



Noise Assessment

*Submitted as part of the Outline Planning Application for
Land to the east of Clitheroe Road (Lawsonsteads Farm), Whalley*

COMMERCIAL ESTATES GROUP



Lawsonsteads,
Clitheroe Road, Whalley

Noise Assessment for
Proposed Residential
Development

FINAL

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	5
1. INTRODUCTION	7
1.1 Overview	7
1.2 Site Description	7
2. NOISE CRITERIA	9
2.1 National Planning Policy Framework	9
2.2 Application of the NPPF to this Development	10
2.3 Planning Policy Guidance 24 (PPG24)	10
2.4 World Health Organisation	12
2.5 BS 8233 'Sound Insulation and Noise Reduction for Buildings' 12	12
2.6 Local Authority Requirements	12
3. ASSESSMENT METHODOLOGY	13
3.1 Noise Measurements	13
3.2 Construction Noise & Vibration	13
3.3 Predicted Road Traffic Noise	13
3.4 Suitability for New School	14
4. NOISE MONITORING	15
4.1 Overview	15
4.2 Instrumentation	15
4.3 Meteorological Conditions	15
4.4 Observations	15
4.5 Results	16
5. NOISE ASSESSMENT	17
5.1 PPG 24 Assessment.....	17
5.1 Noise Levels with the Development in Place.....	18
5.2 Internal Noise Levels	18
5.3 Noise Levels in Rear Garden Areas.....	19
5.4 Suitability for New School	20
5.5 Construction Noise	20
6. NOISE MITIGATION MEASURES.....	22
7. CONCLUSIONS.....	23
8. REFERENCES.....	24
APPENDIX A: NOISE PERCEPTION AND TERMINOLOGY	21
APPENDIX B: NOISE MONITORING LOCATIONS/SITE PLAN	22
APPENDIX C: SITE PHOTOGRAPHS	22
APPENDIX D: NOISE MONITORING DETAILS.....	24
APPENDIX E: NOISE PLOTS.....	25
APPENDIX F: NOISE MODELLING DETAILS.....	27
APPENDIX G: NOISE MODEL OUTPUTS	28
APPENDIX H: TRAFFIC DATA	36

EXECUTIVE SUMMARY

Scope

URS has been appointed by Commercial Estates Group to undertake a noise survey and assessment for a proposed residential development on land west of the A671 and east of Clitheroe Road in Whalley, Lancashire.

Methodology

Ambient noise monitoring was carried out on the eastern boundary of the site closest to the A671 in order to complete an assessment of ambient noise levels with regard to the requirements of Planning Policy Guidance 24 (PPG24). The area of the site closest to the A671 has been classified in terms of the relevant Noise Exposure Categories (NECs).

A noise model of the site, closest to the Clitheroe Road and the proposed new link road, was generated and the noise levels at the façades of selected proposed dwellings predicted based on the parameters contained within an illustrative site. Estimated internal noise levels within proposed residential properties were assessed against the criteria for living rooms and bedrooms in British Standard BS 8233 'Sound insulation and noise reduction in buildings'.

Noise levels in gardens were assessed against the World Health Organisations 'Community Noise Guidelines' level of 50 dB $L_{Aeq,16hr}$, "to avoid minimal moderate annoyance" adopted by the Council.

The suitability of the proposed site for the new school was assessed in accordance with guidance Building Bulletin 93 (BB 93).

Findings

Ambient unattended noise measurements were undertaken at one location closest to the A671 between 17:00, Thursday 5th May 2011 to 10:15, Tuesday 10th May 2011.

- Location N1 (north along the eastern boundary): 69 dB $L_{Aeq,16hr}$ (daytime) and 62 dB $L_{Aeq,8hr}$ (night-time).

In addition, ambient unattended noise measurements were undertaken at a further location closest to the A671 between 17:30, Thursday 5th May 2011 and 19:45, Friday 6th May 2011.

- Location N2 (south along the eastern boundary): 54 dB $L_{Aeq,16hr}$ (daytime) and 48 dB $L_{Aeq,8hr}$ (night-time).

Based on noise modelling based on 2020 traffic data and taking into account the illustrative site layout, the majority of the development site falls within NEC B during the daytime and night-time with the exception of at the boundary fringe for a small number of proposed properties closest to Clitheroe Road and the proposed link road, where it is NEC C during the daytime.

Noise Levels were predicted at the façades of dwellings representative of those closest to the Clitheroe Road and the proposed link road, based on the illustrative site layout. The use of high specification double glazing and alternative forms of ventilation may be required for living rooms, standard double glazing and standard trickle vents will suffice for other bedrooms, to ensure the 'good' criterion (required by the Local Authority) within BS 8233 is met.

Noise levels were predicted within rear garden areas of the dwellings proposed on the illustrative plan. The results of the noise modelling based on 2020 traffic data (with development) showed that noise levels were likely to exceed the Local Authority's recommended criterion limit of 50 dB $L_{Aeq,16hr}$ by up to 10 dB for those on the boundary of the site closest to Clitheroe Road and the proposed access road.

However, the World Health Organisation (WHO) recommended external environmental daytime and evening limit of 55 dB L_{Aeq} over the 16-hour daytime period (07:00-23:00) "to avoid minimal serious annoyance" was not exceeded across the majority of the site. These levels do not consider the implementation of mitigation measures, for example garden fences or walls. Therefore a carefully designed layout at the Reserved Matters stage should ensure the Council's desired external private garden areas noise exposure limits are not exceeded.

The assessment at the site has indicated that noise levels can be suitably mitigated in order to achieve the Council's requirements to provide adequate protection for future residents. However, to further reduce noise levels within rear gardens, garden boundary fencing for proposed properties closest to Clitheroe Road and the new link road should be considered during the detailed design phase.

Based on the noise modelling, the proposed area designated for the new school is considered suitable, meeting the requirements of BB93.

1. INTRODUCTION

1.1 Overview

URS has been appointed by Commercial Estates Group to undertake a noise survey and assessment for a proposed residential development on land west of A671 and east of Clitheroe Road in Whalley, Clitheroe, Lancashire, BB7 9RG.

An outline planning application has previously been submitted for 300 dwellings, a 50-bed nursing home and a primary school to Ribble Valley Borough Council (RVBC) in February 2011 (Application reference: 3/2011/0111). RVBC subsequently requested that a noise assessment be undertaken to assess the potential impact of road traffic noise from the A671 (to the east of the site) on the amenity of the new residents. This revised application is based on an illustrative masterplan, including 260 dwellings and a primary school.

This report considers the noise impacts of the surrounding area on the proposed development site.

We understand our tasks to be to:

- monitor existing baseline noise levels on the boundary of the site closest to the A671;
- predict noise levels on the site from traffic on the A671 and surrounding roads during the daytime and night-time using noise modelling software;
- assess the suitability of the site for residential use in line with current guidance including NPPF [1], WHO [2], BS8233 [3] and if considered appropriate by the Local Authority, the requirements of Planning Policy Guidance [4] (PPG24);
- provide daytime and night-time noise level contour plots on the boundary of the site closest to the A671 and surrounding roads;
- assess the suitability of the area within the site reserved for a primary school;
- provide a detailed report covering methodology, measurements and results of calculations; and
- provide advice regarding noise mitigation.

A brief summary of the noise theory and terminology used within this report is given in Appendix A.

1.2 Site Description

The 36 acre site is currently agricultural land and contains no buildings. The site slopes downwards from north to south and from east to west.

The site lies on the edge of an established residential area in a rural location. In the immediate surroundings of the proposed development are:

- the A671 to the east (separated by a dense area of trees towards the south);
- agricultural land and residential buildings to the north and south; and
- residential buildings to the west.

Existing noise sources which could impact on the eastern boundary of the proposed development include:

- road traffic from the A671 to the east;
- road traffic from the A59 further north; and
- aircraft noise.

A plan illustrating the site boundary and noise monitoring locations is given in Figure B.1, Appendix B.

Photographs of the site and monitoring locations are presented in Appendix C.

2. NOISE CRITERIA

2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) was introduced in March 2012. The document sets out the Government's planning policies for England and how these are expected to be applied. The Framework replaces the previous guidance document PPG24 'Planning and Noise'.

The Framework provides for the production of distinctive local and neighbourhood plans by Local Authorities, in consultation with local people, which should be developed to reflect the needs and priorities of their communities.

Applications for planning permission must be determined in accordance with the Local Authority development plan (which includes any local plan or neighbourhood plans which have been adopted for the area), unless material considerations indicate otherwise. The NPPF must be taken into account in the preparation of local and neighbourhood plans, and is a material consideration in the determination of planning applications. Planning policies and decisions must also reflect, and where appropriate promote, relevant EU obligations and statutory requirements.

The planning system is required to contribute to and enhance the natural and local environment. Consequently, the aim is to prevent both new and existing development from contributing to, or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution.

The NPPF states that planning policies and decisions should aim to:

- "avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impacts on quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established [subject to the provisions of the Environmental Protection Act 1990 and other relevant law]; and
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."

With regards to 'adverse effects' and 'significant adverse effects' the NPPF refers to the Noise Policy Statement for England (NPSE) Explanatory Note [5].

The statement sets out the long term vision of the government's noise policy, which is to "promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development".

This long term vision is supported by three aims:

- "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 improvements of health and quality of life."

The long term policy vision and aims are designed to enable decisions to be made regarding what is an acceptable noise burden to place on society.

The 'Explanatory Note' within the NPSE provides further guidance on defining 'significant adverse effects' and 'adverse effects' using the concepts:

- No Observed Effect Level (NOEL) - the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;
- Lowest Observable Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected; and
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

The three aims can therefore be interpreted as follows:

- The first aim is to avoid noise levels above the SOAEL.
- The second aim considers situations where noise levels are between the LOAEL and SOAEL. In such circumstances, all reasonable steps should be taken to mitigate and minimise the effects. However this does not mean that such adverse effects cannot occur.
- The third aim considers situations where noise levels are between the LOAEL and NOEL. In these circumstances, where possible, reductions in noise levels should be sought through the pro-active management of noise.

The NPSE recognises that it is not possible to have single objective noise-based measures defining the SOAEL, LOAEL and NOEL that is applicable to all sources of noise in all situations. The levels are likely to be different for different noise sources, receptors and at different times of the day.

2.2 Application of the NPPF to this Development

The NPPF and associated NPSE provide the concepts for defining various levels of effect, but do not translate these into actual noise levels against which a proposed residential development can be assessed as acceptable, acceptable with various degrees of mitigation, or unacceptable. The Noise Exposure Categories of A-D used in PPG24 which provided this advice no longer form part of the national planning guidance in England. Instead, it is up to individual Local Authorities to interpret the concepts in the NPPF and NPSE and translate them into noise level criteria for residential development to be applied in their area.

2.3 Planning Policy Guidance 24 (PPG24)

Planning Policy Guidance PPG24 'Planning and Noise' uses the concept of Noise Exposure categories (NECs), ranging from A-D, to help local planning authorities in their consideration of applications for residential development near transport-related noise sources. Category A represents the circumstances in which noise is unlikely to be a determining factor, while category D relates to a situation in which development should normally be refused. Categories B and C deal with situations where noise mitigation measures may make development acceptable.

PPG24 recommends adopting a 16-hour daytime period of 07:00-23:00 and an 8-hour night-time period of 23:00-07:00.

The recommended values for specifying NEC bands are given in PPG24 and are repeated in Table 2.1.

TABLE 2.1: PPG24 NOISE EXPOSURE CATEGORY LEVELS

Noise Levels Corresponding to the NECs for New Dwellings $L_{Aeq,T}$ dB				
Noise Source	Noise Exposure Category (NEC)			
	A	B	C	D
Road Traffic				
07:00-23:00	<55	55 – 63	63 – 72	>72
23:00-07:00	<45	45 – 57	57 – 66	>66
Rail Traffic				
07:00-23:00	<55	55 – 66	66 – 74	>74
23:00-07:00	<45	45 – 59	59 – 66	>66
Air Traffic				
07:00-23:00	<57	57 – 66	66 – 72	>72
23:00-07:00	<48	48 – 57	57 – 66	>66
Mixed Sources				
07:00-23:00	<55	55 – 63	63 – 72	>72
23:00-07:00	<45	45 – 57	57 – 66	>66

For example, for an area of a site subject predominantly to road traffic noise an existing daytime noise level of less than 55 dB $L_{Aeq,16h}$ corresponds to Noise Exposure Category A. An existing night-time noise level of less than 45 dB $L_{Aeq,8h}$ corresponds to Noise Exposure Category A. No noise mitigation works would normally be required at a site falling entirely into NEC A for day and night-time purposes.

Having determined the day and night-time NEC rating of the site the recommended action specific to applications for planning permission are tabulated in PPG24 and repeated in Table 2.2.

TABLE 2.2: PPG24 NOISE EXPOSURE CATEGORY DESCRIPTIONS

NEC	Determination
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

For areas falling into Noise Exposure Category B or C, it is possible to address moderate or high levels of environmental noise for future residents by specifying noise reduction measures such as acoustic barriers to reduce noise levels to future gardens and acoustic ventilation and glazing to reduce internal noise levels.

In terms of night-time noise levels (between 23:00 and 07:00), PPG24 also states that where individual noise events exceed 82 dB $L_{A_{Smax}}$ (slow time weighting), several times in any hour, this should be treated as being NEC C, regardless of the $L_{Aeq,T}$ (except where the $L_{Aeq,T}$ already puts the site in NEC D).

2.4 World Health Organisation

The World Health Organisation (WHO) 'Community Noise Guidelines' recommend external environmental daytime and evening limits of 55 dB L_{Aeq} or less over the 16-hour daytime period (07:00 to 23:00) "to avoid minimal serious annoyance", and 50 dB L_{Aeq} "to avoid minimal moderate annoyance".

For night-time sources the WHO guidelines recommend a night-time (23:00 to 07:00) 8-hour noise level of 30 dB L_{Aeq} inside bedrooms (for a reasonably steady noise source) to avoid sleep disturbance.

2.5 BS 8233 'Sound Insulation and Noise Reduction for Buildings'

The WHO recommended limit specific to sleep disturbance is confirmed in Table 5 of British Standard BS 8233. The 'good' criterion for reasonable resting and sleeping conditions within buildings is specified as 30 dB $L_{Aeq,T}$ while 35 dB $L_{Aeq,T}$ is considered 'reasonable'.

For living rooms, which are assumed to be occupied during the day, 30 dB $L_{Aeq,T}$ is considered 'good' and 40 dB $L_{Aeq,T}$, 'reasonable'.

2.6 Local Authority Requirements

After consultation with James Russell, Environmental Health Officer, Ribble Valley Borough Council [6], the measurement procedure, assessment methodology and monitoring locations were agreed.

RVBC had the following recommendation:

"A noise assessment should be provided that ensure all properties achieve the best standards recommended by the World Health Organisation, and BS 8233, relating to both internal and external noise standards. Consideration should be given to strategic noise barriers, additional noise attenuation to 'at risk' properties and site orientation of 'at risk' properties."

3. ASSESSMENT METHODOLOGY

3.1 Noise Measurements

Baseline noise monitoring has been undertaken in line with measurement guidance in British Standard BS 7445: 2003 'Description and Measurement of Environmental Noise'.

With regards to the suitability of the site for residential development the monitored noise levels have been used to assess the site against the guidance and criteria given in Planning Policy Guidance Note 24 'Planning and Noise'.

Noise levels within gardens and recreational areas have been assessed against the criteria given in the World Health Organisation 'Community Noise'.

3.2 Construction Noise & Vibration

At this stage when only an indicative masterplan is available for the site, no specific details on the construction activities, programme or number and type of construction plant are currently available. Therefore, detailed construction noise predictions at specific receptors have not been completed, instead a qualitative approach has been adopted focussing on the best practice mitigation measures.

Discussions with Ribble Valley Borough Council [6] (RVBC) have established that the Council do not have any specific requirements or guidelines with regard to construction noise, beyond requiring standard construction working hours be adhered to and working to the Control of Pollution Act 'Code of Practice' [7].

3.3 Predicted Road Traffic Noise

Noise monitoring cannot represent the noise levels at all positions across the site. Therefore, to aid in the categorisation of the site into NECs the noise monitoring results have been supplemented by road traffic noise levels across the site from traffic data.

Road traffic noise levels across the site have been predicted using the SoundPLAN (V7.1) noise mapping software, which implements the Calculation of Road Traffic Noise (CRTN) methodology. The $L_{A10,18h}$ traffic noise levels determined by CRTN are converted within SoundPLAN to the standard European Union 12 hour day (07:00-19:00), 4 hour evening (19:00-23:00) and 8 hour night (23:00-07:00) L_{Aeq} levels using the conversion factors provided by the Transport Research Laboratory (TRL [8][9]).

For residential properties a 16 hour daytime (07:00-23:00) and 8 hour night time (23:00-07:00) period is used in PPG24. To determine a 16 hour daytime L_{Aeq} , the 12 hour day and 4 hour evening levels are logarithmically combined.

These predictions have enabled the creation of a set of noise contour maps, showing predicted daytime and night-time NEC bands across the site, due to road traffic on the main surrounding roads.

At this stage no details of the building layout, room sizes or window dimensions are available, therefore specific calculations of internal noise levels, based on the predicted external noise levels cannot be completed. However, a generic estimate of internal noise levels has been made using the BRE 'Building Envelope Insulation' spreadsheet [10] assuming a room volume of 40 m³ and façade area of 10 m² for living rooms, a room volume of 25 m³ and a façade area of 10 m² for bedrooms, 20% of the façade as windows, standard brick/block wall construction, and a reverberation time of 0.5 seconds.

3.4 Suitability for New School

The suitability of the proposed site for the new school is assessed in accordance with guidance Building Bulletin 93 (BB 93) [11]. This states that where external free-field noise levels at the location of proposed school buildings are 70 dB $L_{Aeq,30mins}$ or more it may be possible to meet the specified internal levels, but this will require considerable sound insulation, screening or barriers.

60 dB $L_{Aeq,30mins}$ free-field is recommended as an upper limit for the boundary of external areas used for formal and informal outdoor teaching and recreational areas. Though for playgrounds and playing fields a limit of 55 dB $L_{Aeq,30mins}$ is recommended, and for at least one outdoor teaching area a limit of 50 dB $L_{Aeq,30mins}$.

To determine the suitability of the location of the proposed school, the noise level based on the noise modelling are compared to the above criteria.

4. NOISE MONITORING

4.1 Overview

Unattended ambient noise measurements were undertaken continuously from 17:00, Thursday 5th May 2011 to 10:15, Tuesday 10th May 2011 at one location and from 17:30, Thursday 5th May 2011 and 19:45, Friday 6th May 2011 at a further location.

The monitoring locations are illustrated in Appendix B, Figure B.1 and are detailed below:

- Location N1 – on the northern edge of the eastern boundary, adjacent to the A671; and
- Location N2 – towards the southern edge of the eastern boundary, adjacent to the A671.

Traffic on the A671 was the dominant source of noise at the site during the day and aircraft noise was also heard. According to the EHO, aircraft noise is dominant during the night-time for quiet periods [12] and therefore the air traffic noise source category could apply during the night, which would result in higher noise levels for the corresponding NECs. However, as a conservative approach the assessment is based on the mixed source category for both daytime and night-time.

Based on observations whilst on site the NECs relating to mixed source noise are considered the most appropriate.

Photographs of the site and noise monitoring locations are presented in Appendix C.

All noise measurements were taken at approximately 1.5 metres above ground level, and located at least 3.5 metres from any vertical reflecting surface. These measures comply with the requirements of BS 7445 [13].

4.2 Instrumentation

Details of the instrumentation employed during the ambient noise survey are provided in Appendix D.

The equipment was programmed to measure various parameters, including the L_{Aeq} and L_{Amax} (slow) values, logging at contiguous periods of 15 minutes. The Calibration level of the equipment was checked prior to and after the monitoring periods – no significant changes (+/- 0.2 dB) were noted.

Calibration certificates for the noise instrumentation are available on request.

4.3 Meteorological Conditions

Weather conditions throughout the monitoring period were mixed, with occasional heavy rainfall, daytime temperatures of 12 to 15°C and little wind ($< 5 \text{ ms}^{-1}$ at all times). To ensure a worst case approach no attempt has been made to remove periods of high rainfall from the assessment.

4.4 Observations

The following observations of local noise sources were made whilst ambient monitoring was undertaken during the daytime:

- constant road traffic along A671 to the east; and
- distant aircraft noise heard.

4.5 Results

The measured noise levels were processed to provide average daytime and night-time L_{Aeq} noise levels. A summary of the measured noise levels at Locations N1 and N2, is given in Table 4.1 for both daytime (07:00 – 23:00) and night-time (23:00 – 07:00) periods.

TABLE 4.1: SUMMARY OF NOISE MEASUREMENTS (N1 AND N2)				
Location	Start Time	End Time	Daytime Noise Level $L_{Aeq,16h}$ (dB) (07:00-23:00)	Night-Time Noise Level $L_{Aeq,8h}$ (dB) (23:00-07:00)
N1	05/05/11, 17:00	10/05/11, 10:15	69	62
N2	05/05/11, 17:30	06/05/11, 19:45	54	48

As would be expected for a site of this kind, night-time noise levels are 6 to 7 dB below day-time noise levels due to a reduction in traffic flow on the A671. This is illustrated in graphical form in Appendix E, Figures E.1 and E.2.

It is considered that the measurement data obtained at the monitoring locations provide a good record of current noise levels on the eastern boundary of the proposed development site closest to the A671.

5. NOISE ASSESSMENT

5.1 PPG 24 Assessment

A summary of the measured noise levels and associated PPG24 Noise Exposure Categories (NECs) at monitoring locations N1 and N2 are given in Table 5.1 for both daytime (07:00 – 23:00) and night-time (23:00 – 07:00) periods. Noise levels have been assessed against the 'mixed source' category in PPG 24.

TABLE 5.1: SUMMARY OF MEASURED NOISE LEVELS AND RELEVANT NECs

Location	Day $L_{Aeq,16h}$ dB	NEC Day	Night $L_{Aeq,8h}$ dB	NEC Night
N1	69	C	62	B
N2	54	A	48	B

Based on the measured $L_{Aeq,16h}$ and $L_{Aeq,8h}$ data over the monitoring period, the north of the eastern boundary falls into NEC C during the daytime and NEC B at night. The south of the eastern boundary falls into NEC A during the daytime and NEC B at night.

With regards to L_{ASmax} (slow time weighting) noise levels during the night-time periods, PPG 24 states that where individual noise events exceed 82 dB L_{ASmax} several times in any hour, this should be treated as being in NEC C regardless of the $L_{Aeq,T}$ (except where the $L_{Aeq,T}$ already puts the site in NEC D). For this assessment, 'several' has been defined as 'three or more events within any given one hour period'. Details of L_{ASmax} levels are given in Table 5.2 below, together with the resultant NEC categories.

TABLE 5.2: SUMMARY OF L_{ASmax} MEASUREMENTS EXCEEDING 82 dB AND NIGHT-TIME NECs

Monitoring Location	Number of occurrences 23:00-07:00 (17 th /18 th December)		Resulting NEC Category
	Total	No. in any one hour	
N1	1	1	B
N2	0	0	B

There were no L_{ASmax} events exceeding 82 dB during any one hour during the night at location N2 and only one at location N1. Therefore, each location remains within their respective NEC categories.

To aid in the categorisation of the site into NECs the noise monitoring results have been supplemented with road traffic noise levels on the A671 and surrounding roads for the year 2012 and 2020. Appendix F contains further details of the noise model.

To establish the NECs across the empty site, noise contour plots are provided in Figures G.1 and G.2, Appendix G for the empty site based on 2012 traffic data:

- Figure G.1 for 2012 during the daytime at ground floor level.
- Figure G.2 for 2012 during the night-time at ground floor level.

The measured 2011 data has been compared to the 2012 traffic noise levels. During the daytime and night-time, the predicted traffic noise levels at ground floor level correspond well with the monitored levels (± 3 dB).

The vast majority of the empty site falls within NEC A during the daytime and NEC B at night. Only the closest approach to the A671 falls within NEC C during both the daytime and night-time.

PPG 24 states that when a site falls within NEC A, "noise need not be considered as a determining factor in granting planning permission". When in NEC B, "noise should be taken into account, and where appropriate, conditions imposed." When in NEC C, "Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise".

Therefore, as some area of the site falls within NEC B and C, mitigation will be required to ensure an adequate level of protection against noise for future residents across the site.

5.1 Noise Levels with the Development in Place

The proposed buildings on the site alter the propagation of noise across the site with buildings closest to A671, Clitheroe Road and proposed link road, providing shielding to properties located further away.

To establish the noise levels across the site with indicative buildings in place, noise contour plots are provided in Figures G.3 to G.4, Appendix G:

- Figure G.3 for 2020 during the daytime at ground floor level.
- Figure G.4 for 2020 during the night-time at ground floor level.

During the daytime and night-time period at ground floor level (Figures G.3 and G.4 respectively, Appendix G), the majority of the developed site is predicted to fall within NEC B with the exception of at the boundary fringe for a small number of proposed properties closest to Clitheroe Road and the proposed link road where it is NEC C (daytime only).

Therefore, as some area of the site fall within NEC B or C, mitigation will be required to ensure an adequate level of protection against noise for future residents across the site.

5.2 Internal Noise Levels

Noise Levels were predicted at the façades of habitable rooms within the proposed dwellings representative of those closest to the proposed link road and Clitheroe Road, shown within Appendix G based on 2020 traffic data:

- Daytime, ground floor provided in Figure G.5.
- Night-time, first floor provided in Figure G.6.

Within Figures G.5 and G.6, the habitable rooms for which alternative forms of ventilation are not required are colour coded dark green and for those where this is recommended are shown in a different colour dependent on specification.

For a typical façade the main path for noise to enter a building is through the windows.

The predicted noise levels across the site were employed to estimate indoor ambient noise levels for selected dwellings.

Calculations have been undertaken using the BRE's Acoustics Centre calculation spreadsheet for determining the sound reduction of façades and elements (Version 2.02). Calculations have been undertaken for typical sized living rooms (40m³) and bedrooms (25m³) with a reverberation time of 0.5 seconds.

The calculations conclude that the following mitigation measures are required to meet the 'good' criteria for internal noise levels within BS8233.

Daytime, ground floor (Figure G.5)

- ≤61 dB L_{Aeq,16hr} – 4/12/4 double glazing with a single hit and miss trickle vent.
- 62 to 63 dB L_{Aeq,16hr} – 10/12/6 double glazing with single hit and miss trickle vent.
- 64 to 65 dB L_{Aeq,16hr} – 10/12/6 double glazing with a single acoustic vent.
- >65 dB L_{Aeq,16hr} – 10/12/6 double glazing with passive attenuated through wall vent.

Night-Time, first floor (Figure G.6)

- ≤59 dB L_{Aeq,16hr} – 4/12/4 double glazing with a single hit and miss trickle vent.
- >59 dB L_{Aeq,8hr} – 10/12/6 double glazing with a single hit and miss trickle vent.

The specifications for the glazing used within the calculations are provided in Table 5.3.

TABLE 5.3: SOUND REDUCTION INDEX (R) OF DOUBLE GLAZING IN dB

Frequency (Hz)	125	250	500	1000	2000
4/12/4 double glazing	24	20	25	34	37
10/12/6 double glazing	26	27	34	40	38

The specifications for the ventilation used within the calculations are provided in Table 5.4.

TABLE 5.4: ELEMENT NORMALIZED LEVEL DIFFERENCE (D_{n,e}) OF VENTILATORS dB

Frequency (Hz)	125	250	500	1000	2000
Hit and miss trickle vent (4000mm ²)	34	27	37	35	34
Acoustic trickle vent (4000mm ²)	30	33	38	37	36
Passive attenuated through wall vent	39	36	36	44	52

5.3 Noise Levels in Rear Garden Areas

The Environmental Health Officer at RVBC stated that the WHO guideline level of 50 dB L_{Aeq,16h} should ideally not be exceeded in rear garden areas.

The World Health Organisation (WHO) 'Community Noise Guidelines' recommend external environmental daytime and evening limits of 55 dB L_{Aeq} or less over the 16-hour daytime period (07:00-23:00) "to avoid minimal serious annoyance", and 50 dB L_{Aeq} "to avoid minimal moderate annoyance".

A contour plot was created to show areas within the different bands for the noise levels in rear gardens at ground floor level based on 2020 traffic data, this is provided in Figure G.7, Appendix G.

Based on the illustrative layout plan given in Figure G.7, Appendix G, traffic noise levels in rear garden areas are likely to exceed the Local Authority's recommended external environmental daytime and evening limit of 50 dB $L_{Aeq,16hr}$ by up to 10 dB, closest to Clitheroe Road and the new link road.

Given the location of the site, a certain level of road traffic noise is likely to be tolerable, and this is considered acceptable. Indeed, the World Health Organisation (WHO) recommend external environmental daytime and evening limit of 55 dB L_{Aeq} over the 16-hour daytime period (07:00-23:00) "to avoid minimal serious annoyance" is not exceeded across the whole site based on the illustrative site layout.

5.4 Suitability for New School

Based on the noise modelling for the year 2020, Figure G.3, the proposed school (located on the western boundary), is predicted to achieve the guideline levels in BB 93.

The predicted noise levels at the rear of the proposed school are at or below 55 dB $L_{Aeq,16hr}$. This indicates that there is no risk of the BB93 upper limit of 70 dB $L_{Aeq,30mins}$ being exceeded. It is also highly likely that the recommended upper limit for external areas used for teaching of 60 dB $L_{Aeq,30mins}$ and 55 dB for playgrounds will be met. In addition, the area closest to the proposed school building is predicted to achieve 50 dB $L_{Aeq,16hr}$, therefore an outdoor teaching area below 50 dB, $L_{Aeq,30mins}$ is likely to be met. The proposed area designated for the new school is considered suitable.

5.5 Construction Noise

The contractor would be required to follow Best Practicable Means to reduce the noise impact upon the local community including the following:

- All construction plant and equipment should comply with EU noise emission limits;
- Proper use of plant with respect to minimising noise emissions and regular maintenance. All vehicles and mechanical plant used for the purpose of the works should be fitted with effective exhaust silencers and should be maintained in good efficient working order;
- Selection of inherently quiet plant where appropriate. All major compressors should be 'sound reduced' models fitted with properly lined and sealed acoustic covers which should be kept closed whenever the machines are in use and all ancillary pneumatic percussive tools should be fitted with mufflers or silencers of the type recommended by the manufacturers;
- Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum;
- Plant and equipment such as flat bed lorries, skips and chutes should be lined with noise attenuating materials. Materials should be handled with care and be placed, not dropped. Materials should be delivered during normal working hours;
- All ancillary plant such as generators, compressors and pumps should be position so as to cause minimum noise disturbance, i.e. furthest from receptors or behind close boarded noise barriers. If necessary, acoustic enclosures should be provided and/or acoustic shielding;

- Construction contractors should be obliged to adhere to the codes of practice for construction working given in BS 5228 and the guidance given therein regarding minimising noise emissions from the site; and
- Reference should be made to the Building Research Establishment, BRE 'Pollution Control' guidelines, Parts 1-5 [14].

6. NOISE MITIGATION MEASURES

The buildings closest to Clitheroe Road and the proposed link road will provide significant shielding to the properties further into the site as shown in Figures G3 and G4 in Appendix G.

The highest predicted façade noise levels at the proposed location of the closest new properties to Clitheroe Road/proposed link road are 67 dB, $L_{Aeq,16h}$ during the day and 60 dB $L_{Aeq,8h}$ at night.

For a typical façade, the main path for noise to enter a building is usually through the windows. An estimate of typical internal noise levels has been made using the BRE Building Envelope Insulation spreadsheet and assumptions on typical bedroom and living room sizes as outlined in the Methodology section.

It is recognised that windows are generally the main paths for external noise to enter rooms. The effective noise insulation offered depends upon the glazing design (air gap and individual glass thickness), glazing surface area per room, sealing and room ventilation.

Within Figures G.5 and G.6, Appendix G, on the indicative layout plan, the habitable rooms for which alternative forms of ventilation are not required are colour coded dark green and those where this is recommended are shown in a different colour dependent upon noise level.

The internal layout of properties that face Clitheroe Road and the proposed link road should, where possible, take into account the traffic noise levels, for example, locating non-habitable rooms such as bathrooms, kitchens and access corridors/stairs on the façade facing the road.

To further reduce noise levels within rear gardens, garden boundary fencing for proposed properties closest to Clitheroe Road and the new link road should be considered within the noise assessment for the detailed design phase.

The specification of fences of an acoustic nature within the scheme, will need to be made from close boarded wood with preferably a double staggered layer of boards, achieving a minimum superficial mass of 10 kgm^{-2} .

7. CONCLUSIONS

URS has been appointed by Commercial Estates Group to undertake a noise survey and assessment for a proposed residential development on land west of the A671 and east of Clitheroe Road in Whalley.

Noise measurements, considered to be representative of both the daytime and night-time periods, have been undertaken at the site boundary closest to the A671 with respect to the proposed new residential development.

The assessment is based upon the results of the noise survey and the prediction of noise levels across the site due to traffic noise on surrounding roads.

The proposed buildings on the site alter the propagation of noise across the site with buildings closest to Clitheroe Road and the proposed link road providing shielding to properties located further away.

The majority of the proposed developed site based on 2020 traffic data falls within NEC B during the daytime and night-time. The boundary fringe of a small number of properties closest to Clitheroe Road and the proposed link road fall within NEC C during the daytime.

Noise levels were predicted at the façades of dwellings indicated on the illustrative plans (outline application) representative of those closest to Clitheroe Road and the proposed link road. The results of the modelling show that the use of high specification double glazing and alternative forms of ventilation may be required for living rooms, standard double glazing and standard trickle vents will suffice for bedrooms, to ensure the 'good' criterion within BS 8233 is met.

However, the World Health Organisation (WHO) recommended external environmental daytime and evening limit of 55 dB L_{Aeq} over the 16-hour daytime period (07:00-23:00) "to avoid minimal serious annoyance" was not exceeded across the majority of the site. These levels do not consider the implementation of mitigation measures, for example garden fences or walls. Therefore a carefully designed layout at the Reserved Matters stage should ensure the Council's desired external private garden areas noise exposure limits are not exceeded.

The assessment at the site has indicated that noise levels can be suitably mitigated in order to achieve the Council's requirements to provide adequate protection for future residents. However, to further reduce noise levels within rear gardens, garden boundary fencing for proposed properties closest to Clitheroe Road and the new link road should be considered within the noise assessment for the detailed design phase.

Based on the noise modelling, the proposed area designated for the new school is considered suitable, meeting the requirements of BB93.

8. REFERENCES

- 1 National Planning Policy Framework, Department for Communities and Local Government, March 2012.
- 2 *Guidelines for Community Noise*, 1999. World Health Organisation.
- 3 British Standard BS 8233: 1999 'Sound Insulation and Noise Reduction for Buildings – Code of Practice'. British Standards Institute.
- 4 Planning Policy Guidance: *Planning and Noise PPG 24*, Department of the Environment, September 1994.
- 5 Noise Policy Statement for England (NPSE), Defra, 2010.
- 6 Email from James Russell at Ribble Valley Borough Council to Robert Colder of URS Scott Wilson Ltd, 16/05/2011.
- 7 Control of Pollution Act 1974. London: HMSO.
- 8 TRL (2002) *Converting the UK traffic noise index $L_{A10,18h}$ to EU Noise Indices for Noise Mapping*, TRL Report PR/SE/451/02.
- 9 TRL (2006) *Method for converting the UK road traffic noise index $L_{A10,18h}$ to EU Noise Indices for road noise mapping*, TRL Report st/05/91/AGG04442.
- 10 Building Research Establishment (2004). Building Envelope Insulation spreadsheet v2.02.
- 11 Department for Education and Skills (2003) Building Bulletin 93 (BB93) 'Acoustic Design of Schools'.
- 12 Telephone conversation between James Russell at Ribble Valley Borough Council and Robert Colder of URS Scott Wilson Ltd, 16/05/2011.
- 13 BS 7445: 2003: Description and measurement of environmental noise. British Standards Institute.
- 14 Building Research Establishment 2003 '*Controlling Particles, Vapour and Noise Pollution from Construction Sites*. Parts 1-5.

APPENDIX A: NOISE PERCEPTION AND TERMINOLOGY

Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascal's, Pa). Because of this wide range a noise level scale based on logarithms is used in noise measurement called the decibel (dB) scale. Audibility of sound covers a range of approximately 0 to 140 dB.

The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure noise is weighted to represent the performance of the ear. This is known as the 'A weighting' and annotated as dB (A). Table A1 below lists the sound pressure level in dB (A) for common situations.

TABLE A1: SOUND PRESSURE LEVELS FOR A RANGE OF SITUATIONS	
Typical Noise Levels dB(A)	Example
0	Threshold of hearing
30	Rural area at night, still air
40	Public library Refrigerator humming at 2m
50	Quiet office, no machinery Boiling kettle at 0.5m
60	Normal conversation
70	Telephone ringing at 2m Vacuum cleaner at 3m
80	General factory noise level
100	Pneumatic drill at 5m
120	Discotheque - 1m in front of loudspeaker
140	Threshold of pain

The noise level at a measurement point is rarely steady, even in rural areas, and varies over a range dependent upon the effects of local noise sources. Close to a busy road, the noise level may vary over a range of 5 dB(A), whereas in a suburban area this may increase up to 40 dB(A) and more due to the multitude of noise sources in such areas (cars, dogs, aircraft etc.) and their variable operation. Furthermore, the range of night time noise levels will often be smaller and the levels significantly reduced compared to daytime levels.

The equivalent continuous A-weighted sound pressure level, L_{Aeq} , is the single number that represents the average sound energy measured over that period. The L_{Aeq} is the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period.

Human subjects are generally only capable of noticing changes in steady levels of no less than 3 dB(A). It is generally accepted that a change of 10 dB(A) in an overall, steady noise level is perceived to the human ear as a doubling (or halving) of the noise level. (These findings do not necessarily apply to transient or non-steady noise sources such as changes in noise due to changes in road traffic flow, or intermittent noise sources).

The L_{ASmax} measurement parameter is the maximum instantaneous sound pressure level attained during the measurement period (30 seconds, 5 minutes etc.), measured on the 'slow' response setting of the sound level meter. Even though sounds appear fairly steady to the human ear they are seldom if ever steady in level. To accommodate this factor, sound level meters (SLMs) are generally provided with at least two meter responses or exponential averaging circuits. Fast meter response has a time constant of 1/8th of a second (125ms) and approximates the integration time of human hearing. The slow time response (time constant = 1 second) is intended to obtain an approximate average value of rapidly fluctuating levels from simple meter readings. This is used during the application of noise exposure categories, during night time periods within PPG24.

APPENDIX B: NOISE MONITORING LOCATIONS/SITE PLAN



Figure B.1: Development Site Boundary and Noise Monitoring Locations N1 and N2

APPENDIX C: SITE PHOTOGRAPHS

Figure C.1 View South from Near Location N1



Figure C.2 View East from Location N2

APPENDIX D: NOISE MONITORING DETAILS

Instrumentation

The following instrumentation was employed during the noise survey for which calibration certificates can be supplied on request:

- Location N1:
Norsonic 140 integrated sound level meter, s/n 1403909;
- Location N2:
Norsonic 140 integrated sound level meter, s/n 1403883; and
- Brüel and Kjær acoustic calibrator 4231, serial number 2217876.

Meteorological Conditions

TABLE D1: METEOROLOGICAL CONDITIONS				
Date	Average Temp °C	Average Wind Speed ms ⁻¹	Wind Direction	Precipitation cm (sum)
05/05/2011	12	2	SE	0.1
06/05/2011	15	2	SE	0.2
07/05/2011	15	3	E	1.2
08/05/2011	14	3	S	0.4
09/05/2011	12	2	SE	0.2
10/05/2011	12	3	SW	0.5

APPENDIX E: NOISE PLOTS

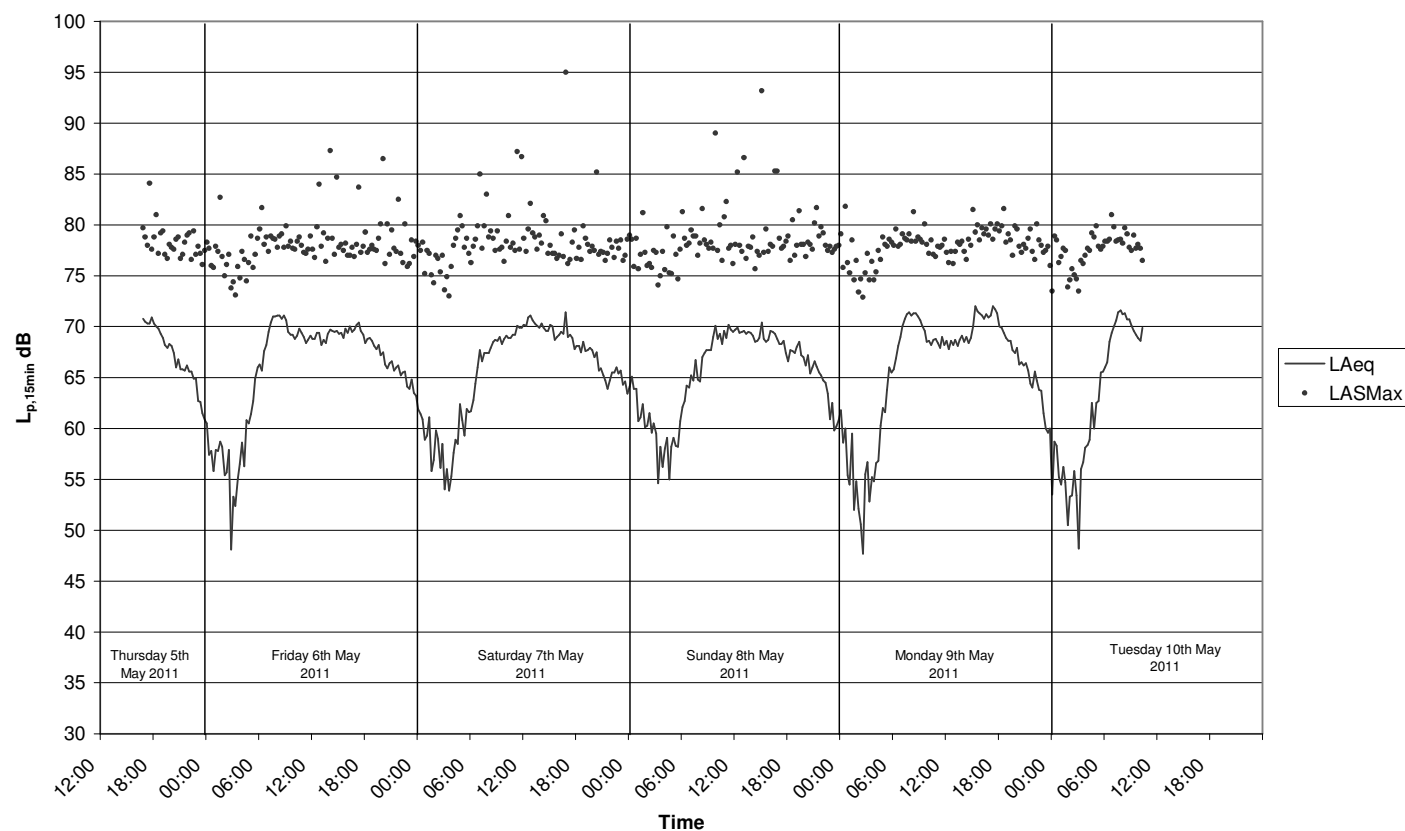


Figure E.1: Monitoring Location N1

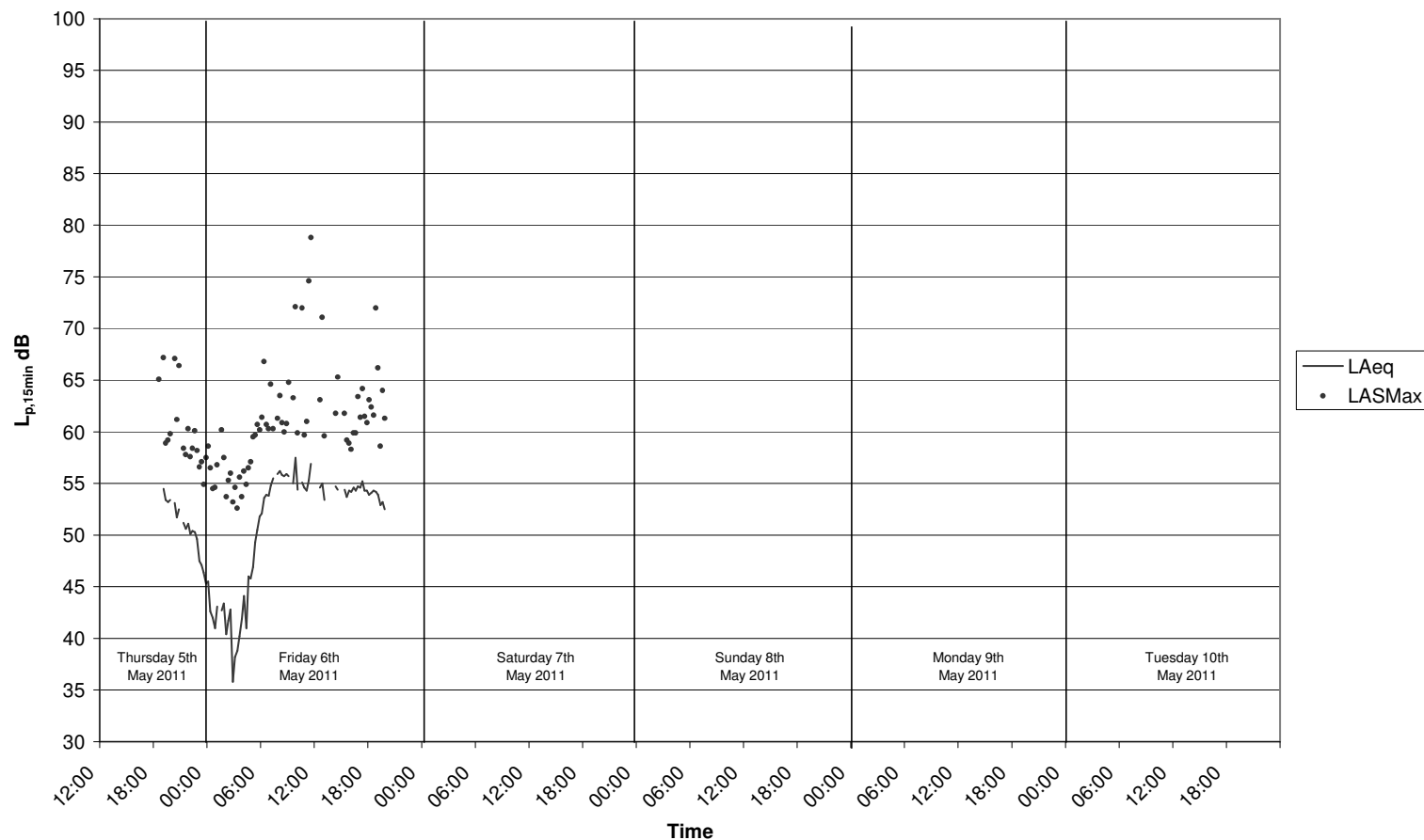


Figure E.2: Monitoring Location N2

APPENDIX F: NOISE MODELLING DETAILS

Road traffic flow data 18hr flow for the year 2012 base and 2020 with development from Bryanghall (via email from Alex McGarrell to Robert Colder on 01/02/2013). The traffic data used within the assessment is provided in Appendix H.

Details

Commercially available 2 m ground contour data has been sourced from eMapSite.com

Existing and proposed buildings on around the site assumed to be at a height of 6m for two storeys.

Order of Reflections = 3

CRTN prediction methodologies

Grid height = 1.5 metres for ground floor height and 4 metres for first floor height.

The following data sources were used in setting up the noise model:

- OS base mapping: 20100902171200_41928576_os-detail-12-month-licence-ibu.dxf
- Ground heights on current site and in the wider area: 1m_Contours.shp purchased from emapsite 13/05/11.
- Planning Layout in dwg format: latest masterplan REV B.dwg

Ground absorption (0= hard, 1 = soft):

- Wider area = 0.6.
- On site proposed = 0.5.
- On site current = 1
- Road surfaces = 0.

APPENDIX G: NOISE MODEL OUTPUTS

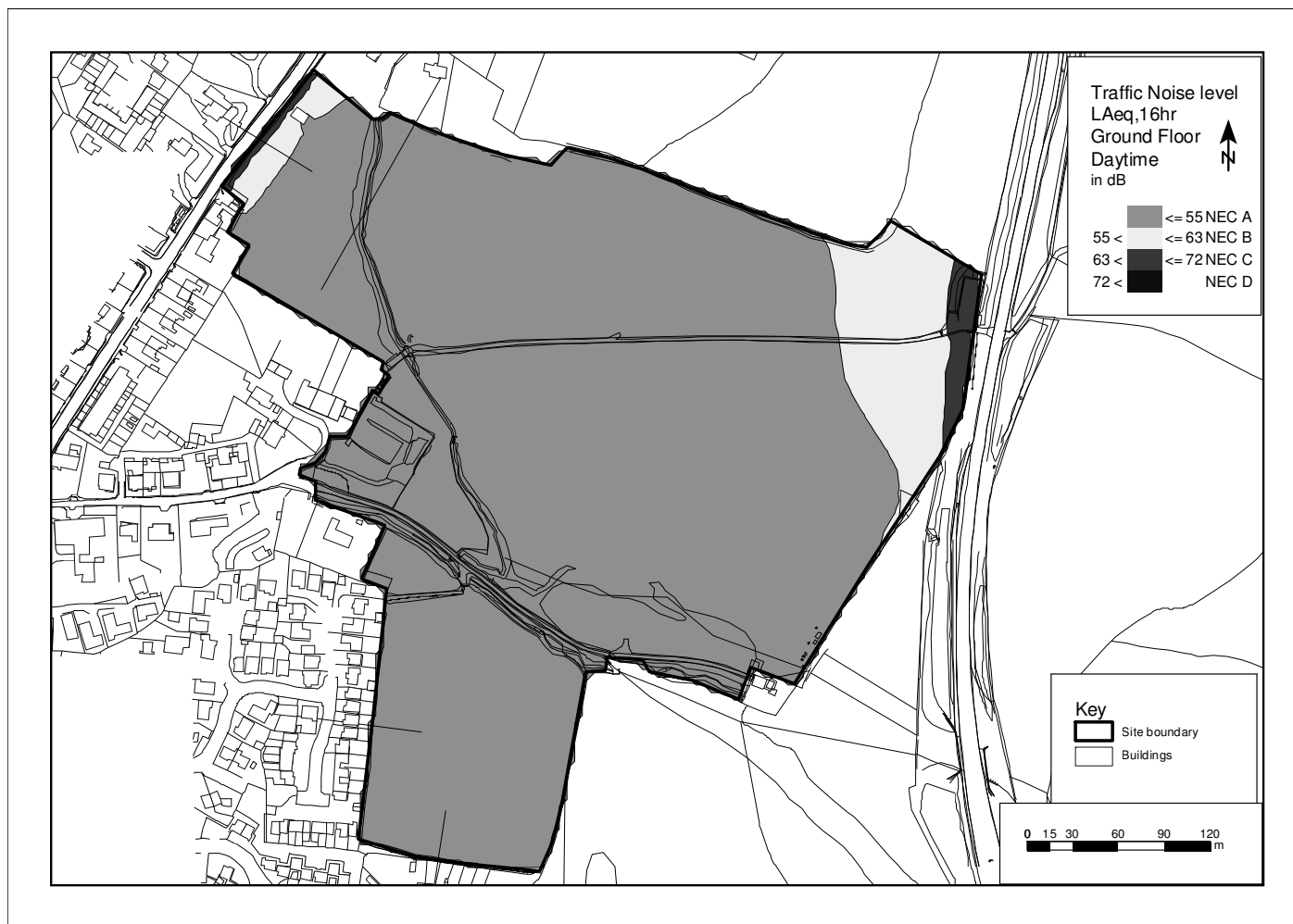


Figure G.1: Noise Level Contours for the Empty Site, Daytime $L_{Aeq,16hr}$ at Ground Floor Level, 2012

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Figure G.2: Noise Level Contours for the Empty Site, Night-Time $L_{Aeq,8hr}$ at Ground Floor Level, 2012
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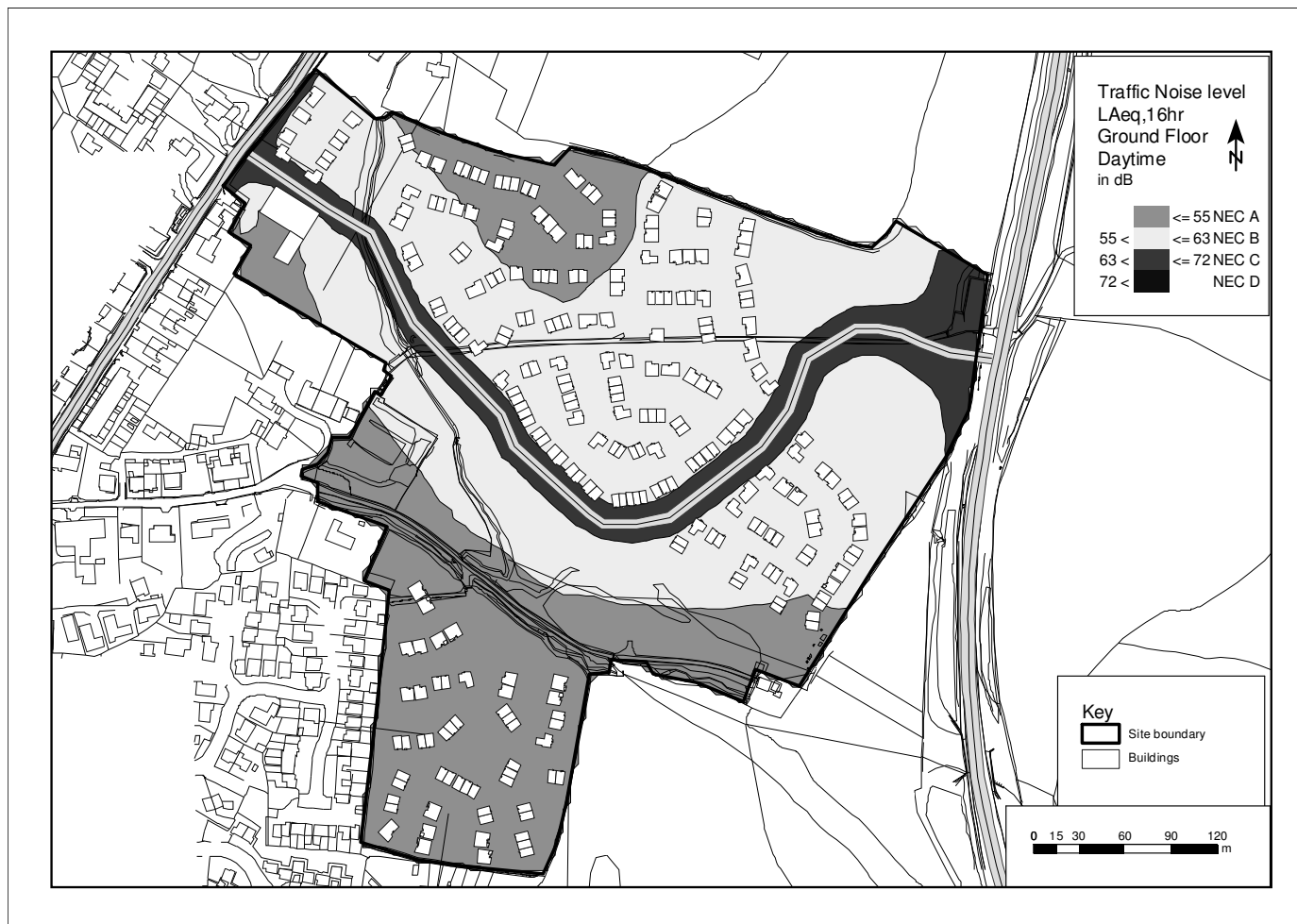


Figure G.3: Noise Level Contours for the proposed site, Daytime $L_{Aeq,16hr}$ at Ground Floor Level, 2020

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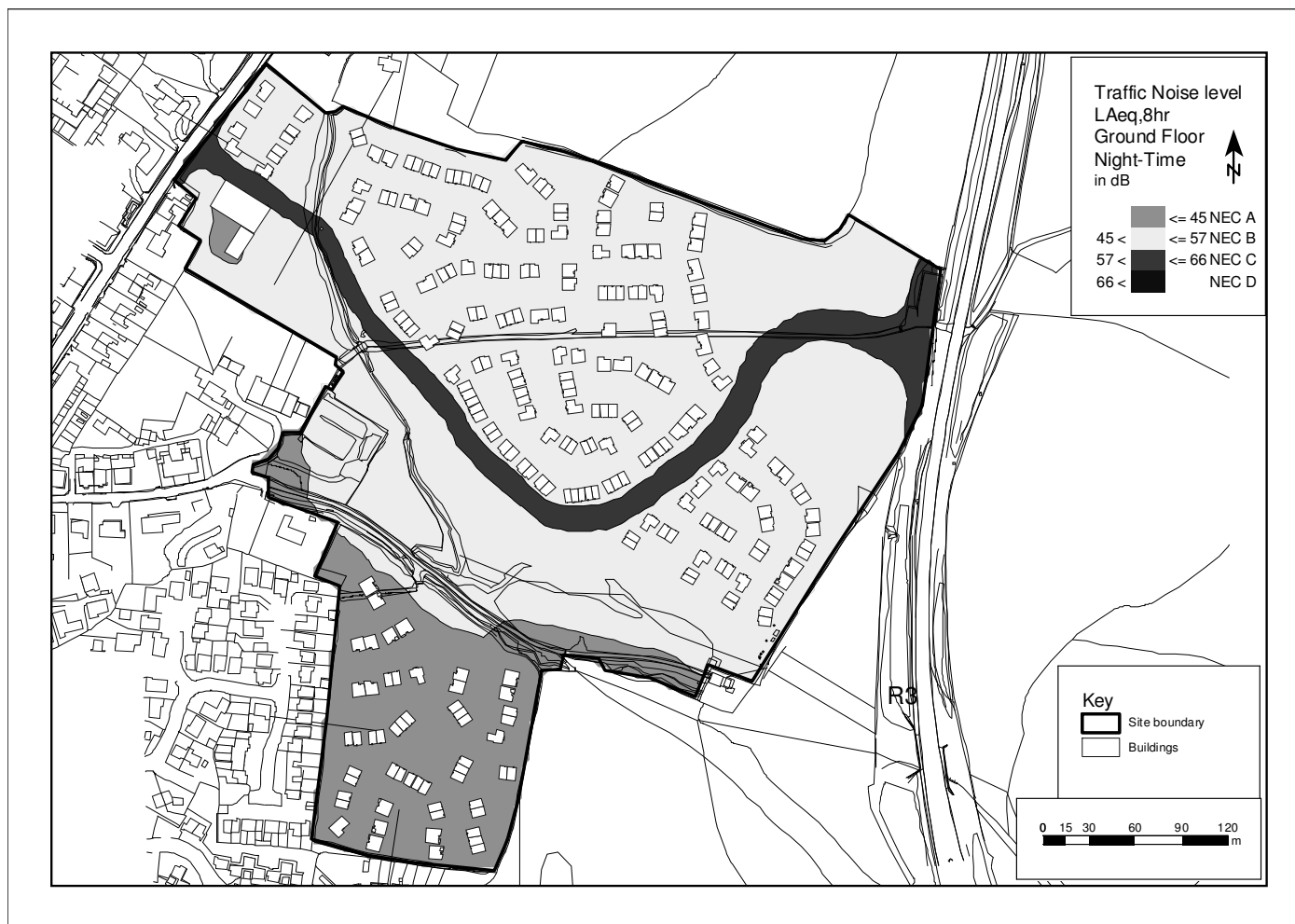


Figure G.4: Noise Level Contours for the Proposed Site, Night-Time $L_{Aeq,8hr}$ at Ground Floor Level, 2020

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NOISE ASSESSMENT

February 2013

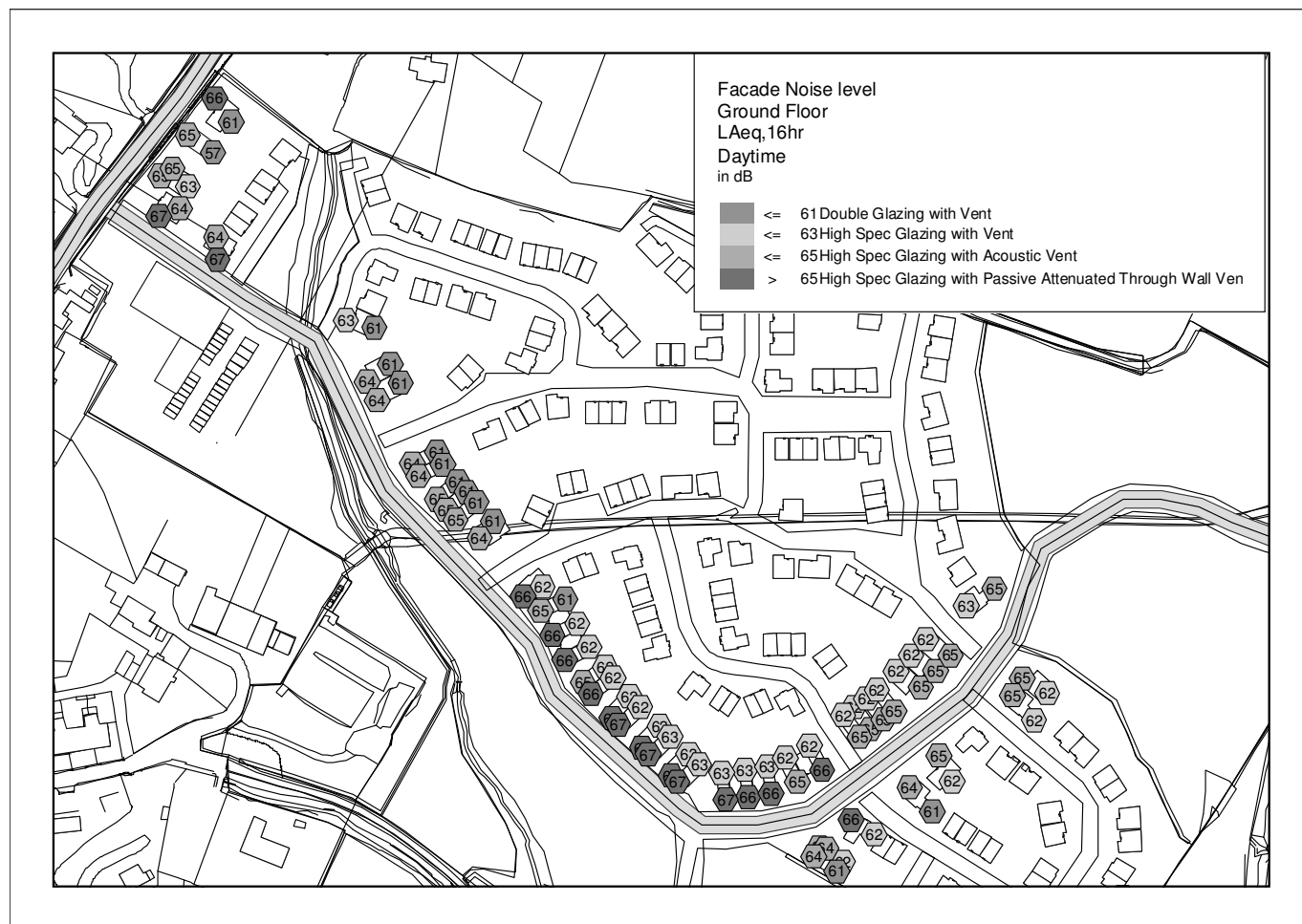


Figure G.5: Façade Noise Levels, Daytime $L_{Aeq,16hr}$ at Ground Floor Level, 2020

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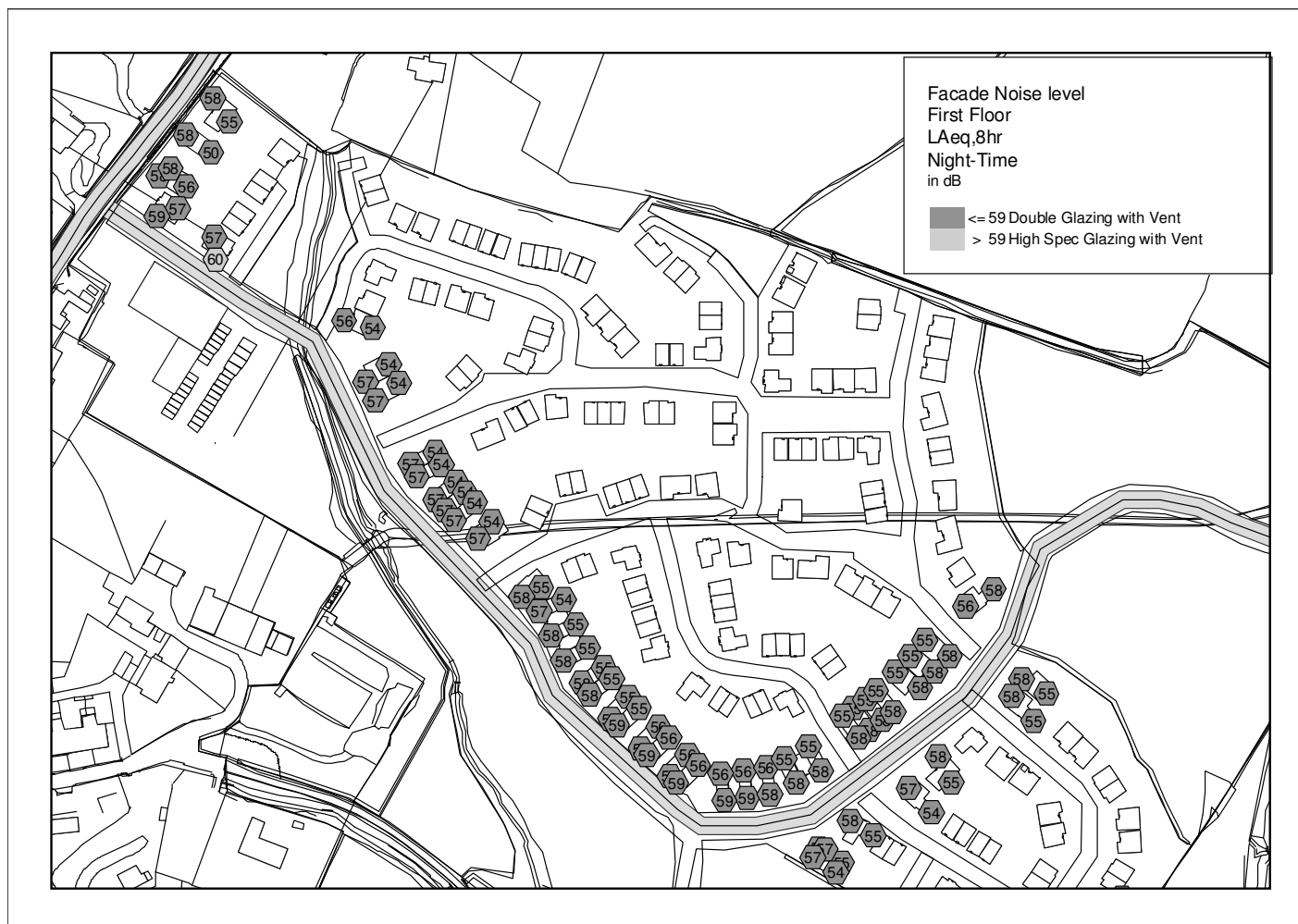


Figure G.6: Façade Noise Levels, Night-Time $L_{Aeq,8hr}$ at First Floor Level, 2020

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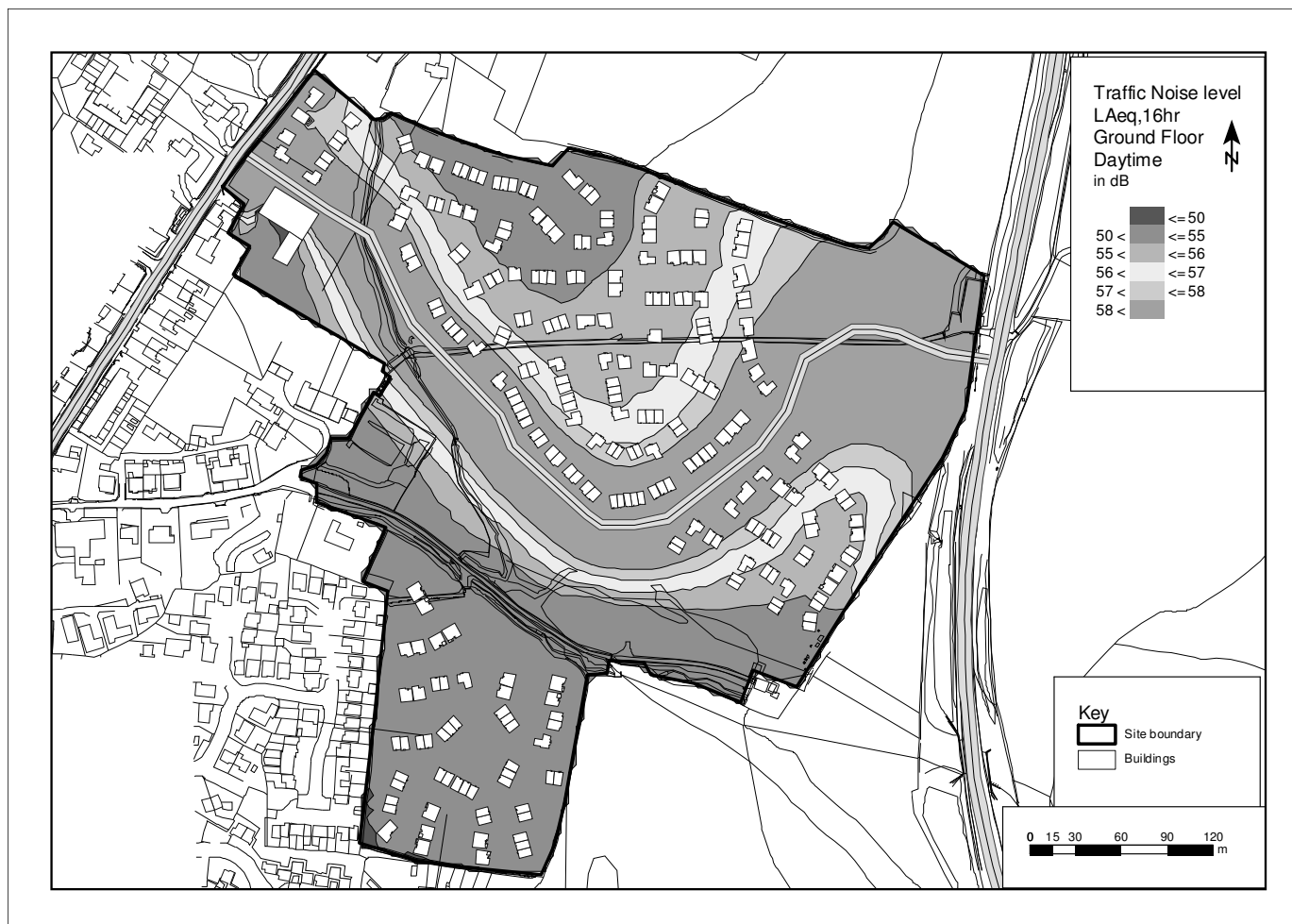


Figure G.7: Noise Level Contours for Proposed Site, Daytime $L_{Aeq,16hr}$ at Ground Floor Level in Rear Garden Areas, 2020
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APPENDIX H: TRAFFIC DATA

TABLE H1: ROAD TRAFFIC DATA (TWO WAY)				
Road	Year	18hr AAWT	%HGVs	Speed (MPH)
A671 Easterly Bypass (north)	2012 Base	13132	5	60
	2020 Development	14721	5	60
A671 Easterly Bypass (South)	2012 Base	11927	5	60
	2020 Development	15744	5	60
A761 Accrington Road	2012 Base	18691	5	60
	2020 Development	20935	1	60
B6246 Accrington Road	2012 Base	7753	6	30
	2020 Development	5924	6	30
A59 (west)	2012 Base	13872	5	70
	2020 Development	15008	5	70
A59 (east)	2012 Base	21926	4	70
	2020 Development	24236	4	70
Wiswell Lane	2012 Base	3700	3	30
	2020 Development	2441	3	30
Clitheroe Road	2012 Base	6359	4	30
	2020 Development	8609	4	30
Link Road	2012 Base	-	-	-
	2020 Development	5356	4	30
B6246 Station Road	2012 Base	9036	5	30
	2020 Development	10493	5	30
B6246 King Street	2012 Base	8278	3	30
	2020 Development	9475	3	30