sharps acoustics

Land East of Mousdell Close, Ashington

Assessment of impact of noise on a proposed residential development

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Appendices

1.0 Introduction

1.1 Sharps Acoustics LLP (SAL) has been commissioned by Rocco Homes to undertake an assessment of noise from road traffic to determine the potential effects on a proposed residential development on land East of Mousdell Close, Ashington and to propose noise mitigation, where required. The application proposal is for the *erection of 74no. dwellings with associated landscaping, open space, parking and creation of new vehicular access from Rectory Lane*.

1.2 The site comprises land/field to the south of Rectory Lane and in general is a quiet rural location on the outskirts of Ashington village. The lane appears to serve the residents in Mousdell Close, Penn Gardens and the Church and rectory at the end of it, but does not appear to be used by anyone else. An aerial view of the site and surroundings is provided as Figure A1 in Appendix A.

1.3 Section 2.0 of this report contains a review of relevant planning and noise policy. Section 3.0 discusses relevant technical guidance. Section 4.0 discusses Good Acoustic Design for the site. Section 5.0 sets out details of noise survey work carried out at the site. Section 6.0 describes the noise environment around the site, based on surveyed levels and provides details of recommended noise mitigation. Section 7.0 contains the assessment conclusions.

2.0 Policy context

NPPF

2.1 The Government's overarching policy in relation to planned development is contained in the National Planning Policy Framework (NPPF).

2.2 Paragraph 187 of the NPPF advises that planning polices and decisions should:

> *"… contribute to and enhance the natural and local environment by … preventing new and existing development from contributing to, being put at unacceptable risk from … noise pollution."*

2.3 Paragraph 198 of the NPPF states that Planning policies and decisions should ensure that any:

> *"… 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 …"*

2.4 Paragraph 193 of the NPPF (which is often referred to as the "agent of change" principle), requires that:

> *"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."

2.5 The NPPF does not provide prescriptive advice on how to avoid noise from giving rise to significant adverse impacts on health and quality of life. Therefore, it is necessary to consider advice in other guidance documents. This advice is discussed below.

2.6 In relation to the statement in paragraph 198 of the NPPF about significance, there is a footnote stating:

"See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010)".

2.7 This is the NPSE – discussed below.

NPSE

2.8 The Noise Policy Statement for England was prepared by DEFRA and is dated March 2010.

2.9 Paragraph 1.5 of the NPSE states that the advice within the document applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.

2.10 The NPSE, paragraph 2.12, explains that the WHO defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity".

2.11 The Noise Policy Aims of the NPSE (NPSE paragraphs 2.22 to 2.24) can be summarised as follows:

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

2.12 The NPSE makes a distinction between "quality of life", which is a subjective measure, and "health", which refers to physical and mental well-being.

2.13 The latest WHO Guidelines (Environmental Noise Guidelines for the European Region, 2018) explain that impacts that may result from noise such as annoyance and sleep disturbance are considered to be "critical health outcomes" and that quality of life, well-being and mental health are "important health outcomes". Sleep disturbance is also referred to as having an effect on quality of life.

2.14 The NPSE introduces the concepts of the "no observed effect level" (NOEL); the "lowest observed adverse effect level" (LOAEL); and a "significant observed adverse effect level" (SOAEL).

2.15 It is the last of these criteria – the SOAEL – that is the level above which significant adverse effects on health and quality of life occur. This criterion equates to the first aim of the NPSE and the policy requirement in the NPPF.

2.16 The second aim of the NPSE is to mitigate and minimise adverse impacts between LOAEL and SOAEL.

2.17 The NPSE does not provide noise guideline values or limits above which SOAEL occurs. Indeed, the document advises that it is not possible to have a single objective noise-based measure that defines SOAEL. Therefore, it is necessary to refer to other advisory documents in order to seek to define such levels.

PPG - Noise

2.18 This "Planning Practice Guidance note – Noise" was released on 6th March 2014 and has been updated since, most recently in July 2019.

2.19 The PPG reinforces the concept of LOAEL and SOAELs discussed above and seeks to define a person's perception at these different effect levels. It describes what is meant by levels below the LOAEL (at the NOEL and NOAEL) under the heading, "How can it be established whether noise is likely to be a concern?", as follows:

> *"At the lowest extreme, when noise is not perceived to be present, there is by definition no effect. As the noise exposure increases, it will cross the 'no observed effect' level. However, the noise has no adverse effect so long as the exposure does not cause any change in behaviour, attitude or other physiological responses of those affected by it. The noise may slightly affect the acoustic character of an area but not to the extent there is a change in quality of life. If the noise exposure is at this level no specific measures are required to manage the acoustic environment." Paragraph: 005 Reference ID: 30-005-20190722.*

2.20 NPPG describes the NOAEL as, "noise can be heard, but does not cause any change in behaviour, attitude or other physiological response …", whereas at a LOAEL, "noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance." Noise levels below the LOAEL are described as "present and not intrusive" whereas levels above the LOAEL but below the SOEAL are described as "present and intrusive".

2.21 A "significant" effect is described as "present and disruptive" resulting in "a material change in behaviour, attitude or other physiological response …".

2.22 The PPG provides a hierarchy of planning actions required for different perceptions and effects of noise. Between LOAEL and SOAEL the recommended action is to mitigate noise and reduce to a minimum. At SOAEL the action recommended is to avoid. These are the same terms used in the NPPF and NPSE. The NPPF, NPSE and NPPG do not ascribe noise levels to any of the effects discussed within the three documents. Therefore, it is necessary to consider other guidance which attributes noise levels to health effects such as annoyance during the day or sleep disturbance at night.

2.1 The PPG also gives further consideration relating to mitigating the impact of noise on residential developments and considers that noise may be partially off-set if residents of the dwellings have access to:

- A relatively quiet façade (containing windows to habitable rooms as part of their dwelling)
- A relatively quiet external amenity space for their sole use such as a balcony which is generally considered as desirable
- A relatively quiet nearby external space for use by a number of residents as part of the amenity of their dwellings and / or
- A relatively quiet external, publicly accessible amenity space that is nearby (e.g. within a 5 minute walk).

2.2 In relation to the use of closed windows to achieve acceptable internal noise levels, the PPG comments, in a section titled, "What factors influence whether noise could be a concern?":

> *"The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation.*
>
> *…*
>
> *More specific factors to consider when relevant include:*
>
> *… whether any adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time (and the effect this may have on living conditions). In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations." (my emphasis)*

2.3 In relation to the agent of change principle, the PPG advises:

> *"Development proposed in the vicinity of existing businesses, community facilities or other activities may need to put suitable mitigation measures in place to avoid those activities having a significant adverse effect on residents or users of the proposed scheme."*

2.4 It also suggests that a developer of a new noise sensitive use near to an existing source of noise (as the "agent of change") should:

- Clearly define effects of existing businesses that might cause a noise nuisance;
- Clearly define mitigation being proposed to address any potential significant adverse effects; and
- Ensure that a satisfactory living environment is achieved and help mitigate to the risk of a statutory nuisance being found.

Local Policy

2.5 The site is within the Horsham District Council's (HDC) jurisdiction. HDC have a local plan entitled Horsham District Planning Framework (dated November 2015), within which Policy 24 "Environmental Protection", paragraph 9.11 relates to noise and requires that:

> *"9.11 Noise pollution can have a significant impact on the quality of life and health of individuals and communities. To help avoid adverse noise impacts from development, authorities in both East and West Sussex have produced a Planning Guidance Document on this issue. Applicants should therefore address the issues raised in this document prior to making an application."*

2.6 This site lies within West Sussex's jurisdiction and the above referred to document by HDC is entitled *Planning Noise Advice Document: Sussex*, dated September 2021. The aim of the document is "*…to complement the Noise Policy Aims set out in the Noise Policy Statement for England (2010) (NPSE)…*" (as per paragraphs 2.8-2.17 of this report).

2.7 The above document clearly lays out the expectations of a noise report and associated noise related guidelines/standards that should be followed, depending on the proposed scheme. Annex 1 lists all the relevant development categories and the associated standards and recommended noise thresholds, of which a new *Residential development* is applicable to this scheme, with the following requirements:

Development Category	Type of development	Relevant standards (See reference list below for full details)	Recommended noise thresholds at the most sensitive noise receptors.
Residential development	New houses, extensions, flats, and house conversions that require planning permission.	BS8233:2014. WHO (2009). ProPG (2017) Building Regulations 2010 Approved Document E.	1 Apply the indoor ambient noise levels in Tables 4 and 6 of BS8233. 2 Apply the WHO 2009 Community Noise guidelines for outdoor amenity areas.

2.8 The above is further discussed in Section 3.0 overleaf.

3.0 Relevant Guidance and Standards

Derivation of suitable assessment methodology and criteria

3.1 It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source may be determined by several methods, as follows:

i. The effect may be determined by reference to guideline noise values. British Standard (BS) 8233:2014 and a number of published documents such as the World Health Organisation's (WHO) "*Guidelines for Community Noise"* contain such guidelines.

ii. Alternatively, the impact may be determined by considering the change in noise level that would result from the proposal, in an appropriate noise index for the characteristic of the noise in question. There are various criteria linking change in noise level to effect. This is the method that is suited to, for example, the assessment of noise from road traffic because it is capable of predicting impact to all properties adjacent to a road link irrespective of their distance from the road.

iii. Another method is described within British Standard BS 4142, the current version of which is BS 4142: 2014+A1: 2019, 'Methods for rating and assessing industrial and commercial sound', to determine the significance of sound impact from sources of industrial and/or commercial nature. The sources that the standard is intended to assess are sounds from industrial and manufacturing processes, sound from fixed plant installations, sound from loading and unloading of goods at industrial and/or commercial premises and the sound from mobile plant and vehicles, such as forklift, train or ship movements.

3.2 In order to assess the potential effect of the noise from existing noise sources (road traffic on Rectory Lane), a comparison of measured noise levels with guideline values is most appropriate and in-line with planning requirements. Sources of guidance and suitable values to use are discussed below.

Guidance relating to road traffic noise affecting proposed new dwellings

3.3 The assessment of noise and the design of new dwellings should seek to achieve absolute noise levels taken from relevant objective standards. Such guideline values are given in the World Health Organisation (WHO) document "Guidelines for Community Noise" 1999. These values are repeated within British Standard, BS 8233:2014 which is principally intended to assist in the design of new dwellings. This guidance is directly applicable for the design of dwellings which may be affected by road traffic noise.

3.4 These values (which BS8233 describes as "desirable") provide robust levels below which there have been found to be no adverse effect (so below the LOAEL).

3.5 Table 3.1 contains a summary of the recommended internal noise guideline levels to achieve levels below LOAEL.

Table 3.1: Internal design guideline for noise from WHO / BS8233: 2014

Activity	Location	Period	
		Day (0700 to 2300 hours)	Night (2300 to 0700 hours)
Resting	Living Room	35 dB $L_{Aeq, 16hr}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16hr}$	
Sleeping	Bedroom	35 dB $L_{Aeq, 16hr}$	30 dB $L_{Aeq, 8hr}$

3.6 This is considered a robust but balanced view in the context of current policy towards supporting residential development. Where a development is considered necessary or desirable, despite external noise levels above WHO guidelines, BS8233 recommends that internal targets may be relaxed by up to 5dB and reasonable internal conditions still achieved.

3.7 WHO guidelines advise that:

> *"During daytime, few people are highly annoyed at L_{Aeq} levels below 55dB(A), and few are moderately annoyed at L_{Aeq} levels below 50 dB(A)."*

3.8 BS 8223:2014 uses these values and advises that, in outdoor areas and external amenity areas (gardens and patios), "a level of it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments." However, the standard recognises that where design standards cannot be achieved for these traditional amenity spaces then the "lowest practical levels" should be achieved. A robust aim would be to achieve the WHO guidelines for daytime, outdoor living areas, although in some developments these absolute limits may not be achievable.

3.9 At the time of writing this report, BS8233 is in the process of being revised. The draft of the revised version has just been released for public comment and it is currently anticipated that the final version of the document is most likely to be published in Q3 or Q4 of 2025 which would be after the date for the determination for this application. Nonetheless, to the extent that the document is released prior to the application being determined, it may be necessary to revisit this assessment to deal with the effect of any changes in the British Standard accordingly.

3.10 Further guidance is provided in "ProPG: Planning & Noise, Professional Practice Guidance on Planning & Noise", a joint publication from the Association of Noise Consultants, the Chartered Institute of Environmental Health and the Institute of Acoustics in 2017. This document discusses the principle of "Good Acoustic Design" and recommends a hierarchy of noise management measures that it suggests that "LPAs should encourage", as follows:

> *"i. Maximising the spatial separation of noise source(s) and receptor(s).*
>
> *ii. Investigating the necessity and feasibility of reducing existing noise levels and relocating existing noise sources.*

iii. Using existing topography and existing structures (that are likely to last the expected life of the noise-sensitive scheme) to screen the proposed development site from significant sources of noise.

iv. Incorporating noise barriers as part of the scheme to screen the proposed development site from significant sources of noise.

v. Using the layout of the scheme to reduce noise propagation across the site.

vi. Using the orientation of buildings to reduce the noise exposure of noise sensitive rooms.

vii. Using the building envelope to mitigate noise to acceptable levels."

3.11 The application of Good Acoustic Design Principles at this site is discussed in Section 4.0.

4.0 Good Acoustic Design

4.1 The development plan is included in Figure A2 in Appendix A. The good acoustic design hierarchy presented in the ProPG is discussed for each measure below, however, it should be noted (and as per Section 6.0) that noise is not an issue/factor for this scheme due to the relatively 'quiet' environment in which the site sits and therefore the site achieves a "Good Acoustic Design" by default.

Maximising the spatial separation of noise source(s) and receptor(s)

4.2 The development framework plan sets properties back from the road and provides a noise separation buffer between Rectory Lane and the facades of the proposed residential properties of approximately 12m.

Investigating the necessity and feasibility of reducing existing noise levels and relocating existing noise sources

4.3 Reducing existing noise levels or moving the source of noise is not possible in this case as the noise sources affecting the proposed development site is road traffic noise and the developer is unable to affect this in this instance.

Using existing topography and existing structures (that are likely to last the expected life of the noise-sensitive scheme) to screen the proposed development site from significant sources of noise

4.4 At this site, there are no existing structures or topographical features which would assist with screening.

Incorporating noise barriers as part of the scheme to screen the proposed development site from significant sources of noise

4.5 Screening is not proposed, as this is not needed for this relatively quiet site.

Using the layout of the scheme to reduce noise propagation across the site

4.6 As the worst-case façades along Rectory Lane are already meeting the noise criteria for residential dwellings without any attenuation requirements (see Section 6.0), other dwellings across the site would equally not be adversely affected .

Using the orientation of buildings to reduce the noise exposure of noise sensitive rooms

4.7 Not required due to the 'low' impact of noise onto the site/from Rectory Lane.

Using the building envelope to mitigate noise to acceptable levels

4.8 The glazed aspect of any façade is typically the weakest element, with the noise reduction offered through a façade with a partially open standard window to provide circa 15dB reduction from an external free field level to an internal level. However, noise-sensitive rooms which are to be located on the noisiest Rectory Lane facades with standard open windows, would still result in internal noise levels achieving those recommended by the local planning authority and BS8233/WHO guidelines. Sealed facades will therefore not be used or required anywhere on the proposed development site.

5.0 Noise survey

5.1 The site is surrounded by farmland to the north and south, with residential premises to the east and west. There is a new residential development being constructed further to the east (but bounding the site in-part to the southeast) site, as shown in Figure A1 in Appendix A.

5.2 Noise survey work was undertaken in one location, as shown in Figure A3 in Appendix A. A 01dB Fusion (Class 1) sound level meter was used for all measurements and all measurements were made under free field conditions with the microphone height at 1.5m above ground level.

5.3 Unattended measurements were made between approximately 0830 hours on Thursday 5th and 0700 hours on Wednesday 11th June 2025, with Rectory lane's kerb approximately 9m from the survey location.

Weather Conditions

5.4 The weather conditions during the survey was mixed, with several periods of wet weather over the first few days of the survey and one short period of thunderstorms with heavy rain (as corroborated by the sound recordings measured) between 1800-1830 hours on Saturday 7th June. These periods are shown in full for every approximate 30 minutes throughout the survey dates in Appendix B. These periods of wet weather have been excluded from the noise analysis, as highlighted in red in Appendix B.

5.5 Equally, levels measured during periods when the wind speed was 5 m/s or lower can be relied upon. Those measured in higher wind speeds (also in red font within Appendix B) have not been used in this assessment.

Survey Results

5.6 Figure C1 in Appendix C shows the measured noise levels at the survey location, annotated to indicate the two biggest peaks which occurred due to the aforementioned thunderstorm and a bird landing on the sound level meter and chirping for approximately 20mins.

5.7 Excluding periods when the wind speed was too high or rain/drizzle occurred (for reliable measurements), the measured values are summarised in Table 5.1 below.

Table 5.1: Summary of noise survey results at location 2

Period	Measured levels, dB	
	$L_{Aeq,T}$	$L_{A90,T}$
Day (0700 to 2300 hours)	49	41
Night (2300 to 0700 hours)	46	27

5.8 For information purposes it can be noted:

- Measurements of sound level were all made with the A-weighting, which is a filter applied to the sound level meter to simulate the frequency response of the human ear, which is more sensitive to high frequency sound than low.

- L_{Aeq} is the equivalent continuous noise level which is a method of averaging the varying noise level over the measurement period into a single figure value. The L_{Aeq} has the same sound energy as the fluctuating level over that period. The L_{Aeq} is also known as the "ambient level" and in BS4142 the L_{Aeq} in the absence of the proposed development sound is known as the "residual level".

- L_{A90} is the noise level exceeded for 90% of the time and is referred to as the background noise level.

Description of Noise Climate

5.9 During the dropping off and picking up of the survey equipment, the ambient noise climate was noted to be a mixture of distant road traffic in and around the village, London Road (A24), birdsong, occasional leaf rustle when the wind gusted, occasional motor vehicles passing along the lane and occasional construction noise (vehicles) on the nearby new housing construction site to the east.

6.0 Assessment of noise

6.1 The closest areas in which housing is proposed to Rectory Lane from this scheme will be at an approximate 12 m distance from its kerb. Survey measurements can be used to predict noise levels incident on living spaces at the different distances between measured levels and proposed dwelling façades, using the formula 10*log(d1/d2) for a line source (road), where d1 = distance between microphone and kerb of Rectory Lane (9m) and d2 is distance between source (rectory road) and nearest dwelling façade (12m).

6.2 Assuming that all of the sound present was from road traffic (to err on the side of caution/as a worst-case analysis), the calculated ambient noise levels at the worst-case dwelling façade(s) would be as shown in Table 6.1 below.

Table 6.1: Calculated noise at worst-case façade(s)

Period	Noise level at closest living space, $L_{Aeq,T}$, dB (free field)
Day (0700 to 2300 hours)	48
Night (2300 to 0700 hours)	45

6.3 From Table 6.1 and taking into account a ~15 dB reduction for a typical open window, would result in internal levels of ~33 dB $L_{Aeq,16h}$ for the daytime and a night-time level of ~30 dB $L_{Aeq,8h}$. These levels are equal to, or below, that of the recommended internal levels given by BS8233/WHO (Table 3.1) and ideally required by HDC / West Sussex Council; albeit those levels are accepted to be with closed windows. With a windows closed assessment, this would result in internal noise levels to be substantially lower by approximately 30 dBA (i.e. internal levels of 18 dBA during the day and 15 dBA at night with windows closed).

6.4 Equally, external amenity areas would fall below the required/recommended 50 dB $L_{Aeq,16h}$, although with these being located to the rear of the proposed houses facing Rectory Lane, levels in these external gardens are expected to be quieter still.

6.5 Consequently, noise for the entire site are not considered to be an issue, no mitigation measures are deemed to be required and internal noise levels would be kept below the LOAEL values for all dwellings, with both windows opened or closed.

7.0 Conclusions

7.1 A detailed assessment has been made of the potential effect of environmental noise on the proposed development.

7.2 A review has been carried out of relevant policy, standards and guidance to determine appropriate noise assessment criteria.

7.3 The principles of Good Acoustic Design are complied with by default at this site, due to the relative quiet noise environment.

7.4 Considering noise from road traffic on Rectory Road, all noise levels in proposed external and internal areas would result in there being no adverse effects; with or without open windows.

7.5 No further noise mitigation measures are thereby required for this site to meet the local authority and national guidance criteria.

Appendix A: Figures

Figure A1: Site and surrounding area

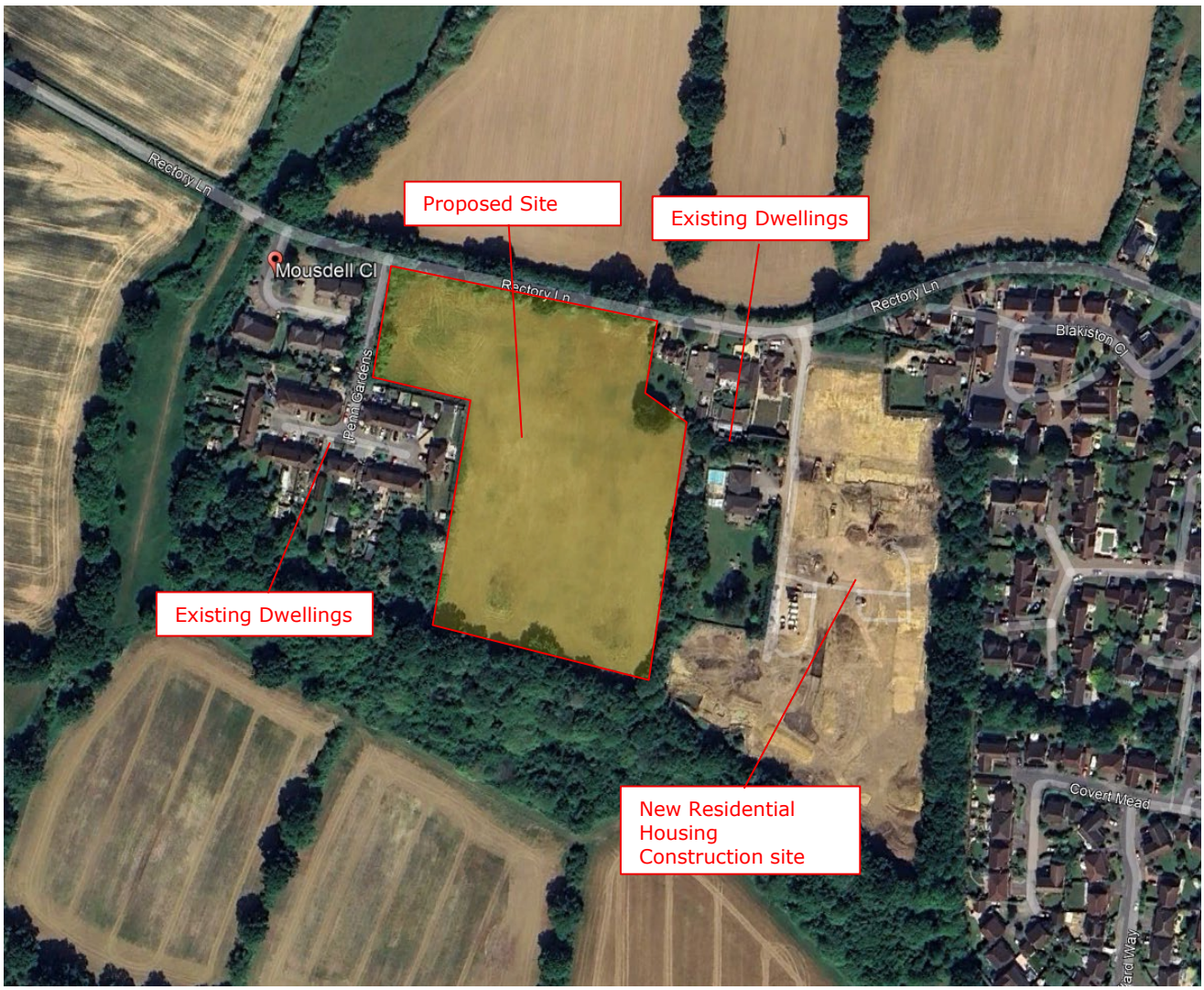

Figure A2: Development Plan

Figure A3: Measurement Position

Appendix B: Weather data

Thu, 5 Jun	Temp °	Weather	Wind m/s	Humidity	Fri, 6 Jun	Temp °C	Weather	Wind m/s	Humidity	Sat, 7 Jun	Temp °C	Weather	Wind m/s	Humidity	Sun, 8 Jun	Temp °C	Weather	Wind m/s	Humidity
					00:20	13	Passing clouds.	4	88%	00:20	12	Light rain. Clear.	4	94%	00:20	10	Passing clouds.	3	100%
					00:50	12	Passing clouds.	3	94%	00:50	12	Light rain. Clear.	3	94%	00:50	11	Passing clouds.	4	88%
					01:20	12	Clear.	3	94%	01:20	12	Light rain. Passing clouds.	2	94%	01:20	11	Clear.	4	88%
					01:50	11	Clear.	3	94%	01:50	12	Light rain. Passing clouds.	2	94%	01:50	9	Clear.	3	100%
										02:20	12	Light rain. Partly cloudy.	3	94%	02:20	10	Passing clouds.	3	94%
					02:50	11	Clear.	3	94%	02:50	12	Light rain. Partly cloudy.	3	94%	02:50	10	Passing clouds.	4	94%
					03:20	11	Clear.	4	94%	03:20	11	Light rain. Passing clouds.	2	100%	03:20	10	Clear.	5	88%
					03:50	10	Clear.	3	94%	03:50	11	Light rain. Passing clouds.	2	100%	03:50	10	Clear.	5	88%
					04:20	10	Clear.	3	94%	04:20	11	Light rain. Passing clouds.	2	100%	04:20	9	Clear.	5	87%
					04:50	10	Sunny.	3	100%	04:50	11	Light rain. Scattered clouds.	2	100%	04:50	8	Sunny.	4	93%
					05:20	10	Sunny.	3	100%	05:20	11	Light rain. Scattered clouds.	2	100%	05:20	8	Sunny.	3	87%
					05:50	10	Passing clouds.	2	100%	05:50	11	Light rain. Passing clouds.	3	100%	05:50	9	Sunny.	4	82%
					06:20	11	Passing clouds.	3	94%	06:20	11	Scattered clouds.	3	100%	06:20	9	Sunny.	4	87%
					06:50	12	Passing clouds.	3	94%	06:50	11	Passing clouds.	3	100%	06:50	10	Sunny.	5	82%
					07:20	13	Scattered clouds.	4	88%	07:20	12	Scattered clouds.	3	94%	07:20	10	Sunny.	5	88%
07:50	13	Light rain. Partly sunny.	5	94%	07:50	14	Scattered clouds.	4	88%	07:50	12	Scattered clouds.	5	94%	07:50	11	Sunny.	4	82%
08:20	13	Light rain. Partly sunny.	4	94%	08:20	14	Scattered showers. Broken clouds.	4	88%	08:20	13	Scattered clouds.	4	88%	08:20	12	Passing clouds.	6	77%
08:50	13	Light rain. Broken clouds.	4	94%	08:50	14	Scattered showers. Broken clouds.	5	88%	08:50	13	Sprinkles. Scattered clouds.	5	88%	08:50	13	Passing clouds.	6	67%
09:20	14	Light rain. Broken clouds.	4	94%	09:20	15	Light rain. Broken clouds.	5	82%	09:20	13	Scattered clouds.	4	88%	09:20	13	Passing clouds.	6	67%
09:50	13	Light rain. Partly sunny.	4	94%	09:50	13	Light rain. Scattered clouds.	4	94%	09:50	13	Scattered clouds.	5	88%	09:50	14	Scattered clouds.	6	63%
10:20	14	Light rain. Broken clouds.	4	88%	10:20	14	Scattered clouds.	5	94%	10:20	14	Scattered clouds.	4	82%	10:20	15	Scattered clouds.	7	55%
10:50	14	Broken clouds.	6	88%	10:50	15	Partly sunny.	5	88%	10:50	14	Scattered clouds.	5	77%	10:50	15	Scattered clouds.	6	59%
11:20	14	Light rain. Partly sunny.	5	94%	11:20	15	Scattered clouds.	4	77%	11:20	15	Scattered clouds.	5	72%	11:20	15	Scattered clouds.	6	59%
11:50	14	Light rain. Broken clouds.	6	94%	11:50	15	Scattered clouds.	5	77%	11:50	15	Scattered clouds.	5	72%	11:50	16	Scattered clouds.	6	55%
12:20	14	Light rain. Broken clouds.	6	94%	12:20	18	Passing clouds.	5	64%	12:20	16	Passing clouds.	5	68%	12:20	16	Scattered clouds.	6	52%
12:50	15	Broken clouds.	5	88%	12:50	17	Scattered clouds.	6	64%	12:50	16	Scattered clouds.	6	68%	12:50	17	Scattered clouds.	5	49%
13:20	16	Broken clouds.	6	77%	13:20	18	Scattered clouds.	7	60%	13:20	16	Scattered clouds.	5	72%	13:20	17	Scattered clouds.	5	49%
13:50	16	Partly sunny.	6	77%	13:50	17	Scattered clouds.	6	59%	13:50	17	Scattered clouds.	6	68%	13:50	18	Scattered clouds.	6	46%
14:20	14	Drizzle. Broken clouds.	6	94%	14:20	18	Passing clouds.	6	56%	14:20	16	Scattered showers. Partly sunny.	6	72%	14:20	18	Scattered clouds.	5	46%
14:50	14	Drizzle. Partly sunny.	5	94%	14:50	18	Passing clouds.	6	56%	14:50	15	Sprinkles. Scattered clouds.	5	82%	14:50	18	Passing clouds.	5	43%
15:20	14	Drizzle. Partly sunny.	6	100%	15:20	18	Scattered clouds.	6	60%	15:20	16	Scattered clouds.	5	77%	15:20	18	Sunny.	7	43%
15:50	14	Drizzle. Partly sunny.	5	100%	15:50	17	Scattered clouds.	7	64%	15:50	16	Scattered showers. Scattered clouds.	5	77%	15:50	18	Sunny.	7	43%
16:20	14	Light rain. Partly sunny.	5	100%	16:20	18	Scattered showers. Passing clouds.	6	60%	16:20	15	Sprinkles. Scattered clouds.	5	82%	16:20	18	Sunny.	7	46%
16:50	15	Partly sunny.	5	94%	16:50	17	Scattered showers. Passing clouds.	7	59%	16:50	15	Sprinkles. Partly sunny.	4	82%	16:50	18	Passing clouds.	6	46%
17:20	15	Partly sunny.	4	94%	17:20	17	Passing clouds.	7	59%	17:20	14	Light rain. Broken clouds.	5	88%	17:20	18	Sunny.	7	40%
17:50	15	Scattered clouds.	4	94%	17:50	17	Passing clouds.	5	59%	17:50	13	Light rain. Broken clouds.	3	100%	17:50	18	Sunny.	8	43%
18:20	15	Scattered clouds.	4	88%	18:20	17	Sunny.	5	59%	18:20	13	Heavy rain. Broken clouds.	5	100%	18:20	17	Sunny.	6	45%
18:50	15	Scattered clouds.	3	88%	18:50	16	Passing clouds.	6	63%	18:50	13	Light rain. Scattered clouds.	2	94%	18:50	17	Sunny.	6	45%
19:20	15	Scattered clouds.	4	88%	19:20	16	Passing clouds.	6	63%	19:20	12	Light rain. Scattered clouds.	2	100%	19:20	16	Sunny.	7	48%
19:50	15	Light rain. Partly sunny.	3	88%	19:50	15	Passing clouds.	5	68%	19:50	12	Scattered clouds.	3	100%	19:50	16	Sunny.	6	48%
20:20	14	Partly sunny.	3	94%	20:20	15	Passing clouds.	5	68%	20:20	13	Scattered clouds.	3	94%	20:20	16	Sunny.	5	52%
20:50	14	Sprinkles. Broken clouds.	4	94%	20:50	14	Passing clouds.	4	72%	20:50	13	Scattered clouds.	6	88%	20:50	15	Sunny.	4	55%
21:20	14	Light rain. Passing clouds.	4	94%	21:20	14	Clear.	4	77%	21:20	12	Light rain. Passing clouds.	4	88%	21:20	14	Clear.	3	59%
21:50	14	Light rain. Passing clouds.	4	88%	21:50	14	Clear.	4	77%	21:50	12	Clear.	4	88%	21:50	14	Passing clouds.	2	63%
22:20	13	Passing clouds.	3	100%	22:20	14	Clear.	4	77%	22:20	11	Passing clouds.	3	94%	22:20	14	Passing clouds.	3	77%
22:50	13	Sprinkles. Passing clouds.	4	94%	22:50	13	Clear.	3	82%	22:50	11	Passing clouds.	3	94%	22:50	14	Clear.	3	77%
23:20	13	Passing clouds.	3	94%	23:20	13	Passing clouds.	4	82%	23:20	11	Passing clouds.	3	94%	23:20	13	Clear.	2	82%

Mon, 9 Jun	Temp °C	Weather	Wind m/s	Humidity	Tue, 10 Jun	Temp °C	Weather	Wind m/s	Humidity	Wed, 11 Jun	Temp °C	Weather	Wind m/s	Humidity
00:20	13	Passing clouds.	2	82%	00:20	13	Passing clouds.	2	88%	00:20	14	Passing clouds.	4	88%
00:50	12	Passing clouds.	2	88%	00:50	13	Passing clouds.	2	88%	00:50	13	Passing clouds.	3	88%
01:20	12	Clear.	2	88%	01:20	13	Passing clouds.	2	88%	01:20	13	Passing clouds.	3	88%
01:50	13	Clear.	2	82%	01:50	13	Passing clouds.	3	88%	01:50	12	Clear.	2	94%
02:20	13	Clear.	2	88%	02:20	14	Passing clouds.	4	82%	02:20	12	Clear.	3	94%
02:50	13	Clear.	2	88%	02:50	14	Passing clouds.	6	82%	02:50	12	Clear.	2	94%
03:20	13	Clear.	2	88%	03:20	14	Partly cloudy.	6	82%	03:20	11	Clear.	2	100%
03:50	12	Clear.	2	94%	03:50	14	Passing clouds.	5	82%	03:50	12	Passing clouds.	3	94%
04:20	12	Clear.	1	88%	04:20	14	Passing clouds.	5	82%	04:20	12	Fog.	3	100%
04:50	12	Sunny.	1	88%	04:50	14	Partly sunny.	5	82%	04:50	13	Fog.	3	100%
05:20	12	Sunny.	2	88%	05:20	14	Partly sunny.	5	82%	05:20	13	Fog.	2	100%
05:50	13	Passing clouds.	2	82%	05:50	14	Partly sunny.	5	82%	05:50	14	Fog.	3	100%
06:20	13	Partly sunny.	2	82%	06:20	14	Partly sunny.	5	88%	06:20	14	Fog.	3	100%
06:50	13	Partly sunny.	2	82%	06:50	15	Partly sunny.	4	82%	06:50	14	Fog.	4	100%
07:20	13	Passing clouds.	2	82%	07:20	15	Partly sunny.	4	82%	07:20	14	Fog.	4	100%
07:50	14	Sunny.	2	77%	07:50	15	Partly sunny.	4	82%					
08:20	14	Passing clouds.	2	77%	08:20	16	Partly sunny.	5	83%					
08:50	14	Passing clouds.	2	77%	08:50	16	Partly sunny.	5	83%					
09:20	15	Sunny.	4	72%	09:20	17	Partly sunny.	5	77%					
09:50	15	Passing clouds.	4	77%	09:50	18	Partly sunny.	5	73%					
10:20	16	Passing clouds.	3	72%	10:20	17	Partly sunny.	6	77%					
10:50	16	Passing clouds.	4	68%	10:50	18	Broken clouds.	6	78%					
11:20	17	Passing clouds.	4	64%	11:20	18	More clouds than sun.	6	78%					
11:50	18	Passing clouds.	5	56%	11:50	18	Broken clouds.	6	78%					
12:20	18	Passing clouds.	4	56%	12:20	19	Scattered clouds.	7	73%					
12:50	17	Broken clouds.	5	59%	12:50	19	Partly sunny.	5	73%					
13:20	18	Scattered clouds.	5	56%	13:20	19	Partly sunny.	5	73%					
13:50	19	Passing clouds.	5	52%	13:50	20	Scattered clouds.	4	69%					
14:20	18	Passing clouds.	5	60%	14:20	21	Scattered clouds.	5	60%					
14:50	18	Passing clouds.	5	56%	14:50	21	Scattered clouds.	5	64%					
15:20	18	Scattered clouds.	5	60%	15:20	22	Partly sunny.	4	61%					
15:50	18	Scattered clouds.	5	60%	15:50	22	Scattered clouds.	4	61%					
16:20	18	Scattered clouds.	6	60%	16:20	22	Scattered clouds.	4	61%					
16:50	19	Scattered clouds.	5	56%	16:50	22	Scattered clouds.	4	61%					
17:20	18	Scattered clouds.	5	56%	17:20	22	Scattered clouds.	2	61%					
17:50	19	Passing clouds.	5	56%	17:50	22	Scattered clouds.	4	57%					
18:20	18	Scattered clouds.	6	60%	18:20	22	Scattered clouds.	3	57%					
18:50	17	Passing clouds.	5	68%	18:50	22	Passing clouds.	3	57%					
19:20	17	Passing clouds.	5	68%	19:20	21	Passing clouds.	3	60%					
19:50	16	Sunny.	4	72%	19:50	21	Passing clouds.	2	60%					
20:20	16	Sunny.	3	72%	20:20	20	Passing clouds.	3	73%					
20:50	15	Sunny.	4	72%	20:50	20	Scattered clouds.	2	73%					
21:20	15	Clear.	4	72%	21:20	19	Passing clouds.	2	78%					
21:50	14	Clear.	4	82%	21:50	18	Passing clouds.	2	83%					
22:20	14	Clear.	4	82%	22:20	18	Clear.	1	83%					
22:50	14	Clear.	4	77%	22:50	17	Passing clouds.	2	88%					
23:20	13	Clear.	4	88%	23:20	15	Clear.	3	88%					

Appendix C: Survey results

Figure C1: Graph of measured levels