C G Fry and Son Ltd, Welbeck Strategic Land and Taylor Wimpey

Gillingham Strategic Site Location

Mixed-Use Development

Noise Assessment

October 2017

Executive Park, Avalon Way, Anstey, Leicester, LE7 7GR

Tel: +44 (0)116 234 8000

Email: nigel.mann@wyg.com

Document Control

Project:	Gillingham Strategic Site Location, Mixed Use Development
Client:	Welbeck Land
Job Number:	A055606-2
File Origin:	O:\Acoustics Air Quality and Noise\Active Projects\A055606-2

Document Checking:

Prepared by:	Emma Aspinall *Consultant, Environmental Scientist*	Initialled:	EA

Contributor:	Helen Makewell *Senior Consultant, Environmental Scientist*	Initialled:	HM

Checked By:	Graham Davis *Senior Consultant Environmental Scientist*	Initialled:	GD

Verified by:	Nigel Mann *Director - Environmental Scientist*	Initialled:	NM

Issue	Date	Status
1	17th October 2017	First Issue
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Executive Summary

This report presents the findings of a noise assessment for a proposed residential led, mixed-use development on land located between the A3061 (Shaftesbury Road) and the B3092 (New Road) to the south of Gillingham, Dorset.

An assessment of the change in traffic noise was undertaken for both the effect the proposed development would have and the effects in conjunction with other committed developments within the surrounding area. The results of which indicate that the changes in noise level resulting from changes in traffic flow are minimal with the maximum change predicted falling within the 'Lowest Observed Adverse Effect Level' range.

A noise intrusion assessment was undertaken for proposed dwellings across the site which found a number of areas within the proposed development site exceed the guideline criteria. A glazing and ventilation strategy for the site is proposed to ensure that the internal noise levels of dwellings (due to traffic noise levels) within the proposed development area fall within these levels.

Overall, the assessments undertaken indicate that the proposed development is not expected to have an 'adverse impact' on health or quality of life for either existing or proposed residents.

1.0 Introduction

1.1 Noise Assessment Criteria

This report presents the findings of a noise assessment for a proposed residential led, mixed-use development on land located between the B3061 (Shaftesbury Road) and the B3092 (New Road) to the south of Gillingham, Dorset. The proposed development incorporates the construction of 1800 dwellings, an extension to the existing primary school and a new access route with associated junctions on both the B3061 and the B3092.

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 effects of noise. The noise levels across the site have been predicted at proposed receptors using CADNA noise modelling software, which incorporates ISO 9613, CRN 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

This report is intended to provide information relevant to the local planning authority and their consultees in support of a detailed planning application for the above proposed development. Policy guidance with respect to noise is found in National Planning Policy Framework. With regard to noise and planning, NPPF contains the following 4 short statements (section 123):

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- 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 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 principals 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 NPPG and repeated as follows:

Table 1.1 NPPG Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No Specific Measures Required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No Specific Measures Required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; 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			
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 NPPG do not, however, present absolute noise level criteria which define SOAEL, LOAEL and NOEL 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, Section 2.0 presents the noise level criteria used as a basis of this assessment.

The NPPG 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 Helen Makewell. 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' Qualifications & 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	-	-
Helen Makewell	BSc (2004)	Dec 2010	Nov 2008	Mar 2011	Mar 2014
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 Relevant Guidance (England)

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:

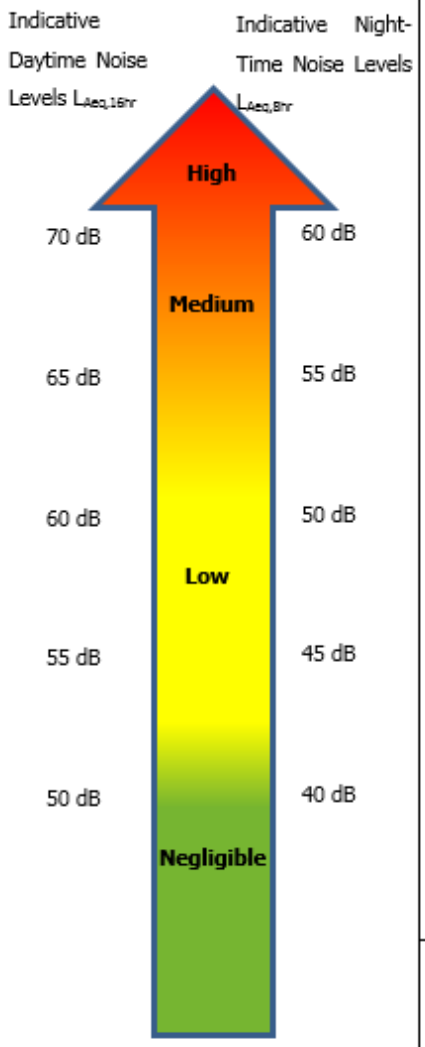
- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- Encourage the process of good acoustic design in and around new residential developments;
- Outline what should be taken into account in deciding planning applications for 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.

With regard to Stage 1, ProPG provides guidance for the producing 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

<table>
<tr><th>Noise Risk Assessment</th><th>Potential Effect Without Noise Mitigation</th><th>Pre-Planning Application Advice</th></tr>
<tr><td rowspan="2"> 
</td><td>Increasing risk of adverse effect</td><td>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.</td></tr>
<tr><td>No adverse effect</td><td>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.</td></tr>
</table>

2.0 Assessment Criteria

2.1 Noise Assessment Criteria

In order to enable the assessment of the proposed development in terms of LOAEL and SOAEL, Tables 2.1 – 2.4 present 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*'

Building Bulletin 93 'Acoustic Design of Schools' (February 2015)

Table 3.2 of HD213/11 published in November 2011 (Design Manual for Roads and Bridges)

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 properties and school	Noise levels below: Bedrooms – 30 $dBL_{Aeq,8hours}$ / 45 dBL_{Amax} Living Rooms – 35 $dBL_{Aeq,16hours}$ External Amenity Space – 50 $dBL_{Aeq,16hours}$ Classrooms (daytime) – 35 $dBL_{Aeq,16hours}$	No Action Required Score of zero or lower is an indication of the sound source having a low impact Within BS8233 / WHO / BB93 / BB101
Lowest Observed Adverse Effect Level	Internal Noise intrusion assessment for proposed residential properties and school	Noise levels exceed: Bedrooms – 30 $dBL_{Aeq,8hours}$ / 45 dBL_{Amax} Living Rooms – 35 $dBL_{Aeq,16hours}$ External Amenity Space – 55 $dBL_{Aeq,16hours}$ Classrooms (daytime) – 35 $dBL_{Aeq,16hours}$	Mitigate to achieve: BS4142 Score of plus 5 or lower *Bedrooms – 30 $dBL_{Aeq,8hours}$ / 45 dBL_{Amax}* *Living Rooms – 35 $dBL_{Aeq,16hours}$* *External Amenity Space – 55 $dBL_{Aeq,16hours}$* Open Plan Office (daytime) – 45 $dBL_{Aeq,16hours}$ Classrooms (daytime) – 35 $dBL_{Aeq,16hours}$ Within BS8233 / WHO / BB93 / BB101
Significant Observed Adverse Effect	Internal Noise intrusion assessment for proposed residential properties and school	Noise levels exceed: Bedrooms – 30 $dBL_{Aeq,8hours}$ Living Rooms – 35 $dBL_{Aeq,16hours}$ External Amenity Space – 55 $dBL_{Aeq,16hours}$ Classrooms (daytime) – 35 $dBL_{Aeq,16hours}$	Mitigate to achieve: *Bedrooms – 30 $dBL_{Aeq,8hours}$ / 45 dBL_{Amax} Living Rooms – 35 $dBL_{Aeq,16hours}$* *External Amenity Space – 55 $dBL_{Aeq,16hours}$* Within BS8233 / WHO criteria
Unacceptable Observed Adverse Effect	Internal Noise intrusion assessment for proposed residential properties and school	Noise levels with mitigation exceed: Bedrooms – 35 $dBL_{Aeq,8hours}$ Living Rooms – 40 $dBL_{Aeq,16hours}$ External Amenity Space – 60 $dBL_{Aeq,16hours}$ Classrooms (daytime) – 45 $dBL_{Aeq,16hours}$	Prevent

Table 2.2 Noise Level Criteria and Actions (Traffic Noise Assessment – Short Term)

Effect Level	Assessment	Noise Level Criteria
No Observed Adverse Effect Level	Change in Traffic Noise Levels	Change in Noise Levels $L_{A10\ 18hr}$ (dB) 0.0 – 0.9>
Lowest Observed Adverse Effect Level	Change in Traffic Noise Levels	Change in Noise Levels $L_{A10\ 18hr}$ 1.0 - 2.9 (dB)
Significant Observed Adverse Effect	Change in Traffic Noise Levels	Change in Noise Levels $L_{A10\ 18hr}$ 3.0 – 4.9 (dB)
Unacceptable Observed Adverse Effect	Change in Traffic Noise Levels	Change in Noise Levels from New or Altered Highway $L_{A10\ 18hr}$ 5.0> (dB)

Based on Tables 7.10 & 7.12 in IEMA Guidelines for Environmental Noise Impact Assessment

Table 2.3 Noise Level Criteria and Actions (Traffic Noise Assessment – Long Term)

Effect Level	Assessment	Noise Level Criteria
No Observed Adverse Effect Level	Change in Traffic Noise Levels	Change in Noise Levels $L_{A10\ 18hr}$ 0.0 – 2.9 (dB)
Lowest Observed Adverse Effect Level	Change in Traffic Noise Levels	Change in Noise Levels $L_{A10\ 18hr}$ 3.0 - 4.9 (dB)
Significant Observed Adverse Effect	Change in Traffic Noise Levels	Change in Noise Levels $L_{A10\ 18hr}$ 5.0 – 9.9 (dB)
Unacceptable Observed Adverse Effect	Change in Traffic Noise Levels	Change in Noise Levels from New or Altered Highway $L_{A10\ 18hr}$ 10.0> (dB)

Table 2.4 Noise Level Criteria and Actions (Construction Noise Assessment)

Effect Level	Assessment	Noise Level Criteria	Action / Justification
No Observed Adverse Effect Level	Construction Noise Assessment	Fixed Limits In rural areas noise levels exceed 50dB In urban areas noise levels exceed 55dB	No Action Required Complaints Relating To Plant Noise Unlikely
Lowest Observed Adverse Effect Level	Construction Noise Assessment	Fixed Limits In rural areas noise levels exceed 60dB In urban areas noise levels exceed 65dB	Mitigate to achieve total noise levels below relevant category threshold
Significant Observed Adverse Effect	Construction Noise Assessment	Fixed Limits In rural areas noise levels exceed 70dB In urban areas noise levels exceed 75dB	Mitigate to achieve total noise levels below relevant category threshold
Unacceptable Observed Adverse Effect	Construction Noise Assessment	Fixed Limits In rural areas noise levels exceed 80dB In urban areas noise levels exceed 85dB	Mitigate to achieve total noise levels below relevant category threshold

2.2 Vibration Assessment Criteria

2.2.1 Building Damage

BS 7385-2:1993 *Evaluation and Measurement for Vibration in Buildings* provides guidance on acceptable values of transient vibration for avoidance of cosmetic damage during the construction phase of the development to buildings as follows.

Table 2.5 Transient Vibration Guide Values for Cosmetic Damage

Type of Building	Peak Component Particle Velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Residential of Light Commercial Type Buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 50 Hz and above

Table 2.5 above shows the limits for transient vibration, above which cosmetic damage could occur. Minor damage is possible at vibration magnitudes which are greater than twice those given above and major damage to a building structure may occur at values greater than four times the tabulated values. PPV values of below 15 mm/s are unlikely to results in any damage to buildings.

Damage is classified into the following categories:

Table 2.6 Damage Classification

Damage	Description
Cosmetic	The formation of hairline cracks on drywall surfaces, or the growth of existing cracks in plaster or drywall surfaces; in addition, the formation of hairline cracks in mortar joints of brick/concrete block construction.
Minor	The formation of large cracks or loosening and falling of plaster or drywall surfaces, or cracks through bricks/concrete blocks.
Major	Damage to structural elements of the building, cracks in support columns, loosening of joints, splaying of masonry cracks, etc

At this stage of the design where it is unclear where the areas of construction will be in relation to the existing properties, it is considered that vibration due to construction should be scoped out of this assessment and not be considered further until the final layout plans are available showing the massing of the proposed buildings. At this time construction vibration with regard to sensitive properties surrounding the site should be considered.

2.2.2 Human Exposure

BS 6472-2:2008 Guide to evaluation of human exposure to vibrations in buildings provides general guidance on human exposure to building vibration in the range of 1 Hz to 80 Hz and includes curves of equal annoyance for humans. It also outlines the measurement methodology to be employed. It introduces the concept of Vibration Dose Value (VDV) and estimated Vibration Dose Value (eVDV) for the basis of assessment of the severity of impulsive and intermittent vibration levels, such as would be caused by a series of trains passing a given location.

Human reaction to vibration depends on displacement, frequency, the duration (exposure time), point of application and direction of the vibration. It appears that the effect of vibration on the people within a building will be far more serious than the effect on the building itself. The units in which VDV and eVDV are measured are metres per second raised to the power of minus 1.75 (or $ms^{-1.75}$).

The Standard gives recommended vibration dose values above which various degrees of adverse comment may be expected in residential buildings, with a daily 16 hour VDV of 0.2 to 0.4 $ms^{-1.75}$ likely to give low probability of adverse comment as shown in the following table.

Table 2.6 VDV and Various Degrees of Adverse Comment in Residential Buildings

Location	Low probability of adverse comment	Adverse comment possible	Adverse comment probable
Residential Buildings (16 hour DAY 07.00 – 23.00)	0.2 to 0.4 $ms^{-1.75}$	0.4 to 0.8 $ms^{-1.75}$	0.8 to 1.6 $ms^{-1.75}$
Residential Buildings (8 hour NIGHT 23.00 – 07.00)	0.1 to 0.2 $ms^{-1.75}$	0.2 to 0.4 $ms^{-1.75}$	0.8 ms-1.75

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	Provided by i-Transport LLP
Traffic data – local roads	WYG	Provided by i-Transport LLP
Building heights – around site	WYGE Observations	8 m height for two storey residential properties, and 4 m for Bungalows
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.
Façade Correction	CADNA	Façade corrections have been incorporated into the modelling

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 Road Traffic Data

All roads expected to make a significant contribution have been included within this assessment. Traffic flows and HGV percentages have been based on traffic data provided by i-Transport LLP. Baseline data has been provided for the year 2016 and two scenarios detailed below and in Tables 3.2 – 3.4 have been considered to represent traffic levels in the year 2021:

1. 2021 with committed development opening year (DMOY)
2. 2021 with committed development, plus development opening year (DSOY)
3. 2021 with committed development, plus development and implementation of mitigation measures (Sustainable Travel Plan) (DSOY)
4. 2031 Do minimum design year (DMDY)
5. 2031 with local plan development, plus development and implementation of mitigation measures – Do something - Design year (DSDY)

Table 3.2 Traffic Data (Baseline 2016)

Link Number	Road	2016	HGV %
1	B3081 South of Access	12336	4%
2	B3081 North of Access	12347	4%
3	B3092 South of Principal Access (South of Cole St Lane)	6027	3%
4	B3092 North of Brickyard Lane	7717	3%
5	B3081 South of B3092	13874	3%
6	B3081 North of B3092	18692	3%
7	B3092 between Wyke Road and Station Road	15952	4%
8	B3081 Wyke Road	10436	3%
9	B3092 North of Wyke Road	12849	3%
10	Newbury (High Street)	5229	1%
11	B3092 south of Brickfields Business Park	6028	3%
12	Principal Street (East)	0	0%
13	Principal Street (West)	0	0%

Table 3.3 Traffic Data (2021)

Junction/Link Number	Road	Committed Development (DM)	HGV %	Committed Development + Development – No Mitigation (DS)	HGV %	Committed Development + Development – With Mitigation (DS)	HGV %
1	B3081 South of Access	14248	3%	15294	3%	16871	3
2	B3081 North of Access	14257	3%	16463	2%	15723	3

Junction/Link Number	Road	Committed Development (DM)	HGV %	Committed Development + Development – No Mitigation (DS)	HGV %	Committed Development + Development – With Mitigation (DS)	HGV %
3	B3092 South of Principal Access (South of Cole St Lane)	6346	3%	7129	3%	7061	3
4	B3092 North of Brickyard Lane	8145	3%	9773	2%	8508	3
5	B3081 South of B3092	15781	3%	19051	2%	16668	3
6	B3081 North of B3092	20500	3%	23160	2%	24073	3
7	B3092 between Wyke Road and Station Road	16922	4%	18010	3%	18909	3
8	B3081 Wyke Road	11054	3%	12008	3%	12036	3
9	B3092 North of Wyke Road	13709	2%	14301	2%	14025	2
10	Newbury (High Street)	5831	1%	6711	0%	6485	1
11	B3092 south of Brickfields Business Park	6343	3%	7559	2%	7338	2
12	Principal Street (East)	0	0%	0	0%	3905	0
13	Principal Street (West)	0	0%	4041	0%	4549	0

Table 3.4 Traffic Data (2031)

Junction/Link Number	Road	Committed Development (DM)	HGV %	Committed Development + Development + Mitigation (DS)	HGV %
1	B3081 South of Access	14850	3%	19320	3%
2	B3081 North of Access	14858	3%	17418	3%
3	B3092 South of Principal Access (South of Cole St Lane)	6620	3%	8247	3%
4	B3092 North of Brickyard Lane	8497	3%	10921	3%
5	B3081 South of B3092	16416	3%	17659	3%
6	B3081 North of B3092	21351	3%	27542	3%
7	B3092 between Wyke Road and Station Road	17494	4%	22724	4%
8	B3081 Wyke Road	11548	3%	13220	3%
9	B3092 North of Wyke Road	14313	2%	15647	3%
10	Newbury (High Street)	6162	1%	4947	1%

Junction/Link Number	Road	Committed Development (DM)	HGV %	Committed Development + Development + Mitigation (DS)	HGV %
11	B3092 south of Brickfields Business Park	6616	3%	9867	3%
12	Principal Street (East)	0	0%	6061	1%
13	Principal Street (West)	0	0%	6945	1%

3.1.2 Model Input Data – Construction Phase

Information regarding noise emissions from equipment used during the construction phase has been be obtained from Annex C of BS 5228-1:A1 - 2014 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*. This annex presents a range of current sound level data on typical site equipment and common site activities.

This data is obtained by field measurements for items of plant in actual use on construction and open sites in the UK. Levels quoted in the database are based on an average (logarithmic) of measured sound levels, and where appropriate have been derived from more than one model of similarly sized plant. The results are presented as un-weighted octave band activity L_{eq} levels, and overall A-weighted activity L_{eq} levels in dB. All sound pressure levels are standardized to 10 metres from the plant.

The items of plant and associated noise levels shown in the tables below have been used for the purposes of this assessment and consider the range of typical activities likely to be employed during the construction phase of the proposed development. Items of mobile plant have been positioned in the areas on the development site that are close to existing residential dwellings.

Table 3.2 Construction Phase Mobile Plant

Plant	BS 5228-1:A1 - 2014 Annex C Ref.	Octave Band Sound Pressure Levels (Hz)								Model Input L_{Aeq} at 10 m	Model Input L_W (L_{Amax})
		63	125	250	500	1K	2K	4K	8K		
Wheeled Loader	Table C.2 No.26	87	82	77	78	73	70	64	57	79 dB	123 dB
Crusher	Table C.9 No. 14	86	89	88	88	86	83	76	70	91 dB	130 dB
Articulated Dump truck	Table C.2 No.33	85	87	77	75	76	73	69	62	81 dB	125 dB
Tracked Excavator	Table C.2 No.19	95	84	79	73	70	68	64	57	77 dB	111 dB

3.1.3 Model Verification (Traffic 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_{AMax} are shown in the table below.

Table 3.3 Modelled vs. Monitored Results $L_{Aeq;\ daytime\ 07:00 – 23:00}$

Location	Monitored L_{Amax}	Modelled L_{Amax}	Difference between Monitored and Modelled Results
LT1	46.8	46.9	0.1
LT2	58.6	58.7	0.1
LT3	50.3	47.3	-3.0
LT4	46.8	49.8	3.0
LT5	50.0	49.7	-0.3
ST1	60.8	60.5	-0.3
ST3	44.7	45.5	0.8
ST5	44.7	44.8	0.1
ST7	73.2	68.1	-5.1
ST8	66.6	63.0	-3.2
ST9	47.3	44.4	-2.9
ST10	50.3	50.3	0.0
ST11	64.8	65.3	0.5
ST12	64.6	64.6	0.0
ST13	46.3	44.7	-1.6

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

Location	Monitored L_{Amax}	Modelled L_{Amax}	Difference between Monitored and Modelled Results
LT1	38.1	38.9	0.8
LT2	48.4	48.6	0.2
LT3	38.1	37.2	-0.9
LT4	35.9	35.9	0.0
LT5	35.9	35.0	-0.9
ST1	53.5	50.5	-3.0
ST3	40.5	37.9	-2.6
ST4	37.5	48.9	11.4
ST5	31.9	35.2	3.3
ST7	51.0	50.0	-1.0
ST8	45.0	47.6	2.6
ST9	39.9	39.3	-0.6
ST10	43.5	43.5	0.0
ST11	61.3	44.6	2.0
ST12	61.7	61.7	0.0

Table 3.5 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	64.6	0.4
LT2	79.0	78.8	-0.2
LT3	64.0	65.4	1.4
LT4	64.5	62.3	-2.2
LT5	59.0	61.9	2.9
ST1	82.7	80.1	-2.6
ST3	58.1	61.1	3.0
ST4	59.7	70.5	10.8
ST5	60.3	58.5	-1.8
ST7	78.9	79.7	0.8
ST8	67.3	70.0	2.7
ST9	57.5	56.8	-0.7
ST10	72.3	71.5	-0.8
ST11	82.1	80.0	-2.1
ST12	87.3	87.3	0.0

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

The verification points show a divergence between monitored and modelled results of no more than ±3.0 dB, with the exception of locations ST7 and ST8 during the daytime period which are predicting lower than other monitoring positions, due to the greater frequency of passing vehicles during the short-term 15 minute measurement than the model is predicting over a 16hour period. Similarly, locations ST4 and ST5 during the night-time L_{Aeq} period and ST4 during the night-time L_{AMax} period are predicting greater noise levels compared to other short-term measurements, due to a low frequency of passing road traffic during the measurement.

Locations ST2 and ST6 lie next to long term receptors (LT2 and LT3) however, as greater weight and confidence is given in the unattended measurements due to a longer exposure time, ST2 and ST6 have not been considered within the verification. Therefore the models are considered to be suitably verified.

3.2 Sensitive Receptors

Existing noise levels have been assessed using an indicative layout with residential properties within each of the defined areas (see drawing ref: 01050_PP02_Land Use Plan_D3) with respect to direct noise from road traffic noise both surrounding and within the site (with development scenarios). The locations of the proposed existing and construction receptors are described in Tables 3.6 - 3.8 below. Additionally, there locations are shown in SK02 and SK03 of Appendix B.

Table 3.6 Proposed Residential Receptors

Ref.	Description	Closest Source	Approximate Distance To Source (m)	Height (m)
R01	East of Site: Eastern Façade	Principal Street West	10.0	1.5 / 4.0
R02	North East of Site: Eastern Façade	B3081	180.0	1.5 / 4.0
R03	East of Site: Eastern Façade	B3081	166.0	1.5 / 4.0
R04	East of Site: Eastern Façade	Principal Street West	25.0	1.5 / 4.0
R05	South East of Site: Southern Façade	Principal Street West	15.0	1.5 / 4.0
R06	South East of Site: Eastern Façade	Principal Street West	92.0	1.5 / 4.0
R07	South East of Site: Southern Façade	Principal Street West	134.0	1.5 / 4.0
R08	South of Site: Southern Façade	Principal Street West	105.0	1.5 / 4.0
R09	North of Site: Eastern Façade	Principal Street West	341.0	1.5 / 4.0
R10	South East of Site: Southern Façade	Principal Street West	16.0	1.5 / 4.0
R11	South of Site: Northern Façade	Principal Street West	21.0	1.5 / 4.0
R12	South of Site: Southern Façade	Principal Street West	18.0	1.5 / 4.0
R13	South of Site: Southern Façade	Principal Street West	128.0	1.5 / 4.0
R14	South West of Site: Western Façade	Principal Street West	23.0	1.5 / 4.0
R15	South West of Site: Eastern Façade	Principal Street West	20.0	1.5 / 4.0
R16	South West of Site: Southern Façade	Principal Street West	155.0	1.5 / 4.0
R17	South West of Site: Western Façade	B3092	30.0	1.5 / 4.0
R18	West of Site: Northern Façade	Principal Street West	14.0	1.5 / 4.0
R19	West of Site: Western Façade	Principal Street East	20.0	1.5 / 4.0

Table 3.7 Existing Residential Receptor Locations (Traffic Noise Assessment)

Ref.	Description	Closest Source	Approximate Distance To Source (m)	Height (m)
T01	Lien Seng, Madjeston	B3092	20.0	1.5/4.0
T02	Madjeston House, Majeston	B3092	16.0	1.5/4.0
T03	11 Meadowcroft, New Road	B3092	13.0	1.5/4.0
T04	4 Shaftesbury View, New Road	B3092	5.0	1.5/4.0
T05	The Old Manse, New Road	B3081	12.0	1.5/4.0
T06	Keston, Newbury	B3081	10.0	1.5/4.0
T07	53 Church View	B3081	26.5	1.5/4.0
T08	2 Wyke Street	Wyke Street	8.2	1.5/4.0
T09	The Clough, Wyke Road	Wyke Road	10.5	1.5/4.0
T10	5 St. Marys Court, St. Marys Place	B3081	10.0	1.5/4.0
T11	4 Octave Terrace, Queen Street	B3081	21.9	1.5/4.0
T12	4 Harwood Cottages, Newbury	Newbury	8.2	1.5/4.0
T13	Mountain Ash, Lodden	Shaftesbury Road	10.0	1.5/4.0
T14	2 Ham Court, Shaftesbury Road	Shaftesbury Road	14.6	1.5/4.0
T15	Stonecroft, Shaftesbury Road	Shaftesbury Road	9.6	1.5/4.0
T16	1 Ham Cottages, Shaftesbury Road	Shaftesbury Road	8.4	1.5/4.0

Ref.	Description	Closest Source	Approximate Distance To Source (m)	Height (m)
T17	Park Cottage Shaftesbury Road	Shaftesbury Road	7.7	1.5/4.0
T18	Ham Cottage, Cole Street Lane	Shaftesbury Road	9.2	1.5/4.0

Table 3.8 Construction Receptor Locations

Ref.	Description	Closest Source	Approximate Distance To Source (m)	Height (m)
CR01	Dairy House, Cole Street Lane	South West of Site	108.0	1.5
CR02	St. Mary the Virgin C.E Primary School, Pheasant Way	North of Site	75.0	1.5
CR03	6 Pheasant Way	North of Site	170.0	1.5
CR04	4 Woodpecker Meadow	North of Site	246.0	1.5
CR05	Copper Coin, Shaftesbury Road	North of Site	372.0	1.5
CR06	Lockwood Farm, Shaftesbury Road	West of Site	161.0	1.5
CR07	2 Higher Ham House, Shaftesbury Road	West of Site	116.0	1.5
CR08	Foyers Lodge, Shaftesbury Road	West of Site	102.0	1.5
CR09	Schiehallion, Cole Street Lane	South of Site	160.0	1.5
CR10	Meadow Brook Farm, Cole Street Lane	South of Site	55.0	1.5
CR11	Duckpond, Cole Street Farm, Cole Street Lane	South of Site	52.0	1.5

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 Zones 2-3.

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:

B&K 2238	Environmental Noise Analyser (WYG9)	s/n	2684499
B&K 4231	Calibrator	s/n	2176211
Norsonic 140	Environmental Noise Analyser	s/n	1402987
Norsonic 1251	Sound Calibrator	s/n	31043
Rion NL-32	Environmental Noise Analyser (WYG12)	s/n	213442
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 (WYG27)	s/n	264490
Rion NL-52	Environmental Noise Analyser (WYG11)	s/n	1021257

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 eighteen locations (as specified in the following table and shown in SK01 of Appendix B) from Thursday 24th November 2106 to Thursday 1st December 2016. Attended short term measurements were undertaken at thirteen locations during the day, evening, peak and night-time periods with five additional locations being measured unattended over a 160 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 easterly wind direction.

Table 4.1 Noise Monitoring Locations

Ref	Description	Grid Reference	
		X	Y
LT1	North of Old Farm Cottage, on unnamed road west of B3092	380754	125240
LT2	North of Newhouse Farm, Cole Street Lane	381096	125058
LT3	North of Newhouse Farm Dairy, Cole Street Lane	381754	125078
LT4	West of Sydenhams, B3081	381916	125491
LT5	East of Orchard Park, B3081	382348	125496
ST1	South of Old Farm Cottage, on unnamed road west of B3092	380686	125093
ST2	North of Newhouse Farm, Cole Street Lane	381097	125052
ST3	South of Brickfields Business Park	380938	125547
ST4	Brickfields Business Park/B3092 junction	381056	125843
ST5	The Meadows	381323	125826
ST6	South of Newhouse Farm Dairy, Cole Street Lane	381748	125003
ST7	West of Orchard Park	382088	125472
ST8	Kingsmead Business Park entrance	382036	125595
ST9	South of St. Mary the Virgin School	381696	125652
ST10	Rookery Close	381807	126011
ST11	Kingscourt Road/Shaftesbury Rd	381628	126059
ST12	Railway crossing to east of Gillingham	381958	126639
ST13	Field to east of Kingscourt Road	381769	126261

4.2 Noise Survey Results

Existing ambient noise levels around the site are dominated by road traffic noise from the B3081 and B3092 roads. Additionally, the railway traffic contributed to the noise climate at attended positions ST12 and ST13.

Although no contribution was noted during the measurement survey, other potential sources of noise were identified around the proposed development site, such as commercial/industrial noise from the sites along the B3091 and the B3092, noise from pupils and staff at St Mary's C of E Primary School and agricultural sources from the proposed development site and surrounding areas.

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	29/11/2016 15:54	5 ºC	0-1 m/s	E	0	Traffic along B3092

Survey Location	Date & Time	Temperature	Wind Speed	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
Day ST2	30/11/2016 12:58	9 ºC	0-1 m/s	E	1	Traffic along B3092
Day ST3	29/11/2016 15:30	5 ºC	0-1 m/s	E	0	Traffic along B3092
Day ST5	29/11/2016 15:03	6 ºC	1-2 m/s	E	0	Traffic along B3092
Day ST6	30/11/2016 12:35	8 ºC	0 m/s	-	0	Traffic along Cole Street Lane
Day ST7	30/11/2016 12:06	8 ºC	0-1 m/s	E	0	Traffic along B3081
Day ST8	30/11/2016 11:47	8 ºC	0-1 m/s	E	0	Traffic along B3081
Day ST9	30/11/2016 09:43	0 ºC	0 m/s	-	0	Traffic along B3081
Day ST10	30/11/2016 10:05	5 ºC	0 m/s	-	0	Traffic along B3081
Day ST11	30/11/2016 10:32	5 ºC	1-2 m/s	E	0	Traffic along B3081
Day ST12	30/11/2016 11:15	5 ºC	0-1 m/s	E	0	Passing trains, faint road traffic noise
Day ST13	30/11/2016 10:54	5 ºC	0-1 m/s	E	0	Passing trains, faint road traffic noise
Evening ST1	29/11/2016 22:46	-1 ºC	0-1 m/s	E	0	Traffic along B3092
Evening ST2	29/11/2016 22:27	-1 ºC	0-1 m/s	E	0	Traffic along B3092
Evening ST3	29/11/2016 22:05	-1 ºC	0-1 m/s	E	0	Traffic along B3092
Evening ST4	29/11/2016 21:05	-1 ºC	1-2 m/s	E	0	Traffic along B3092
Evening ST5	29/11/2016 21:25	-1 ºC	0-1 m/s	E	0	Traffic along Cole Street Lane
Evening ST6	30/11/2016 20:26	-3 ºC	0-1 m/s	E	0	Traffic along B3081
Evening ST7	30/11/2016 20:26	-3 ºC	0 m/s	-	0	Traffic along B3081
Evening ST8	30/11/2016 21:06	-3 ºC	0 m/s	-	0	Traffic along B3081
Evening ST9	30/11/2016 21:26	-3 ºC	0 m/s	-	0	Traffic along B3081
Evening ST10	30/11/2016 21:50	-3 ºC	0 m/s	-	0	Traffic along B3081
Evening ST11	30/11/2016 22:10	0 ºC	0 m/s	-	0	Traffic along B3081
Evening ST12	30/11/2016 22:45	0 ºC	0 m/s	-	0	Passing trains, faint road traffic noise
Night ST1	29/11/2016 23:00	-1 ºC	0-1 m/s	E	0	Traffic along B3092
Night ST2	29/11/2016 23:23	-1 ºC	0-1 m/s	E	0	Traffic along B3092
Night ST3	29/11/2016 23:44	-1 ºC	0-1 m/s	E	0	Traffic along B3092
Night ST4	30/11/2016 00:08	-2 ºC	0 m/s	-	0	Traffic along B3092
Night ST5	30/11/2016 00:28	-1 ºC	0 m/s	-	0	Traffic along Cole Street Lane
Night ST6	01/12/2016 01:10	-3 ºC	0 m/s	-	0	Traffic along B3081
Night ST7	01/12/2016 00:48	-3 ºC	0 m/s	-	0	Traffic along B3081

Survey Location	Date & Time	Temperature	Wind Speed	Wind Direction	Cloud Cover (Oktas)	Dominant Noise Source
Night ST8	01/12/2016 00:26	-3 ºC	0 m/s	-	8	Traffic along B3081
Night ST9	01/12/2016 00:08	-2 ºC	0 m/s	-	8	Traffic along B3081
Night ST10	30/11/2016 23:48	1 ºC	0 m/s	-	8	Traffic along B3081
Night ST11	30/11/2016 23:26	0 ºC	0 m/s	-	8	Traffic along B3081
Night ST12	30/11/2016 23:00	0 ºC	0 m/s	-	4	Passing trains, faint road traffic 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 x 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)
Week Day 07:00 - 23:00	71 hours	24/11/2016 – 01/12/2016 07:00 - 23:00	LT1	46.8	89.4	28.9	46.4	39.0
Week Night 23:00 – 07:00	40 hours	24/11/2016 – 01/12/2016 23:00 - 07:00		40.0	64.2	22.6	38.5	32.0
Weekend Day 07:00 - 23:00	32 hours	26/11/2016 – 27/11/2016 07:00 - 23:00		43.3	76.6	25.1	44.2	37.0
Weekend Night 23:00 – 07:00	16 hours	26/11/2016 – 27/11/2016 07:00 - 23:00		35.8	73.0	21.6	34.4	26.0
Week Day 07:00 - 23:00	71 hours	24/11/2016 – 01/12/2016 07:00 - 23:00	LT2	58.6	88.9	30.8	56.6	46.0
Week Night 23:00 – 07:00	40 hours	24/11/2016 – 01/12/2016 23:00 - 07:00		49.1	79.0	24.5	44.7	39.0
Weekend Day 07:00 - 23:00	32 hours	26/11/2016 – 27/11/2016 07:00 - 23:00		54.0	87.6	28.8	50.2	43.0
Weekend Night 23:00 – 07:00	16 hours	26/11/2016 – 27/11/2016 07:00 - 23:00		47.0	83.5	24.2	43.1	31.0
Week Day 07:00 - 23:00	71 hours	24/11/2016 – 01/12/2016 07:00 - 23:00	LT3	50.3	88.1	27.2	47.2	42.0
Week Night 23:00 – 07:00	40 hours	24/11/2016 – 01/12/2016 23:00 - 07:00		42.9	71.1	24.7	40.7	31.0
Weekend Day 07:00 - 23:00	32 hours	26/11/2016 – 27/11/2016 07:00 - 23:00		44.7	77.1	30.6	45.4	42.0
Weekend Night 23:00 – 07:00	16 hours	26/11/2016 – 27/11/2016 07:00 - 23:00		37.9	70.8	30.1	38.9	33.0
Week Day 07:00 - 23:00	71 hours	24/11/2016 – 01/12/2016 07:00 - 23:00	LT4	46.8	83.9	21.3	45.7	41.0
Week Night 23:00 – 07:00	40 hours	24/11/2016 – 01/12/2016 23:00 - 07:00		40.2	66.2	17.2	37.6	25.0
Weekend Day 07:00 - 23:00	32 hours	26/11/2016 – 27/11/2016 07:00 - 23:00		42.5	76.4	21.2	42.0	38.0
Weekend Night 23:00 – 07:00	16 hours	26/11/2016 – 27/11/2016 07:00 - 23:00		31.5	59.5	17.5	32.9	23.0
Week Day 07:00 - 23:00	71 hours	24/11/2016 – 01/12/2016 07:00 - 23:00	LT5	50.0	91.9	22.4	44.9	35.0

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 Night 23:00 – 07:00	40 hours	24/11/2016 – 01/12/2016 23:00 - 07:00		44.4	74.8	17.1	38.4	27.0
Weekend Day 07:00 - 23:00	32 hours	26/11/2016 – 27/11/2016 07:00 - 23:00		46.6	86.5	21.4	39.3	30.0
Weekend Night 23:00 – 07:00	16 hours	26/11/2016 – 27/11/2016 07:00 - 23:00		30.4	62.5	17.3	30.1	22.0
Day 09:30 – 16:30	15 Mins	29/11/2016 15:54	ST1	60.8	85.9	38.6	57.7	42.0
	15 Mins	30/11/2016 12:58	ST2	59.0	78.6	39.4	59.9	49.3
	15 Mins	29/11/2016 15:30	ST3	44.7	58.2	39.3	46.6	42.0
	15 Mins	29/11/2016 15:03	ST5	44.7	66.0	33.6	47.1	37.1
	15 Mins	30/11/2016 12:35	ST6	59.0	79.0	24.5	54.2	27.8
	15 Mins	30/11/2016 12:06	ST7	73.2	86.6	39.4	77.4	53.7
	15 Mins	30/11/2016 11:47	ST8	66.6	83.1	40.6	69.7	59.0
	15 Mins	30/11/2016 09:43	ST9	47.3	68.2	37.5	48.0	40.4
	15 Mins	30/11/2016 10:05	ST10	50.3	65.6	36.9	53.7	41.0
	15 Mins	30/11/2016 10:32	ST11	74.3	88.8	50.3	78.5	60.0
	15 Mins	30/11/2016 11:15	ST12	64.6	93.4	33.6	41.9	35.6
	15 Mins	30/11/2016 10:54	ST13	46.3	73.9	35.9	44.4	37.6
Evening 19:00 - 23:00	15 Mins	29/11/2016 22:46	ST1	49.7	75.3	26.8	47.8	31.7
	15 Mins	29/11/2016 22:27	ST2	46.8	71.3	30.5	45.1	33.2
	15 Mins	29/11/2016 22:05	ST3	44.2	69.4	30.8	47.5	34.8
	15 Mins	29/11/2016 21:05	ST4	59.5	83.5	35.2	60.0	39.5
	15 Mins	29/11/2016 21:25	ST5	49.6	70.6	26.4	46.4	29.0
	15 Mins	30/11/2016 20:26	ST6	50.7	77.3	36.2	44.8	39.2
	15 Mins	30/11/2016 20:26	ST7	65.6	81.2	38.5	69.3	43.5
	15 Mins	30/11/2016 21:06	ST8	53.1	68.6	34.0	58.2	37.5
	15 Mins	30/11/2016 21:26	ST9	60.6	92.3	35.6	46.8	39.2
	15 Mins	30/11/2016 21:50	ST10	47.0	69.4	33.5	50.0	36.3
	15 Mins	30/11/2016 22:10	ST11	66.2	85.8	36.9	69.2	40.8
	15 Mins	30/11/2016 22:45	ST12	37.0	52.3	30.7	39.2	33.6
Night 23:00 - 07:00	15 Mins	29/11/2016 23:00	ST1	53.5	82.7	24.5	47.9	28.8
	15 Mins	29/11/2016 23:23	ST2	37.0	62.7	25.5	40.3	28.5
	15 Mins	29/11/2016 23:44	ST3	40.5	58.1	27.3	44.1	29.1
	15 Mins	30/11/2016 00:08	ST4	37.5	59.7	28.9	37.4	31.2
	15 Mins	30/11/2016 00:28	ST5	31.9	60.3	19.9	33.1	21.7
	15 Mins	01/12/2016 01:10	ST6	33.2	66.5	23.1	32.5	24.5
	15 Mins	01/12/2016 00:48	ST7	51.0	78.9	24.1	45.3	26.1
	15 Mins	01/12/2016 00:26	ST8	45.0	67.3	27.9	44.9	29.5
	15 Mins	01/12/2016 00:08	ST9	39.9	66.6	28.7	41.8	30.7
	15 Mins	30/11/2016 23:48	ST10	43.5	72.3	26.0	39.4	27.5
	15 Mins	30/11/2016 23:26	ST11	61.3	82.1	25.3	59.9	28.8
	15 Mins	30/11/2016 23:00	ST12	61.7	87.3	30.7	41.7	33.7

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

4.3 Vibration Survey

4.3.1 Vibration Survey Methodology

Measurements were obtained using a Vibrock Digital Seismograph Type V901 fitted with a ground vibration transducer. The instrument measured Resultant, Displacement, Acceleration, Peak Particle Velocity (PPV) at a scanning duration of 30 seconds and VDV at a scanning duration of 15 minutes. Attended measurements were used to determine background levels.

4.3.2 Vibration Survey Results

During the survey, existing sources of vibration was noted to be the movement of vehicles from road traffic along the B3091 and the B3092.

Measurements were made in a bus layby along the B3081 which was considered to be representative of the closest distance to the proposed new residential properties along Principal Street within the proposed redline boundary.

Table 4.4 shows the maximum Resultant, Displacement, Acceleration and Peak Particle Velocity (PPV) measured at each monitoring location during normal conditions (background) and HGV/bus passing events. Table 4.5 shows the VDV measurements under the same conditions as Table 4.4

Table 4.4 Vibration Measurement Results

Location	Max Resultant (mm/s)	Max Displacement (mm)	Max Acceleration (g)	Max PPV (mm/s)
V1 – Background	0.125	0.000	0.010	0.125
V1 – HGV Pass	0.250	0.001	0.010	0.275

Table 4.5 VDV Results

Location	VDV		
	X	Y	Z
V1- Background	0.007	0.006	0.006
V1 – HGV/bus Passing 15mins	0.018	0.022	0.015

5.0 Assessment of Effects

5.1 ProPG Stage 1 Assessment

Noise levels at the site are around 55 dB $L_{Aeq(16hour)}$ in the daytime and 50 dB $L_{Aeq(8hour)}$ in the night-time. The site falls within Low/Medium Noise Risk Category and as such requires good acoustic design.

5.2 ProPG Stage 2 Assessment – Element 2 Internal Noise Levels

Residential Dwellings

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 specification R_w 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. An indicative layout has been included within the modelling to show the effect of screening that will be provided by the front row of houses adjacent to each of the roads, this is for assessment purposes only and will not necessarily reflect the final layout of the residential properties within the proposed development. Indicative garden fences have also been included, again for assessment purposes only.

Noise intrusion levels have been determined using road traffic noise levels for 2031 (with local plan development, plus development and implementation of mitigation measures). The following calculations have been used to determine the daytime L_{Aeq}, night-time L_{Night} noise levels.

- Daytime L_{Aeq}

  $L_{Aeq(16\text{-}hour)} - L_{A10(18\text{-}hour)} - 2$ dB

- Night-time L_{Aeq}

  $L_{night} = 0.90L_{A10(18\text{-}hour)} - 3.77$ dB

A verified night-time L_{AMax} model (as verified in table 3.4 of this report) has been used to determine maximum, worst case noise levels.

Table 5.1 Residential: Daytime (L_{Aeq}) Noise Intrusion

Location	External L_{Aeq} at 1m from facade	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria Internal LAeq
R01	62.9	52.9	32.9	35

Location	External L_{Aeq} at 1m from facade	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria Internal LAeq
R02	50.2	40.2	20.2	35
R03	48.0	38.0	18.0	35
R04	61.7	51.7	31.7	35
R05	65.7	55.7	35.7	35
R06	55.7	45.7	25.7	35
R07	46.2	36.2	16.2	35
R08	45.1	35.1	15.1	35
R09	41.3	31.3	11.3	35
R10	63.8	53.8	33.8	35
R11	63.2	53.2	33.2	35
R12	63.7	53.7	33.7	35
R13	38.5	28.5	8.5	35
R14	60.0	50.0	30.0	35
R15	64.2	54.2	34.2	35
R16	44.5	34.5	14.5	35
R17	59.6	49.6	29.6	35
R18	64.3	54.3	34.3	35
R19	63.3	53.3	33.3	35

Table 5.2 Residential: Night-time (L_{Aeq}) Noise Intrusion

Location	External L_{Aeq} at 1m from facade	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria Internal LAeq
R01	63.0	53.0	33.0	30
R02	50.8	40.8	20.8	30
R03	54.0	44.0	24.0	30
R04	61.7	51.7	31.7	30
R05	65.5	55.5	35.5	30
R06	55.8	45.8	25.8	30
R07	50.4	40.4	20.4	30
R08	47.2	37.2	17.2	30
R09	42.1	32.1	12.1	30
R10	63.9	53.9	33.9	30
R11	63.2	53.2	33.2	30
R12	63.6	53.6	33.6	30
R13	40.4	30.4	10.4	30
R14	60.0	50.0	30.0	30
R15	64.1	54.1	34.1	30
R16	47.1	37.1	17.1	30
R17	59.5	49.5	29.5	30
R18	64.2	54.2	34.2	30

Location	External L_{Aeq} at 1m from facade	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria Internal LAeq
R19	63.2	53.2	33.2	30

Table 5.3 Residential: Night-time (L_{Amax}) Noise Intrusion

Location	External L_{Aeq} at 1m from facade	Internal L_{Aeq} with windows open	Internal L_{Aeq} with windows closed	Criteria Internal LAeq
R01	70.6	60.6	40.6	45
R02	59.9	49.9	29.9	45
R03	62.0	52.0	32.0	45
R04	68.9	58.9	38.9	45
R05	72.4	62.4	42.4	45
R06	67.8	57.8	37.8	45
R07	73.2	63.2	43.2	45
R08	65.4	55.4	35.4	45
R09	52.5	42.5	22.5	45
R10	70.8	60.8	40.8	45
R11	70.0	60.0	40.0	45
R12	70.9	60.9	40.9	45
R13	75.9	65.9	45.9	45
R14	71.8	61.8	41.8	45
R15	71.0	61.0	41.0	45
R16	73.7	63.7	43.7	45
R17	73.5	63.5	43.5	45
R18	71.0	61.0	41.0	45
R19	71.2	61.2	41.2	45

The recommended WHO/BS 8233 internal noise levels are generally exceeded across the site during the daytime and night-time, assuming a windows-closed scenario at properties immediately adjacent to the Principal Street West. In order to achieve the recommended internal noise criteria, a range of mitigation measures are outlined in Section 6.1 of this report. These assessments include noise from the existing roads.

Primary School Extension

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 specification R_w 30 dB (e.g 6/12/6mm double glazing or equivalent) has been used.

For the purpose of this assessment, an indicative location of the proposed primary school extension has been assessed. The noise levels show that glazing with a sound reduction of a minimum R_w 30 dB would be required.

5.3 ProPG Stage 2 Assessment – Element 3 Proposed External Amenity

For the purpose of this assessment, garden areas have indicatively been defined for a few residential dwellings, with garden fences included. The assessment shows that noise levels do not exceed the BS 8233/WHO Upper Guideline limit of 55 dB

Table 5.4 Private Amenity Areas/Gardens: Daytime (L_{Aeq}) Noise Intrusion

Location	External $L_{Aeq, 16hr}$ Daytime	BS 8233 Upper Guideline Criteria L_{Aeq}
G01	45.7	55
G02	42.3	55
G03	47.4	55
G04	47.2	55
G05	50.0	55

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5.4 Road Traffic Noise Assessment

Based on the traffic data provided by iTransport LLP, the assessment below compares the different scenarios presented to determine the change in noise levels resulting from both the scheme in the opening year 2021 (based on worst case traffic flows of the whole site being occupied) and in a future assessment year 2031 (also based on worst case traffic flows). Reference is also given to the change in noise level that occurs from the change in traffic flows through general growth in traffic without the scheme.

The Do Something traffic flows used in the assessment of the changes in road traffic incorporate committed developments and the proposed Park Farm development located to the east of the site. In addition to this, the opening year assessment is presented giving "with mitigation" and "no mitigation" results. The mitigation described refers to a Sustainable Travel Plan, and is not described further in this report. More information can be found within the transport assessment that also accompanies this planning application.

Table 5.5 within Appendix B shows the results of the traffic noise assessment comparing the 'without' (2021 – With Committed Development - DM) and 'with' (2021 – Committed Development plus Development) development traffic noise levels at representative receptors.

Table 5.5 Difference between the 'with' and 'without' development 2021 scenario – no mitigation

Location	Traffic Noise Without Development 2021 ($L_{A10,18hr}$ dB(A))	Traffic Noise With Development 2021 ($L_{A10,18hr}$ dB(A))	Difference
T01	62.9	63.4	0.5
T02	61.7	62.2	0.5
T03	64.9	65.2	0.3
T04	67.6	67.9	0.3
T05	67.0	67.0	0.0
T06	68.6	68.3	-0.3
T07	65.6	65.5	-0.1
T08	68.5	68.8	0.3
T09	67.3	67.6	0.3
T10	70.3	70.4	0.1
T11	65.8	65.9	0.1
T12	64.3	64.2	-0.1
T13	69.1	68.8	-0.3
T14	67.6	67.3	-0.3
T15	69.6	69.2	-0.4
T16	70.0	69.6	-0.4

Location	Traffic Noise Without Development 2021 ($L_{A10,18hr}$ dB(A))	Traffic Noise With Development 2021 ($L_{A10,18hr}$ dB(A))	Difference
T17	70.7	70.1	-0.6
T18	70.6	69.9	-0.7

Table 5.6 Difference between the 'with' and 'without' development 2021 scenario – with mitigation

Location	Traffic Noise Without Development 2021 ($L_{A10,18hr}$ dB(A))	Traffic Noise With Development 2021 ($L_{A10,18hr}$ dB(A))	Difference
T01	62.9	63.2	0.3
T02	61.7	62.0	0.3
T03	64.9	65.1	0.2
T04	67.6	67.8	0.2
T05	67.0	67.3	0.3
T06	68.6	69.0	0.4
T07	65.6	65.6	0.0
T08	68.5	68.8	0.3
T09	67.3	67.6	0.3
T10	70.3	70.4	0.1
T11	65.8	65.9	0.1
T12	64.3	64.7	0.4
T13	69.1	69.4	0.3
T14	67.6	67.9	0.3
T15	69.6	69.9	0.3
T16	70.0	70.3	0.3
T17	70.7	71.5	0.8
T18	70.6	71.4	0.8

Table 5.7 Difference between the development 2021 scenario and the future 2031 scenario with local plan development, plus development and mitigation

Location	Traffic Noise Without Development 2021 ($L_{A10,18hr}$ dB(A))	Traffic Noise With Development 2031 ($L_{A10,18hr}$ dB(A))	Difference
T01	62.9	63.9	1.0
T02	61.7	62.7	1.0
T03	64.9	66.2	1.3
T04	67.6	69.0	1.4
T05	67.0	67.9	0.9
T06	68.6	69.1	0.5
T07	65.6	66.8	1.2
T08	68.5	69.2	0.7
T09	67.3	67.9	0.6

Location	Traffic Noise Without Development 2021 ($L_{A10,18hr}$ dB(A))	Traffic Noise With Development 2031 ($L_{A10,18hr}$ dB(A))	Difference
T10	70.3	71.1	0.8
T11	65.8	66.6	0.8
T12	64.3	63.5	-0.8
T13	69.1	69.6	0.5
T14	67.6	68.1	0.5
T15	69.6	70.1	0.5
T16	70.0	70.5	0.5
T17	70.7	72.1	1.4
T18	70.6	72.0	1.4

Table 5.8 Difference between the without development 2021 scenario and the future 2031 without development scenario

Location	Traffic Noise Without Development 2021 ($L_{A10,18hr}$ dB(A))	Traffic Noise Without Development 2031 ($L_{A10,18hr}$ dB(A))	Difference
T01	62.9	63.0	0.1
T02	61.7	61.8	0.1
T03	64.9	65.1	0.2
T04	67.6	67.8	0.2
T05	67.0	67.2	0.2
T06	68.6	68.7	0.1
T07	65.6	65.6	0.0
T08	68.5	68.7	0.2
T09	67.3	67.5	0.2
T10	70.3	70.5	0.2
T11	65.8	66.0	0.2
T12	64.3	64.5	0.2
T13	69.1	69.3	0.2
T14	67.6	67.8	0.2
T15	69.6	69.7	0.1
T16	70.0	70.1	0.1
T17	70.7	73.1	2.4
T18	70.6	73.0	2.4

The results of the short-term assessment indicate that at representative receptors as a result of the implementation of the scheme, with or without the mitigation, there would be a change of less than 1.0 dB which falls within the No Observed Adverse Effect Level.

The results of the long-term assessment indicate that at representative receptors as a result of the implementation of the scheme indicate there would be a change in noise level of up to 1.4dB, as with the short-term noise level assessment this falls within the No Observed Adverse Effect Level.

The results of the long-term assessment comparing the change in traffic noise level without the proposed development indicate that the change in noise level of up to 2.4 dB, as with the above assessments detailed above noise level assessment this falls within the No Observed Adverse Effect Level.

5.5 Construction Noise Assessment

Noise levels from potential construction activity associated with the development of the site have been assessed in accordance with BS 5228-1:+ A1 2014 criteria which indicate if a significant effect is likely to occur at noise sensitive properties.

Point sources representing all likely items of plant have been represented in the model and in the case of mobile plant these have been placed in worst-case locations with respect to nearby noise sensitive premises (sources have been located adjacent to the development site boundaries). Worst case assumptions regarding the 'on-time' of individual plant items have also been made and represented in the calculations. In order to ensure that the assessment is worst case, it is assumed that all proposed construction activity is occurring simultaneously.

Significance based on fixed limits

Table 5.9 below shows predicted levels of construction noise at existing noise sensitive properties, as detailed in Table 3.8, for comparison with the recommended noise limit criteria.

Table 5.9 Construction Phase Noise Assessment Results (Fixed Limits Method) Existing Receptors

Ref	Construction Noise Level (dB(A))	Criteria (dB(A))	Within Recommended fixed noise limit
CR01	44.7	70.0	Yes
CR02	40.4	70.0	Yes
CR03	34.9	70.0	Yes
CR04	32.4	70.0	Yes
CR05	27.0	70.0	Yes
CR06	28.6	70.0	Yes
CR07	39.6	70.0	Yes
CR08	42.6	70.0	Yes

Ref	Construction Noise Level (dB(A))	Criteria (dB(A))	Within Recommended fixed noise limit
CR09	39.9	70.0	Yes
CR10	48.1	70.0	Yes
CR11	44.9	70.0	Yes

The results indicate that the noise levels at the façades of the existing noise sensitive properties would be within the recommended criteria. Noise levels within the fixed limit criteria are likely to result in internal conditions where conversation would not be difficult and therefore would be within the Lowest Observed Adverse Effect Level.

5.6 Vibration Assessment

5.6.1 Potential Building Damage

The assessments undertaken in respect to vibration make the assumption that the expected ground conditions remain the same throughout the site and in the immediate surrounding area.

The following table shows the maximum Peak Particle Velocity measured at the site for comparison with the BS 7385 criteria.

Table 5.2 Vibration Assessment – Building Damage

Location	Max PPV at 1m (mm/s)	Damage Criteria	Within Criteria
Bus layby on B3081	0.275	15.0	Yes

The result in the table above show that the peak particle velocity (PPV) measured at a location representative of the worst-case (closest) distance to the properties proposed to be built as part of the Proposed Development was measured at 0.275 mm/s. This is a positive indication that there is unlikely to be any building damage associated with vibration from the adjacent road. This also indicates that during the operation of the proposed development, there would not be any building damage from passing HGV traffic.

5.6.2 Human Response

The following table shows the calculated estimated vibration dose value (eVDV) for comparison with the BS 6472 criteria.

Table 5.3 Vibration Assessment – Human Response (Daytime)

Location	eVDV ($ms^{-1.75}$)
Bus layby on B3081	0.012

The results in the table above show that the daytime eVDV calculated at a location representative of the worst-case (closest) distance to the properties proposed to be built as part of the Proposed Development was 0.012ms-1.75. This indicates that there is a 'low probability of adverse comment' possible when compared to the BS 6472 criteria.

However it should be noted that no damping effects of the building and associated foundations/earthworks have been incorporated into these calculations, thus making them worst case. Additionally, this also indicates that during the daytime operation of the proposed development, there would be a "low probability of adverse comment" in relation to passing HGV and Bus traffic.

5.7 Tranquillity Assessment

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 Zones 4-6.

Most of the site falls into zone 5, pertaining to a moderate tranquillity rating. There are three public footpaths which cross through the site. The current footpath routes following a north easterly direction, lead to an area of slightly lower tranquillity (residential area of Shaftesbury Road). The footpath route which follows a north westerly direction leads to an area of higher tranquillity around Lodden Lakes, with the indicative footpath route maintaining this walkway. Following all footpath routes to the south, they again lead to areas of higher tranquillity with indicative plans preserving these routes. Whilst the mixed use development presents potential additional noise for proposed residents and alterations to the footpath routes, there is considered to be no significant effect on tranquillity value.

6.0 Acoustic Design Statement (Mitigation)

Residential Dwellings

The results of the noise intrusion assessment undertaken using cumulative traffic flows has been used to calculate the levels of glazing needed in order 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.

This scenario has been used as it incorporates the full use of Principal Street which runs through the site.

The results indicate that based on an indicative layout the following will be required within the proposed development boundary. The majority of dwellings within the site will require alternative ventilation and/or glazing. A glazing strategy is illustrated in SK07 of Appendix B and shows areas which may require some form of mitigation, however, future buildings/barriers within the site would create effective screening, reducing the extent of these areas.

The remaining properties throughout the site will meet internal noise levels and require R_w 30 dB glazing.

Most of the properties within the site boundary will need alternative ventilation which can be provided in several ways such as acoustic trickle vents (which need to have a minimum sound reduction equal to or greater than the glazing), other passive ventilation systems or mechanical ventilations systems.

Furthermore, care should be taken to minimise the potential impact of noise via careful design of site/building layout such as consideration of the appropriate positioning of living rooms, bedrooms and gardens. Within the buildings themselves, living rooms and bedrooms should ideally be located on shielded façades with non-sensitive spaces such as corridors, bathrooms, en-suite, utility rooms, windowless gable ends and kitchens located on the road facing façades of residential properties. Gardens should ideally be sited on the shielded side of dwellings with relation to the roads around and within the site

Private Amenity Areas/Gardens

Garden fences should be constructed from brick or solid timber panels with no gaps and be a minimum of 1.8 metres high to provide further protection to private amenity spaces.

Primary School Extension

Internal noise levels within the primary school extension are expected to meet the requirements of BB93 with the installation of glazing with a sound reduction of Rw 30 dB at a minimum. The proposed Primary School extension will also need alternative ventilation which can be provided in several ways such as acoustic trickle vents (which need to have a minimum sound reduction equal to or greater than the glazing), other passive ventilation systems or mechanical ventilations systems.

7.0 Conclusions

This report presents the findings of a noise assessment for a proposed residential led development on land east of B3092 known as Gillingham Strategic Site Location, using cumulative traffic flow data. Section 123 of the NPPF gives four test points relating to noise; considering these the following conclusions can be drawn:

NPPF 123 A & B

In considering the NPPF test in section 123, points A & B. The proposed development is not expected to have an 'adverse impact' on health or quality of life. Similarly, with regard 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 use of a suitable glazing and ventilation strategy.

An assessment of the increases in road traffic noise as a result of the cumulative effects of the proposed development and that of the Park Farm development proposed to the east of the site has shown that noise levels at nearby existing sensitive receptor locations are predicted to experience a negligible increase in noise levels as a result of the scheme and therefore the noise levels are not considered to cause an impact.

Glazing and Ventilation Strategy

The recommended WHO/BS 8233 internal noise levels are generally met across the site during the daytime and night-time, assuming a windows-closed scenario. The strategy has been provided which achieves both ventilation and internal ambient noise level requirements of $L_{Aeq\ daytime}$ 35 dB, $L_{Aeq\ night\text{-}time}$ of 30 dB and $L_{Amax\ night\text{-}time}$ of 45 dB in all residential bedroom and living spaces of the proposed development; noise levels are predicted to be within or below the Lowest Observable Adverse Effect Level criteria.

Noise levels within indicative private external amenity area (gardens) are predicted to be below 55 dB $L_{Aeq,\ 16\ hours}$. Therefore mitigation would not be required to provided additional shielding and reduce noise levels.

NPPF 123 C & D

Given that the site is bounded by similarly sensitive residential properties to the north, east and south, it is not considered that existing development wanting to develop would be restricted by the use of the proposed development site for residential purposes. The development is situated in a CPRE Zone 2-3 for tranquillity (1 being least tranquil and 10 being most). As such, the proposed use of the site is not considered likely to affect this rating.

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

An explanation of the specific acoustic terminology referred to within this report is provided below.

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.

An explanation of abbreviations used within this report is provided below.

CADNA – Computer Aided Noise Abatement

DMRB – Design Manual for Roads and Bridges

HGV – Heavy Goods Vehicle

UDP – Unitary Development Plan

UKAS – United Kingdom Accreditation Service

WYGE – WYG Environment

Appendix B – Sketches

SK01 Noise Monitoring Locations

SK02 Existing Sensitive Receptor Locations

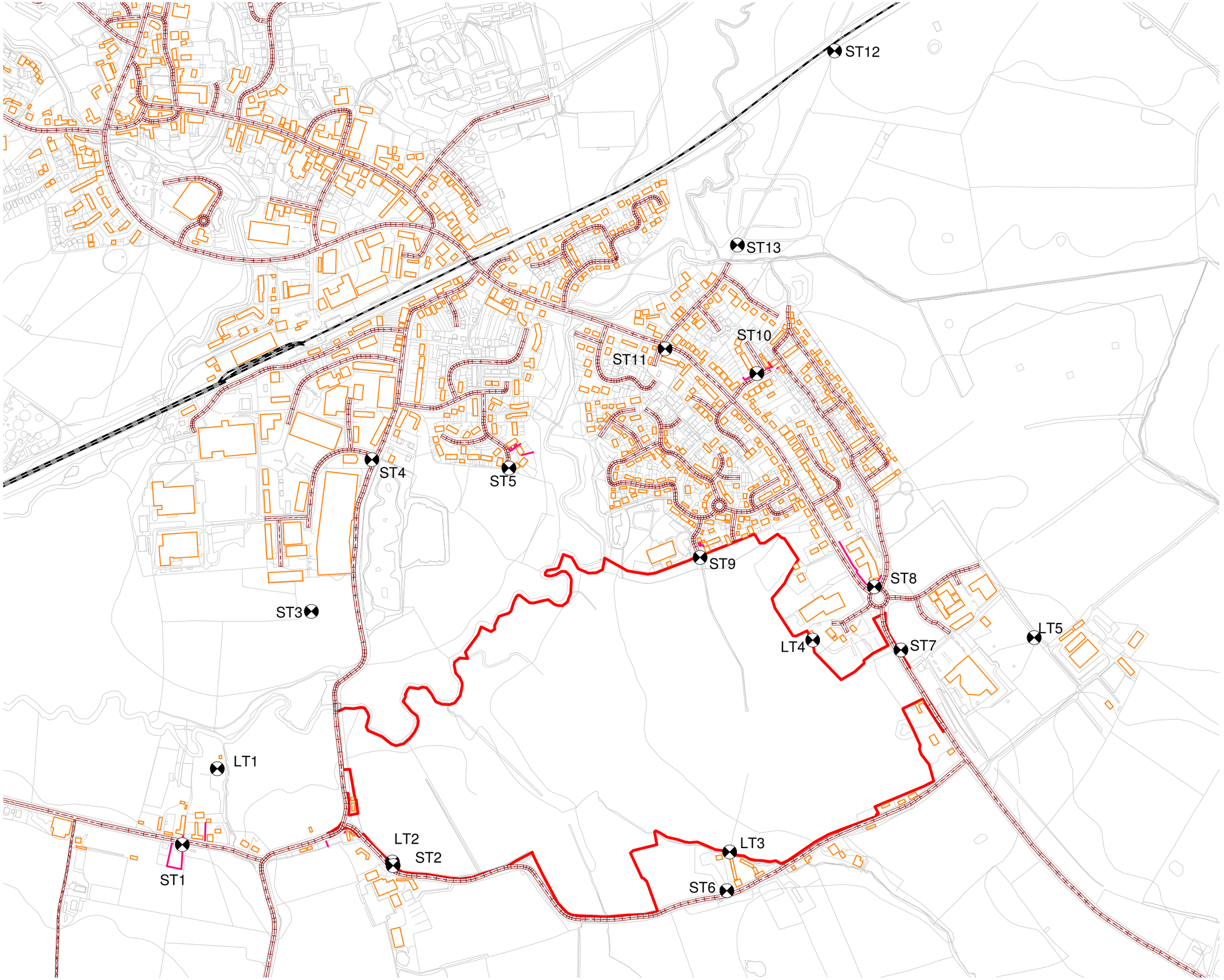
SK03 Proposed (Indicative Only) Sensitive Receptor Locations

SK04 Do Minimum $L_{A10,18hr}$ Noise Contours (2021)

SK05 Do Something $L_{A10,18hr}$ Noise Contours (2031)

SK06 Do Minimum 2020 / Do Something 2020 Noise Level Difference Contours

SK07 Glazing and Ventilation Strategy



Client:
Welbeck Strategic Land
C G Fry and Son Ltd
Taylor Wimpey

Project:
Gillingham Strategic Site Location

Project Number:
A055606-2

Drawing Title / Scenario:
Noise Monitoring Locations

Drawing Number:
SK01

Key:

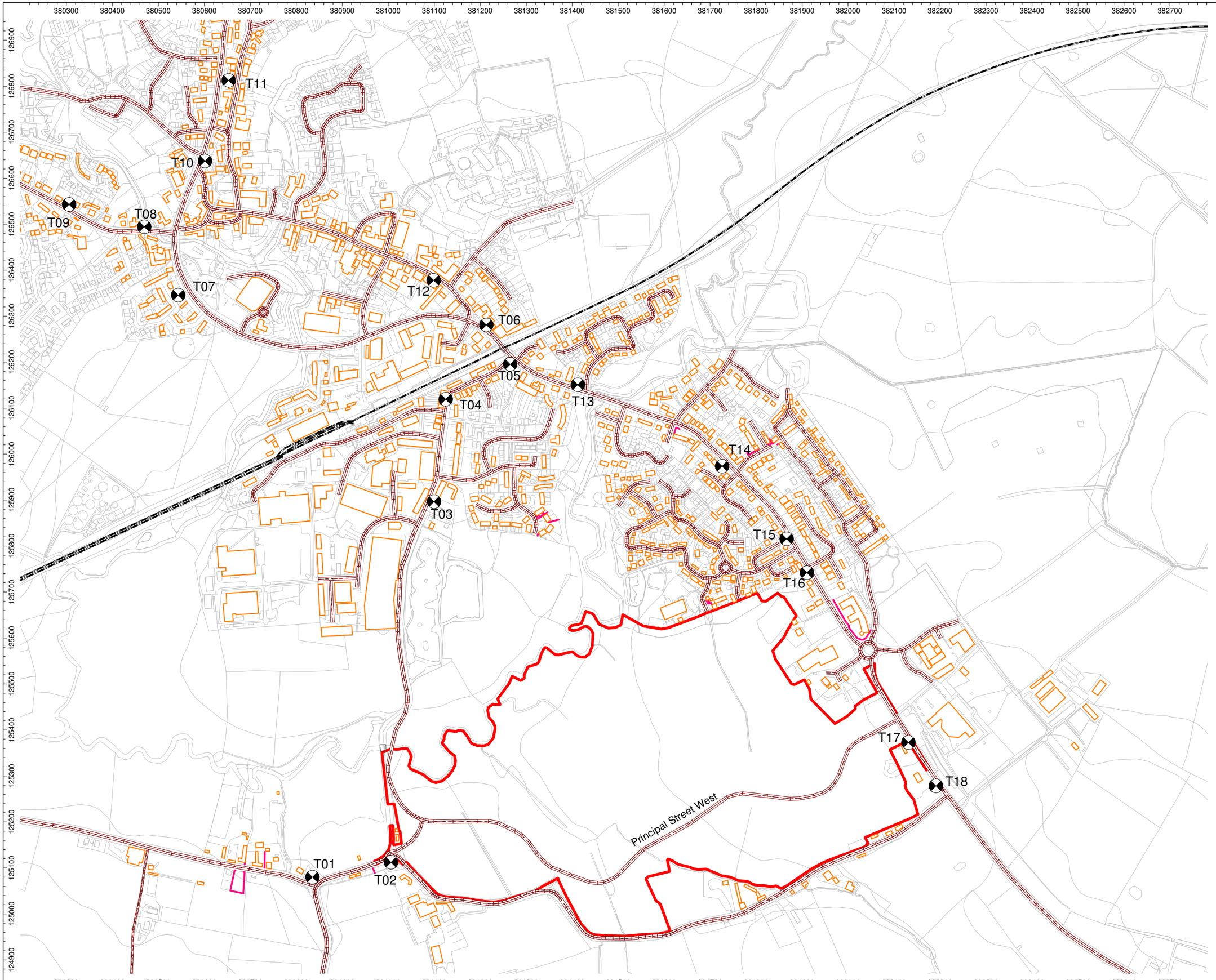
Site Boundary:

Scale : Not to scale

WYGE Leicester 27.11.17

Licence Number AL 553611

Executive Park
Avalon Way
Anstey
Leicestershire
LE7 7GR
Tel 0116 234 8000



Client:
Welbeck Strategic Land
C G Fry and Son Ltd
Taylor Wimpey

Project:
Gillingham Strategic Site Location

Project Number:
A055606-2

Drawing Title / Scenario:
Existing Sensitive Receptor Locations

Drawing Number:
SK02

Key:

Site Boundary:

Scale : Not to scale

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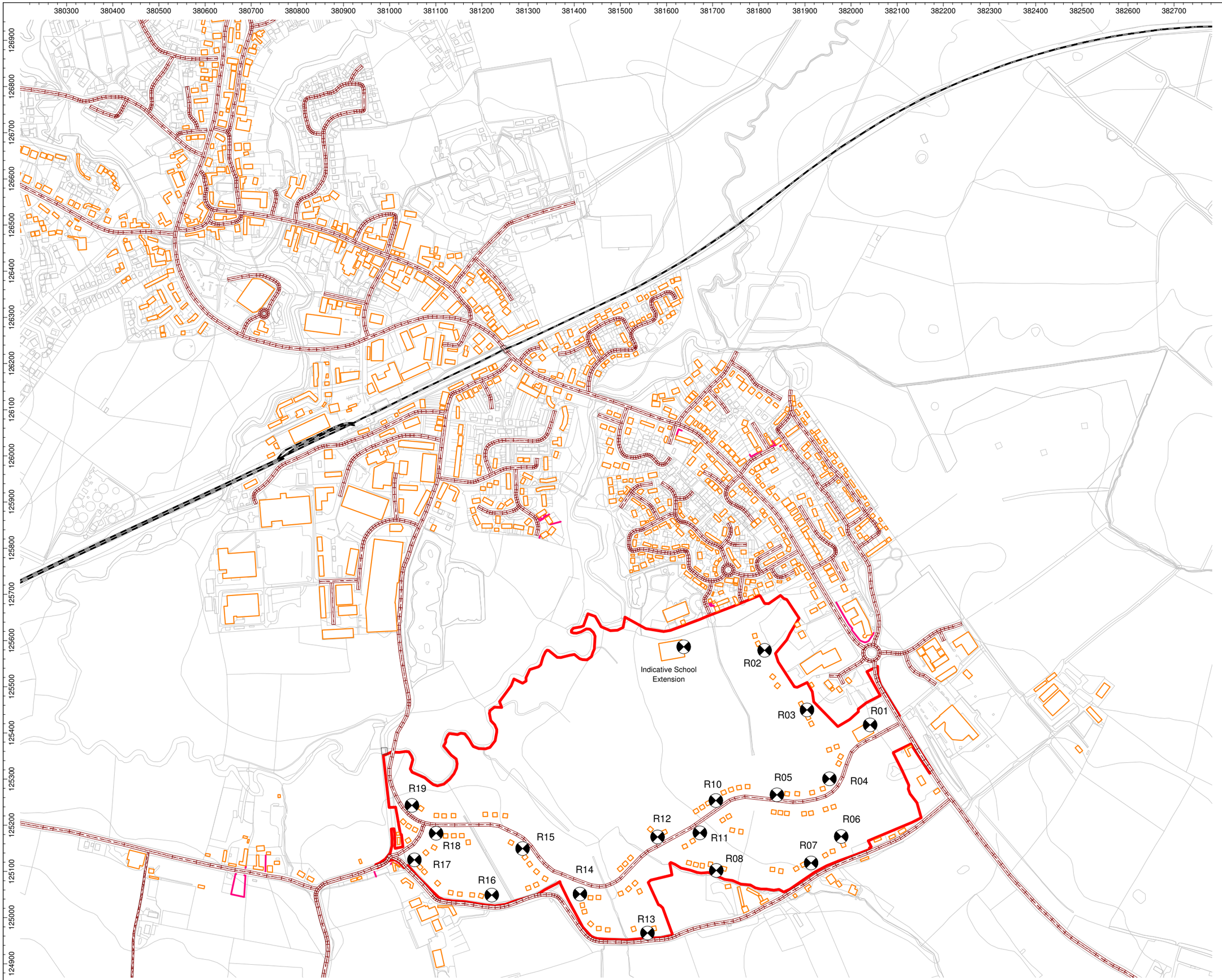
Licence Number AL 553611

Executive Park
Avalon Way
Anstey
Leicestershire
LE7 7GR
Tel 0116 234 8000



Client:
Welbeck Strategic Land
C G Fry and Son Ltd
Taylor Wimpey

Project:
Gillingham Strategic Site Location

Project Number:
A055606-2

Drawing Title / Scenario:
Proposed Sensitive Receptor Locations

Drawing Number:
SK03

Key:

Site Boundary:

Scale : Not to scale

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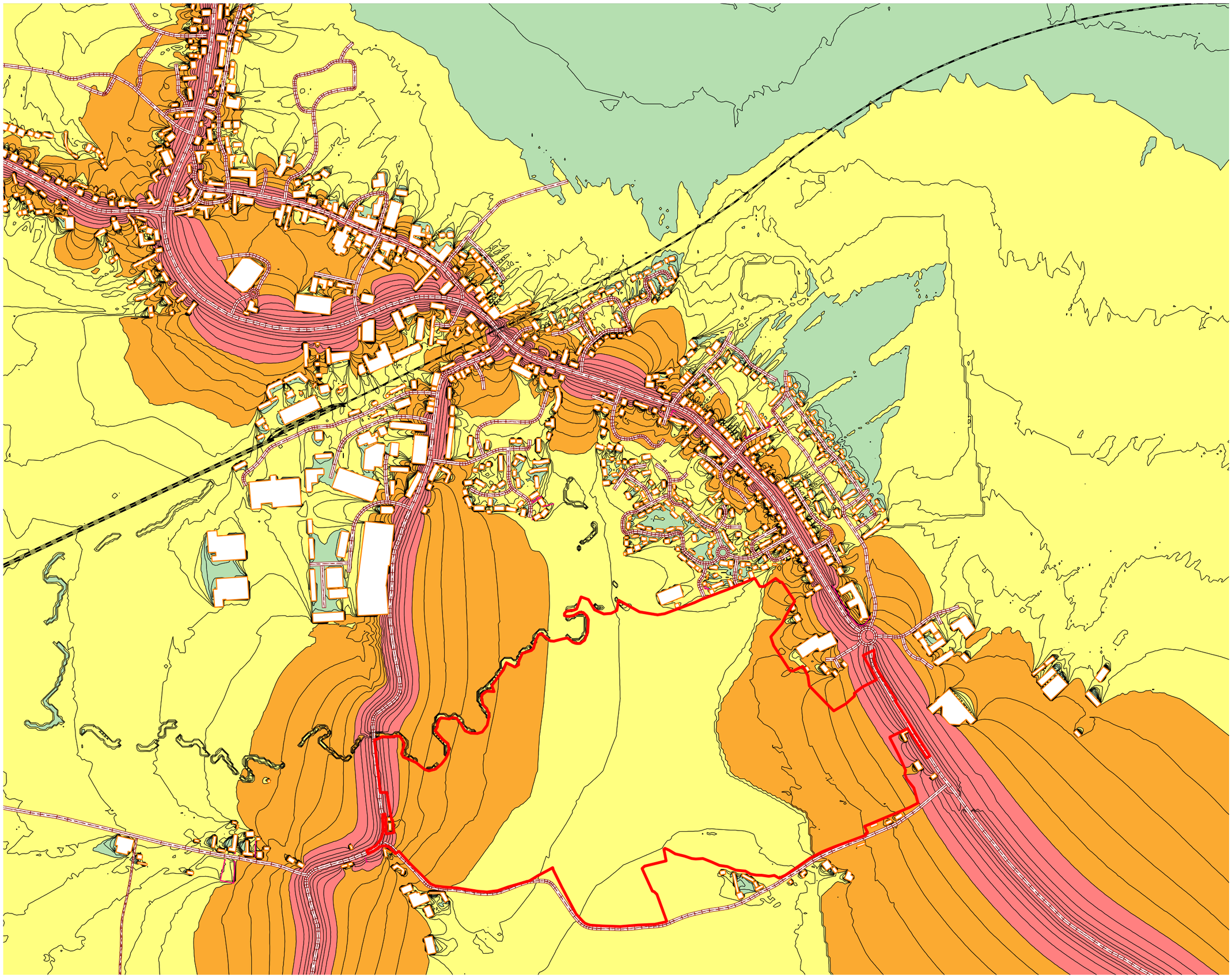
Executive Park
Avalon Way
Anstey
Leicestershire
LE7 7GR
Tel 0116 234 8000



Client:
Welbeck Strategic Land
C G Fry and Son Ltd
Taylor Wimpey

Project:
Gillingham Strategic Site Location

Project Number:
A055606-2

Drawing Title / Scenario:
Daytime Do Minimum
LA10,18hr
Noise Contours (2021)

Drawing Number:
SK04

Key:

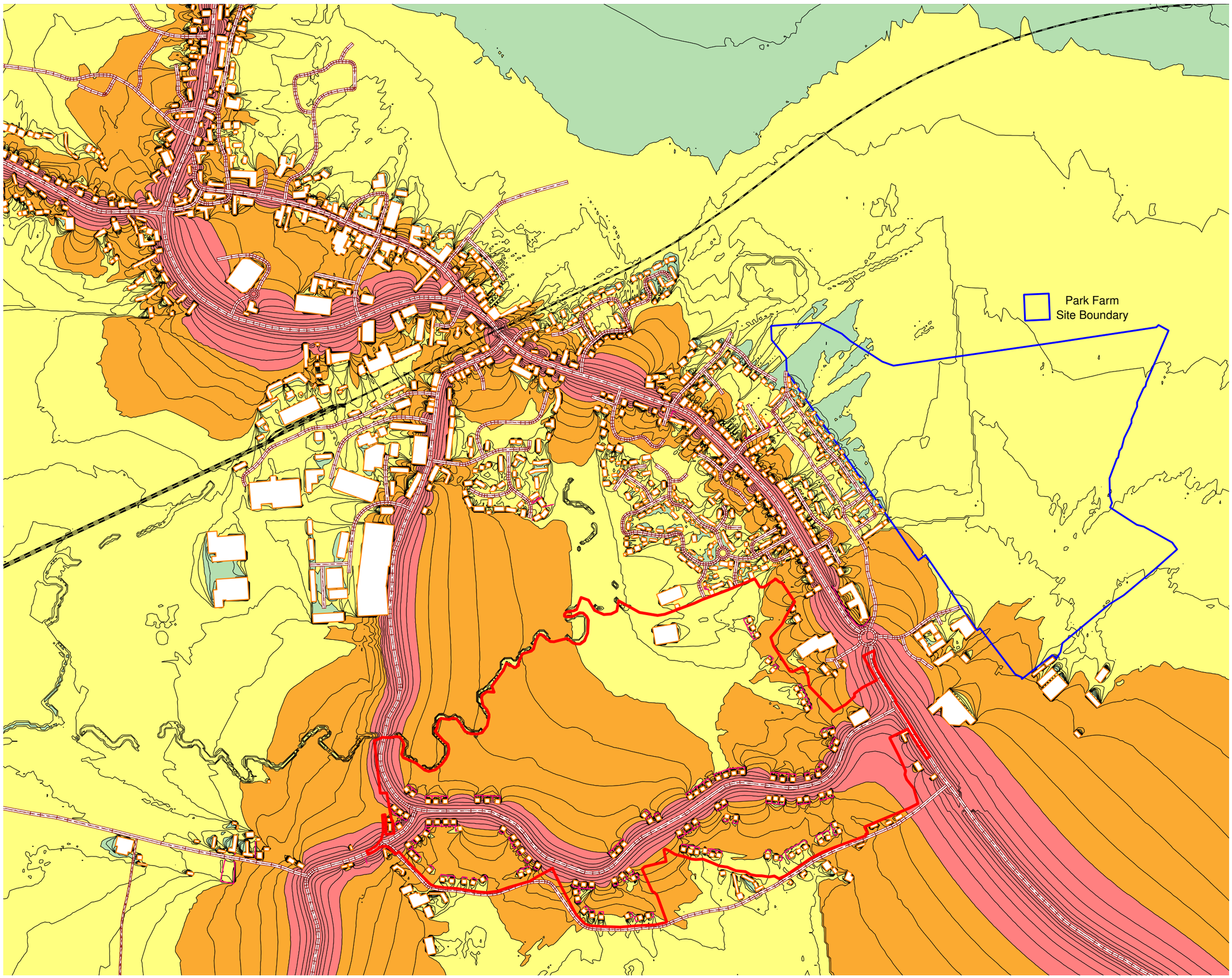
Site Boundary:

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

Scale : Not to scale

WYGE Leicester 27.11.17

Executive Park
Avalon Way
Anstey
Leicestershire
LE7 7GR
Tel 0116 234 8000



Client:
Welbeck Strategic Land
C G Fry and Son Ltd
Taylor Wimpey

Project:
Gillingham Strategic Site Location

Project Number:
A055606-2

Drawing Title / Scenario:
Daytime Do Something
LA10,18hr
Noise Contours (2031)

Drawing Number:
SK05

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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Anstey
Leicestershire
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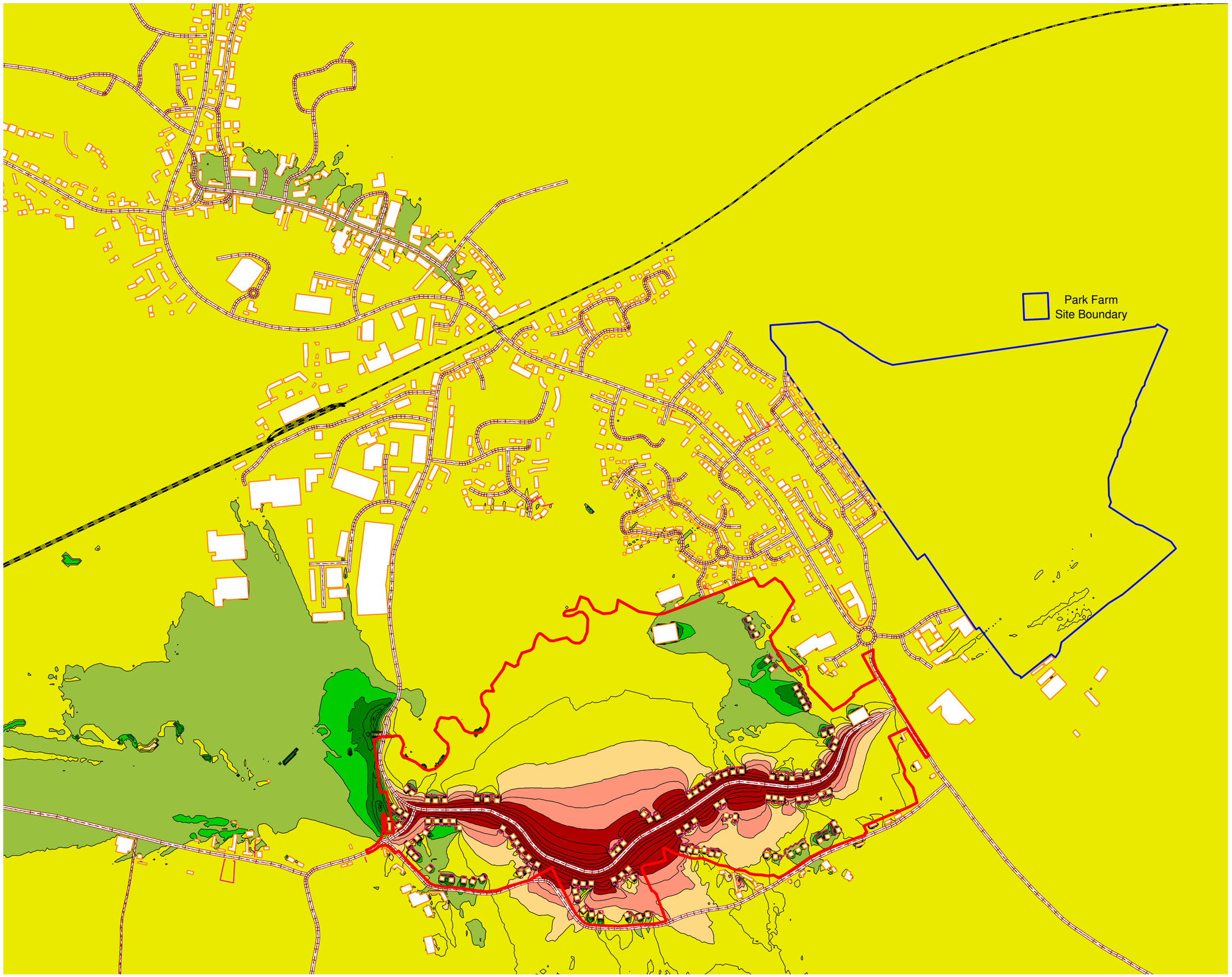

Client:
Welbeck Strategic Land
C G Fry and Son Ltd
Taylor Wimpey

Project:
Gillingham Strategic Site Location

Project Number:
A055606-2

Drawing Title / Scenario:
Do Minimum 2021/ Do Something 2031: Noise Level Difference Plot

Drawing Number:
SK06

Key:

Site Boundary:

-10 <= ... < -5
-5 <= ... < -3
-3 <= ... < 0
0 <= ... < 3
3 <= ... < 5
5 <= ... < 10

Scale : Not to scale

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Licence Number AL 553611

Executive Park
Avalon Way
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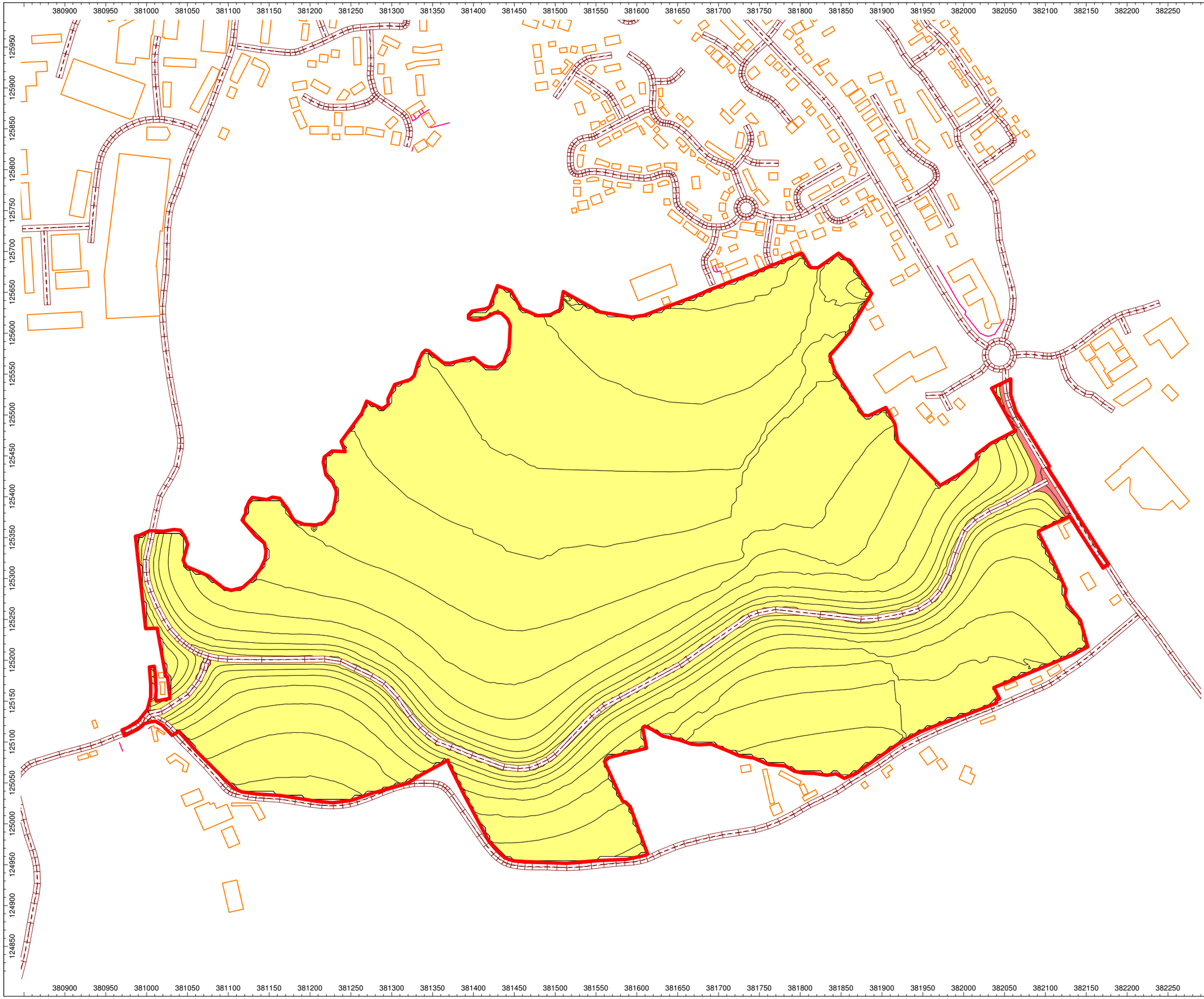
Leicestershire
LE7 7GR
Tel 0116 234 8000



Client:
Welbeck Strategic Land
C G Fry and Son Ltd
Taylor Wimpey

Project:
Gillingham Strategic Site Location

Project Number:
A055606-2

Drawing Title / Scenario:
Indicative Layout Showing Glazing Strategy

Drawing Number:
SK07

Key:

Site Boundary:

- Natural Ventilation
- Alternative Ventilation/Glazing
- Enhanced Glazing Required
- No Build Zone

Scale : Not to scale

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Anstey
Leicestershire
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