

NoiseAssess

Acoustics, Noise and Vibration Consultants

Project:	Proposed commercial development Century Works, Manchester Road, Millhouse Green, Sheffield, S36 9LQ
Scope of Report	Outline assessment of the potential impact of noise from proposed commercial development on the nearest residential properties
Client:	To Your Home Ltd
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1.0 INTRODUCTION

- 1.1 NoiseAssess Ltd has been commissioned by To Your Home Ltd to assess the potential noise impact of a proposed Commercial Development off Manchester Road at Millhouse Green.
- 1.2 The site location is shown on Figure 1. This assessment has been based on the proposed plans produced by NYP Architectural Services Limited as shown in Figures 2-4. The plans show a single building made up of seven individual units backing onto the west boundary of the site with a service yard and parking area to the east. The proposed development is on land which has an extant planning permission for a detached B2 building not yet built (see Figure 5). That planning permission would be surrendered to facilitate this development.
- 1.3 The nearest house is to the west of the site and is marked R1 on Figure 6. This house is owned by the site owner but has been assessed as a noise-sensitive location because it could be sold separately. There is an earth bund between the site and the residential property/garden which will be raised, and a fence erected on top. The next nearest residential properties are to the northwest off Bullhouse Lane. These are further away and more screened than R. To the north of the site there is the Trans-Pennine Trail and Bullhouse Lane beyond which there is agricultural land. To the east there is an existing industrial building, Century Works, which is used by a metalworking business. Beyond Century Works there is Manchester Road (A628). There are residential properties on the other side of Manchester Road to the north, but they are close to the road and more distant and screened from the site than R shown on Figure 6. To the south there is agricultural land.
- 1.4 The access to the site will be off Manchester Road via a roadway to the south of the existing industrial building.
- 1.5 It is understood that the application will be for unrestricted hours of use although it is likely that most of the units forming the proposed development will be used in the daytime only.
- 1.6 The methodology for this assessment was discussed in advance with James Gardham, Environmental Health Officer at Barnsley Metropolitan Borough Council. James Gardham has asked for noise from the site to be assessed in accordance with BS4142 and that, if possible, the cumulative noise from the

proposed development at the closest residential properties be controlled such that the Rating level is not be more than the background noise level. He asked that the noise survey include weekend periods and that the owner's residence be assessed as the closest noise-sensitive location.

- 1.7 This report considers the potential impact of operational noise from within the proposed new units, noise from vehicle movements and loading/unloading and mechanical services noise. The end users of the units are unknown and therefore this is an indicative outline assessment of the potential noise impact based on assumptions as detailed in the assessment section below.

2.0 CRITERIA

BS4142

2.1 The noise impact of commercial/industrial noise sources on existing residential properties is normally assessed in accordance with BS4142¹.

2.2 The scope of BS4142 is given in the extract below.

"1.1 This standard describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

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

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."

2.3 The standard compares sound from industrial / commercial sources with the background sound level. The standard states in Clause 9.1 that "Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level". Such features are taken into account by adding a correction to the specific sound level depending on the extent to which the distinguishing acoustic characteristics will attract attention. The standard states the following in Clause 9.2:

"Tonality: For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone that is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible".

"Impulsivity: A correction of up to 9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."

"Other sound characteristics: Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied."

"Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant then it may be appropriate to apply a single correction. Where both features are likely to affect perception of response, the correction ought normally to be applied in a linear fashion."

"Intermittency: When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied".

Note: Although not clear in the standard it appears from the examples given that the intermittency penalty is for use when the specific sound source is intermittent but not particularly impulsive. Therefore, it has been assumed that impulsive and intermittency penalties would not generally be both applied in a linear fashion.

2.4 BS4142 provides guidance on the assessment of impacts in Clause 11.

"11 Assessment of the impacts

COMMENTARY ON CLAUSE 11.

The significance of sound of an industrial / commercial nature depends upon both the margin by which the rating of the specific sound source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs / will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.

Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level, and consider the following:

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

- 2.5 BS4142 recommends that the specific sound level during daytime periods 07:00 - 23:00 hrs should be determined over a reference time interval of 1 hour and during night-time periods 23:00 - 07:00 hrs over a reference time interval of 15 minutes.

Assessment in Context

- 2.6 BS4142 recommends that the industrial sound should also be assessed in context. Therefore, the sound levels have been assessed in the context of the character of the area; the existing ambient noise levels and the criteria given in BS8233².
- 2.7 The BS8233 recommendations for indoor ambient noise levels are given below.

Table 1: BS8233 recommendations for indoor ambient noise levels

Activity	Location	07:00 to 23:00 hrs	23:00 to 07:00 hrs
Resting	Living room	35 dBL _{Aeq,16hour}	-
Dining	Dining room/area	40 dBL _{Aeq,16hour}	-
Sleeping (daytime resting)	Bedroom	35 dBL _{Aeq,16hour}	30 dBL _{Aeq,8hour}

- 2.8 Paragraph 7.7.3.2 of BS8233 recommends that for traditional external amenity areas such as gardens and patios, it is desirable that during the daytime the external noise level does not exceed 50 dBL_{Aeq,T} with an upper guideline value of 55 dBL_{Aeq,T} which would be acceptable in noisier environments. The time period is not stated but is assumed to be 16 hours (07:00 hours to 23:00 hrs) as in the previous version of BS8233.

3.0 BASELINE NOISE DATA

- 3.1 An unattended noise survey has been carried out from 14:00 hours on Thursday 09/07/2020 to 12:00 hours on Monday 13/07/2020. The survey was carried out at the noise monitoring location marked as M on Figure 6. This position is considered representative of the nearest residential property to the site.
- 3.2 The noise survey was carried out using an auto-logging Rion NL-31 sound level meter (serial number 583274). The sound level meter was calibrated using a portable Norsonic 1251 calibrator (s/n 32860) at the start and finish of the survey with no variation in the calibration level. The measurements were taken with the microphone at a height of approximately 2m above ground level in freefield conditions. The microphone was mounted on the top of the metal fence at the northern end of the large garden of the closest residential property (R) which is to the west of the proposed development site.
- 3.3 Based on weather reports the weather conditions during the survey were generally dry with light winds (<5m/s). There were some periods when winds were slightly above 5m/s on the Saturday afternoon and some periods of light rain on the Thursday.
- 3.4 The main noise sources during the periods of attendance on site were distant road traffic and occasional industrial noise. The resident reported that there was some noise from lawn mowing on the Saturday morning and some noise from a small gathering in the garden in the early part of Saturday evening. However, these factors do not appear to have significantly increased the background dBL_{A90} noise levels. This is probably because the garden is large and the noise was intermittent.
- 3.5 The baseline noise survey was carried out when environmental noise levels were reduced due to restrictions during the Covid-19 pandemic. It is possible that environmental noise levels may be higher when road traffic flows, industrial/commercial activity and flights are back to normal.
- 3.6 The results of the noise survey are summarised below and are presented in full in Appendix A2. The L_{Aeq} values given are log averages of the 5-minute values. The 5-minute L_{A90} values have been arithmetically averaged to calculate the reference period values (1-hour day and 15-min night) and then the modal values have been calculated for daytime and night-time periods.

Table 2. Summary of existing daytime noise levels

Day	Start time	End time	Average dBL _{Aeq}	Modal dBL _{A90}
Thursday	14:00	23:00	50.8	41
Friday	07:00	23:00	48.4	37
Saturday	07:00	23:00	48.2	35
Sunday	07:00	23:00	40.4	34
Monday	07:00	12:00	45.2	-

Table 3. Summary of existing night-time noise levels

Night	Start time	End time	Average dBL _{Aeq}	Modal dBL _{A90}
Thursday-Friday	23:00	07:00	45.7	35
Friday-Saturday	23:00	07:00	37.6	31
Saturday-Sunday	23:00	07:00	40.2	27
Sunday-Monday	23:00	07:00	38.5	24

4.0 NOISE SOURCES ON THE PROPOSED SITE

- 4.1 Noise emissions from the proposed commercial development have been calculated using the assumptions given below.
- 4.2 Calculations have been based on the proposed site layout and building details shown in Figures 2-4.
- 4.3 The internal noise levels which will occur within the new units are not known at this time. Warehouse type operations may generate relatively low internal noise levels, but some workshop uses could generate higher internal noise levels. For the purposes of this assessment it has been assumed that all of the units in the daytime and one unit at night could have an average internal noise level of 80 dBL_{Aeq} with the octave-band spectrum shown in the table below. It has been assumed that the noise levels in the other six units at night would be 70 dBL_{Aeq} or less on average with the octave-band spectrum shown in the table below.
- 4.4 The noise levels have been applied to the whole of the unit building envelope of the units which is conservative as normally large parts of the building envelope would be subject to lower noise levels. A noise level of 80 dBL_{Aeq} would result in noise exposure equivalent to the lower exposure action value of 'The Control of Noise at Work Regulations, 2005' over an 8 hour shift and in order for this level to be generated at the inner face of the sheeting of the walls and roof noise levels at staff working positions would be likely to be significantly higher. Therefore, this assumption is typical of units which are 'Hearing Protection Zones' where the use of hearing protection would be mandatory. In practice it is likely that new businesses would design their operations to control noise at source to reduce staff noise exposure which is the aim of 'The Control of Noise at Work Regulations'. The noise level of 70 dBL_{Aeq} would be typical of workshops with intermittent high noise levels approaching hearing protection levels at some working positions because it is a continuous noise level applied to the whole building envelope.

Table 4. Assumed internal noise levels in units

Time / Units	Internal noise level (dB) at octave band centre frequency (Hz)								dBL _{Aeq}
	63	125	250	500	1000	2000	4000	8000	
Day - all units. Night - 1 unit	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	80.0
Night - 6 units	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	70.0

- 4.5 It is understood that the walls and roof of the units will be formed with a profiled metal sheeting system. For the purposes of this assessment, the sound insulation given in the table below has been assumed. This data can be achieved by some systems with inner and outer profiled metal sheeting and a cavity filled with insulation. The system can be selected by checking the manufacturer's information against the figures below. For the roof lights shown on the plans the typical insulation for triple walled polycarbonate has been assumed as given below.

Table 5. Assumed sound insulation data used for walls and roofs

Material	Sound reduction index (dB R) at octave band centre frequency (Hz)								dBR _w
	63	125	250	500	1000	2000	4000	8000	
Profiled metal sheeting system	14	15	27	40	45	55	55	55	37
Triple walled polycarbonate	7	8	11	15	20	22	22	22	-

- 4.6 For the purposes of the calculations it has been assumed that the units will be operated with the roller shutter doors open. This is conservative as only some of the doors are likely to be open into noise generating areas at any one time. It has also been assumed that the personnel doors to the front and rear of the units will be open. Again, this is conservative.
- 4.7 The calculations have included the following vehicle and loading/unloading movements. These assumptions have been made with reference to the Highway Statement by Paragon Highways dated March 2020.
- 1 HGV arrival or departure per hour in the daytime.
 - 1 HGV reverse movement per hour in the daytime.
 - 2 van / car arrivals or departures per hour in the daytime.
 - 20 Forklift Truck (FLT) movements per hour in the daytime for loading or unloading, each movement being from the yard into a unit and back.
 - 2 van / car arrivals or departures in a 15-minute period at night.
 - 2 Forklift Truck (FLT) movements in a 15-minute period at night.
- 4.8 The following noise data has been used for vehicle movements and loading/unloading. This data covers the use of conventional HGV reversing alarms. Vehicle refrigeration units have not been included

because refrigerated storage is not currently proposed. The FLT data is based on one trip into and out of a unit at another site using a diesel FLT which is the worst case.

Table 6. NoiseAssess library data for vehicle movements – Freefield SEL noise levels

Noise source	Distance (m)	SEL (dB) at octave band centre frequency (Hz)								dB(A)
		63	125	250	500	1000	2000	4000	8000	
HGV arrive/depart	10	90.6	89.0	84.0	81.2	79.8	74.1	65.4	54.2	84.0
HGV reverse	10	102.9	98.8	88.7	88.2	87.8	83.5	76.4	67.7	92.1
Van/car arrive/depart	10	71.5	66.6	65.1	64.8	64.4	59.8	53.0	45.4	68.0
FLT movement	10	80.7	75.7	74.7	78.3	77.0	75.9	72.1	63.3	82.1

- 4.9 At this stage it is not known what external mechanical services will be installed, therefore a noise design target has been provided as discussed below. However, for the initial calculations, an external aircon condenser has been included at each unit (i.e. 7 units in total). The condensers have been assumed to be at ground level at the rear of the units. The noise level of the aircon condensers has been assumed to be as shown below. This is taken from manufacturer's noise data for a typical condenser with a higher noise level (some are 10 dB(A) quieter than this).

Table 7. Assumed noise level of each aircon external condenser, dB/dB(A) at 1m.

Sound pressure level (dB) at octave band centre frequency (Hz)								dBL _{Aeq}
63	125	250	500	1000	2000	4000	8000	
65.0	59.0	54.0	58.0	54.0	45.0	45.0	41.0	58.5

5.0 OUTLINE RECOMMENDATIONS FOR NOISE CONTROL

- 5.1 The final uses of the units are unknown at the time of the preparation of this assessment. Therefore, outline recommendations for mitigation measures have been based on the assumptions given above.

Site layout and boundary treatment

- 5.2 The proposed site layout helps to reduce noise impact at the nearest residential properties because the rear of the units is to be towards the nearest houses and the service yard and roller shutter doors will be screened by the units.
- 5.3 There is already an earth bund to the west of the site and the section on Figure 3 shows the bund with a fence on top giving a total height of around 5.5m above the yard level at the units. It is recommended that the fence along the top of the bund should be an acoustic fence comprising a minimum of 20mm thick weather-treated, close-boarded timber fencing with cover strips to seal the gaps between panels and gravel boards to seal the gap at the base. Proprietary acoustics fences are available from the following:
- Jacksons Fencing
<https://www.jacksons-fencing.co.uk/acoustic-fencing>
 - Premier Acoustic Fencing
<http://www.premieracousticfencing.co.uk/>
 - Modular Walls
<http://www.modularwall.co.uk/products/acoustimax/>
 - Gramm Barriers
<http://www.grammbarriers.com/our-products/acoustic-barriers/>
- 5.4 At the southern end of the bund the acoustic fence should be continued at a height of at least 3m above ground level and close-fitting, close-boarded gates used to reduce noise passing via the residential driveway.
- 5.5 The recommendations are given in this report are for acoustic reasons only and advice on other matters should be obtained from other specialists. For instance, advice will be required on foundation design for

the fence on the bund for wind loading. The safety implications of the installation of the recommended products / material should be checked by the Client before use and appropriate systems of work put in place. The sound insulation performance of the proposed construction will be dependent upon correct installation and workmanship.

Mechanical Services Plant

- 5.6 At present no details are available for the noise levels, locations, or hours of use of external plant. Seven aircon condensers have been included in the calculations (one for each unit) as detailed above. Noise control measures would be necessary for plant which generates higher noise levels above certain limits. Noise design targets have therefore been provided which can be used to check plant and design noise control measures, if necessary, at the detailed design stage. The targets are given in the assessment section below.
- 5.7 If required, the noise emissions from plant can be controlled using measures such as the selection of quieter models; the use of local barriers, enclosures, ductwork attenuators, lagging etc. If attenuators are used it may be necessary to use a ductwork expansion section to reduce velocities to limit re-generated noise from airflow. Plant can be mounted using anti-vibration mounts to reduce the re-radiation of noise from connected structures. Flexible connectors can be used to reduce the transmission of vibration into connected ductwork. Large steel plates can be covered with damping sheets or constructed with sound-deadened steel. The siting of plant can help to reduce the requirement for mitigation. If it is sited on the front elevation of the building low to the ground it would have maximum barrier attenuation provided by the building. If it is sited to the rear it should preferably be sited low to the ground to maximise the attenuation provided by the bund/fence.

6.0 NOISE LEVELS AT CLOSEST NOISE SENSITIVE PROPERTIES

- 6.1 The cumulative noise from the proposed commercial development has been calculated at the position marked R on Figure 6 which is the closest residential property and currently under the same ownership. Barrier calculations have been based on the ground levels and bund/fence height shown on the drawings and recommended above. The receptor has been taken as 1.5m above the local ground level at the house in both daytime and night-time periods because the property is single storey. The calculations are based on the assumptions made regarding the use of the development as detailed in Section 4 including one aircon condenser per unit. Noise from additional mechanical services is considered separately below.
- 6.2 The calculations have been carried out using NoiseAssess in-house Excel spreadsheets. Separate calculations have been carried out for noise breakout from the units, vehicle movements/loading/unloading and the aircon condensers. The results have then been log-summed to give the overall noise impact. The results of the calculations are shown below.

Table 8. Results on noise calculations at Receptor R, $dB_{LAeq,1hr}$.

Time	Day	Night
Breakout	29	22
Vehicles/Loading/Unloading	26	16
Aircon Condensers	13	13
Total	31	23

7.0 NOISE ASSESSMENT

Noise limiting design target for external plant

- 7.1 A relatively loud aircon condenser to each unit has been included in the above calculations. The noise generated by the aircon condensers at the receptor is low because of screening by the bund/fence. If other plant were installed low to the ground at the rear or at the front of the units, it would be screened from the nearest houses. The use of the aircon condenser noise levels is indicative only and in case other plant is required, targets have been calculated which can be used for plant selection and the design of noise control measures if required. The targets have been selected so that when combined with the other noise sources the cumulative noise level would still comply with the criterion that the BS4142 rating level should not exceed the background noise level.
- 7.2 Separate noise limits have been calculated for external plant operating during the daytime and plant which may run at night. The plant noise limits are given below.

Table 9. Suggested cumulative plant noise design limit outside residential properties

Running period of plant	07:00-23:00hrs	24hrs
Highest Permissible Specific Plant Noise Level, dBL _{Aeq}	23	14

- 7.3 The above design targets relate to the total noise from all plant to all units. The design target for the noise from plant to one unit should be reduced by $10 \times \log(n)$ where n is the number of units likely to have significant levels of plant noise affecting the receptor. The target for individual plant items can be derived by reducing these figures in the same way based on the number of items. The distance and screening attenuation can be added to the above figures to give the noise limits close to the plant items. Indicative noise control measures for plant are given in the Section 5 above. The mitigation requirements will be least onerous if the plant is sited low on the front wall of the building because the building would then screen the plant from the nearest residential properties.
- 7.4 If plant were to be installed to the above limits, then the cumulative noise levels calculated in Table 8 above would not change. The revised cumulative calculations are given below.

Table 10. Revised cumulative noise calculations at Receptor R, $dBL_{Aeq,1hr}$.

Time	Day	Night
Breakout	29	22
Vehicles/Loading/Unloading	26	16
Aircon Condensers	23	14
Total	31	23

BS4142 Assessment

- 7.5 The calculated noise level at the closest residential property has then been assessed in accordance with BS4142.
- 7.6 The noise assessment has been carried out for Location R as shown on Figure 1, using the lowest modal background noise levels ($dBL_{A90,1hr}$ day and $dBL_{A90,15min}$ night) given in Tables 2 and 3 above. This is conservative because the values relate to Sunday daytime and the quietest part of Sunday-Monday night when use of the units is least likely. It should also be noted that the survey was carried out when environmental noise levels were reduced due to restrictions during the Covid-19 pandemic. It is possible that levels may be higher when traffic flows, industrial/commercial activity and flights are back to normal.
- 7.7 BS4142 requires penalties to be added where noise from an industrial source has a tonal and / or intermittent/impulsive quality. The assessment has been based on the following assumptions:
- Noise from the proposed development having a tonal quality that is just perceptible at the closest residential property resulting in a tonal penalty of 2 dB
 - Noise from the proposed development having impulsivity or intermittency that is just perceptible at the closest residential property resulting in a penalty of 3 dB.
- 7.8 The BS4142 assessment calculations are shown below.

Table 11. BS4142 Assessment of noise from the development at Receptor R – Sun-Mon

Time	Day	Night
Specific noise level, dBL _{Aeq}	31	23
Tonal Penalty, dB	2	2
Impulsive/Intermittency penalty, dB	3	3
Rating, dB	36	28
Background noise level, dBL _{A90}	34	24
Rating - background, dB	2	4

- 7.9 The BS4142 assessment results are just over the level which normally indicates a low impact (i.e. 0) but below the level indicating and adverse noise impact (i.e. +5). The results are just over the criterion requested by James Gardham that the BS4142 rating level should not exceed the background noise level. However, the above results are based on the lowest modal dBL_{A90} values which occurred on the Sunday in the daytime and on the Sunday-Monday night in the night-time. These results are based on high internal noise levels occurring at those times which is very unlikely. The lowest weekend dBL_{A90} values are extremely low and a previous version of BS4142 stated that such low levels were outside the scope of the standard. The current version relies on the addition of assessment in context which is discussed further below. At extremely low noise levels BS4142 must be used with caution because the noise may not be noticeable even when it is slightly in excess of the background noise level.
- 7.10 If the BS4142 assessment is based on the weekday modal dBL_{A90} noise levels (i.e. those recorded on the Thursday – Friday) then the result is as shown below.

Table 12. BS4142 Assessment of noise from the development at Receptor R - weekdays

Time	Day	Night
Specific noise level, dBL _{Aeq}	31	23
Tonal Penalty, dB	2	2
Impulsive/Intermittency penalty, dB	3	3
Rating, dB	36	28
Background noise level, dBL _{A90}	37	35
Rating - background, dB	-1	-7

- 7.11 The above results indicate a low noise impact on weekdays and weeknights which are the times that the higher noise levels assumed are likely to occur. These results also meet the criterion requested by James Gardham.
- 7.12 BS4142 also recommends that the potential noise levels be considered in context as detailed below.

Consideration of noise levels in context

- 7.13 The proposed development is on land close to an existing industrial building in use for metal working activities. It is presumed that building has no planning restrictions on the hours of use. The land on which this development is proposed is an existing yard area already used for industrial activities. The proposed development is therefore not out of context with the area and will not significantly change the character of the area.
- 7.14 There is an extant consent for a detached building to the rear of the existing industrial building for B2 use. The current proposal is in the same area as that consent and would replace it. The current proposal is slightly closer to the nearest residential property but could potentially generate less noise in the direction of the house because the roller shutter doors face directly away from the house and because it will be screened by the bund/fence. Therefore, the potential noise impact of this proposal is not significantly greater than the potential noise impact of a development on the same land which already received planning permission.
- 7.15 The nearest house covered by this assessment is in the same ownership as the development site and therefore complaints from the existing residents are extremely unlikely. This house has been assessed as the nearest noise-sensitive receptor as requested by James Gardham because it could potentially be sold separately. However, there are no plans for it to be sold separately and, if it were, any new residents would be fully aware of the industrial context because the access is through the industrial development. Therefore, the nearest house could be considered a less critical noise assessment location than completely uninvolved properties. The next nearest residential properties would have significantly lower noise impact because of increased distance and screening.

- 7.16 The baseline noise survey was carried out at a time when environmental noise levels may have been reduced due to restrictions during the Covid-19 pandemic. It is possible that environmental noise levels may be higher when road traffic flows, industrial/commercial activity and flights are back to normal. This would reduce the calculated noise impact.
- 7.17 To assist with the consideration of noise from the new development in context the noise levels have been compared with the lowest average ambient noise levels measured during the noise survey and the criteria given in BS8233. It is recognised that this standard is generally used for anonymous noise sources and it is used here only to provide additional information on the scale of the noise levels. The results of these comparisons are given below. The comparison with average ambient noise levels is based on the Sunday and the Sunday-Monday night which were the quietest periods.

Table 13. Noise from proposed site at Receptor R assessed in context

Time	Day	Night
Source noise ambient noise level, $dB_{L_{Aeq}}$	31	23
Comparison with existing ambient noise levels		
Existing ambient noise level, $dB_{L_{Aeq}}$	40	38
Difference between existing & source noise level, dB(A)	-9	-15
Existing ambient + source noise level, $dB_{L_{Aeq}}$	41	38
Increase in existing ambient noise level, $dB_{L_{Aeq}}^{\dagger}$	1	0
Comparison with BS8233 criteria for gardens		
BS8233 Desired limit for private gardens	50	-
Difference between source noise & desired limit, dB(A)	-19	-
Comparison with BS8233 internal noise limiting criteria		
Internal noise level due to source noise, dB(A) ⁺⁺	16-21	8-13
BS8233 recommended internal noise criteria dB(A)	≤ 35	≤ 30
Difference between BS8233 internal limit & internal source, dB(A)	-19 to -14	-22 to -17

[†]An increase in ambient noise level of up to 3dB(A) is not considered to be significant

⁺⁺Attenuation due to partially open window taken as 10-15dB(A)

- 7.18 The above results show that – when compared with the weekend ambient noise levels (Sunday and Sunday to Monday night) there would be no significant increase in noise levels. The noise levels are also well below the BS8233 criteria. Therefore, the BS4142 assessment, when modified by the context, indicates that the development would have a low noise impact at all times.

8.0 CONCLUSIONS

- 8.1 An indicative assessment of noise from the proposed commercial development has been carried out.
- 8.2 There is already an earth bund between the proposed site and the nearest residential property. The proposed plans show this bund increased in height with a fence on top. It is recommended that the fence be constructed as an acoustic fence to the specification detailed above and the top of the fence be a minimum of 5.5m above the ground level at the proposed building. It is also recommended that an acoustic barrier height of 3m be maintained in the residential access area by continuing the fence at the end of the bund and constructing close-fitting close-boarded access gates to a similar standard.
- 8.3 Details of the plant which will be installed is unknown at this stage. Calculations have been carried out with reasonably loud aircon condensers serving each of the 7 units. The resultant plant noise levels are low. The condensers are an indicative example and to cover the possibility of other plant being required plant noise limits have been set for the daytime and night-time periods. The limits can be used for the design of plant if necessary. Indicative plant noise mitigation measures have been provided. Plant sited at the rear of the proposed building close to the ground would have significant screening by the bund/fence. Plant sited close to ground level at the front of the proposed building would have even more screening by the building. Therefore, strategic positioning of any proposed plant is likely to give significant barrier attenuation making the design of plant noise attenuation measures less onerous.
- 8.4 The plant noise limit levels have been summed with the calculated levels of noise breakout from the units and vehicle movements / loading / unloading.
- 8.5 The cumulative noise has been assessed in accordance with BS4142. The BS4142 assessment results are just above the level indicating a low noise impact and just below the level indicating an adverse noise impact. However, this is based on the background noise levels recorded at the weekend which were extremely low. BS4142 must be used with caution at such low background noise levels and the context must be considered. The BS4142 assessment calculated using weekday background noise levels indicates a low noise impact.

- 8.6 BS4142 also advises that the potential noise be considered in context. The proposal is close to an existing industrial building and on land currently used as an industrial yard. The proposed development site has an extant planning permission for a detached industrial building which has not been implemented and would be replaced by this new proposal. Therefore, the proposal is not out of context with the area.
- 8.7 The property assessed as the closest noise-sensitive receptor is in the same ownership as the development site and is accessed through the industrial area. Therefore, it could be argued that noise impact at this location is less critical than at completely uninvolved properties. The next nearest residential properties have increased distance and screening and therefore would have lower noise impact.
- 8.8 The predicted noise levels from the development are low when compared with existing ambient noise levels including in comparison with the lower ambient noise levels at the weekend. The predicted noise levels are also low when compared with the criteria given in BE8233. Therefore, the BS4142 assessment, when modified by the context, indicates that the development would have a low noise impact at all times.
- 8.9 The results of this assessment indicate that noise impact can be adequately controlled and therefore it is recommended that consent for the development should not be refused on noise grounds. If it is considered necessary, detailed assessment of the noise from each unit can be secured by an appropriately worded planning condition.

9.0 REFERENCES

1. BS4142: British Standard 4142:2014, Methods for rating and assessing industrial and commercial sound.
2. BS8233: British Standard 8233, Guidance on sound insulation and noise reduction for buildings, BSI 2014.

FIGURE 1: SITE LOCATION

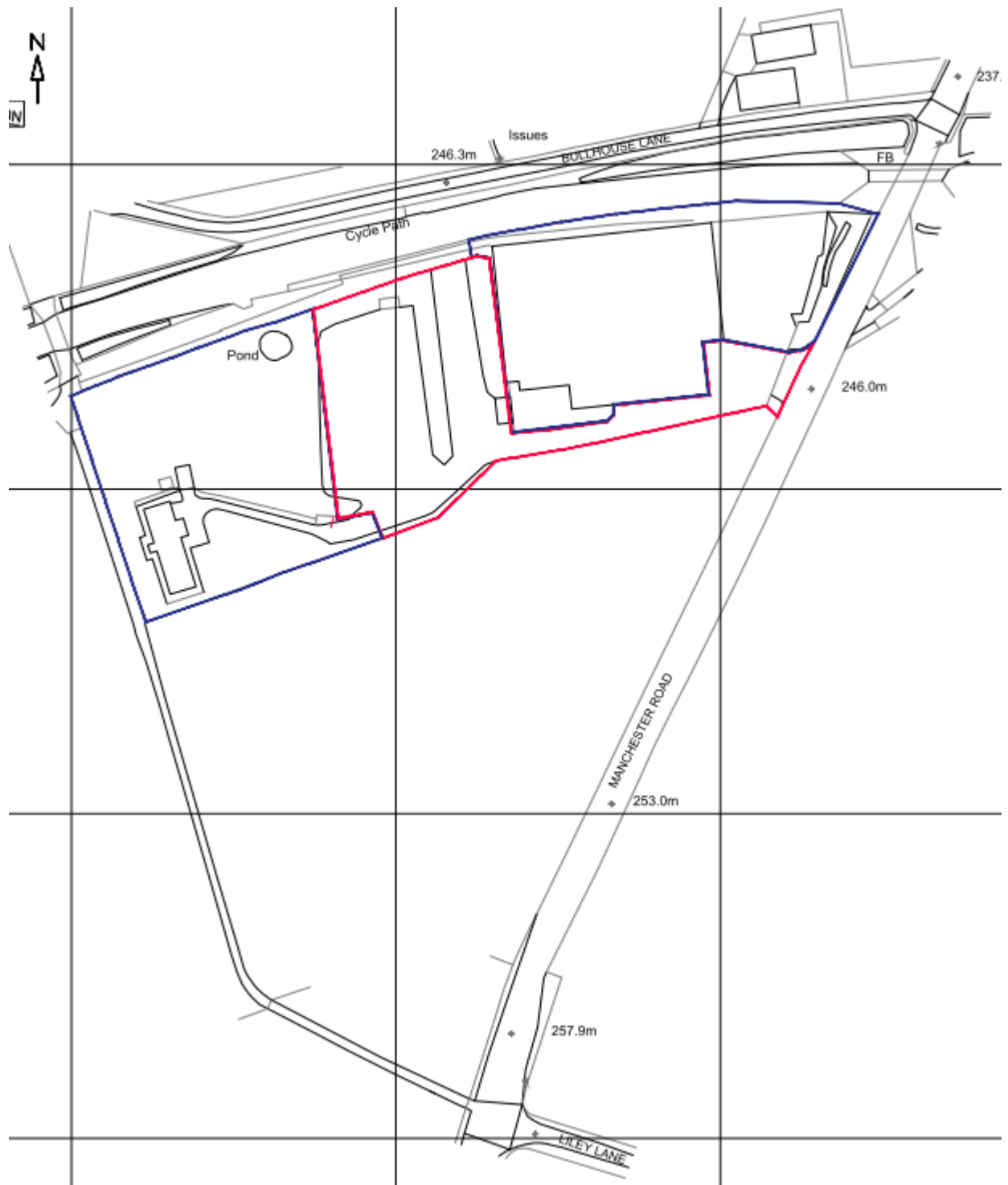


FIGURE 2: PROPOSED SITE PLAN

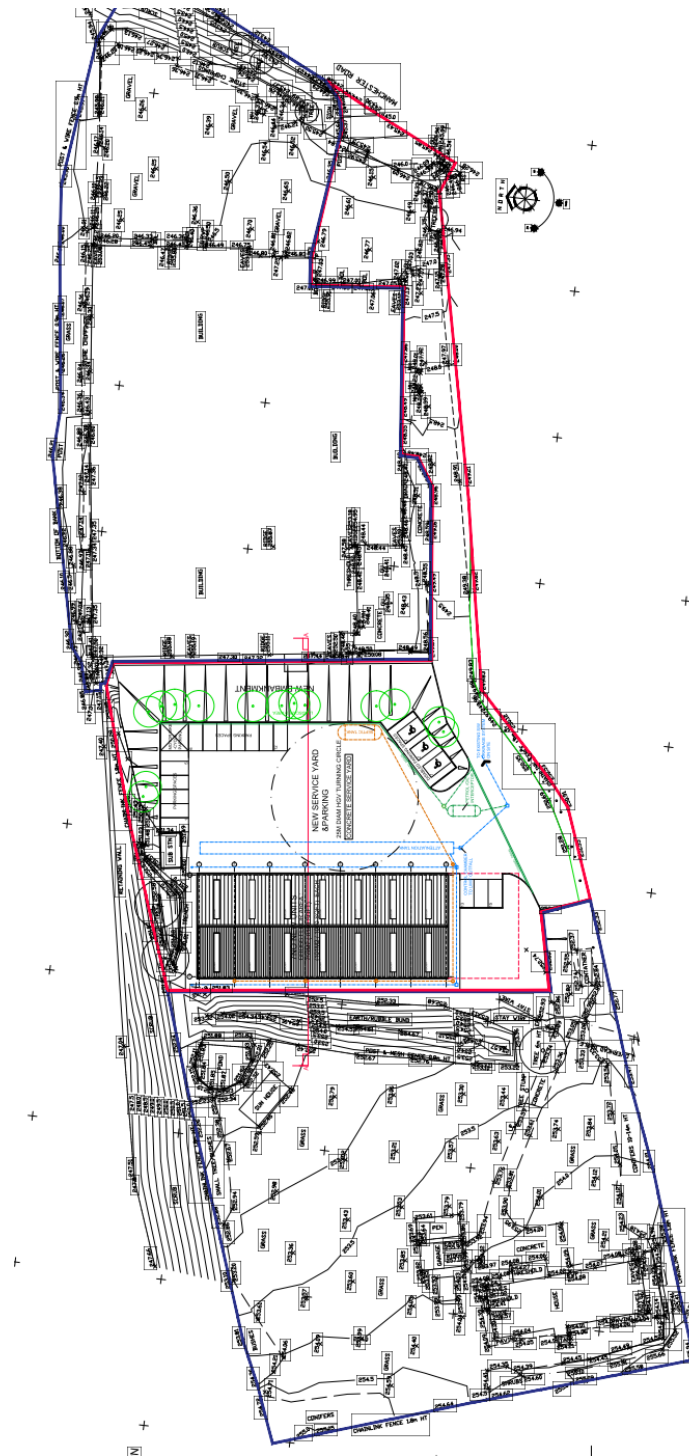


FIGURE 3: PROPOSED SITE LAYOUT AND SECTION

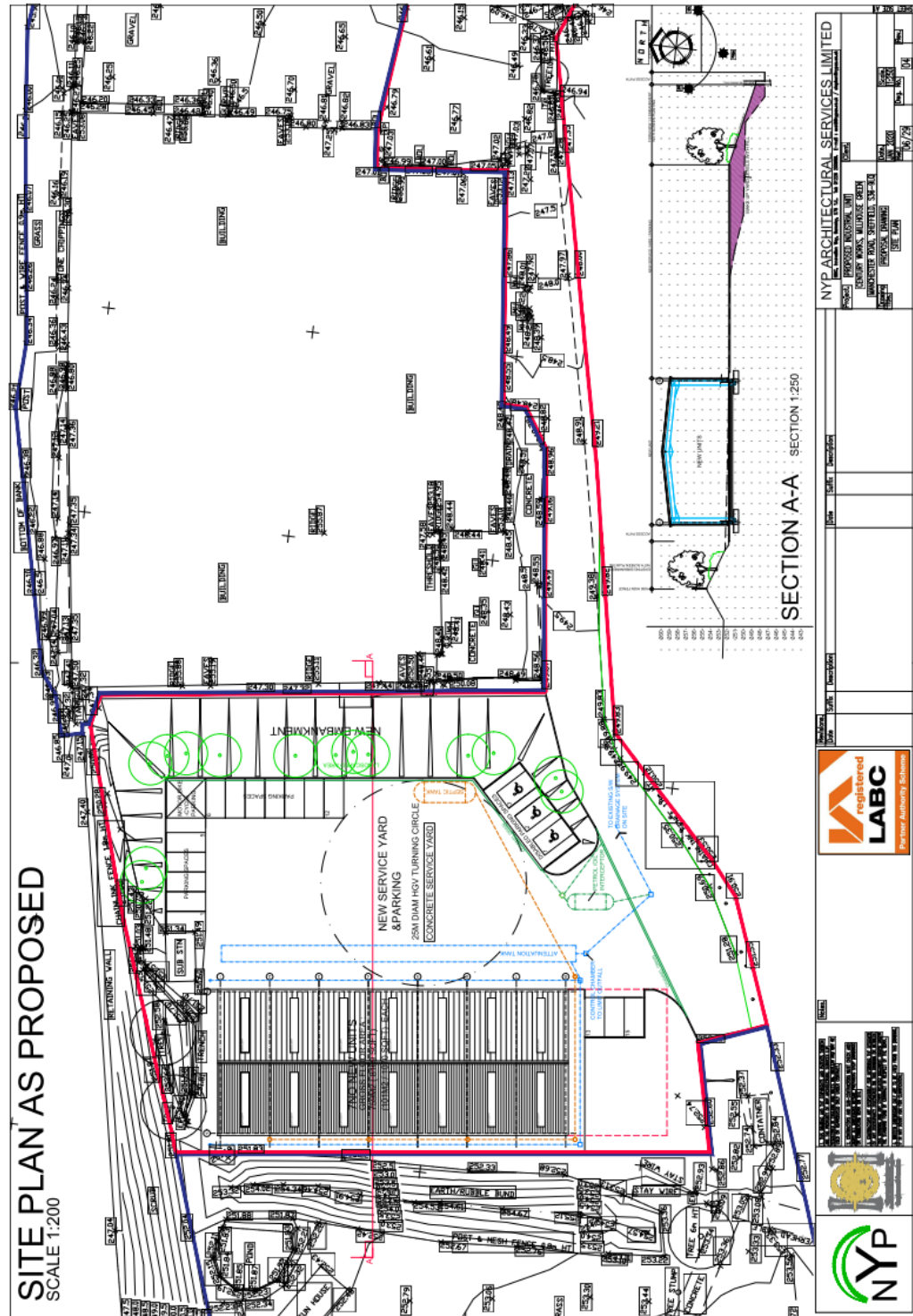


FIGURE 5: EXISTING APPROVAL NOT IMPLEMENTED

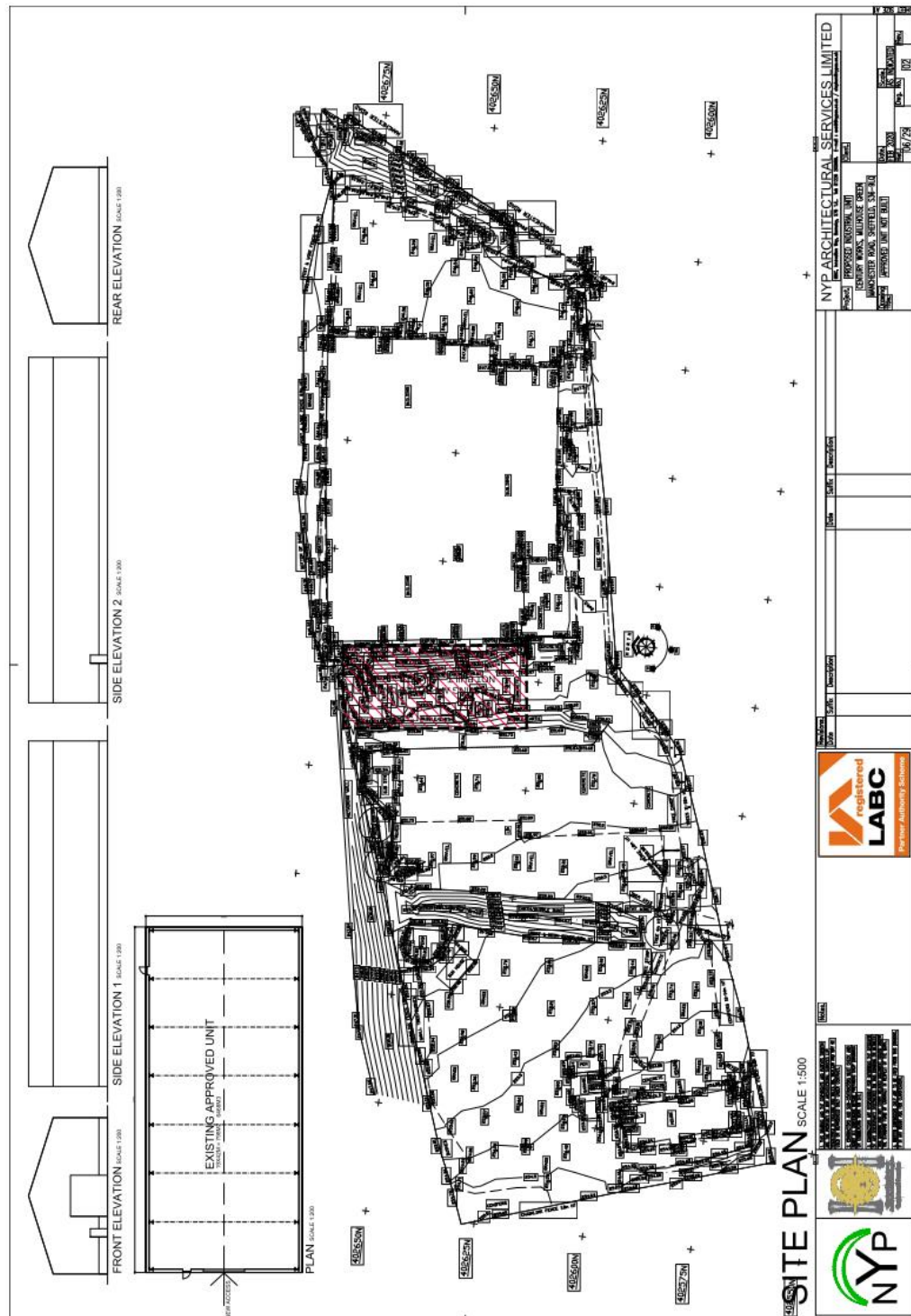
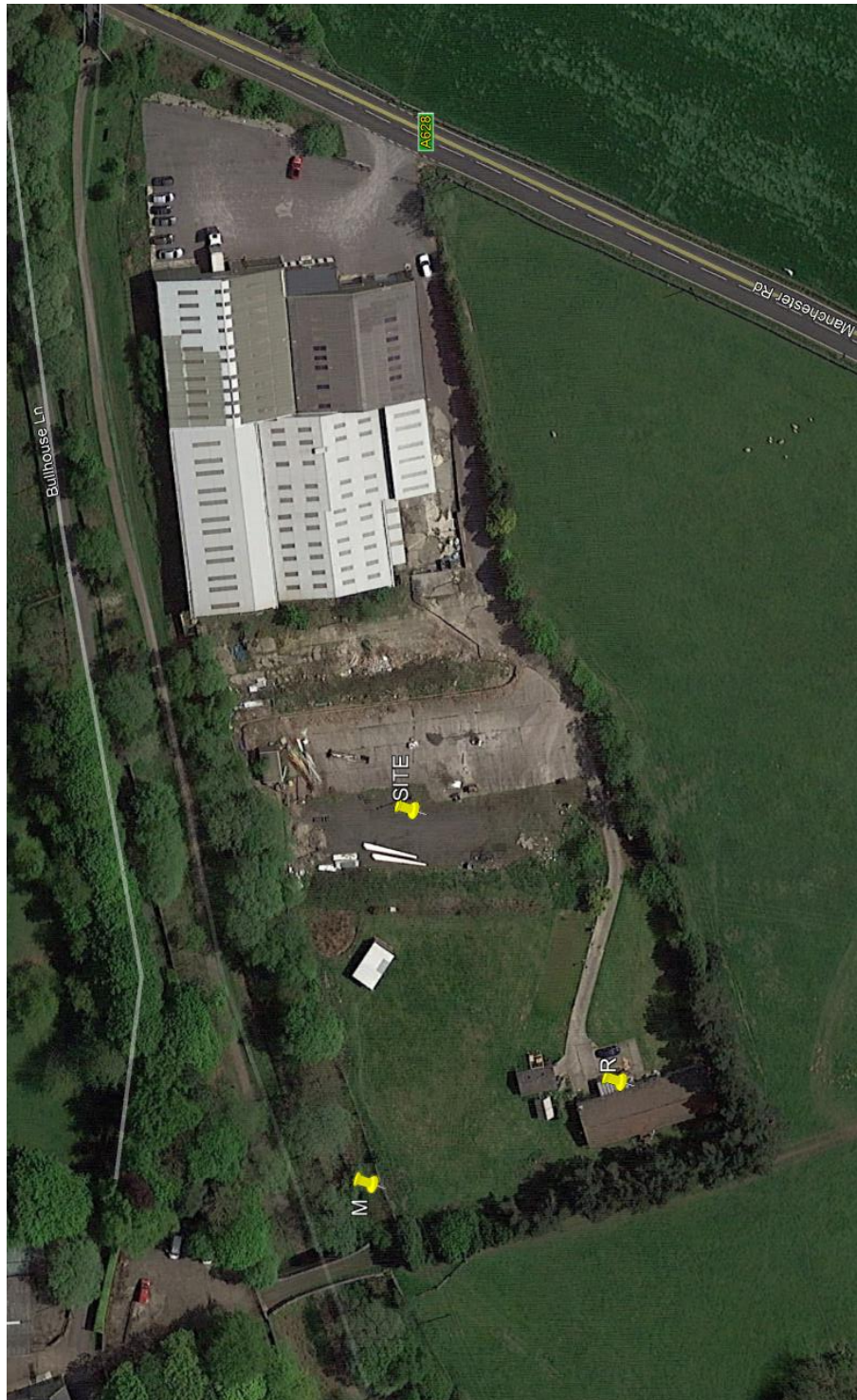


FIGURE 6: NOISE MONITORING AND RECEPTOR LOCATIONS



APPENDIX A1: ACOUSTIC TERMINOLOGY

Ambient noise	The sound pressure level at a given location (i.e. sound from all sources) usually measured using the L_{Aeq} parameter.
A-weighting	A weighting applied to the frequencies which make up a sound pressure level to mimic the response of the human ear which is less responsive to low frequency sounds as it is to high frequency sounds. The resultant level after application of the weighting is called the 'A-weighted sound pressure level' and is denoted by dB(A) or by using a subscript A (e.g. dB_{LAeq}).
Background noise	The noise measured in the absence of the noise under investigation usually using the statistical parameter L_{90} which represents the quietest parts of the measurement period.
Broadband sound	Sound which contains all the frequencies.
Decibel (dB)	A logarithmic measurement scale used for sound pressure levels. This scale is used because the simple use of sound pressures would be unwieldy as the range of pressures to which the human ear responds is very large. The normal threshold of hearing at 1kHz is 0dB. A level of 120 dB_{LAeq} is very loud (L signifies level and the A and eq are explained under A-weighting and L_{eq}). Some night club dance floors can have sound levels of around 110 dB_{LAeq} . In the workplace the wearing of hearing protection is compulsory for staff who experience a noise level of over 85 dB_{LAeq} averaged over an 8-hour day and is normally used when the levels are over 80 dB_{LAeq} averaged over the 8-hour day. Noise intrusion levels into bedrooms (e.g. from traffic noise) are often controlled to below 30 dB_{LAeq} in the design of new properties (standards sometimes vary between authorities). Noise levels of below 20 dB_{LAeq} are very quiet and would normally only be achieved in a well designed recording studio. Although noise calculations are normally carried out using figures to 1 decimal place the results are often presented to the nearest dB as changes of a fraction of a dB are not normally perceptible even in controlled conditions.
Facade noise level	Noise level including a contribution from the reflection from a building facade, usually measured at 1m from the facade.
Free field	Noise levels with no contribution from reflections from nearby structures.
Hertz	The units used for frequency denoted by Hz, i.e. the number of cycles of pressure fluctuation per second. K used in front of Hz represents 1000 (1kHz = 1000Hz). High frequency sounds (e.g. 8kHz) are high pitched and low frequency sounds (e.g. 63Hz) are the bass notes.

L_{eq}	A parameter used to denote the 'equivalent continuous sound pressure level'. This is the sound pressure level of a continuous sound that would contain the same energy as the varying sound being measured or investigated. L_{Aeq} is the parameter used to denote the 'A-weighted equivalent continuous sound pressure level' (see A-weighting).
L_{10}	A statistical parameter often used for the measurement of road traffic noise. It is the level exceeded for 10% of the time period being considered. If A-weighted a subscript A is included and the time period can also be included in subscript, e.g. $L_{A10, 1\text{hour}}$.
L_{90}	A statistical parameter often used for the measurement of background noise levels. It is the level exceeded for 90% of the time period being considered. If A-weighted a subscript A is included and the time period can also be included in subscript, e.g. $L_{A90, 5\text{min}}$.
L_{max}	The maximum noise level which occurred during the monitoring period. $L_{Amax,f}$ denotes the maximum A-weighted sound pressure level using the fast time constant of 125ms.
Loudness	Although a 3dB increase is equivalent to a doubling of the sound power level of a sound source this increase is the minimum perceptible under normal conditions. It takes a 10dB change in noise level for it to sound roughly twice (or half) as loud subjectively.

APPENDIX A2: NOISE SURVEY RESULTS

Daytime Noise Survey Data**Table A2.1: Daytime Noise Survey Data**
Thursday 09 Jul 2020

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
09/07/2020	14:00:00	01:00:00	45.4	60.1	41.1
09/07/2020	15:00:00	01:00:00	46.6	63.8	41.2
09/07/2020	16:00:00	01:00:00	52.3	74.2	40.2
09/07/2020	17:00:00	01:00:00	49.9	69.1	39.2
09/07/2020	18:00:00	01:00:00	43.9	64.0	39.4
09/07/2020	19:00:00	01:00:00	46.4	61.3	43.2
09/07/2020	20:00:00	01:00:00	45.3	58.0	40.8
09/07/2020	21:00:00	01:00:00	57.9	85.0	35.4
09/07/2020	22:00:00	01:00:00	42.3	54.7	40.2
AVERAGE			50.8	-	40.1
HIGHEST			57.9	85.0	43.2
LOWEST			42.3	54.7	35.4
MODE			-	-	41.0

Table A2.2: Daytime Noise Survey Data
Friday 10 Jul 2020

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
10/07/2020	07:00:00	01:00:00	42.4	63.4	36.6
10/07/2020	08:00:00	01:00:00	52.9	78.4	36.5
10/07/2020	09:00:00	01:00:00	43.5	64.2	37.1
10/07/2020	10:00:00	01:00:00	53.9	76.3	37.5
10/07/2020	11:00:00	01:00:00	41.4	64.8	36.6
10/07/2020	12:00:00	01:00:00	44.3	75.7	35.9
10/07/2020	13:00:00	01:00:00	42.1	66.3	37.2
10/07/2020	14:00:00	01:00:00	40.7	55.1	37.8
10/07/2020	15:00:00	01:00:00	46.0	64.9	41.3
10/07/2020	16:00:00	01:00:00	45.6	66.6	40.5
10/07/2020	17:00:00	01:00:00	47.9	84.1	37.6
10/07/2020	18:00:00	01:00:00	54.9	75.7	37.5
10/07/2020	19:00:00	01:00:00	49.5	71.1	37.3
10/07/2020	20:00:00	01:00:00	43.8	77.3	33.6
10/07/2020	21:00:00	01:00:00	34.6	51.1	31.0
10/07/2020	22:00:00	01:00:00	37.7	60.3	32.7
AVERAGE			48.4	-	36.7
HIGHEST			54.9	84.1	41.3
LOWEST			34.6	51.1	31.0
MODE			-	-	37.0

Table A2.3: Daytime Noise Survey Data
Saturday 11 Jul 2020

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
11/07/2020	07:00:00	01:00:00	40.0	64.9	32.3
11/07/2020	08:00:00	01:00:00	41.0	65.4	33.7
11/07/2020	09:00:00	01:00:00	56.6	76.9	41.2
11/07/2020	10:00:00	01:00:00	44.9	75.4	34.9
11/07/2020	11:00:00	01:00:00	49.9	67.6	38.2
11/07/2020	12:00:00	01:00:00	54.6	74.2	38.9
11/07/2020	13:00:00	01:00:00	42.0	66.0	36.3
11/07/2020	14:00:00	01:00:00	41.5	66.9	36.2
11/07/2020	15:00:00	01:00:00	44.0	60.0	38.0
11/07/2020	16:00:00	01:00:00	40.9	65.0	35.3
11/07/2020	17:00:00	01:00:00	43.4	69.2	35.2
11/07/2020	18:00:00	01:00:00	44.0	76.2	35.1
11/07/2020	19:00:00	01:00:00	42.2	66.3	34.4
11/07/2020	20:00:00	01:00:00	40.5	66.5	32.7
11/07/2020	21:00:00	01:00:00	36.6	53.3	31.5
11/07/2020	22:00:00	01:00:00	35.7	53.7	28.8
AVERAGE			48.2	-	35.2
HIGHEST			56.6	76.9	41.2
LOWEST			35.7	53.3	28.8
MODE			-	-	35.0

Table A2.4: Daytime Noise Survey Data
Sunday 12 Jul 2020

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
12/07/2020	07:00:00	01:00:00	47.1	75.8	28.9
12/07/2020	08:00:00	01:00:00	36.5	58.5	29.2
12/07/2020	09:00:00	01:00:00	37.7	65.8	30.8
12/07/2020	10:00:00	01:00:00	40.7	63.0	35.8
12/07/2020	11:00:00	01:00:00	40.0	62.3	34.8
12/07/2020	12:00:00	01:00:00	37.9	61.2	32.1
12/07/2020	13:00:00	01:00:00	39.5	57.1	33.5
12/07/2020	14:00:00	01:00:00	41.7	60.1	35.0
12/07/2020	15:00:00	01:00:00	38.7	65.8	33.4
12/07/2020	16:00:00	01:00:00	39.0	64.5	33.9
12/07/2020	17:00:00	01:00:00	38.4	57.3	33.6
12/07/2020	18:00:00	01:00:00	39.8	63.3	33.9
12/07/2020	19:00:00	01:00:00	40.5	62.5	33.7
12/07/2020	20:00:00	01:00:00	39.5	56.4	32.9
12/07/2020	21:00:00	01:00:00	38.9	70.4	30.1
12/07/2020	22:00:00	01:00:00	33.4	51.6	27.3
AVERAGE			40.4	-	32.4
HIGHEST			47.1	75.8	35.8
LOWEST			33.4	51.6	27.3
MODE			-	-	34.0

Table A2.5: Daytime Noise Survey Data
Monday 13 Jul 2020

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
13/07/2020	07:00:00	01:00:00	44.8	64.3	39.8
13/07/2020	08:00:00	01:00:00	42.9	55.7	38.9
13/07/2020	09:00:00	01:00:00	43.6	64.4	37.8
13/07/2020	10:00:00	01:00:00	47.0	65.4	41.4
13/07/2020	11:00:00	01:00:00	46.2	60.2	41.7
AVERAGE			45.2	-	39.9
HIGHEST			47.0	65.4	41.7
LOWEST			42.9	55.7	37.8
MODE			-	-	-

Night-Time Noise Survey Data**Table A2.6: Night time Noise Survey Data****Thursday 09 Jul 2020 to Friday 10 Jul 2020**

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
09/07/2020	23:00:00	0:15:00	36.9	45.8	35.7
09/07/2020	23:15:00	0:15:00	35.3	42.5	34.4
09/07/2020	23:30:00	0:15:00	34.1	41.4	33.2
09/07/2020	23:45:00	0:15:00	35.9	43.9	34.7
10/07/2020	00:00:00	0:15:00	34.8	43.6	33.8
10/07/2020	00:15:00	0:15:00	32.0	43.5	30.8
10/07/2020	00:30:00	0:15:00	30.6	44.7	29.2
10/07/2020	00:45:00	0:15:00	29.7	42.8	28.0
10/07/2020	01:00:00	0:15:00	28.9	40.4	27.3
10/07/2020	01:15:00	0:15:00	30.0	40.7	28.3
10/07/2020	01:30:00	0:15:00	30.3	46.6	27.2
10/07/2020	01:45:00	0:15:00	31.6	40.6	29.4
10/07/2020	02:00:00	0:15:00	29.2	38.3	27.8
10/07/2020	02:15:00	0:15:00	29.0	42.7	26.5
10/07/2020	02:30:00	0:15:00	28.2	44.5	26.3
10/07/2020	02:45:00	0:15:00	30.0	46.7	25.8
10/07/2020	03:00:00	0:15:00	36.2	47.6	30.1
10/07/2020	03:15:00	0:15:00	33.8	45.3	30.4
10/07/2020	03:30:00	0:15:00	28.8	42.4	27.5
10/07/2020	03:45:00	0:15:00	28.7	38.3	26.9
10/07/2020	04:00:00	0:15:00	47.8	64.9	28.8
10/07/2020	04:15:00	0:15:00	54.6	67.9	33.5
10/07/2020	04:30:00	0:15:00	49.7	67.1	32.5
10/07/2020	04:45:00	0:15:00	48.3	69.1	31.3
10/07/2020	05:00:00	0:15:00	57.5	73.6	31.0
10/07/2020	05:15:00	0:15:00	42.9	66.9	32.0
10/07/2020	05:30:00	0:15:00	42.7	75.0	34.7
10/07/2020	05:45:00	0:15:00	39.1	53.7	35.9
10/07/2020	06:00:00	0:15:00	38.7	54.3	35.5
10/07/2020	06:15:00	0:15:00	38.3	51.7	35.3
10/07/2020	06:30:00	0:15:00	37.1	50.5	34.3
10/07/2020	06:45:00	0:15:00	39.1	56.0	36.0
AVERAGE			45.7	-	31.1
HIGHEST			57.5	75.0	36.0
LOWEST			28.2	38.3	25.8
MODE			-	-	35.0

Table A2.7: Night time Noise Survey Data**Friday 10 Jul 2020 to Saturday 11 Jul 2020**

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
10/07/2020	23:00:00	0:15:00	38.1	56.4	32.5
10/07/2020	23:15:00	0:15:00	33.7	40.2	32.0
10/07/2020	23:30:00	0:15:00	33.4	39.1	31.7
10/07/2020	23:45:00	0:15:00	36.8	42.8	34.7
11/07/2020	00:00:00	0:15:00	44.2	61.4	32.7
11/07/2020	00:15:00	0:15:00	32.9	40.2	31.6
11/07/2020	00:30:00	0:15:00	34.0	41.3	32.4
11/07/2020	00:45:00	0:15:00	32.8	38.4	31.4
11/07/2020	01:00:00	0:15:00	33.2	46.2	31.3
11/07/2020	01:15:00	0:15:00	32.8	46.6	30.7
11/07/2020	01:30:00	0:15:00	36.4	67.0	30.3
11/07/2020	01:45:00	0:15:00	30.0	38.4	28.6
11/07/2020	02:00:00	0:15:00	31.8	43.4	28.8
11/07/2020	02:15:00	0:15:00	34.1	50.8	28.9
11/07/2020	02:30:00	0:15:00	30.7	42.1	29.3
11/07/2020	02:45:00	0:15:00	32.1	41.1	30.3
11/07/2020	03:00:00	0:15:00	32.2	41.1	30.6
11/07/2020	03:15:00	0:15:00	32.0	36.8	30.6
11/07/2020	03:30:00	0:15:00	33.4	41.2	31.7
11/07/2020	03:45:00	0:15:00	32.0	40.3	30.5
11/07/2020	04:00:00	0:15:00	37.7	59.6	30.5
11/07/2020	04:15:00	0:15:00	36.2	54.4	31.1
11/07/2020	04:30:00	0:15:00	34.6	51.1	32.2
11/07/2020	04:45:00	0:15:00	42.1	65.5	31.7
11/07/2020	05:00:00	0:15:00	41.9	61.5	31.3
11/07/2020	05:15:00	0:15:00	35.6	55.2	30.1
11/07/2020	05:30:00	0:15:00	38.1	52.3	31.1
11/07/2020	05:45:00	0:15:00	38.9	57.9	33.2
11/07/2020	06:00:00	0:15:00	37.7	54.3	34.6
11/07/2020	06:15:00	0:15:00	42.5	64.5	34.2
11/07/2020	06:30:00	0:15:00	42.5	63.1	33.1
11/07/2020	06:45:00	0:15:00	38.3	57.1	32.7
AVERAGE			37.6	-	31.5
HIGHEST			44.2	67.0	34.7
LOWEST			30.0	36.8	28.6
MODE			-	-	31.0

Table A2.8: Night time Noise Survey Data**Saturday 11 Jul 2020 to Sunday 12 Jul 2020**

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
11/07/2020	23:00:00	0:15:00	32.7	48.5	27.7
11/07/2020	23:15:00	0:15:00	30.9	41.5	27.9
11/07/2020	23:30:00	0:15:00	29.9	43.3	27.0
11/07/2020	23:45:00	0:15:00	31.0	45.8	26.7
12/07/2020	00:00:00	0:15:00	32.7	45.2	27.2
12/07/2020	00:15:00	0:15:00	30.8	42.6	26.6
12/07/2020	00:30:00	0:15:00	29.3	44.1	27.1
12/07/2020	00:45:00	0:15:00	29.3	41.3	27.2
12/07/2020	01:00:00	0:15:00	27.8	41.2	25.9
12/07/2020	01:15:00	0:15:00	29.6	44.7	26.0
12/07/2020	01:30:00	0:15:00	28.1	39.0	26.1
12/07/2020	01:45:00	0:15:00	27.9	38.4	26.2
12/07/2020	02:00:00	0:15:00	27.6	37.1	25.9
12/07/2020	02:15:00	0:15:00	28.8	45.1	26.0
12/07/2020	02:30:00	0:15:00	29.0	45.4	25.4
12/07/2020	02:45:00	0:15:00	27.9	42.9	25.3
12/07/2020	03:00:00	0:15:00	28.6	40.5	25.8
12/07/2020	03:15:00	0:15:00	26.7	45.8	25.5
12/07/2020	03:30:00	0:15:00	27.1	38.9	25.5
12/07/2020	03:45:00	0:15:00	29.7	41.7	26.2
12/07/2020	04:00:00	0:15:00	39.3	63.7	26.8
12/07/2020	04:15:00	0:15:00	32.5	55.4	26.8
12/07/2020	04:30:00	0:15:00	37.7	57.9	27.8
12/07/2020	04:45:00	0:15:00	36.7	50.1	28.2
12/07/2020	05:00:00	0:15:00	34.8	53.8	28.9
12/07/2020	05:15:00	0:15:00	35.4	52.9	28.7
12/07/2020	05:30:00	0:15:00	43.4	61.5	29.1
12/07/2020	05:45:00	0:15:00	42.3	62.2	28.5
12/07/2020	06:00:00	0:15:00	51.4	68.0	30.3
12/07/2020	06:15:00	0:15:00	44.3	62.7	29.4
12/07/2020	06:30:00	0:15:00	49.1	69.1	28.0
12/07/2020	06:45:00	0:15:00	38.2	58.3	28.2
AVERAGE			40.2	-	27.1
HIGHEST			51.4	69.1	30.3
LOWEST			26.7	37.1	25.3
MODE			-	-	27.0

Table A2.9: Night time Noise Survey Data**Sunday 12 Jul 2020 to Monday 13 Jul 2020**

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
12/07/2020	23:00:00	0:15:00	32.3	49.0	21.9
12/07/2020	23:15:00	0:15:00	34.4	47.9	23.3
12/07/2020	23:30:00	0:15:00	33.0	51.7	24.2
12/07/2020	23:45:00	0:15:00	31.9	44.1	25.3
13/07/2020	00:00:00	0:15:00	29.9	45.5	24.3
13/07/2020	00:15:00	0:15:00	29.9	41.7	25.0
13/07/2020	00:30:00	0:15:00	30.0	43.0	24.5
13/07/2020	00:45:00	0:15:00	28.1	40.5	24.5
13/07/2020	01:00:00	0:15:00	28.2	44.1	23.3
13/07/2020	01:15:00	0:15:00	30.7	44.5	25.1
13/07/2020	01:30:00	0:15:00	26.8	41.8	23.9
13/07/2020	01:45:00	0:15:00	28.2	45.5	24.7
13/07/2020	02:00:00	0:15:00	26.5	41.6	24.3
13/07/2020	02:15:00	0:15:00	27.3	43.9	23.2
13/07/2020	02:30:00	0:15:00	26.9	40.7	23.9
13/07/2020	02:45:00	0:15:00	27.4	40.2	23.6
13/07/2020	03:00:00	0:15:00	29.1	44.2	24.3
13/07/2020	03:15:00	0:15:00	30.2	43.7	25.0
13/07/2020	03:30:00	0:15:00	37.7	61.2	31.0
13/07/2020	03:45:00	0:15:00	34.4	52.3	29.2
13/07/2020	04:00:00	0:15:00	36.7	56.0	28.2
13/07/2020	04:15:00	0:15:00	46.9	72.0	29.6
13/07/2020	04:30:00	0:15:00	37.6	56.9	32.0
13/07/2020	04:45:00	0:15:00	38.9	61.7	34.4
13/07/2020	05:00:00	0:15:00	39.0	52.7	34.2
13/07/2020	05:15:00	0:15:00	38.1	51.4	33.9
13/07/2020	05:30:00	0:15:00	40.9	54.0	35.9
13/07/2020	05:45:00	0:15:00	43.6	62.8	36.9
13/07/2020	06:00:00	0:15:00	39.8	57.6	35.3
13/07/2020	06:15:00	0:15:00	40.4	52.5	36.4
13/07/2020	06:30:00	0:15:00	44.2	54.1	39.9
13/07/2020	06:45:00	0:15:00	45.5	56.1	41.1
AVERAGE			38.5	-	28.5
HIGHEST			46.9	72.0	41.1
LOWEST			26.5	40.2	21.9
MODE			-	-	24.0