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GLADMAN DEVELOPMENTS LIMITED

HAFOD ROAD, JOHNSTOWN

NOISE IMPACT ASSESSMENT

NOVEMBER 2023

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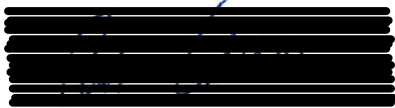
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NOVEMBER 2023

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EXECUTIVE SUMMARY

Wardell Armstrong LLP (WA) has been instructed by Gladman Developments Limited (GDL) to carry out a noise assessment and identify the mitigation measures which are required to discharge Conditions 18 and 19 of the planning approval (Ref: ESCP/2020/0210) for 136 dwellings at land off Hafod Road, Johnstown.

The assessment has been undertaken in line with the current planning approval and technical guidance.

A noise assessment was undertaken by WA in 2013 which was submitted to Wrexham County Borough Council (WCBC). However, due to the time which has passed, and a request from the Environmental Health Officer (EHO) at WCBC, a renewed noise survey has been undertaken by WA in September 2023. The renewed survey was undertaken to establish the representative sound levels from all surrounding noise sources during the daytime and night-time that may affect the proposed development. The dominant noise sources affecting the site have been identified as road traffic on Hafod Road, A483, Bangor Road, nearby railway line and the nearby industrial sites including a landfill site.

As requested by the planning condition, an assessment of the construction phase noise and vibration has been included into this assessment.

A computer noise model has been used to predict noise levels across the developed site to determine any noise mitigation measures which are needed to meet the requirements of the planning condition.

The internal noise level assessment demonstrates that, with the implementation of appropriate glazing and ventilation systems, the existing noise levels at the site can be properly controlled to provide good living conditions for future residents, which are in accordance with the criteria of the planning condition. Furthermore, the noise in external areas meets with the desirable level for gardens of proposed dwellings.

Therefore, following the implementation of the mitigation measures outlined in this report, Conditions 18 and 19 of the planning approval can be discharged.

1 INTRODUCTION

1.1 Hafod Road, Johnstown

- 1.1.1 By instruction from Gladman Developments Limited (GDL), Wardell Armstrong LLP (WA) has been commissioned to undertake a noise assessment with a view to discharging the planning conditions relating to noise for a residential development of 136 homes at Land West of Hafod road, Johnstown and 465sqm (B2/B8) industrial, storage and distribution and 235sqm (A1) retail unit.
- 1.1.2 Vehicular access to the development will be via Bangor Road to the south of the site.
- 1.1.3 A noise assessment was undertaken by WA in 2013, however due to the elapsed time, and a request from the EHO at WCBC, WA has carried out renewed noise monitoring to inform this assessment.
- 1.1.4 To the north, the site is bound by a wooded area, and a mixed-use industrial area. To the east, the site is bound by Hafod Road, with open land beyond. To the south the site is bound by the B5426 Bangor Road with a landfill site beyond. To the west the site is bound by the Wrexham to Ruabon railway line with residential dwellings beyond.
- 1.1.5 The development comprises residential development in the norther part of the site, with commercial units in the southern area.

1.2 Planning conditions – Noise

- 1.2.1 The proposed development received outline planning approval at planning appeal on the 14th of July 2021, with conditions attached (Ref: ESC P/2020/0210).
- 1.2.2 Conditions 18 and 19 of the appeal notification relates to noise. The conditions attached to the original planning application state:

18. A site specific BS5228 noise assessment shall be submitted to and approved in writing by the Local Planning Authority as part of each of the reserved matters applications in respect of the relevant phases of the development. The assessment shall include the noise output level from existing noise generating uses around the application site and consider the impact upon future nearby residential properties from the different phases of development, to include output levels from the combinations of plant used for each phase of the development. The assessment shall also include noise mitigation/ attenuation measures where WHO guidelines are likely to be exceeded at noise sensitive

properties in respect of both existing and proposed dwellings. The development shall be implemented in accordance with the approved details.

19. The rating level of any noise generated by reason of this development post completion shall not exceed the pre-existing background level by more than 5dB(A) at any time. The noise levels shall be determined at nearby noise sensitive premises, and measurements and assessment shall be made in accordance with BS4142:2014 Method of Rating Industrial Noise Affecting Mixed Residential and Industrial Areas.

- 1.2.3 This report details the noise monitoring and modelling carried out to address the requirements of the planning conditions. The monitoring and modelling follow current technical guidance and provide a mitigation scheme for those plots at which it is required, in accordance with the condition.

2 ASSESSMENT METHODOLOGY

2.1 Scope of Works

- 2.1.1 The scope of this noise assessment comprises a consideration of noise at the proposed residential areas which are identified in the planning condition.

2.2 National Planning Legislation and Guidance

- 2.2.1 An assessment is required to consider any potentially noise sensitive areas of the site and existing sensitive receptors located close to the development. The potential impacts of the existing sources of noise on the proposed residential receptors have been assessed with reference to:

- National Planning Policy Framework, 2023.
- Planning Practice Guidance – Noise, 2019.
- Noise Policy Statement for England, 2010.
- British Standard 5228:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise (BS 5228-1), and Part 2: Vibration (BS 5228-2).
- British Standard 8233:2014 Guidance on Sound Insulation and noise reduction or buildings (BS8233).
- ProPG: Planning & Noise – Professional Practice Guidance on Planning & Noise – New Residential Development, May 2017.
- British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS4142).

2.3 Local Authority Consultation

- 2.3.1 Email consultation was carried out with an EHO at Wrexham County Borough Council (WCBC). The EHO at WCBC requested renewed noise monitoring to support this noise assessment.

2.4 Noise Survey

- 2.4.1 As part of this assessment, WA has carried out noise monitoring to assess the current ambient and background sound levels at proposed receptor locations.
- 2.4.2 The results of the noise survey are detailed in Section 3 of this report.

2.5 Noise Model

- 2.5.1 The computer noise modelling software, SoundPLAN Version 9.0, has been used to accurately assess the propagation of noise across the development site, with the proposed development buildings in place.
- 2.5.2 The computer noise model has also been used to identify the required mitigation measures.

3 NOISE SURVEY

3.1 Introduction

- 3.1.1 Wardell Armstrong LLP carried out a noise survey between the 12th and the 16th of October 2023 to measure the existing sound levels at the proposed development site.
- 3.1.2 Noise measurements were taken at locations which are considered to be representative of noise sources surrounding the site. These noise sources that were found to be affecting the site were nearby roads and the mixed industrial are to the north. The monitoring locations are shown on Drawing GM13056-007.
- 3.1.3 The sound level meter was calibrated to a reference level of 94dB at 1kHz both before, and on completion of, the noise survey. No significant drift in calibration was measured during the survey.
- 3.1.4 A-weighted¹ L_{eq}^2 , L_{90}^3 and L_{10}^4 noise levels, together with the maximum and minimum sound pressure levels, were also measured to provide additional information. The measured noise levels are set out in full in Appendix B.
- 3.1.5 The noise measurements were made using a Class 1, integrating sound level meter. The microphone was mounted vertically on a tripod 1.5m above the ground and more than 3.5 metres from any other reflecting surfaces.

Monitoring Location 1 (ML1): Located at the Eastern site boundary, approximately 2m from Hafod Road.

Monitoring Location 2 (ML2): Located in the eastern side of the site, approximately 2m away from the railway line.

Monitoring Location 3 (ML3): Located at the northern part of site and approximately 10m west of the silos on the industrial site to the north.

Monitoring location 4 (ML4): In the southern part of site, approximately 4m from Bangor Road (B5426).

¹ A' Weighting	An electronic filter in a sound level meter which mimics the human ear's response to sounds at different frequencies under defined conditions
² L_{eqs}	Equivalent continuous noise level; the steady sound pressure which contains an equivalent quantity of sound energy as the time-varying sound pressure levels.
³ L_{90}	The noise level which is exceeded for 90% of the measurement period.
⁴ L_{10}	The noise level which is exceeded for 10% of the measurement period.

3.1.6 A site walk-over during noise monitoring allowed observations and detailed notes to be made of the significant noise sources which contribute to each of the measured levels. The observations are outlined in Table 1 below.

3.1.7 The noise monitoring has been undertaken as described in Table 1 below.

Table 1: Details of the Noise Monitoring				
Monitoring Location	Attended / Unattended	Start Date & Time	End Date & Time	Site Observations
ML1	Unattended	12/10/2023 09300hrs	16/10/2023 1400hrs	Dominant noise sources: Road traffic on Hafod Road and A483, including both cars and HGVs. Other noise sources: Birdsong, pedestrians, and cyclists.
ML2	Unattended	12/10/2023 1010hrs	16/10/2023 1415hrs	Dominant noise sources: Birdsong Other noise sources: pedestrians, and cyclists. One train observed while on site, however noise from other trains was measured and included in the results.
ML3	Attended	12/10/2023 1110hrs	12/10/2023 1410hrs	Dominant noise sources: industrial noise from Eco-Readymix to the north. Other noise sources: Birdsong, pedestrians, and cyclists.
ML4	Attended	16/10/2023 1045hrs	16/10/2023 1345hrs	Dominant noise sources: Road traffic on Bangor Road (B5426) and the landfill site to the south. Other noise sources: Birdsong

3.1.8 The noise survey includes representative measurements of noise sources at the proposed development site, it therefore allows for a robust assessment to be made of the effects of noise at the development site.

3.1.9 Weather conditions on 12th October during the installation of the sound level meters were as follows:

- Wind: 1-3ms⁻¹;
- Dry, with temperatures ranging from 3-7°C; and
- 90% cloud coverage.

3.1.10 Weather conditions on 16th of October during the collection of the sound level meters were as follows:

- Wind: 5ms⁻¹;
- Temperatures ranging from 4-8°C, with very light rain beginning; and,
- 100% cloud coverage.

3.1.11 Weather data was collected from 'Wundermap' ([WunderMap® | Interactive Weather Map and Radar | Weather Underground \(wunderground.com\)](#)) for the periods of time where WA was not present on site. Note that all of the data collected during periods of rainfall has been discarded from the reported results, these periods are highlighted in red in Appendix B.

3.2 Measured Noise Levels

3.2.1 The noise levels measured during the noise survey have been divided into daytime (0700-2300 hours) and night-time (2300-0700 hours) categories. The individual levels have been arithmetically averaged to give single daytime and night-time ambient, sound levels.

3.2.2 The individual event levels ($L_{Amax,f}$) during the night-time have been analysed using the audio recording taken during the noise monitoring. In accordance with ProPG, the 10th highest occurring event level for night-time periods was used for the assessment.

3.2.3 The results of the noise survey are presented in Table 2 below.

Monitoring Location	Time Period	Measured Noise Level, (Logarithmically Averaged), L_{Aeq}	10 th Highest Measured Noise Level (dB $L_{Af, max}$)	Background Sound Level (Arithmetically Averaged) L_{A90}	Background Sound Level (Modal Average) L_{A90}
ML1 – Hafod road	Daytime (0700-2300)	62	N/A	47	45
	Night-time (2300-0700)	57	86	39	35
ML2 – Railway Line	Daytime (0700-2300)	62	N/A	N/A	N/A
	Night-time (2300-0700)	58	92	N/A	N/A
ML3 – North	Daytime (0700-2300)	56	N/A	N/A	N/A

Table 2: Average Daytime and Night-time Noise Levels

Monitoring Location	Time Period	Measured Noise Level, (Logarithmically Averaged), L_{Aeq}	10 th Highest Measured Noise Level (dB $L_{Af, max}$)	Background Sound Level (Arithmetically Averaged) L_{A90}	Background Sound Level (Modal Average) L_{A90}
	Night-time (2300-0700)	N/A	N/A	N/A	N/A
ML4 - South	Daytime (0700-2300)	57	N/A	N/A	N/A
	Night-time (2300-0700)	N/A	N/A	N/A	N/A

3.2.4 Based on the above, a robust assessment can be made of the noise mitigation measures which are necessary to achieve the required internal noise guideline levels at proposed receptors, in accordance with Condition 18. The results of the survey also serve as a representative level for the current background level to predict changes in the background level to discharge Condition 19.

3.2.5 Further details of the measured levels are shown in **Appendix B**.

4 ASSUMPTIONS, AND UNCERTAINTY

4.1 Introduction

4.1.1 The assessment is affected by the following assumptions and limitations.

4.2 Assumptions

4.2.1 The following assumptions have been made,

- The development will be constructed using traditional construction methods, and that piling may be required.
- The proposed development has been modelled to scale with reference to layout drawing 'BDC Layout (002)',
- The model has an assumed temperature of 10°C, 70% humidity, and 1013.3mbar air pressure. The intervening ground between the noise sources and site is a mixture of hard and soft ground, hence the use of 0.6 as the term to represent ground absorption (where 0 = completely absorbent and 1 = completely reflective),
- Development led road traffic will not significantly affect the road traffic noise at existing receptors, and,
- An open window provides around 13dB noise attenuation.

4.3 Limitations

4.3.1 As the detailed traffic flow information for the construction phase of the proposed development is not available at this stage, it is not possible to undertake a quantitative assessment of the impact of these associated vehicles at receptor locations.

4.3.2 Forecasting of construction traffic is difficult at this stage as the level of construction traffic will be dictated by the future build programme, which will be determined by the operator during detailed design. In order to quantify the level of construction vehicles on a link-by-link basis, the following information will be required.

- The daily quantum of construction vehicles per day.
- A split of vehicle types used during construction (contractor to specify).
- Origin/destination information for construction vehicles.
- The location of the Site access(es) to be used during the construction phases.

- The agreed route through the development area that will be taken by HGVs.
- The arrival times of construction related journeys.
- The number of construction workers.
- Details of any transport strategies adopted through the construction phases.

4.3.3 At this stage, detailed information regarding the nature and timescales of activities likely to take place during the earthworks and construction phase are not known. Many of these unknown details will be resolved in due course during detailed design.

4.3.4 A provision has been made for 465sqm (B2/B8) industrial, storage and distribution and 235sqm (A1) retail unit, vehicular access to the development will be via Bangor Road to the south of the site. Proposed plant specifications are not available at this time so noise limits have been set to comply with relevant standards.

4.4 Uncertainty

4.4.1 To reduce the level of uncertainty within the assessment, the following steps have been taken,

- In accordance with guidance, the microphone was mounted vertically on a tripod 1.5m above the ground. The monitoring was carried out more than 3.5 metres from any other reflecting surfaces,
- The distance between the source and nearest receptors has been measured from scale plans showing the location of the development,
- The noise measurements were undertaken with any unsuitable weather being removed from the data,
- The results of each measurement period were reported to the nearest 0.1dB,
- Noise measurements were made using a Class 1, integrating sound level meter, and,
- The sound level meter was calibrated prior to and following the noise survey, no significant drift in calibration was recorded.

5 CONSTRUCTION PHASE IMPACT ASSESSMENT

5.1 Construction Phase Noise

- 5.1.1 The activities associated with the earthworks and construction phase of the proposed development have the potential to generate noise and create an impact on the surrounding area. Construction noise can have effects on the surrounding neighbourhood. The effects are varied and are complicated further by the nature of the site works, which will be characterised by mobile noise sources that will change location throughout the construction period. The duration of construction works is also an important consideration. Higher noise levels may be acceptable if it is known that the levels will occur for a limited period.
- 5.1.2 Furthermore, there may be dwellings which become occupied during the construction phase, and these receptors could be adversely affected.
- 5.1.3 During the earthworks and construction phase, any work carried out at the site is likely to generate noise that may propagate beyond the boundary of the site. Activities on the site that could give rise to construction related noise impacts include (but are not limited to) the following.
- Site preparation (e.g. ground excavation, levelling of ground, trenching, trench filling, unloading and levelling of hardcore and compacting filling).
 - Construction of the Proposed Development, including piling, the creation of access roads, fabrication processes (e.g. planing, sanding, routing, cutting, drilling and laying foundations).
- 5.1.4 Residents generally understand that there will be some noise when construction is underway and identify that issues tend to occur where work starts early, finishes late or takes place on Saturday afternoon, Sundays or Bank Holidays.
- 5.1.5 Based on the ambient noise levels measured during the daytime period, noise during the construction phase would need to be limited to 65dB(A) during the daytime when considered at residential receptors.
- 5.1.6 Adherence with this limit would ensure that residential receptors do not suffer a significant adverse effect.
- 5.1.7 However, the earthworks and construction phase activities have the potential to generate short-term increases in noise levels, above 65dB(A). The level of noise received at the receptors closest to the Proposed Development would depend upon

the sound power levels of the machines used, the distance to the properties, the presence of screening or reflecting surfaces and the ability of the intervening ground to absorb the propagating noise.

5.2 Construction Phase Vibration

5.2.1 It is not possible to fully mitigate vibration emissions from an open site. It is important therefore to examine the proposed working method to ascertain what, if any, operations would be likely to cause unacceptable levels of vibration at nearby sensitive locations. It is possible that these operations could be modified to reduce their vibration impacts.

5.2.2 The nearest residential receptor to the proposed construction works, will vary depending upon the part of the proposed development under construction. As a worst-case scenario, earthworks and construction works may potentially take place at, approximately, 10m from existing residential properties. At this distance, it is considered possible that vibration due to the operation of construction machinery will be above the threshold of complaint.

5.2.3 In addition to the earthworks and construction works described, it is possible that piling will be required. At this time, the type(s) of piling that would be used at various locations across the site is not known and it is likely that the contractor responsible for undertaking construction works at the Site would decide the appropriate method of piling required. BS5228-2 recognises that the most common form of vibration associated with piling is the intermittent type derived from conventional driven piling. The intensity of vibration disturbance, which may be registered at a receptor, will be a function of many factors. These are set out in BS 5228-2 and include:

- Energy per blow or cycle;
- Distance between source and receptor;
- Soil structure interaction (i.e. nature of connection between soil and structure being monitored); and
- Construction of structure and location of measuring points (e.g. soil surface, building foundation and internal structural element).

5.2.4 Detailed information regarding the above is not yet known and it is not possible to assess the potential impacts of vibration generated by piling.

- 5.2.5 Therefore, if piling were required, and based upon previous experience and reasonable assumptions made at this stage, vibrations arising from the construction phase are likely to have a short-term adverse effect on existing residential properties.
- 5.2.6 However, if piling were not required, and based upon previous experience and reasonable assumptions made at this stage, vibrations arising from the construction phase are could have a short-term adverse effect on existing residential properties of prior to the implementation of mitigation measures.
- 5.2.7 The receptors likely to be affected by piling will vary depending on the phase of the Proposed Development under construction. Once the precise building locations, ground conditions for each location and type(s) of piling are confirmed, vibration levels could be estimated and recommendations for control made as appropriate.

6 OPERATIONAL PHASE NOISE MODELLING

6.1 Introduction

- 6.1.1 This section of the report sets out the details of the methodologies used to prepare the noise model so that existing levels of noise affecting the site can be accurately determined at all parts of the proposed development.
- 6.1.2 The model has also been used to determine the appropriate mitigation measures to meet the noise levels which are required by the planning condition.

6.2 Noise Model Setup

- 6.2.1 The assessment of the propagation of sound across the developed site has been undertaken using the noise modelling software SoundPLAN version 9.0.
- 6.2.2 SoundPLAN software uses geographical information to create a model of the study area on which to generate noise contours and includes objects that affect the propagation of noise such as buildings and topography.
- 6.2.3 The SoundPLAN model uses the noise prediction methodology set out in ISO 9613-2:1996 'Attenuation of sound during propagation outdoors'. The noise modelling produces noise contour plans demonstrating the levels of transportation noise across the site.
- 6.2.4 The following noise sources have been input and calibrated in the noise model:
- Hafod Road.
 - The railway line to the east.
 - Eco-ReadyMix to the north
 - Bangor road and the landfill site to the south
- 6.2.5 The noise modelling has been checked for accuracy against the measured noise levels. This has been undertaken to assess the suitability of the noise model to determine the propagation of noise across the site. This has been undertaken by co-locating a receptor location with the monitoring location in the model, the results are shown in Table 3.

Table 3: Noise Model Calibration					
Monitoring Location	Measurement Period	Measurement Parameters	Measured Noise Level	Modelled Noise Level	Calibration Difference
ML1	Daytime	dB LAeq, 16hrs	61.7	61.7	0.0
	Night	dB LAeq, 8hr	54.9	54.8	-0.1
		dB LAmax,f	86.2	86.2	0.0
ML2	Daytime	dB LAeq, 16hrs	62.2	62.1	0.0
	Night	dB LAeq, 8hr	55.9	55.9	0.0
		dB LAmax,f	91.6	91.8	+0.2

6.3 Modelling Results

- 6.3.1 The following noise modelling drawings have been prepared, based upon the information collected during the baseline surveys, information from the client, and development proposals, including proposed mitigation measures.
- 6.3.2 The drawings have been used inform the noise impact assessment in Section 6 of this report and are in accordance with the requirements of Condition 18.

7 OPERATIONAL NOISE IMPACT ASSESSMENT

7.1 Introduction

- 7.1.1 An assessment of the effect of noise from existing sources of noise has been carried out for the development site. The assessment uses the noise model outputs as described in Section 5 of this report.

7.2 Assessment of Noise in External Areas

- 7.2.1 In accordance with the requirements of BS8233, and as required by the planning condition, “The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$ ”.
- 7.2.2 The results of the computer modelling, with 1.8m high fences included around gardens, as proposed by the developer, identifies that all of the proposed external amenity areas are below the lower guideline value of 50dB(A) $L_{eq,16hr}$. The results are shown in Drawing GM13056-001.

7.3 Assessment of Internal Noise Levels in Habitable rooms

- 7.3.1 SoundPLAN noise modelling has been used to calculate the noise levels at the façades of proposed dwellings during the daytime. The calculated levels are summarised in Drawing GM13056-002.
- 7.3.2 In accordance with BS8233, and as required by the planning condition, the internal noise level in living rooms and bedrooms during the daytime should be no more than 35dB(A) $L_{eq,16hour}$. Appropriate mitigation measures have been identified in Section 7 to achieve this guideline noise level in living rooms and bedrooms during the daytime.
- 7.3.3 As the required internal noise level for living rooms is 35dB(A) $L_{eq,16hr}$, and an open window will attenuate noise by 13dB(A), all facades need to have levels below 48dB(A) $L_{eq,16hr}$ to allow for the windows to be open whilst still achieving the required internal noise level. The computer noise model identifies that there are some dwellings with a façade noise level above 48dB(A) $L_{eq,16hr}$, and so noise mitigation measures will be required for some dwellings.

7.4 Assessment of Night-Time Noise levels in Bedrooms

- 7.4.1 SoundPLAN noise modelling has been used to calculate the noise levels at the proposed dwellings during the night-time. The calculated average noise levels at the façades of the proposed developments during the night-time are summarised in Drawing GM13056-003.
- 7.4.2 In accordance with BS8233, and as required by the planning condition, the internal noise level in bedrooms at night should achieve 30dB(A) $L_{eq,8hour}$.
- 7.4.3 As the required internal noise level for bedrooms is 30dB(A) $L_{eq,8hour}$, and an open window will attenuate noise by 13dB(A) $L_{eq,8hour}$, all facades need to have levels below 43dB(A) to allow for the windows to be open whilst still achieving the required internal noise level. The computer noise model identifies that there are some dwellings with a façade noise level above 43dB(A) $L_{eq,8hour}$, and so noise mitigation measures will be required for some dwellings.
- 7.4.4 SoundPLAN noise modelling has also been used to calculate the $L_{Af,Max}$ noise levels at proposed dwellings during the night-time. The calculated maximum noise levels at the façades of the properties, during the night-time are summarised in Drawing GM13056-004.
- 7.4.5 In accordance with BS8233, and as required by the planning condition, the internal noise level in bedrooms at night should not exceed 45dB(A) $L_{f,Max}$, more than 10 times per night.
- 7.4.6 The maximum internal noise level for bedrooms is 45dB(A) $L_{f,Max}$, and an open window will attenuate noise by 13dB(A). Facades levels below 58dB(A) $L_{f,Max}$ will not require any mitigation, allowing for the windows to be opened whilst still achieving the required internal noise level. The façade noise level at the majority of dwellings across the development is below 58dB(A), therefore no mitigation will be required at these dwellings. Only a small number of dwellings in the eastern part of the site closest to Hafod road exceed 58dB(A) $L_{f,Max}$ and will require mitigation to meet internal guideline levels.

7.5 Noise Impacts Associated with Proposed Commercial Area

- 7.5.1 A provision has been made for a commercial area to be constructed in the southern part of the site with associated parking spaces and vehicle access. Proposed plant specifications are not available at this time therefore, noise limits for the commercial area have been determined in accordance with BS 4142. Adherence with these noise limits will ensure that the impact from the industrial and commercial areas do not exceed 5dB above the measured background noise level when considered at existing and proposed noise sensitive receptors.
- 7.5.2 For the purpose of this assessment plant noise emission limit is set in accordance with BS4142. Background sound levels measured on site are summarised in Table 2. Any plant associated with the proposed commercial area should be designed such that its rating noise level at receptors does not exceed the background sound levels shown in Table 2.
- 7.5.3 The rating level of the plant, deliveries and car park area associated with the proposed commercial area should not exceed 50dB(A) during the daytime period and 40dB(A) during the night-time at the noise sensitive receptors. When considering free field distance attenuation and the closest noise sensitive receptor being 130 metres away, the total sound pressure level should not exceed 87dB(A) during the daytime period and 77dB(A) during the night-time when measured 1 metre away from the proposed plant.
- 7.5.4 All plant should be designed and or mitigated to the levels specified above.

7.6 Summary

- 7.6.1 The assessment shows that some windows of some dwellings will need to be closed to achieve the noise limits in the planning condition. However, it is essential that rooms are appropriately ventilated, therefore mitigation will be required for some dwellings.
- 7.6.2 Therefore, noise break in calculations have been carried out to determine the appropriate glazing and an alternative means of ventilation for the proposed dwellings. The results of these calculations have been used to inform the required mitigation, in accordance with Condition 18, as defined in Section 7 below.

8 NOISE MITIGATION MEASURES

8.1 Introduction

8.1.1 This section of the assessment considers the mitigation measures required to meet the criteria detailed in BS5228 and BS8233 as required by Condition 18.

8.2 Construction Phase Mitigation

Construction Phase Noise

8.2.1 We would suggest that the following measures will also be included to minimise noise emissions during the construction phase.

- When works are taking place within close proximity to the sensitive receptors identified, the screening of noise sources via the erection of temporary screens will be employed.
- All machinery will be regularly maintained to control noise emissions, with particular emphasis on lubrication of bearings and the integrity of silencers.
- Site staff will be made aware that they are working adjacent to a sensitive area and avoid all unnecessary noise due to misuse of tools and equipment, unnecessary shouting and radios.
- As far as possible, the avoidance of two noisy operations occurring simultaneously in close proximity to the same sensitive receptor.
- Adherence to any time limits imposed on noisy works by the local authority.
- Implement set working hours during the week and at weekends.
- Ensure engines are turned off when possible.
- Should earthworks and construction activities need to be carried out during night-time hours, the local authority may include a planning condition that requests advance notice and details of any night working to be provided.

Vibration from Earthworks and Construction

8.2.2 BS 5228-2 recognises that the most common form of vibration associated with piling is the intermittent type derived from conventional driven piling. Whilst it is recognised that the piling process will need to be selected on the basis of the strata to be encountered, the loads to be supported and the economics of the system, careful consideration (by the appointed Contractor(s)) will be given to the type of piling to be

used in order to minimise the potential for vibration to be generated by any necessary piling.

8.2.3 The receptors likely to be affected by piling (if required) will vary depending on the phase of the proposed development under construction. Once the precise building locations and ground conditions for each location and type(s) of piling are confirmed, vibration levels will be estimated and recommendations for control made as appropriate.

8.2.4 To keep ground borne vibration to a minimum the following measures (as referred to in BS 5228-2) will be put in place.

- Substitution: Where reasonably practicable, plant and or methods of work likely to cause significant levels of vibration at the receptors identified will be replaced by less intrusive plant/methods of working.
- Isolation of plant at source: This may prove a viable option where the plant is stationary (e.g. a compressor, generator) and located close to a receptor.

8.2.5 There are a number of measures that can be implemented, depending upon the type of piling chosen (e.g. continuous flight auger (CFA) piling produces significantly less vibration than conventional driven piling and, therefore, fewer mitigation measures would be required if CFA piling were chosen as the preferred method). Additionally, the distance between the piling rig and the receptors has a significant bearing upon the likely impact, and the vibration produced by piling is transient and occurs in any one location for only a limited period of time.

8.2.6 BS5228-2 indicates that mitigation might include the use of alternative methods, removal of obstructions, provision of cut-off trenches, reduction of energy input per blow, reduction of resistance to penetration. As the construction programme and methodologies become more defined, earthworks and construction vibration will be reviewed and a detailed strategy for control will be devised and implemented.

8.3 External Amenity Areas

8.3.1 The results of the computer noise model, which are shown on Drawing GM13056-001, identify that the noise in all gardens will be below the upper guideline level of 55dB $L_{Aeq,16hrs}$.

8.4 Internal Noise Level

- 8.4.1 Our assessment shows that a specification for glazing and ventilation will be required for some plots to meet the requirements of Condition 18.
- 8.4.2 The internal noise levels have been calculated using octave band composite SRI break-in calculations. External noise levels have been taken from the SoundPLAN noise model. Values have been determined for both the ground floor and the first floor.
- 8.4.3 Noise break-in calculations have been conducted to determine the requirements for glazing and ventilation to achieve a 35dB $L_{Aeq,16hr}$ during the day, and 30dB $L_{Aeq,8hr}$ during the night and 45dB $L_{Amax,F}$ no more than 10 times per night.
- 8.4.4 Noise break-in calculations have been carried out for the most affected plots to determine the details of the noise mitigation required, to achieve the internal noise guideline levels in BS8233, and are shown as Drawings attached to this report in accordance with Condition 18.
- 8.4.5 Therefore, with reference to the Façade Maps shown in Drawings GM13056-002 to 004, the glazing and ventilation requirements for each façade of the proposed development are shown in Table 4 below.

Table 4: Mitigation Strategy for the Proposed Development			
Façade Map Colour Key	Glazing		Ventilation
	Living Rooms	Bedrooms	
	Any		Open Window
	4/12/4	10/12/4	Greenwood 2500EAW.AC1

- 8.4.6 Proposed mitigation for living room facades is shown on Drawing GM13056-005. Proposed mitigation for bedroom facades is shown on Drawing GM13056-006.
- 8.4.7 Alternative glazing or ventilation methods to those shown in Table 5 can be used, but the performance should be equal to or better than the glazing and ventilation specification described above.
- 8.4.8 We recommend that any proposed ventilation strategy is confirmed with a mechanical engineer prior to installation.

9 CONCLUSIONS

- 9.1.1 This assessment considers noise from the surrounding sources of noise on proposed dwellings. The assessment has been undertaken in line with current planning and technical guidance to enable the discharge of planning conditions, Conditions 18 and 19.
- 9.1.2 The assessment of noise at the development site relies upon the data captured by WA during a noise survey between the 12th and the 16th of October 2023.
- 9.1.3 As request by the planning condition, an assessment of noise and vibration during the construction phase has been provided, with mitigation measures suggested as appropriate.
- 9.1.4 For the operational phase assessment, the measured baseline data has been input into the 3D noise model SoundPLAN, which has been used to calculate noise levels across all parts of the development site.
- 9.1.5 The results of the computer noise model show that 50-55dB(A) would be achieved in all gardens, with the installation of 1.8 metre high garden fences in most gardens with a few exceptions, as defined in this report. This noise level is required by the planning condition.
- 9.1.6 For internal living and bedroom areas in some of the dwellings, the appropriate glazing and ventilation elements specified in this report, will be required. This will meet the internal noise levels required by the planning condition. Dwellings towards the south boundary of the development will meet the noise requirements of the condition even with an open window.
- 9.1.7 The products in the final build must meet or exceed the attenuation of the glazing and ventilation in Table 4 of this report.
- 9.1.8 In accordance with Condition 18, this report shows what façade mitigation scheme is required for all noise levels at the development to be in accordance with BS8233:2014. The drawings attached to the report, together with the mitigation details set out in Table 4, comprise the scheme of mitigation required by the planning condition.

- 9.1.9 A commercial area is proposed in the southern part of the site. Noise from mechanical plant, deliveries and car park area will be attenuated so that it is less than or up to 5dB above the background sound level at proposed dwellings, as required by Condition 19.
- 9.1.10 In Accordance with condition 19, this report shows that the background level will not increase by more than 5dB at any nearby sensitive receiver at any time post-completion of the development.

APPENDICES

Appendix A

Noise Guidance and Legislation

Policy, Standards and Guidance

Appendix A

A.1 National Planning Policy Framework

In February 2021 the 'National Planning Policy Framework' (NPPF) was amended as the current planning policy guidance within England.

Paragraph 185 of the NPPF states:

'Planning policies and decisions should also ensure that new development is appropriate for its location taking in account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impact that could arise from the development. In doing so they should:

- a. Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development - and avoid noise giving rise to significant adverse impact on health and the quality of life;
- b. Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason'...

Paragraph 187 of the NPPF states:

'Planning policies and decisions should ensure that new development can be integrated with existing business and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'

A.2 Noise Policy Statement for England

With regard to 'significant adverse impacts on health and the quality of life' the NPPF refers to the 'Noise Policy Statement for England' (NPSE).

The Noise Policy Statement for England refers to the World Health Organisation when discussing noise impacts and introduces observed effect levels which are based on

established concepts from toxicology that are applied to noise impacts by WHO.

Three levels are defined as follows:

‘NOEL – No Observed Effect Level

- This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

- This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

- This is the level above which significant adverse effects on health and quality of life occur’.

The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided. The second aim refers to the situation where the impact lies somewhere between LOAEL and SOAEL, and it requires that all reasonable steps are taken to mitigate and minimise the adverse effects of noise. However, this does not mean that such adverse effects cannot occur.

A.3 Planning Practice Guidance – Noise

The Planning Practice Guidance (PPG) provides further detail about how the effect levels can be recognised. Above the NOEL noise becomes noticeable, however it has no adverse effect as it does not cause any change in behaviour or attitude. Once noise crosses the LOAEL threshold it begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. Increasing noise exposure further might cause the SOAEL threshold to be crossed. If the exposure is above this level the planning process should be used to avoid the effect occurring by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused. At the highest extreme the situation should be prevented from occurring regardless of the benefits which might arise. Table A.1 summarises the noise exposure hierarchy.

Table A.1 - National Planning Practice Guidance noise exposure hierarchy			
Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

The PPG summarises the approach to be taken when assessing noise. It accepts that noise can override other planning concerns, but states:

“Neither the Noise Policy Statement for England nor the National Planning Policy Framework (which reflects the Noise Policy Statement) expects noise to be considered in isolation, separate from the economic, social and other

environmental dimensions of proposed development”

A.4 *ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise*

ProPG Planning and Noise provides professional practice guidance in relation to new residential development exposed to noise from transport sources. It provides practitioners with a recommended approach to the management of noise within the planning system in England.

The guidance reflects the Government’s overarching National Planning Policy Framework, the Noise Policy Statement for England, and Planning Practice Guidance (including PPG-Noise) and draws on other authoritative sources of guidance. It provides advice for Local Planning Authorities and developers, and their professional advisors, on achieving good acoustic design in and around new residential developments.

A.5 *British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings*

British Standard 8233 “Guidance on sound insulation and noise reduction for buildings” 2014, suggests the following guideline noise levels and states that they are based on guidelines issued by the World Health Organisation;

- 35 dB L_{Aeq} (16 hour) during the day time in noise sensitive rooms
- 30 dB L_{Aeq} (8 hour) during the night time in bedrooms
- 45 dB $L_{Amax,F}$ during the night time in bedrooms
- 50 dB L_{Aeq} (16 hour) desirable external noise levels for amenity space such as gardens and patios
- 55 dB L_{Aeq} (16 hour) upper guideline value which would be acceptable in noisier environments.

In addition, for internal noise levels it states;

“Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.”

Furthermore, with regard to external noise, the Standard states;

“However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a

compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited”.

Appendix B

Raw Data

ML1 daytime

09:40:00	64.3	79.4	45.1	66.9
09:50:00	62.3	80.5	44.3	59.7
10:00:00	59.6	81.7	44.8	54.9
10:10:00	59.5	80.1	46.1	54.4
10:20:00	64	85.1	44.7	61.8
10:30:00	67.2	87.1	44.1	68.5
10:40:00	62.5	80.9	43.3	62.3
10:50:00	64.4	80.8	45.2	65.3
11:00:00	62.8	85.6	45	62.2
11:10:00	61.2	79.1	45.1	60.8
11:20:00	61.1	80.5	44.7	60.4
11:30:00	63.1	78.4	45.2	63.5
11:40:00	61.7	80	44.1	59.2
11:50:00	63.2	79.6	45.2	65.2
12:00:00	60.1	80.5	44.7	58.7
12:10:00	60.5	80.5	45	56
12:20:00	63.5	81.6	45	63
12:30:00	61.1	80.1	46.7	57.7
12:40:00	64.2	84.1	47.2	62.1
12:50:00	64.4	83.5	44.8	62.2
13:00:00	61	81.8	45.2	56.2
13:10:00	62.4	81.2	44.8	60.8
13:20:00	61.5	81.3	46.8	59.4
13:30:00	61	81.3	45.4	60.5
13:40:00	62.3	80.6	47.4	58.9
13:50:00	66.5	86.2	46.4	66.4
14:00:00	58.2	80.2	46.9	54.6
14:10:00	60.5	79.9	47	58.2
14:20:00	62.6	83.9	48.5	60.4
14:30:00	61.6	79	47.8	62
14:40:00	64.8	85.5	49.8	61.2
14:50:00	64.4	82.8	49.6	62.7
15:00:00	61.6	80.8	50.4	61.3
15:10:00	64.2	81.7	50.4	64
15:20:00	64.8	84.4	51.1	65.1
15:30:00	66.3	83.3	51	67.1
15:40:00	62.4	81.9	50.9	59.2
15:50:00	65.7	83.7	50.9	65.3
16:00:00	63.7	82.2	50.3	65.6
16:10:00	64.9	81.6	50.5	67.2
16:20:00	64	81.8	50.7	62.4
16:30:00	63.6	82	51.6	63.2
16:40:00	66.6	82.3	51.7	69.3
16:50:00	64.5	82.3	51.3	64.5
17:00:00	65.9	81.1	51.9	68.1
17:10:00	63.6	81.7	51.8	62.7

17:20:00	64.3	82.6	51	63.5
17:30:00	63.8	82	52	63.8
17:40:00	62.8	83.3	51.4	59.5
17:50:00	64.8	88.9	50.1	57.9
18:00:00	62.5	82.4	49.4	58.9
18:10:00	57.2	79	49.9	55.5
18:20:00	60.9	78.9	50.7	60.1
18:30:00	56.9	77.3	47.8	52.6
18:40:00	59.5	80.8	45.9	51.9
18:50:00	58.7	79.8	46.5	57.5
19:00:00	55.8	75.9	47.2	54.1
19:10:00	53.7	72.1	48	53.4
19:20:00	55	78.6	47	53.6
19:30:00	56.1	76.4	46.2	53.7
19:40:00	49.4	58.6	45.7	51.8
19:50:00	62.4	88.4	45.6	54
20:00:00	50.5	72.1	44.3	49.3
20:10:00	60	84.3	43.8	50.8
20:20:00	54.5	76.3	44	50.6
20:30:00	60.1	81.9	44	52.5
20:40:00	58.8	82.8	43.1	48.8
20:50:00	56.2	80.6	40.9	47.6
21:00:00	54.1	76.2	42.6	50.8
21:10:00	46	53.8	41	48.9
21:20:00	52.2	76.4	40.9	45.5
21:30:00	49	72	39.3	44.8
21:40:00	59.3	83.3	40.9	47
21:50:00	58.8	81.5	41.7	50.2
22:00:00	45.2	53	38.8	48.3
22:10:00	55.8	78.8	38.8	50.1
22:20:00	59.3	81.8	38.2	52.8
22:30:00	59	83	38.8	45.2
22:40:00	40.4	44.9	37.9	42.2
22:50:00	41.4	46.8	38.8	43.5
08:40:00	60.3	80	48.1	60.2
08:50:00	63.4	84.1	47.6	61
09:00:00	56	79.5	46.2	49.6
09:10:00	63.5	82.9	49.3	63.3
09:20:00	64.9	83.3	50.3	65.9
09:40:00	67.5	89.5	46.5	64.1
10:20:00	61.9	82.3	48.7	58.4
10:30:00	65.4	85.7	48.7	66.5
10:40:00	62.1	82	49.1	56.8
10:50:00	63.9	83.1	49.9	64.1
11:00:00	62.1	81.2	48.5	61.4
11:10:00	64.3	85.4	47	59
11:20:00	66.1	85.6	47.2	64.5
11:30:00	62.6	83.9	48.7	60.2

11:40:00	64.4	85.7	48.5	57.4
11:50:00	60.7	82.2	50.8	58.8
12:00:00	63.2	81.5	49.8	60.7
12:10:00	63.7	84.5	50.2	61.3
12:20:00	63.9	83.7	51.2	61.4
12:30:00	65.6	85.1	52.8	65.2
12:40:00	67.3	87.4	51.4	66.6
13:50:00	61.8	82.6	50.4	58.1
14:00:00	64	85.1	50.5	60.6
14:10:00	60.4	78.2	50.4	58.2
14:20:00	64.5	85.5	50.2	60.6
14:30:00	66.6	86.7	50.5	64.4
14:50:00	66.1	84	50.6	66.5
15:00:00	65.7	87	50.4	66
15:10:00	65.1	85.9	50.5	61.5
15:20:00	65.5	87.3	50.6	59.6
15:30:00	66.4	84.7	49.7	64.8
15:40:00	63.1	84.4	50.5	61.7
15:50:00	67	86.1	50.5	65.7
16:00:00	67.9	85.4	50.7	70.6
16:10:00	66.9	85.4	49.6	67.5
16:20:00	65	82.7	49.5	64
16:30:00	67.2	85.3	49.4	66.5
16:40:00	64.8	86	48.9	64.8
16:50:00	65.7	82.3	49.6	67.7
17:00:00	66.9	85.3	50.4	68.7
17:10:00	64.7	86	49.1	63.9
17:20:00	61.8	79.9	48.1	58.1
17:30:00	62.1	81.3	48.5	59.4
17:40:00	59.8	79.9	48.8	53.2
17:50:00	58.7	77.9	48.3	51.9
18:00:00	62.7	83.5	48.4	58.9
18:10:00	62.1	81.8	47.6	61.3
18:20:00	62.9	83.7	47.4	58.1
18:30:00	60.4	79.4	47.8	57
18:40:00	59.5	77.9	48.5	55.4
18:50:00	60.6	84.1	48.4	52.2
19:00:00	57.3	76.4	49.3	59.5
19:10:00	61.3	80.3	48.9	56.6
19:20:00	57.5	77.2	47.2	56.3
19:30:00	52.7	76.4	46.2	49.1
19:40:00	61.6	81.9	46.3	57.6
19:50:00	48.4	53.5	46.5	49.7
20:00:00	59.6	81.4	46.2	52.3
20:10:00	54.3	74.1	48.1	54.4
20:20:00	49.9	55.9	46.7	52.4
20:30:00	48.6	55.8	46.4	50.5
20:40:00	57.4	81	45	49.3

20:50:00	47.4	56.2	44.2	49.6
21:00:00	45.9	52.8	43.4	48
21:10:00	56.7	79.1	42.7	49.1
21:20:00	51.5	74.3	44.3	47.1
21:30:00	45.4	50.1	43.5	46.7
21:40:00	52.2	75.8	44.3	50.9
21:50:00	45.6	50.3	43.2	47.2
22:00:00	45.4	55.5	43.4	45.8
22:10:00	55.4	78.2	41.9	45.9
22:20:00	44.2	49.7	41.9	45.6
22:30:00	44.1	52	41.7	45.8
22:40:00	45	51.3	42.5	46.4
22:50:00	47.7	55.4	42.5	51.8
07:20:00	62.6	82.3	45.4	55.2
07:30:00	59.5	81.4	44.8	50.9
07:40:00	59.9	80.2	45.9	51.9
07:50:00	64.2	83.1	45.8	59.4
08:30:00	48	61.3	46	48.9
08:40:00	59.6	81.5	46.2	51.2
08:50:00	58.5	78.3	45.6	55.6
09:00:00	60.6	82.1	45	54.4
09:40:00	64.1	85	46.1	61.9
09:50:00	62	81.5	45	57.5
10:00:00	66.4	84.1	45.3	65.4
10:10:00	62.2	80.7	46.5	62.1
10:20:00	62.2	82.8	49.3	60.2
10:30:00	59.8	79.6	49.6	58.4
10:40:00	61.3	81.6	47.7	55.9
10:50:00	63	82.4	47.4	60.1
11:00:00	64.7	85.1	48.1	60.8
11:30:00	63.5	82.6	46.7	61.8
11:40:00	57.1	77	46.6	51.5
11:50:00	57.5	78.9	49.4	52.9
12:00:00	63.7	84.6	48.6	60.8
12:10:00	61.1	81.5	48.6	59.2
12:20:00	62	82.3	49.4	58.7
12:30:00	62	82.1	49.1	58.9
12:40:00	58.2	77.9	47.5	52.1
12:50:00	56.4	77.1	45	50.5
13:00:00	60	80.6	47.2	56.6
13:10:00	61.6	81.3	49.1	57.1
13:20:00	61.8	80.2	48.1	59.4
13:30:00	60.1	79.9	48.3	54.1
13:40:00	61.6	86.5	49.4	57
13:50:00	61.8	78.5	50.7	60
14:00:00	59.5	80.9	48.4	55.9
14:10:00	62.9	83.2	48.2	57.6
14:20:00	55	76.7	47.5	55.3

14:30:00	59.6	78.1	46.7	58.2
14:40:00	57	75.8	45.1	53.4
14:50:00	56.6	75.5	45.8	57.4
15:00:00	64.9	88.8	47.1	59.7
15:10:00	61.9	78.9	47.5	60.8
15:20:00	60.4	79.6	49	60.3
15:30:00	64.8	86.1	48	60.6
15:40:00	59.3	77.7	46.8	55.3
15:50:00	54.1	73	47.8	53.9
16:00:00	62.3	81.4	48.3	59.2
16:10:00	58.2	78	47.6	57.9
16:20:00	57.5	77.5	47.6	55.9
16:30:00	56.2	78.9	47.2	53.2
16:40:00	63.7	80.9	47.7	65.7
16:50:00	61	82.9	46.7	55.4
17:00:00	56.6	79.3	45.4	48
17:10:00	56.7	79.6	45.2	49.5
17:20:00	57.1	78.6	45.5	50.7
17:30:00	60.5	82.6	45.5	51.3
17:40:00	58.6	78.4	46.5	55.3
17:50:00	62.3	86.1	46.2	53.8
18:00:00	51.2	61	46.9	53.5
20:30:00	46	53	43.7	48
20:40:00	55.5	78.3	44.5	48.7
20:50:00	61.3	83.6	43.3	49.9
21:00:00	58.2	79.7	41.6	47.5
21:10:00	44	48.1	42.3	45.1
21:20:00	51.6	71	43.8	47.9
21:30:00	64.3	88.1	44.4	49.6
21:40:00	45.6	53.4	43.7	46.9
21:50:00	57.7	81.6	44.3	51.6
22:00:00	45.6	51	43.5	47.2
22:10:00	45.5	57.8	42.3	47.4
22:40:00	42.7	46.8	40.7	44.1
22:50:00	54.8	78.3	41.8	47.2
07:00:00	59.1	81.3	45.2	55.7
07:10:00	50.9	66.6	46.8	52.7
07:20:00	53.7	69.6	47	54.7
07:30:00	58.6	80.9	48.4	55.2
07:40:00	56.8	77.6	49.3	54.4
07:50:00	56.3	78.2	49.4	55.1
08:00:00	63	85.1	47.1	54.4
08:10:00	61.5	83.1	48	55.1
08:20:00	58.4	81.6	46.8	51.7
08:30:00	62.6	82.3	48.3	55.8
08:40:00	58	78	49.3	56.3
08:50:00	57.7	80.2	48.4	55.6
09:00:00	57.6	78.8	48.3	54.2

09:10:00	50	66	45.2	51.4
09:20:00	57.7	78.9	43.8	52.1
09:30:00	60.8	83	45.8	52.4
09:40:00	58.4	78.5	46.3	52.9
09:50:00	57.1	79.9	45.9	52.7
10:00:00	61.6	81.2	45	57.3
10:10:00	53.4	73.8	44.4	51.3
10:20:00	60.6	82.1	44.3	53.7
10:30:00	59.6	81.4	42.8	52.8
10:40:00	60.2	80.9	43.6	55.4
10:50:00	57.6	77.4	42.9	52.3
11:00:00	61.2	80.3	46.2	57.9
11:10:00	58.3	80.9	44.3	53.2
11:20:00	61.9	82.4	44.8	57.9
11:30:00	64.2	83	45.3	61.9
11:40:00	58.1	78.2	46.5	55.3
11:50:00	59.1	80.3	45.3	53.3
12:00:00	56.9	78.2	46.7	54.5
12:10:00	59.6	82.5	48.2	54.2
12:20:00	60.6	78.9	47.9	59.9
12:30:00	59.2	78.6	48.1	54.5
12:40:00	59.4	77.7	46.6	58.1
12:50:00	57.2	78.3	43.7	50.2
13:00:00	61.3	85	45.8	58.2
13:10:00	56	75.5	47.8	52.9
13:20:00	56.3	77.5	47.1	55.3
13:30:00	59.3	79.5	45.2	53.8
13:40:00	62.2	81.5	45.6	61.7
13:50:00	57.2	79.5	45.3	52.3
14:00:00	60.3	78.6	42.8	58.4
14:10:00	50.9	71.4	45.9	49.8
14:20:00	60.5	82.6	44.2	56.2
14:30:00	58.1	77.5	48.1	53.5
14:40:00	59	78.5	48	53.4
14:50:00	60.1	81	48.2	53.9
15:00:00	55.8	77	46.9	52.6
15:10:00	60.1	84.6	48.2	54.1
15:20:00	60.6	79.2	47.3	57.8
15:30:00	59.7	79.3	48.2	57.7
15:40:00	56.7	74.8	48.3	53.1
15:50:00	61	80.4	47.1	57.9
16:00:00	53.5	77.7	45.9	49.5
16:10:00	56.6	78	47.5	51.9
16:20:00	58.8	74.4	48.6	60
16:30:00	56.4	78.5	46.9	51.4
16:40:00	55.2	73.9	47	53.2
16:50:00	61.8	84.8	49.5	54.7
17:00:00	59.8	79.9	51.2	55.6

17:10:00	58.9	81.2	48.9	53.9
17:20:00	58.7	78.6	48.2	55.9
17:30:00	59.4	81.2	48	56
17:40:00	62.7	82.9	48.9	55.8
17:50:00	58.5	77.4	47.4	57
18:00:00	62.3	84.5	49.4	58.3
18:10:00	58.4	78.8	49.7	55.5
18:20:00	57.9	79.9	49.6	54
18:30:00	53.7	71.1	49.5	52.9
18:40:00	59.3	79.9	49.6	54.5
18:50:00	57.1	77.9	48.7	53.5
19:00:00	66.1	90.9	50.3	61.9
19:10:00	60.9	80.3	50.5	55.8
19:20:00	51.7	56.8	48.3	53.6
19:30:00	52.2	57.5	49.3	54.1
19:40:00	52	56.2	49.7	53.6
19:50:00	52.2	58.3	49.6	53.9
20:00:00	52.6	57.4	49	54.6
20:10:00	58.4	77.4	48.8	56.2
20:20:00	56.6	78.6	49.4	56.7
20:30:00	57.2	77.5	50.3	57.2
20:40:00	56.3	78	49.7	56.3
20:50:00	58.1	82.9	46.2	55.9
21:00:00	52.4	59.9	48	55.2
21:10:00	51.4	59.4	45.6	54.2
21:20:00	53.5	59.8	47.6	56
21:30:00	50	57.2	41.9	53.2
21:40:00	52.2	60.4	47.3	54.6
21:50:00	54.5	78.3	45	54
22:00:00	62.4	88.7	43.1	53.8
22:10:00	57.9	80.5	46.1	55.1
22:20:00	51	63.4	43.7	54
22:30:00	51	57.2	45.4	53.9
22:40:00	48.4	57.7	39.9	51.6
22:50:00	49.5	59.6	42.8	52.5
07:00:00	64.9	83.4	54.7	62.8
07:10:00	64.9	81.2	55.6	64.8
07:20:00	64.1	81.6	55.3	62
07:30:00	64.5	82.4	56	62.5
07:40:00	64.8	82.5	56.1	62.8
07:50:00	67	85.9	56.4	65.8
08:00:00	65.8	82.9	53.6	63.1
08:10:00	63.6	84.2	52.3	59.9
08:20:00	59.4	80.3	53.2	56.2
08:30:00	64.1	81.9	51.2	63.5
08:40:00	62.1	79.7	50.8	58.5
08:50:00	66.8	85.2	49.1	67.9
09:00:00	62.5	82.5	49.3	57.8

09:10:00	64.4	81.3	48.7	64.9
09:20:00	65.2	85.9	46.8	63.5
09:30:00	64.6	82.2	45.6	64.4
09:40:00	58.4	81.6	44.5	52.1
09:50:00	61.8	81.6	44.5	58.8
10:00:00	59.6	82.4	44.5	48.6
10:10:00	64.1	82.6	45.3	61.6
10:20:00	61.8	84	45	58.9
10:30:00	65.1	82.9	46.6	62.9
10:40:00	63.4	84.1	45.9	60.3
10:50:00	64.7	86.6	46.9	64.6
11:00:00	61.8	80.9	47.1	59.5
11:10:00	64.4	80.4	48.2	63.5
11:20:00	65.9	82.7	46.8	64.4
11:30:00	63.5	82.6	46.5	60.4
11:40:00	63.5	83.3	47.7	61.1
11:50:00	61.9	81	46.6	59.9
12:00:00	58	80.3	46.9	53.2
12:10:00	61.9	79.4	47	60.7
12:20:00	63.7	83.6	47.5	63.1
12:30:00	62.4	81	47	61.9
12:40:00	62	80.9	48.2	58.7
12:50:00	61.8	81.4	47.9	58.8
13:00:00	60.4	78.9	47.7	57
13:10:00	60.7	80.1	46.8	58.4
13:20:00	61.3	79.5	47	57.6
13:30:00	63.1	82.6	47.8	62
13:40:00	61.6	81.8	48.6	57.7

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23:00:00	41.5	48.6	37.4	43.6
23:10:00	43	47.6	40.5	45.6
23:20:00	46.3	50.2	44.9	47.4
23:30:00	46.2	52.5	44.5	47.6
23:40:00	46.4	55.4	42.7	48.8
23:50:00	45.2	51	42.9	47.5
00:00:00	46.5	57.1	44.5	48
00:10:00	47.2	56.9	45.4	48.6
00:20:00	47.7	54.5	46	48.9
00:30:00	48.1	55.9	46.8	49.1
00:40:00	48.5	53.8	47.1	49.6
00:50:00	47.8	53	46.4	48.8
01:00:00	47.9	51.9	47.1	48.4
01:10:00	47.2	51.1	45.8	48.2
01:20:00	51.8	74.6	46.7	48.4
01:30:00	48.1	56.5	46.6	48.9
01:40:00	49	54	47.8	49.7
01:50:00	48.9	55	47.9	49.5

02:00:00	49.5	52.8	48.2	50.5
02:10:00	50.9	53	50.2	51.4
02:20:00	52.4	55.5	50.4	53.6
02:30:00	51.7	57.3	50.5	52.5
02:40:00	51.9	57.4	51.1	52.5
02:50:00	51.2	55.6	50.5	51.6
03:00:00	50.2	53	49.5	50.6
03:10:00	50.8	54.2	50	51.2
03:20:00	50.5	59.3	49.9	50.7
03:30:00	55	77.9	50.5	51.4
03:40:00	49.3	56.4	48.1	50.3
03:50:00	55	77.9	49.4	50.4
04:00:00	48.8	53.8	47.9	49.3
04:10:00	49.6	55	48.4	50.3
04:20:00	55.3	79.8	46.3	48.5
04:30:00	61.1	82	44.7	49.3
04:40:00	49.7	54.6	47.9	50.6
04:50:00	61.6	85.9	48.5	50.5
05:00:00	50.9	55.5	49.6	51.8
05:10:00	50.2	54.7	48.5	51
05:20:00	51.6	54.9	50.5	52.2
05:30:00	52.4	55.2	51.5	52.8
05:40:00	64.6	84.9	50.7	60.1
05:50:00	67.8	84.4	53.7	68.1
06:00:00	66.2	82.8	49.5	66.9
06:10:00	62.9	82.4	48.4	55.3
06:20:00	66.6	83.8	50.7	65.1
06:30:00	64.5	85.7	47.2	55.5
06:40:00	67.5	83.9	45.9	68.5
06:50:00	67.4	84.4	49.1	68.1
23:00:00	42.5	50.1	39.3	44.6
23:10:00	52.4	77	40.6	46.9
23:20:00	42.5	46.5	40.7	43.8
23:30:00	50.9	75.9	40.5	44.1
23:40:00	42.3	46.5	40.3	44.1
23:50:00	48.7	69.5	40.1	45.8
00:00:00	54.9	77.8	39.4	44.9
00:10:00	43.3	51.9	40.1	45.5
00:20:00	47.8	69.2	40.6	46.7
00:30:00	57.4	82.2	39.5	46.5
00:40:00	40.8	53.3	37.3	42.7
00:50:00	39.1	45.1	36.4	40.8
01:00:00	38	45.3	35.6	39.6
01:10:00	38.7	46.8	35.6	40.7
01:20:00	37.5	47.1	32.5	40.2
01:30:00	40.2	51	35.2	43.3
01:40:00	37.2	46.7	33.5	39.2
01:50:00	37.7	50.4	32.6	40.7

02:00:00	40.8	54.3	33.8	44
02:10:00	38.1	48.8	34	40.6
02:20:00	42.4	55	35.2	45.1
02:30:00	42.2	53	34.9	45.9
02:40:00	41.3	51.1	35.3	43.7
02:50:00	39.3	51.9	34.1	41.4
03:00:00	39.7	51.2	34.5	42.9
03:10:00	40.1	50.2	33	43.7
03:20:00	41.2	51.4	35.4	44.5
03:30:00	38.3	48.2	32.9	41.1
03:40:00	37.7	46.7	33	40.6
03:50:00	38.8	51.2	32.9	41.8
04:00:00	37.5	48.3	34.8	39.6
04:10:00	40.7	52.7	35.3	43.6
04:20:00	40.8	50.2	34.8	44.3
04:30:00	41.3	52.9	36.5	44.1
04:40:00	42	49.7	37.6	44.5
04:50:00	55.4	79.7	37.6	44.6
05:00:00	54	79.4	36.2	46.7
05:10:00	43.6	51.1	38.9	46.6
05:20:00	43.7	50.8	39.5	46.3
05:30:00	55.6	78.7	41.4	48.7
05:40:00	44.4	50.3	39.9	46.9
05:50:00	58	83.1	41.1	49.6
06:00:00	46.6	55.9	41.8	49.1
06:10:00	50.1	65.1	44.9	52.1
06:20:00	60.8	81.7	47.4	53.7
06:30:00	59.7	79	47.6	54.4
06:40:00	63.2	88.4	45.3	51.6
06:50:00	59	83.4	44.3	55.9
23:00:00	44.4	53.7	42.4	45.7
23:10:00	43.4	48.7	41.6	45
23:20:00	44.3	48.3	42.2	45.9
23:30:00	43.6	47.8	40.9	45.1
23:40:00	54.6	79.6	41.3	45.4
23:50:00	42.8	47.8	40.1	44.6
00:00:00	42.9	50.5	40.5	44.6
00:10:00	42.2	46.4	40	43.7
00:20:00	46.3	63	40.8	45.8
00:30:00	43.8	50.6	41	45.4
00:40:00	54.8	79.7	41	45.5
00:50:00	44	49.9	38.6	47.1
01:00:00	45.7	53.5	41.3	48.7
01:10:00	43.1	53.7	38.4	45.8
01:20:00	40.6	45.6	38.2	41.9
01:30:00	40.6	46.7	37.9	42.2
01:40:00	54.8	79.3	35.8	43.5
01:50:00	44.2	59.6	37.4	46.1

02:00:00	41.1	51.7	35.9	44
02:10:00	40.5	47.3	36.3	43.2
02:20:00	55	79.9	37.3	44.2
02:30:00	43.4	50.6	35.8	46.9
02:40:00	39.5	49.5	31.4	42.7
02:50:00	39	48.3	34.6	41.4
03:00:00	41.3	50.1	35.5	44.2
03:10:00	43.4	50	38	46.6
03:20:00	55.4	80.7	34.5	41.6
03:30:00	55.6	79.5	36.4	42.8
03:40:00	58.5	83.7	36.8	50.1
03:50:00	43.9	52.2	37.2	47.4
04:00:00	41.8	49.1	37.8	44.4
04:10:00	42.4	50.6	37	45.5
04:20:00	43.6	53.6	38.1	45.8
04:30:00	47.8	53.3	42.9	50.2
04:40:00	43.4	50.3	39.5	46
04:50:00	41.7	50.3	36.9	44.6
05:00:00	40.9	51.3	36.4	44
05:10:00	42.2	53.8	35.6	46
05:20:00	41.5	48.4	37.8	44
05:30:00	42.5	52	37.9	45
05:40:00	54.8	79.3	38.7	45.5
05:50:00	56.4	80.6	41.3	46.6
06:00:00	59.1	80.3	40	47.6
06:10:00	58.4	79.9	43.4	52.5
06:20:00	52.7	75.5	42.1	52.1
06:30:00	50.3	65.7	42.5	52
06:40:00	56.8	79	43.8	51.6
06:50:00	57.7	78.4	44.3	54
23:00:00	49	55.7	42.3	52
23:10:00	48.8	56.5	41.1	52.3
23:20:00	48	56.4	39.4	51.4
23:30:00	47.8	56.6	36.4	51.6
23:40:00	56.3	80.1	41.3	53
23:50:00	47.3	55.4	34.9	51
00:00:00	49.2	57.9	38.8	53
00:10:00	48.6	58.3	37.7	52.3
00:20:00	46.7	58.1	33.1	50.9
00:30:00	48.2	59.7	36.2	51.9
00:40:00	45.8	56.1	33.7	50.1
00:50:00	46.9	58.3	34.8	50.9
01:00:00	47.8	55.9	32.9	52.2
01:10:00	46.3	56.7	30.3	50.6
01:20:00	48.2	58.8	35.2	52.1
01:30:00	49	56.9	38.6	53.1
01:40:00	47.3	57.6	36.4	50.9
01:50:00	42.4	52.9	32.6	46.8

02:00:00	43.3	53.1	34.4	47.2
02:10:00	45.7	53.9	35.9	49.8
02:20:00	45.6	53.7	34.7	49.9
02:30:00	45.5	54.9	31.4	50
02:40:00	45.5	55.6	34.4	49.5
02:50:00	41.8	57.2	27.6	46.5
03:00:00	45.5	54.6	33.4	49.5
03:10:00	44.4	54.9	30.9	48.8
03:20:00	47.1	56.3	33.8	51.1
03:30:00	47.5	59.2	36.9	51.2
03:40:00	46.1	56.2	34.7	50.4
03:50:00	60.2	85.1	37.3	51.5
04:00:00	48	56.9	35.3	51.9
04:10:00	57.7	81.7	40.4	53.6
04:20:00	49.8	57.9	40.2	53.5
04:30:00	56.1	80.9	40.9	53.5
04:40:00	50	56.3	42.6	53.1
04:50:00	61.4	85.5	46.4	56.4
05:00:00	57.3	80.8	47.8	55.6
05:10:00	57.4	77.6	49.4	56.7
05:20:00	59.6	83	50	56.9
05:30:00	61.9	81.8	49.8	56.9
05:40:00	63.4	82.6	50.4	59.7
05:50:00	67.1	83.1	50.9	68.2
06:00:00	64.6	82.5	52.1	62.6
06:10:00	57.9	79.9	52.4	58
06:20:00	64.6	83	52.2	63.5
06:30:00	65.3	85	52.8	63.7
06:40:00	63.7	82.7	53.1	61.2
06:50:00	62.8	80.3	53	60.9

ML2 Day

Period				
start	Leq	Lmax	L90	L10
10:20:00	41.7	55.8	37.4	44.3
10:30:00	43.7	57.9	36.8	45.5
10:40:00	40.1	52.3	36.6	42.1
10:50:00	68.6	90.8	39.1	47.9
11:00:00	43.4	52.2	40.5	45.1
11:10:00	45.3	50.2	42.5	47.3
11:20:00	41.9	49.4	38.9	44.2
11:30:00	41.9	50.3	38.7	44.3
11:40:00	40.5	55.6	37	42.3
11:50:00	68.1	94.2	37.6	43.6
12:00:00	58.2	83.4	38.1	41.6
12:10:00	41.4	50.1	38	43.7
12:20:00	41.4	51	39	42.8
12:30:00	43.3	51.3	40.9	44.7
12:40:00	59.2	84.3	40	44.2

12:50:00	64.9	89.3	40.6	45.1
13:00:00	42	50.5	39.5	43.7
13:10:00	41.7	52.5	39.1	43.3
13:20:00	41.7	50.8	39.8	43
13:30:00	43.5	58.3	40.5	45.3
13:40:00	62.5	85.6	40.7	45.2
13:50:00	71.4	94.9	40.6	46.2
14:00:00	60.1	85.2	41.8	46.9
14:10:00	45.5	57.1	42	47.5
14:20:00	44.3	52.8	42.2	45.7
14:30:00	43.9	52.8	41.8	45.2
14:40:00	44.4	55.6	41.9	45.9
14:50:00	68.7	92.2	42.4	45.8
15:00:00	45.9	56.5	43.3	47
15:10:00	45.9	51.4	43.6	47.6
15:20:00	45.8	58.2	43.8	46.9
15:30:00	44.8	50.1	42.9	46
15:40:00	45.5	49.2	43.7	46.9
15:50:00	70.6	93.3	44.4	49.1
16:00:00	60.2	84.4	44.5	48.2
16:10:00	45.8	54.7	44	47
16:20:00	46.1	50.8	44.2	47.4
16:30:00	46.9	51.9	45.4	48.2
16:40:00	48.5	54.8	45.6	50.9
16:50:00	70.3	92.7	44.3	49
17:00:00	47.6	63.2	44.9	48
17:10:00	47	52.1	45.3	48.2
17:20:00	46.3	50.3	45	47.4
17:30:00	46.9	50.6	45.1	48.1
17:40:00	46.5	53.5	44.8	47.5
17:50:00	68	92	44.8	48.7
18:00:00	59.8	85.1	44.4	47.3
18:10:00	46.2	57.8	44.1	47.1
18:20:00	46.1	51	44.3	47.6
18:30:00	46.5	56.4	44	47.6
18:40:00	62.6	88.7	41.6	47.7
18:50:00	64.8	89.5	41.3	46.4
19:00:00	43.8	48.9	41.5	45.4
19:10:00	75.8	94	41.2	50.5
19:20:00	43.1	49	40.8	44.7
19:30:00	67.8	91.5	40.8	46.7
19:40:00	42.7	47.7	40.1	44.6
19:50:00	68.5	93.9	39.2	46.2
20:00:00	39.6	45.2	37.3	41.3
20:10:00	38.8	42.2	37	40.2
20:20:00	66.4	90.9	37.4	42.2
20:30:00	41.2	49.2	38.3	43.4
20:40:00	39.3	45.5	37.3	40.5

20:50:00	38	46.3	35.4	39.6
21:00:00	70.2	93.8	36	45.9
21:10:00	72.2	91.4	36.2	44.1
21:20:00	38.1	45	35.3	39.9
21:30:00	36.7	40.7	34.1	38.5
21:40:00	38	45.5	34.6	40.1
21:50:00	39.1	44.9	35.7	41.2
22:00:00	38.2	44.4	34.5	40.4
22:10:00	68	92	34.7	41.4
22:20:00	38.4	47.1	34.5	41
22:30:00	37.2	41.8	35.3	38.5
22:40:00	36.1	41.5	34.2	37.3
22:50:00	63.5	86.3	34.2	37.7
07:00:00	46.8	50.3	45.5	48.2
07:10:00	66.1	90.6	48.2	55
07:20:00	50.9	65.6	48	51.8
07:30:00	62.5	86.9	49.4	55.2
07:40:00	61.2	84.8	49.1	51.6
07:50:00	51.1	55.5	47.5	53.9
08:00:00	67.1	89.6	49.6	53.7
08:10:00	53.2	56.3	51.2	55.5
08:20:00	49.2	52.9	47.3	50.7
08:30:00	48	64.5	44.1	48.1
08:40:00	45.4	57	43.3	47
08:50:00	63.1	86.6	43.3	46.7
09:00:00	64.9	89.4	42.3	46.6
09:10:00	46.5	56.2	43.1	48.1
09:20:00	49	54.4	45.1	52
09:30:00	59.1	84.3	43.2	48.1
09:40:00	70	93	41	48.5
09:50:00	44.6	48.6	42.8	45.7
10:00:00	45	52.1	42.8	46.8
10:10:00	73.8	93.1	41.6	47.3
10:20:00	43.9	52.3	41.5	45.3
10:30:00	44.8	52.6	42.6	45.9
10:40:00	45	50.9	43.3	46.3
10:50:00	61.2	84.9	43.3	48.3
11:00:00	68.5	91.2	42.4	46.8
11:10:00	43	52	41	44.3
11:20:00	42.3	49.2	40.9	43.4
11:30:00	44.2	50.1	42.2	45.8
11:40:00	47	67.2	43.8	48.1
11:50:00	65.7	91.2	43.4	48.7
12:00:00	56.5	81.6	42.8	47.3
12:10:00	46.7	56.1	43.7	48.3
12:20:00	51	75	45.1	50.5
12:30:00	48.7	57	46.4	50.7
12:40:00	59.1	83.7	45.4	49.9

12:50:00	64.3	89.3	46.8	52.8
13:00:00	48.7	53.3	45.3	50.9
13:10:00	49.2	54.3	46.6	50.8
13:20:00	57.6	82.6	45.3	51.4
13:30:00	61.2	86	48.2	53.9
13:40:00	46.7	64.5	43.9	47.7
13:50:00	45.4	49.1	43.4	46.7
14:00:00	70.3	93.5	43.8	46.9
14:10:00	56.5	81.8	44.2	49.3
14:20:00	51.7	75.2	43.2	46.9
14:30:00	46.7	50.5	44.3	48.9
14:40:00	46.3	52.1	44.2	47.7
14:50:00	66.3	91	44.3	48.1
15:00:00	45.8	54.8	44.2	46.7
15:10:00	65.5	85.5	45	49.8
15:20:00	46.3	58.7	43.3	47.3
15:30:00	44.8	51.9	42	46.6
15:40:00	45.2	50.1	43	47.1
15:50:00	70.8	94.2	43.6	49.4
16:00:00	45.5	51.2	43.7	46.8
16:10:00	46.3	59.7	42.7	48.6
16:20:00	62.4	86.1	43.6	47.4
16:30:00	45.7	56.3	43.6	47.1
16:40:00	59.4	84	42.8	45.6
16:50:00	69.1	92	43.1	48.7
17:00:00	45.7	51.8	44.1	46.9
17:10:00	46.1	54.5	44	47.1
17:20:00	45.8	51.8	43.6	47.6
17:30:00	46.2	56	44.1	47.5
17:40:00	45.1	48.1	43.5	46.4
17:50:00	46.5	59.3	43.5	48.8
18:00:00	66.4	90.9	43.4	46.9
18:10:00	57.6	82.9	43.2	46.5
18:20:00	45.6	55.3	43.2	46.8
18:30:00	44.8	52.7	43	46
18:40:00	61.1	86	43.4	46.9
18:50:00	63.4	88.8	43.1	48.1
19:00:00	76.2	97.6	45	52.6
19:10:00	47.1	59	44.7	48.5
19:20:00	46.9	57	43.5	49.3
19:30:00	44.8	52.8	42.3	46.4
19:40:00	68.8	92.4	42.7	47.4
19:50:00	44.8	52.2	42.3	46.7
20:00:00	45.5	57	42.1	47.4
20:10:00	67.8	92.9	43.6	49.1
20:20:00	46.8	55.5	43	49.7
20:30:00	44.6	52	41.6	46.9
20:40:00	44.3	52.8	40.9	46.5

20:50:00	42.7	52.7	39.8	44.4
21:00:00	44	61.2	39.6	44.8
21:10:00	63.6	88.5	38.6	43.3
21:20:00	43.3	51.1	40	45.4
21:30:00	42.7	52.9	40.5	44.1
21:40:00	66.5	90.7	40.5	45.5
21:50:00	42.6	57	39.3	43.3
22:00:00	43.2	51.5	40.1	45.1
22:10:00	40.9	47.7	38.3	42.8
22:20:00	41.9	53.8	38.6	43.8
22:30:00	59.4	84.1	38.4	43.5
22:40:00	41.5	49.9	38	43
22:50:00	60.5	84.3	37.9	49.2
07:00:00	49.3	54.8	46.7	51.8
07:10:00	47.4	53.7	44.9	49.8
07:20:00	46.9	63.5	42.6	46.1
07:30:00	45.1	55.9	41.6	47.4
07:40:00	59.7	85.4	41.7	47
07:50:00	56.6	82	42.9	46.9
08:00:00	46.3	54.1	42.8	48.9
08:10:00	47.3	57.6	42.7	49.9
08:20:00	44.3	52	42.4	45.6
08:30:00	59.5	85.2	42.6	46.3
08:40:00	45.7	54.6	43.1	47.3
08:50:00	67.6	90.5	42	49.3
09:00:00	46.6	53.7	41.5	49.5
09:10:00	47.2	56.3	41.9	50.1
09:20:00	47.9	54.8	44.2	50
09:30:00	48.8	64.1	43.1	51.9
09:40:00	67.2	92	41.2	47.8
09:50:00	44.2	54.1	41.4	45.9
10:00:00	75.9	95.9	40.8	49.8
10:10:00	46.5	56.9	43	48.3
10:20:00	50.4	59.5	45.4	53.3
10:30:00	50.2	57.1	46	52.5
10:40:00	59.1	84.6	43.7	47.6
10:50:00	62.8	87.3	42.9	49
11:00:00	48.1	64.1	42.9	49.9
11:10:00	50.1	58.5	44.8	53.4
11:20:00	49.3	58.8	45.6	51.5
11:30:00	44.3	52.1	41.6	46.2
11:40:00	43.2	49.3	41.3	44.6
11:50:00	68.2	91.7	41.7	45.9
12:00:00	43.8	50.1	41.1	45.7
12:10:00	68.9	92.1	41.8	45.9
12:20:00	43.1	50.2	40.6	45.2
12:30:00	47.8	63.5	44.1	49.1
12:40:00	59.4	83.9	42.6	48.2

12:50:00	44.8	51.7	41.2	47.2
13:00:00	66.6	91.8	42.5	49.9
13:10:00	45.2	53.2	41.8	47.5
13:20:00	47.1	64.9	42.1	48.7
13:30:00	47.9	61.4	43.9	50.5
13:40:00	47.4	54.3	44	50
13:50:00	70.7	94.3	45.8	54
14:00:00	61.9	86.9	44	50.4
14:10:00	45.8	54.4	42.7	48
14:20:00	50.1	63.9	42.6	54
14:30:00	66.9	93.1	41.4	51.6
14:40:00	43.1	60.1	40.3	44
14:50:00	68.9	92.1	41.6	49.1
15:00:00	47.5	65.8	42.9	48.9
15:10:00	46.8	56.8	42.8	49.6
15:20:00	49.3	59.1	43.2	52.6
15:30:00	48.4	62.6	42.7	51.9
15:40:00	45.6	52.8	42	48.6
15:50:00	67.8	92.1	42.3	48.5
16:00:00	62.4	87.8	42.7	50.4
16:10:00	46.2	63.9	42.3	47.6
16:20:00	45.6	52.2	42.2	48.1
16:30:00	46	56.2	43	48.4
16:40:00	69.5	92.1	42.6	49.4
16:50:00	66.4	91.8	41.1	47.2
17:00:00	42.2	49.9	39.8	43.6
17:10:00	44.1	51.4	40.7	46.8
17:20:00	44	63.2	41.1	44.9
17:30:00	45.6	59.3	42.1	47.5
17:40:00	47.4	63.2	43.2	49.2
17:50:00	65.8	89.5	41.3	45.7
18:00:00	61.5	85.2	42.9	54.4
18:10:00	52	66.3	46.8	54.8
18:20:00	50.8	59.1	46.1	53.7
18:30:00	45.4	49.6	43.1	47.1
18:40:00	43.8	50.2	41.7	45.6
18:50:00	61.2	85.4	43.2	50.4
19:00:00	66.6	89.4	48.5	54.4
19:10:00	47.2	53.5	43.6	49.1
19:20:00	44	50.6	42	45.5
19:30:00	44.7	52.2	42.5	46.4
19:40:00	44.3	51.6	41.9	45.5
19:50:00	44	50.7	41.8	46.3
20:00:00	64.7	90.1	48.4	56.7
20:10:00	45.8	50.5	43.2	48.1
20:20:00	43	47.4	41.8	43.9
20:30:00	59	83.5	40.6	44.3
20:40:00	66	91.7	40.1	44.6

20:50:00	42.4	55.2	39.3	44.1
21:00:00	64	88.7	38.8	43
21:10:00	42.1	49.2	39.9	43.7
21:20:00	42.7	49.2	40.1	44.3
21:30:00	43.1	54.7	40.1	44.8
21:40:00	43.5	51.9	40.8	45.2
21:50:00	69.3	90.8	41.3	47.6
22:00:00	46.8	55.8	39.9	51.9
22:10:00	41.8	52.4	38.5	44
22:20:00	56.1	81.5	40.3	45.4
22:30:00	41.2	47.9	38.8	43.1
22:40:00	38.8	48.4	35.4	40.5
22:50:00	65	89.6	36.2	43
07:00:00	46.4	64.8	39	49.5
07:10:00	46.8	65.3	39	44
07:20:00	43.7	58.1	39.7	44.4
07:30:00	47.3	67.9	41.1	45.9
07:40:00	44.7	52.6	41.5	46.9
07:50:00	47.9	65	42.2	48.8
08:00:00	45.2	60.9	40.1	46.6
08:10:00	48.5	68.4	41.5	48.2
08:20:00	45.1	56.8	40.5	47.8
08:30:00	44.4	53	41.2	46.6
08:40:00	44.9	54.9	42.1	46.5
08:50:00	51.3	75	41.4	46.1
09:00:00	44.2	53.2	41.2	45.8
09:10:00	43.2	58	39.4	44.3
09:20:00	45.2	65.6	39.7	46.1
09:30:00	41.7	49.9	37.7	44.6
09:40:00	42.9	63.2	35.9	42.8
09:50:00	55.4	79.7	37	43.5
10:00:00	66.9	91	35.6	44.6
10:10:00	41.2	58.3	36.1	42.9
10:20:00	41.7	54.7	36.3	44.1
10:30:00	40.9	53.6	36	44.1
10:40:00	45	63.6	37.3	47.7
10:50:00	47.3	61.8	37.8	46.7
11:00:00	38.8	47.7	36.2	40.7
11:10:00	65.9	89.7	35.3	42.5
11:20:00	40.8	56	37.8	43.1
11:30:00	42.7	66.7	38.1	41.9
11:40:00	44.4	53.8	39.3	48.4
11:50:00	41	50.3	37	44.2
12:00:00	71	94.4	38.5	42.2
12:10:00	43.5	56.1	38.8	46.1
12:20:00	44.3	56.6	39.2	47.1
12:30:00	44.8	61.1	39.5	46.2
12:40:00	61.9	85.2	40.3	50.2

12:50:00	65.3	91	39.3	53.6
13:00:00	60.9	86.9	39.7	47
13:10:00	41.4	54.6	39.4	42.9
13:20:00	40.5	47.4	38.3	42.2
13:30:00	40.7	48.7	38.3	42.6
13:40:00	41.2	55.1	38.2	42.2
13:50:00	69.6	92.9	38	43.2
14:00:00	42.8	55.1	38.2	45.1
14:10:00	41.4	46	39.8	42.5
14:20:00	48.3	64.2	39.7	48.7
14:30:00	41.7	50.6	39.8	42.8
14:40:00	41.3	51.6	39.1	42.6
14:50:00	68.5	92.4	38.9	43.9
15:00:00	43.6	56.7	38.9	45
15:10:00	41	46.4	39.4	42.1
15:20:00	41.1	50.8	39.1	42.8
15:30:00	42	53.1	39.7	43.7
15:40:00	43.2	62	39.8	43.9
15:50:00	67.8	91.9	39	48.5
16:00:00	44.3	64	39.5	44.5
16:10:00	46.2	70.4	38.9	43
16:20:00	43.2	61.9	39.7	44.3
16:30:00	47.8	71.5	39.7	45.3
16:40:00	41	46.6	39.6	41.9
16:50:00	42.4	48	40.8	43.5
17:00:00	70.2	94.1	41.9	45.6
17:10:00	46.1	55	42.3	48.7
17:20:00	58.7	83.1	41.7	50.6
17:30:00	42.9	46.3	41.1	43.9
17:40:00	43.3	49.8	41.3	44.9
17:50:00	71.9	94.9	41.2	46.4
18:00:00	44.1	51.3	42	45.9
18:10:00	44.1	48.7	42.7	45.3
18:20:00	43.8	50.5	41.6	45.2
18:30:00	46.2	60.8	42.6	47.7
18:40:00	46.4	61	41.9	46.8
18:50:00	43.9	47.8	41.6	45.6
19:00:00	43.9	48.3	42.1	45.2
19:10:00	59.2	84.7	43.8	47.8
19:20:00	45.3	52.2	43.3	46.8
19:30:00	70	93.2	43.1	49.3
19:40:00	47.7	54.1	45	49.4
19:50:00	46.9	51.5	44.5	48.7
20:00:00	45.5	53.6	42.5	47.6
20:10:00	45.7	51.6	42.4	47.8
20:20:00	66.9	91.1	42.9	48
20:30:00	45.3	52.2	42	47.3
20:40:00	45	48.8	42.1	47

20:50:00	44.4	51.8	41.6	46.2
21:00:00	67.2	91.5	41	47.7
21:10:00	43.8	50.3	40.7	45.6
21:20:00	45.9	61.6	42.1	46.8
21:30:00	44.7	52.5	40.6	47.1
21:40:00	68.6	93.1	40.9	47.9
21:50:00	43	48.8	40.2	44.9
22:00:00	42.5	48.4	38.9	44.8
22:10:00	42.9	49.3	40	45.3
22:20:00	44.2	57.3	40.3	45.9
22:30:00	44.4	51.3	40.9	46.6
22:40:00	41.2	52.7	36.8	43.3
22:50:00	41.2	49.4	37.7	43.8
07:00:00	49.6	54	47.5	51.1
07:10:00	50.6	58	48.9	52
07:20:00	52.7	61	50.4	54.1
07:30:00	68.4	90.9	51.6	55.8
07:40:00	53.1	59	51.4	54.1
07:50:00	68.4	92.6	51.3	54.9
08:00:00	52.5	60.9	50.3	53.8
08:10:00	53	59.5	50.1	55.9
08:20:00	55.2	63.1	51.3	57.4
08:30:00	63.8	87.2	49.5	57
08:40:00	52.6	58.9	48.8	54.6
08:50:00	60.5	85.3	48.4	54.2
09:00:00	53.9	62.9	48.1	56.8
09:10:00	51.4	57.6	47.3	54.2
09:20:00	59	84.2	45.5	50.3
09:30:00	49.2	61.9	44.8	51.6
09:40:00	62.7	88.6	41.6	50.4
09:50:00	48.1	56.3	40.8	50.9
10:00:00	46.1	56.8	39.6	49.7
10:10:00	50.3	61.8	41.8	53.8
10:20:00	50	60.7	40.9	54.1
10:30:00	47	55.8	40.9	50.9
10:40:00	42.8	48	41.2	44
10:50:00	43.9	52.4	41.4	45.4
11:00:00	68.6	91.9	43	47
11:10:00	62	85	44.5	53.3
11:20:00	52.1	60.7	47.1	54.9
11:30:00	50.7	58.6	43.1	53.5
11:40:00	49.3	62.7	42.5	51.9
11:50:00	65.7	91.5	42.6	52.4
12:00:00	60.8	86	43.2	53.7
12:10:00	48.5	59.3	42.7	52.3
12:20:00	49.5	61.6	42.5	53.2
12:30:00	47.7	57.7	42.6	51.8
12:40:00	46.6	65.8	43.6	46.7

12:50:00	65.3	90.1	43.2	47
13:00:00	44.5	50.4	42.6	45.8
13:10:00	44.4	48.2	42.6	45.8
13:20:00	45.3	50.5	42.9	46.9
13:30:00	60.1	84.8	43.8	47.1
13:40:00	47.5	63.4	43.6	47.5
13:50:00	45.8	52.8	43.9	47.2
14:00:00	71.5	93.4	41.9	46.7

ML2 Night

Period start	Leq	Lmax	L90	L10
23:00:00	58.9	84.3	32.9	38.8
23:10:00	62	86.9	36.9	43.6
23:20:00	45.6	47.9	44.4	46.2
23:30:00	45.5	49.9	44.6	46.3
23:40:00	74.5	96	43.8	47
23:50:00	45.1	48.6	44.2	46.1
00:00:00	46	50.3	45.2	46.6
00:10:00	60.5	84.9	45.2	46.9
00:20:00	46.6	48.9	45.2	47.2
00:30:00	46.9	48.7	46.2	47.5
00:40:00	47.7	53.2	46.7	48.2
00:50:00	47.3	50.3	46.2	47.8
01:00:00	47.4	49.3	46.7	47.9
01:10:00	46.8	49.5	45.7	47.5
01:20:00	47.1	51.1	46.4	47.6
01:30:00	46.9	53.2	46.3	47.4
01:40:00	48.2	50.3	47.4	48.8
01:50:00	48.7	52.6	47.8	49.4
02:00:00	48.9	53.9	47.7	49.7
02:10:00	50	52	49.3	50.7
02:20:00	51.3	57	50	52.6
02:30:00	50.9	52.8	50	51.4
02:40:00	50.8	54.9	49.8	51.6
02:50:00	50.3	52.4	49.6	50.7
03:00:00	49.7	54	48.9	50.4
03:10:00	49.5	53.5	49	49.9
03:20:00	49.6	53	49.1	49.9
03:30:00	50.1	51.6	49.5	50.5
03:40:00	48.6	54.3	47.5	49.4
03:50:00	49.4	56.5	48.6	49.8
04:00:00	48.2	51.2	47.3	48.8
04:10:00	48.7	52.3	47.6	49.5
04:20:00	47	49.3	45.4	48.1
04:30:00	46.1	49.8	44.1	48
04:40:00	48.7	51.5	47.2	49.6
04:50:00	48.6	51.5	47.6	49.3
05:00:00	65.1	89.5	48.8	50.8

05:10:00	48.5	52.8	46.6	49.5
05:20:00	50.3	55.7	49.3	51
05:30:00	51	53	49.2	52
05:40:00	50.9	54.4	48.2	53.5
05:50:00	68.9	92.9	52.1	53.6
06:00:00	63.3	87.5	46.9	51.5
06:10:00	48.5	51.6	46.7	49.8
06:20:00	60	85.2	49.5	51.8
06:30:00	47.3	51.8	43.6	50.1
06:40:00	70.6	90.6	41.1	45.4
06:50:00	59	83.4	47	56.1
23:00:00	38.3	45.7	36	40
23:10:00	66.4	91.8	37.7	45
23:20:00	39.7	48.4	37.3	41.2
23:30:00	38.8	45.9	36.4	41
23:40:00	39.7	47.4	37.2	41.4
23:50:00	38.5	47.3	35.9	40.2
00:00:00	38.2	45.6	35.5	40.1
00:10:00	62.1	86.9	35.6	42
00:20:00	40.4	48.2	36.3	42.9
00:30:00	41.6	53.8	36.9	43.9
00:40:00	38.9	47.9	35.2	41.2
00:50:00	37.5	49.3	34.3	39.1
01:00:00	34.6	44	32.5	36
01:10:00	34.9	45.4	31.6	36.8
01:20:00	32.3	38.9	29.3	34
01:30:00	33.7	43.6	30.9	35.5
01:40:00	34.2	45.4	30.4	36.1
01:50:00	34.6	45.9	30.6	36
02:00:00	33.6	41.2	30.9	35.4
02:10:00	34.6	43.3	31.3	36.8
02:20:00	35.4	43.3	32.1	37.8
02:30:00	35.4	44.4	32	37.6
02:40:00	37.2	46	31.7	40.3
02:50:00	33.9	43.6	31.2	36
03:00:00	36.1	45.2	32	38.6
03:10:00	33.7	40.4	31.5	35.5
03:20:00	33.7	48	30	35.5
03:30:00	33.6	41	31.6	35.3
03:40:00	34.8	46.8	31.3	37.1
03:50:00	32.7	41.7	30.6	34.1
04:00:00	35.2	47.4	32.2	37
04:10:00	65.5	89.8	32.2	42.4
04:20:00	35.1	42.4	32.4	37
04:30:00	35.7	49.4	32.6	36.9
04:40:00	37.6	47.2	34.5	40
04:50:00	36.5	46.6	33.1	38.9
05:00:00	35.9	42.4	33.1	37.9

05:10:00	36.9	46	34.2	39.1
05:20:00	36.7	42.8	34.4	38.3
05:30:00	38.1	42.2	36	39.6
05:40:00	40.1	47.6	37.4	42
05:50:00	60.1	83.8	35.9	42
06:00:00	43.5	54.3	39.1	45.9
06:10:00	69	94.8	39.8	44.7
06:20:00	49.9	55.3	40.2	54.2
06:30:00	69.3	90.5	48.6	53.4
06:40:00	49.1	54.6	45.7	52.1
06:50:00	50.9	60.9	45.1	54.4
23:00:00	62.1	86	37.8	42.9
23:10:00	41.5	54.6	38.2	43.2
23:20:00	40.9	46.6	38.6	42.4
23:30:00	41.2	48.6	38.5	43
23:40:00	41	50.3	37.7	42.9
23:50:00	39.9	45.3	36.4	42.1
00:00:00	57.3	83	38.1	43.4
00:10:00	40.7	47.5	37.7	42.5
00:20:00	42.3	52.8	38.5	44
00:30:00	41.3	51.7	38.5	43
00:40:00	40.7	46.1	38.1	42.6
00:50:00	37.9	46.2	34.8	39.8
01:00:00	40.6	51.5	37.7	42.5
01:10:00	39.7	49.4	35.5	42.1
01:20:00	39.1	46.9	35.8	41.2
01:30:00	38.4	44.9	34.6	40.8
01:40:00	37.4	44.1	34.2	39.7
01:50:00	38.7	56.3	34.2	40.5
02:00:00	38.8	52.2	34.6	40.5
02:10:00	37.6	44.5	34.4	39.7
02:20:00	36.7	43.9	33.5	38.8
02:30:00	38.6	46.9	32.5	42
02:40:00	36.3	45.7	31.9	38.6
02:50:00	36.4	45.9	32.5	38.8
03:00:00	39.9	48	33.7	43.6
03:10:00	41.4	50.5	37.7	44.1
03:20:00	35.3	41.6	32	37.4
03:30:00	37.4	53	32.5	40.3
03:40:00	43	50.1	36.7	46.3
03:50:00	39.7	46.1	36.1	42.5
04:00:00	39	46	36	41.2
04:10:00	40.9	47	34.9	44.5
04:20:00	43.5	50.5	37.5	47.2
04:30:00	49	52.7	45.2	51.3
04:40:00	44.9	49.2	43.5	45.8
04:50:00	42.6	46.1	41.4	43.5
05:00:00	39.5	47.3	37.3	41

05:10:00	38.1	48.9	35.5	39.9
05:20:00	38	47.3	34.2	40.4
05:30:00	37.8	46.2	34.6	39.8
05:40:00	39.6	47.4	37	41.4
05:50:00	40.4	49.5	35.3	42.8
06:00:00	39.4	47.2	34.9	42
06:10:00	38.7	43	36	40.5
06:20:00	40.2	46.4	37	42.3
06:30:00	42.4	49.3	38.8	44.6
06:40:00	40.8	47.5	37.4	43
06:50:00	41.1	49.2	37.5	43
23:00:00	42	47.6	38.8	43.8
23:10:00	42.4	55.4	37.7	44.2
23:20:00	41	47.6	37	43.4
23:30:00	40.1	47.2	36.3	42.6
23:40:00	41.5	47.4	37.4	44.1
23:50:00	40.3	49.7	35.2	42.9
00:00:00	41.9	50.9	37.6	44.1
00:10:00	41.9	48.8	37.8	44.4
00:20:00	41	50.6	34.3	44.1
00:30:00	41.7	51.8	35.5	45
00:40:00	40.2	49.3	33.1	44
00:50:00	41.4	50.2	34.5	45.2
01:00:00	41.7	50.6	32	45.3
01:10:00	42.2	53.1	31.2	45.7
01:20:00	42.2	52.8	34	45.8
01:30:00	42.6	51.6	37.5	45.6
01:40:00	41.5	50.1	35.2	44.5
01:50:00	37.9	52.2	32.2	40.6
02:00:00	38.7	47.3	33.5	41.6
02:10:00	39.8	48.5	33.1	43.3
02:20:00	40.4	50.4	33.6	43.4
02:30:00	39.7	48.2	31.5	43.5
02:40:00	38.7	48.5	31.9	41.6
02:50:00	37.6	50.2	29.5	41.1
03:00:00	40.5	53.1	32	43.7
03:10:00	39.5	53.2	30.6	43.3
03:20:00	40.7	51.9	32.5	44.9
03:30:00	65.2	90.2	34.4	45.3
03:40:00	39.3	49.4	33.3	42.7
03:50:00	40.7	49.7	35.2	44.2
04:00:00	42.1	51	34.4	45.7
04:10:00	43.2	52.6	37.5	45.7
04:20:00	44.3	50.9	40	46.7
04:30:00	44.7	53.3	40.1	47.2
04:40:00	43.4	50	39.3	45.8
04:50:00	44.6	50.1	41	46.7
05:00:00	44.9	50.5	41.7	46.9

05:10:00	45.2	50.3	42.5	47.1
05:20:00	46.2	51.2	43.4	48.2
05:30:00	47.9	55.1	44.9	50.2
05:40:00	46.7	54.4	44.2	48.8
05:50:00	70.6	94	43.9	49.1
06:00:00	64.6	90.1	44.2	48.5
06:10:00	68.8	93.6	45.1	49.8
06:20:00	59.1	84.2	45.4	49.7
06:30:00	48.2	55.2	45.4	49.9
06:40:00	66.3	90.5	47	51.4
06:50:00	50	54.6	47.5	51.8

ML3

Period				
start	Leq	Lmax	L90	L10
11:11:00	62	63.2	61.1	62.7
11:12:00	62.3	63.8	61.4	63.6
11:13:00	61.2	62.8	60.1	62.3
11:14:00	60.1	62.8	59.1	61
11:15:00	61.2	68.1	60.1	61.8
11:16:00	70.9	72.8	60.1	72.4
11:17:00	69.5	71	68.4	70.5
11:18:00	67.1	68.8	65.5	68.1
11:19:00	63.9	65.4	63	64.8
11:20:00	63	64.4	62.1	63.8
11:21:00	59.7	62.1	57.9	61.1
11:22:00	55.7	57.5	54.6	57
11:23:00	54	55.2	53.2	54.4
11:24:00	54.6	58.8	51.6	57.8
11:25:00	56	61.5	51	58.7
11:26:00	56	60.1	51.3	58.9
11:27:00	53.2	60.8	50.7	56.4
11:28:00	57.6	59.3	53.5	58.8
11:29:00	58.7	60.7	52.3	60.3
11:30:00	54.6	60.5	50.1	59.9
11:31:00	55.9	61.4	50.6	60.8
11:32:00	56.3	60.9	50.9	60.4
11:33:00	52.4	58	49.1	57.2
11:34:00	52.5	61.3	50	54.3
11:35:00	50.2	53.4	49	51.7
11:36:00	50.5	51.7	48.9	51.4
11:37:00	53.4	58.7	50.6	55.7
11:38:00	52	58.8	49.9	54.9
11:39:00	50.8	53.2	48.4	52.6
11:40:00	50.5	54.3	47.9	51.7
11:41:00	50.2	51.9	49.1	50.9
11:42:00	49	50.6	47.4	50.2
11:43:00	50.7	53.4	47.8	52.6
11:44:00	48.8	60.7	46.9	48.1

11:45:00	48.4	51.3	47.1	49.2
11:46:00	47.4	53.1	45.3	48.9
11:47:00	44.2	49.3	41.3	46.5
11:48:00	41.7	50.4	38.6	42.6
11:49:00	44.6	50.4	41.2	47.5
11:50:00	43.6	49.1	41.3	45.4
11:51:00	42.7	48.2	39.6	45.2
11:52:00	47	53.3	40.8	49.6
11:53:00	45	50.5	42.1	47.1
11:54:00	43.9	47.6	41.7	46.9
11:55:00	46.3	50.9	44.5	48
11:56:00	48.5	54.8	44.7	51.7
11:57:00	45.2	50.2	43.4	46
11:58:00	44.5	50.1	42	46.4
11:59:00	43.7	45.7	42.4	44.7
12:00:00	45.7	52.9	43.2	48
12:01:00	49.1	57.8	43	53.5
12:02:00	47.7	52.1	42.8	49.2
12:03:00	46.9	51.8	44.8	48.4
12:04:00	50.5	55.4	47.4	52.8
12:05:00	52.2	54.5	50.4	53.2
12:06:00	50.9	53.7	48.4	52.1
12:07:00	51.5	57.3	46.8	56.7
12:08:00	49.1	58.9	46.8	48.6
12:09:00	47.7	50.1	47.1	48.3
12:10:00	48.9	50.5	47.6	49.4
12:11:00	48.8	53.8	47.8	49.1
12:12:00	48.4	50.5	47.8	48.8
12:13:00	48.8	50.5	48.1	49.4
12:14:00	48.6	49.8	48	49
12:15:00	48.5	50.1	47.5	49.3
12:16:00	47	57.8	44.5	47.3
12:17:00	45.6	50.1	44.4	46.7
12:18:00	58	73.2	44	46
12:19:00	48.5	53.9	44.8	51
12:20:00	44.2	47.1	41.7	46.1
12:21:00	46.2	52.1	43	49.9
12:22:00	48.9	62.4	43	51.7
12:23:00	47.8	54.7	44.1	51.4
12:24:00	48	56.9	45.2	49.3
12:25:00	50.7	60	46.9	53.4
12:26:00	50	59.6	46.6	51.5
12:27:00	49.1	55.6	47.1	50.8
12:28:00	48.8	55.3	46.6	51.4
12:29:00	49.4	59.2	45.5	51.2
12:30:00	52.7	57.8	48.4	55.6
12:31:00	52.7	58	49.9	55.7
12:32:00	52.5	57.6	49.8	56.2

12:33:00	53.6	57	50.1	56
12:34:00	51.6	55.9	50.8	52.4
12:35:00	51.2	54.2	50.1	51.9
12:36:00	54.6	58.9	51.1	57
12:37:00	51.3	52.5	50.7	51.8
12:38:00	51.5	53.8	50.7	51.8
12:39:00	53.3	57.8	50.7	56.4
12:40:00	52.3	56.8	49.9	55.3
12:41:00	51.9	62.9	50	51.6
12:42:00	50.7	53.6	49.8	51.6
12:43:00	51.5	57.2	49.7	52.2
12:44:00	50.6	51.9	49.7	51.2
12:45:00	50.8	51.5	50.3	51.1
12:46:00	50.4	55.7	48.3	51.8
12:47:00	48.4	54.2	47.3	49.2
12:48:00	49.2	50.6	48.1	49.8
12:49:00	49.3	50.3	47.7	50
12:50:00	48.9	51.5	47.9	49.8
12:51:00	51.4	59.2	48.6	54.8
12:52:00	52.9	60	49	58
12:53:00	53.9	59.5	50.2	57.7
12:54:00	55.2	61.1	50.4	58
12:55:00	53.1	59.3	49.5	56.7
12:56:00	54.2	59.4	48.7	57.5
12:57:00	54.7	59.4	50.1	58
12:58:00	52.2	58.7	48.8	54.8
12:59:00	54.2	60.2	49.6	57.5
13:00:00	51.3	59.5	45.2	55.4
13:01:00	44.7	47.7	43.1	46.3
13:02:00	46.2	49.9	43.4	48.1
13:03:00	46.5	49.1	45.2	48.1
13:04:00	47.4	52.1	45.8	48.7
13:05:00	45.9	48.7	44.9	46.8
13:06:00	47.8	52.7	45.3	50.5
13:07:00	48.1	55.3	45.3	50
13:08:00	51.9	59.8	45.7	57.4
13:09:00	50.6	61.4	46.2	51.4
13:10:00	49.7	60.4	45.6	51.2
13:11:00	48.8	60.7	45.9	49.2
13:12:00	49.5	60.2	44.1	51.5
13:13:00	47.7	56.9	44.6	48.1
13:14:00	48.3	55.5	45.7	49.9
13:15:00	50.3	56.8	44.7	54.4
13:16:00	49	58.1	43.3	52.6
13:17:00	45.2	50.6	43.3	46.1
13:18:00	46.9	53.3	43.9	48
13:19:00	47.3	56.2	42.6	50.5
13:20:00	45.7	56.1	43.1	47.1

13:21:00	47.9	55.8	43.6	51.8
13:22:00	50.5	58.7	46.3	52.6
13:23:00	47.4	49.8	46.2	48.4
13:24:00	47.6	50.9	45.6	49.3
13:25:00	49.5	51.6	47	51
13:26:00	50.9	56.7	49.1	51.8
13:27:00	54.5	58	51.4	56.7
13:28:00	53.5	59.5	50.7	56.3
13:29:00	53.6	57.8	50.7	56
13:30:00	53.2	61.3	50.7	55.8
13:31:00	53.1	61.6	50.2	53.3
13:32:00	50.2	52.4	49.6	50.5
13:33:00	51.9	57.2	49.8	53.4
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13:36:00	54.7	56.4	53.7	55.8
13:37:00	56.4	58.7	54	58.2
13:38:00	54	58.3	53	54.7
13:39:00	54	57.2	52.9	55.4
13:40:00	54.3	58.6	52.8	55.9
13:41:00	53.7	55.1	52.9	54.6
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13:43:00	52.4	55.1	50.9	53.3
13:44:00	51.7	55.8	50.7	52.5
13:45:00	49.6	51.5	46.5	51
13:46:00	51.7	56.3	47.5	55
13:47:00	49	51	48.2	49.6
13:48:00	48.1	54	46.8	48.9
13:49:00	47.1	51.2	44.5	48.7
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13:51:00	48.6	50.6	47.1	49.9
13:52:00	51.7	61.6	47.2	52.7
13:53:00	51.8	59.3	48	56.1
13:54:00	50.8	60.6	46.8	52.5
13:55:00	53.7	62.1	49.3	56.2
13:56:00	54.7	63.3	49.2	60.3
13:57:00	50.4	55.8	45.3	53.5
13:58:00	55.2	58.2	51.5	57.1
13:59:00	56.1	62.5	46.8	58.7
14:00:00	57.2	69.9	51.4	58
14:01:00	60.8	70.7	53.1	63.2
14:02:00	57	63.4	53.4	59.3
14:03:00	55.3	60.2	51.9	57.8
14:04:00	52.5	57.2	51.4	53.4
14:05:00	52.6	53.6	52	53
14:06:00	53.7	58.6	50.9	56.7
14:07:00	52.2	53.9	50.8	53.3
14:08:00	52.4	54.6	51.6	53

14:09:00	51.4	52.4	50.4	51.9
14:10:00	53.9	59	50.5	55.8

ML4

Period start	Leq	Lmax	L90	L10
10:45:00	52.9	57.7	51.3	53.5
10:46:00	54.4	62.5	50.8	56.4
10:47:00	54.5	62.8	50.4	57.6
10:48:00	55.4	63.3	50	60.8
10:49:00	55.6	68.5	50	58.2
10:50:00	57.4	65.2	51.1	62.2
10:51:00	53.6	64.8	49.8	54.5
10:52:00	55.3	63.6	51.7	58.4
10:53:00	57.6	66.4	52.3	60.6
10:54:00	58.7	66.3	52.5	63.1
10:55:00	56.2	67	51.2	59.2
10:56:00	54.2	62.1	51.6	57.4
10:57:00	55.5	64	52.1	58.1
10:58:00	57	66.3	52.5	61
10:59:00	56.4	64.9	52.6	60
11:00:00	58.5	65.1	54.5	63.5
11:01:00	57.8	65.5	52.2	60.6
11:02:00	53.9	62.3	51.1	55.6
11:03:00	54.6	65.1	51.1	57.1
11:04:00	55.7	64	51.8	59.5
11:05:00	54.6	64.1	51.3	56.2
11:06:00	59.4	67	53.9	63
11:07:00	55.9	65.1	52.3	58
11:08:00	56.1	66.3	51.1	59.7
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11:10:00	57.8	66.6	55	58.6
11:11:00	57	64.6	53.7	59.2
11:12:00	58.4	64.5	54.7	61.5
11:13:00	58.4	66.5	52.1	63.5
11:14:00	54.9	62	53	56.7
11:15:00	55.9	64.7	53.1	57.8
11:16:00	56.4	65	50.9	60.5
11:17:00	57.1	64.3	53.3	60.1
11:18:00	57.2	66	53.4	60.5
11:19:00	58.5	67.8	53.8	61.2
11:20:00	55.5	64.9	51	59
11:21:00	56	63.1	51.6	59.6
11:22:00	56.3	62.6	53	59.1
11:23:00	57.3	63	53.1	61.2
11:24:00	57	65.4	52.9	60
11:25:00	56.7	66.2	52.8	58.9
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11:27:00	55.3	62.6	49	60

11:28:00	52.7	60.1	49.6	54
11:29:00	59.5	68.9	52.4	62
11:30:00	58.2	66.1	52	61.5
11:31:00	57.6	67.5	50.2	63.3
11:32:00	55.3	63.9	51.2	58.3
11:33:00	58.8	65.7	51.6	63.5
11:34:00	55.5	64.5	51.9	58.7
11:35:00	53.9	62.6	49.8	55.7
11:36:00	56.9	65.9	51	60.1
11:37:00	56	64.5	51.6	59.4
11:38:00	55.8	64.2	51.4	59.6
11:39:00	53.4	64.2	49.9	55.5
11:40:00	56.1	62.6	51.8	60.6
11:41:00	55	63.5	50.3	57.9
11:42:00	56.8	65.2	49.8	60
11:43:00	57	64.6	51.7	60.8
11:44:00	57.5	68.3	51.5	62.2
11:45:00	58.4	67.5	53.3	62
11:46:00	56.8	62.2	52.2	60.8
11:47:00	56.4	64	52.8	59.2
11:48:00	56.8	64.2	51.6	60.2
11:49:00	53.1	55.5	52.1	54
11:50:00	58.9	66.7	53.2	62.9
11:51:00	57.3	65.7	51.6	60.4
11:52:00	57.8	67.1	51.9	61.7
11:53:00	53.9	63.5	50.2	55.6
11:54:00	56.9	66.7	51.6	59.3
11:55:00	59.1	67.2	52.9	62.8
11:56:00	58.1	68.1	52.3	61.4
11:57:00	57.9	68.2	51.5	61.8
11:58:00	55.9	63.5	52	58.5
11:59:00	55.5	64	51.2	59.4
12:00:00	56.1	63.8	50.6	60.8
12:01:00	59.1	69	53.2	62.2
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12:09:00	58.4	66.4	52.7	63.5
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12:14:00	55.7	64.3	52.2	58
12:15:00	55.7	66.7	51.3	57.6

12:16:00	55	63.2	52.6	56.6
12:17:00	54	64	49.8	55.2
12:18:00	52.5	57.1	50.9	53.4
12:19:00	57.7	66.8	52.2	62.6
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12:29:00	55.5	65	52.7	57.1
12:30:00	57.4	66	52	60.8
12:31:00	51.6	53.9	50.3	53
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12:35:00	55.6	63.7	51.2	58.6
12:36:00	55.1	66.7	50.8	55.6
12:37:00	54.7	62.6	51	57.4
12:38:00	57.2	62.8	52.2	61.3
12:39:00	59.2	66	53.1	62.9
12:40:00	55.8	64.5	52.2	59.6
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12:43:00	61	68.8	54	65.2
12:44:00	57	64.9	52.4	59.8
12:45:00	57	65.9	53.3	59.9
12:46:00	58.3	65.4	53.3	61.7
12:47:00	56.3	66.3	52.4	57.3
12:48:00	59	64.9	55.5	61.1
12:49:00	60.6	70.4	53.3	65.8
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12:51:00	56.2	63.2	54	57.4
12:52:00	57.6	63.7	53	60.4
12:53:00	55.3	59.3	52.8	57.8
12:54:00	59.4	66.7	53.8	63.5
12:55:00	57.6	65	54	60.8
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12:57:00	58.4	62.5	55.8	60.5
12:58:00	58.6	68.4	53.5	61.2
12:59:00	56.9	62.1	54.7	58.8
13:00:00	57.3	65	52.6	61.7
13:01:00	58	66.9	53	61.4
13:02:00	56.6	63.3	52.8	58.6
13:03:00	52.5	55.6	51.6	53.1

13:04:00	54	61.2	50.8	56.3
13:05:00	58.3	66.1	52.7	62.5
13:06:00	55.7	65.7	52.4	58
13:07:00	55.5	63.4	51	59.8
13:08:00	56.9	67.5	51.2	60.7
13:09:00	55.6	65.6	51.9	58.5
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13:11:00	56.9	65.7	53.1	59.5
13:12:00	56.2	64.4	52.8	59.2
13:13:00	56.7	65.6	50.3	60.6
13:14:00	56	66.5	50	59.7
13:15:00	56.4	63.9	52.8	59.2
13:16:00	58.1	66.7	53.4	62.1
13:17:00	56.1	66.3	52.3	58.4
13:18:00	59.5	69.5	54.9	61.9
13:19:00	58.1	65.9	53.5	61.1
13:20:00	55.5	60.2	53.5	57.5
13:21:00	58.6	66.6	53.7	61.8
13:22:00	56.2	65.4	51.9	59.7
13:23:00	55.2	63.4	52.4	58.4
13:24:00	57.1	63.5	52.2	59.9
13:25:00	64.3	80	51.7	63.2
13:26:00	56	62.3	51.7	58.7
13:27:00	56.1	64.8	52.6	59.5
13:28:00	57.6	66	53.1	60.8
13:29:00	56.9	66.2	52.2	60.3
13:30:00	55.9	63.8	52.8	58.9
13:31:00	57.9	66	53.2	60.8
13:32:00	54.9	58.8	52.5	56.9
13:33:00	57.4	65.1	52.5	60.8
13:34:00	59.2	65.8	53	63.1
13:35:00	56.9	65.6	53	60.5
13:36:00	57.4	64.5	54.6	60
13:37:00	57.3	65.8	54.1	59.6
13:38:00	57.7	65.5	53.9	61.3
13:39:00	58	67.3	52.2	60.5
13:40:00	59.9	66.1	54.5	62.8
13:41:00	58	65.1	54.5	60.7
13:42:00	59.3	67.6	54.7	62.3
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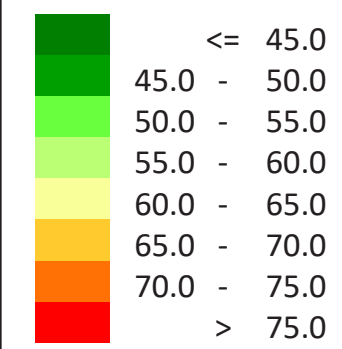
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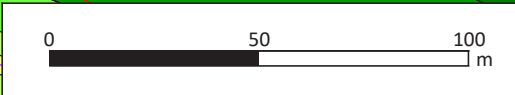
Key

-  Site Boundary
-  Buildings
-  Roads
-  Eco ReadyMix
-  1.8m Wall
-  2.0m Wall

Daytime L_{Aeq} 16hour dB



CLIENT: Gladman developments Limited		
PROJECT: Hafod road, Johnstown		
TITLE: Figure 1 - Daytime Noise Contours Across the Proposed Site		
DRG NO: GM13056/001		REV: A
DRG SIZE: A3	SCALE: 1:1800	DATE: 02/11/2023
DRAWN BY AS	CHECKED BY	APPROVED BY



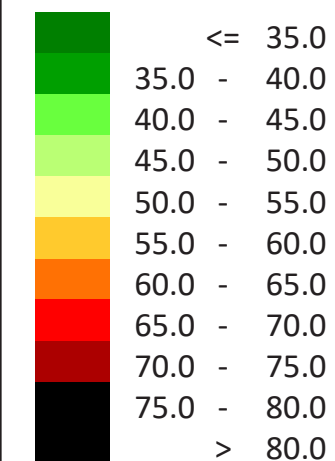
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Key

- Site Boundary
- Buildings
- roads
- * EcoReadymix
- 1.8m Wall
- 2.0m wall
- Free field point

Daytime L_{Aeq} 16hour dB



CLIENT: Gladman developments Limited

PROJECT: Hafod road, Johnstown

TITLE: Figure 2 - Daytime Facade Levels Across The Proposed Site

DRG NO: GM13056/002

REV: A

DRG SIZE: A3

SCALE: 1:1800

DATE: 02/11/2023

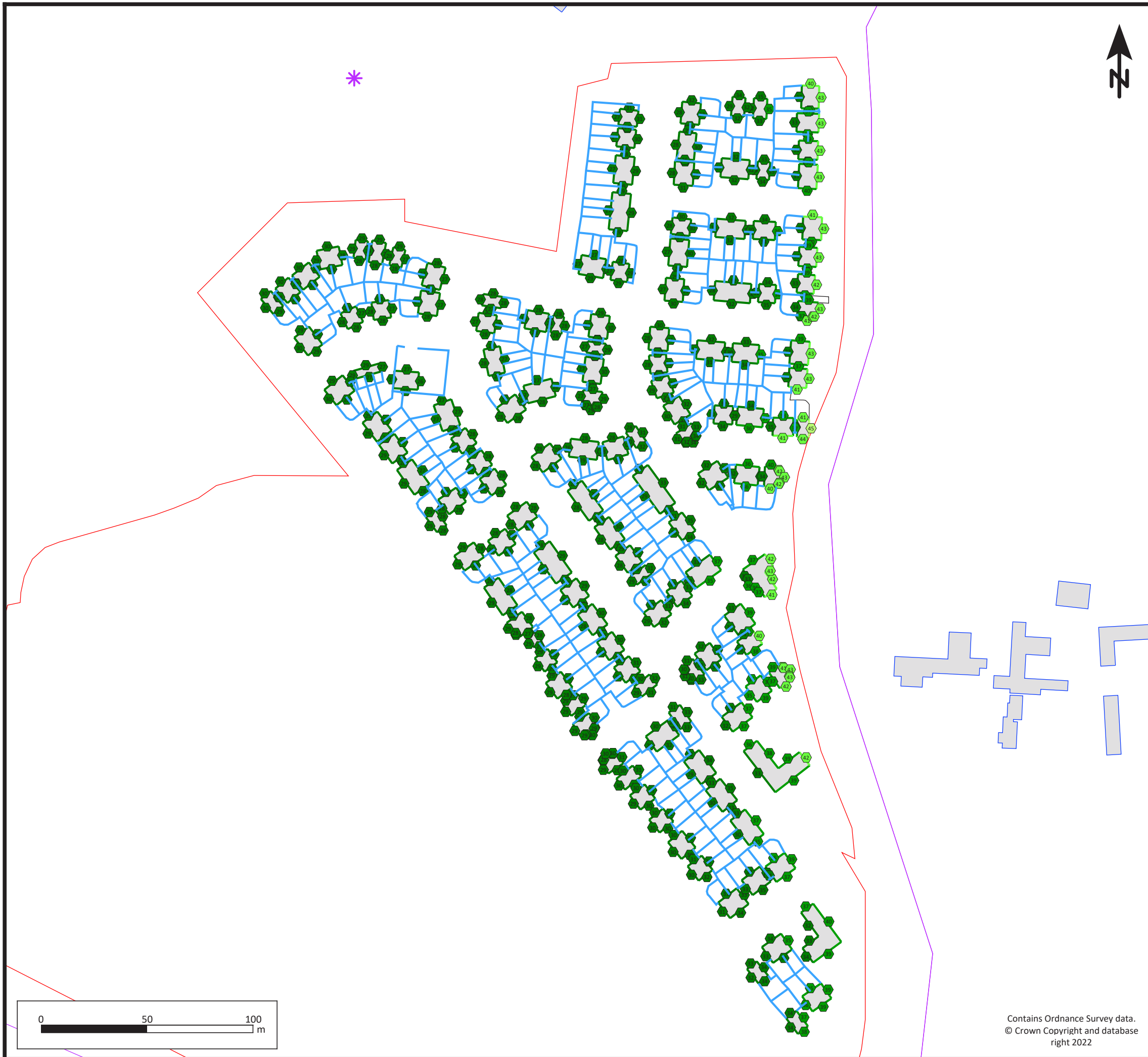
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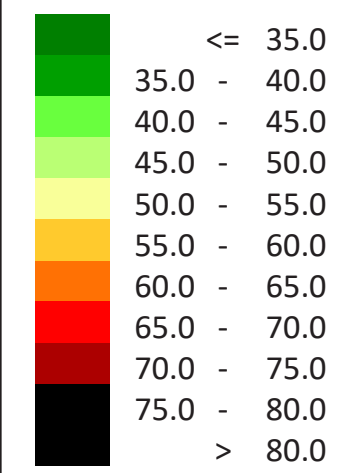
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Key

- Site Boundary
- Buildings
- Road
- * Eco ReadyMix
- 1.8m Wall
- 2.0m Wall

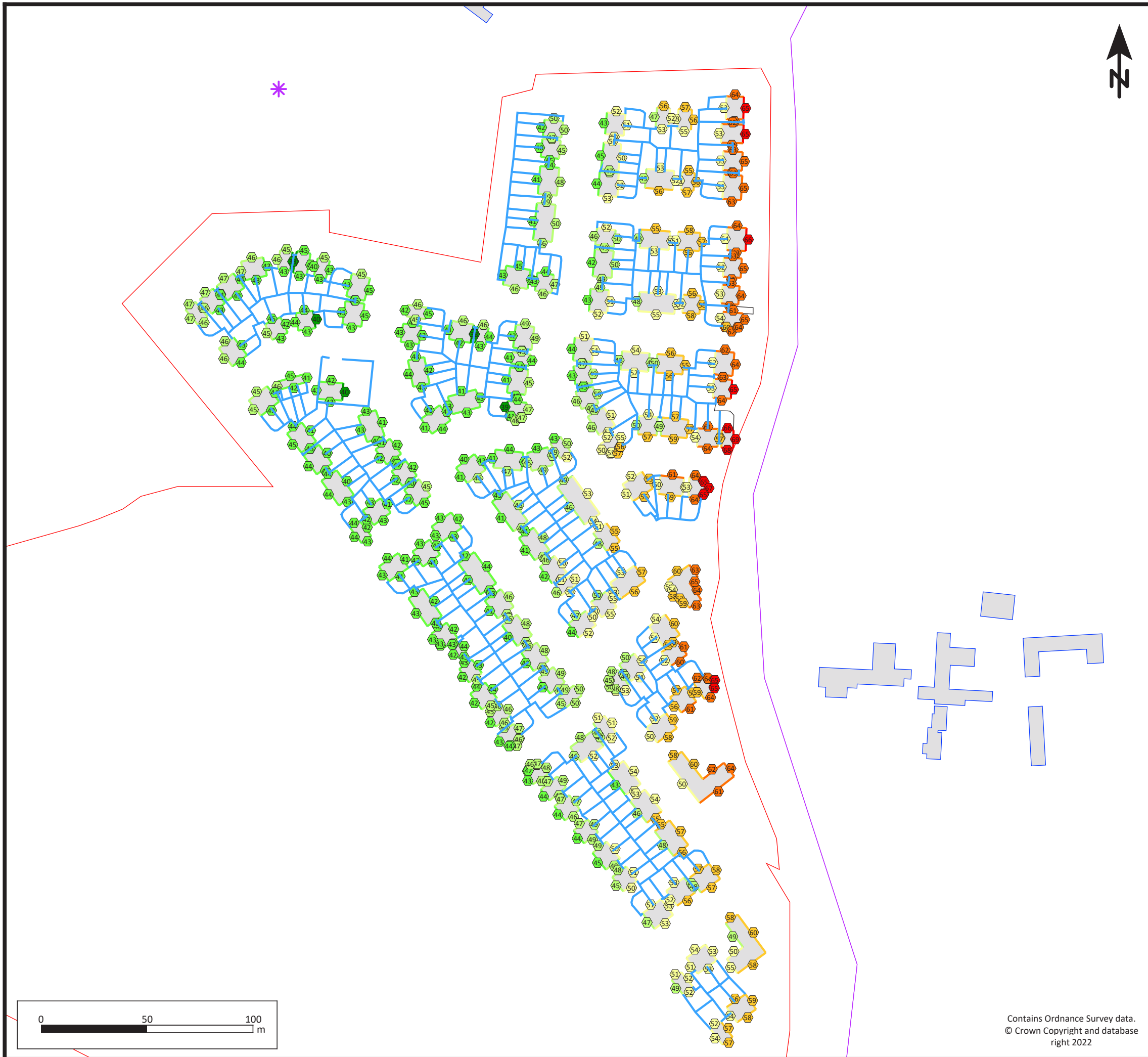
Nighttime L_{Aeq} 8hour dB



CLIENT: Gladman developments Limited		
PROJECT: Hafod road, Johnstown		
TITLE: Figure 3 - Night-time Facade Levels Across the Proposed Site		
DRG NO: GM13056/003	REV: A	
DRG SIZE: A3	SCALE: 1:1800	DATE: 02/11/2023
DRAWN BY AS	CHECKED BY	APPROVED BY



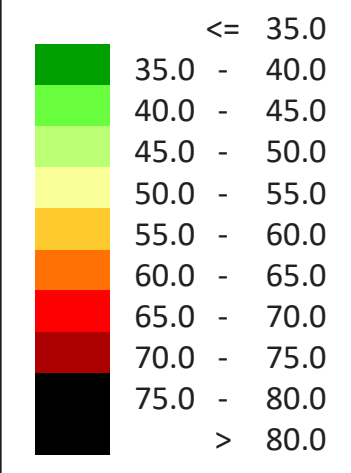
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Key

- Site Boundary
- Existing Buildings
- Roads
- * Eco Roadymix
- 1.8m Wall
- 2.0m wall

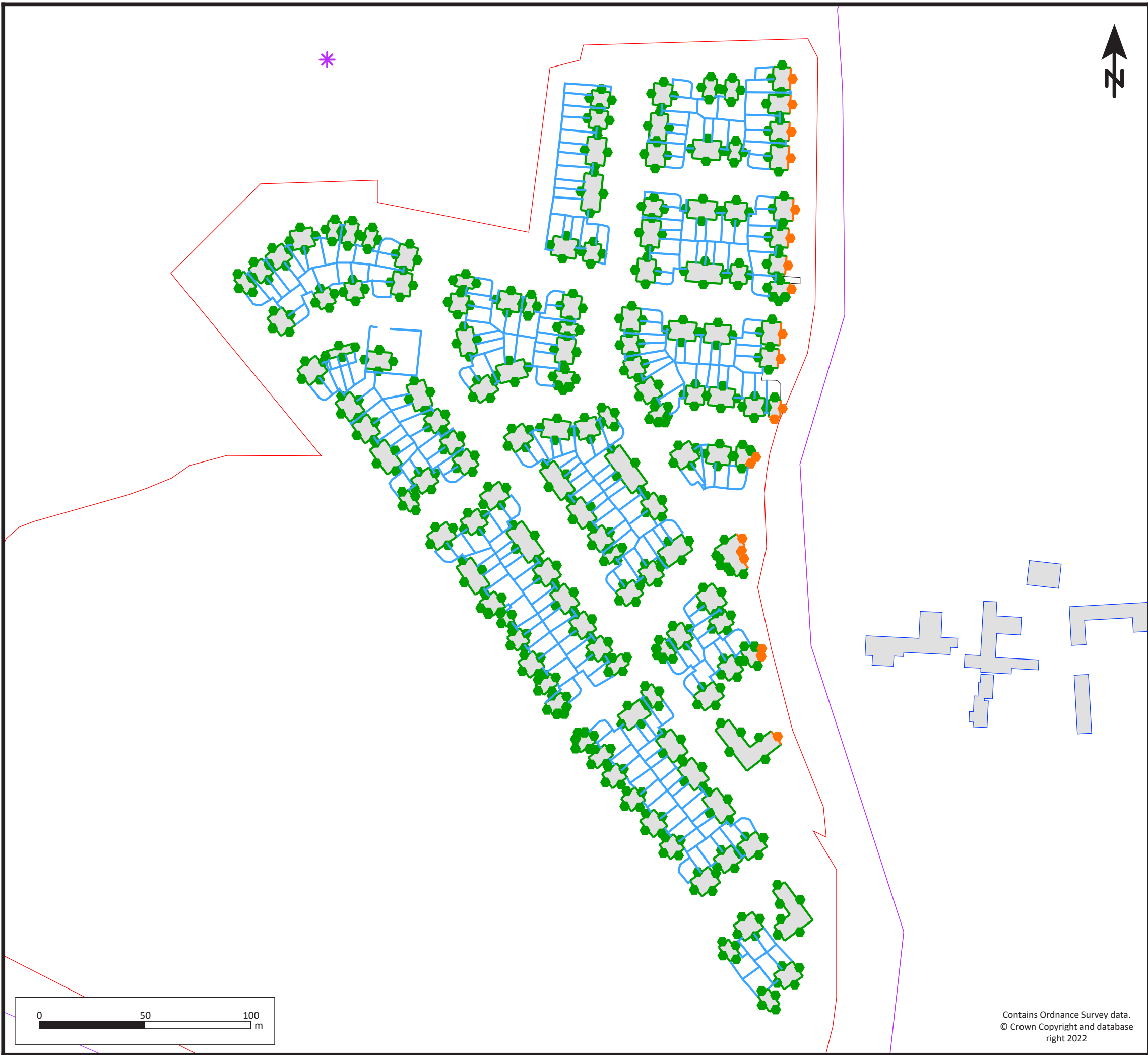
Nighttime L_{LAF} Max dB



CLIENT: Gladman developments Limited		
PROJECT: Hafod road, Johnstown		
TITLE: Figure 4 - Maximum Night-time Facade Levels Across the Proposed Site		
DRG NO: GM13056/004		REV: A
DRG SIZE: A3	SCALE: 1:1800	DATE: 02/11/2023
DRAWN BY AS	CHECKED BY	APPROVED BY



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Key

-  Site Boundary
-  Buildings
-  roads
-  EcoReadymix
-  1.8m Wall
-  2.0m wall

Daytime L_{Aeq} 16hour dB

-  Open windows, standard glazing
-  10/12/6, 2500EAW.AC1

CLIENT: Gladman developments Limited

PROJECT: Hafod road, Johnstown

TITLE: Figure 5 - Livingroom Mitigation

DRG NO: GM13056/006

REV: A

DRG SIZE: A3

SCALE: 1:1800

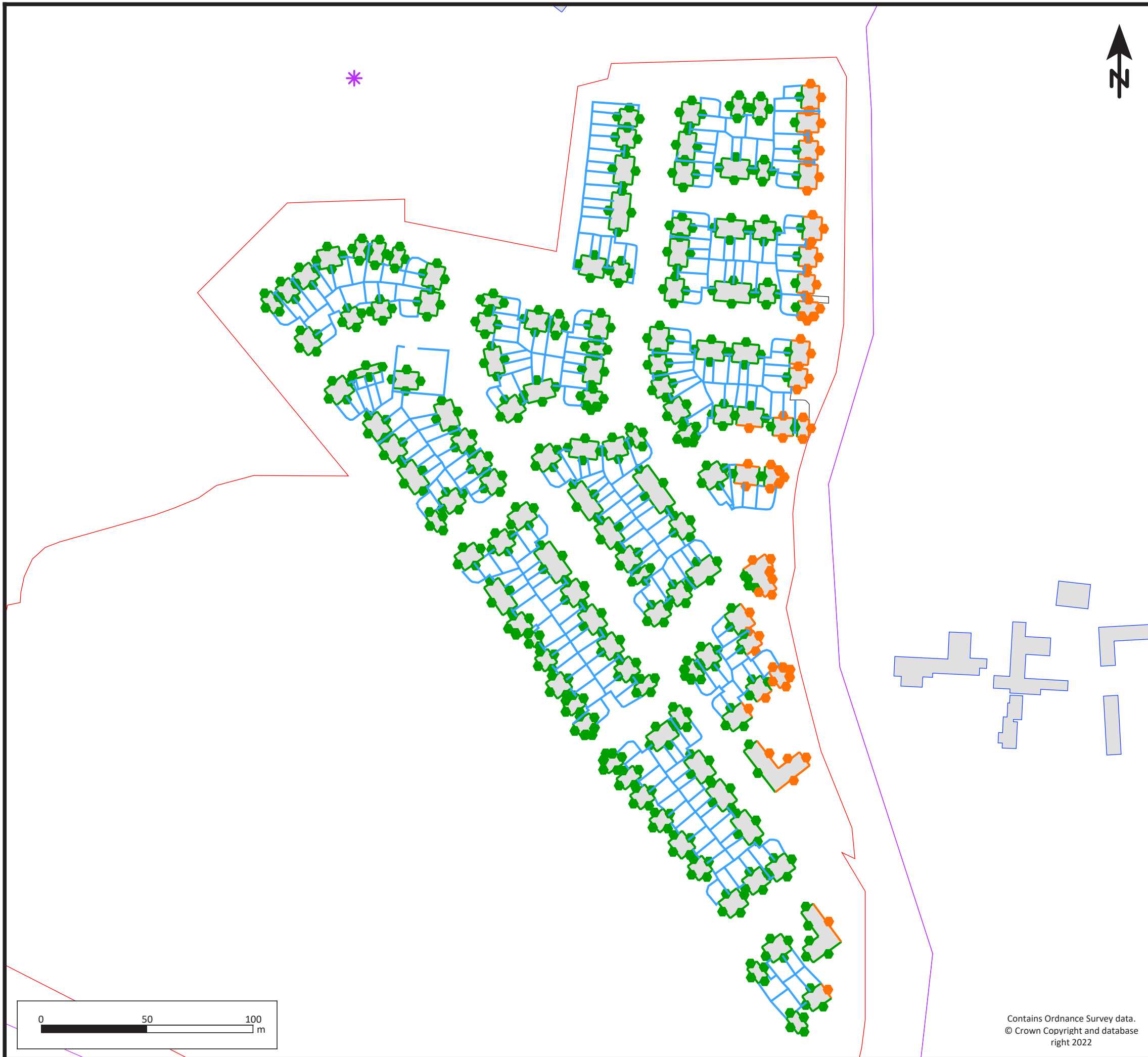
DATE: 02/11/2023

DRAWN BY AS

CHECKED BY

APPROVED BY





Key

- Site Boundary
- Existing Buildings
- Road
- Eco ReadyMix
- 1.8m Wall
- 2.0m Wall

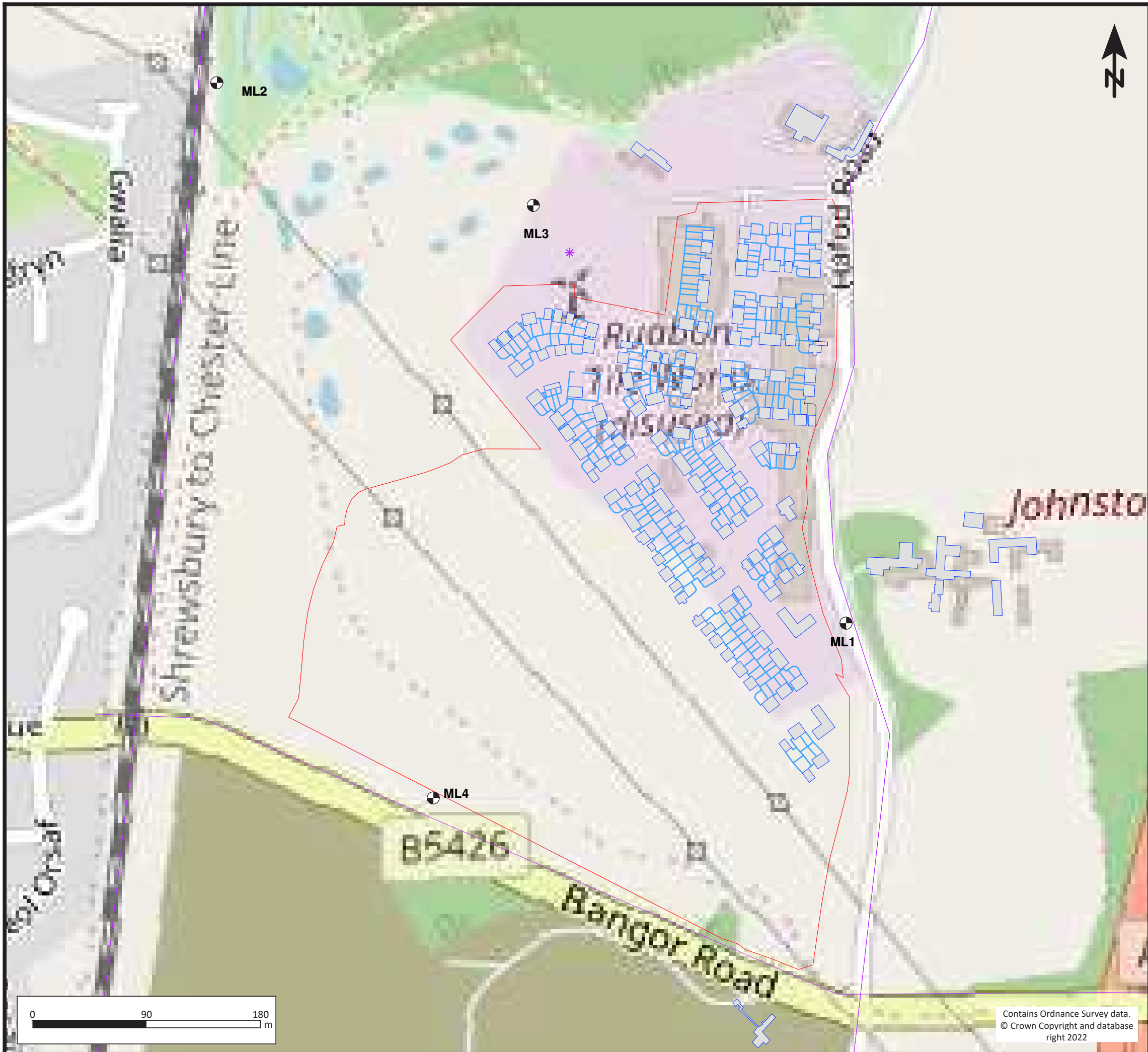
Nighttime $L_{AF\ Max}$ dB

- Open window, standard Glazing
- 10/12/6, Greenwood 2500EAW.AC1

CLIENT: Gladman developments Limited		
PROJECT: Hafod road, Johnstown		
TITLE: Figure 6 - Bedrrom Mitigation		
DRG NO: GM13056/005		REV: A
DRG SIZE: A3	SCALE: 1:1800	DATE: 02/11/2023
DRAWN BY EF	CHECKED BY SU	APPROVED BY SU



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Key

-  Site Boundary
-  Buildings
-  Road
-  Eco ReadyMix
-  Measurement Location

CLIENT: Gladman developments Limited		
PROJECT: Hafod road, Johnstown		
TITLE: Figure 3 - Night-time Facade Levels Across the Proposed Site		
DRG NO: GM13056/007		REV: A
DRG SIZE: A3	SCALE: 1:3000	DATE: 31/10/2023
DRAWN BY AS	CHECKED BY	APPROVED BY



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