffic along Sinah Lane.
Daytime ST4	26/06/2018 10:41	27.0 °C	1-2	W	0	Occasional road traffic noise along Sinah Lane and Park Road and birds.
Daytime ST5	26/06/2018 11:28	27.0 °C	0-1	W	0	Road traffic noise on Sinah Lane and Staunton Avenue.
Evening ST1	25/06/2018 21:02	24.0 °C	0-1	W	0	Occasional road traffic noise on Sinah Lane. Pedestrians

Survey Location	Date & Time	Temperature (°C)	Wind Speed (m/s)	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
						walking along Hayling Billy Trial.
Evening ST2	25/06/2018 21:39	24.0 °C	0-1	W	0	Road traffic noise along Sinah Lane, birds in trees.
Evening ST3	25/06/2018 22:35	23.0 °C	0-1	W	0	Distant road traffic noise along Sinah Lane.
Evening ST4	25/06/2018 22:15	24.0 °C	0-1	W	0	Occasional traffic along Sinah Lane and Park Road. People talking in houses.
Evening ST5	25/05/2018 21:21	24.0 °C	0-1	W	0	Traffic along Sinah Lane, faint plant noise on the side of theatre.
Night-time ST1	25/06/2018 23:05	22.0 °C	0-1	W	0	Distant dock noise.
Night-time ST2	25/06/2018 23:54	22.0 °C	0-1	W	0	Distant dock noise.
Night-time ST3	26/05/2018 00:33	20.0 °C	0-1	W	0	Distant dock noise and very occasional traffic from Sinah Lane.
Night-time ST4	26/05/2018 00:17	20.0 °C	0-1	W	0	Distant dock noise and occasional traffic noise on Sinah Lane.
Night-time ST5	25/05/2018 23:33	24.0 °C	0-1	W	0	Occasional traffic noise on Sinah Lane and distant dock noise.

The results of the statistical measurements and frequency measurements conducted during the survey are summarised in the following table. All values are sound pressure levels in dB (re: 2×10^{-5} Pa).

Table 4.3 Results of Baseline Noise Monitoring Survey (Average Levels)

Period	Duration (T)	Monitoring Date and Times	Location	L _{Aeq,T} (dB)	L _{Amax,T} (dB)	L _{Amin,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
Weekday Daytime 07:00 - 23:00	46 Hours	21/06/2018-26/06/2018 07:00 - 23:00	LT1	48.2	84.8	21.5	46.1	36.0
Weekday Night-time 23:00 - 07:00	24 Hours	21/06/2018-26/06/2018 23:00 - 07:00		38.1	74.9	19.6	34.9	27.0
Weekend Daytime 07:00 - 23:00	32 Hours	23/06/2018 - 24/06/2018 07:00 - 23:00		45.3	85.3	17.9	45.2	35.0
Weekend Night-time 23:00 - 07:00	16 hours	23/06/2018-24/06/2018 23:00 - 07:00		37.0	75.5	18.6	33.5	27.0
Weekday Daytime 07:00 - 23:00	46 Hours	21/06/2018 - 26/06/2018 07:00 - 23:00	LT2	44.5	94.2	23.1	43.8	36.0
Weekday Night-time 23:00 - 07:00	24 Hours	21/06/2018 - 26/06/2018 23:00 - 07:00		38.9	74.0	20.2	35.2	34.0
Weekend Daytime 07:00 - 23:00	32 Hours	23/06/2018 - 24/06/2018 07:00 - 23:00		43.7	77.2	19.2	42.95	34.0



Period	Duration (T)	Monitoring Date and Times	Location	L _{Aeq,T} (dB)	L _{Amax,T} (dB)	L _{Amin,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)
Weekend Night-time 23:00 – 07:00	16 hours	23/06/2018 – 24/06/2018 23:00 – 07:00		36.4	68.5	19.0	33.9	28.0
Weekday Daytime 07:00 – 23:00	46 Hours	21/06/2018 – 26/06/2018 07:00 – 23:00	LT3	45.0	94.3	24.0	43.6	34.0
Weekday Night-time 23:00 – 07:00	24 Hours	21/06/2018 – 26/06/2018 23:00 – 07:00		35.7	70.3	20.7	34.3	33.0
Weekend Daytime 07:00 – 23:00	32 Hours	23/06/2018 – 24/06/2018 07:00 – 23:00		43.3	76.0	20.7	43.2	34.0
Weekend Night-time 23:00 – 07:00	16 Hours	23/06/2018 – 24/06/2018 23:00 – 07:00		34.8	63.5	21.3	34.3	25.0
Weekday Daytime 07:00 – 23:00	10 Hours	25/06/2018 – 26/06/2018 07:00 – 23:00	MT1	44.7	82.5	42.6	44.1	37.0
Weekday Night-time 23:00 – 07:00	8 Hours	25/06/2018 – 26/06/2018 23:00 – 07:00		40.6	75.0	24.2	35.6	27.0
Weekday Daytime 07:00 – 23:00	10 Hours	25/06/2018 – 26/06/2018 07:00 – 23:00	MT2	61.7	92.8	24.5	62.5	39.0
Weekday Night-time 23:00 – 07:00	8 Hours	25/06/2018 – 26/06/2018 23:00 – 07:00		52.7	81.5	25.5	40.7	28.0
Daytime 07:00 – 19:00	15 Mins	26/06/2018 10:01	ST1	51.2	77.4	36.8	52.0	40.6
	15 Mins	26/06/2018 10:23	ST2	58.1	77.2	33.3	59.3	42.4
	15 Mins	26/06/2018 10:58	ST3	43.5	66.2	31.2	43.9	33.8
	15 Mins	26/06/2018 10:41	ST4	55.8	71.9	36.1	59.6	41.4
	15 Mins	26/06/2018 11:28	ST5	68.1	75.1	40.8	70.5	57.0
Evening 19:00 – 23:00	15 Mins	25/06/2018 21:02	ST1	40.0	59.0	28.8	43.7	32.0
	15 Mins	25/06/2018 21:39	ST2	56.0	78.7	24.5	56.2	29.9
	15 Mins	25/06/2018 22:35	ST3	31.6	51.5	24.1	33.7	27.5
	15 Mins	25/06/2018 22:15	ST4	42.5	63.3	24.7	41.8	26.5
	15 Mins	25/06/2018 21:21	ST5	59.1	76.4	30.8	62.9	34.6
Night-time 23:00 – 07:00	15 Mins	25/06/2018 23:05	ST1	40.9	75.5	26.9	36.9	29.3
	15 Mins	25/06/2018 23:55	ST2	33.2	55.7	28.2	34.1	30.2
	15 Mins	26/06/2018 00:34	ST3	29.9	51.5	26.2	30.4	27.9
	15 Mins	26/06/2018 00:17	ST4	32.6	54.0	26.2	31.7	27.8
	15 Mins	25/06/2018 23:36	ST5	49.3	71.3	26.9	40.0	29.2

All values are sound pressure levels in dB re: 2x 10⁻⁵ Pa

5.0 Assessment of Effects

5.1 ProPG Stage 1 Assessment

Daytime $L_{Aeq, 16\text{hour}}$ noise levels range between 44 - 68 dB and night-time $L_{Aeq, 8\text{hour}}$ noise levels range between 29 – 49 dB, therefore the site falls within the Low to Medium Noise Risk Categories and as such good acoustic design measures may need to be incorporated into the design at the detailed design stage.

5.2 ProPG Stage 2 Assessment – Element 2 Internal Noise Levels

Internal noise levels within potential dwellings have been assessed both with windows open, where a reduction from a partially open window of 10 dB has been used, and with windows closed where an assumption of glazing with minimum specification $R_w + C_{tr}$ 30 dB (e.g 6/12/6mm double glazing or equivalent) has been used.

The results presented in tables 5.1 – 5.3 below show the predicted noise intrusion levels at properties across the site. The recommended WHO/BS 8233 internal noise levels are exceeded at some receptors across the site during the daytime and night-time, assuming a windows-open scenario. In order to achieve the recommended internal noise criteria, a range of mitigation measures are outlined in Section 6.1 of this report, with SK05 in Appendix B showing the glazing and ventilation requirements for facades within the proposed development.

Table 5.1 Daytime Noise Intrusion Levels L_{Aeq} 16 hour

Location	External L_{Aeq} at 1m from facade	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria Internal L_{Aeq}
R01	44.3	34.3	14.3	35
R02	41.1	31.1	11.1	35
R03	40.3	30.3	10.3	35
R04	40.1	30.1	10.1	35
R05	38.7	28.7	8.7	35
R06	42.4	32.4	12.4	35
R07	34.3	24.3	4.3	35
R08	38.9	28.9	8.9	35
R09	40.1	30.1	10.1	35
R10	36.9	26.9	6.9	35
R11	34.7	24.7	4.7	35
R12	35.6	25.6	5.6	35
R13	33.8	23.8	3.8	35
R14	45.1	35.1	15.1	35
R15	34.1	24.1	4.1	35
R16	56.8	46.8	26.8	35

Location	External L_{Aeq} at 1m from facade	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria Internal L_{Aeq}
R17	36.0	26.0	6.0	35
R18	41.3	31.3	11.3	35

Table 5.2 Night-time Noise Intrusion Levels L_{Aeq} 8 hour

Location	External L_{Aeq} at 1m from facade	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria Internal L_{Aeq}
R01	44.2	34.2	14.2	30
R02	40.8	30.8	10.8	30
R03	39.1	29.1	9.1	30
R04	38.5	28.5	8.5	30
R05	34.4	24.4	4.4	30
R06	35.0	25.0	5.0	30
R07	33.2	23.2	3.2	30
R08	34.4	24.4	4.4	30
R09	33.3	23.3	3.3	30
R10	31.8	21.8	1.8	30
R11	31.2	21.2	1.2	30
R12	34.9	24.9	4.9	30
R13	33.7	23.7	3.7	30
R14	50.5	40.5	20.5	30
R15	39.4	29.4	9.4	30
R16	58.5	48.5	28.5	30
R17	36.8	26.8	6.8	30
R18	41.8	31.8	11.8	30

All values are sound pressure levels in dB re: 2×10^{-5} Pa.

Table 5.3 Night-time Noise Intrusion Levels L_{Amax}

Location	External L_{Amax} at 1m from facade	Internal L_{Amax} with windows open	Internal L_{Amax} with windows closed	Criteria Internal L_{Amax}
R01	66.2	56.2	36.2	45
R02	63.2	53.2	33.2	45
R03	61.8	51.8	31.8	45
R04	61.2	51.2	31.2	45
R05	57.1	47.1	27.1	45
R06	59.0	49.0	29.0	45
R07	52.9	42.9	22.9	45
R08	58.1	48.1	28.1	45
R09	56.6	46.6	26.6	45
R10	55.1	45.1	25.1	45
R11	52.3	42.3	22.3	45
R12	53.1	43.1	23.1	45
R13	50.7	40.7	20.7	45

Location	External L_{Amax} at 1m from facade	Internal L_{Amax} with windows open	Internal L_{Amax} with windows closed	Criteria Internal L_{Amax}
R14	62.7	52.7	32.7	45
R15	53.2	43.2	23.2	45
R16	71.3	61.3	41.3	45
R17	53.4	43.4	23.4	45
R18	55.9	45.9	25.9	45

Enhanced glazing will be required for facades adjacent to Hayling Billy Business Centre. Alternative ventilation will be required for most properties across the proposed development; alternative ventilation can be provided in several ways from acoustic trickle vents (which need to have a minimum sound reduction equal to or greater than the glazing) to other passive ventilation systems.

5.3 ProPG Stage 2 Assessment – Element 3 External Amenity Spaces

Daytime noise levels in private external amenity spaces of the proposed development have been assessed. The scheme has been designed to reduce noise levels within garden areas through the use of solid garden fences and maximising the screening provided by the proposed dwellings; fences will be constructed from brick or solid timber panels with no gaps and be a minimum of 1.8 metres high, to protect external amenity spaces within the proposed development.

The locations of these receptors are illustratively shown in SK02 of Appendix B with the results of this assessment are presented below in Table 5.4.

Table 5.4 Private External Amenity Area Noise Levels $L_{Aeq,16hr}$

Ref	External $L_{Aeq,16hr}$ Daytime	BS 8233 Lower Limit Criteria L_{Aeq}
G01	47.2	50
G02	40.4	50
G03	41.1	50
G04	40.1	50
G05	37.2	50
G06	36.4	50
G07	45.6	50
G08	44.2	50

All values are sound pressure levels in dB re: 2×10^{-5} Pa0

The results in the table above show that daytime L_{Aeq} noise levels within private external amenity areas are not predicted to exceed the BS 8233 lower guideline value (50 dB).



6.0 Acoustic Design Statement

6.1 Glazing and Ventilation Strategy

The mitigation measures below are sufficient to reduce the effects of any noticeable and disruptive noise from the surrounding environment by helping to prevent noise levels exceeding BS 8233 criteria for L_{Aeq} and L_{Amax} within all areas of the proposed development.

The glazing and ventilation strategy provided in SK05 has been designed to achieve internal daytime L_{Aeq} of 35 dB, an internal night-time L_{Aeq} of 30 dB and an internal night-time L_{Amax} of 45 dB in habitable rooms of the proposed development. Enhanced glazing with a sound reduction of $R_w + C_{tr}$ 32 dB would be provided for facades facing Hayling Billy Business centre. The full glazing and ventilation strategy, based on the indicative site layout, is shown illustratively in SK05 of Appendix B. A majority of dwellings across the site will require an alternative means of ventilation which can be provided in several ways from acoustic trickle vents (which need to have a minimum sound reduction equal to or greater than the glazing) to other passive ventilation systems.

Care will be taken to minimise the potential impact of noise via careful design of building layout with consideration being made to the appropriate positioning of living rooms and bedrooms with respect to the adjacent roads and Hayling Billy Business Centre. Within the buildings themselves, living rooms and bedrooms will ideally be located on shielded façades with non-sensitive spaces such as corridors, bathrooms, en-suite, utility rooms, window-less gable ends and kitchens should ideally be located on the road and business centre facing façades of residential properties.

Fences will be constructed from brick or solid timber panels with no gaps and be a minimum of 1.8 metres high, to protect external amenity spaces within the proposed development.



7.0 Conclusions

This report presents the findings of a noise assessment in support of a planning application for a residential development on land north of Sinah Lane, Hayling Island. Section 123 of the NPPF gives four test points relating to noise; considering these the following conclusions can be drawn:

NPPF 123 A & B

The proposed development is not expected to have an 'adverse impact' on health or quality of life. Similarly regards to NPPF (123) point B, it is considered that all 'adverse impacts on health and quality of life' (relating to noise) are mitigated by the glazing and ventilation strategy outlined in Section 6.0.

NPPF 123 C & D

It is not considered that any nearby businesses would be restricted by the introduction of the sensitive use of the site. The development is situated in a CPRE Zone 3 area of tranquillity (Zone 1 being the least tranquil and Zone 10 being the most tranquil), as such is not considered to be an area of tranquillity and the development would have a negligible impact on the tranquillity of the area.

Glazing & Ventilation Strategy

The recommended WHO/BS 8233 internal noise levels are exceeded at a number of receptors across the site during the daytime and night-time, assuming a windows-open scenario. Standard double glazing with a sound reduction of $R_w + C_{tr}$ 30 dB is sufficient across the majority of the site in order to achieve the target internal noise levels when windows are closed, however, enhanced glazing would be required for plots facing Hayling Billy Business Centre in order to meet internal targets for noise levels. Alternative ventilation (e.g. trickle vents) will be necessary for noise sensitive rooms in most dwellings across the site.

All private external amenity areas receptors are below BS 8233 lower guideline values for L_{Aeq} with fences constructed from brick or solid timber panels with no gaps and be a minimum of 1.8 metres high.

Planning Practice Guidance

Accordingly, the proposed development satisfies the relevant policy considerations set out in the NPPF and the PPG: Noise.



Appendices



Appendix A – Acoustic Terminology and Abbreviations

Acoustic Terminology

- dB** Sound levels from any source can be measured in frequency bands in order to provide detailed information about the spectral content of the noise, i.e. whether it is high-pitched, low-pitched, or with no distinct tonal character. These measurements are usually undertaken in octave or third octave frequency bands. If these values are summed logarithmically, a single dB figure is obtained. This is usually not very helpful as it simply describes the total amount of acoustic energy measured and does not take any account of the ear's ability to hear certain frequencies more readily than others.
- dB(A)** Instead, the dBA figure is used, as this is found to relate better to the loudness of the sound heard. The dBA figure is obtained by subtracting an appropriate correction, which represents the variation in the ear's ability to hear different frequencies, from the individual octave or third octave band values, before summing them logarithmically. As a result the single dBA value provides a good representation of how loud a sound is.
- L_{Aeq}** Since almost all sounds vary or fluctuate with time it is helpful, instead of having an instantaneous value to describe the noise event, to have an average of the total acoustic energy experienced over its duration. The L_{Aeq, 07:00 – 23:00} for example, describes the equivalent continuous noise level over the 12 hour period between 7 am and 11 pm. During this time period the L_{pA} at any particular time is likely to have been either greater or lower than the L_{Aeq, 07:00 – 23:00}.
- L_{Amin}** The L_{Amin} is the quietest instantaneous noise level. This is usually the quietest 125 milliseconds measured during any given period of time.
- L_{Amax}** The L_{Amax} is the loudest instantaneous noise level. This is usually the loudest 125 milliseconds measured during any given period of time.
- L_n** Another method of describing, with a single value, a noise level which varies over a given time period is, instead of considering the average amount of acoustic energy, to consider the length of time for which a particular noise level is exceeded. If a level of x dBA is exceeded for say 6 minutes within one hour, then that level can be described as being exceeded for 10% of the total measurement period. This is denoted as the L_{A10, 1 hr} = x dB.
- The L_{A10} index is often used in the description of road traffic noise, whilst the L_{A90}, the noise level exceeded for 90% of the measurement period, is the usual descriptor for underlying background noise. L_{A1} and L_{Amax} are common descriptors of construction noise.
- R_w** The *weighted sound reduction index* determined using the above *measurement* procedure, but weighted in accordance with the procedures set down in BS EN ISO 717-1. Partitioning and building board manufacturers commonly use this index to describe the inherent sound insulation performance of their products.



Abbreviations

CADNA – Computer Aided Noise Abatement

DMRB – Design Manual for Roads and Bridges

HGV – Heavy Goods Vehicle

PPG – Planning Practice Guidance

UDP – Unitary Development Plan

UKAS – United Kingdom Accreditation Service

WYGE – WYG Environment



Appendix B – Sketches

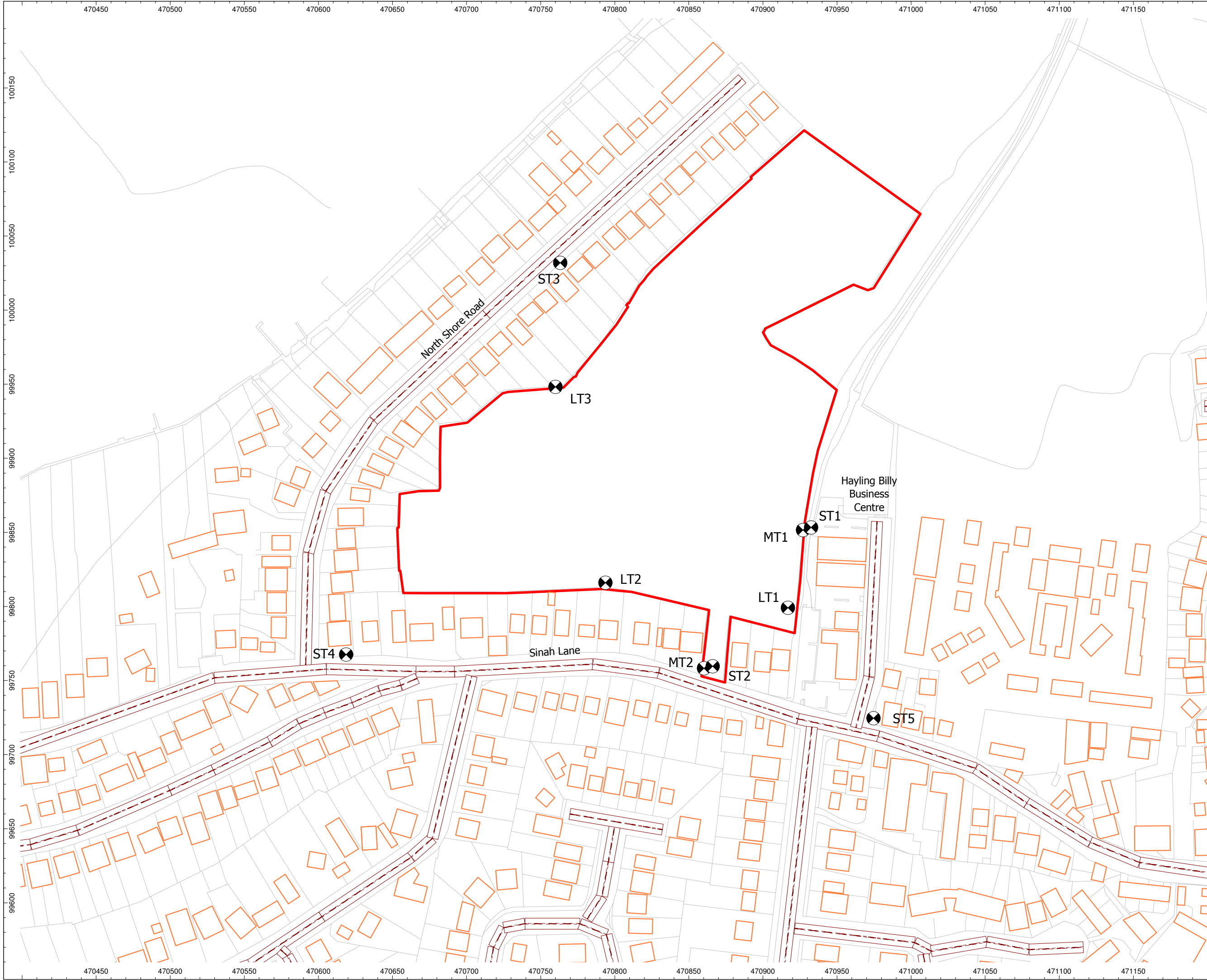
SK01 Noise Monitoring Locations

SK02 Proposed Receptors and External Amenity Receptor Locations

SK03 Existing Daytime $L_{Aeq,16hr}$ Noise Levels

SK04 Existing Night-time $L_{Aeq,8hr}$ Noise Levels

SK05 Glazing and Mitigation Strategy



Client:
Barratt Homes

Project:
**Sinah Lane,
Hayling Island**

Project Number:
A100655

Drawing Title / Scenario:
Noise Monitoring Locations

Drawing Number:
SK01

Key:

Site Boundary: 

Scale : Not to scale

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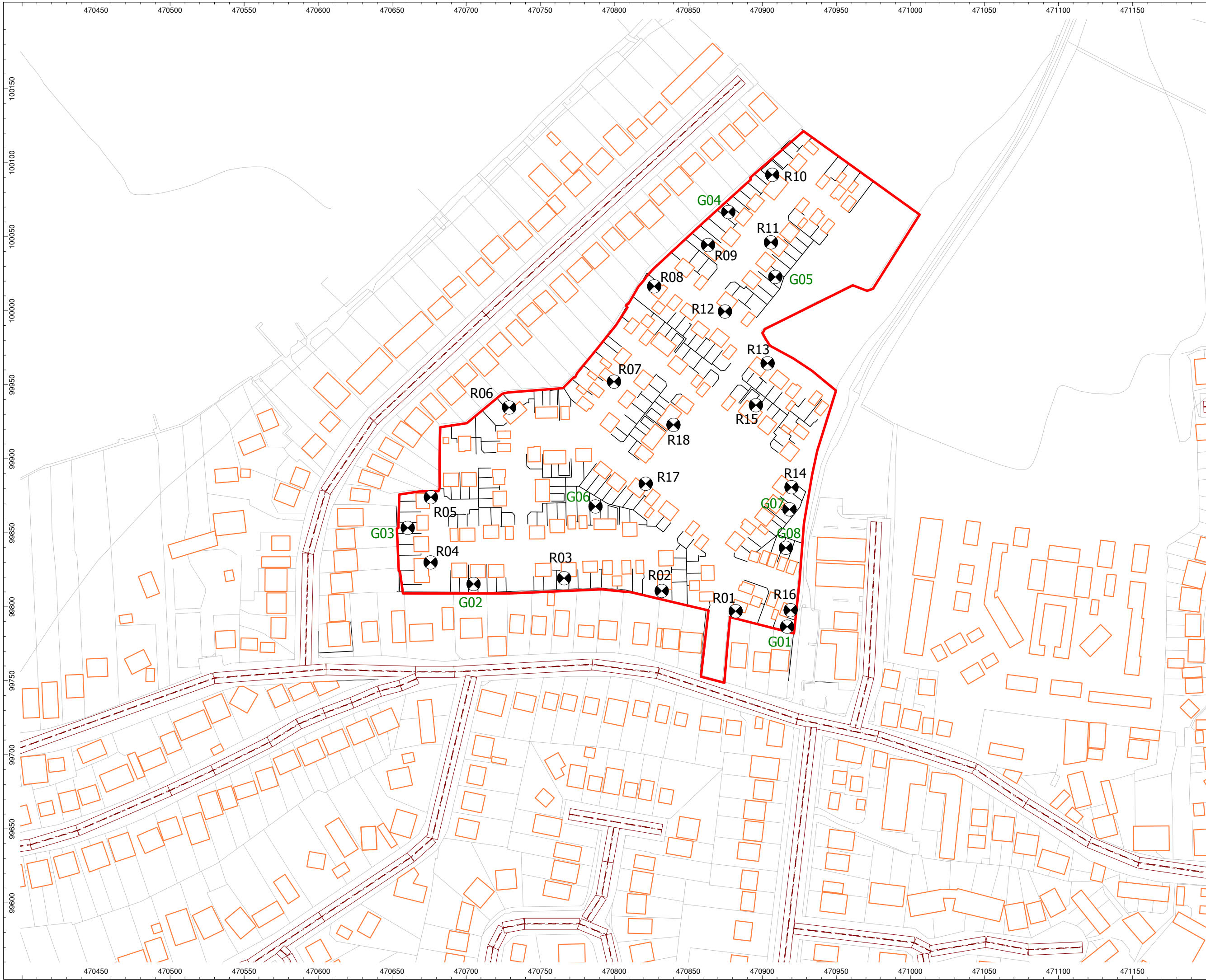
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Drawing Title / Scenario:
**Proposed Receptors and
External Amenity Receptor
Locations**

Drawing Number:
SK02

Key:

Site Boundary: —

Scale : Not to scale

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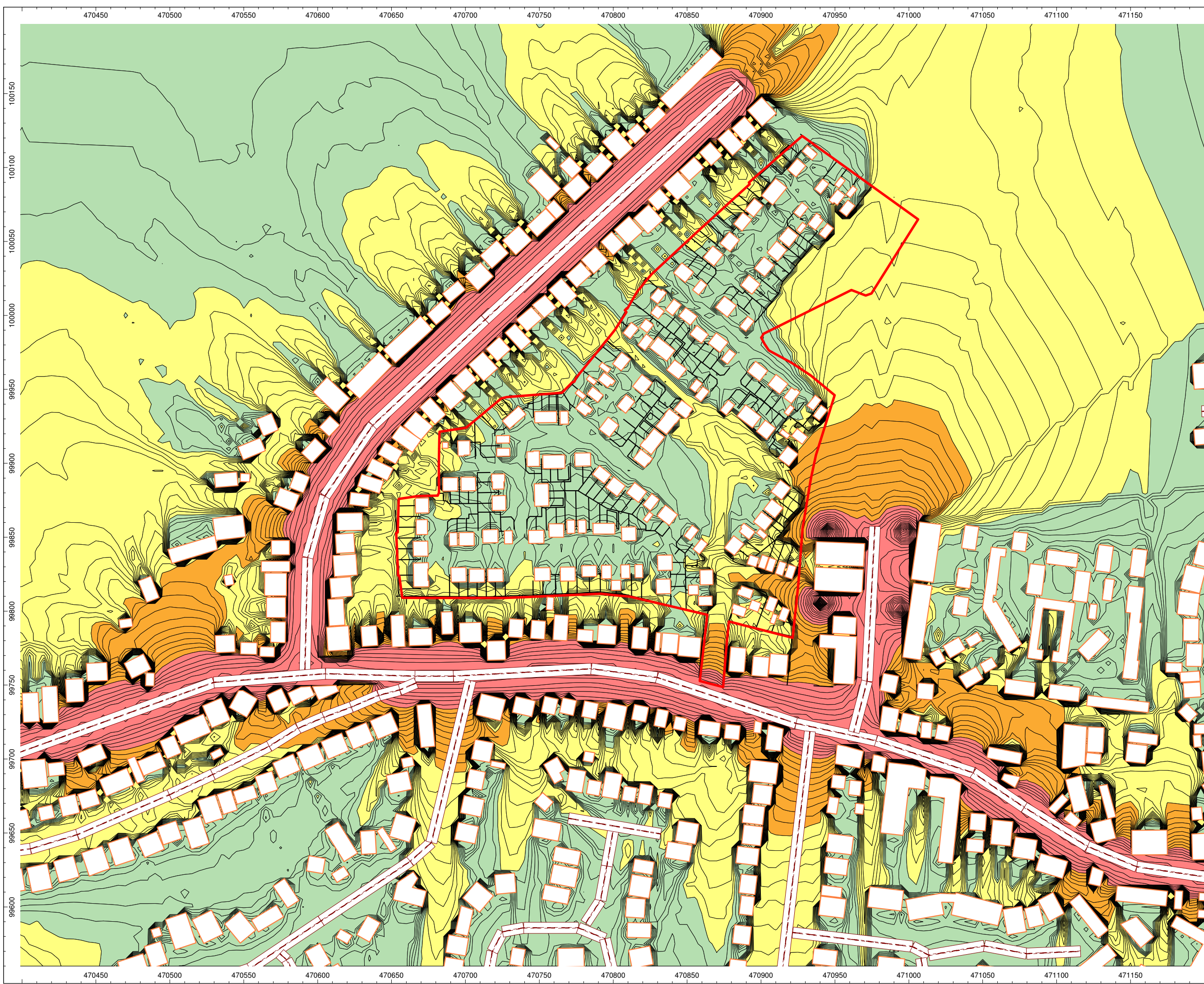
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Drawing Title / Scenario:
Existing Daytime LAeq
16hr Noise Levels

Drawing Number:
SK03

Key:

Site Boundary: —

0.0 - 40.0 dB
40.0 - 50.0 dB
50.0 - 60.0 dB
>60.0 dB

Scale : Not to scale

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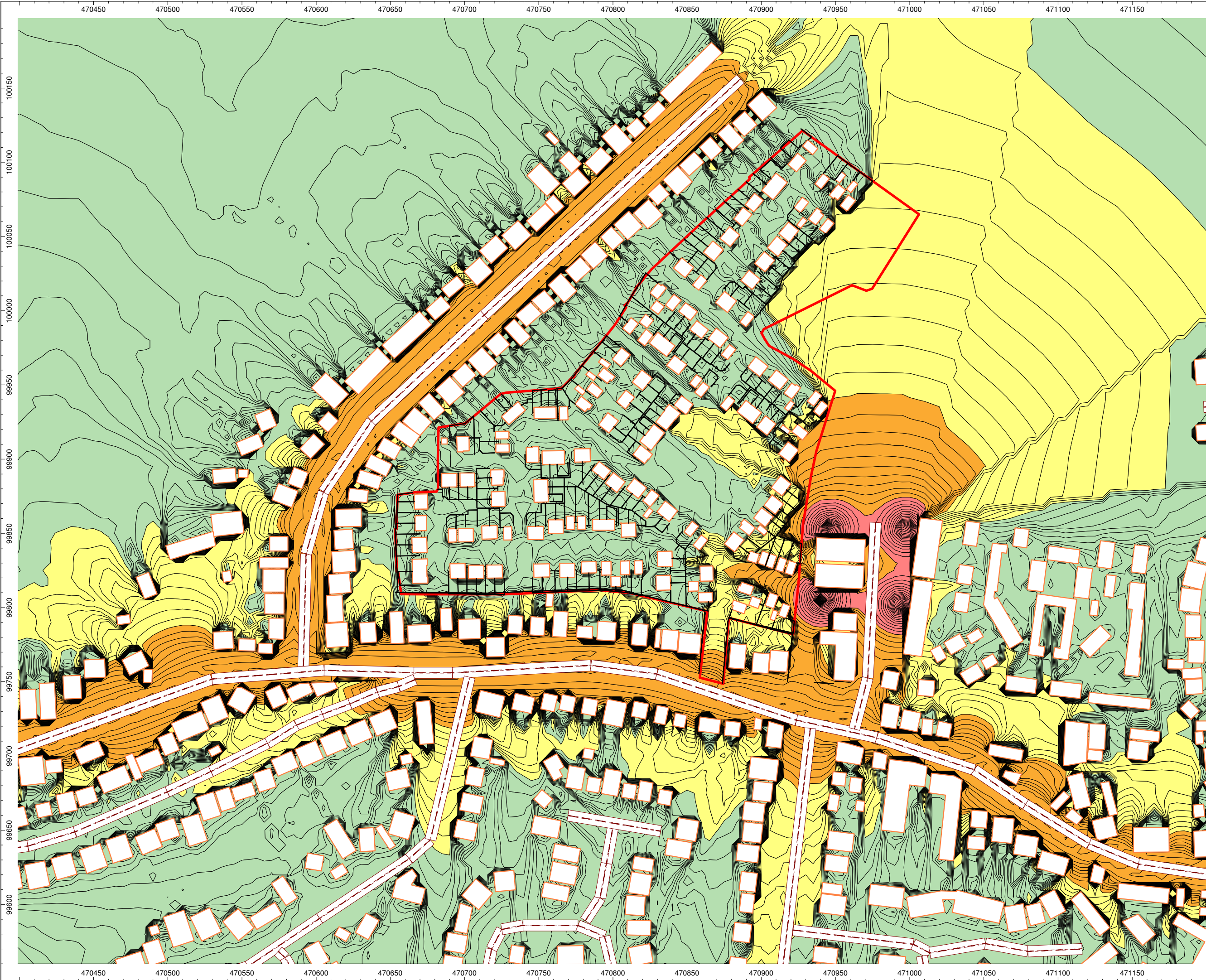
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Project Number:
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Drawing Title / Scenario:
Existing Night-time LAeq
8hr Noise Levels

Drawing Number:
SK04

Key:

Site Boundary: —

0.0 - 40.0 dB
40.0 - 50.0 dB
50.0 - 60.0 dB
>60.0 dB

Scale : Not to scale

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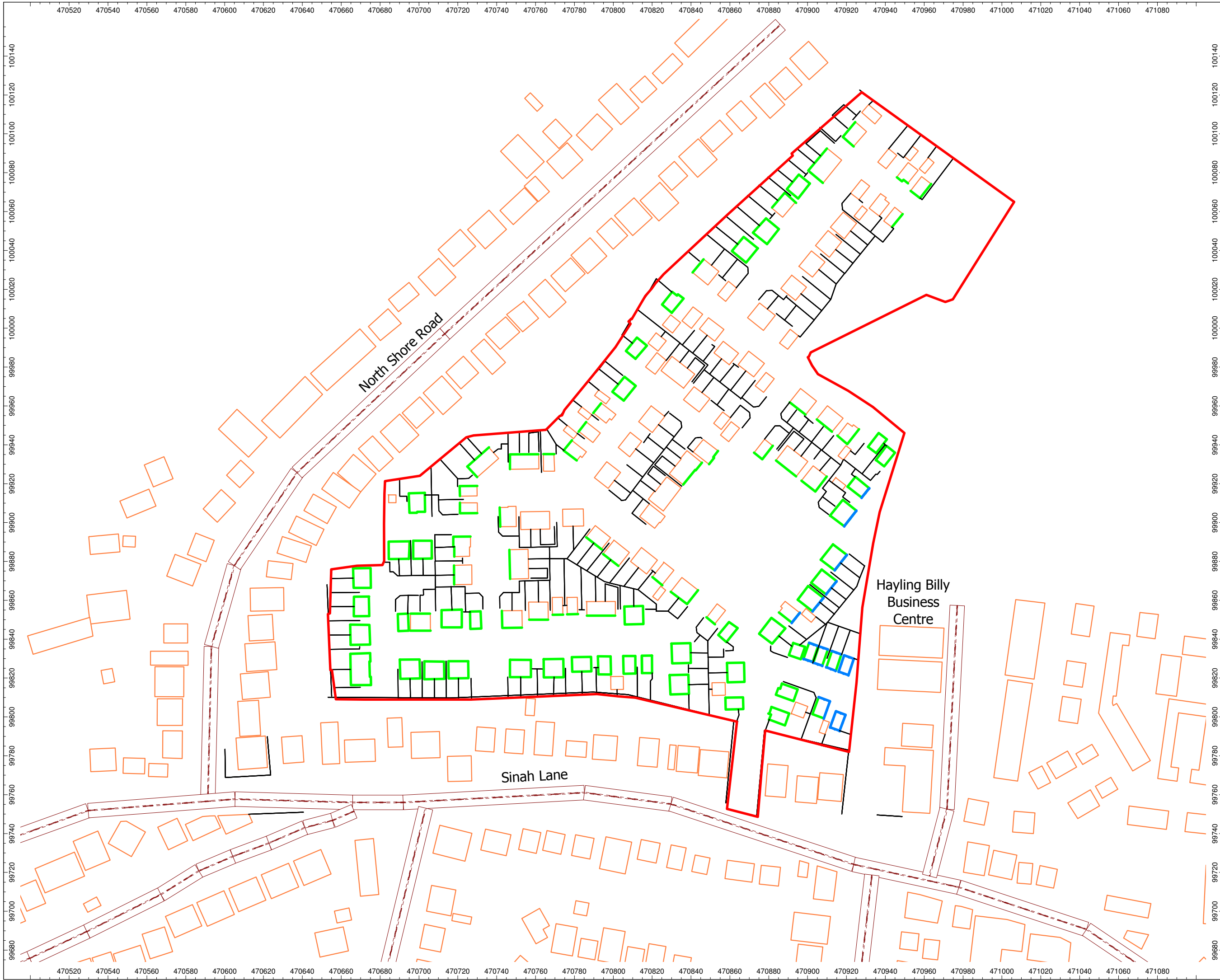
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Project Number:
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Drawing Title / Scenario:
**Glazing and Mitigation
Strategy**

Drawing Number:
SK05

Key:

Site Boundary: 

Enhanced Glazing &
Alternative Ventilation
Rw + Ctr 32 dB: 

Glazing &
Alternative Ventilation
Rw + Ctr 30 dB: 

Scale : Not to scale

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