

PROPOSED RESIDENTIAL DEVELOPMENT CHAIN ROAD, MANCHESTER

Noise Impact Assessment

Prepared for: Great Places Housing Group Limited

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1.0 Introduction

SLR Consulting Limited (SLR) have been appointed by Great Places Housing Group Ltd (GPHG) to undertake a noise impact assessment for a proposed residential development on the corner of Chain Road and Victoria Avenue in Blackley, Manchester (the Site).

This noise impact assessment has been provided to support a full planning application with Manchester City Council (MCC) for residential development of the Site to include thirty-two new residential plots in total; consisting of six blocks of traditional housing and single block of flats.

The proposal for new residential housing has introduced a noise sensitive development near existing road traffic routes. This report has been prepared to assess the impact of transportation noise on the proposal, relevant to overarching national and local policy requirements relating to noise impacts.

Whilst reasonable effort has been made to make this report easily understandable, it is technical in nature. To assist the reader, a glossary of acoustic terminology has been included in Appendix 01.

2.0 Site Description

2.1 Development Site

The development site has been identified as a roughly triangular area of land at the junction of Victoria Avenue and Chain Road in Blackley, Manchester. The A6104 Victoria Avenue describes the southern boundary, with Chain Road running across the north of the site from their adjoining T-junction to the east. Existing residential dwellings along Victoria Avenue and Alnwick Road have been noted to define respective south western and western boundaries of the development land. The M60 Manchester Outer Ring road has been noted nominally 300 m north east of the site beyond existing residential streets of Blackley.

It has been ascertained that The Lion & Lamb public house used to occupy the site, whose address was formerly listed as 68 Victoria Avenue. Any associated building has since been demolished, leaving the west portion of the site of unused hardstanding and carparking, with bell mouth access from Chain Road. The central portion of the site along Victoria Avenue and adjacent to No. 70, has been noted as unused and overgrown land. Both areas have been bounded to the east by a footpath running between Victoria Avenue and Chain Road. The remaining triangular area of land on the end road junction of Victoria Avenue and Chain Road has been noted as open and maintained grassland.

2.2 Proposed Use of Site

The planned proposal has been noted to include the following schedule of accommodation to include the addition of 32 No. residential plots:

- Block 1 / Plots 1-4 – terrace of 4 No. two-storey, three-bedroom capacity dwelling houses along Victoria Avenue.
- Block 2 / Flats 1-20 – three-story building of 20 No. flats (comprising 15 No. two-bedroom and 5 No. one-bedroom) with centrally located communal access, at the corner of Victoria Avenue and Chain Road.
- Block 3 / Plots 5-6 – an L-shaped semi-detached pair of 2 No. two-storey, three-bedroom capacity dwelling houses along Chain Road.
 - Plots 11-12 handed in the opposite direction in the north west corner along Chain Road.
- Block 4 / Plots 7-8 - semi-detached pair of 2 No. two-storey, three-bedroom capacity dwelling houses along Chain Road.
- Block 5 / Plots 9-10 - semi-detached pair of 2 No. two-storey, four-bedroom capacity dwelling houses along Chain Road.

Site access is to be improved from the existing bell mouth along Chain Road, allowing a single and central access route into the development. Car parking has been included within the proposal to facilitate 14 No. spaces for flats (70 %) and 12 No. for dwellings (100 %) with a designated parking area in the south west corner of the site.

All residential dwellings have been noted to include rear-facing garden areas allowing Block frontages to both Victoria Avenue and Chain Road. The proposed arrangement of housing has been noted to align with the typical layout of residential dwellings in the local area.

The proposed layout of the Site has been included within Figure 2-1.

Figure 2-1
Proposed Site Layout



2.3 Noise Generated Outside of the Development

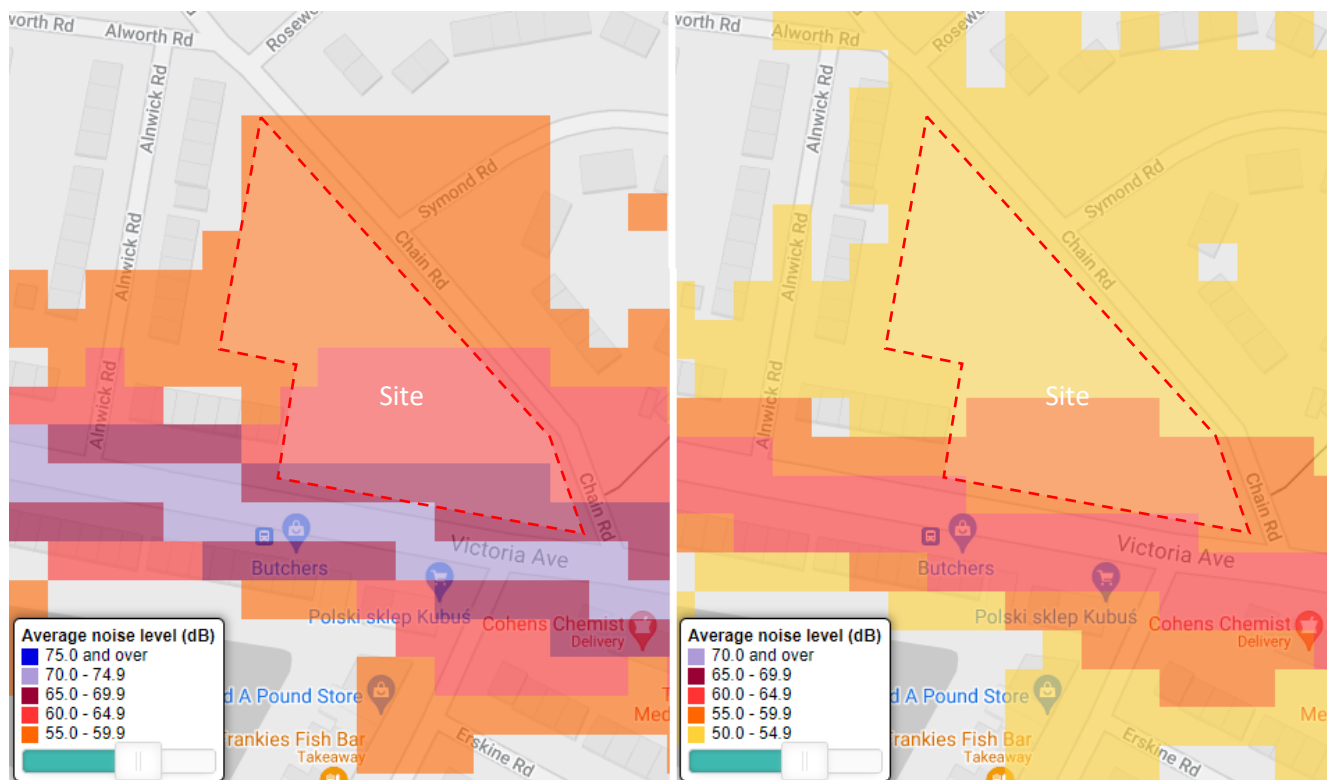
The most significant environmental noise source incident on the development land has been considered as road traffic from the A6104 Victoria Avenue to the south and to a lesser extent, Chain Road to the north. The M60 Motorway has also been noted nominally 300 m north east and where banked and screened immediately north of Junction 20, it has been prospectively considered of lesser importance compared to locally passing roads.

There have been no identifiable commercial, industrial or entertainment-based noise sources incident on the development land to consider for noise impact assessment.

Indication of site-wide sound levels from 2017 strategic noise maps of England¹, following the Environmental Noise Directive (END) 2002/49/EC, have indicated the A6104 Victoria Avenue as dominant on the development land. Road traffic noise levels of 65 – 70 dB $L_{Aeq, 16h}$ daytime and 60 dB $L_{Aeq, 8h}$ night have been approximated at the proposed line of housing of Victoria Avenue, falling approximately 10 dB to the north at Chain Road.

¹ <http://www.extrium.co.uk/noiseviewer.html>

Figure 2-2
Indicative Road Traffic Noise Exposure, Day dB L_{Aeq} , 16 h and Night dB L_{Aeq} , 8 h



3.0 Guidance

3.1 Manchester City Council Planning & Noise Technical Guidance (2015)

This local technical guidance document has been aimed at applicants, developer and acoustics consultants to provide advice in relation to noise in a planning context to encourage good acoustic design. It outlines what is expected for development within the City of Manchester so that new development can achieve the highest possible standard without compromising the health and wellbeing of people.

Under the subheading of residential developments, it has been noted that Manchester City Council has adopted the following internal ambient noise limits for residential properties:

- Bedrooms (night time 23:00 – 07:00) 30 dB $L_{Aeq, T}$.
 - With individual noise events not normally exceeding 45 dB $L_{Amax, F}$ by more than 15 times.
- Living Rooms (daytime 07:00 – 23:00) 35 dB $L_{Aeq, T}$.
- Gardens and terraces (daytime) 55 dB $L_{Aeq, T}$.

To achieve good acoustic design a sequential approach has been encouraged early in the development process, by assessing the site, determining the Council's noise level requirements, commensurate sound insulation and/or noise control measures as well as quality control and good workmanship.

The following information has been read as essential to include within a noise report.

- A statement of the reason for and scope of the report.
- Details of the proposed development to which the report relates.
- A location and development plan.
- A description of the area and environment surrounding the development site.
- The methodology used to carry out the noise survey including the monitoring locations, equipment used and detail of last calibration, weather conditions at time of site survey.
- Full table of results.
- Assessment of the results in accordance with the relevant standard and policies.
 - This must include the City Council's noise level design criteria.
- Recommendations for noise control measures if needed.
- Full calculations of the noise reductions expected to support and suggested control measures.

The guidance has provided a full explanation to the requirements for noise surveying as well as those associated with good acoustic design. Measures to deal with noise reduction have been advocated to include building orientation, screening, layout and design; beyond façade treatments including windows, doors and ventilation.

It has been observed that where the guidance was provided by Manchester City Council in 2015, updated industry guidance has subsequently been published to assist planning and noise related matters for residential development.

3.2 ProPG: Planning & Noise (2017)

ProPG: Planning & Noise – Professional Practice Guidance on Planning & Noise, New Residential Development was developed by a working group consisting of representatives from the Association of Noise Consultants (ANC), Institute of Acoustics (IOA), Chartered Institute of Environmental Health (CIEH) and practitioners from a planning and local authority background.

This guidance was made effective in May 2017 to provide a recommended approach to the management of noise within the planning system in England. It has drawn upon legislation, guidance and standards available at the time of publication to reflect the Noise Policy Statement for England (NPSE), the National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG-Noise) and other authoritative sources of guidance.

ProPG has been noted to advocate two sequential stages covering an ‘initial noise risk assessment’ at Stage 1 then a ‘full assessment’ at Stage 2 considering four key elements.

- Element 1 – Good acoustic design process.
- Element 2 – Internal noise level guidelines.
- Element 3 – External amenity area noise assessment.
- Element 4 – Assessment of other relevant issues.

The scope of ProPG considers new residential development that will be predominantly exposed to airborne noise from transportation sources. In cases where the site is exposed to noise of an industrial and/or commercial nature, this shall be considered at Stage 1 of the ProPG approach.

ProPG has provided a summary of internal noise level guidelines as part of Stage 2 assessment requirements. These guidelines values have been derived from British Standard BS 8233:2014 *Guidance on Sound Insulation and Noise Reduction for Buildings* and *The World Health Organisation Guidelines for Community Noise (1999)*.

Table 3-1
ProPG Internal Ambient Noise Levels, dB

Activity	Location	07:00 to 23:00 dB LAeq, 16 h	23:00 to 07:00 dB LAeq, 8 h
Resting	Living room	35	-
Dining	Dining room/area	40	-
Sleeping (daytime resting)	Bedroom	35	30 45 dB LAmax(F) ¹
¹ Not normally exceeded more than 10 times per night.			

3.3 Acoustics Ventilation and Overheating Guide (2020)

The AVO Guide has been published for application by practitioners when following Stage 2 Element 1 of good acoustic design within ProPG. This extended guidance document has aimed to assist designers to adopt an integrated approach to the acoustic design within the context of the ventilation and thermal comfort requirements.

It has been acknowledged from the AVO guide that there is a need to address how the ventilation strategy and overheating mitigation impacts of the impacts on the acoustic conditions and whether a more-informed strategy is required in the mitigation of overheating.

4.0 Environmental Survey Summary

To establish the prevailing sound climate at the Site, a baseline survey was undertaken over a weekday period on Tuesday 17th August 2021. The survey methodology and results have been set out below.

4.1 Baseline Survey Methodology

An attended monitoring program was undertaken on the development land space to appraise the exposure to road traffic noise during day and night time periods.

An in-situ review was taken as to the security of the site and ability to leave measurement equipment unattended for the purposes of baseline surveying. With the site being completely open in nature, it was not viewed to be conducive to unattended surveying for a continuous period of 24-hours due to full visibility of proposed equipment. There was viewed to be limited options on this site, whereby a shortened method has been applied but developed to consider measurements during day and night time periods.

The primary methodology adopted for this site has followed TRL², specifically Method 3 and CRTN³ to provide values of dB L_{A10, 18h}, converting day and night indices from short term measurements. This approach has been acknowledged to rely upon the assumption that different road types will, on average, provide a consistent diurnal flow pattern. If significant deviations occur from expected conditions, such as very low flows on non-motorway roads during the night, then it has been acknowledged that errors in conversion may result.

Another limitation of predicting long term exposure from a short-term method has been with the assessment of maximum sound levels. Fundamentally, there would be errors in appraising *typical* maximum sound level exposure during the night, while only using measurements obtained during the day. The above-listed shortened method does not account for this acoustic metric, which can be critical in acoustic design in terms of instantaneous sounds from passing traffic and where residential development has been proposed in proximity.

To overcome limitations of a shortened measurement approach during the daytime, this study has assumed additional measurements within the early morning period as to inform the typical dB L_{Aeq, 1 h} and L_{Amax(F)} values. The assumption has been made that a rise in environmental noise levels as normally seen within the early morning period 06:00 – 07:00, such that measurements during this time would tend towards the worst case. This additional measurement has enabled a comparison between the measured dB L_{Aeq, 1 h} 06:00 – 07:00 and predicted dB L_{Aeq, 8 h} 23:00 – 07:00 values for night time assessment.

It has otherwise been recognised that results from road traffic noise exercises^{4, 5} have indicated the magnitude of uncertainty from short-term road traffic measurement of dB L_{Aeq, 1 h} at ± 4.2 dB with a 95 % confidence level. The largest contributor to measurement uncertainty has been acknowledged as meteorological effects on propagation, rather than from the properties of the source itself.

While no consultation has been attempted with MCC in the adoption of this method, there has been very limited options available in the monitoring of road traffic noise incident on the site. Only attended measurements have been considered possible whereby the typical limitations and uncertainties associated with the available method has been duly explained.

² Abbot, P. G. & Nelson, P. M. Converting the UK traffic noise index L_{A10, 18h} to EU noise indices for noise mapping. TRL Limited project report PR/SE/451/02. Prepared for DEFRA, 2002.

³ The Calculation of Road Traffic Noise, CRTN. Department of Transport Welsh Office, 1988.

⁴ Alves, S. & Waddington, D. Estimation of uncertainty using revised draft ISO 1996-2. Acoustics Bulletin March/April 2014.

⁵ Craven, N.J. & Kerry, G. A good practice guide on the sources and magnitude of uncertainty arising in the practical measurement of environmental noise. The University of Salford, 2007.

4.2 Equipment and Measurements

Sound pressure level measurements were carried out using the following equipment listed in Table 4-1, confirming to Class 1 acoustic accuracy for sound level meters and matched calibrators.

The sound level meters were calibrated before the measurements using the handheld acoustic calibrator and the calibration was checked upon completion of the survey. No significant drift was observed with calibration offsets of ≤ 0.2 dB. The calibration chain of equipment has been maintained as traceable via the United Kingdom Accreditation Service (UKAS) to National Standards, no greater than one year for sound calibrators and two years for sound level meters.

Table 4-1
Sound Monitoring Equipment

Location	Description	Serial No.
Location 1 Victoria Avenue	Cirrus CR:171B Sound Level Meter	G079816
	Cirrus CR:515 Acoustic Calibrator	81268
Location 2 Chain Road	Cirrus CR:171B Sound Level Meter	G300561
	Cirrus CR:515 Acoustic Calibrator	87922

Sound pressure levels were measured in free field conditions at the following locations during the survey:

- Location 1: at the proposed location of Block 1 / Plot 1-4 south façade, 1.5 m above ground and 6 m from the kerb of Victoria Avenue.
- Location 2: at the proposed location of Block 3 / Plot 5-6 north façade, 1.5 m above ground and 6 m from the kerb of Chain Road.

The monitoring protocol at measurement Positions 1 and 2 consisted of entirely attended readings over the survey period.

The following noise level indices were recorded:

- $L_{Aeq, T}$ – The A-weighted equivalent continuous noise level over the measurement period.
- $L_{A90, T}$ – The A-weighted noise level exceeded for 90% of the measurement period.
- $L_{A10, T}$ – The A-weighted noise level exceeded for 10% of the measurement period.
- $L_{Amax(F)}$ – The maximum A-weighted noise level during the measurement period.

4.3 Sound Climate

Where attended monitoring was carried out, a full witnessed log of events has been obtained to describe main sound sources incident on the site during times of site attendance. These have included notes by the surveyor that:

- During the early morning, a distant rumble of the M60 was dominant, prior to an increase in road traffic along Victoria Avenue and to a lesser extent, along Chain Road.
- During the daytime, road traffic noise along Victoria Avenue was constant and dominant across the development site.
- The nature of incident sources has been confirmed as road traffic with Victoria Avenue prevailing as dominant. This included the general passing of vehicles including buses, lorries, cars, vans and tractors.
 - Other sources were noted from operating refuse vehicles, nearby pedestrian traffic light crossing as well as distant construction works over 200 m away along Victoria Avenue.

The weather during the survey period was deemed acceptable for sound monitoring with temperatures approximately 14-16 °C with a light breeze averaging less than 2 ms⁻¹. Ground conditions at the time of assessment were notably damp with periods of light rainfall about the beginning and end of the surveying period.

4.4 Baseline Survey Results

A full list of survey results has been provided within Appendix 03 of this report. Summaries for the purposes of assessment have been in terms of ranges within Table 4-2 and derived period averages within Table 4-3.

Table 4-2
Range of Free-Field Measured Noise Levels, dB

Location	Period	Time	L _{Aeq, 1 h}	L _{A90, 1 h}	L _{A10, 1 h}	L _{Amax(F), 1 min}
1	Part Day	10:00 – 13:00	67	55 – 56	71 – 72	69 – 87
	Part Night	06:00 – 07:00	65	52	69	54 – 88
2	Part Day	10:00 – 13:00	59	54	61 – 62	55 – 83
	Part Night	06:00 – 07:00	56	52	57	52 – 77

Table 4-3
Derived Free-Field Noise Levels, dB

Location	Period	Time	L _{Aeq, T}	L _{Amax(F)}
1	Day	07:00 – 23:00	68	-
	Night	23:00 – 07:00	59	77
2	Day	07:00 – 23:00	58	-
	Night	23:00 – 07:00	51	68

Summary observations have been made between day and night time sound levels in Tables 4-2 and 4-3, as well as Figure 2-2. It has been noted that:

- Position 1 and 2 daytime sound levels showed good correlation with period values expected in the range of 65 – 70 dB $L_{Aeq, 16 h}$ at Position 1 and generally 10 dB less at Position 2. Respective daytime values of 68 dB and 58 dB $L_{Aeq, 16 h}$ at Positions 1 and 2 have been taken as representative for assessment.
- Night time sound levels have indicated potential differences between measured dB $L_{Aeq, 1 h}$ data and derived dB $L_{Aeq, 8 h}$ results. A difference of 5-6 dB has been noted with an assumption of non-motorway traffic representing a typical diurnal pattern, as aligning with a similar method used within Figure 2-1.

It can be evidenced through continuous noise assessment⁶ as accepted for planning permission along Victoria Avenue, that a typical diurnal pattern would be expected, noted of approximately 67 dB $L_{Aeq, 16 h}$ daytime falling to 59 dB $L_{Aeq, 8 h}$ (and 78 dB $L_{Amax(F)}$) at night; as approximating values seen at Position 1 in Table 4-3. Where no reliance has been placed on this reference, a precautionary approach has been to consider at least 3 dB above the night time predictions as to ensure that average equivalent levels have not been underestimated at night.

This precautionary consideration has been extended to maximum levels, given that values equated within Table 4-3 have related to short-term, 1-minute values exceeded 10 times during the measured period; generally, to accord to standard industry guidance⁷. The assumption has been made that the worst-case maximum impacts have been directly obtained during the period 06:00 – 07:00. However, where an entire night period has not been measured due to the lack of site security, then a 3 dB allowance has been added as to ensure that night time maxima have not been significantly underestimated by the adopted surveying method.

4.5 Baseline survey limitations

The Association of Noise Consultants and the Institute of Acoustics have previously issued guidance on the Practicality and Reliability of Baseline Sound Level Surveying and related matters during the COVID-19 pandemic⁸. This guidance has been duly considered in the preparation of this report with respect to typical road traffic volumes in the vicinity of the Site.

At the time of writing, the Governments Guidance⁹ included the lifting of legal restrictions with respect to businesses. Further information from the Department of Transport official statistics¹⁰ have indicated nominally 100 % of all motor vehicles were in use during the times of site assessment. Despite this information representing national modes of transport use, it has provided an indication that road traffic was back to 'normal' or pre-pandemic volumes. Some correlation has therefore been expected between in-situ measurements and that shown in Figure 2-2, as seen with the derived data in Table 4-3.

While some limitations and uncertainty have been reviewed in the collation of baseline data at the development site, the overall influence of pandemic conditions has not been considered significant to the outcome of this assessment.

⁶ Manchester City Council Planning application 125974/FO/2020. Noise impact assessment for land south of Victoria Avenue. Millar Goodall report No. 102085, 16th August 2019.

⁷ Paxton, B. Conlan, N et al. Assessing Lmax for residential developments: the AVO guide approach. Proceedings of the Institute of Acoustics. Volume 41, Part 1, 2019.

⁸ ACE / IOA Joint Guidance on the Impact of COVID-19 on the Practicality and Reliability of Baseline Sound Level Surveying and the Provision of Sound & Noise Impact Assessments. Version 6, January 2021.

⁹ <https://www.gov.uk/guidance/covid-19-coronavirus-restrictions-what-you-can-and-cannot-do>

¹⁰ <https://www.gov.uk/government/statistics/transport-use-during-the-coronavirus-covid-19-pandemic>

5.0 ProPG Assessment

The assessment method of ProPG has been applied to the residential development to understand the risks and design requirements to mitigate the proposal from environmental noise sources.

5.1 Stage 1 – Initial Risk Assessment

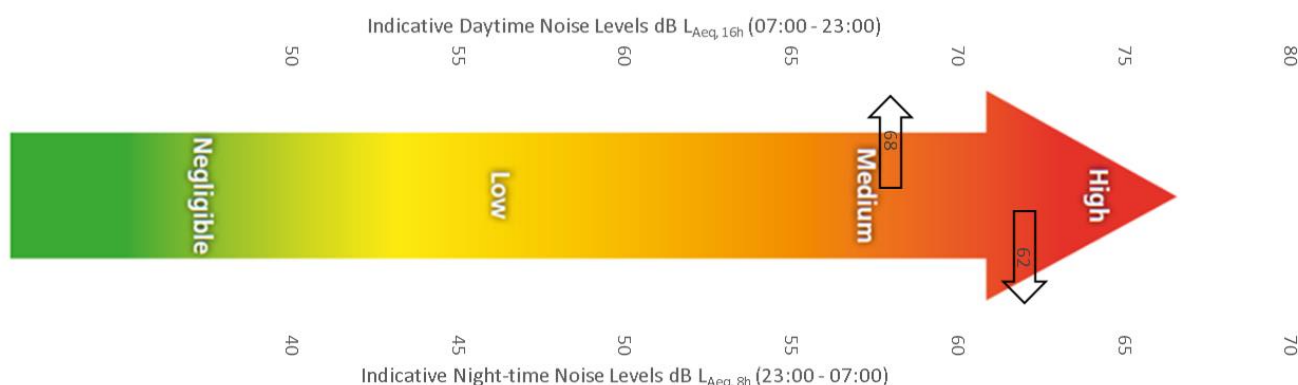
The environmental survey provided in Section 4.0 of this report has described the following period sound pressure levels that have been used for an initial site risk assessment according to Stage 1 of ProPG.

Table 5-1
Summary Assessment External Noise Levels, dB

Location	Description	Period	Hours	Indicative Noise Level
1	1.5 m above ground, east boundary towards Railway Street	Daytime	07:00 – 23:00	68 dB L _{Aeq} , 16 h
		Night-Time	23:00 – 07:00	62 dB L _{Aeq} , 8 h
				80 dB L _{Amax} (F) *
2	4.0 m above ground, north boundary towards Kingston Street	Daytime	07:00 – 23:00	58 dB L _{Aeq} , 16 h
		Night-Time	23:00 – 07:00	54 dB L _{Aeq} , 8 h
				71 dB L _{Amax} (F) *

* Value exceeded 10 times during entire night time period, per industry guidance.

Figure 5-1
ProPG Indicative Risk Assessment



The dominant sound source at the site was noted from transportation sources, particularly the A6104 Victoria Avenue south of the development site. Commercial activities were not observed at any point of site attendance.

The initial site noise risk assessment has been categorised of ‘at least medium risk’ on future occupants of the new noise sensitive development, tending towards a high risk at night. Where a medium-high noise risk has been noted, the pre-planning application advice stated in ProPG has been combined as follows:

“As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS

which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.

High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice."

5.2 Stage 2 – Full Assessment

5.2.1 Good Acoustic Design Process

ProPG has stated it is imperative for acoustic design to be considered at an early stage of the development control process, as to avoid unreasonable acoustic conditions and prevent those which are unacceptable.

The proposed development land has been notably fixed within its urban setting, where it has not been considered possible to move proposed receptors away from the incident noise source, or visa-versa. Given the dominant source as road traffic providing the range of measured sound levels across the developing land space, there has been considered minimal acoustic benefit in moving residential plots of the proposal.

A review of application plans has provided the orientation of all buildings with rear-facing amenity spaces, using the intervening residential building as a physical barrier between transportation noise source and external areas. For example, Block 1 / Plot 1-4 along the south boundary to Victoria Avenue has been noted with north facing gardens and Blocks 3-5 / Plots 5-12 along the north boundary to Chain Road have included south facing gardens.

The plan layouts of each dwelling type have been reviewed in this assessment. It has been borne in mind that good acoustic design generally requires facing less-sensitive rooms (i.e. kitchens and bathrooms) towards the dominant incident noise sources.

- For all residential house type blocks and plots, it has been considered that some acoustic benefit could be created through reversing the rear facing kitchens and front facing living areas at ground floor level.
 - Limited acoustic benefit has been considered possible at upper floors, where for three-bedroom plot, bathrooms and a single bedroom has typically remained front facing.
- For residential flats of single-aspect design, it has been considered unavoidable that all habitable rooms would normally remain facing towards the incident noise sources.

It has been understood that all proposed dwellings are to be formed by traditional brick construction along with an insulated and tiled roof. The sound insulation of these components has been deemed less consequential to resulting internal ambient noise levels, where the acoustic performance of glazing and ventilation elements will typically remain as dictating.

There has been considered a quantifiable acoustic benefit to adding the development within the available land space, by means of interrupting line of sight between dwellings of Alnwick Road from Victoria Avenue. A screening effect of the development has been considered very likely to ensure a reduction in sound levels to the rear façade and garden areas of dwellings along Alnwick Road.

5.2.2 Internal Noise Level Guidelines

ProPG has provided a summary of internal noise level guidelines as part of Stage 2 assessment that have been replicated in Table 3-1 of this assessment.

The method adopted to achieve suitable internal noise level guidelines has been based upon information contained within the recent ANC publication, The AVO Guide. This has provided an approach as to how the competing aspects of thermal and acoustic comfort can be managed and has been written to reflect the requirements of ProPG and overarching planning requirements.

Given the initial site risk assessment in the worst-case, as high risk, it has been considered commensurate to judge suitable façade components in terms of octave bands.

The range of whole dwelling ventilation strategies for development has been taken from The Building Regulations 2010 Approved Document F (2013, as amended) Means of Ventilation (ADF). An outline appraisal for suitability has been provided using Table B2 of the AVO Guide.

Table 5-2
Outline Appraisal of Different Ventilation Strategies

Ventilation strategy according to ADF	Typical windows and vent	Higher acoustic performance windows and vent
System 1: Intermittent extract fans	✗	✗
System 2: Passive stack ventilation	✗	✗
System 3: Continuous mechanical extract (MEV)	✗	✓
System 4: Continuous mechanical supply and extract with heat recovery (MVHR)	✗	✓

The following specifications have been based on calculations to the detailed method in section G2.1 of BS 8233 (equivalent to the method in BS EN 12354-3). A typical small bedroom has been considered at least 7.5 m² with the glazed area of the façade at 25 % of the floor area as a representation of the worst-case.

An adaptation term has been provided for all specifications following the method ISO 717-1:2020. This has included a comparison between the normalised, A-weighted sound spectrum for day and night against the adaptation curves for C_{tr} . In this instance the relevant spectrum adaptation term C_{tr} has been confirmed by visual comparison. As the dominant sound source has been reviewed as distant urban road traffic, this has also been directly relevant from Table A1 of ISO 717-1.

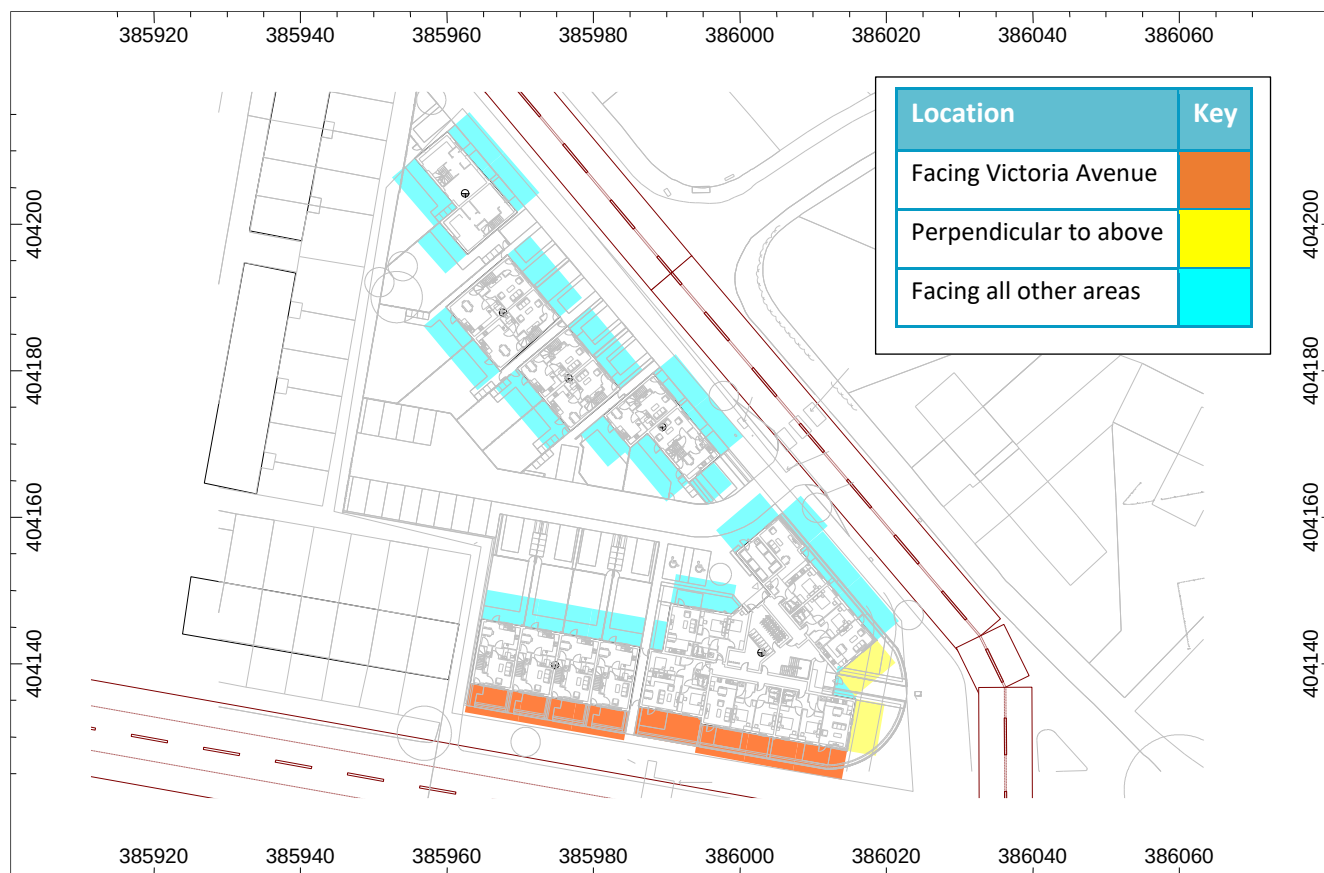
Table 5-3
Minimum Specifications for Windows and Ventilators

Building Element and Location	Specification	Metric	Typical Configuration
Windows facing Victoria Avenue	≥ 35	dB $R_w + C_{tr}$	Double glazing 8-16-8.8 acoustic laminate glass
Windows perpendicular to above	≥ 31	dB $R_w + C_{tr}$	Double glazing 4-14-6 standard glass types
Windows facing all other areas	≥ 27	dB $R_w + C_{tr}$	Double glazing 4-16-4 standard glass types
Ventilators facing Victoria Avenue	≥ 41	dB $D_{ne, w} + C_{tr}$	High performance acoustic trickle vent as rated*
Ventilators perpendicular to above	≥ 36	dB $D_{ne, w} + C_{tr}$	Acoustic trickle vent as rated*
Ventilators facing other areas	≥ 30	dB $D_{ne, w} + C_{tr}$	Acoustic trickle vent as rated*

**Only one ventilator accounted per habitable room, following Table 5-2 and if using System 3 approach.*

It should be noted in the case of a single window at a corner location and across two elevations, that the higher specification from Table 5-3 has been recommended. For example, Flat 3 living dining room at ground floor level on the corner of Block 1 requires at least 35 dB $R_w + C_{tr}$ windows and 41 dB $D_{ne, w}$ ventilator.

Figure 5-2
Illustration of Sound Insulation Schemes



The advice in this section has considered the internal ambient noise level with closed windows under Building Regulations ventilation conditions. The AVO guide has informed that acoustic assessments should also be formed for the overheating ventilation condition, which in the first instance has been considered with open windows. With an advocated and simplistic insertion loss of 13 dB from external to internal areas through an open window, the following summary has been provided for the worst-affected façades with both closed and open windows.

Table 5-4
Estimated IANLs from Different Ventilation Conditions

Level 1 Risk Assessment following the AVO Guide			Internal Ambient Noise Levels (IANLs)		
Location	Windows	Condition	Day dB LAeq, 16h	Night dB LAeq, 8h	Max dB LAmax(F)
Victoria Avenue	Windows closed and ventilators open	Building ventilation	32	26	43
	Windows partially open	Overheating ventilation	55	49	67
Chain Road	Windows closed and ventilators open	Building ventilation	30	26	43
	Windows partially open	Overheating ventilation	45	41	58

In case of closed windows, building ventilation conditions have been shown to provide suitable internal ambient noise levels following ProPG and AVO, given that predicted values in the above Table 5-4 do not exceed those in Table 3-1 and guidance from MCC.

The potential for adverse effects with open windows depends upon both the internal ambient noise level and the frequency and duration of the overheating condition. There has been no known appraisal¹¹ to determine the latter. The AVO guide has provided that such assessment is recommended, based on the external sound levels.

It has been noted from the AVO guide, that a material change in behaviour may occur with internal ambient noise levels of $> 50 \text{ dB } L_{Aeq, T}$ (07:00 – 23:00) during the day, $> 42 \text{ dB } L_{Aeq, T}$ or $> 65 \text{ dB } L_{Amax(F)}$ (23:00 – 07:00) during the night.

- These values have been exceeded by the simple calculations provided in the above Table 5-4, therefore providing the initial estimation that opening windows is unlikely to be acceptable at the development when accounting for the worst-case façade along Victoria Avenue only.

An overheating assessment has been inferred by the calculation results, to be provided by the design team as to understand how alternative ventilation strategies can be used to overcome the potential overheating risk associated with this development.

It has been noted that rear facing windows of all dwellings will maintain an ability to open windows, therefore for house types of Block 1 this may present a lesser risk for the site when compared to single-aspect flats that will not have the provision for cross ventilation or rear cooling.

Solutions have been suggested as suitable for front facing bedrooms of dwellings, or for all rooms of proposed flats, or part of entire building ventilation strategy, to include:

- PIV input ventilators. Such as the Titon Sonair F+ rated as a high performance, through wall acoustic trickle ventilator $55 \text{ dB } D_{ne, w}$ when open and allowing input airflow rates up to $140 \text{ m}^3/\text{h}$.
- MVHR with summer bypass. Such as the Nuaire MRXBOXAB-ECOx-1ZSW (x relating to size 2/3/4/5) with acoustic enclosure, low in-duct sound levels and summer bypass switch and airflow rates up to $90 \text{ m}^3/\text{h}$.

Accounting for front facing bedrooms of approximately 30 m^3 , the above provisions have been considered suitable to afford 3 to 4.5 air changes per hour.

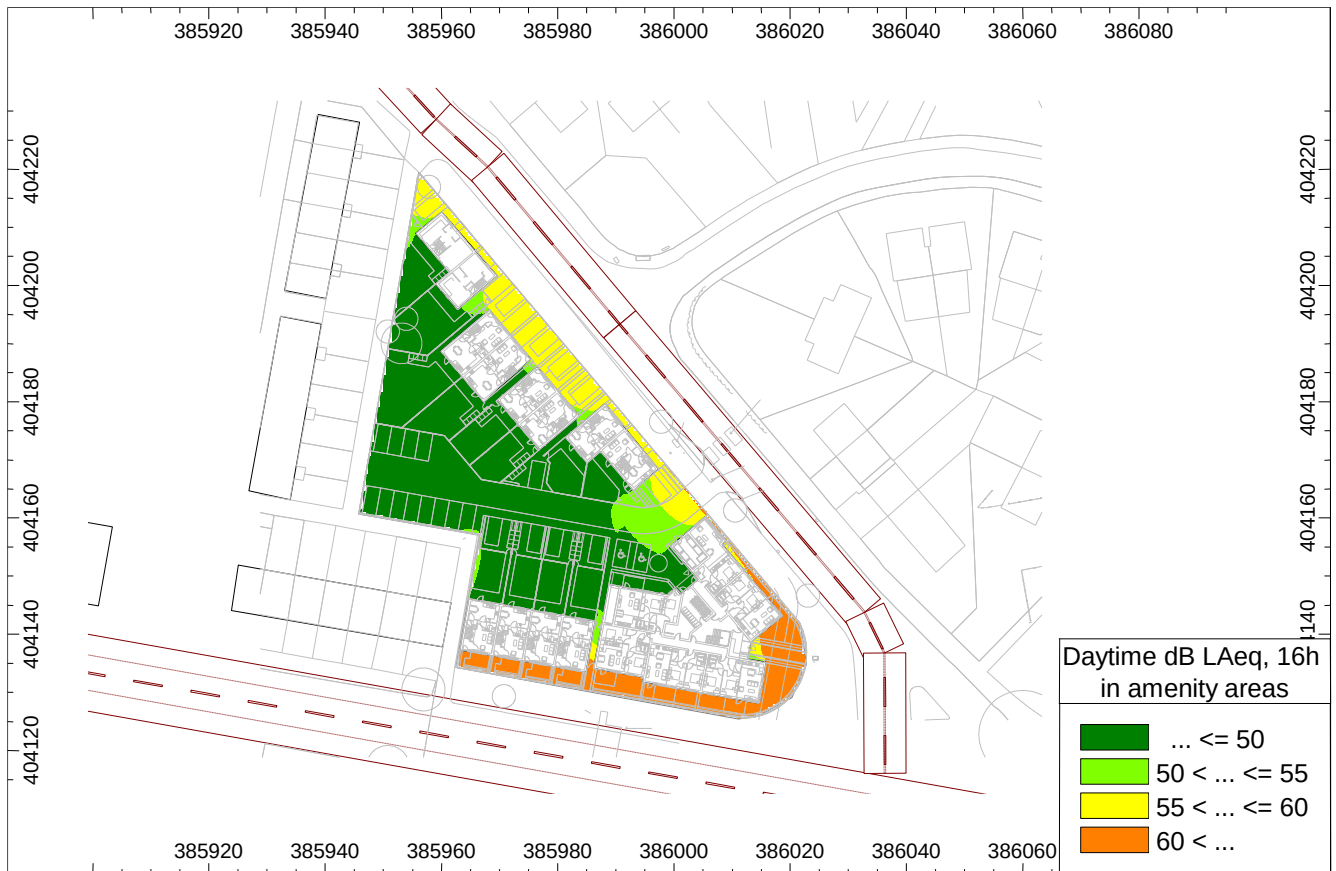
5.2.3 External Noise Level Guidelines

Amenity areas have been proposed as rear facing for all residential dwellings. Modelling of the site has provided that useful screening loss will occur from development buildings as to provide all garden areas within ProPG guidance of $50\text{--}55 \text{ dB } L_{Aeq, 16 \text{ h}}$ or MCC upper limit of $55 \text{ dB } L_{Aeq, 16 \text{ h}}$ to provide suitably protected, quiet and tranquil outdoor spaces within the development.

Modelling results of external amenity spaces has been provided within Figure 5-2 below. It should be noted that this imagery has not considered any garden fencing such that the specification of any screening measures for the scheme has not been viewed as important in terms of acoustic performance. Rather, the acceptability of road traffic noise within external amenity spaces has been solely a result of the design and layout of the scheme.

¹¹ Chartered Institute of Building Services Engineers (CIBSE) TM59: Design methodology for the assessment of overheating risk in homes (2017)

Figure 5-3
Daytime Noise Levels in External Amenity Areas, dB



6.0 Conclusion

Great Places Housing Group Ltd has appointed SLR to undertake a noise assessment for a proposed residential development at Chain Road in Blackley, Manchester. This noise assessment has been provided in support of a full planning application for a residential development of 32 No. plots.

Stage 1 assessment in accordance with ProPG Planning and Noise: New Residential Development has provided that the site is influenced by dominant road traffic noise. The initial site noise risk assessment has been categorised at least medium risk on the future occupants of the new noise sensitive development. No commercial or industrial noise sources were incident on the development.

Stage 2 assessment in accordance with ProPG has reviewed a good acoustic design process, internal ambient noise levels, external amenity areas and other matters. Commensurate design specifications have been established considering current industry guidance.

On the basis that design specifications within this report have been adopted, it follows that any significant adverse noise impacts will be avoided in the finished development as to accord with overarching national and local planning requirements for new residential development.

A recommendation is made to the decision maker to grant with a noise condition to ensure that significant adverse effects will be avoided inside proposed dwelling by use of a commensurate scheme of sound insulation, as outlined within this report.

APPENDIX 01

Glossary of Terminology

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0dB (the threshold of hearing) to over 120dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table 01-01
Sound Levels Commonly Found in the Environment

Sound Level	Location
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 40 dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a car
60 to 70 dB(A)	Typical high street
70 to 90 dB(A)	Inside factory
100 to 110 dB(A)	Burglar alarm at 1m away
110 to 130 dB(A)	Jet aircraft on take off
140 dB(A)	Threshold of Pain

Acoustic Terminology

dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (of 20 μ Pa).
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.
$L_{Aeq, T}$	$L_{Aeq, T}$ is defined as the notional steady sound level which, over a stated period T, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.
$L_{A10, T}$ & L_{A90}	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 as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.
$L_{Amax(F)}$	$L_{Amax(F)}$ 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.

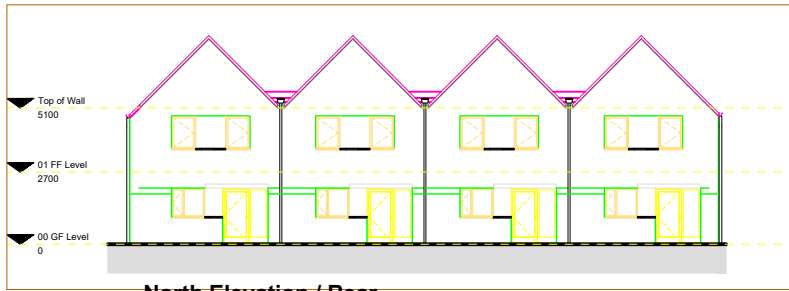
APPENDIX 02

Drawings

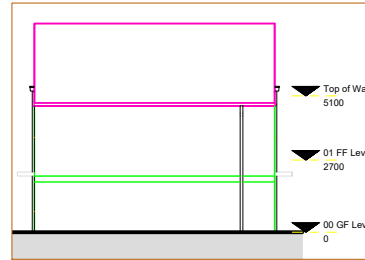
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Accommodation Area Schedule (GIA)

Level	Area	House Type
Block 1 - Plot 1		
00 GF Level	42.2 m ²	3b4p
01 FF Level	42.2 m ²	3b4p
01 FF Level	84.3 m ²	
Block 1 - Plot 2		
00 GF Level	42.2 m ²	3b4p
01 FF Level	42.2 m ²	3b4p
01 FF Level	84.3 m ²	
Block 1 - Plot 3		
00 GF Level	42.2 m ²	3b4p
01 FF Level	42.2 m ²	3b4p
01 FF Level	84.3 m ²	
Block 1 - Plot 4		
00 GF Level	42.6 m ²	3b4p
01 FF Level	42.6 m ²	3b4p
01 FF Level	85.2 m ²	
Grand total:	338.2 m ²	



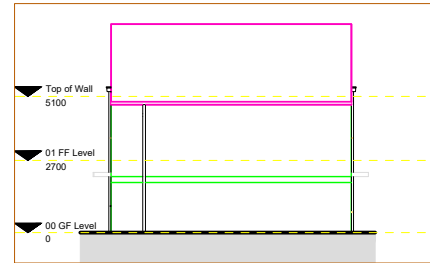
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East Elevation / Side
1 : 100



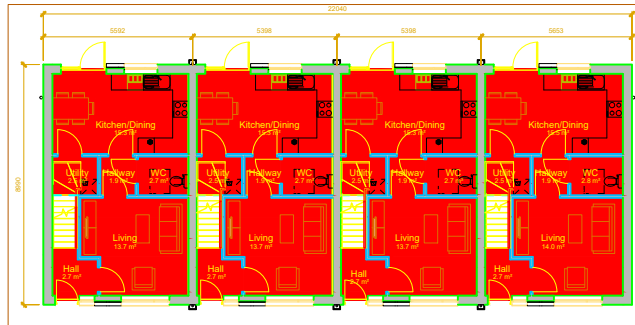
South Elevation / Front
1 : 100



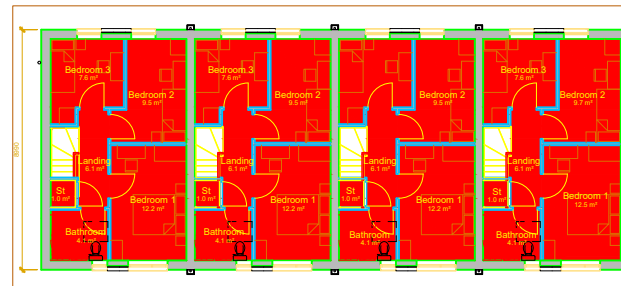
West Elevation / Side
1 : 100



3D View 1



Ground Floor Plan
1 : 100



First Floor Plan
1 : 100

A 18/06/21 Acc. schedule added, dims modified, client's comments

REV. DATE DRN. ORO.

Chain Road, Blackley

CLIENT
Great Places Housing Group

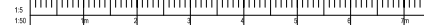
DRAWING
Block 1 - Plans & Elevations

SCALE 1 : 100 SHEET SIZE A1 DRAWN SP CHECKED CL DATE 09/06/21

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Accommodation Area Schedule (GIA)				
Plot Number	Level	Area	House Type	
Bin Store	00 GF Level	18.1 m ²	Communal	
Communal	00 GF Level	111.7 m ²	Communal	
Communal	01 FF Level	58.7 m ²	Communal	
Communal	02 SF Level	58.3 m ²	Communal	
Plot 1	00 GF Level	61.9 m ²	2b3p	
Plot 2	00 GF Level	61.9 m ²	2b3p	
Plot 3	00 GF Level	61.9 m ²	2b3p	
Plot 4	00 GF Level	61.9 m ²	2b3p	
Plot 5	00 GF Level	52.6 m ²	1b1p	
Plot 6	00 GF Level	63.8 m ²	1b2p	
Plot 7	01 FF Level	61.9 m ²	2b3p	
Plot 8	01 FF Level	61.9 m ²	2b3p	
Plot 9	01 FF Level	61.9 m ²	2b3p	
Plot 10	01 FF Level	61.9 m ²	2b3p	
Plot 11	01 FF Level	61.9 m ²	2b3p	
Plot 12	01 FF Level	50.0 m ²	1b2p	
Plot 13	01 FF Level	50.5 m ²	1b2p	
Plot 14	02 SF Level	61.9 m ²	2b3p	
Plot 15	02 SF Level	61.9 m ²	2b3p	
Plot 16	02 SF Level	61.9 m ²	2b3p	
Plot 17	02 SF Level	61.9 m ²	2b3p	
Plot 18	02 SF Level	61.9 m ²	2b3p	
Plot 19	02 SF Level	50.1 m ²	1b2p	
Plot 20	02 SF Level	50.5 m ²	1b2p	
Grand total 24		1430.1 m ²		

B 07/07/21 SP Bin, Cycle, Parcel & Plant room amended KM
A 18/06/21 - Acc. schedule added, dims modified, client's comments -

REV. DATE DRN. CHKD.

PROJECT
Chain Road, Blackley

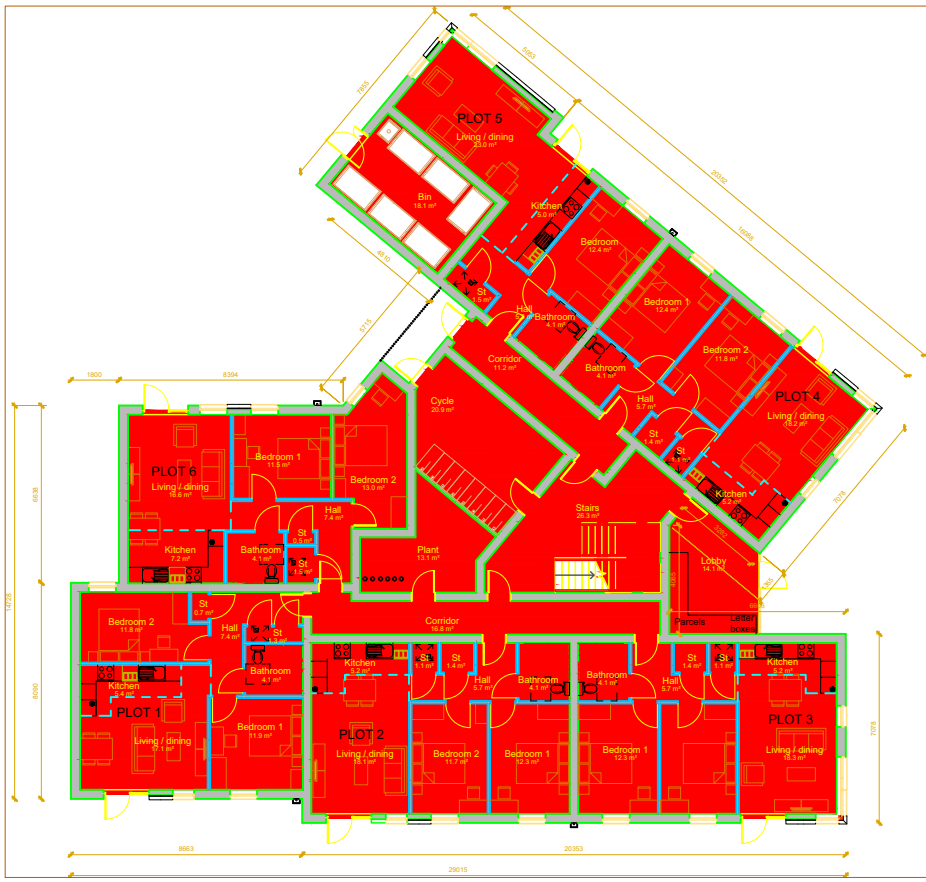
CLIENT
Great Places Housing Group

DRAWING
Block 2 - Apartments - Ground & First Floor

SCALE 1: 100 SHEET SIZE @ A1 DRAWN SP CHECKED CL DATE 09/06/21

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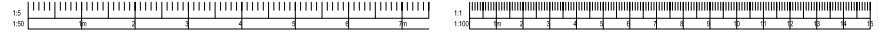
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STATUS Feasibility



Ground Floor Plan
1 : 100



First Floor Plan
1 : 100



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Accommodation Area Schedule (GIA)				
Plot Number	Level	Area	House Type	
Bin Store	00 GF Level	18.1 m ²	Communal	
Plot 9	00 GF Level	111.7 m ²	Communal	
Communal	01 FF Level	58.7 m ²	Communal	
Communal	02 SF Level	58.3 m ²	Communal	
Plot 1	00 GF Level	61.8 m ²	2b3p	
Plot 2	00 GF Level	61.9 m ²	2b3p	
Plot 3	00 GF Level	61.9 m ²	2b3p	
Plot 4	00 GF Level	61.9 m ²	2b3p	
Plot 5	00 GF Level	62.6 m ²	1b1p	
Plot 6	00 GF Level	63.8 m ²	1b2p	
Plot 7	01 FF Level	61.8 m ²	2b3p	
Plot 8	01 FF Level	61.9 m ²	2b3p	
Plot 9	01 FF Level	61.9 m ²	2b3p	
Plot 10	01 FF Level	61.9 m ²	2b3p	
Plot 11	01 FF Level	61.9 m ²	2b3p	
Plot 12	01 FF Level	60.0 m ²	1b2p	
Plot 13	01 FF Level	60.5 m ²	1b2p	
Plot 14	02 SF Level	61.8 m ²	2b3p	
Plot 15	02 SF Level	61.9 m ²	2b3p	
Plot 16	02 SF Level	61.9 m ²	2b3p	
Plot 17	02 SF Level	61.9 m ²	2b3p	
Plot 18	02 SF Level	61.9 m ²	2b3p	
Plot 19	02 SF Level	60.1 m ²	1b2p	
Plot 20	02 SF Level	60.5 m ²	1b2p	
Grand total: 24		1430.1 m ²		

B 07/07/21 SP Bin, Cycle, Parcel & Plant room amended KM
 A 18/06/21 - Acc. schedule added, dims modified, client's comments -

REV.	DATE	DRN.	ORIG.
PROJECT			
Chain Road, Blackley			
CLIENT			
Great Places Housing Group			
DRAWING			
Block 2 - Apartments - Second Floor			
SCALE	SHEET SIZE	DRAWN	CHECKED
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			DATE
			09/06/21

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Second Floor Plan
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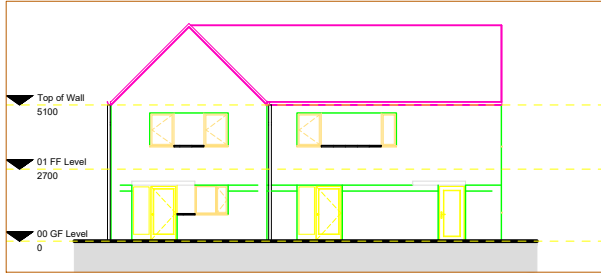
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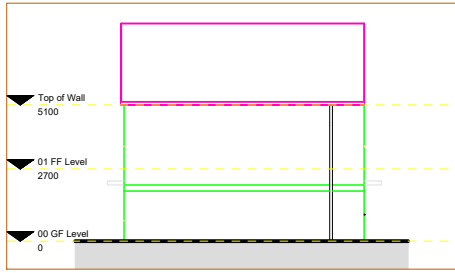
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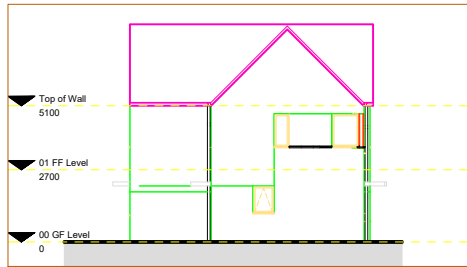
Accommodation Area Schedule (GIA)		
Level	Area	House Type
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01 FF Level	42.5 m ²	
	85.0 m ²	
Block 2 - Plot 6		
00 GF Level	42.6 m ²	
01 FF Level	42.6 m ²	
	85.2 m ²	
Grand total 4	170.3 m ²	



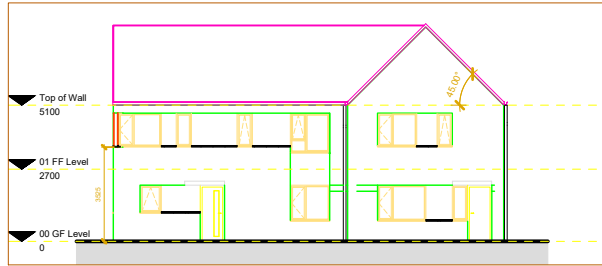
South Elevation / Rear
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West Elevation / Side
1 : 100



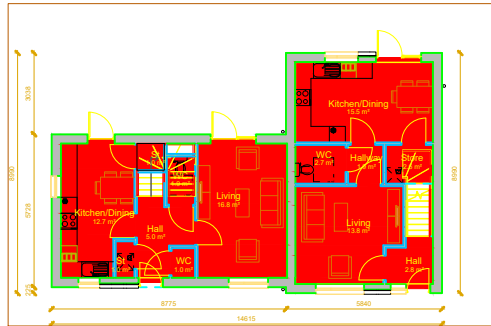
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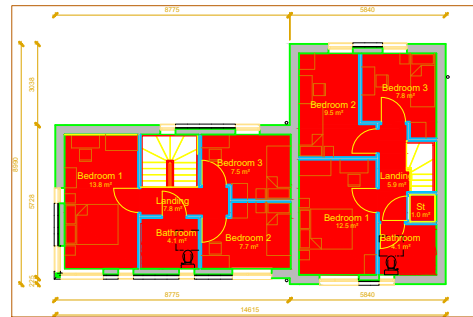
North Elevation / Front
1 : 100



3D View 1



Ground Floor Plan
1 : 100



First Floor Plan
1 : 100

A 18/06/21 - Acc schedule added, dims modified, clients comments

REV.	DATE	DRN.	CHKD.
PROJECT Chain Road, Blackley			
CLIENT Great Places Housing Group			
DRAWING Block 3 - Plans & Elevations			
SCALE 1 : 100	SHEET SIZE @ A1	DRAWN SP	CHECKED CL
		DATE 09/06/21	

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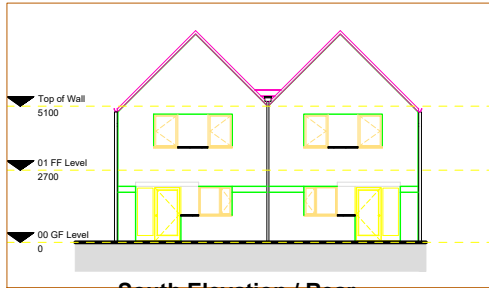
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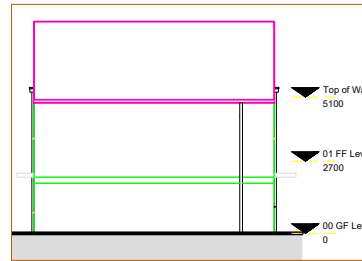
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Accommodation Area Schedule (GIA)

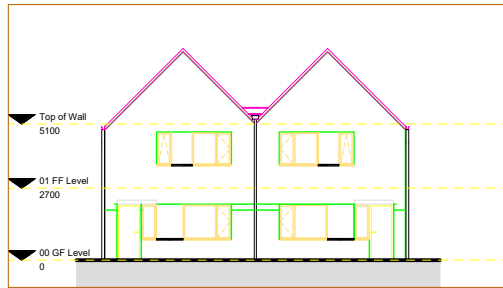
Level	Area	House Type
Block 4 - Plot 7		
00 GF Level	42.2 m ²	3b4p
01 FF Level	42.2 m ²	3b4p
01 FF Level	84.3 m ²	
Block 4 - Plot 8		
00 GF Level	42.2 m ²	3b4p
01 FF Level	42.2 m ²	3b4p
01 FF Level	84.3 m ²	
Grand total: 4	168.6 m ²	



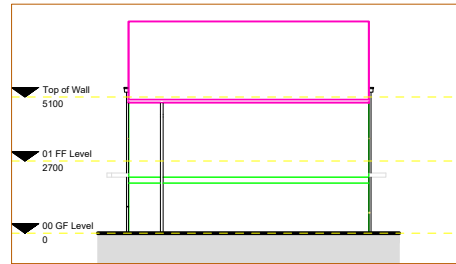
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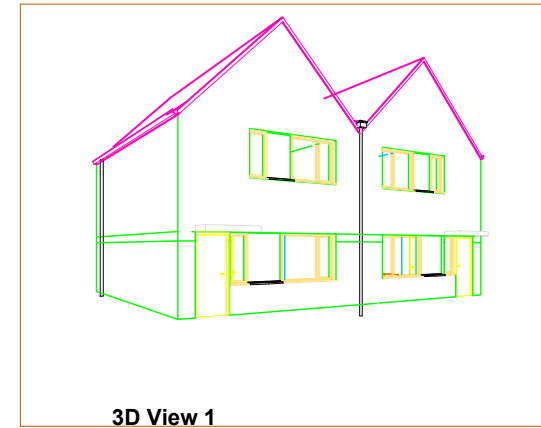
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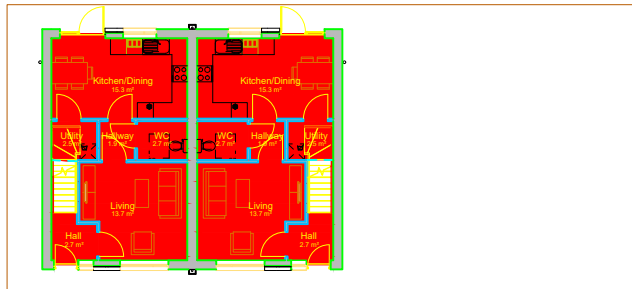
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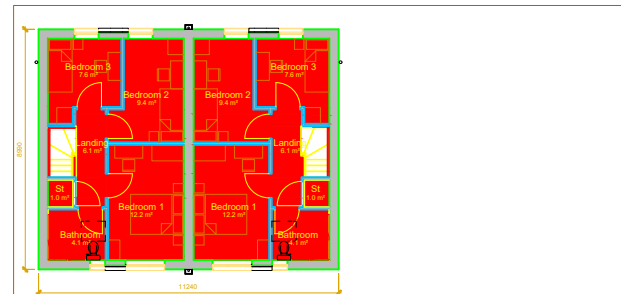
West Elevation / Side
1 : 100



3D View 1



Ground Floor Plan
1 : 100



First Floor Plan
1 : 100

A 18/06/21 - Acc. schedule added, dims modified, client's comments

REV. DATE DRN. CHKD.

PROJECT
Chain Road, Blackley

CLIENT
Great Places Housing Group

DRAWING
Block 4 - Plans & Elevations

SCALE 1 : 100 SHEET SIZE @ A1 DRAWN SP CHECKED CL DATE 09/06/21

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DRAWING NOT TO BE SCALED.

REPORT ERRORS & OMISSIONS TO ARCHITECT.

CHECK ALL DIMENSIONS ON SITE.

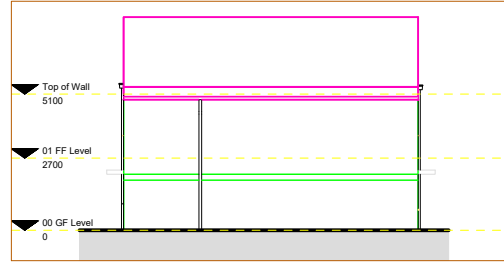
DRAWING TO BE READ IN CONJUNCTION WITH THE HEALTH AND SAFETY PLAN AND ALL RELEVANT RISK ASSESSMENTS.

Acommodation Area Schedule (GIA)

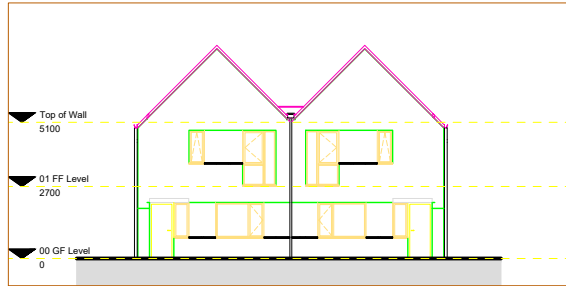
Level	Area	House Type
Block 5 - Plot 9		
00 GF Level	53.9 m ²	4bdp
01 FF Level	53.9 m ²	4bdp
02 FF Level	107.8 m ²	
Block 5 - Plot 10		
00 GF Level	53.9 m ²	4bdp
01 FF Level	53.9 m ²	4bdp
02 FF Level	107.8 m ²	
Grand total 4	215.7 m ²	



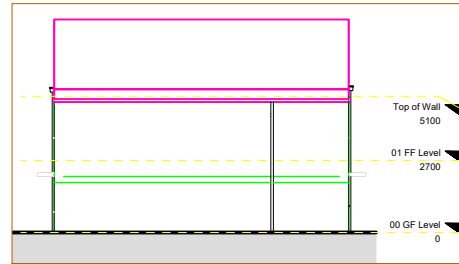
South Elevation / Rear
1 : 100



West Elevation / Side
1 : 100



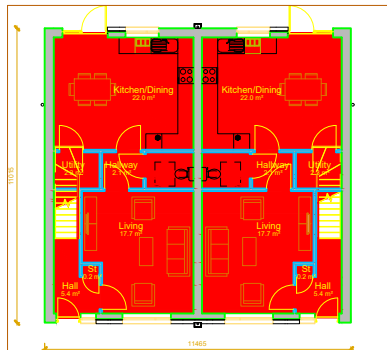
North Elevation / Front
1 : 100



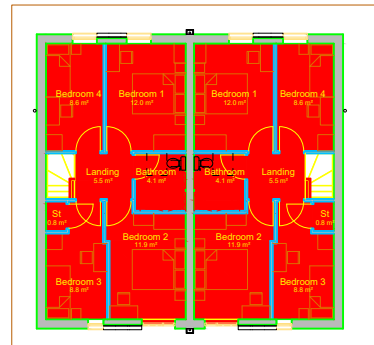
East Elevation / Side
1 : 100



3D View 1



Ground Floor Plan
1 : 100



First Floor Plan
1 : 100

A 10/06/21 - Acc. schedule added, dims modified, client's comments

REV. DATE DRN. O.K.D.

PROJECT
Chain Road, Blackley

CLIENT
Great Places Housing Group

DRAWING
Block 5 - Plans & Elevations

SCALE 1 : 100 SHEET SIZE A1 DRAWN SP CHECKED CL DATE 09/06/21

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JOB No 18-002 DRAWING No 0119 REVISION A
STATUS Feasibility



APPENDIX 03

Survey Results

Table 03-01
Hourly Time History Results – dB

Location	Date and Time	L _{Aeq, 1h}	L _{A90, 1h}	L _{A10, 1h}	L _{Amax(F), 1h}
Position 1 6 m from Victoria Avenue	17/08/2021 06:00	65.4	52.3	69.1	87.7
	17/08/2021 10:00	66.7	55.8	70.8	77.8
	17/08/2021 11:00	66.5	55.1	70.8	82.3
	17/08/2021 12:00	67.4	55.7	71.6	87.1
Position 2 6 m from Chain Road	17/08/2021 06:00	55.9	51.7	56.9	70.6
	17/08/2021 10:00	58.8	54.2	61.2	80.0
	17/08/2021 11:00	58.9	53.5	60.7	82.8
	17/08/2021 12:00	59.4	53.6	62.2	80.4

Table 03-02
Octave Band Results – dB L_{Aeq, T}

Location	Date and Time	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	L _{Aeq, 1h}
Position 1 6 m from Victoria Avenue	17/08/2021 06:00	58.2	58.1	58.2	63.0	57.8	55.3	65.4
	17/08/2021 10:00	61.1	61.1	60.5	64.7	58.4	47.8	66.7
	17/08/2021 11:00	60.2	60.4	60.2	64.7	58.1	45.3	66.5
	17/08/2021 12:00	61.9	61.6	61.3	65.5	59.0	47.6	67.4
Position 2 6 m from Chain Road	17/08/2021 06:00	52.2	50.4	50.5	53.9	46.7	37.8	55.9
	17/08/2021 10:00	58.0	55.5	54.0	56.2	50.1	43.8	58.8
	17/08/2021 11:00	58.3	56.6	54.3	56.1	50.1	44.2	58.9
	17/08/2021 12:00	58.0	55.3	54.3	56.7	51.0	44.9	59.4

Table 03-02
Derived Octave Band Results – dB L_{Aeq, T}

Location	Period	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	L _{Aeq, T}
Position 1 6 m from Victoria Avenue	07:00 – 23:00	62.3	62.2	61.9	66.2	59.7	48.1	68.1
	23:00 – 07:00	52.1	52.0	52.1	56.9	51.7	49.2	59.3
	(as above, + 3dB)	55.1	55.0	55.1	59.9	54.7	52.2	62.3
Position 2 6 m from Chain Road	07:00 – 23:00	57.4	55.1	53.5	55.7	49.7	43.6	58.4
	23:00 – 07:00	46.9	45.1	45.2	48.6	41.4	32.5	50.6
	(as above, + 3dB)	49.9	48.1	48.2	51.6	44.4	35.5	53.6

Table 03-04
15th Highest Maximum Sound Level Results, Octave Bands – dB L_{Amax}(F), 1 min

Location	Period	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	L _{Amax} (F)
Position 1 6 m from Victoria Avenue	17/08/2021 05:56	83.8	84.6	75.6	73.1	78.0	84.4	87.7
	17/08/2021 05:55	84.8	82.1	79.1	79.0	80.0	76.8	83.7
	17/08/2021 06:58	72.7	72.3	70.6	72.5	76.2	77.7	82.8
	17/08/2021 06:46	77.6	77.7	79.6	75.9	70.0	66.7	79.7
	17/08/2021 06:50	74.8	74.2	81.8	73.5	67.7	63.6	79.4
	17/08/2021 06:45	68.1	70.4	72.6	77.4	70.0	57.0	78.3
	17/08/2021 06:47	68.6	70.2	73.8	75.8	67.4	54.9	77.5
	17/08/2021 06:15	70.8	69.5	72.2	75.4	69.1	60.6	77.1
	17/08/2021 06:44	69.8	69.4	71.6	76.0	68.1	60.3	77.1
	17/08/2021 06:54	69.6	71.5	70.8	75.7	68.0	56.6	77.0
	17/08/2021 06:34	73.7	70.4	73.3	75.8	67.5	60.1	76.7
	17/08/2021 06:16	67.7	71.6	69.9	75.0	68.9	56.1	76.6
	17/08/2021 06:04	66.9	68.7	71.3	74.6	66.4	57.6	76.2
	17/08/2021 06:36	69.3	70.4	69.0	74.7	68.0	57.1	76.1
Position 2 6 m from Chain Road	17/08/2021 05:49	66.2	65.9	64.7	67.2	71.2	72.0	76.5
	17/08/2021 05:47	76.3	71.0	64.0	65.5	71.7	67.5	74.8
	17/08/2021 05:48	60.5	55.5	53.0	61.9	67.4	69.9	73.2
	17/08/2021 06:15	64.9	65.0	64.5	69.0	60.6	52.8	70.6
	17/08/2021 06:29	67.2	63.9	63.5	68.3	60.6	53.6	70.0
	17/08/2021 06:50	63.6	65.6	63.9	66.1	59.8	54.0	68.7
	17/08/2021 06:58	60.0	63.2	61.9	67.5	57.6	52.3	68.6
	17/08/2021 06:52	65.1	63.8	63.4	66.9	56.8	47.0	68.4
	17/08/2021 06:17	62.7	63.9	63.5	65.7	61.0	54.0	68.3
	17/08/2021 06:07	57.3	60.4	61.0	66.7	59.9	49.8	68.2
	17/08/2021 06:09	59.4	61.5	62.6	66.3	59.3	51.0	68.2
	17/08/2021 06:01	60.5	62.0	62.3	66.1	59.2	53.9	67.8
	17/08/2021 06:21	69.2	64.3	62.3	65.9	56.4	49.7	67.7
	17/08/2021 06:55	62.6	65.2	64.2	63.2	59.7	54.8	67.3
	17/08/2021 05:49	66.2	65.9	64.7	67.2	71.2	72.0	76.5

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