A CAF GROUP COMPANY

ENVIRONMENT

Richborough
Land to the North of Little Green Lane,
Croxley Green

Noise Impact Assessment

233574

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Noise Impact Assessment

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December 2024

DOCUMENT ISSUE RECORD

Document Number:	**LGL-BWB-XX-ZZ-RP-YA-002**
BWB Reference:	**233574_002**

Revision	Date of Issue	Status	Author:	Checked:	Approved:
P01	11/12/2024	Issue	James Storey BSc(Hons)	Lucy Elmer BA (Hons), MSc, MIOA	Mike Barrett BSc (Hons), MIOA
P02	16/12/2024	Issue	James Storey BSc (Hons)	Lucy Elmer BA (Hons), MSc, MIOA	Mike Barrett BSc (Hons), MIOA

Notice

EXECUTIVE SUMMARY

BWB Consulting (BWB) was instructed by Richborough (the Client) to undertake a noise impact assessment to support an outline planning application for up to 600 residential dwellings (Use Class C3(a)), a 5-bedroom property for children's social care and supported living (Use Class C3(b)). Two vehicular access points from Little Green Lane and further pedestrian / cycleway accesses. A one form entry primary school (Use Class F1(a)) (plus expansion land for a two form entry primary school). A mixed use local centre including provision for NHS health and social care services (Use Class E(e)), community building (Use Class F2), retail and café provision (Use Class E(a-c)), car parking and associated infrastructure. A country park, areas for play and recreation, allotments, community orchard and landscaping with associated infrastructure including sustainable urban drainage systems. (All matters are reserved except for vehicular access).

A baseline noise survey was undertaken in July 2024 and the subsequent assessment work has been undertaken in accordance with current standards and guidance, following consultation with Three Rivers District Council (TRDC).

As the exact location of the sources and receptors is unknown at this time, mitigation has been suggested in outline terms only. This report demonstrates that the internal and external noise levels could meet the requirements of BS 8233 and BB93 with appropriate mitigation in place.

The development generated road traffic noise has been assessed and is predicted to have a minor impact at worst on existing noise sensitive receptors, once context is taken into account, with the exception of Links Way. There will be a short term moderate impact on Links Way that reduces to a minor impact in the long term, and consideration has been given to mitigation to ensure impacts are mitigated and reduced to a minimum.

Noise limits have been set for fixed plant items associated with the proposed local centre which will need to be achieved at nearby existing sensitive receptors.

Based on the results of the assessment, it has been demonstrated that the site is suitable for the proposed uses.

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1. INTRODUCTION

Instruction

1.1 BWB Consulting was instructed by Richborough Limited to undertake a noise impact assessment to support the outline planning application for a residential development for up to 600 residential dwellings (Use Class C3(a)), a 5-bedroom property for children's social care and supported living (Use Class C3(b)), two vehicular access points from Little Green Lane and further pedestrian / cycleway accesses, a one form entry primary school (Use Class F1(a)) (plus expansion land for a two form entry primary school), a mixed-use local centre including a medical centre (Use Class E(e)), community building (Use Class F2), retail and café provision (Use Class E(a-c)), car parking and associated infrastructure, a country park, areas for play and recreation, allotments, community orchard and landscaping with associated infrastructure including sustainable urban drainage systems (all matters are reserved except for vehicular access).This assessment has been undertaken based on the results of a baseline noise survey on the Site. The results of the survey have been assessed in accordance with current standards and guidance, following consultation with Three Rivers District Council (TRDC).

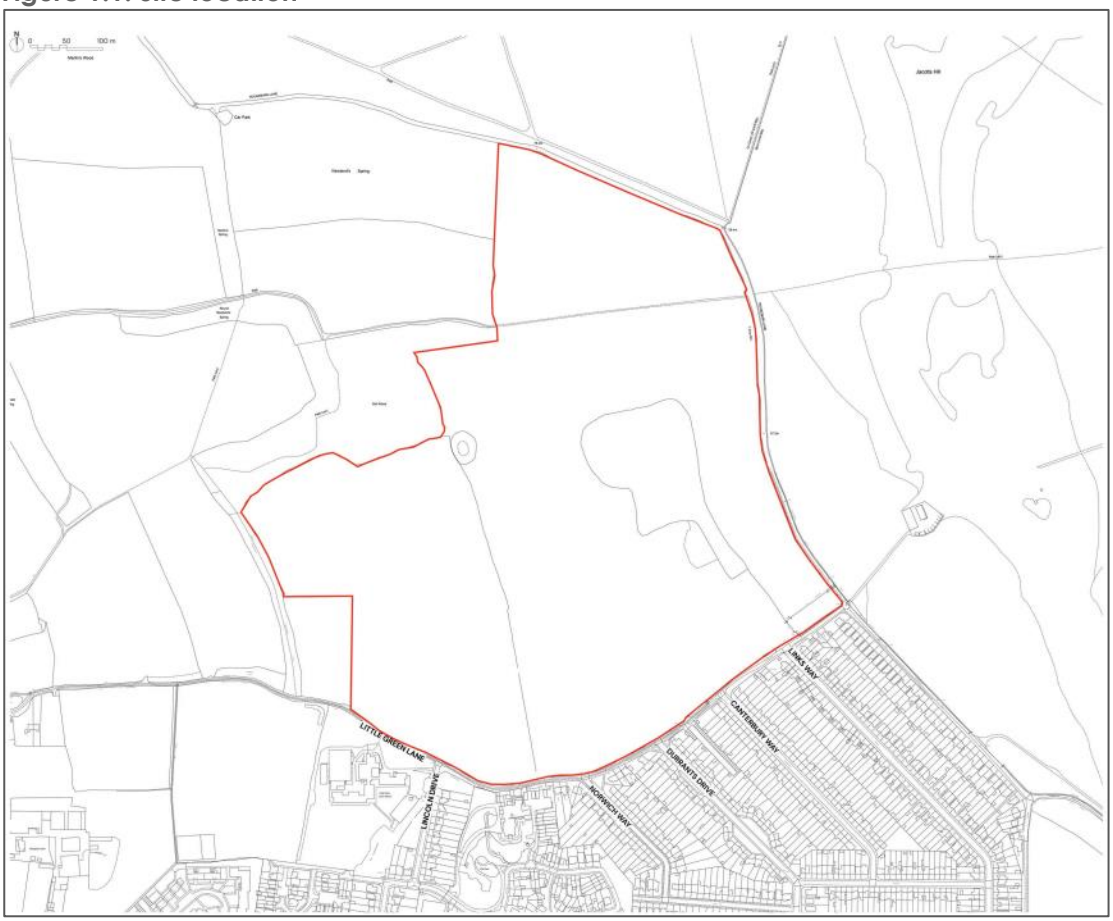
1.2 This report is necessarily technical in nature, so to assist the reader, a glossary of acoustic terminology can be found in **Appendix A**.

Site Setting

1.3 The Site currently comprises open farmland with Rousebarn Lane and woodland to the north, Rousebarn Lane with woodland and West Herts Golf Club beyond to the east, existing housing and Little Green Junior School to the south and open land to the west.

1.4 The location of the Site is shown in **Figure 1.1**.

Figure 1.1: Site location



Proposed Development

1.5 The proposed development includes up to 600 residential dwellings (Use Class C3(a)), a 5-bedroom property for children's social care and supported living (Use Class C3(b)), two vehicular access points from Little Green Lane and further pedestrian / cycleway accesses, a one form entry primary school (Use Class F1(a)) (plus expansion land for a two form entry primary school), a mixed-use local centre including a medical centre (Use Class E(e)), community building (Use Class F2), retail and café provision (Use Class E(a-c)), car parking and associated infrastructure, a country park, areas for play and recreation, allotments, community orchard and landscaping with associated infrastructure including sustainable urban drainage systems (all matters are reserved except for vehicular access).

1.6 The illustrative masterplan is shown below in **Figure 1.2.**

Figure 1.2: Illustrative Masterplan

2. STANDARDS AND GUIDANCE

National Planning Policy Framework (NPPF)

2.1 Published in December 2024, this document sets out the Government's planning policies for England and supersedes the previous NPPF published in 2023. It makes the following reference to noise in the section entitled Conserving and enhancing the natural environment:

> "*187. Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *[…]*
>
> *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans."*

2.2 It also makes the following references to noise in the Section entitled *Ground conditions and pollution*:

> "*198. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> *a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life[72];*
>
> *b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*
>
> [72] *See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010)."*

Planning Practice Guidance (PPG)

2.3 In March 2014, the Department for Communities and Local Government (DCLG) launched a national planning practice guidance web-based resource. The guidance is to complement the NPPF and provide advice on how to deliver its policies.

2.4 The section on noise includes a table which summarises 'the noise exposure hierarchy, based on the likely average response' and offers 'examples of outcomes' relevant to

the No Observed Effect Level (NOEL), Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL) effect levels described in the Noise Policy Statement for England (NPSE).

2.5 The outcomes are in descriptive form and the guidance offers no numerical definition of the NOEL, NOAEL, LOAEL and SOAEL, or detailed advice regarding methodologies for determining them. There is also no reference to the further research identified as necessary in the NPSE in 2010.

2.6 The table identifying descriptive examples of outcomes presented in the PPG is summarised in **Table 2.1**.

Table 2.1: Noise Hierarchy from Planning Practice Guidance

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not Present	No Effect	No Observed Effect	No Specific Measures Required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	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. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of	Significant Observed Adverse Effect	Avoid

Response	Examples of Outcomes	Increasing Effect Level	Action
	intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.		
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

BS 8233:2014: Guidance On Sound Insulation And Noise Reduction For Buildings

2.7 This standard provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.

2.8 The guidance provided includes appropriate internal and external noise level criteria which are applicable to dwellings and office for steady external noise sources. It is stated that it is desirable that the internal ambient noise level does not exceed the following criteria set out in **Table 2.2**.

Table 2.2: Summary of Internal Ambient Noise Levels to be Achieved in Habitable Rooms

Activity	Location	Internal noise level criteria ($L_{Aeq,T}$, dB)	
		Daytime (07:00 - 23:00hrs)	Night-time (23:00 - 07:00hrs)
Resting	Living room	35	-
Dining	Dining room/area	40	-
Sleeping (daytime resting)	Bedroom	35	30

2.9 Whilst BS 8233:2014 recognises that a guideline value may be set in terms of SEL or L_{AFmax} for the assessment of regular individual noise events that can cause sleep disturbance

during the night-time, a specific criterion is not stipulated. Accordingly, reference has been made in this assessment to the World Health Organisation (WHO) 1999: Guidelines for Community Noise.

2.10 With respect to external amenity space such as gardens and patios it is stated that it is desirable that the 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. It is then confirmed that higher external noise criteria may be appropriate under certain circumstances such as within city centres urban areas, and locations adjoining the strategic transportation network, where it may be necessary to compromise between elevated noise levels and other factors such as convenience of living, and efficient use of land resource.

World Health Organisation (WHO) 1999: Guidelines for Community Noise

2.11 The World Health Organisation (WHO) guidance: 1999: Guidelines for community noise includes guidance for individual maximum noise events during the night-time. This document draws upon guidance from Vallet and Vernay, which states:

> "*For good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night*"

Building Bulletin 93 (BB93), December 2014: Acoustic Design of Schools: Performance Standards

2.12 BB93 sets out minimum performance standards for acoustic conditions within school buildings and describes the means of demonstrating compliance with Approved Document E of the Building Regulations. The overall objective of the performance standards is to ensure that the design and construction of school buildings provide acoustic conditions that enable effective teaching and learning.

2.13 The document presents upper limits for Indoor Ambient Noise Levels (IANL) in teaching and learning spaces due to environmental noise break-in. The limits are specified in terms of the equivalent continuous sound pressure level over a 30-minute periods (dB $L_{Aeq,30min}$). The stipulated IANL limits are applicable within unoccupied teaching and learning spaces without contributions from plant or equipment, playgrounds and rainfall but with contributions from building services noise and external sources outside the school premises (e.g. road and air traffic noise).

2.14 **Table 2.3** sets out the recommended target internal noise level criteria to be achieved within school's premises.

Table 2.3: BB93 Internal Ambient Noise Level Criteria Within Schools

Area	Upper limit for the indoor ambient noise level, dB $L_{Aeq,30mins}$	
	New Build	Refurbishment
Teaching classrooms, study rooms, interview/counselling rooms, medical rooms, conference rooms and meeting rooms	35	40

Area	Upper limit for the indoor ambient noise level, dB $L_{Aeq,30mins}$	
	New Build	Refurbishment
Resource areas, science labs, D&T and art tooms, indoor sports hall, dance studio, gym, offices*, staff rooms*	40	45
Dining rooms, atria, circulation and stairs*, entrance lobby*, changing rooms, learning street.	45	50
Kitchens*, WCs*	50	55
*For these areas the performance standards are for guidance only (Applied to under Part E – schedule 1 of the Building Regulation 2000).		

BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial; and Commercial Sound

2.15 The BS 4142 Standard describes methods for rating and assessing the following:

- Sound from industrial and manufacturing processes;
- Sound from fixed installation which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train movements on or around an industrial and/or commercial site.

2.16 The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. The Standard advises the purpose of the methodology includes the assessment of sound from any plant and activities associated with existing industrial and/or commercial uses at proposed residential dwellings.

2.17 If appropriate, the specific sound level of the source ($L_{Aeq,T}$) is corrected, by the application of one or more corrections for acoustic features such as tonal qualities and/or distinct impulses, to give a 'rating' level ($L_{Ar,Tr}$). The Standard effectively compares and rates the difference between the rating level of the specific sound and the typical background sound level ($L_{A90,T}$) in the absence of the specific sound.

2.18 The Standard advises that the time interval ('T') of the background sound measurement should be sufficient to obtain a representative or typical value of the background sound level at the time(s) the source in question operates or is proposed to operate in the future.

2.19 Comparing the rating level with the background sound level, BS 4142 states:

"Typically, the greater this difference, the greater the magnitude of impact.

A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.

A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significantly adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

The Design Manual for Roads and Bridges (DMRB): LA111 Noise and Vibration (Revision 2)

2.20 This document sets out procedures for undertaking the environmental assessment of new road schemes, including the assessment of noise impacts from road traffic. In particular, it describes a method for assessing the severity of a noise impact, in terms of the number of people who will be bothered by any noise increases/decreases due to a new road scheme. When undertaking a DMRB assessment, the methodology contained within the Department for Transport 1988 document Calculation of Road Traffic Noise (CRTN) should be used to calculate levels of road traffic noise.

2.21 The DMRB assessment methodology suggests that the magnitude of noise changes from a project should be classified into levels of impact. LA111 considers how the magnitude of change can be affected by whether a noise level change occurs in the short term (e.g., as a result of a sudden opening of a scheme), or in the long term (e.g., gradually over time, such as that associated with natural traffic growth).

2.22 The example classification scale for short term changes, which is the most stringent, is presented in **Table 2.4**.

Table 2.4: Classification of Magnitude of Noise Impacts in the Short Term and Long Term

Short Term		Long Term	
Noise Change, dB $L_{A10, 18h}$	**Magnitude of Impact**	**Noise Change, dB $L_{A10, 18h}$**	**Magnitude of Impact**
0	No Change	0	No Change
0.1 to 0.9	Negligible	0.1 to 2.9	Negligible
1.0 to 2.9	Minor	3.0 to 4.9	Minor
3.0 to 4.9	Moderate	5.0 to 5.9	Moderate
5.0+	Major	10.0+	Major

2.23 DMRB LA 111 states that the initial assessment of likely significant effects on noise sensitive buildings shall be determined using **Table 2.5**, which is reproduced from Table 3.58 of DMRB LA 111.

Table 2.5: Initial Assessment of Operational Noise Significance

Significance	Short term magnitude of change
Significant	Major
Significant	Moderate
Not Significant	Minor
Not Significant	Negligible

2.24 DMRB LA 111 states that the LOAEL and SOAEL shall be set for all noise sensitive receptors within the Study Area, for time periods when they are in use. LOAEL and SOAEL considered in this assessment are defined in **Table 2.6**, which is reproduced from Table 3.49.1 of DMRB LA 111. These LOAEL and SOAEL are considered to apply to both dwellings and other noise sensitive receptors for the purpose of this assessment.

Table 2.6: Operational Noise LOAEL and SOAEL for all Receptors

Time Period	LOAEL	SOAEL
Day (06:00 – 24:00)	55 dB $L_{A10,18hr}$ (façade)	68 dB $L_{A10,18hr}$ (façade)
Night (23:00-07:00)*	40 dB L_{night}, outside (free-field)	55 dB L_{night}, outside (free-field)
*Note that DMRB LA 111 states the night-time period is 00:00 – 06:00, however, consultation with National Highways has confirmed this period should read "(23:00 – 07:00)"		

2.25 It is considered that a potentially significant noise change occurs when there is:

- A 1 dB change in noise level in either the short-term or long-term when the resulting noise level exceeds the SOAEL. In the long-term, the noise level must also change by at least 1 dB when comparing the Do Minimum opening year and Do Something future year scenarios to ensure the change is as a result of the proposed scheme opposed to a change that would happen even if the proposed scheme did not go ahead;
- A 3 dB change in the short-term or 5 dB change in the long-term (i.e. "moderate" change from DMRB LA 111) where the resulting noise level is between the LOAEL and SOAEL; and,
- Where noise levels are below the LOAEL, significant effects are not expected.

Consultation with Three Trees District Council

2.26 The Environmental Health team at TRDC was contacted via email in June 2024, to agree the noise assessment methodology.

2.27 The following methodology was proposed:

  - A baseline noise survey consisting of 24-hour unattended measurements.
  - Assessment of noise associated with development generated road traffic at existing noise sensitive receptors due to the operation of the site;

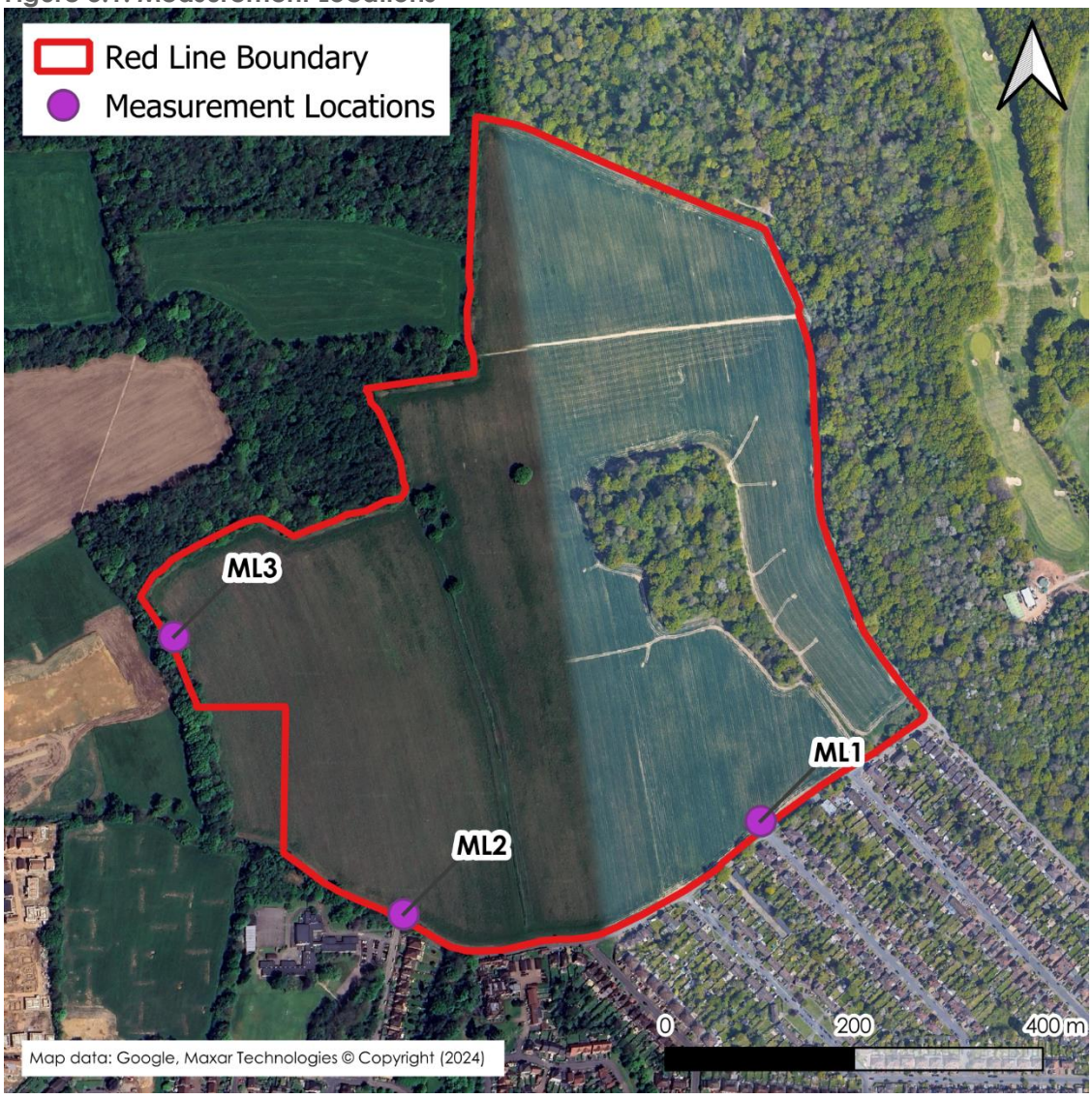
- Assessment of operational noise associated with the development on existing and proposed local noise sensitive receptors in the vicinity of the site, covering items of fixed external building services plant and the operation of any proposed commercial spaces; and
- Assessment of site suitability for noise sensitive development from existing noise sources in close proximity to the site, and proposed noise sources associated with the operation of the site.

2.28 As of the date of this report, no reply has been received from TRDC.

3. BASELINE NOISE MEASUREMENTS

3.1 A baseline noise survey has been undertaken to determine the prevailing noise climate at locations representative of proposed noise sensitive receptors on the proposed development site. Baseline noise measurements have been undertaken at the measurement locations (ML) identified in **Figure 3.1**.

Figure 3.1: Measurement Locations



Measurement Location 1 (ML1)

3.2 Noise measurements were undertaken at Measurement Location 1 (ML1) between 11:00 on Thursday the 11th July 2024 and 13:30 on Friday 12th July 2024. Measurement equipment was established in free-field conditions at a height of circa. 1.8 m above local ground level. Measurement equipment was positioned 4m from Little Green Lane directly on the Site boundary.

3.3 During periods of attendance on-site, the noise climate was noted to be dominated by occasional traffic on neighbouring roads and occasional passing farm vehicles the Site.

Measurement Location 2 (ML2)

3.4 Noise measurements were undertaken at Measurement Location 2 (ML2) between 11:30 on Thursday the 11th July 2024 and 09:50 on Monday the 15th July 2024. Measurement equipment was established in free-field conditions at a height of circa. 1.8m above local ground level. Measurement equipment was positioned 8m from Little Green Lane, approximately 3m from the Site boundary.

3.5 During periods of attendance on-site, the noise climate was noted to be dominated by occasional traffic on neighbouring roads and occasional passing of farm vehicles on the Site (day 1 only).

Measurement Location 3 (ML3)

3.6 Noise measurements were undertaken at Measurement Location 3 (ML3) between 14:00 on Friday the 12th July 2024 and 07:45 on Monday the 15th July 2024. Measurement equipment was established in free-field conditions at a height of circa. 1.8m above local ground level.

3.7 During periods of attendance on-site, the noise climate was noted to be typical for a rural field location.

Measurement Equipment

3.8 The baseline noise survey was undertaken using the Class 1 specification noise measurement equipment detailed in **Table 3.1**. Equipment was calibrated using a portable calibrator immediately before and after the measurements with no significant drift in calibration observed. The sound level meters, pre-amplifiers and microphones were calibrated to traceable standards at an accredited laboratory within the 24 months prior to the measurements. The portable calibrator was calibrated within the 12 months preceding the date of the survey.

Table 3.1: Noise Measurement Equipment

Position	Equipment	Make and Model	Serial Number
ML1 & ML3	Sound Level Meter	01dB Duo	10503
	Microphone	GRAS -40CD	207273
	Preamp	01dB – PRE22	1805293
ML2	Sound Level Meter	01dB Duo	10522
	Microphone	GRAS -40CD	136864
	Preamp	01dB PRE22	10130
ML3	Sound Level Meter	CEL-63x	1274541
	Microphone	CEL-251	2072
	Preamp	CEL-495	003668
All	Calibrator	Cirrus – 511E	33927

Meteorological Conditions

3.9 The weather during the survey was conducive to environmental noise measurements with no precipitation and winds less than 5m/s

Measurement Results

3.10 A summary of the measured levels to be used within the assessment are provided below. **Tables 3.2 to 3.7** detail measured sound levels at ML1, ML2 and ML3. Full measurement results for the whole period are presented in **Appendix B**.

Table 3.2: Summary of Measured Sound Pressure Levels at ML1

Period[1]	Duration	dB $L_{Aeq,T}$[2]	dB $L_{A90,T}$[3]	dB L_{AFmax}[4]
Daytime	16hours	54	40	-
Night-time	8hours	42	36	63

1 Average daytime/night-time across the entire measurement period.
2 Logarithmic average sound pressure levels during measurement period
3 Typical backgrounds determined from an arithmetic average of the mean, mode and median LA90,15mins values during measurement period.
4 10th highest measured L_{AFmax} level with 5 minute separation.

Table 3.3: Summary of Average (logarithmic) Octave Band Sound Pressure Levels at ML1

Period	Octave Band Sound Pressure Levels (L_{eq} dB)								dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz	
Daytime	59	58	54	51	48	46	42	38	54
Night-time	52	46	38	37	36	33	33	31	42

Table 3.4: Summary of Measured Sound Pressure Levels at ML2

Period[1]	Duration	dB $L_{Aeq,T}$[2]	dB $L_{A90,T}$[3]	dB L_{AFmax}[4]
Daytime	16 hours	51	39	-
Night-time	8 hours	43	37	58

1 Average daytime/night-time across the entire measurement period.
2 Logarithmic average sound pressure levels during measurement period
3 Arithmetic average $L_{A90,15m}$ over the measurement period.
4 10th highest measured L_{AFmax} level with 5 minute separation.

Table 3.5: Summary of Average (logarithmic) Octave Band Sound Pressure Levels at ML2

Period[1]	Octave Band Sound Pressure Levels (L_{eq} dB)								dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz	
Daytime	58	55	52	49	46	43	40	36	51

Period[1]	Octave Band Sound Pressure Levels (L_{eq} dB)								dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz	
Night-time	49	44	40	39	39	32	30	27	43
1 Average daytime/night-time across the entire measurement period.									

Table 3.6: Summary of Sound Pressure Levels at ML3

Period[1]	Duration	dB $L_{Aeq,T}$[2]	dB $L_{A90,T}$[3]	dB L_{AFmax}[4]
Daytime	16 hours	47	36	-
Night-time	8 hours	40	35	56
1 Average daytime/night-time across the entire measurement period. 2 Logarithmic average sound pressure levels during measurement period 3 Arithmetic average $L_{A90,15m}$ over the measurement period. 4 10th highest measured L_{AFmax} level with 5 minute separation.				

Table 3.7: Summary of Average (logarithmic) Octave Band Sound Pressure Levels at ML3

Period[1]	Octave Band Sound Pressure Levels (L_{eq} dB)								dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz	
Daytime	54	51	47	45	43	37	30	28	47
Night-time	48	42	39	38	35	24	28	30	40
1 Average daytime/night-time across the entire measurement period.									

4. ASSESSMENT

4.1 As the proposed site is located away from the strategic road and rail network, it is considered that the noise levels measured at ML1, ML2 and ML3 are representative of proposed noise sensitive receptors on the Site.

Proposed Residential and Country Park - External Daytime Noise Levels

4.2 The highest measured noise level on the site during the daytime period is 54dB $L_{Aeq,16h,}$ measured at ML1, which is below the upper guideline level of 55dB $L_{Aeq,16h}$ recommended in BS8233:2014 and WHO guidance for outdoor amenity spaces. Therefore, mitigation is not required.

Proposed Residential - Internal Noise Levels

South-East Boundary

4.3 The measured noise levels at ML1 were 54dB $L_{Aeq,16h}$ during the daytime and 42dB $L_{Aeq,8h}$ during the night-time. The 10th highest L_{AFmax} during the night-time is 63dB L_{AFmax}.

4.4 Assuming a 15dB loss through a partially opened window, this would result in internal noise levels at ML1 of 39dB $L_{Aeq,16h}$ during the daytime and 27dB $L_{Aeq,8h}$ during the night-time. The 10th highest internal L_{AFmax} value is 48dB. Therefore, the criteria of 35dB for the daytime and 45dB for the night-time are likely to be exceeded, assuming partially opened windows.

South-West Boundary

4.5 The measured noise levels at ML2 are 51dB $L_{Aeq,16h}$ during the daytime and 43dB $L_{Aeq,8h}$ during the night-time. The 10th highest L_{AFmax} during the night-time is 58dB L_{AFmax}.

4.6 Assuming a 15dB loss through a partially opened window, this would result in internal noise levels at ML2 of 36dB $L_{Aeq,16h}$ during the daytime and 28dB $L_{Aeq,8h}$ during the night-time. The 10th highest internal L_{AFmax} value is expected to be 43dB L_{AFmax}. Therefore, the criteria of 35dB for the daytime is likely to be exceeded, assuming partially opened windows.

4.7 Consideration has been given to mitigation is **Section 5**.

West Boundary

4.8 The measured noise levels at ML2 are 47dB $L_{Aeq,16h}$ during the daytime and 40dB $L_{Aeq,8h}$ during the night-time. The 10th highest L_{AFmax} during the night-time is 56dB L_{AFmax}.

4.9 Assuming a 15dB loss through a partially opened window, this would result in internal noise levels of 32dB $L_{Aeq,16h}$ during the daytime and 25dB $L_{Aeq,8h}$ during the night-time. The 10th highest internal L_{AFmax} value is 41dB L_{AFmax}.

4.10 The criteria of 35dB for the daytime and 30dB and 45dB for the night-time, are likely to be achieved, assuming partially opened windows. Therefore, further mitigation is not considered warranted.

Proposed School - Internal Noise Levels

4.11 It is currently anticipated that the proposed Primary School will be situated within the south-east area of the Site, approximately 80m from the Site boundary. However, as the application is in outline, and location of the school is not fixed, the noise levels measured at ML1 will be used as a basis for the assessment.

4.12 The highest external daytime level over a 30 minute period at ML1 is 58dB $L_{Aeq,30m}$. Assuming a 15dB loss through a partially opened window, this would result in an internal daytime level of 43dB $L_{Aeq,30m}$. The upper IANL limit for newbuild school general teaching areas is 35dB $L_{Aeq,30mins}$, therefore it is expected the internal level of a school located at ML1 exceeds limits set out in BB93.

4.13 Should the school be located away from the Site boundary as indicated in the Illustrative Masterplan shown in **Figure 1.2**, it is expected the noise levels will be lower than assessed at ML1 due to screening provided by the development itself.

4.14 Mitigation has been outlined in **Section 5** of this report.

Proposed Fixed Plant

4.15 It is anticipated that there may be fixed plant items associated with the proposed Local Centre which may have the potential to generate noise. However, as this application is outline, details of the type, number and precise location are not available.

4.16 In the absence of detailed information, it is appropriate to specify suitable noise control limits to which any plant should conform. These limits should include any appropriate corrections for acoustic characteristics, in accordance with BS 4142.

4.17 It is considered that the rating level of fixed pant noise sources should not exceed the prevailing sound level when measured at the nearest receptors. The cumulative effect of all external plant should be specified so that the rating level is less than or equal to the prevailing background level.

4.18 Representative background sound levels have been determined from an arithmetic average of the mean, mode and median L_{A90} values measured at ML1.

4.19 Noise from external plant on the Site should achieve the following noise level limits at nearby NSRs, shown in **Table 4.1**.

Table 4.1: Noise Limits from Fixed Plant

Rating Level Limit to be Achieved at NSRs (dB $L_{A,Tr}$)	
Daytime (0700-2300)	**Night-time (2300-0700)**
40	36

4.20 The above rating level limit will apply at least 3.5m from the façade of any residential property (i.e. free-field conditions).

4.21 In accordance with BS 4142, the assessment of plant noise emissions should include appropriate rating corrections for tonal, irregular, or intermittent plant where applicable, before comparison with the above limits.

4.22 Once the detailed nature of such future uses is confirmed, noise from any fixed plant can be considered to ensure that the limits can be met.

4.23 It should be noted that the derived rating level limits would be applicable to the total noise from the simultaneous operation of all external plant serving the Proposed Development. As such, noise emissions from individual items of plant will need to be lower than the given limit, although the exact limit for each individual item of plant will be dependent upon its type, noise characteristics, location etc.

Noise from Development Generated Road Traffic

4.24 The proposed development has the potential to impact on existing nearby existing NSRs. There may be a change in road traffic noise levels at existing noise sensitive receptors due to development generated road traffic.

4.25 The results of a traffic assessment were used as the basis for determining the change in road traffic noise levels that would result from development generated road traffic.

4.26 Traffic data for Opening Year (with and without development) and the Future Year (with and without development) have been used to inform the assessment of road traffic noise level change over the short and long-term durations. The traffic data for these scenarios are presented in the appendix.

4.27 The Basic Noise Level (BNL), as referenced in Calculation Road Traffic Noise (CRTN), has been calculated for the study area, to predict the change in noise level between the Opening Year without Development, and the Opening Year with Development (i.e. the short-term road traffic noise level change). Calculations have also been undertaken to predict the change in noise level between the Future Year with Development, and the Future Year without Development (i.e. the long-term road traffic noise level change).

4.28 The DMRB assessment methodology given in LA111 suggests that the magnitude of noise changes from a project should be classified into levels of impact. LA111 considers how the magnitude of change can be affected by whether a noise level change occurs in the short-term (e.g. as a result of a sudden opening of a scheme), or in the long-term (e.g. gradually over time, such as that associated with natural traffic growth).

4.29 Traffic flows for the opening year on Durrants Drive are low and fall outside of the scope of CRTN. Therefore, the method published in the Noise Advisory Council document "*A Guide to Measurement and Prediction of Equivalent Continuous Sound Level L_{eq}*" published in 1978 has been used to calculate the change in road traffic noise on Durrant Drive. This method is as follows.

4.30 The predicted SEL level at 10m from the nearside kerb edge, for vehicles with an unladen weight below 1525kg, is stated to be derived from the following equation:

- SEL = 37.8 + 20log(V)
    - V = speed in km/h

4.31 For vehicles with an unladen weight above 1525kg, the following equation applies:

- SEL = 44.5 + 20log(V)
    - V = speed in km/h

4.32 To predict the L_{eq} level from the calculated SEL, the following equation is used:

- $L_{eq} = L_{AX} + 10\log(n) - 10\log(T)$
    - L_{AX} = SEL
    - n = number of events
    - T = time in seconds

4.33 In accordance with DMRB, the magnitude of impact is assessed against the criteria found in **Table 2.4** for change in the short-term and long-term.

4.34 The predicted changes in road traffic noise are shown in **Table 4.2** which shows the increase in noise for the following scenarios:

- The 'with' and 'without' development scenarios in 2026 (short term change), i.e. by how much traffic noise levels are likely to be different with the development than without, with any predicted changes being solely due to the traffic generated by the proposed development; and
- The 'with' and 'without' development scenarios in 2032 (long term change), i.e. by how much traffic noise levels are likely to be different with the development than without, with any predicted changes being solely due to the traffic generated by the proposed development.

Table 4.2: Predicted Changes in Road Traffic Noise

Road/Link	2026 BNL, dB		2026 (with dev.) Vs. 2026 (without dev.)	2033 BNL, dB		2033 (with dev.) Vs. 2033 (without dev.)
	Without Dev.	With Dev.		Without Dev.	With Dev.	
Durrants Drive[1]	47.6	53.1	+5.5	47.7	53.1	+5.4
Canterbury Way[2]	43.7	43.7	0	43.8	43.9	+0.1
Links Way[2]	54.8	58.9	+4.1	54.9	59.0	+4.2

1 Calculated using the methodology found in The Noise Council Advisory Document 'A Guide to Measurement and Prediction of Equivalent Continuous Sound Level Leq'.
2 Calculated using the methodology found in CRTN.

4.35 Comparing the results against the criteria in **Table 2.4** given in LA111, the results shown in **Table 4.2** indicate that:

- The magnitude of change at Durrants Drive is considered major during the short-term and moderate during the long-term.
- The magnitude of change at Canterbury Way is considered negligible for both short-term and long-term.
- The magnitude of change at Links Way is considered moderate in the short-term and minor in the long-term.

4.36 Therefore, future noise levels in the short term on Links Way, and in the short and long term on Durrants Drive, warrant further consideration. This is described in more detail in **Section 5**.

5. MITIGATION

Proposed Residential - Internal Noise Levels

5.1 It is widely considered that first amelioration measure available to an occupant will be to close windows. Therefore, in order to assess the noise mitigation required to ensure an adequate level of protection against noise, it is appropriate to explore in the first instance the protection that could be afforded by the sound insulation performance of the external building fabric, and in particular the glazing elements.

5.2 Detailed noise break-in calculations have been undertaken in accordance with the rigorous method from section G.2 from BS 8233 based on the frequency spectra measured on Site and the following assumed dimensions and assumptions;

- Room dimensions of 4m (width) x 3.5m (depth) x 2.5m (height);
- Double glazed window dimensions of 1.0m (width) x 2.5m (height);
- External building fabric elements shall achieve a sound reduction performance of at least $R_w + C_{tr}$ 48dB;
- A reverberation time of 0.5 seconds; and
- 2 No. ventilator per habitable room.

5.3 The break-in calculations below have been made at ML1 as it has the highest noise measurement and therefore considered a robust approach.

5.4 To achieve the daytime internal noise criterion of 35 dB $L_{Aeq,16h}$ and 45dB L_{AFmax} adopted for this assessment, based on a façade closest to ML1 experiencing 54 dB $L_{Aeq,16h}$ free-field at the facade, a reduction of 19 dB would be required for habitable rooms. To achieve the internal criteria of 30 dB $L_{Aeq,8h}$ and 45 dB L_{AFmax} during the night-time, adopted for this assessment, a reduction of up to 18dB

5.5 For worst affected dwellings, all internal criteria would be achieved with double glazing (example configuration: 4mm/(6-16mm/4mm), which would need to provide a minimum $R_w + C_{tr}$ of 25dB. Acoustic trickle ventilators, which achieve a minimum performance of $D_{n,e,w} + C_{tr}$ 35dB, would be required.

5.6 For dwellings that are located further back into the site that benefit from screening provided by the development itself, it is likely that standard double glazing and open windows will be sufficient to mitigate noise to acceptable levels.

5.7 **Table 5.1** shows the resultant internal noise levels of proposed dwellings with mitigation in place.

Table 5.1: Predicted External and Internal Noise Levels with Mitigation, dB

Facade	Predicted External Noise Level, free-field			Resultant Internal Noise Level		
	$L_{Aeq,16h}$	$L_{Aeq,8h}$	L_{AFmax}	$L_{Aeq,16h}$	$L_{Aeq,8h}$	L_{AFmax}
ML1	54	42	63	30	17	29

5.8 The final glazing and ventilation schedule should be finalised on a plot-by-plot basis at the appropriate design stage by a qualified acoustician, once the final internal layouts and glazing areas for each room are known.

Proposed School – Internal Noise Levels

5.9 To achieve the daytime internal noise criterion of 35 dB $L_{Aeq,30m}$, based on external measurements at ML1 experiencing 58dB $L_{Aeq,30m}$ free-field, a reduction of 23 dB would be required for classrooms.

5.10 As the application is outline, and the location and design of the school is not finalised, it is considered break-in calculations for the school cannot provide an accurate representation of internal classroom noise at this stage. This is largely due to the large number of variables in school building design.

5.11 Whilst specific break-in calculations for the school have not been completed, the break-in calculations for residential properties at ML1 demonstrate that the necessary noise reductions to meet guidelines can be met with standard ventilation uprating.

5.12 It is therefore considered that the noise levels on the proposed Site can be controlled to meet the required level of 35dB $L_{Aeq,30m}$ detailed in BB93.

Development Generated Road traffic Noise

5.13 The assessment of the potential noise impact from development generated road traffic on existing receptors indicates that, when considering the change in noise levels, and the resultant future noise levels at worst affected receptors, there is likely to be a moderate impact in the short term on Links Way, a major impact in the short term on Durrants Drive and a moderate impact in the long term on Durrants Drive.

5.14 In accordance with DMRB, the magnitude of impact can be modified through consideration of a combination of other contextual factors or local circumstances to determine final significance.

5.15 One important contextual consideration is the location of outdoor amenity spaces. The gardens for dwellings located along Durrants Drive and Links Way are all located on the screened side of dwellings. Therefore, these will be unaffected by any increase in noise from development generated road traffic.

5.16 The time in which an increase in road traffic noise occurs is also an important contextual consideration. It is likely that, due to the residential nature of the proposed development, the increase in road traffic noise will only occur during the daytime, peaking during the morning and the afternoon. For the remainder of the time, the impact is likely to be lower, with few movements occurring during the night-time periods.

5.17 It is also relevant that the increase in road traffic noise by the proposed development does not change the acoustic character of the area. The roads impacted by an increase in road traffic noise are already used for residential access therefore the acoustic context will not change due to the proposed development.

5.18 For receptors on both roads, they are set back broadly 10m from the road noise source, and therefore the BNL is equivalent to the actual $L_{A10,18h}$ to be experienced.

5.19 The absolute noise level at receptors on Durrants Drive of 53.1 dB $L_{A10,18h}$ in both the short term and long term and is therefore below the absolute daytime LOAEL threshold of 55dB $L_{A10,18h}$ set out in DMRB. Therefore, it is considered that, in this context, no consideration to mitigation is warranted.

5.20 The absolute noise level at receptors on Links Way of 58.9 dB $L_{A10,18h}$ in the short term is comfortably below the SOAEL, and 3 dB above the LOAEL as defined in DMRB.

5.21 According to the Noise Exposure Hierarchy from PPG, for effects sitting between the LOAEL and the SOAEL, the policy action is to "Mitigate and reduce to a minimum". Therefore, consideration has been given to the guidance within DMRB to mitigate noise where adverse impacts are predicted. This recommends consideration could be given to the following;

- vertical or horizontal alignment of the road;
- earth bunds to act as a noise barrier;
- noise barriers;
- low noise road surfacing;
- speed limits; and
- restrictions on noisy vehicle types.

5.22 In this scenario, is not feasible to alter the alignment of the road or build earth bunds and/or noise barriers due to the design of the existing road and surrounding properties.

5.23 Low noise road surfacing can be an effective method of reducing road traffic noise if the vehicles are moving at high speeds, however the expected average speed of Links Way is 20mph. At low speeds, engine noise is the dominant noise source of road traffic and therefore a low noise road surface is not an effective form of mitigation in this scenario.

5.24 Speed limits are unlikely to be an effective form of mitigation against development generated road traffic noise as the roads are already low speed.

5.25 Restrictions on noisy vehicle types such as HGVs is unlikely to be an effective form of mitigation as, due to the majority residential nature of the proposed development, the road traffic data used in the DMRB assessment already reflects a low number of noisy vehicle types.

5.26 The above considerations demonstrate that mitigation for development generated road traffic noise are not feasible for the proposed development and that the effects of an increase of noise have been reduced to a minimum, therefore satisfying Government Policy. It is important to note that, in the longer term, the impact on Links

Way reduces to Minor, and therefore the increased impact is essentially a temporary one.

6. CONCLUSIONS

6.1 BWB Consulting (BWB) was instructed by Richborough (the Client) to undertake a Noise Impact Assessment to support an outline planning application for up to 600 residential dwellings (Use Class C3(a)), a 5-bedroom property for children's social care and supported living (Use Class C3(b)). Two vehicular access points from Little Green Lane and further pedestrian / cycleway accesses. A one form entry primary school (Use Class F1(a)) (plus expansion land for a two form entry primary school). A mixed use local centre including provision for NHS health and social care services (Use Class E(e)), community building (Use Class F2), retail and café provision (Use Class E(a-c)), car parking and associated infrastructure. A country park, areas for play and recreation, allotments, community orchard and landscaping with associated infrastructure including sustainable urban drainage systems. (All matters are reserved except for vehicular access).

6.2 A baseline noise survey was undertaken in July 2024 and the subsequent assessment work has been undertaken in accordance with current standards and guidance, following consultation with Three Rivers District Council (TRDC).

6.3 As the exact location of the sources and receptors is unknown at this time, mitigation has been suggested in outline terms only. It is considered that the internal and external noise levels could meet the requirements of BS 8233 and BB93 with appropriate mitigation in place.

6.4 The development generated road traffic noise has been assessed and is predicted to have a minor impact at worst on existing noise sensitive receptors, once context is taken into account, with the exception of Links Way. There will be a short term moderate impact on Links Way that reduces to a minor impact in the long term, and consideration has been given to mitigation to ensure impacts are mitigated and reduced to a minimum.

6.5 Noise limits have been set for fixed plant items associated with the proposed local centre which will need to be achieved at nearby existing sensitive receptors.

6.6 Based on the results of the assessment, it has been demonstrated that the site is suitable for residential development.

APPENDICES

APPENDIX A: Glossary of Acoustic Terms

Noise

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc., according to the parameter being measured.

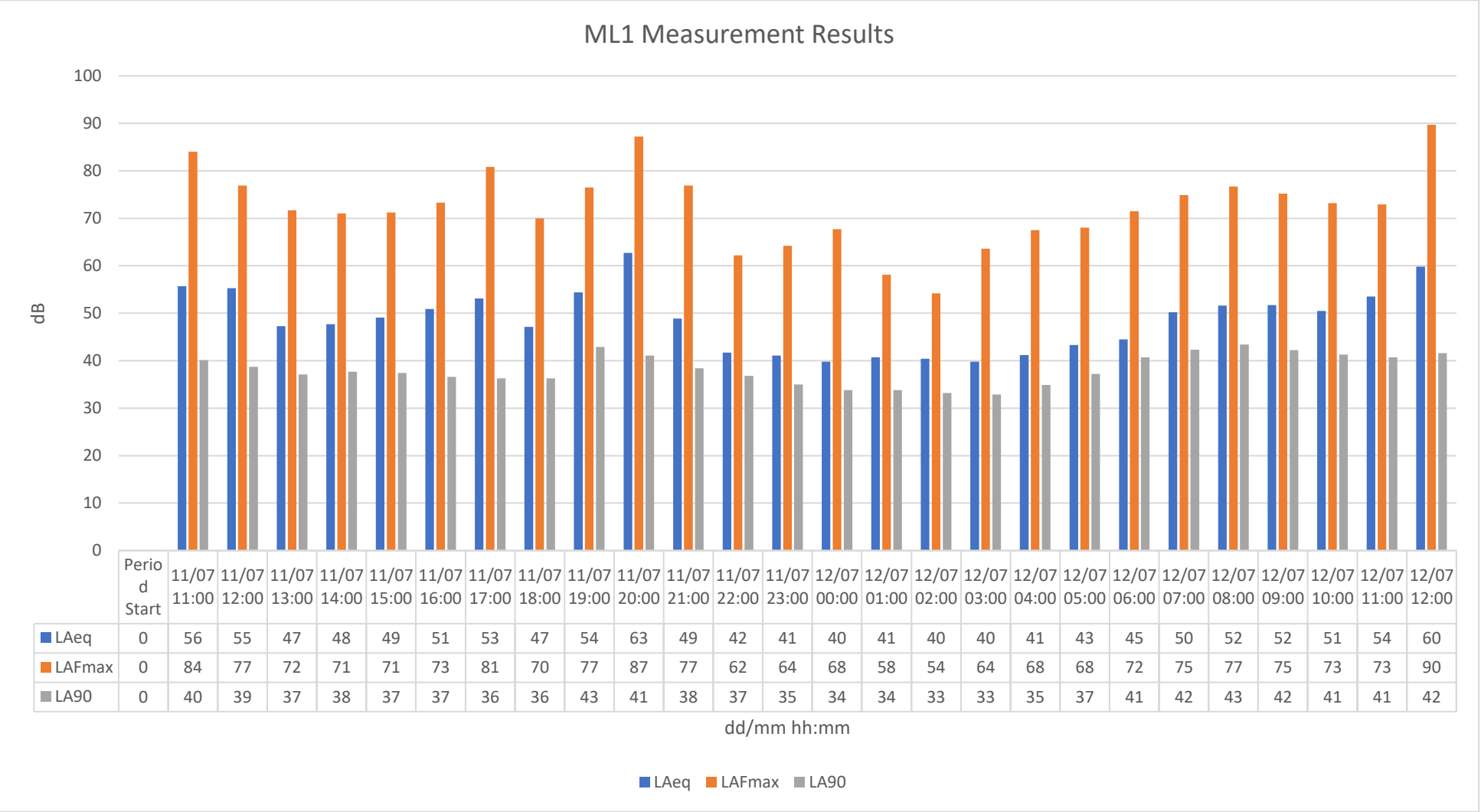
The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

Acoustic Terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. Sound pressure level is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10-5Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} and L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time, and the L_{90} is the level exceeded for 90% of the time.
Sound Power Level, L_w	logarithm of the ratio of a given sound power to the reference sound power. Such power level in decibels is ten times the logarithm to the base ten of the ratio. unless otherwise specified, the reference sound power is 1 pW. Sound power is the total sound energy radiated by a sound source and measured in watts (W). Sound power level
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Façade Level	A sound field determined at a distance of 1m in front of a large sound reflecting object such as a building façade.
R/R_w	R is the laboratory measurement of the sound insulating properties of a material or building element in a stated frequency band R_w is the weighted Sound Reduction Index a single number quantity which characterises the airborne sound insulation of a material or building element over a range of frequencies, based on laboratory measurements.
D_{ne}/$D_{ne,w}$	D_{ne} is the laboratory measured level difference of a building element which has been normalised to a referenced absorption of 10$m^{2.}$ $D_{ne,w}$ is the is the weighted Sound Reduction Index a single number quantity which characterises the airborne sound insulation of a material or building element over a range of frequencies, based on laboratory measurements.
C_{tr}	Spectrum Adaptation Terms (C and C_{tr}) the single number rating method defined in BS EN ISO 717 uses a standard reference curve to determine the weighted value of airborne sound insulation. The spectrum adaptation term C_{tr} is used to take into urban traffic noise.

APPENDIX B: Noise Survey Data

Figure B1: ML1 Measurement Results



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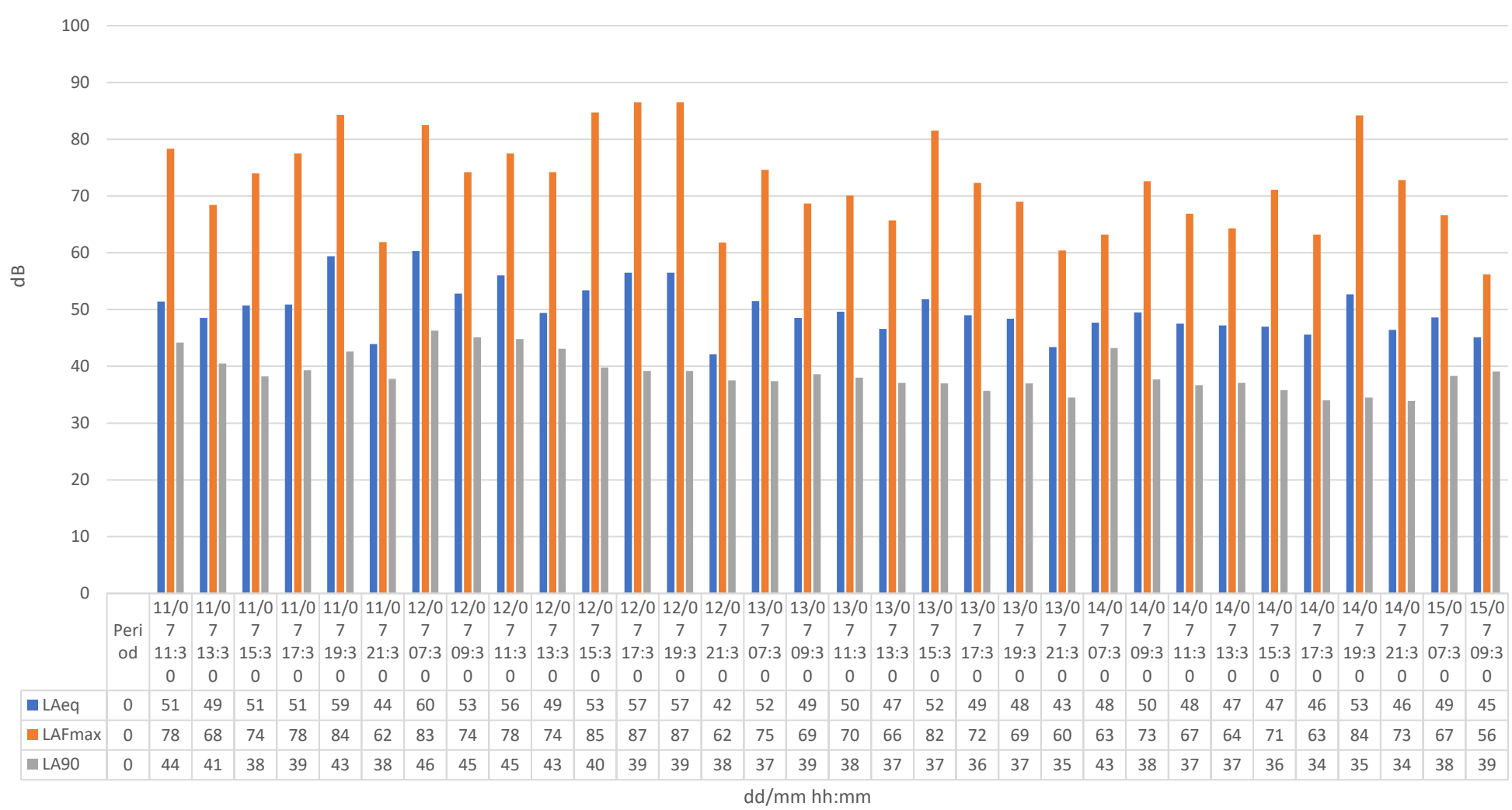
LAeq	0	56	55	47	48	49	51	53	47	54	63	49	42	41	40	41	40	40	41	43	45	50	52	52	51	54	60
LAFmax	0	84	77	72	71	71	73	81	70	77	87	77	62	64	68	58	54	64	68	68	72	75	77	75	73	73	90
LA90	0	40	39	37	38	37	37	36	36	43	41	38	37	35	34	34	33	33	35	37	41	42	43	42	41	41	42

Figure B2: ML2 Daytime Measurement Results



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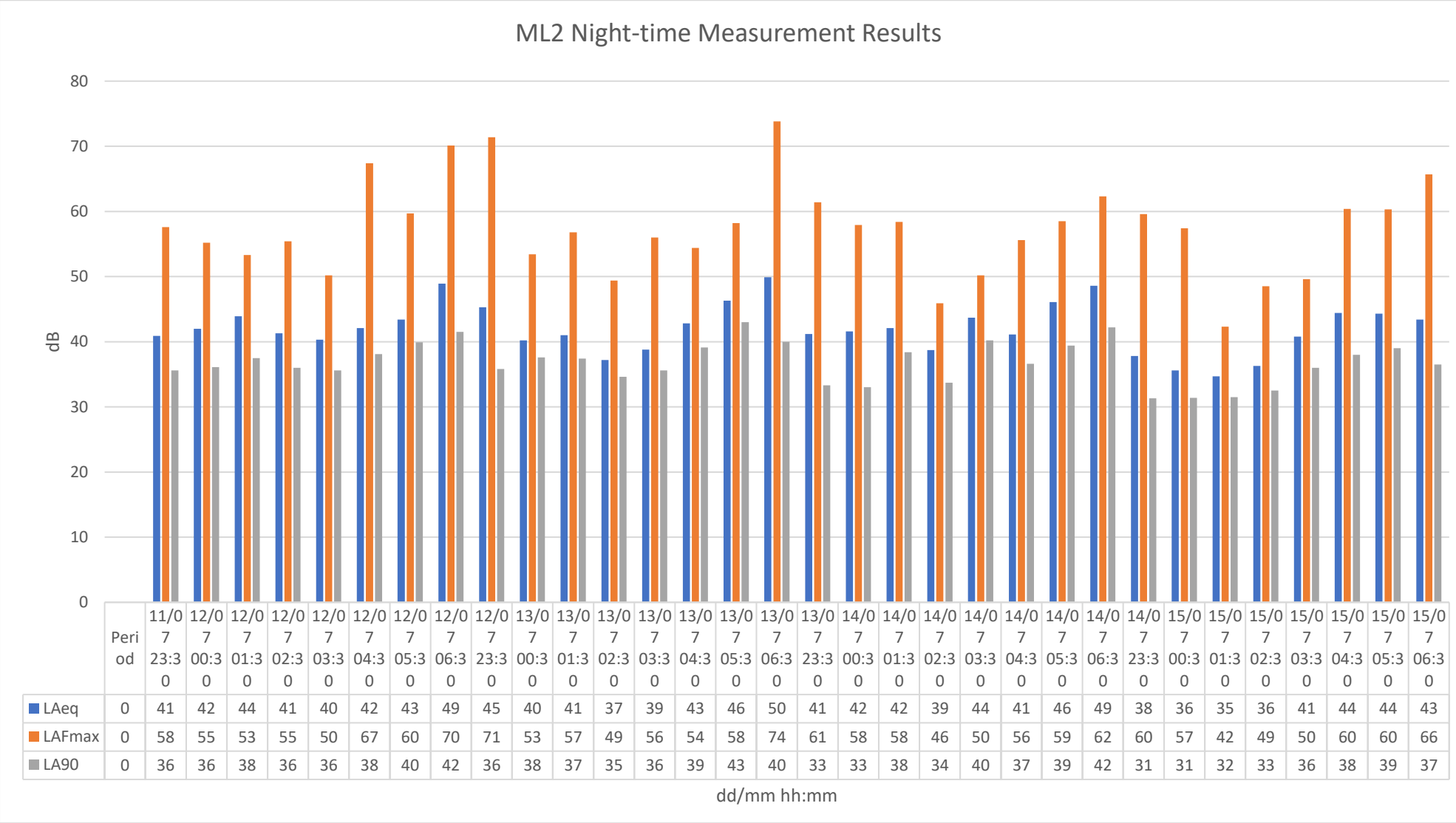
LAeq	0	51	49	51	51	59	44	60	53	56	49	53	57	57	42	52	49	50	47	52	49	48	43	48	50	48	47	47	46	53	46	49	45
LAFmax	0	78	68	74	78	84	62	83	74	78	74	85	87	87	62	75	69	70	66	82	72	69	60	63	73	67	64	71	63	84	73	67	56
LA90	0	44	41	38	39	43	38	46	45	45	43	40	39	39	38	37	39	38	37	37	36	37	35	43	38	37	37	36	34	35	34	38	39

Figure B3: ML2 Night-time Measurement Results



	Period	11/07 23:30	12/07 00:30	12/07 01:30	12/07 02:30	12/07 03:30	12/07 04:30	12/07 05:30	12/07 06:30	12/07 23:30	13/07 00:30	13/07 01:30	13/07 02:30	13/07 03:30	13/07 04:30	13/07 05:30	13/07 06:30	13/07 23:30	14/07 00:30	14/07 01:30	14/07 02:30	14/07 03:30	14/07 04:30	14/07 05:30	14/07 06:30	14/07 23:30	15/07 00:30	15/07 01:30	15/07 02:30	15/07 03:30	15/07 04:30	15/07 05:30	15/07 06:30
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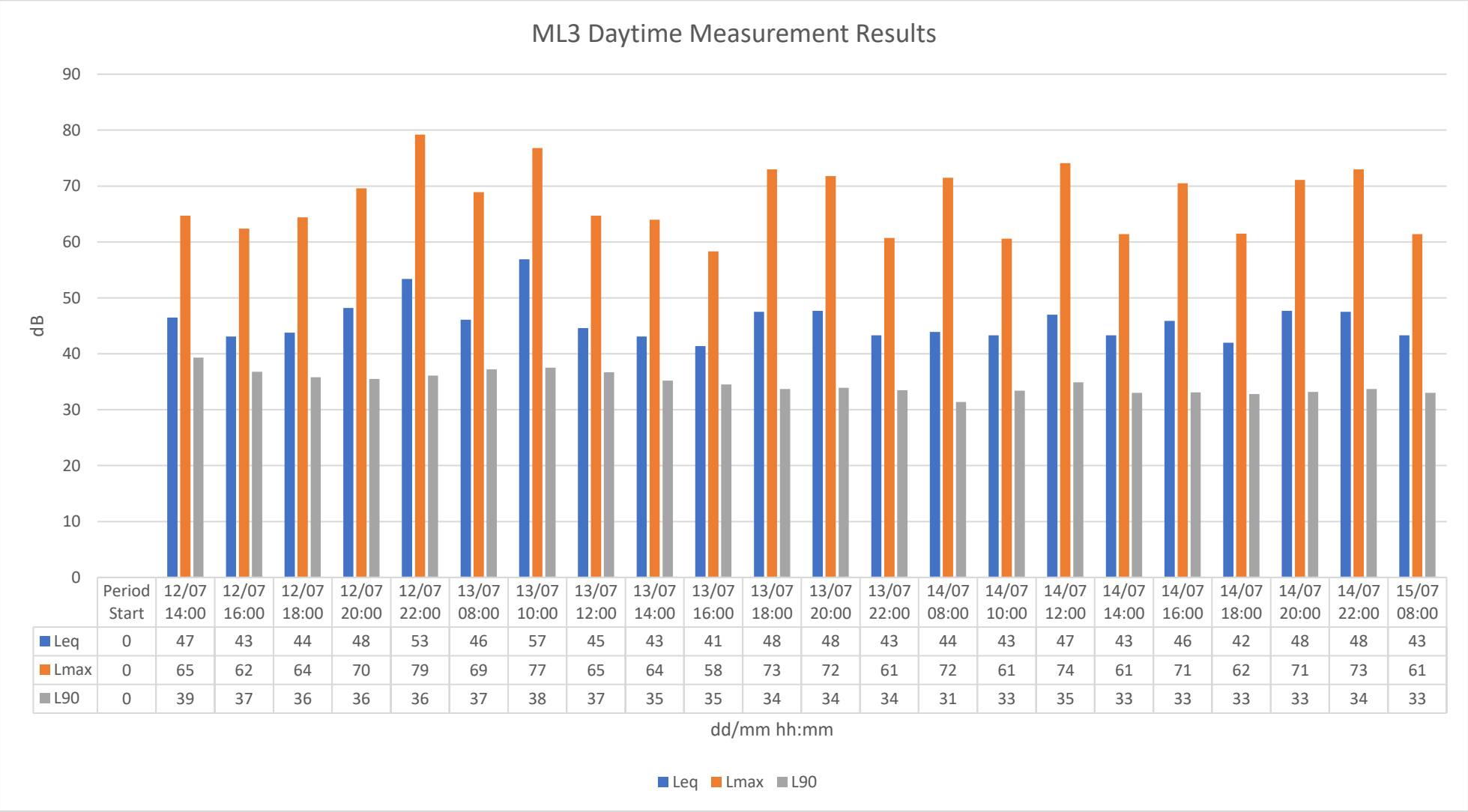
LAFmax	0	58	55	53	55	50	67	60	70	71	53	57	49	56	54	58	74	61	58	58	46	50	56	59	62	60	57	42	49	50	60	60	66
LA90	0	36	36	38	36	36	38	40	42	36	38	37	35	36	39	43	40	33	33	38	34	40	37	39	42	31	31	32	33	36	38	39	37

Figure B4: ML3 Daytime Measurement Results



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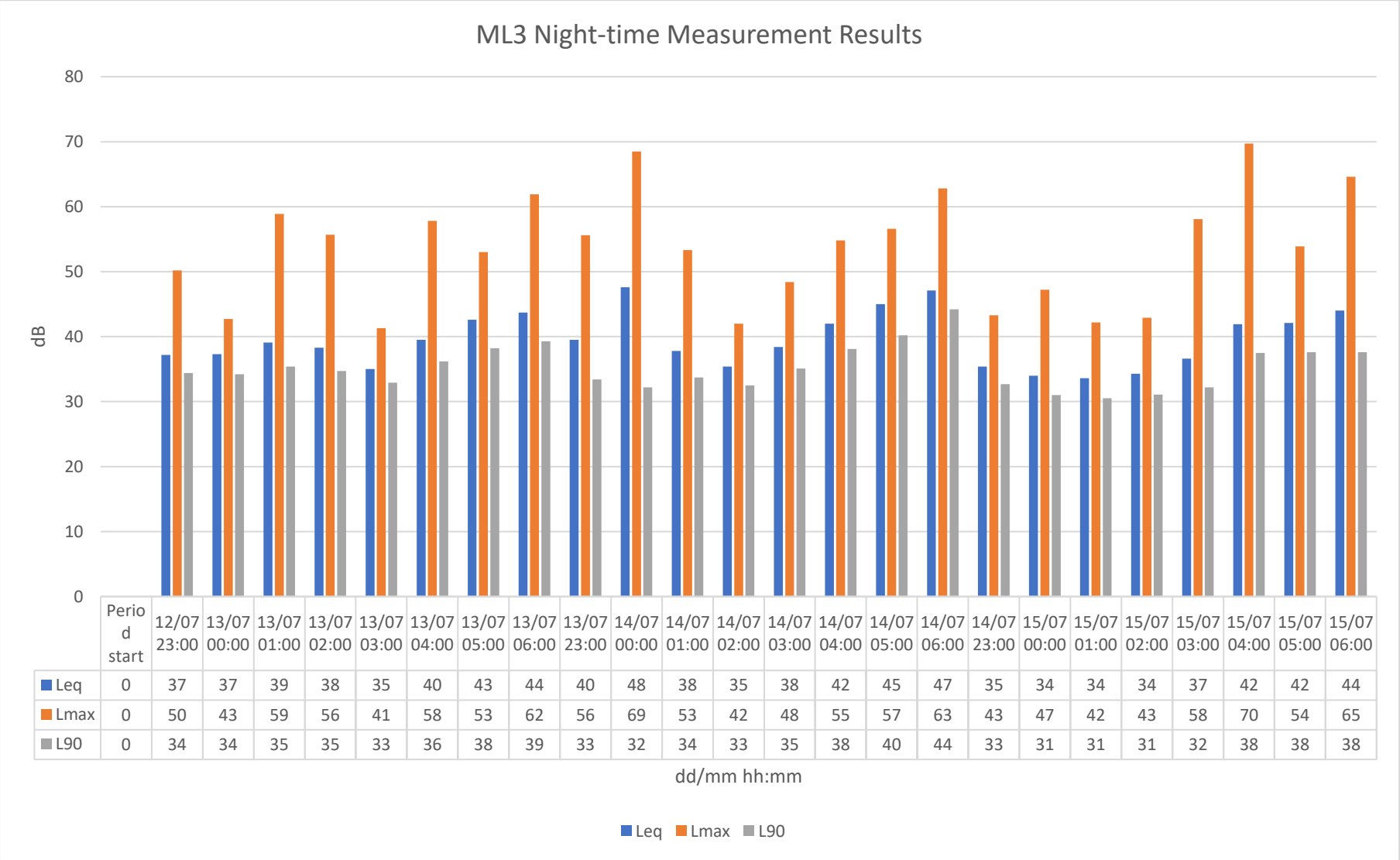
Leq	0	47	43	44	48	53	46	57	45	43	41	48	48	43	44	43	47	43	46	42	48	48	43
Lmax	0	65	62	64	70	79	69	77	65	64	58	73	72	61	72	61	74	61	71	62	71	73	61
L90	0	39	37	36	36	36	37	38	37	35	35	34	34	34	31	33	35	33	33	33	33	34	33

Figure B5: ML3 Night-time Measurement Results



	Period start	12/07 23:00	13/07 00:00	13/07 01:00	13/07 02:00	13/07 03:00	13/07 04:00	13/07 05:00	13/07 06:00	13/07 23:00	14/07 00:00	14/07 01:00	14/07 02:00	14/07 03:00	14/07 04:00	14/07 05:00	14/07 06:00	14/07 23:00	15/07 00:00	15/07 01:00	15/07 02:00	15/07 03:00	15/07 04:00	15/07 05:00	15/07 06:00
Leq	0	37	37	39	38	35	40	43	44	40	48	38	35	38	42	45	47	35	34	34	34	37	42	42	44
Lmax	0	50	43	59	56	41	58	53	62	56	69	53	42	48	55	57	63	43	47	42	43	58	70	54	65
L90	0	34	34	35	35	33	36	38	39	33	32	34	33	35	38	40	44	33	31	31	31	32	38	38	38

Appendix C: Traffic Data

Table C1: Traffic Data

	Opening Year, Without Development		Opening Year, With Development		Opening Year +15 Years, Without Development		Opening Year + 15 Years, With Development	
Road	**Flow**	**HGV**	**Flow**	**HGV**	**Flow**	**HGV**	**Flow**	**HGV**
Durrant Drive	456	18	1756	31	456	19	1756	32
Canterbury Way	258	20	258	20	258	21	258	21
Links Way	1135	47	2435	60	1135	49	2435	62

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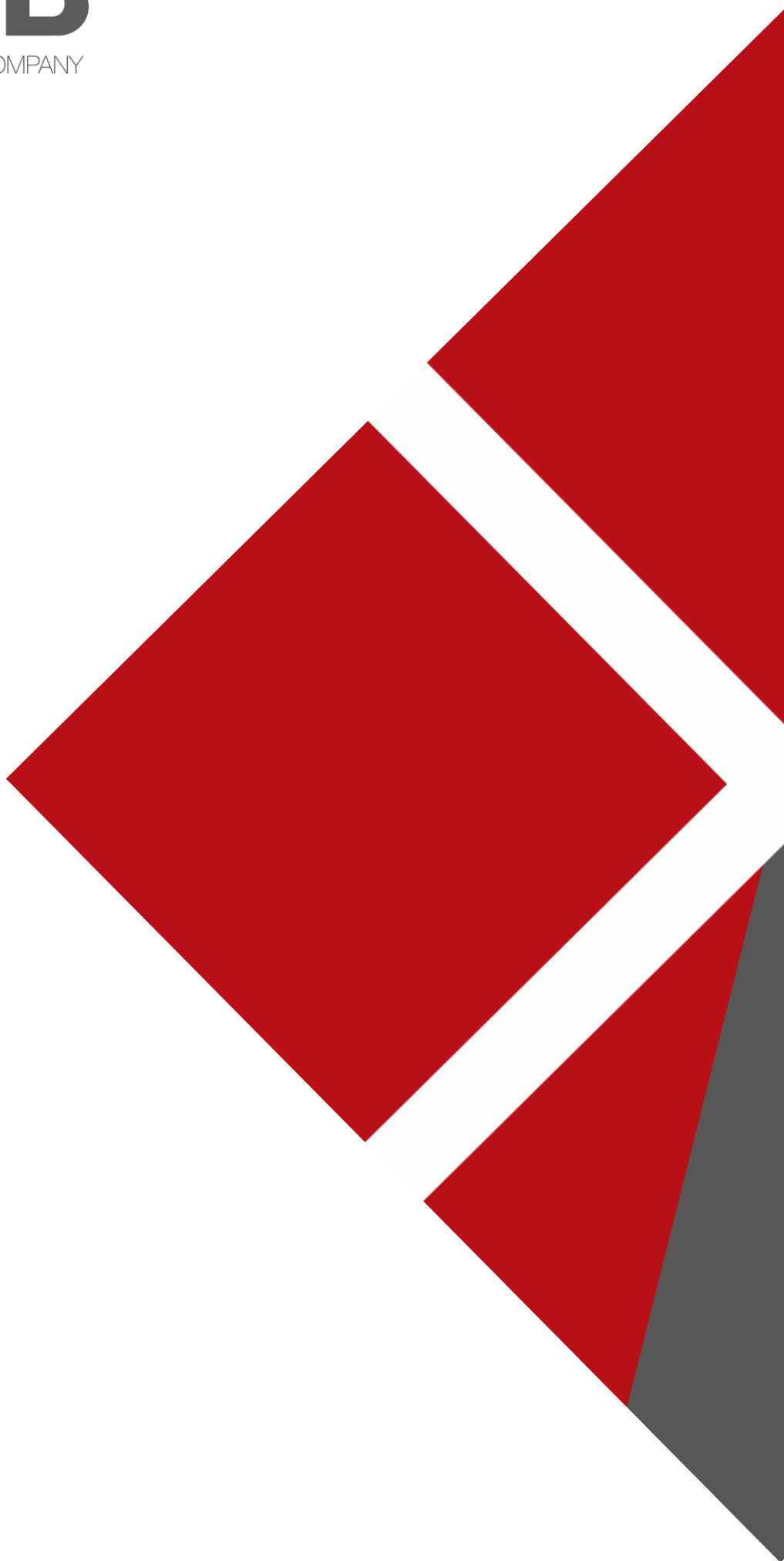

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