Hertfordshire County Council

Baldock BA4, Hertfordshire

Noise Assessment

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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 south of Royston Road (BA4), in Baldock, Hertfordshire.

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)

This report is intended to provide information relevant to the local planning authority and their consultees in support of a planning application for the above proposed development. Policy guidance with respect to noise is found in National Planning Policy Framework (NPPF), published on 24th July 2018. With regard to noise and planning, NPPF contains the following statement at paragraph 170:

"170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans

A further 2 short statements are presented at paragraph 180, which state:

"180. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a. *"mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life*

b. *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational an amenity value for this reason."*

Furthermore, paragraphs 182 and 183 state:

> *"182. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.*
>
> *183. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."*

Practice Guidance (PPG): Noise provides further guidance with regard to the assessment of noise within the context of Planning Policy. The overall aim of this guidance, tying in with the principles of the NPPF and the Explanatory Note of the Noise Policy Statement for England, 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 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 by Graham Davis 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	-	-
Graham Davis	BA (2008)	Nov 2013	Sep 2011	Jan 2014	-
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;
- 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 $L_{Aeq,8hr}$ High: 70 dB / 60 dB Medium: 65 dB / 55 dB Low: 60 dB / 50 dB Negligible: 55 dB / 45 dB and 50 dB / 40 dB	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: *Bedrooms – 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax}* *Living Rooms – 35 dB $L_{Aeq,16hours}$* *External Amenity Space – 55 dB $L_{Aeq,16hours}$* 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: *Bedrooms – 30 dB $L_{Aeq,8hours}$ / 45 dB L_{Amax}* *Living Rooms – 35 dB $L_{Aeq,16hours}$* *External Amenity Space – 55 dB $L_{Aeq,16hours}$* 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	Vincent & Gorbing Limited	Drawing Title: Illustrative housing layout Drawing Number: 106A

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}	Modelled L_{Aeq}	Difference between Monitored and Modelled Results
LT1	52.9	51.3	-1.6
LT2	72.9	73.5	0.6
LT3	57.3	57.8	0.5
LT4	52.1	52.2	0.1
LT5	60.8	60.3	-0.5
LT6	71.5	70.4	-1.1
LT7	57.1	56.3	-0.8
LT8	61.7	60.6	-1.1
LT9	58.5	57.4	-1.1
LT10	51.3	55.4	4.1
LT11	73.0	72.5	-0.5
LT12	48.2	44.7	-3.5
ST1	59.9	60.1	0.2
ST2	63.6	64.6	1.0
ST3	59.3	61.6	2.3
ST4	54.8	56.9	2.1
ST5	76.6	76.9	0.3
ST6	74.2	73.0	-1.2
ST7	61.0	59.1	-1.9
ST8	50.7	52.7	2.0
ST9	58.3	55.7	-2.3
ST10	80.3	73.1	-7.2
ST11	71.4	71.0	-0.4
ST12	74.8	70.6	-4.2

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

Location	Monitored L_{Aeq}	Modelled L_{Aeq}	Difference between Monitored and Modelled Results
LT1	44.4	42.6	-1.8
LT2	65.2	65.3	0.1
LT3	50.5	50.2	-0.3
LT4	47.0	44.1	-2.9
LT5	53.0	52.6	-0.4
LT6	63.3	62.3	-1.0
LT7	50.8	40.7	-0.1
LT8	56.6	56.3	-0.3
LT9	53.4	43.2	-0.2

Location	Monitored L_{Aeq}	Modelled L_{Aeq}	Difference between Monitored and Modelled Results
LT10	43.6	47.2	3.6
LT11	64.9	64.6	-0.3
LT12	43.9	37.1	-6.8
ST1	49.0	50.1	1.1
ST2	53.5	53.5	0.0
ST3	47.6	52.8	5.2
ST4	41.6	38.8	-2.8
ST5	66.8	68.5	1.7
ST6	67.1	68.8	1.7
ST7	37.5	39.9	2.4
ST8	40.2	43.3	3.1
ST9	48.7	45.9	-2.8
ST10	67.8	64.9	-2.9
ST11	63.1	64.3	1.2
ST12	63.2	62.1	-1.1

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

Location	Monitored LAmax	Modelled LAmax	Difference between Monitored and Modelled Results
LT1	65.0	63.3	-1.7
LT2	83.4	83.6	0.2
LT3	85.1	82.4	-2.7
LT4	71.3	72.4	1.1
LT5	72.7	82.2	-0.5
LT6	90.2	86.2	-4.0
LT7	80.8	82.0	1.2
LT8	89.7	88.9	-0.8
LT9	91.6	89.9	-1.7
LT10	75.6	71.5	-4.1
LT11	88.8	89.0	0.2
LT12	61.8	59.7	-2.1
ST1	67.5	67.5	0.0
ST2	74.8	77.5	2.7
ST3	71.7	87.5	15.8
ST4	62.3	64.8	2.5
ST5	80.2	86.9	6.7
ST6	87.2	84.3	-2.9
ST7	70.9	68.1	-2.8
ST8	68.0	69.6	1.6
ST9	79.5	67.4	-12.1
ST10	90.0	90.0	0.0
ST11	85.7	86.0	0.3
ST12	86.3	86.4	0.1

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

The verification for measurements LT10 and LT12 is more complex, as they are a greater distance from the closest noise source and so the propagation of the noise levels has a greater potential to be affected by local sources such as birdsong, topography and meteorological conditions, in comparison to other measurement locations. Thus, as detailed below the reliability of these two locations has a lower weighting than other measurements used for verification.

During the daytime period, the model verification points show a divergence between monitored and modelled results of no more than ±3.0 dB, with the exception of locations LT10, LT12, ST10 and ST12. These positions are all predicting lower than other monitoring positions, apart from of LT10, which is predicting higher.

When considering ST10 and ST12, the variance is considered to be due to a greater frequency of vehicles passing during the short-term 15-minute measurement, in comparison to the number of vehicles predicted in the model over a 16-hour period. ST10 was also carried out in close proximity to LT11, which has a greater weight in confidence due to a longer exposure time, which has been verified within ±3.0.

During the night-time L_{Aeq} period, ST3 and ST8 are predicting greater noise levels compared to other measurements. This can be explained due to a lower frequency of passing road traffic during the measurements.

For both the daytime and night-time L_{Aeq}, LT10 has been predicted greater, than the measured $L_{Aeq,}$ allowing a worst-case scenario to be considered. LT12 has been predicted lower, but it has been observed that the measured L_{Aeq}, was influenced by frequent birdsong close to the microphone. All other long term measurements have been successfully verified within the model, therefore can be considered suitably verified.

The verification points show a divergence between monitored and modelled results of no more than ±3.0 dB, with the exception of locations LT6, LT10, ST3, ST5 and ST9 during the night-time L_{Amax} period.

Greater noise levels have been modelled for ST3 and ST5 compared to what was measured. This can be explained due to a lower frequency of passing road traffic during the measurement. When considering ST9, the opposite will have been the case. That is, there was a greater number of vehicles passing, during the 15-minute measurement, in comparison to the number of vehicles predicted in the model over an 8-hour period.

Both LT6 and LT10 during the night-time L_{Amax} period are predicting lower than other monitoring positions, however both lie close to other long term monitoring positions (LT11 and LT7) which are both within ±3.0 dB, therefore the model is considered suitably verified.

3.1.2 Road Traffic Data

All roads expected to make a significant contribution have been included within the assessment. Traffic flows and HGV percentages have been based on traffic data provided by WYG transport consultants. Traffic flows used for the noise intrusion assessment include a link road for the proposed mixed-use residential-led development (planning permission ref 17/04417/OP) which lies to the southeast of the site, as this is considered to represent a worst-case scenario. Traffic data from the future year (2031) is detailed below.

Table 3.6 Traffic Data (2031)

Road	2031	HGV %
A507 (A1(M) Junction 10 Western arm)	23130	3%
A507 (between A1(M) Junction 10 and Services)	19961	3%
North Road (between Junction 10 and North Link Road)	15083	3%
North Road (between Junction 10 and North Link Road) 40mph speed limit	15083	3%
North Road (between Junction 10 and North Link Road) – alternative widening	15083	3%
North Road (between North Link Road and Bygrave Road)	13618	3%
North Road (between Bygrave Road and Royston Road)	13512	3%
Clothall Road (between Royston Road and South Road)	5893	3%
Clothall Road (to the South of South Road)	11821	3%
Bygrave Road	1795	3%
Royston Road (near Clothall Road)	7516	3%
Royston Road (near the A505 junction)	10169	3%
Wallington Road	14843	3%
A505 (A1(M) Junction 9 Eastern arm)	38465	3%
Whitehorse Street	10052	3%
Letchworth Road (between A1(M) and Weston Way)	13530	3%
Letchworth Road (between Weston Way and Norton Road)	12115	3%
A1(M) (between J8 and J9)	85559	3%
A1(M) (between J9 and J10)	52146	3%
A1(M) (between J10 and J11)	50089	3%
South Link Road	7609	3%

3.2 Sensitive Receptors

Proposed residential receptors have been assessed against the existing noise levels with respect to direct noise from road traffic 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	North of site	Royston Road	5	1.5 / 4.0
R02	Northwest of site	Royston Road	36	1.5 / 4.0
R03	Northwest of site	Royston Road	49	1.5 / 4.0
R04	West of site	Royston Road	92	1.5 / 4.0
R05	West of site	Royston Road	100	1.5 / 4.0
R06	Southwest of site	Royston Road	117	1.5 / 4.0
R07	Southwest of site	New Link Road	112	1.5 / 4.0
R08	South of site	New Link Road	65	1.5 / 4.0
R09	Southeast of site	New Link Road	41	1.5 / 4.0
R10	East of site	New Link Road	43	1.5 / 4.0
R11	Centre of site	New Link Road	71	1.5 / 4.0
R12	Centre of site	New Link Road	88	1.5 / 4.0
R13	Northeast of site	New Link Road	48	1.5 / 4.0
R14	Northeast of site	Royston Road	54	1.5 / 4.0
R15	North of site	Royston Road	9	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	Northwest of site	Royston Road	20	1.2
G02	Northwest of site	Royston Road	25	1.2
G03	West of site	Royston Road	66	1.2
G04	Southwest of site	New Link Road	126	1.2
G05	South of site	New Link Road	84	1.2
G06	Southeast of site	New Link Road	47	1.2
G07	East of site	New Link Road	58	1.2
G08	Centre of site	Royston Road	78	1.2
G09	East of site	New Link Road	51	1.2
G10	Northeast of site	Royston Road	22	1.2

3.3 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 2.

4.0 Noise Survey

4.1 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 (WYG12)	s/n	213442
Rion NL-52	Environmental Noise Analyser (WYG13)	s/n	1221575
Rion NL-52	Environmental Noise Analyser (WYG15)	s/n	620858
Rion NL-52	Environmental Noise Analyser (WYG17)	s/n	1043466
Rion NL-52	Environmental Noise Analyser (WYG18)	s/n	843173
Rion NL-52	Environmental Noise Analyser (WYG19)	s/n	253701
Rion NL-52	Environmental Noise Analyser (WYG20)	s/n	253702
Rion NL-52	Environmental Noise Analyser (WYG22)	S/n	1021257
Rion NL-52	Environmental Noise Analyser (WYG23)	s/n	732146
Rion NL-52	Environmental Noise Analyser (WYG24)	s/n	264490
Rion NL-52	Environmental Noise Analyser (WYG25)	s/n	264488
Rion NL-52	Environmental Noise Analyser (WYG26)	s/n	264490
Rion NL-52	Environmental Noise Analyser (WYG26)	s/n	123729
Rion NC-74	Sound Calibrator	s/n	35046823
Norsonic 140	Environmental Noise Analyser	s/n	1402987
Norsonic 1251	Sound Calibrator	s/n	31043

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 24 locations (as specified in the following table and shown in SK01 of Appendix B) from Thursday 9th February 2017 to Monday 20th February 2017. Attended short term measurements were undertaken at 12 locations during the day, evening, peak and night-time periods with 12 additional locations being measured unattended over a 100-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 with scattered showers. Anemometer readings confirmed that wind speeds were less than 5 ms^{-1} at all times during the survey with a predominant north-easterly wind direction.

Table 4.1 Noise Monitoring Locations

Ref	Description
LT1	Laxton Gardens
LT2	Facing A505 to rear of Holme Farm
LT3	Wallington Road
LT4	To rear of Barley Rise
LT5	Facing A505 from footpath towards fly over
LT6	Royston Road
LT7	To rear of 'West Deane' Royston Road
LT8	Field boundary to rear of Cattery
LT9	Along field boundary south of Bygrave Road
LT10	Light industrial units
LT11	North Road
LT12	Field Boundary to east of Ashwell Road
ST1	Walnut Ave facing South Rd
ST2	Facing Clothall Road from access road to Holme Farm
ST3	Wallington Road
ST4	Yeomanry Drive
ST5	Bridge over the A505
ST6	Royston Road
ST7	Yeomanry Drive
ST8	Bygrave Road
ST9	Wedon Way facing Ashwell Rd
ST10	North Road
ST11	Station Road/Royston Road
ST12	Royston Road

4.2 Noise Survey Results

Existing ambient noise levels around the site are dominated by accumulated road traffic noise. The main contributing sources being the A505, B656, North Road, South Road and A507 Clothall 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	Wind Speed	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
Day ST1	09/02/2017 15:12	2.0 ºC	1-2 m/s	NE	8	Road traffic noise associated South Road
Day ST2	09/02/2017 14:53	2.0 ºC	1-2 m/s	NE	8	Road traffic noise associated with A505 & A507
Day ST3	09/02/2017 15:31	2.0 ºC	1-2 m/s	NE	8	Road traffic noise associated with Wallington Road
Day ST4	09/02/2017 15:51	2.0 ºC	1-2 m/s	NE	8	Background road traffic noise from A505. Predominantly road noise from Yeomanry Road
Day ST5	10/02/2017 11:20	3.0 ºC	2-3 m/s	SW	8	Road traffic noise associated with A505
Day ST6	09/02/2017 15:34	3.0 ºC	1-2 m/s	W/NW	8	Road traffic noise associated with B656
Day ST7	10/02/2017 12:18	1.0 ºC	0-1 m/s	ENE	8	Noise from B656, A505, and residential traffic
Day ST8	10/02/2017 09:30	3.0 ºC	1-2 m/s	NE	8	Distant road traffic noise associated with Bywell Road
Day ST9	10/02/2017 09:51	3.0 ºC	1-2 m/s	NE	8	Distant road traffic noise with occasional road traffic noise from Ashwell Road & Bywell Road
Day ST10	10/02/2017 13:03	1.0 ºC	0-1 m/s	NE	8	Road traffic on North Road
Day ST11	10/02/2017 11:51	1.0 ºC	1-2 m/s	W	8	Road traffic noise associated with cross roads. Operational noise from building site
Day ST12	09/02/2017 16:17	3.0 ºC	1-2 m/s	NE	8	Road traffic noise associated with B656
Evening ST1	09/02/2017 21:05	3.0 ºC	1-2 m/s	NE	8	Road traffic noise associated with South Road. Background road traffic noise
Evening ST2	09/02/2017 20:45	3.0 ºC	1-2 m/s	ENE	8	Background road traffic noise associated with A505 & Clothall Road (A507)
Evening ST3	09/02/2017 21:28	3.0 ºC	1-2 m/s	NE	8	Road traffic noise associated with A505. Occasional vehicle pass on Wallington Road
Evening ST4	09/02/2017 21:50	2.0 ºC	1-2 m/s	NE	8	Occasional road traffic noise associated with Yeomans Drive. Background road traffic noise from A505
Evening ST5	09/02/2017 21:59	1.0 ºC	2-3 m/s	SW	8	Road traffic noise associated with A505
Evening ST6	09/02/2017 21:36	1.0 ºC	1-2 m/s	SW	8	Traffic on B656 and at motorway junction
Evening ST7	09/02/2017 22:44	1.0 ºC	0-1 m/s	NE	8	Distant traffic of the A505, some traffic from B656
Evening ST8	09/02/2017 22:45	3.0 ºC	1-2 m/s	NE	8	Occasional vehicle pass from Bywell Road. Background road traffic noise
Evening ST9	09/02/2017 22:25	3.0 ºC	1-2 m/s	NE	8	Occasional vehicle pass from Ashwell Road. Background road traffic noise
Evening ST10	09/02/2017 20:45	1.0 ºC	1-2 m/s	NW	8	Road traffic noise associated with North Road

Survey Location	Date & Time	Temperature	Wind Speed	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
Evening ST11	09/02/2017 21:13	1.0 ºC	0-1 m/s	NE	8	Road traffic noise associated with North Road. Vehicles starting & stopping for traffic lights
Evening ST12	09/02/2017 22:22	1.0 ºC	0-1 m/s	NE	8	Road traffic on B656 Vents from Duckworth
Night ST1	09/02/2017 23:26	0.0 ºC	1-2 m/s	NE	8	Distant road traffic noise associated. Occasional car pass from South Road.
Night ST2	09/02/2017 23:06	0.0 ºC	1-2 m/s	NE	8	Occasional road traffic noise associated with A507. Background road traffic noise from A505
Night ST3	09/02/2017 23:45	0.0 ºC	1-2 m/s	NE	8	Background road traffic noise. Occasional car pass from Wallington Road
Night ST4	10/02/2017 00:09	0.0 ºC	1-2 m/s	NE	8	Background road traffic noise. Occasional car pass from Yeoman Drive
Night ST5	09/02/2017 23:35	0.0 ºC	1-2 m/s	SW	8	Road traffic noise associated with A505
Night ST6	09/02/2017 23:13	0.0 ºC	1-2 m/s	SW	8	Road traffic noise associated with A505 & B656
Night ST7	10/02/2017 00:54	0.0 ºC	1-2 m/s	NNE	8	Road traffic noise associated with A505. Planes overhead and residential boiler
Night ST8	10/02/2017 00:59	0.0 ºC	1-2 m/s	NNE	8	Background road traffic noise. Occasional car pass from Bywell Road
Night ST9	10/02/2017 00:38	0.0 ºC	1-2 m/s	NNE	8	Background road traffic noise. Occasional car pass from Ashwell Road
Night ST10	10/02/2017 01:18	0.0 ºC	1-2 m/s	NNE	8	Road traffic noise associated with North Road. Distant road traffic noise from A1
Night ST11	10/02/2017 00:32	0.0 ºC	1-2 m/s	NNE	8	Infrequent traffic at crossroads
Night ST12	10/02/2017 00:01	0.0 ºC	1-2 m/s	NNE	8	Distant road traffic noise associated with A505. Plant noise from industrial estate

The results of the statistical measurements conducted during the baseline survey are summarised in Tables 4.3 and 4.4 below.

Table 4.3 Long-term (LT) 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)
Week Day 07:00 - 23:00	26 Hours	09/02/2017 – 10/02/2017 13:10 – 23:00	LT1*	52.9	86.5	30.8	54.0	48.0
Week Night 23:00 – 07:00	16 Hours	09/02/2017 – 13/02/2017 23:00 - 05:00		44.4	65.0	21.5	45.0	29.0

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 Day 07:00 - 23:00	32 Hours	11/02/2017 – 12/02/2017 07:00 - 23:00		52.9	90.1	34.8	54.0	48.0
Weekend Night 23:00 – 07:00	16 Hours	11/02/2017 – 12/02/2017 23:00 - 07:00		43.0	64.1	22.4	44.0	37.0
Week Day 07:00 - 23:00	27 Hours	09/02/2017 – 10/02/2017 12:30 - 23:00	LT2*	72.9	86.3	35.0	75.0	67.0
Week Night 23:00 – 07:00	16 Hours	09/02/2017 – 13/02/2017 23:00 - 05:00		65.2	83.4	21.0	65.0	33.0
Weekend Day 07:00 - 23:00	32 Hours	11/02/2017 – 12/02/2017 07:00 - 23:00		72.3	93.4	36.7	75.0	67.0
Weekend Night 23:00 – 07:00	16 Hours	11/02/2017 – 12/02/2017 23:00 - 07:00		63.4	81.3	22.0	66.0	38.0
Week Day 07:00 - 23:00	25 hours	09/02/2017 – 10/02/2017 13:44 - 23:00	LT3*	57.3	84.8	30.4	60.0	48.0
Week Night 23:00 – 07:00	16 Hours	09/02/2017 – 13/02/2017 23:00 - 05:00		50.1	85.1	21.1	45.0	31.0
Weekend Day 07:00 - 23:00	32 Hours	11/02/2017 – 12/02/2017 07:00 - 23:00		56.9	86.1	35.4	60.0	48.0
Weekend Night 23:00 – 07:00	16 Hours	11/02/2017 – 12/02/2017 23:00 - 07:00		50.5	83.4	23.0	46.0	35.0
Week Day 07:00 - 23:00	30 hours	09/02/2017 – 10/02/2017 13:59 - 23:00	LT4*	49.2	81.4	31.3	50.0	45.0
Week Night 23:00 – 07:00	16 Hours	09/02/2017 – 13/02/2017 23:00 - 05:00		46.2	67.5	22.0	46.0	31.0
Weekend Day 07:00 - 23:00	32 Hours	11/02/2017 – 12/02/2017 07:00 - 23:00		52.1	85.6	34.8	52.0	46.0
Weekend Night 23:00 – 07:00	16 Hours	11/02/2017 – 12/02/2017 23:00 - 07:00		47.0	71.3	23.4	46.0	39.0
Week Day 07:00 - 23:00	25 hours	09/02/2017 – 10/02/2017 14:31 - 23:00	LT5*	60.7	83.9	38.0	62.0	58.0
Week Night 23:00 – 07:00	16 Hours	09/02/2017 – 13/02/2017 23:00 - 05:00		53.0	72.4	19.9	54.0	27.0
Weekend Day 07:00 - 23:00	32 Hours	11/02/2017 – 12/02/2017 07:00 - 23:00		60.8	80.1	34.1	63.0	58.0
Weekend Night 23:00 – 07:00	16 Hours	11/02/2017 – 12/02/2017 23:00 - 07:00		51.2	72.7	20.4	54.0	34.0
Week Day 07:00 - 23:00	30 Hours	09/02/2017 – 10/02/2017 15:33 – 23:00	LT6*	71.6	96.4	27.5	75.0	54.0
Week Night 23:00 – 07:00	24 Hours	09/02/2017 – 13/02/2017 23:00 - 05:00		63.3	86.9	20.8	52.0	31.0
Weekend Day 07:00 - 23:00	32 Hours	11/02/2017 – 12/02/2017 07:00 - 23:00		70.8	99.5	32.3	74.0	53.0

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 23:00 – 07:00	16 Hours	11/02/2017 – 12/02/2017 23:00 - 07:00		61.9	90.2	22.6	52.0	34.0
Week Day 07:00 - 23:00	25 Hours	09/02/2017 – 10/02/2017 13:35 – 23:00	LT7*	56.2	82.8	26.8	54.0	49.0
Week Night 23:00 – 07:00	24 Hours	09/02/2017 – 13/02/2017 23:00 – 05:00		50.8	80.8	20.0	45.0	28.0
Weekend Day 07:00 - 23:00	32 Hours	11/02/2017 – 12/02/2017 07:00 - 23:00		57.1	87.5	31.1	55.0	48.0
Weekend Night 23:00 – 07:00	16 Hours	11/02/2017 – 12/02/2017 23:00 - 07:00		48.3	79.4	20.6	44.0	33.0
Week Day 07:00 - 23:00	36 Hours	16/02/2017 – 20/02/2017 09:03 – 12:18	LT8	61.7	96.7	37.5	56.0	50.0
Week Night 23:00 – 07:00	16 Hours	16/02/2017 – 20/02/2017 23:00 - 07:00		56.6	89.7	28.0	47.0	34.0
Weekend Day 07:00 - 23:00	32 Hours	18/02/2017 – 19/02/2017 07:00 - 23:00		60.9	92.1	35.8	56.0	48.0
Weekend Night 23:00 – 07:00	16 Hours	18/02/2017 – 19/02/2017 23:00 - 07:00		54.2	86.3	230	49.0	35.0
Week Day 07:00 - 23:00	35 Hours	16/02/2017 – 20/02/2017 10:42 – 13:12	LT9*	58.5	92.3	33.3	51.0	48.0
Week Night 23:00 – 07:00	16 Hours	16/02/2017 – 20/02/2017 23:00 - 07:00		53.4	91.6	28.0	44.0	35.0
Weekend Day 07:00 - 23:00	32 Hours	18/02/2017 – 19/02/2017 07:00 - 23:00		56.5	89.4	33.7	48.0	44.0
Weekend Night 23:00 – 07:00	16 Hours	18/02/2017 – 19/02/2017 23:00 - 07:00		49.7	82.8	22.1	40.8	38.0
Week Day 07:00 - 23:00	24 Hours	09/02/2017 – 10/02/2017 15:13 - 23:00	LT10*	51.3	81.3	32.6	52.0	47.0
Week Night 23:00 – 07:00	16 Hours	09/02/2017 – 13/02/2017 23:00 - 05:00		42.8	62.3	25.5	42.0	33.0
Weekend Day 07:00 - 23:00	32 Hours	11/02/2017 – 12/02/2017 07:00 - 23:00		49.9	72.4	35.9	51.0	44.0
Weekend Night 23:00 – 07:00	16 Hours	11/02/2017 – 12/02/2017 23:00 - 07:00		43.6	75.6	26.1	45.0	36.0
Week Day 07:00 - 23:00	25 Hours	09/02/2017 – 13/02/2017 14:11 - 23:00	LT11*	73.0	104.4	36.2	77.0	59.0
Week Night 23:00 – 07:00	16 Hours	09/02/2017 – 13/02/2017 23:00 - 05:00		64.9	87.0	28.5	58.0	37.0
Weekend Day 07:00 - 23:00	32 Hours	11/02/2017 – 12/02/2017 07:00 - 23:00		72.4	99.0	37.4	76.0	54.0
Weekend Night 23:00 – 07:00	16 Hours	11/02/2017 – 12/02/2017 23:00 - 07:00		64.7	88.1	29.8	61.0	39.0

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)
Week Day 07:00 - 23:00	33 hours	16/02/2017 – 20/02/2017 10:17 – 11:27	LT12*	48.2	76.0	29.3	49.0	45.0
Week Night 23:00 – 07:00	15 Hours	16/02/2017 – 20/02/2017 23:00 - 07:00		43.9	61.8	29.1	44.0	39.0
Weekend Day 07:00 - 23:00	32 Hours	18/02/2017 – 19/02/2017 07:00 - 23:00		47.2	79.8	36.0	48.0	43.0
Weekend Night 23:00 – 07:00	16 hours	18/02/2017 – 19/02/2017 23:00 - 07:00		41.4	58.3	28.2	42.0	35.0

*Excluded events include bird song and high wind speeds

Table 4.4 Short-term (ST) 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)
Daytime 07:00 - 19:00	15 Mins	09/02/2017 15:12	ST1	59.9	76.0	38.4	63.5	47.0
	15 Mins	09/02/2017 14:53	ST2	63.6	78.2	49.8	67.8	54.0
	15 Mins	09/02/2017 15:31	ST3	59.3	76.0	42.9	63.5	49.0
	15 Mins	09/02/2017 15:51	ST4	54.8	75.6	38.9	56.9	46.0
	15 Mins	10/02/2017 11:20	ST5	76.6	87.5	60.5	80.1	69.0
	15 Mins	09/02/2017 15:34	ST6	74.2	87.3	47.6	79.3	56.0
	15 Mins	10/02/2017 12:18	ST7	61.0	80.3	40.9	61.1	44.0
	15 Mins	10/02/2017 09:30	ST8	50.7	69.8	38.2	53.9	41.0
	15 Mins	10/02/2017 09:51	ST9	58.3	80.4	38.1	58.0	40.0
	15 Mins	10/02/2017 13:03	ST10	80.3	94.4	50.6	85.6	56.0
	15 Mins	10/02/2017 11:51	ST11	71.4	92.7	54.9	74.3	62.0
	15 Mins	09/02/2017 16:17	ST12	74.8	89.3	44.4	79.5	53.0
Evening 19:00 - 23:00	15 Mins	09/02/2017 21:05	ST1	55.2	72.2	34.4	59.6	39.0
	15 Mins	09/02/2017 20:45	ST2	59.6	75.3	38.2	61.9	47.0
	15 Mins	09/02/2017 21:28	ST3	54.5	71.9	34.1	56.6	38.0
	15 Mins	09/02/2017 21:50	ST4	50.5	66.1	34.2	52.8	37.0
	15 Mins	09/02/2017 21:59	ST5	69.5	80.3	40.9	73.8	53.0
	15 Mins	09/02/2017 21:36	ST6	70.3	91.5	35.4	71.2	45.0
	15 Mins	09/02/2017 22:44	ST7	52.7	76.1	27.1	44.9	32.0
	15 Mins	09/02/2017 22:45	ST8	49.9	71.0	29.2	49.0	34.0
	15 Mins	09/02/2017 22:25	ST9	50.2	71.3	31.3	47.3	34.0
	15 Mins	09/02/2017 20:45	ST10	75.8	93.8	40.7	79.6	45.0
	15 Mins	09/02/2017 21:13	ST11	66.7	83.1	42.0	69.6	56.0
	15 Mins	09/02/2017 22:22	ST12	68.2	88.4	35.9	70.1	41.0
Night-time 23:00 - 07:00	15 Mins	09/02/2017 23:26	ST1	49.0	67.5	28.1	48.2	33.0
	15 Mins	09/02/2017 23:06	ST2	53.5	74.8	32.3	54.9	40.0
	15 Mins	09/02/2017 23:45	ST3	47.6	71.7	30.3	44.6	33.0
	15 Mins	09/02/2017 00:09	ST4	41.6	62.3	32.5	41.1	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)
	15 Mins	09/02/2017 23:35	ST5	66.8	80.2	39.1	71.7	48.0
	15 Mins	09/02/2017 23:13	ST6	67.1	87.2	32.6	67.5	39.0
	15 Mins	10/02/2017 00:54	ST7	37.5	70.9	22.5	37.8	26.0
	15 Mins	09/02/2017 00:59	ST8	40.2	68.0	23.3	38.5	27.0
	15 Mins	09/02/2017 00:38	ST9	48.7	79.5	22.4	40.6	28.0
	15 Mins	10/02/2017 01:18	ST10	67.8	90.0	30.4	59.2	35.0
	15 Mins	10/02/2017 00:32	ST11	63.1	85.7	27.2	64.9	31.0
	15 Mins	10/02/2017 00:01	ST12	63.2	86.3	36.4	53.7	40.0

5.0 Assessment of Effects

5.1 ProPG Stage 1 Assessment

Daytime $L_{Aeq, 16hour}$ noise levels range between 47 - 73 dB and night-time $L_{Aeq, 8hour}$ noise levels range between 41 – 65 dB, therefore the site falls within the Medium/High Noise Risk Category, therefore requires good acoustic design.

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 most 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	64.4	54.4	34.4	35
R02	49.5	39.5	19.5	35
R03	54.5	44.5	24.5	35
R04	47.2	37.2	17.2	35
R05	47.1	37.1	17.1	35
R06	47.4	37.4	17.4	35
R07	50.7	40.7	20.7	35
R08	54.0	44.0	24.0	35
R09	60.3	50.3	30.3	35
R10	60.7	50.7	30.7	35
R11	48.2	38.2	18.2	35
R12	52.2	42.2	22.2	35
R13	61.1	51.1	31.1	35
R14	56.4	46.4	26.4	35
R15	60.2	50.2	30.2	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	55.9	45.9	25.9	30
R02	43.5	33.5	13.5	30
R03	47.3	37.3	17.3	30
R04	42.0	32.0	12.0	30
R05	41.7	31.7	11.7	30
R06	41.9	31.9	11.9	30
R07	44.5	34.5	14.5	30
R08	46.6	36.6	16.6	30
R09	52.2	42.2	22.2	30
R10	52.5	42.5	22.5	30
R11	43.8	33.8	13.8	30
R12	46.8	36.8	16.8	30
R13	52.9	42.9	22.9	30
R14	48.6	38.6	18.6	30
R15	52.0	42.0	22.0	30

All values are sound pressure levels in dB re: 2x 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	80.2	70.2	50.2	45
R02	60.5	50.5	30.5	45
R03	69.8	59.8	39.8	45
R04	61.8	51.8	31.8	45
R05	58.6	48.6	28.6	45
R06	58.6	48.6	28.6	45
R07	62.0	52.0	32.0	45
R08	68.5	58.5	38.5	45
R09	76.8	66.8	46.8	45
R10	77.1	67.1	47.1	45
R11	65.5	55.5	35.5	45
R12	68.0	58.0	38.0	45
R13	77.5	67.5	47.5	45
R14	72.3	62.3	42.3	45
R15	75.7	65.7	45.7	45

Alternative ventilation will be provided for all 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 metre 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 Upper Guideline Value L_{Aeq}
G01	54.9	55
G02	54.3	55
G03	50.0	55
G04	48.8	55
G05	51.0	55
G06	53.7	55
G07	49.4	55
G08	51.9	55
G09	53.7	55
G10	54.9	55

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

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 upper guideline value (55 dB).

5.4 Tranquillity Assessment

The development is situated in CPRE Zone 2 for tranquillity (1 being least tranquil and 10 being most). The proposed use of the site is not considered likely to affect this rating. The development is situated in a CPRE Zone 2 area of tranquillity, 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.

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. Sensitive bedrooms and living rooms 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.

Enhanced glazing with a sound reduction of up to $R_w + C_{tr}$ 36 will be provided for facades facing Royston Road. The full glazing and ventilation strategy is illustrated in SK05 of Appendix B.

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 train line. 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 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 south of Royston Road (BA4), in Baldock, Hertfordshire. The NPPF (Section 180) gives two test points relating to noise; considering these the following conclusions can be drawn:

NPPF 180 A

The proposed development is not expected to have an 'adverse impact' on health or quality of life. Similarly, 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 180 B

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 2 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 is required for plots facing Royston Road in order to meet internal targets for noise levels. Alternative ventilation (e.g. trickle vents) will be necessary for most dwellings across the site.

All private external amenity areas receptors are below BS 8233 upper 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 that 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

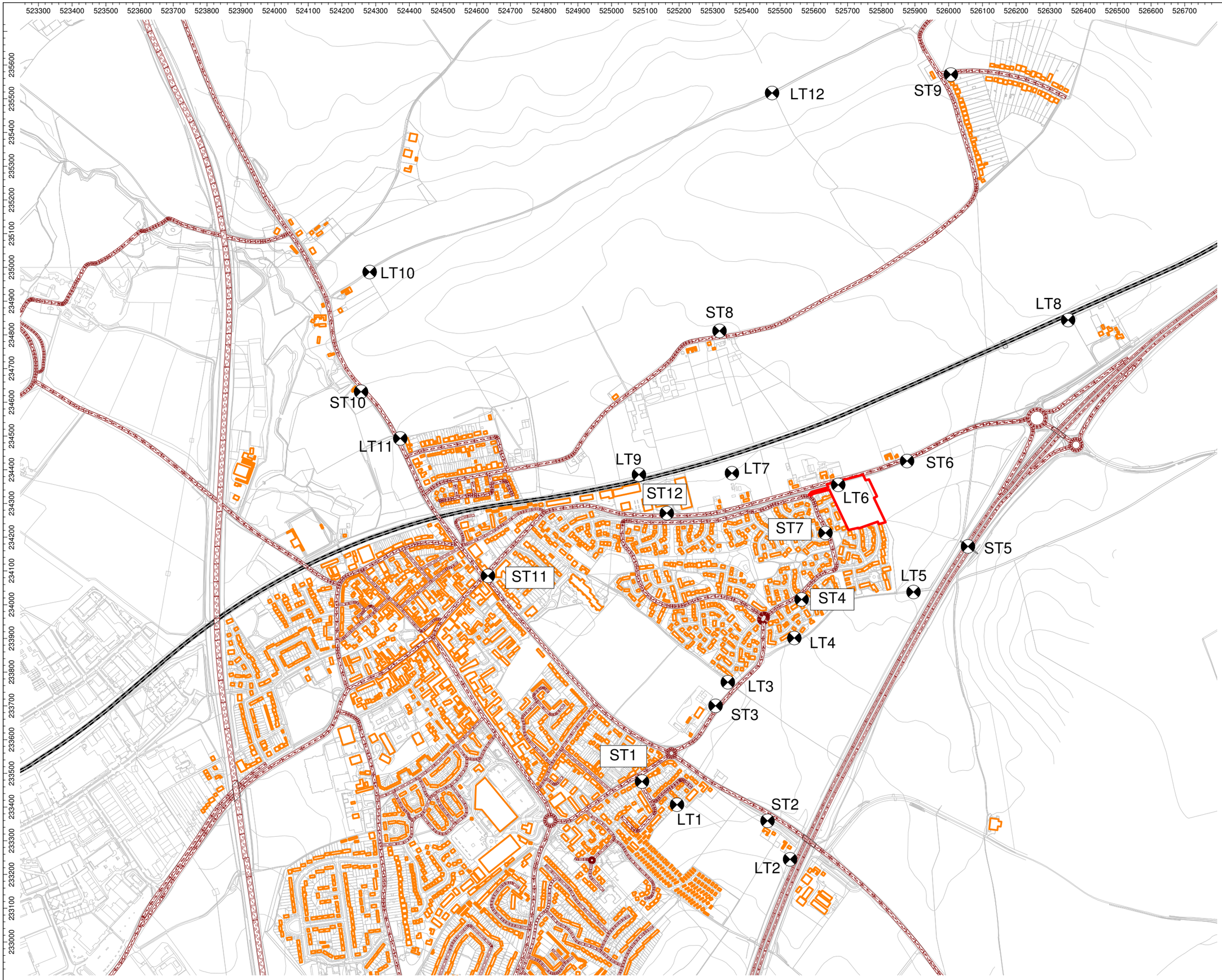
SK01 Noise Monitoring Locations

SK02 Proposed Receptors and External Amenity Receptor Locations

SK03 ProPG Daytime Noise Risk Plot

SK04 ProPG Night-time Noise Risk Plot

SK05 Glazing and Ventilation Strategy



Client:
Hertfordshire County Council

Project:
Baldock BA4 Updates

Project Number:
A090070-171

Drawing Title / Scenario:
Noise Monitoring Locations

Drawing Number:
SK01

Key:

Site Boundary:

Scale : Not to scale

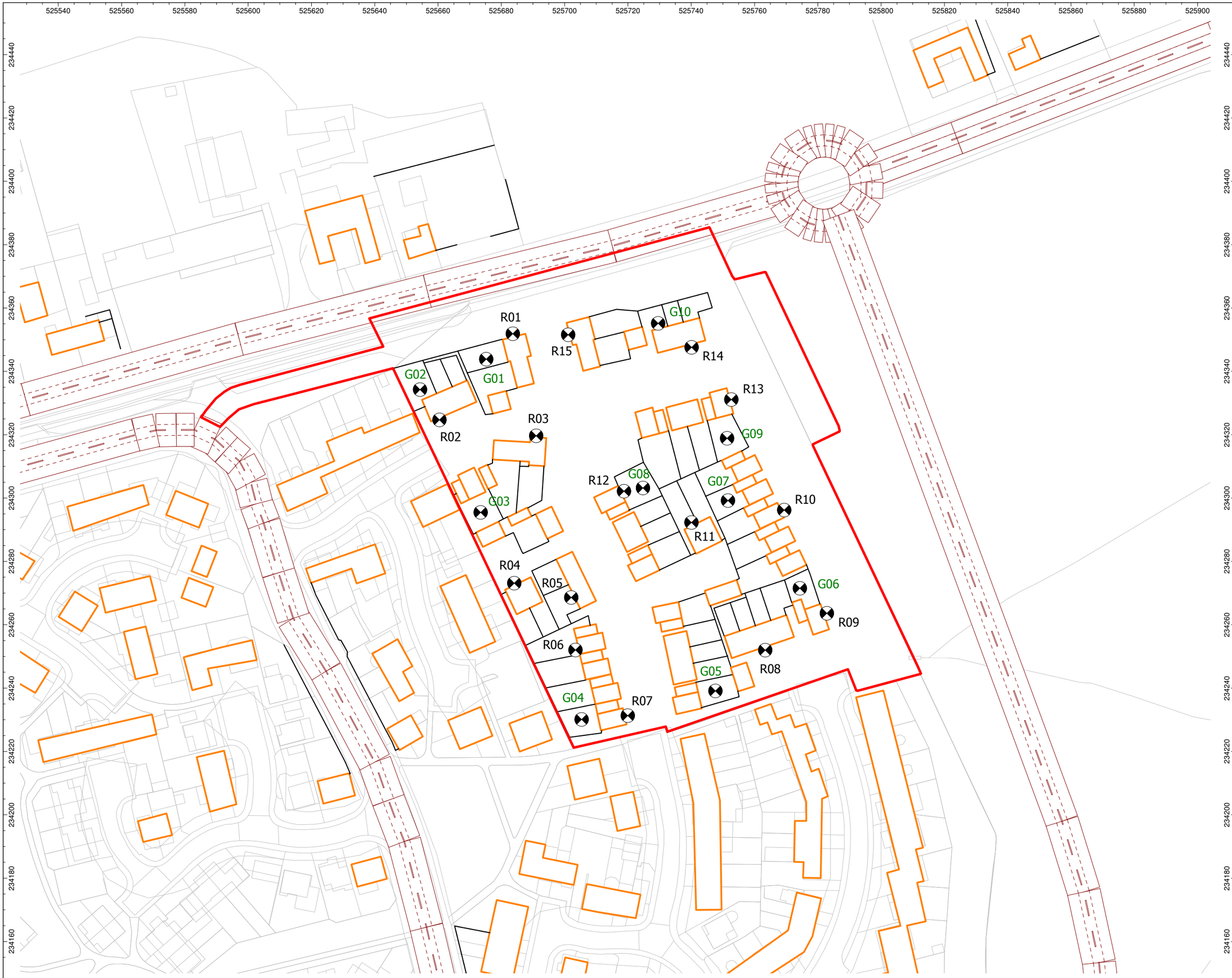
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Client:
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Project:
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Project Number:
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Drawing Title / Scenario:
Proposed Receptor Locations and External Amenity Receptor Locations

Drawing Number:
SK02

Key:

Site Boundary:

Scale : Not to scale

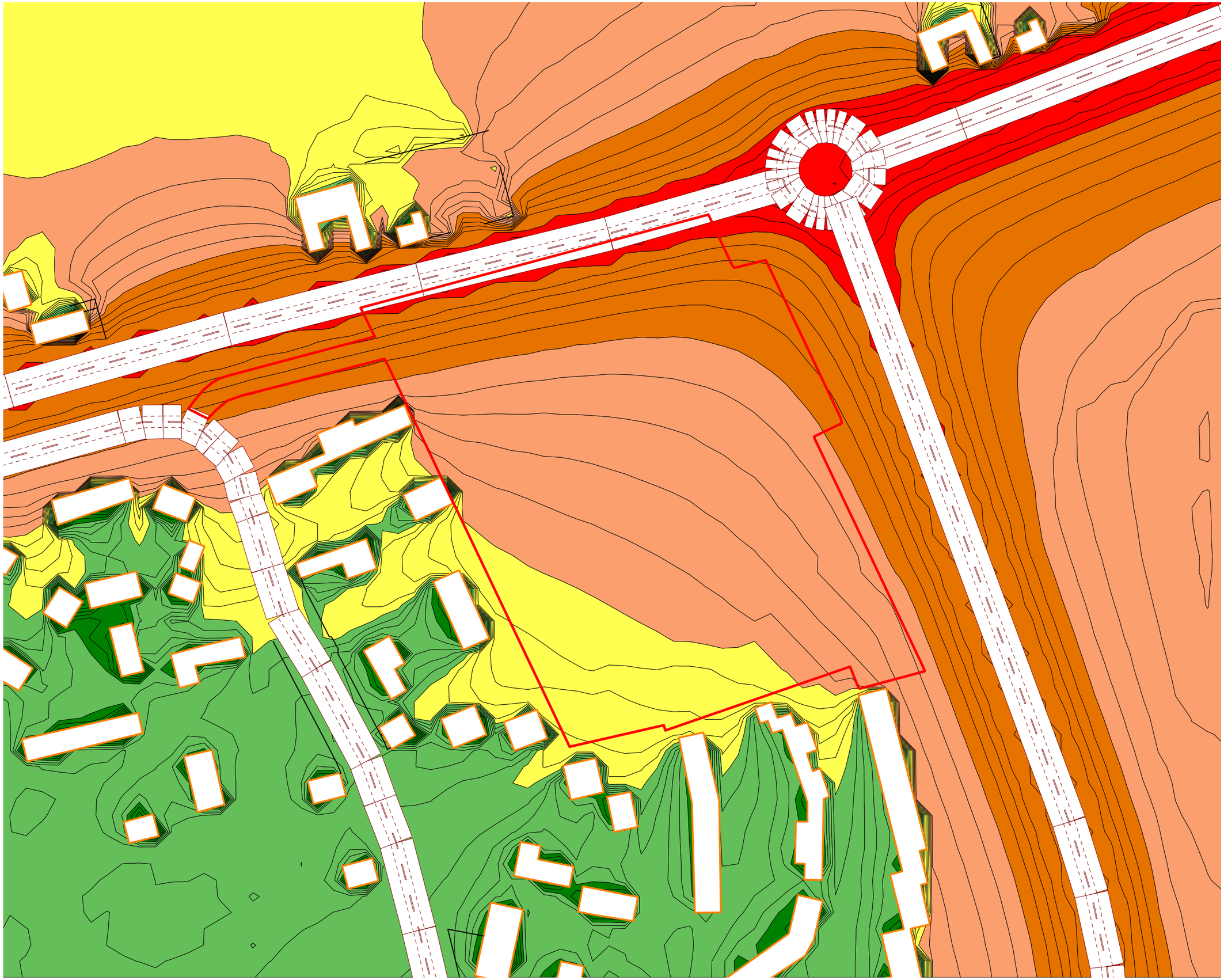
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Project:
Baldock BA4 Updates

Project Number:
A090070-171

Drawing Title / Scenario:
ProPG Stage 1 Risk Assessment: Existing Daytime LAeq 16hr Noise Levels

Drawing Number:
SK03

Key:

Site Boundary:

- Negligible
- Negligible - Low
- Low
- Low - Medium
- Medium
- High

Scale : Not to scale

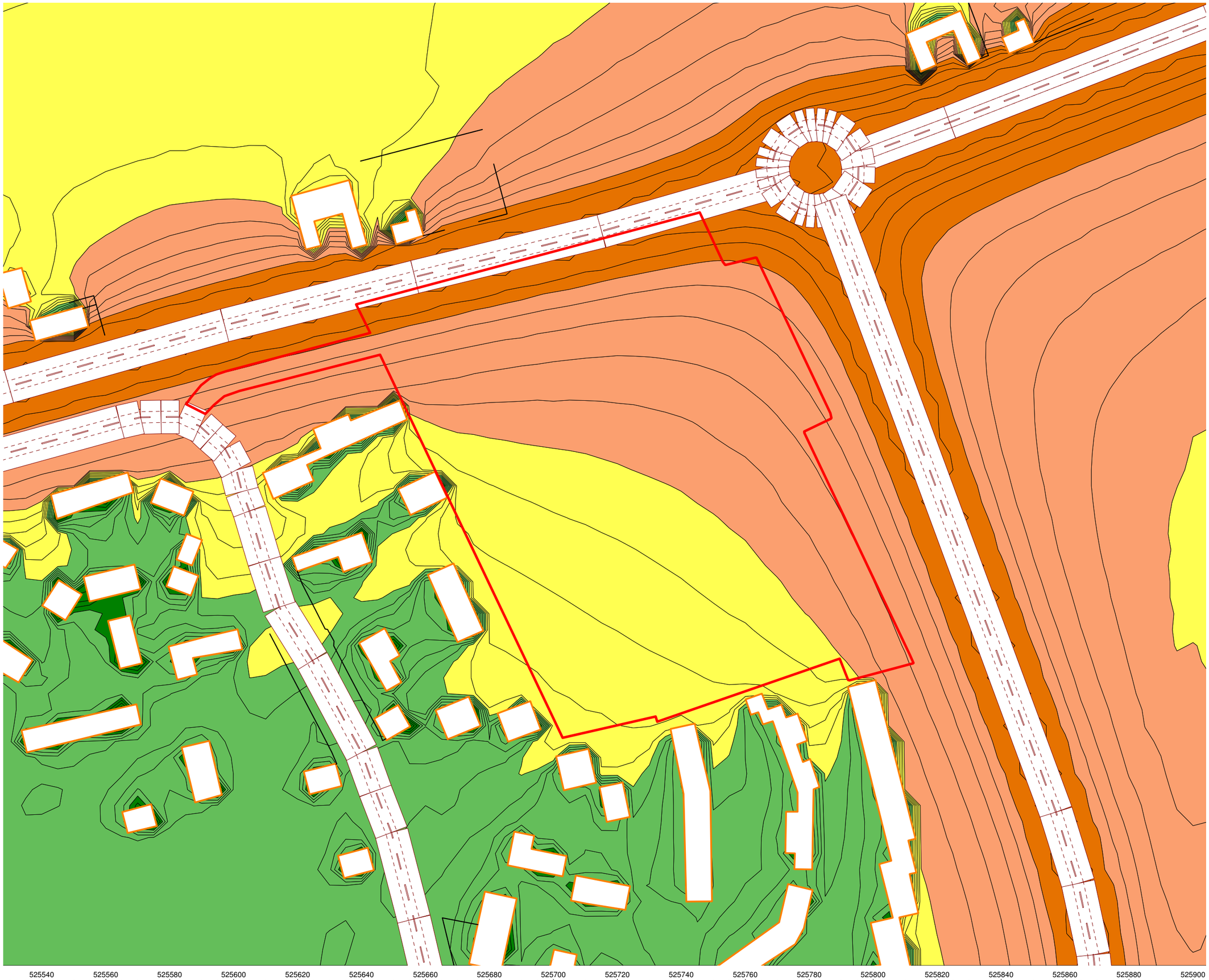
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Project:
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Project Number:
A090070-171

Drawing Title / Scenario:
ProPG Stage 1 Risk Assessment: Existing Night-time LAeq 8hr Noise Levels

Drawing Number:
SK04

Key:

Site Boundary:

- Negligible
- Negligible - Low
- Low
- Low - Medium
- Medium
- High

Scale : Not to scale

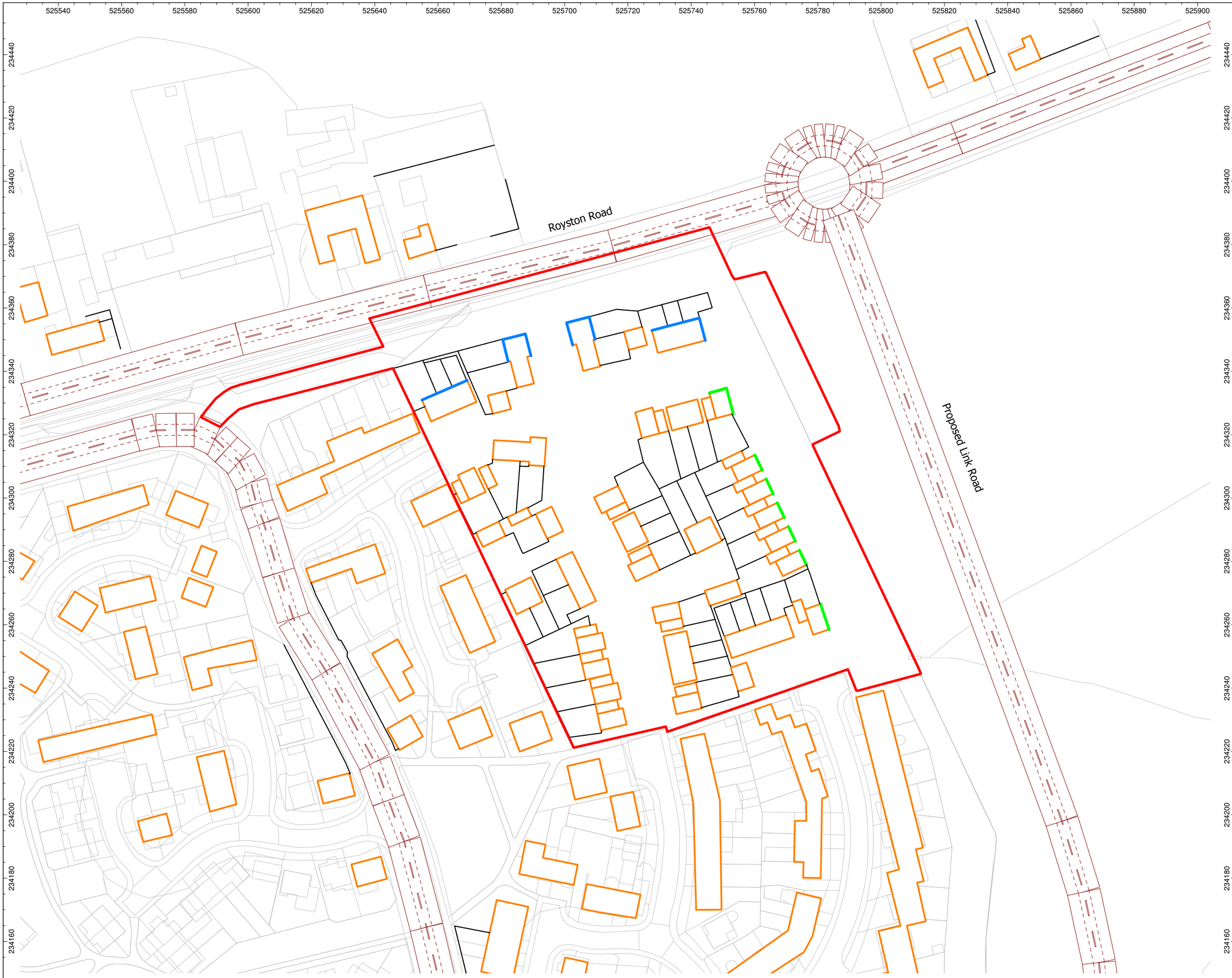
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Project:
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Project Number:
A090070-171

Drawing Title / Scenario:
Glazing and Ventilation Strategy

Drawing Number:
SK05

Key:

Site Boundary:

Enhanced Glazing & Alternative Ventilation Rw + Ctr 36 dB:

Enhanced Glazing & Alternative Ventilation Rw + Ctr 33 dB:

All other facades will require standard double glazing (Rw + Ctr 30 dB) and alternative ventilation

Scale : Not to scale

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