PROFESSIONAL CONSULT

FUTURE ENVIRONMENTS

Noise Impact Assessment

Proposed Commercial Units – Park House, Nottingham

Client: **Meller**

Reference: **22.121.1.R2**

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EXECUTIVE SUMMARY

This Assessment has been undertaken to identify the key noise sources associated with the Development which may have the potential to produce noise impacts upon the closest noise-sensitive residential dwellings. Accordingly, this Assessment has been completed with due regard to the National Planning Policy Framework and its associated National Planning Policy Guidance in addition to appropriate British Standards and guidance documents relevant to the assessment of noise impacts and these are detailed in Section 2.

The precise end-use of the Units is currently unknown, however it is understood that the Units may be used for B2/B8 storage and so this Assessment is based on this end-use. It is understood that the future use of the Development could take place between 07:00 – 19:00 Monday – Sunday.

This Assessment has relied upon a background noise survey completed in a location considered to be representative of the background sound climate at the closest residential dwellings to the Development over a full weekday and weekend period. This Assessment has also relied upon noise measurements completed within another similar storage and distribution unit in order to obtain accurate and reliable noise level data for the proposed use.

This Assessment has shown that the rated level of noise at the Receptors, following installation of noise mitigation measures, falls below the measured daytime background sound level at the closest residential receptors.

The predicted level of noise from the Development is sufficiently low enough at the closest residential dwellings to accord with the 'No Observed Adverse Effect Level' as detailed in the PPG and as such noise should not be deemed to be a determining factor in the granting of planning permission for this Site.

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1 INTRODUCTION

1.1 Appointment

1.1.1 Professional Consult Limited was instructed by Meller ('the Applicant'), to prepare a Noise Impact Assessment ('the Assessment') for a proposed commercial development ('the Development') at Park House in Colwick, Nottingham, NG4 2DW, to be referred to hereafter as 'the Site'.

1.2 The Development

1.2.1 It is understood that pre-application advice has been sought from Gedling Borough Council (Ref. 2022/0929PRE) which seeks to demolish the existing single storey office (approx. 608msq) and two industrial buildings (approx. 400msq) and replace with 5 No multi-purpose industrial units ('the Units') with a total area of 1826msq.

1.3 The Site, Locality & Existing Soundscape

1.3.1 The Site is located to the north of Mile End Road and currently comprised of a single storey office and two industrial buildings.

1.3.2 The Site is bound by residential dwellings to the north and west and commercial units to the east. Residential dwellings are also located adjacent to Mile End Road to the south of the Site. The closest existing residential dwellings are located off Stratford Close to the north and Colwick Manor Farm to the west.

1.3.3 The soundscape at the Site is comprised predominantly of intermittent road traffic noise associated with vehicle movements on Mile End Road.

1.4 Purpose of Assessment

1.4.1 This Assessment has been undertaken to identify the key noise sources associated with the Development which may have the potential to produce noise impacts upon the closest noise-sensitive residential dwellings. Accordingly, this Assessment has been completed with due regard to the National Planning Policy Framework and its associated National Planning Policy Guidance in addition to appropriate British Standards and guidance documents relevant to the assessment of noise impacts and these are detailed in Section 2.

1.4.2 The precise end-use of the Units is currently unknown, however it is understood that the Units may be used for B2/B8 storage and so this Assessment is based on this end-use. It is understood that the future use of the Development could take place between 07:00 – 19:00 Monday – Sunday.

1.4.3 This Assessment has relied upon a background noise survey completed in a location considered to be representative of the background sound climate at the closest residential dwellings to the Development over a full weekday and weekend period. This Assessment has also relied upon noise measurements completed within an existing storage and distribution facility in order to obtain reliable and accurate noise measurements.

1.5 Limitations

1.5.1 The limitations of this report are presented in Appendix 1.

1.6 Confidentiality

1.6.1 Professional Consult has prepared this report solely for the use of the Client. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from Professional Consult; a charge may be levied against such approval.

2 POLICY & GUIDANCE

2.1 National Planning Policy Framework & National Planning Practice Guidance

2.1.1 The Government updated the National Planning Policy Framework (NPPF) and its associated National Planning Practice Guidance (NPPG) on 5th September 2023. Together, the NPPF and NPPG set out what the Government expects of local authorities. The overall aim is to ensure the planning system allows land to be used for new homes and jobs, while protecting valuable natural and historic environments.

2.1.2 The NPPG adds further context to the NPPF and it is intended that the two documents should be read together.

2.1.3 Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. When preparing local or neighbourhood plans, or taking decisions about new development, there may also be opportunities to consider improvements to the acoustic environment.

2.1.4 Local planning authorities' plan-making and decision making should take account of the acoustic environment and in doing so consider:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur; and
- Whether or not a good standard of amenity can be achieved.

2.1.5 In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.

2.1.6 The Observed Effect Levels are as follows:

- Significant observed adverse effect level: This is the level of noise exposure above which significant adverse effects on health and quality of life occur;
- Lowest observed adverse effect level: this is the level of noise exposure above which adverse effects on health and quality of life can be detected; and
- No observed effect level: this is the level of noise exposure below which no effect at all on health or quality of life can be detected.

2.1.7 Table 1 summarises the noise exposure hierarchy, based on the likely average response.

Table 1. 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 some reported 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 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

2.1.8 The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation.

2.1.9 These factors include:

- The source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day - this is because people tend to be more sensitive to noise at night as they are trying to sleep. The adverse effect can also be greater simply because there is less background noise at night;
- For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;
- the spectral content of the noise and the general character of the noise. The local topology and topography should also be taken into account along with the existing and, where appropriate, the planned character of the area.

2.1.10 More specific factors to consider when relevant:

- where applicable, the cumulative impacts of more than one source should be taken into account along with the extent to which the source of noise is intermittent and of limited duration;
- Consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being

kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations; and

- If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.

2.2 BS4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

2.2.1 This standard describes methods for rating and assessing sound of an industrial or commercial nature which includes:

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

2.2.2 The procedure detailed in the standard compares the measured or predicted noise level 'the specific noise level' from any of the above detailed noise sources with the background sound level at a residential dwelling. The measured background sound level at a receptor should be reliable and should not necessarily ascertain a lowest measured background sound level, but rather to quantify what is 'typical.'

2.2.3 The specific noise level also acknowledges the following reference time intervals depending upon whether the noise source operates during daytime or night-time periods:

- Daytime (07:00 - 23:00): 1 hour; and
- Night-time (23:00 - 07:00): 15 minutes.

2.2.4 There are a number of 'penalties' which can be attributed to the specific sound level, either subjectively or objectively, depending upon the 'acoustic features' of the sound level under investigation as follows. These penalties vary in their weighting depending upon the severity of the acoustic feature, as follows (with regards to the subject method):

<u>Tonality</u>

- +2dB: where the tonality is just perceptible;
- +4dB: where the tonality is clearly perceptible; and
- +6dB: where the tonality is highly perceptible.

<u>Impulsivity</u>

- +3dB: where the impulsivity is just perceptible;
- +6dB: where the impulsivity is clearly perceptible; and
- +9dB: where the impulsivity is highly perceptible.

Intermittency

- +3dB: where the intermittency is readily distinctive against the acoustic environment.

2.2.5 Where the assessment is carried out using the objective method, the tonality penalty is either 0dB or 6dB and the impulsivity penalty can range from 0dB up to 9dB in increments of 1dB, depending on the level of impulsivity identified.

2.2.6 In addition to the above acoustic features, there is a penalty for 'other sound characteristics' of +3dB where a sound exhibits characteristics that are neither tonal nor impulsive, though is readily distinctive against the acoustic environment.

2.2.7 BS4142 goes on to state that the rating level is equal to the specific sound level if there are no such features present or expected to be present.

2.2.8 Assessment of the rating level relative to the background noise level can yield the following commentary:

- Typically, the greater this difference (between the rating level and the background sound level), the greater the magnitude of impact;
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context; and
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

2.2.9 Whilst the amended 2019 Standard does make various references to it not being intended to assess noise impacts at indoor locations, section 1.1 does state 'The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident'. Example 6 in the Standard states 'In addition to the rating/background sound level comparison shown in Table A.6, the primary concern is the potential for disturbance of residents who could be sleeping with open bedroom windows. Other guidance, such as BS 8233, might also be applicable in this instance'.

2.2.10 With the above in mind, and for a clear need to ensure that any potential commercial or industrial noise impacts at the building façade do not give rise to internal noise level which causes sleep disturbance in bedrooms, this Assessment will ensure that the predicted rating level (specific sound level including any character corrections) does not exceed 30dB in bedrooms.

2.3 Local Authority Guidance and Criteria – Gedling Borough Council's Environmental Health Department

2.3.1 Consultation was provided to Gedling Borough Council on 23rd November 2022 which stated:

> *'We have been appointed by a client to complete a Noise Impact Assessment a proposed commercial development at Park House in Nottingham, NG4 2DW.*
>
> *It is understood that pre-application advice has been sought from Gedling Borough Council (Ref. 2022/0929PRE) which seeks to demolish the existing single storey office (approx. 608msq) and two industrial buildings (approx. 400msq) and replace with 5 No multi-purpose industrial units with a total*

area of 1826msq. The pre-application response requests a number of Services to be provided in support of the scheme planning application which includes a Noise Impact Assessment.

We will complete a background and ambient sound survey in order to measure the sound levels which are representative of the background and ambient sound climate at the closest residential dwellings to the north and west of the site. The noise survey will be completed over a full weekday and weekend period.

We will complete a Noise Impact Assessment in line with the guidance presented in BS4142:2014+A1. Where noise exceedances are found, we will include appropriate noise mitigation where needed.'

2.3.2 At the time of issuing this Assessment, no response had been received.

3 BACKGROUND SOUND SURVEY & LIBRARY NOISE DATA

3.1 Background Sound Survey

3.1.1 The background sound survey has been run over a full weekday and weekend period to include the time periods 07:00 – 19:00 Monday – Sunday. Noise measurements were completed as follows:

- **Noise Measurement Position 1 (NMP1)**: Located in the northwestern area of the Site from 11:45 on 1st December to 09:45 on 5th December 2022. Weather conditions were generally acceptable for the measurement of environmental noise however there were isolated showers, these have been removed from the analysed dataset.

3.1.2 Table 2 details the measured background sound levels over the anticipated operating period of the Development which is understood to be 07:00 – 19:00 Monday – Sunday.

Table 2. Summary of Measured Background Sound Levels

Period	Measured Background Sound Level, $L_{A90,15mins}$ (dB)	
	Range	Typical (Mode Average)
Daytime (07:00 – 23:00)	36 - 51	45

3.1.3 The full measured background sound levels are presented in Appendix 6.

3.2 Library Source Noise Data

3.2.1 Professional Consult has a library database for various commercial operations and we have recently measured noise levels inside a B2/B8-use warehouse as detailed in Table 3.

Table 3. Summary of Measured Source Noise Levels

Noise Source	Measured Sound Pressure Level (dB)	On-time for Daytime BS4142 Assessment (mins)	Measurement Distance (m)	Notes
Internal reverberant noise level inside Building	71.5 $L_{Aeq,T}$	60	N/A	-

3.3 Noise Survey Equipment

3.3.1 The following equipment was used for the noise surveys.

Table 4. Noise Measurement Equipment

Measurement Position	Equipment Description	Manufacturer & Type No	Serial No.	Calibration Due Date
NMP1	Sound Level Meter	01dB Fusion	11755	29 June 2024
	Pre-amplifier	01dB PRE22	1707173	

	Microphone	GRAS 40CE	291693	
	Calibrator	01dB CAL-31	84086	29 June 2023

3.3.2 The sound level meters were field calibrated prior to and following the noise surveys and there was no drift beyond the allowable limit of 1dB.

3.3.3 Table 5 indicates a summary of the measured weather conditions.

Table 5. Range of Measured Wind Speeds

Period	Range of Measured Wind Speeds (m/s)	Rainfall Recorded?
All periods	0 – 3.6	Yes*
*Periods of poor weather have been removed from the dataset		

4 NOISE IMPACT ASSESSMENT

4.1 Assessment Information

4.1.1 The following noise sensitive residential dwellings have been identified and accounted for in this Assessment.

Table 6. Identified Receptors

Receptor	Identifier	Type	Noise Model Receiver Location
Colwick Manor Farm – Northern Boundary	R1	Residential	Daytime: In garden area, 1.5m above ground level Night-time: At façade, 4.5m above ground level
Colwick Manor Farm – Western boundary	R2	Residential	Daytime: In garden area, 1.5m above ground level Night-time: At façade, 4.5m above ground level
Colwick Manor Farm – South Western boundary	R3	Residential	Daytime: In garden area, 1.5m above ground level Night-time: At façade, 4.5m above ground level

4.2 Calculation of Specific Noise Levels at Receptor

4.2.1 It is necessary to calculate sound power levels for the facades and open doors of all Units. It is understood that the facades and roofs of the Units will have Kingspan composite panels with a sound reduction performance of 25dB R_w. The open door components will have a sound reduction performance of 0dB R_w.

4.2.2 In order to accurately calculate noise levels at the Receptors from the various Units, the calculation procedure detailed below has been adhered to:

- Calculation of the sound pressure level immediately outside the building components by using the following equation:
- SPL outside = SPL inside - R - 6dB

Where: 'R' is the Sound Reduction Index for the building component

4.2.3 Calculation of the sound power level for each building component by using the following equation:

- Lw = SPL + 10 x log S

Where: 'S' is the surface area in square meters of the building component

4.2.4 Table 7 calculates the sound power levels for the facades, roofs and open doors of the Units.

Table 7. Calculated Sound Power Levels for Unit Components

Noise Source	Façade	Calculated Sound Power Level for Building Component, L_{WA} (dB)
Unit 1	North	61.6
	West	60.1

	East	60.1
	Roof	65.0
	Open Doors Roller Shutter Door (3m wide, 4m high)	76.3
Unit 2	North	62.1
	South	62.1
	West	60.9
	Roof	67.5
	Open Doors Roller Shutter Door (3m wide, 4m high)	76.3
Unit 3	East	62.1
	West	62.1
	Roof	66.9
	Open Doors Roller Shutter Door (3m wide, 4m high)	76.3
Unit 4	East	60.1
	West	60.1
	Roof	66.3
	Open Doors Roller Shutter Door (3m wide, 4m high)	76.3
Unit 5	East	62.2
	South	61.6
	West	62.2
	Roof	67.1
	Open Doors Roller Shutter Door (3m wide, 4m high)	76.3

4.2.5 In order to calculate an accurate overall specific sound pressure level at the closest residential receptors, a noise model has been built using CadnaA and the following inputs have been included in the model:

- Building elevations have been taken as existing;
- Vertical area sources have been used for the facades of the buildings and an area source for the roof;

- A reflection order of 2 has been used in all calculations; and
- Noise levels generated using ISO 9613-1 and ISO 9613-2 "Acoustics - Attenuation of sound during propagation outdoors" as incorporated into CadnaA software.

4.2.6 Figure 1 in Appendix 4 details the grid noise map for the daytime period. Analysis of the grid noise maps indicates the following calculated specific sound pressure levels at the closest receptors.

Table 8. Calculated Specific Sound Pressure Level at Receptors

Receptor	Period	Calculated Sound Pressure Level, $L_{Aeq,T}$ (dB)
R1	Daytime (07:00 – 19:00)	46.4
R2		40.4
R3		47.0

4.2.7 The following has been considered in determining if any acoustic features exist in the predicted noise level at the closest residential receptor:

- Tonality: In determining if any tones exist in the measured noise levels, the methodology set out in BS4142:2014 has been followed using the subjective method;
- Impulsivity: In determining if any impulsiveness is evident in the measured noise levels, the methodology set out in BS4142:2014 has been followed using the subjective method;
- Intermittency: Whether or not the measured operations turn on or off during the assessment reference periods; and
- Other sound characteristics: Where no penalties are allocated for the above features, but there will be an audible noise at the closest receptor.

4.2.8 Table 9 allocates the character corrections.

Table 9. Allocation of Character Corrections

Noise Source	Tonality Correction (dB)	Impulsivity Correction (dB)	Intermittency Correction (dB)	Other Sound Characteristics Correction (dB)	Comments
Noise breakout from building	0	0	3	0	Intermittent noise may be audible at the closest receptors
Highest Correction for Assessment Period	**0**	**0**	**3**	**0**	
Overall Correction to be added to Specific Noise at Receptors	**+3**				

4.2.9 Table 10 completes the BS4142 Assessment.

Table 10. BS4142 Assessment

Period	Receptor	Calculated Specific Noise Level at Receptor, $L_{Aeq,T}$ (dB)	Total Overall Character Correction (dB)	Calculated Rated Level (dB)	Typical Background Sound Level, $L_{A90,T}$ (dB)	Difference +/- (dB)
Daytime	R1	46.4	3	49.4	45	**+4.4**
	R2	40.4	3	43.4	45	-1.6
	R3	47.0	3	50.0	45	**+5.0**

4.2.10 Table 10 indicates that there will be an exceedance of the noise criteria level for Receptors R1 and R3 and so the following section considers noise mitigation.

5 MITIGATION

5.1 Commercial Noise

5.1.1 The previous section has shown that the rated level of noise exceeds the noise criteria level at Receptors R1 and R3 and so the most appropriate method for reducing noise levels at the Receptors is to install an acoustic fence on the boundary of the Site with the Receptors and this is shown in Appendix 5.

5.1.2 Table 11 completes the BS4142 Assessment following noise mitigation.

Table 11. BS4142 Assessment – With Mitigation

Period	Receptor	Calculated Specific Noise Level at Receptor, $L_{Aeq,T}$ (dB)	Total Overall Character Correction (dB)	Calculated Rated Level (dB)	Typical Background Sound Level, $L_{A90,T}$ (dB)	Difference +/- (dB)
Daytime (07:00 – 19:00)	R1	40.2	3	43.2	45	-1.8
	R2	35.0	3	38.0	45	-7.0
	R3	41.5	3	44.5	45	-0.5

5.1.3 A review of Table 11 indicates that the rated level of noise falls below the typical background sound level for the daytime period (the criteria noise level) and BS4142:2014+A1:2019 provides the following advice for this outcome:

> *'Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.'*

6 CONCLUSION

6.1.1 Professional Consult Limited was instructed by Meller to prepare a Noise Impact Assessment for a proposed commercial development at Park House in Colwick, Nottingham, NG4 2DW.

6.1.2 It is understood that pre-application advice has been sought from Gedling Borough Council (Ref. 2022/0929PRE) which seeks to demolish the existing single storey office (approx. 608msq) and two industrial buildings (approx. 400msq) and replace with 5 No multi-purpose industrial units with a total area of 1826msq.

6.1.3 The Site is located to the north of Mile End Road and currently comprised of a single storey office and two industrial buildings.

6.1.4 The Site is bound by residential dwellings to the north and west and commercial units to the east. Residential dwellings are also located adjacent to Mile End Road to the south of the Site. The closest existing residential dwellings are located off Stratford Close to the north and Colwick Manor Farm to the west.

6.1.5 The soundscape at the Site is comprised predominantly of intermittent road traffic noise associated with vehicle movements on Mile End Road.

6.1.6 This Assessment has been undertaken to identify the key noise sources associated with the Development which may have the potential to produce noise impacts upon the closest noise-sensitive residential dwellings. Accordingly, this Assessment has been completed with due regard to the National Planning Policy Framework and its associated National Planning Policy Guidance in addition to appropriate British Standards and guidance documents relevant to the assessment of noise impacts and these are detailed in Section 2.

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6.1.8 This Assessment has relied upon a background noise survey completed in a location considered to be representative of the background sound climate at the closest residential dwellings to the Development over a full weekday and weekend period. This Assessment has also relied upon noise measurements completed within another similar storage and distribution unit in order to obtain accurate and reliable noise level data for the proposed use.

6.1.9 This Assessment has shown that the rated level of noise at the Receptors, following installation of noise mitigation measures, falls below the measured daytime background sound level at the closest residential receptors.

6.1.10 The predicted level of noise from the Development is sufficiently low enough at the closest residential dwellings to accord with the 'No Observed Adverse Effect Level' as detailed in the PPG and as such noise should not be deemed to be a determining factor in the granting of planning permission for this Site.

APPENDIX 1: LIMITATIONS

This report and its findings should be considered in relation to the terms of reference and objectives agreed between Professional Consult Limited and the Client.

The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.

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APPENDIX 2: GLOSSARY OF ACOUSTIC TERMINOLOGY

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

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

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

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

An indication of the range of sound levels commonly found in the environment is given in the following table.

Table 1: Typical Sound Pressure Levels

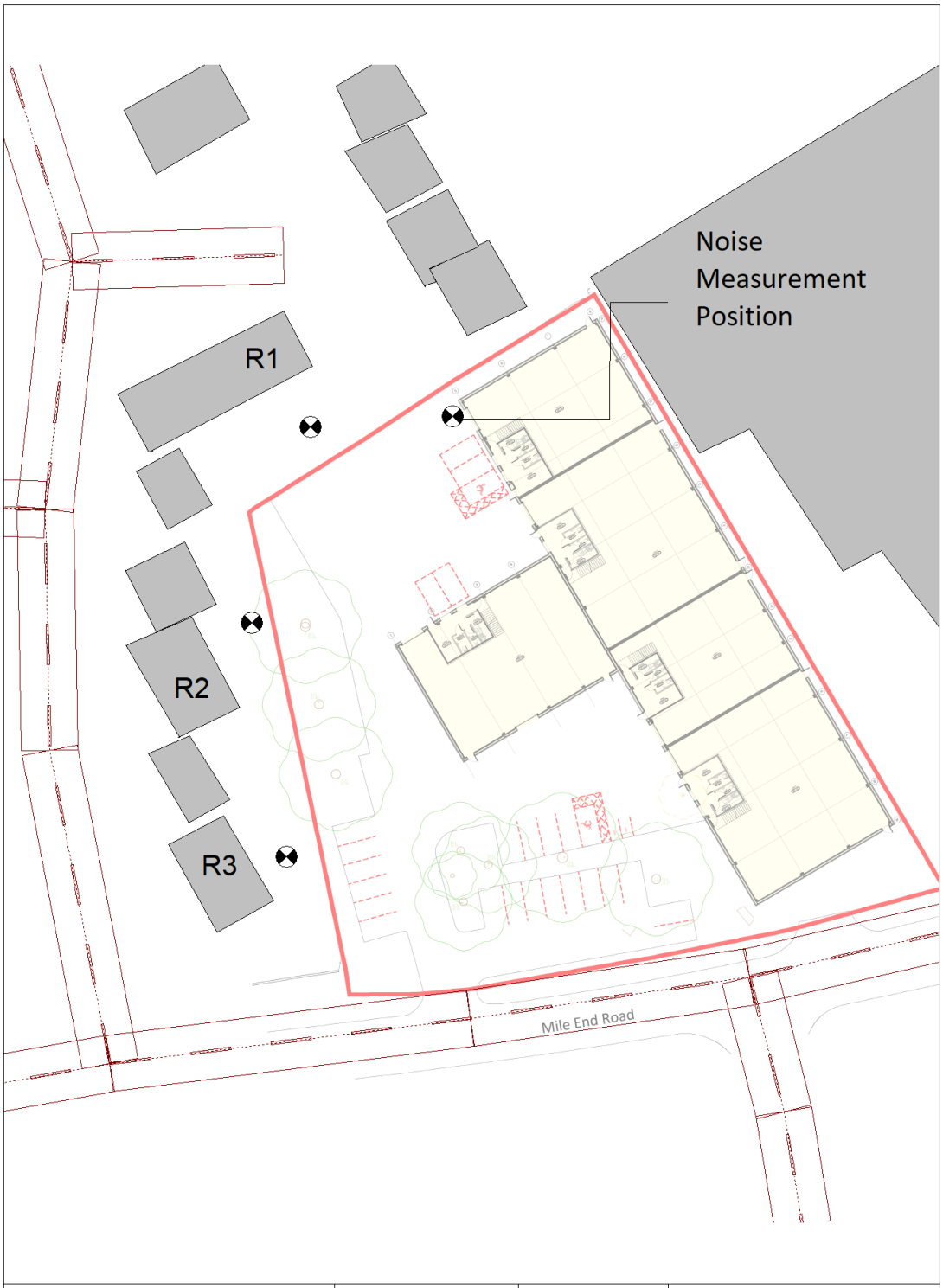
Sound Pressure Level (dB)	Location/Example
0	Threshold of hearing
20 - 30	Quiet bedroom at night
30 - 40	Living room during the day
40 - 50	Typical office
50 - 60	Inside a car
60 - 70	Typical high street
70 - 90	Inside factory
100 - 110	Burglar alarm at 1m away
110 - 130	Jet aircraft on take off
140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

Table 2: Terminology

Descriptor	Explanation
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10-5Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq, T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} & L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.
Free-field Level	2A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Fast	A time weighting used in the root mean square section of a sound level meter with a 125millisecond time constant.
Slow	A time weighting used in the root mean square section of a sound level meter with a 1000millisecond time constant.

APPENDIX 3: SITE LOCATION PLAN & NOISE MEASUREMENT POSITION

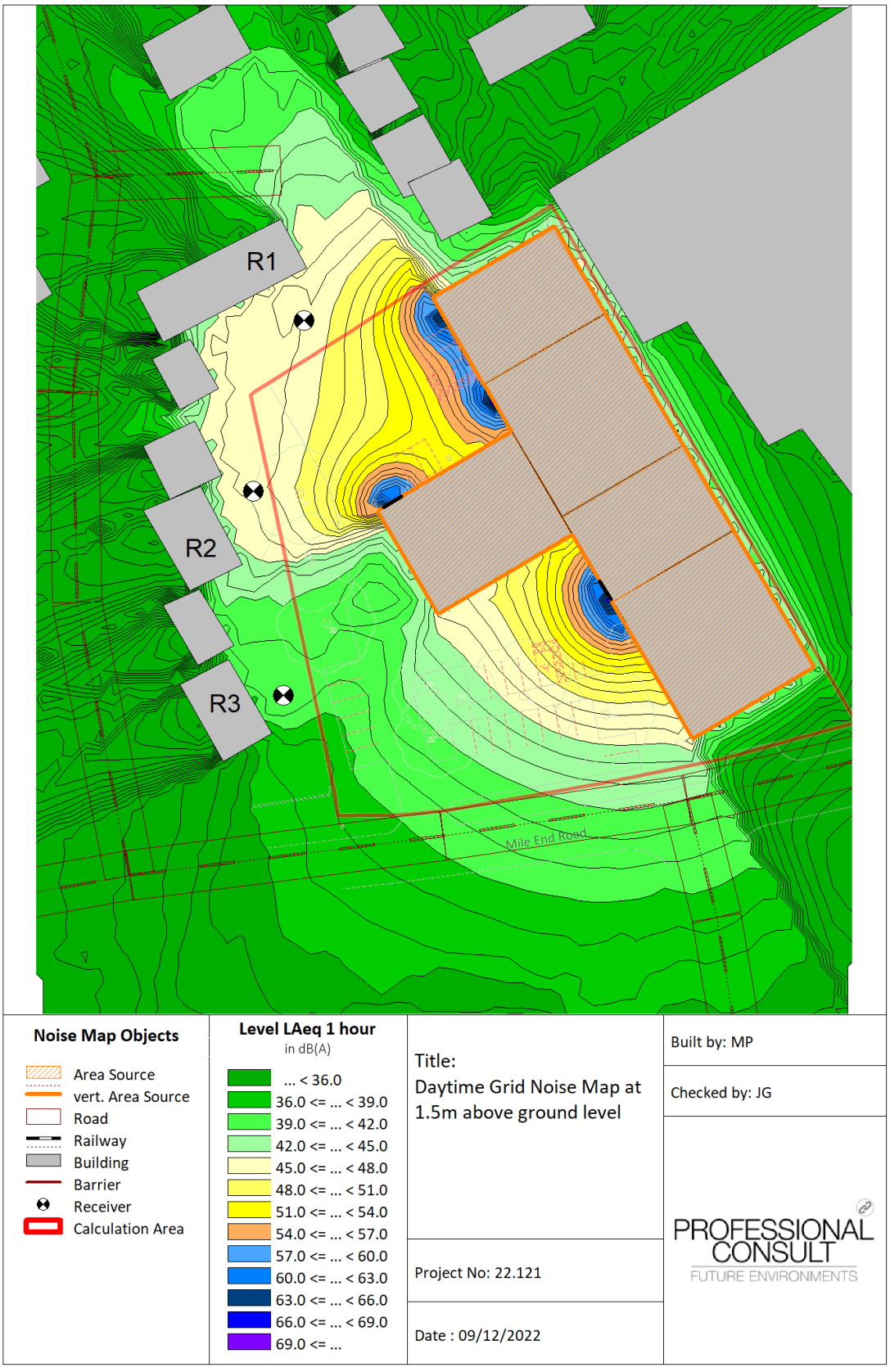
Figure 1 **Proposed Site Plan**



Title : Site Location Plan and Noise Measurement Position	Project No: 22.121	Built by: MP	PROFESSIONAL CONSULT FUTURE ENVIRONMENTS
	Date : 17/10/2023	Checked by: JG	

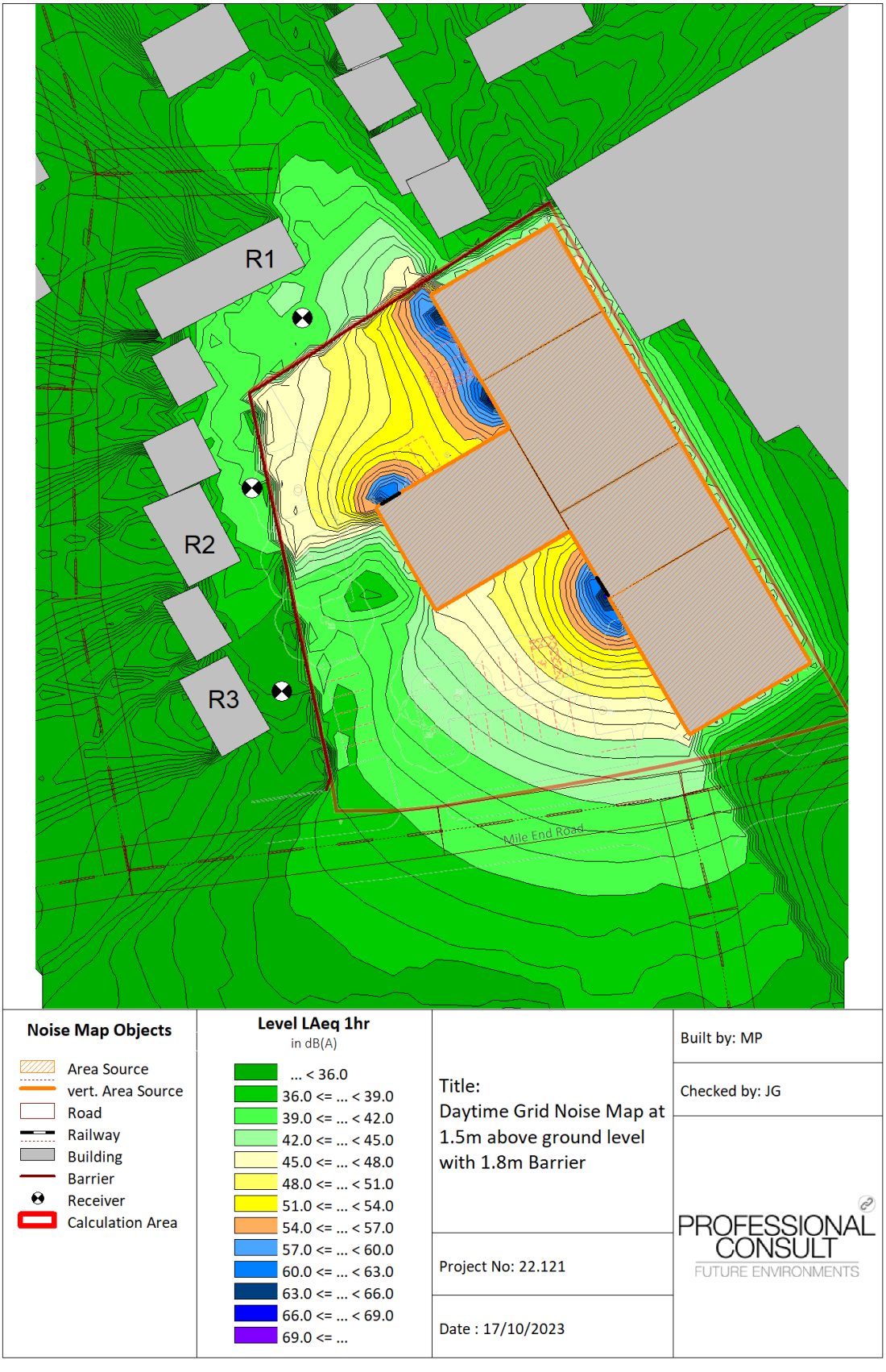
APPENDIX 4: DAYTIME GRID NOISE MAP

Figure 1 **Daytime Grid Noise Map**



APPENDIX 5: DAYTIME GRID NOISE MAP - MITIGATED

Figure 1 **Daytime Grid Noise Map**



APPENDIX 6: MEASURED BASELINE NOISE LEVELS

Measurement Start Time		Measured Sound Pressure Level, dB	
		$L_{Aeq,15mins}$	$L_{A90,15mins}$
01/12/2022 11:44	11:45	44.5	42.4
01/12/2022 11:59	12:00	44.3	41.9
01/12/2022 12:14	12:15	43.4	40.7
01/12/2022 12:29	12:30	45.3	42.3
01/12/2022 12:44	12:45	44.2	41.1
01/12/2022 12:59	13:00	44	41
01/12/2022 13:14	13:15	43.6	40.2
01/12/2022 13:29	13:30	44.6	40.5
01/12/2022 13:44	13:45	43.9	41.2
01/12/2022 13:59	14:00	46.1	42.1
01/12/2022 14:14	14:15	46.1	41.2
01/12/2022 14:29	14:30	45.2	40.8
01/12/2022 14:44	14:45	45.8	41.3
01/12/2022 14:59	15:00	43.9	41
01/12/2022 15:14	15:15	43.7	41.2
01/12/2022 15:29	15:30	45.5	40.4
01/12/2022 15:44	15:45	44	41.6
01/12/2022 15:59	16:00	44.9	42.8
01/12/2022 16:14	16:15	44.4	42.4
01/12/2022 16:29	16:30	44.4	42
01/12/2022 16:44	16:45	45	41.6
01/12/2022 16:59	17:00	44.6	42.5
01/12/2022 17:14	17:15	44.2	42.1
01/12/2022 17:29	17:30	45.7	42.2
01/12/2022 17:44	17:45	44.2	40.1
01/12/2022 17:59	18:00	44.1	41.4
01/12/2022 18:14	18:15	43.6	38.4
01/12/2022 18:29	18:30	41.4	37.4
01/12/2022 18:44	18:45	41.2	35.9
01/12/2022 18:59	19:00	41.9	36.9
01/12/2022 19:14	19:15	41.2	37.5
01/12/2022 19:29	19:30	44.2	36
01/12/2022 19:44	19:45	40	34.4
01/12/2022 19:59	20:00	40.2	34.7
01/12/2022 20:14	20:15	40	34.5
01/12/2022 20:29	20:30	40.3	33.4
01/12/2022 20:44	20:45	37.9	31.6
01/12/2022 20:59	21:00	38.8	30.8
01/12/2022 21:14	21:15	40.4	33.5
01/12/2022 21:29	21:30	39.4	31.5
01/12/2022 21:44	21:45	40.7	31.9
01/12/2022 21:59	22:00	39.5	29.9
01/12/2022 22:14	22:15	36.6	27.1

01/12/2022 22:29	22:30	37.1	27.9
01/12/2022 22:44	22:45	38.4	27.3
01/12/2022 22:59	23:00	41.7	28.6
01/12/2022 23:14	23:15	34.9	26
01/12/2022 23:29	23:30	33.5	24.2
01/12/2022 23:44	23:45	38.2	22.2
01/12/2022 23:59	00:00	33.5	23.4
02/12/2022 00:14	00:15	31.4	22.1
02/12/2022 00:29	00:30	34.1	23.6
02/12/2022 00:44	00:45	30.6	22.2
02/12/2022 00:59	01:00	32.2	25.9
02/12/2022 01:14	01:15	32.2	26
02/12/2022 01:29	01:30	32.2	24.8
02/12/2022 01:44	01:45	31	24.7
02/12/2022 01:59	02:00	33.6	25
02/12/2022 02:14	02:15	28.7	23.8
02/12/2022 02:29	02:30	29.6	24.3
02/12/2022 02:44	02:45	31.4	24.1
02/12/2022 02:59	03:00	32.3	22.9
02/12/2022 03:14	03:15	33	23.8
02/12/2022 03:29	03:30	34.2	24.9
02/12/2022 03:44	03:45	33.5	26.2
02/12/2022 03:59	04:00	36.6	26.9
02/12/2022 04:14	04:15	35	27.9
02/12/2022 04:29	04:30	55.3	29.1
02/12/2022 04:44	04:45	60.5	32.4
02/12/2022 04:59	05:00	63.8	38.3
02/12/2022 05:14	05:15	61.6	43
02/12/2022 05:29	05:30	63.5	39
02/12/2022 05:44	05:45	42.7	38.3
02/12/2022 05:59	06:00	43	38.4
02/12/2022 06:14	06:15	43.5	40.5
02/12/2022 06:29	06:30	43	39.8
02/12/2022 06:44	06:45	59.8	40.3
02/12/2022 06:59	07:00	60.5	41.1
02/12/2022 07:14	07:15	46.3	41.7
02/12/2022 07:29	07:30	44.3	41.2
02/12/2022 07:44	07:45	45	42
02/12/2022 07:59	08:00	44.8	42
02/12/2022 08:14	08:15	47	41.6
02/12/2022 08:29	08:30	46.7	43.2
02/12/2022 08:44	08:45	49.8	43.6
02/12/2022 08:59	09:00	46.9	42.8
02/12/2022 09:14	09:15	45.3	41.6
02/12/2022 09:29	09:30	45.8	42.8
02/12/2022 09:44	09:45	45.4	42.9

02/12/2022 09:59	10:00	44.9	41.9
02/12/2022 10:14	10:15	45.5	41.8
02/12/2022 10:29	10:30	44.6	41.8
02/12/2022 10:44	10:45	44	41.4
02/12/2022 10:59	11:00	45.5	41.4
02/12/2022 11:14	11:15	45.7	42
02/12/2022 11:29	11:30	61.1	43.5
02/12/2022 11:44	11:45	47.3	43.3
02/12/2022 11:59	12:00	46.1	42.8
02/12/2022 12:14	12:15	45	42.9
02/12/2022 12:29	12:30	45.1	43.4
02/12/2022 12:44	12:45	46.6	43.3
02/12/2022 12:59	13:00	46.1	43.8
02/12/2022 13:14	13:15	45.7	43.8
02/12/2022 13:29	13:30	49.9	45.2
02/12/2022 13:44	13:45	46.7	43.7
02/12/2022 13:59	14:00	46.3	43.1
02/12/2022 14:14	14:15	46	43.5
02/12/2022 14:29	14:30	46.1	43.7
02/12/2022 14:44	14:45	46.5	43.8
02/12/2022 14:59	15:00	46.4	44.4
02/12/2022 15:14	15:15	45.9	43.5
02/12/2022 15:29	15:30	47.2	44.1
02/12/2022 15:44	15:45	46.8	44.7
02/12/2022 15:59	16:00	46.8	45
02/12/2022 16:14	16:15	46.7	44.6
02/12/2022 16:29	16:30	46.9	44.5
02/12/2022 16:44	16:45	52.8	44.8
02/12/2022 16:59	17:00	46.7	44.7
02/12/2022 17:14	17:15	48	44.7
02/12/2022 17:29	17:30	47.1	44.9
02/12/2022 17:44	17:45	47.3	44.7
02/12/2022 17:59	18:00	46.4	44.1
02/12/2022 18:14	18:15	45.9	43.8
02/12/2022 18:29	18:30	46.9	43.2
02/12/2022 18:44	18:45	45.2	42.7
02/12/2022 18:59	19:00	44.9	42.1
02/12/2022 19:14	19:15	46.4	42.2
02/12/2022 19:29	19:30	44	41.6
02/12/2022 19:44	19:45	44.3	41
02/12/2022 19:59	20:00	44.3	40.5
02/12/2022 20:14	20:15	43.3	40
02/12/2022 20:29	20:30	42.3	38.4
02/12/2022 20:44	20:45	42.8	39.9
02/12/2022 20:59	21:00	42.8	39.4
02/12/2022 21:14	21:15	42.6	39.1

02/12/2022 21:29	21:30	43.6	39.6
02/12/2022 21:44	21:45	42.7	39.7
02/12/2022 21:59	22:00	42.9	38.9
02/12/2022 22:14	22:15	43.1	39.3
02/12/2022 22:29	22:30	40.5	36.9
02/12/2022 22:44	22:45	41.6	37.6
02/12/2022 22:59	23:00	41.3	37
02/12/2022 23:14	23:15	41.2	36.1
02/12/2022 23:29	23:30	40.6	36.8
02/12/2022 23:44	23:45	40.6	36.4
02/12/2022 23:59	00:00	39.2	34.7
03/12/2022 00:14	00:15	39.7	35.9
03/12/2022 00:29	00:30	38.8	35
03/12/2022 00:44	00:45	37.4	33.3
03/12/2022 00:59	01:00	39.1	34.1
03/12/2022 01:14	01:15	37.5	33.2
03/12/2022 01:29	01:30	39.3	32.8
03/12/2022 01:44	01:45	40.6	34
03/12/2022 01:59	02:00	38.1	33.3
03/12/2022 02:14	02:15	36.8	33
03/12/2022 02:29	02:30	37.6	33
03/12/2022 02:44	02:45	36.9	32.1
03/12/2022 02:59	03:00	36.9	34.1
03/12/2022 03:14	03:15	35.9	30.9
03/12/2022 03:29	03:30	38.3	32.9
03/12/2022 03:44	03:45	37.5	32.5
03/12/2022 03:59	04:00	36.1	32.3
03/12/2022 04:14	04:15	36	31.6
03/12/2022 04:29	04:30	37.3	33.1
03/12/2022 04:44	04:45	38.3	32.7
03/12/2022 04:59	05:00	37.3	31.9
03/12/2022 05:14	05:15	38.2	33.3
03/12/2022 05:29	05:30	40.4	35.6
03/12/2022 05:44	05:45	40.8	36
03/12/2022 05:59	06:00	58.9	37.1
03/12/2022 06:14	06:15	59.8	38.5
03/12/2022 06:29	06:30	57.7	36.6
03/12/2022 06:44	06:45	53.1	37.8
03/12/2022 06:59	07:00	51.5	38.5
03/12/2022 07:14	07:15	50.1	38.4
03/12/2022 07:29	07:30	43.1	39
03/12/2022 07:44	07:45	44.6	41.4
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03/12/2022 08:14	08:15	45.6	42.2
03/12/2022 08:29	08:30	47.7	43.1
03/12/2022 08:44	08:45	51.2	44.9

03/12/2022 08:59	09:00	49.3	45.2
03/12/2022 09:14	09:15	47.6	45.3
03/12/2022 09:29	09:30	46.7	44.3
03/12/2022 09:44	09:45	47.4	44.6
03/12/2022 09:59	10:00	47.7	44.3
03/12/2022 10:14	10:15	47.4	44.7
03/12/2022 10:29	10:30	49	45.3
03/12/2022 10:44	10:45	49.9	43.9
03/12/2022 10:59	11:00	48.5	45.5
03/12/2022 11:14	11:15	47.1	44.9
03/12/2022 11:29	11:30	49.4	45.8
03/12/2022 11:44	11:45	49.6	44.8
03/12/2022 11:59	12:00	48.3	46.2
03/12/2022 12:14	12:15	48.9	46.3
03/12/2022 12:29	12:30	47.8	45.2
03/12/2022 12:44	12:45	47	45.2
03/12/2022 12:59	13:00	48.1	44.7
03/12/2022 13:14	13:15	47.6	45.4
03/12/2022 13:29	13:30	48	45.4
03/12/2022 13:44	13:45	47.9	45.2
03/12/2022 13:59	14:00	47.7	45.3
03/12/2022 14:14	14:15	47.7	45.3
03/12/2022 14:29	14:30	47.2	44.5
03/12/2022 14:44	14:45	46.6	44.4
03/12/2022 14:59	15:00	47.2	45
03/12/2022 15:14	15:15	46.7	44
03/12/2022 15:29	15:30	46.8	44.3
03/12/2022 15:44	15:45	47.3	44.4
03/12/2022 15:59	16:00	46.8	44.1
03/12/2022 16:14	16:15	47.4	43.2
03/12/2022 16:29	16:30	46.5	43.8
03/12/2022 16:44	16:45	45.4	42.7
03/12/2022 16:59	17:00	46.5	43.2
03/12/2022 17:14	17:15	46	43.4
03/12/2022 17:29	17:30	45.3	42.3
03/12/2022 17:44	17:45	45.2	42.8
03/12/2022 17:59	18:00	45.1	42.1
03/12/2022 18:14	18:15	45.5	42.4
03/12/2022 18:29	18:30	44.9	42.1
03/12/2022 18:44	18:45	45.7	41.4
03/12/2022 18:59	19:00	45.5	42
03/12/2022 19:14	19:15	44.3	41.1
03/12/2022 19:29	19:30	46.7	41.6
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03/12/2022 20:29	20:30	45.2	41.6
03/12/2022 20:44	20:45	42.7	38
03/12/2022 20:59	21:00	43.2	37.8
03/12/2022 21:14	21:15	40.9	36.3
03/12/2022 21:29	21:30	41.8	36.3
03/12/2022 21:44	21:45	41.9	37.5
03/12/2022 21:59	22:00	43.7	38.7
03/12/2022 22:14	22:15	42.5	38.1
03/12/2022 22:29	22:30	42.4	37.8
03/12/2022 22:44	22:45	40.8	35.2
03/12/2022 22:59	23:00	42	38.2
03/12/2022 23:14	23:15	40.6	35.9
03/12/2022 23:29	23:30	40.5	36.3
03/12/2022 23:44	23:45	41.7	35.4
03/12/2022 23:59	00:00	39.1	33.1
04/12/2022 00:14	00:15	39.6	34.2
04/12/2022 00:29	00:30	38.3	31.7
04/12/2022 00:44	00:45	38	32.2
04/12/2022 00:59	01:00	37.3	31.7
04/12/2022 01:14	01:15	41.6	33.4
04/12/2022 01:29	01:30	37	31.7
04/12/2022 01:44	01:45	35.8	29.4
04/12/2022 01:59	02:00	36.4	29.2
04/12/2022 02:14	02:15	35.6	29.3
04/12/2022 02:29	02:30	35.6	31.5
04/12/2022 02:44	02:45	38.1	30.6
04/12/2022 02:59	03:00	38	31.3
04/12/2022 03:14	03:15	38.5	31.2
04/12/2022 03:29	03:30	41.9	32.9
04/12/2022 03:44	03:45	39.2	34.2
04/12/2022 03:59	04:00	38.5	35.5
04/12/2022 04:14	04:15	40.5	36.4
04/12/2022 04:29	04:30	38.4	34.1
04/12/2022 04:44	04:45	38.2	34.2
04/12/2022 04:59	05:00	40	35
04/12/2022 05:14	05:15	39.4	35.1
04/12/2022 05:29	05:30	41.2	35.4
04/12/2022 05:44	05:45	43.4	38.5
04/12/2022 05:59	06:00	39.1	33.4
04/12/2022 06:14	06:15	52.1	34.6
04/12/2022 06:29	06:30	39.9	35.4
04/12/2022 06:44	06:45	57.3	38.7
04/12/2022 06:59	07:00	43.4	35.2
04/12/2022 07:14	07:15	40.7	36
04/12/2022 07:29	07:30	42.5	38.6
04/12/2022 07:44	07:45	43	37.3

04/12/2022 07:59	08:00	43.4	37.5
04/12/2022 08:14	08:15	49.6	41.5
04/12/2022 08:29	08:30	52.3	42.8
04/12/2022 08:44	08:45	44.4	40.3
04/12/2022 08:59	09:00	53.8	43.5
04/12/2022 09:14	09:15	52.1	42.2
04/12/2022 09:29	09:30	49.6	43.1
04/12/2022 09:44	09:45	46.8	42.9
04/12/2022 09:59	10:00	50.1	42.5
04/12/2022 10:14	10:15	50.6	44.7
04/12/2022 10:29	10:30	55.7	49.3
04/12/2022 10:44	10:45	52.1	43.2
04/12/2022 10:59	11:00	54.6	45.1
04/12/2022 11:14	11:15	46.5	43
04/12/2022 11:29	11:30	46.5	43.2
04/12/2022 11:44	11:45	47.3	44.1
04/12/2022 11:59	12:00	46	43.8
04/12/2022 12:14	12:15	46.5	43.5
04/12/2022 12:29	12:30	45.8	43.5
04/12/2022 12:44	12:45	51.9	45.4
04/12/2022 12:59	13:00	55.3	49.2
04/12/2022 13:14	13:15	55.5	51.1
04/12/2022 13:29	13:30	47.1	43.1
04/12/2022 13:44	13:45	46.1	42
04/12/2022 13:59	14:00	51.5	46
04/12/2022 14:14	14:15	46.7	43.6
04/12/2022 14:29	14:30	45.9	43.1
04/12/2022 14:44	14:45	47.1	42.3
04/12/2022 14:59	15:00	47	43.9
04/12/2022 15:14	15:15	45.8	42.9
04/12/2022 15:29	15:30	46.7	44.1
04/12/2022 15:44	15:45	46.3	43.4
04/12/2022 15:59	16:00	45.7	43.2
04/12/2022 16:14	16:15	44.7	42.1
04/12/2022 16:29	16:30	47.3	42.7
04/12/2022 16:44	16:45	44.8	40.5
04/12/2022 16:59	17:00	44.5	42.1
04/12/2022 17:14	17:15	44.7	41.4
04/12/2022 17:29	17:30	44	40.3
04/12/2022 17:44	17:45	44.5	42
04/12/2022 17:59	18:00	43.9	40.3
04/12/2022 18:14	18:15	44.6	41.4
04/12/2022 18:29	18:30	43.9	40.3
04/12/2022 18:44	18:45	43.6	39.7
04/12/2022 18:59	19:00	43.7	39
04/12/2022 19:14	19:15	42.6	38.2

04/12/2022 19:29	19:30	41.8	37.5
04/12/2022 19:44	19:45	43.3	37.9
04/12/2022 19:59	20:00	42.5	38.6
04/12/2022 20:14	20:15	41.8	36.1
04/12/2022 20:29	20:30	40.9	36.5
04/12/2022 20:44	20:45	41.9	38.6
04/12/2022 20:59	21:00	42.9	38.6
04/12/2022 21:14	21:15	45.1	40.2
04/12/2022 21:29	21:30	42.8	37.6
04/12/2022 21:44	21:45	44.6	37.1
04/12/2022 21:59	22:00	40.5	34.8
04/12/2022 22:14	22:15	39.5	33.7
04/12/2022 22:29	22:30	40	35.6
04/12/2022 22:44	22:45	38.3	32.4
04/12/2022 22:59	23:00	38.4	33.1
04/12/2022 23:14	23:15	39.5	33.2
04/12/2022 23:29	23:30	40.1	32.3
04/12/2022 23:44	23:45	37.5	32.1
04/12/2022 23:59	00:00	36.1	30.8
05/12/2022 00:14	00:15	36.9	31.1
05/12/2022 00:29	00:30	35.9	29.8
05/12/2022 00:44	00:45	33.1	27.8
05/12/2022 00:59	01:00	33.1	27.1
05/12/2022 01:14	01:15	34.2	27.9
05/12/2022 01:29	01:30	34.8	28.6
05/12/2022 01:44	01:45	31.4	27.9
05/12/2022 01:59	02:00	33.7	28.5
05/12/2022 02:14	02:15	31.8	28.1
05/12/2022 02:29	02:30	34.8	29
05/12/2022 02:44	02:45	34.6	29.4
05/12/2022 02:59	03:00	33.8	29.4
05/12/2022 03:14	03:15	36.1	30
05/12/2022 03:29	03:30	38.3	32
05/12/2022 03:44	03:45	40.5	31.1
05/12/2022 03:59	04:00	39.7	32.8
05/12/2022 04:14	04:15	39.4	32.1
05/12/2022 04:29	04:30	39	32.6
05/12/2022 04:44	04:45	39.5	35.3
05/12/2022 04:59	05:00	40.8	35.3
05/12/2022 05:14	05:15	41.1	36.3
05/12/2022 05:29	05:30	43.9	40
05/12/2022 05:44	05:45	45.2	41.1
05/12/2022 05:59	06:00	48	40.7
05/12/2022 06:14	06:15	49.1	43.1
05/12/2022 06:29	06:30	57.9	46.4
05/12/2022 06:44	06:45	46.2	43.6

05/12/2022 06:59	07:00	46.7	43.4
05/12/2022 07:14	07:15	47.4	45.1
05/12/2022 07:29	07:30	48.1	45.7
05/12/2022 07:44	07:45	47.8	46.2
05/12/2022 07:59	08:00	52.7	48.4
05/12/2022 08:14	08:15	53.9	47.9
05/12/2022 08:29	08:30	48.8	45.8
05/12/2022 08:44	08:45	50.4	46.9
05/12/2022 08:59	09:00	49.5	46.4
05/12/2022 09:14	09:15	48	45.1
05/12/2022 09:29	09:30	50.3	46.1
05/12/2022 09:44	09:45	55.9	48.4