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Project:

MFG Thames Valley

Title:

Noise Impact Assessment

quietly moving forward



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1 INTRODUCTION

- 1.01 Environmental Equipment Corporation Limited has been commissioned by MBH Design Studio Ltd to undertake a noise assessment of the operation of three new jet wash bays, eight new electric vehicle charging bays and their associated supporting infrastructure at the existing MFG Thames Valley service station in Caversham, Reading. These will be introduced as part of a wider remodelling of the service station site. The site currently includes a single jet wash bay, automatic car wash and an area used by a vehicle rental company consisting of car parking and container offices. The proposed remodelling will see the removal of the existing jet wash bay and the redevelopment of the vehicle rental site. The existing sales building, fuel pump forecourt, motorised drive through car wash and canopy will remain unchanged.
- 1.02 This noise assessment has been conducted in accordance with local and national policies, British and International design standards and is based on a noise survey carried out at the site over a weekend period.
- 1.03 This assessment includes:
- The details of an ambient noise survey undertaken by this practice to measure the existing noise climate around the site; and
 - The prediction of noise impacts at the most affected noise sensitive receptors based on the possible operation of the plant across a typical 24 hour period based on the proposed operating periods for the facilities.
- 1.04 This report is prepared solely for MBH Design Studio Ltd. Environmental Equipment Corporation Limited accepts no responsibility for its use by any third party. Note that the contents contained herein are produced for the purposes of review by relevant Planning Authority department.
- 1.05 Whilst every effort has been made to ensure that this report is easy to understand, it is necessarily technical in nature. To assist the reader, an explanation of the terminology used in this report is contained in Appendix A.

2 SITE

- 2.01 The existing MFG Thames Valley service station is located in largely residential area sited in between Caversham and Reading.
- 2.02 The following Google Maps image has been annotated to identify the site and the nearest noise sensitive residential properties. The measurement location used for the noise survey is also marked along with the location of the existing jet wash bay and vehicle car rental parking and office all that will be removed as part of the proposed works.

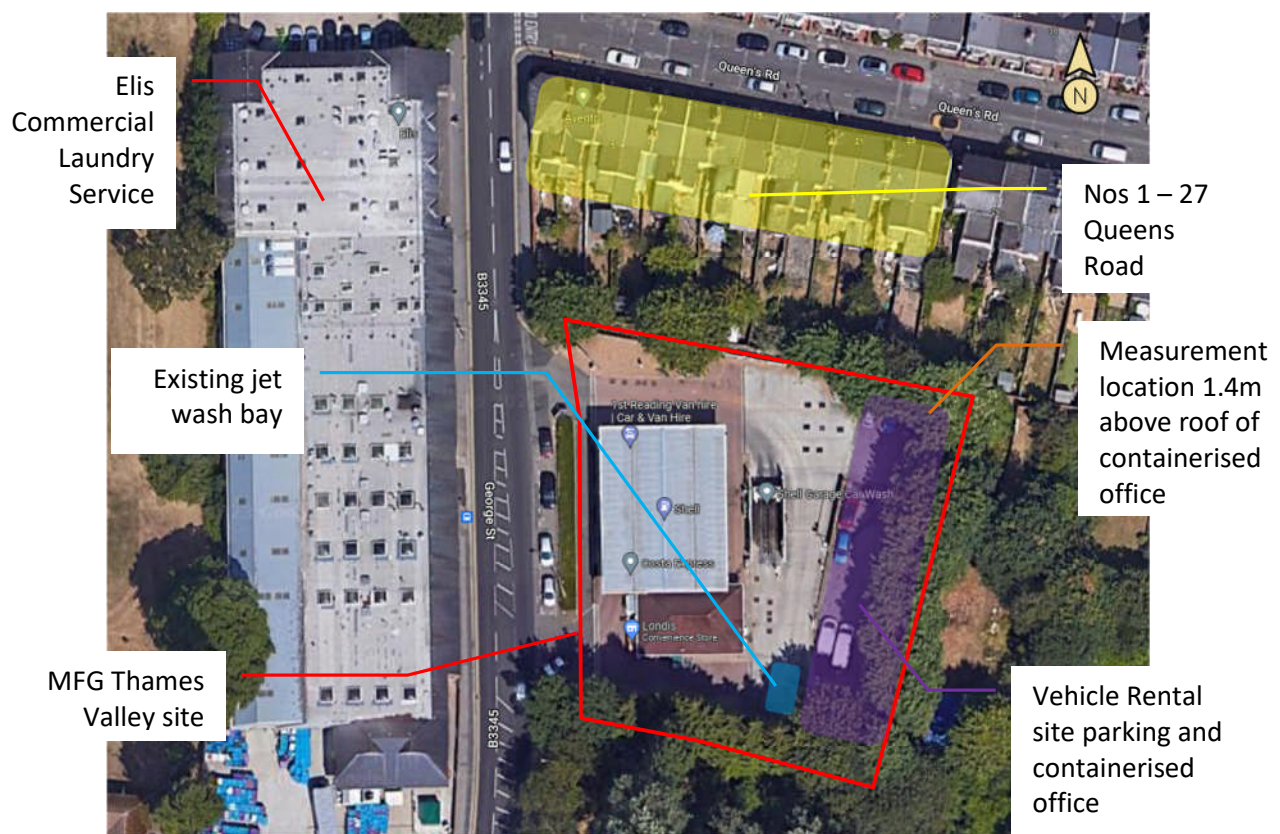


Figure 1: Site layout and nearest dwellings

- 2.03 The closest noise sensitive receptors to the site are the following:
- The two storey dwellings of Nos 1 – 27 Queen's Road to the north of the site
- 2.04 The dwellings indicated in Figure 1 are the closest and most affected properties to the proposed sources of noise and activity on site.
- 2.05 All other noise sensitive receptors are at a greater distance from the proposed location of the charging facilities and jet wash bays or are protected by more screening by the intervening structures, and as such will be subject to lower levels of noise.
- 2.06 This application will see the removal of the existing jet wash bay and vehicle rental site and the installation of eight dedicated electric vehicle charging bays, three coin-operated jet wash bays and the electrical infrastructure required to support the charging bays, which consists of a new substation within a GRP Enclosure. The current petrol pump forecourt, sales building, motorised drive through car wash and canopy will be retained. A large scale plan layout of the redeveloped

site is presented in Appendix B. Figure 2 below overlays this plan onto a Google Maps image to put the proposed layout in context.

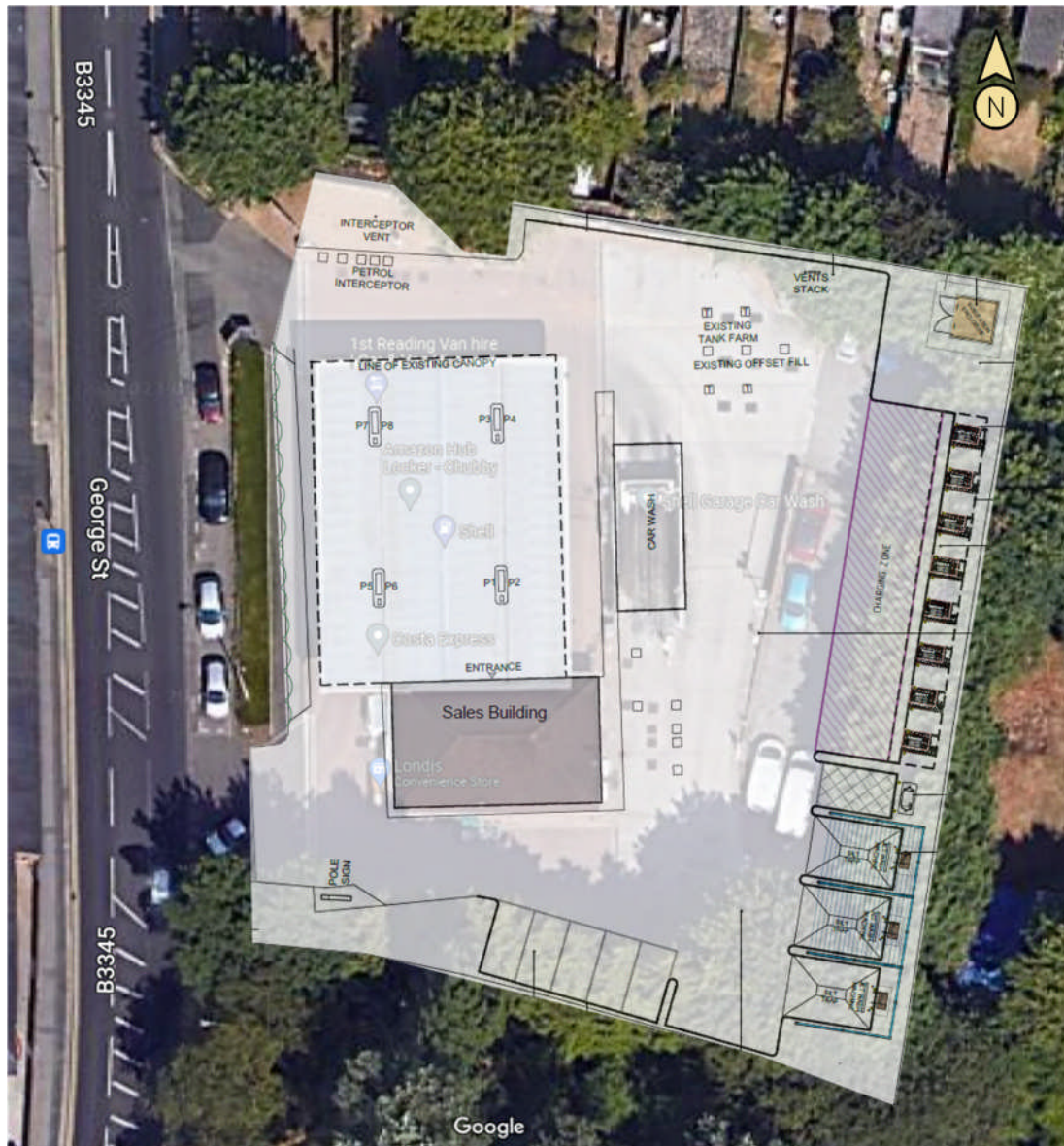


Figure 2: Proposed new site layout and existing surroundings.

- 2.07 The new jet wash bays will be screened on three sides by 3.8m high barriers with a canopy roof over the top of the two of the three bays, all of which will reduce noise and water spray to the surroundings. The fourth side, facing the petrol forecourt will be open.

3 GUIDANCE

3.01 We have reviewed the noise impact in line with current National Planning Policy guidance as this document is the basis upon which Local Council Plans are drawn up. The assessment methodology of 'BS4142:2014: 'Methods for rating and assessing industrial and commercial sound'' is the principle standard against which to assess potential impact in this context and that standard in turn requires that the assessment outcomes be judged and considered taking into account context and relevant guidance metrics.

3.02 Additional guidance has been taken from current British Standards and World Health Organisation Guidance. These documents provide useful reference for assessing acceptability against established absolute noise limits.

BS4142:2014 'Methods for rating and assessing industrial and commercial sound'

3.03 To assess the acceptability of the resultant noise levels we have consulted the relevant standards. BS 4142:2014 'Methods for rating and assessing industrial and commercial sound'. The scope of BS4142 includes that assessment of the following sources:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which compromise 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

3.04 BS4142 gives guidance on assessing the likelihood of adverse impacts by calculating a 'rating level' of the new noise source and comparing its magnitude at noise sensitive locations to the existing or underlying background noise level. The background noise level is subtracted from the 'rating level' to assess the likelihood of complaints:

- The greater the difference the greater the likelihood of complaints.
- A difference of around +10dB or more is an indication of a significant adverse impact, depending on the context.
- A difference of +5dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background noise level, the less likely it is that the specific sound source will have an adverse impact or 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 sound impact, depending on the context.

3.05 This assessment is carried out over a one hour period for the daytime and a fifteen minute period for the night-time. For the purposes of the standard it states that daytime and night-time are typically 07:00 to 23:00 hours and 23:00 to 07:00 hours respectively.

3.06 The 'rating level' of the noise source is obtained taking the following factors into consideration:

- The new plant noise (the specific noise) is measured or predicted in terms of L_{Aeq} .
- An additional correction shall be included if the noise contains a distinguishable, discrete continuous note, if the noise contains distinct impulses or if the noise is irregular enough to attract attention. The value for any tonal noise can be an addition of up to 6dB and for impulsive noise of up to 9dB.

3.07 The background sound level should be established in terms of the L_{A90} noise index. The standard states that the background sound level should be measured over a period of sufficient length to obtain a representative value. The standard states that *'a representative level ought to account for the range of background sound levels and ought not to automatically to be assumed to be either the minimum or modal value.'*

3.08 BS 4142 goes onto state that:

'The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level 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.'

3.09 BS4142 requires uncertainties in the assessment to be considered and, where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

BS8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'

3.10 BS8233:2014, 'Guidance on sound insulation and noise reduction for buildings', section 7 gives guidance on acoustic criteria and noise levels appropriate for various internal spaces that have different functions. Section 7.7 relates specifically to buildings having a residential purpose and offers guidance on appropriate internal ambient noise levels for dwellings (when unoccupied) with specific consideration:

- i. for bedrooms, the acoustic effect on sleep; and
- ii. for other rooms, the acoustic effect on resting, listening and communicating.

3.11 The guidance applies to external noise as it affects the internal acoustic environment from sources without a specific character.

3.12 Table 4 of section 7.7.2 recommends the following internal noise limits based on the presence of steady, external noise sources:

Table 4 Indoor ambient noise levels for dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	—
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	—
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

3.13 The guidance criteria are based upon research and existing guidelines provided by the World Health Organisation.

3.14 It is generally considered that the sound insulation provided by a partially open window will be 15dB, dependent on window type, extent of opening and source frequency content.

3.15 It can be seen that in the worst case, with a partially open window reduction of 15dB, indoor ambient noise targets for bedrooms will be met where the external ambient noise level is below 45dB(A). This is based upon steady noise of an anonymous nature and is consistent with the World Health Organisations LOAEL.

World Health Organisation 'Guidelines for Community Noise 1999'

- 3.16 In addition to the advice detailed above within BS8233 the WHO Guidelines for community noise, 1999 also provide the following guidance relating to noise during the night time.

'For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10 -15 times per night'

- 3.17 The guidelines refer to community noise which is also called environmental noise, residential noise or domestic noise, WHO states that this noise encompasses all sources except noise at the industrial workplace. Main sources of community noise include road, rail and air traffic, industries construction and public work and the neighbourhood. The main indoor sources of noise are ventilation systems, office machines, home appliances and neighbours. Typical neighbourhood noise comes from premises and installations related to the catering trade (restaurant, cafeterias, discotheques, etc.), from live or recorded music, sports events including motor sports, playgrounds, car parks and domestic animals such as barking dogs.

4 MEASUREMENTS

- 4.01 Environmental noise measurements were carried out over an extended period, between 1030 hours on Friday 11th November and concluded 1030 hours Monday 14th November 2022, to establish the existing noise levels at the site. The survey methodology and results are set out below.
- 4.02 Noise measurements have been carried out at the following position, as shown in Figure 1 and described as:

- Position 1: located 1.4m above the roof level of the containerised office of the vehicle in the north east corner of the MFG Thames Valley site. The measurement was not located within 3.5 metres of any reflecting surfaces, other than the mounting surface.

This position is considered to be representative of the nearest windows of the Queen's Road dwellings to the north.

5 EQUIPMENT

- 5.01 The equipment used for the survey was as follows:-

- 01dB Metravib Black Solo Integrating Sound Level Meter conforming to Class 1 BS EN 61672, Type 1 BS EN 60804 & BS EN 60651: 1994;
- 01dB Metravib MCE 212 Condenser Microphone, PRE 21 S Pre-amp and Connecting Leads;
- 01dB Outdoor Microphone Kit and a
- Tripod.

5.02 The equipment holds current UKAS or equivalent accreditation and serial numbers as follows:

Sound Level Meter 01dB Black Solo	Serial No.	61719
	Calibration Date	22 nd August 2022
	Cal Certificate No.	U41741
½" MCE 212 Condenser Mic.	Serial No.	166397
	Calibration Date	22 nd August 2022
	Cal Certificate No.	U41741
Calibrator CAL 21	Serial No.	34634297
	Calibration Date	21 st October, 2021
	Cal. Certificate No.	U37247

N.B. Copies of calibration certificates are available upon request.

5.03 The equipment was calibrated both before and after the survey with no difference noted in the levels.

6 RESULTS

- 6.01 The weather during the survey was suitable for noise measurement, it being dry with little wind for the duration of the survey.
- 6.02 Noise sources at the site include local and distant road traffic as well as activity from the garage forecourt and the occasional use of the automatic car wash and jet wash. Noise from plant serving the Klis Laundry building on the opposite side of George Street, was audible at the measurement location and at the noise sensitive properties on Queens Road
- 6.03 A list of the levels measured is included in Appendix D and represented graphically in Appendix E.
- 6.04 A summary of the time averaged ambient levels and measured background levels over the measurement periods are shown in Table 6.1 over the duration of the survey.

Day	Period	Average $L_{Aeq,T} - \text{dB}$	Minimum $L_{A90} - \text{dB}$	Max. $L_{A90} - \text{dB}$	Modal $L_{A90} - \text{dB}$	Mean $L_{A90} - \text{dB}$
Friday 11 th November 2022	Day time (1030-1900 hrs)	59.4	55	57	56	55
	Evening (1900-2300 hrs)	56.7	44	54	52	52
	Night-time (2300-0700 hrs)	51.2	35	45	37	39
Saturday 12 th November 2022	Day time (0700-1900 hrs)	59.6	45	56	54	53
	Evening (1900-2300 hrs)	55.7	42	52	50	48
	Night-time (2300-0700 hrs)	49.2	32	44	33	36
Sunday 13 th November 2022	Day time (0700-1900 hrs)	59.1	41	56	54	52
	Evening (1900-2300 hrs)	55.3	38	51	51	46
	Night-time (2300-0700 hrs)	49.6	29	52	31	36
Monday 14 th November 2022	Day time (0700-1030 hrs)	58.1	52	55	55	54

Table 6.1: Free-Field Measured Ambient and Lowest Background Noise Levels

6.05 The proposed jet wash bays will be available for use between 0700-2200hrs, however based on typical usage data for similar sites, the use of the jet wash facilities will fall into peak and off peak periods. Table 6.2 presents a summary of the noise survey data during periods. These values will be used as a basis to assess the noise impact of the jet wash (Section 8).

Day	Period	Average $L_{Aeq,T} - \text{dB}$	Minimum $L_{A90} - \text{dB}$	Max. $L_{A90} - \text{dB}$	Modal $L_{A90} - \text{dB}$	Mean $L_{A90} - \text{dB}$
Friday 11 th November 2022	Off peak periods (0700-0900* & 1900-2200hrs)	59.4	54	57	56	55
	Peak Periods (0900-1900hrs)	57.3	52	54	52	53
Saturday 12 th November 2022	Off peak periods (0700-0900 & 1900-2200hrs)	59.6	52	56	54	54
	Peak Periods (0900-1900hrs)	56.0	45	52	50	49
Sunday 13 th November 2022	Off peak periods (0700-0900 & 1900-2200hrs)	59.7	48	56	54	53
	Peak Periods (0900-1900hrs)	55.1	41	51	47	47
Monday 14 th November 2022	Off peak periods (0700-0900 & 1900-2200hrs*)	58.1	54	55	55	55
	Peak Periods (0900-1900hrs)*	58.1	52	55	53	53

Table 6.2: Free-Field Measured Ambient and Lowest Background Noise Levels

* based on partial data due to monitoring not covering entire period

6.06 A review of the survey data shows that the ambient noise levels are consistently above 55 dB(A) during all periods the proposed new jet wash plant would be operated.

7 PLANT ASSESSMENT

7.01 This application is for the installation of eight new electric vehicle charging bays and three new jet wash stations to replace an existing jet wash bay and vehicle rental car park and office. The electrical infrastructure required to support the operation of the charging bays consists of a new substation within a GRP Enclosure.

7.02 EEC Ltd have previously undertaken in-situ measurements of both jet wash plant and operation, along with noise associated with the substations used for these installations and the noise from the operation of the Alpitronic HYC-150 charging station when in use. This measured data has been used which has been used in these calculations. The measured data is in line with the manufacturer's published data (restricted to single figure loudness levels). Copies of the

manufacturer's datasheets for the jet wash and charging stations are included in Appendix F along with the full third octave data used for the charging stations and substations.

Substation		50 dBA Sound power level
Charging Station	Alpitronic HYC-150	<62dBA at 1m (published) (measured level – 55dBA at 1m)
Jet washes	Istobal model 4CA2000	< 70dBA at 1m (Published) 67 dBA* at 1.5m (measured average for a typical 11-minute wash cycle).

**67 dB was the recorded L_{Aeq} over the typical 11-minute wash cycle. Maximum L_{AF} emission values of up to 78 dB were recorded during the ultra-rinse with lance periods (approximately 1.5-2 minutes of the full cycle). Details of this are included in Appendix F.*

7.03 The propagation of noise from the proposed site due to the activities associated with the new installations has been modelled using CadnaA software produce by Datakustik. Calculations are undertaken using the General Method of Calculation from ISO9613-2:1996. Within the noise model, buildings and the immediate topography have been accounted for along with the screening attenuation of the proposed solid barriers to the sides of the jet wash bays (3.8m tall in all directions) with a roof over the top of two of the bays. The substation will be in its own designated space and the charging stations sited with a canopy to the rear that cantilevers over the top of the bays.

7.04 The service station will be open 24 hours and the following illustrations (Figures 3 & 4) show a graphical representation of the noise model and calculated noise levels due to the operation of each element; operations being described as follows:

'Limited Services'

- The proposed jet wash bays will only be available for customer use between 0700-2200hrs but based on operations at a similar service station, '*peak*' usage occurs between 0900-1900hrs with typically up to three uses per bay in any hour with reduced usage during other times, up to twice an hour.
- The electric vehicle charging bays will be available for use at all times.

7.05 The substation will operate 24 hours a day and the charging stations will be available throughout this period but are expected to be used intermittently. Similarly, the jet wash bays are expected to be used intermittently. The following illustrations show a graphical representation of the resulting noise model and calculated noise levels due to the operation of the jet washes and the charging bays including the substation, to establish the worst case cumulative noise level that could occur if all new plant operated simultaneously during the day time and then also the resultant noise levels that could be expected at night when only the plant serving the EV bays is operational. This is obviously worst case, when in reality not all areas would operate simultaneously at full capacity. A reduction in source noise of 4dB would be expected for the operation of only one of the jet wash bays (worst case the bay without a roof), this being representative of off peak times.

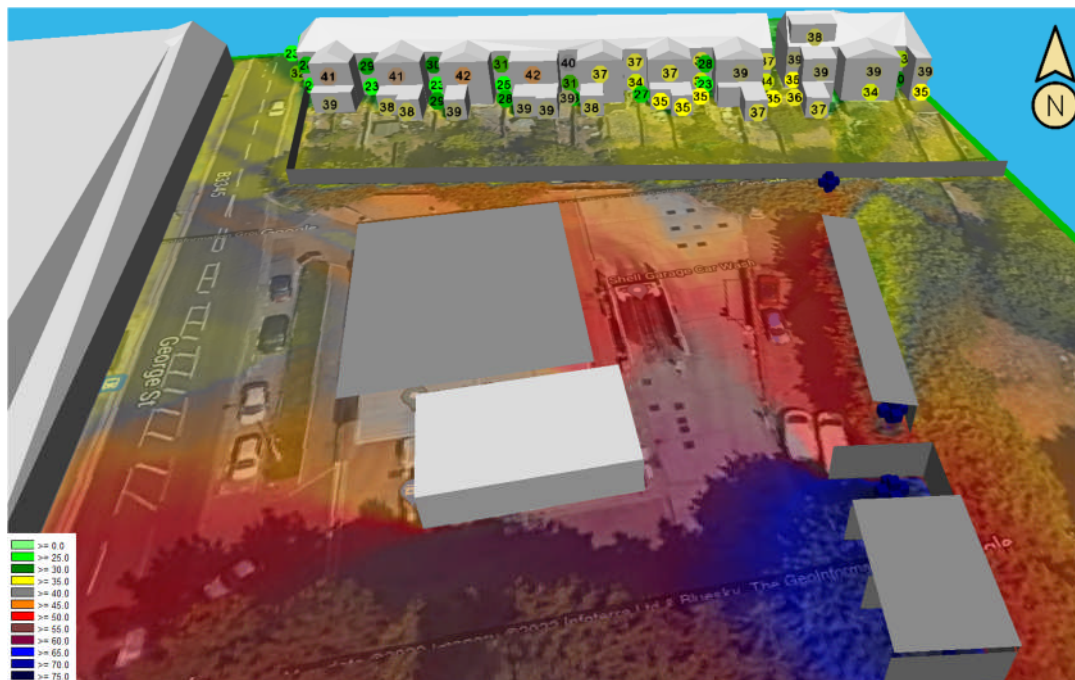


Figure 3: Specific Noise Levels as calculated for three jet wash bays operating – $L_{Aeq,T}$

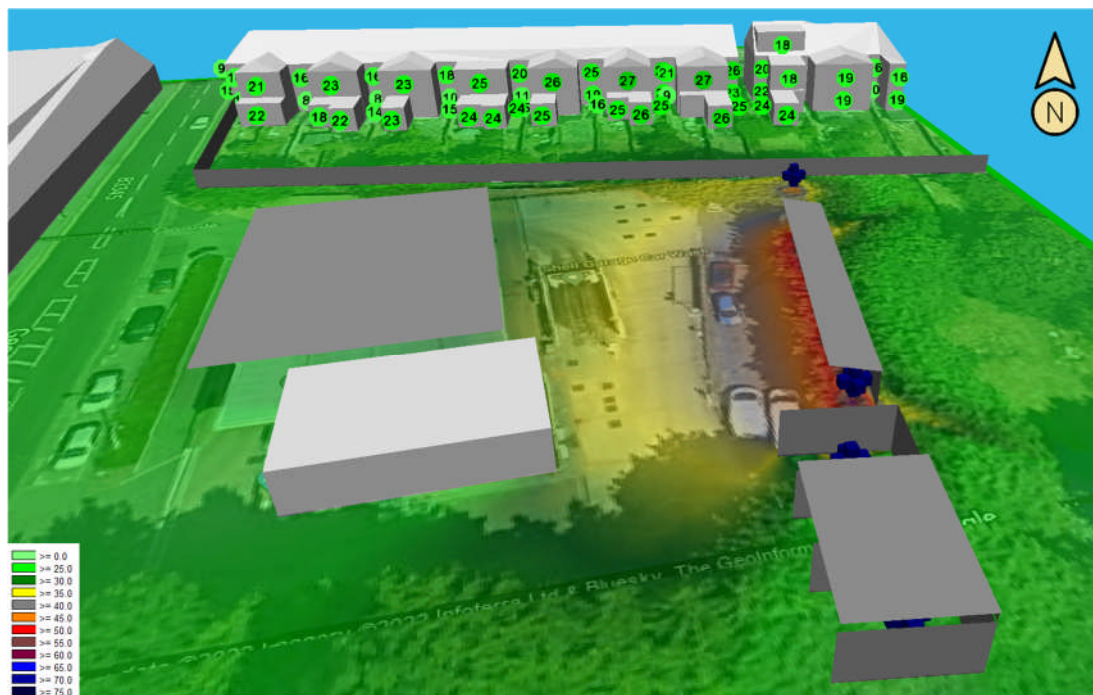


Figure 4: Specific Noise Levels as calculated for substation and charging stations operating – $L_{Aeq,T}$

7.06 The results of the noise modelling show that the nearest and most affected dwellings will be those along Queen's Road, exposed to calculated noise levels as summarised below for peak and off-peak operations:

Noise Source	Period	Queen's Road
Jet Wash Bays	Peak	42 dB(A)
	Off peak	38 dB(A)
Substation & 5 No. EV charging stations	All times	27 dB(A)

Table 7.1: Worst case noise levels at most affected façade of nearest dwellings due to respective plant operation

7.07 The following image presents the results of the noise model when all plant is operating at its maximum capacity (typical of peak operation) and annotates the affected receptor locations, detailing both the worst case day and night time noise levels for each property.

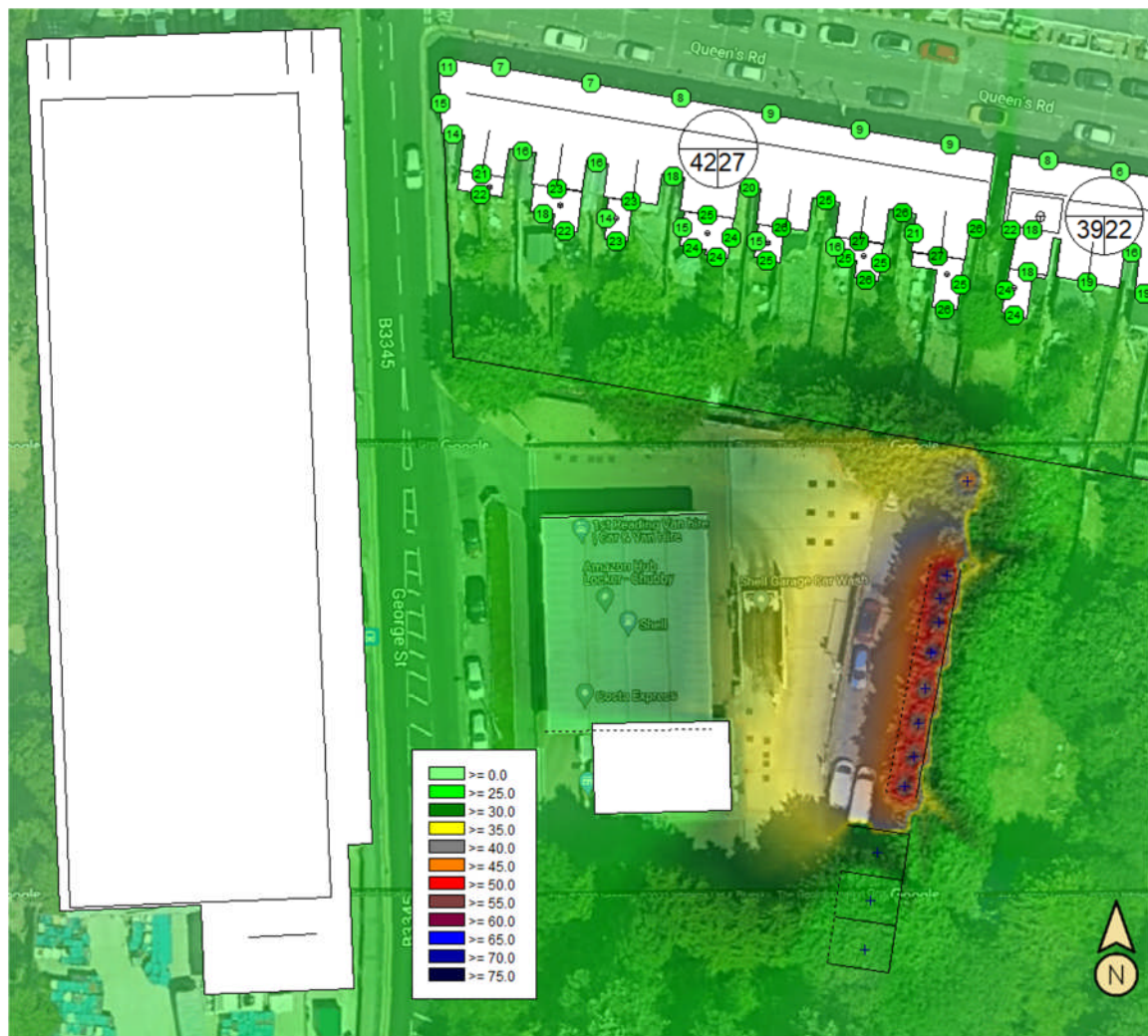
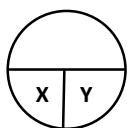


Figure 6: Worst case specific noise levels for relevant plant operating during daytime (peak) and night periods



X – Daytime noise level – Substation, 8 No. charging stations & 3 No. Jet wash bays
Y – Night time noise level – Substation & 8 No charging stations only

8 BS4142 ASSESSMENT

- 8.01 The impact noise due to the operation of the new facilities would typically be assessed in accordance with BS4142 for the daytime and night time operating conditions described in Section 7.04.
- 8.02 The following representative values are derived from a review of the lowest, modal and mean background noise levels recorded across the three days of our survey as presented in Tables 6.1 and 6.2.

- | | | |
|----------------------|---|--------------------------|
| • Jet Wash & EV bays | <i>'Peak hours' 0900-1900hrs</i> | 50 dB(A) L ₉₀ |
| | <i>'Off -peak' 0700-0900 & 1900-2200hrs</i> | 47 dB(A) L ₉₀ |
| • EV bays only | Overnight | 29 dB(A) L ₉₀ |

The representative background noise levels adopted are based on the following considerations:

a. *Peak and Off Peak periods*

Based upon the lowest modal values recorded in the relevant daytime periods across the four days of the survey. This value is considered to be representative of the typical background noise levels during all of the daily peak time periods and the majority of the off peak time periods during which the jet wash bays would be used.

b. *Night time periods*

Based upon the lowest overall background noise level recorded at night over the duration of the survey period. The night time period is considered to be most sensitive, a time when most people will be sleeping. Adoption of the lowest minimum background noise level measured over the duration of the survey period will likely result in an over estimate of impacts therefore confer greater protection.

- 8.03 The expected duration of individual typical charging and jet wash events is 20 minutes and 12 minutes respectively. The jet wash bay usage will be intermittent during the peak periods (0900-1900hrs), with 2 – 3 operations in an hour and 1 – 2 hourly operations during the remaining off peak periods. This is derived from similar service station sites and also the usage of the existing jet wash bay. It is therefore proposed, as a worst case, to assess the noise impact of the jet wash based two separate operations (typically two separate 12 minute events) in any off peak one hour period and three operations from each bay (a total of 9 events, typically 12 minutes each) during the peak periods.
- 8.04 For the night time we have proposed to also assess the noise impact of the substation and charging stations against the lowest background noise level. It is not expected that all charging bays will be used during the quietest times of the night and therefore assessing the worst case of all bays in use against the lowest background noise levels will provide a robust assessment and likely overestimate the noise impact the operation of the charging bays could have on the nearest dwellings.
- 8.05 The following table shows the BS4142 assessment procedure for the daytime activities described above based upon the noise immissions modelled in CadnaA (Section 7 above). The assessments include commentary on context and reference to absolute noise standards found in BS8233:2014,

‘Guidance on sound insulation and noise reduction for buildings’ and WHO guidelines, summary details of which can be found in Appendix C.

- 8.06 The assessment refers only to worst-case site-wide noise impacts at the most affected property of those of Nos 1 – 27 Queen’s Road.
- 8.07 All other receptors are either further away or are subject to the same or less noise than those noted above.

Queen’s Road – Off- Peak Jet Wash Operation (0700-0900hrs & 1900-2200hrs))

Results		Relevant Clause	Commentary
Assessment made during the daytime, so reference time interval is 1 hour		7.2	
Calculated Specific Noise	38 dB $L_{Aeq,1 \text{ hour}}$	7.3.6	Noise modelled using CadnaA, assumes continuous operation of all items during off-peak periods
Source level correction	- 4dB		Peak usage of 2 No. 12 minutes jet wash events in any one hour(- 10 log (24/60) dB) ⁽¹⁾
Acoustic Character Correction	+ 3 dB	9.2	Tonality associated with the changing of the jet wash cycle
Rating Sound Level	(38-4+3) dB = 37 dB	9.2	Overall 1 hour level
Background Noise Level	47 dB $L_{A90,1 \text{ hour}}$	8	Representative background during off-peak periods
Difference	(37-47) dB= -10 dB	11	
Assessment indicates the impact of the noise would be negligible, depending on context		11	The site operates as a commercial business already and includes industrial noise of this type and of even greater magnitude around 55 dB(A) L_{eq} .
Uncertainty of assessment	Not Significant	10	The noise model uses certified published source data and representative background noise levels are based extended survey including a weekend period.

Table 8.1: BS4142 Assessment for closest dwellings based on jet wash and EV charging bays – Off-peak Daytime Activity

- (1) Note the EV charging noise is 10dB less than the noise of the off peak jet wash operation and therefore makes negligible contribution and is ignored

Queen's Road – Daytime Peak Jet Wash Operation (0900-1900hrs)

Results		Relevant Clause	Commentary
Assessment made during the daytime, so reference time interval is 1 hour		7.2	
Calculated Specific Noise	42 dB $L_{Aeq,1 \text{ hour}}$	7.3.6	Noise modelled using CadnaA, assumes continuous operation of all items during peak periods
Source level correction	- 2dB		Peak usage of 3 No. 12 minutes jet wash events in any one hour per bay (- 10 log (36/60) dB) ⁽¹⁾
Acoustic Character Correction	+ 3 dB	9.2	Tonality associated with the changing of the jet wash cycle
Rating Sound Level	(42-2+3) dB = 43 dB	9.2	Overall 1 hour level
Background Noise Level	50 dB $L_{A90,1 \text{ hour}}$	8	Representative background during peak periods
Difference	(43-50) dB = -7 dB	11	
Assessment indicates the noise impact will be very low, depending on context		11	The site operates as a commercial business already and includes industrial noise of this type and of even greater magnitude around 55 dB(A) L_{eq} .
Uncertainty of assessment	Not Significant	10	The noise model uses certified published source data and representative background noise levels are based extended survey including a weekend period.

Table 8.2: BS4142 Assessment for closest dwellings based on all jet wash and EV charging bays - Peak Daytime Activity

- (1) Note the EV charging noise is 10dB less than the noise of the peak jet wash operation and therefore makes negligible contribution and is ignored

Queen's Road – Night time

Results		Relevant Clause	Commentary
Assessment made during the night time, so reference time interval is 15 minutes		7.2	
Calculated Specific Noise	27 dB $L_{Aeq,1 \text{ hour}}$	7.3.6	Noise modelled using CadnaA, assumes continuous operation of substation and all charging stations
Acoustic Character Correction	+ 3 dB	9.2	Possible tonal noise from plant operating
Rating Sound Level	(27 +3) dB = 30 dB	9.2	Overall 15 minute level
Background Noise Level	29 dB $L_{A90,15mins}$	8	Representative background during night time
Difference	(30-29) dB= +1dB	11	
Assessment indicates the noise will be of low impact, depending on context		11	Noise at the magnitude calculated is not expected to have any adverse impact.
Uncertainty of assessment	Not Significant	10	The noise model uses certified published source data and representative background noise levels are based extended survey including a weekend period.

**Table 8.3: BS4142 Assessment for closest dwellings based on EV charging bays
Peak Night time Activity**

8.08 Table 8.4 presents a summary of the each assessed scenario at the closest most affected receptor during each period and the relevant BS 4142 conclusion.

Scenario	Rating Level – Background noise dB	BS 4142 Assessment Conclusion
Off-Peak Daytime (0700-0900hrs & 1900-2200) Substation for 8 No. EV Charging Bays + 1 No Jet Wash Bay (max two operations in an hour)	-10	Noise impact is considered to be negligible, depending on context.
Peak Daytime (0900-1900hrs) Substation for 8 No. EV Charging Bays + 3 No Jet Wash Bays (max 9 operations in an hour)	-7	Noise impact is considered to be very low, depending on context.
Peak Night Time (2200-0700hrs) Substation for 8 No. EV Charging Bays	+1	Noise impact would be considered to be low

Table 8.4: Summary of BS4142 conclusions for each potential worst case scenario

- 8.09 As indicated in the above BS4142 assessments, the impacts of the operational noise from the site (controlled by the jet wash bay activity) would be considered to be of no worse than low impact, depending on context during all periods the services will be available.
- 8.10 The context in this instance is that the impact will in practice be effectively further mitigated by a number of contributing factors:
- the assessment is based on items operating at their typical worst case (maximum) capacity and at the nearest affected window.
 - The existing ambient noise level is consistently above 55 L_{Aeq} during the daytime which is higher than the worst case calculated noise of the proposed plant operation and therefore can be expected to provide some useful masking.
 - The existing jet wash bay which is being removed was on an open area of the forecourt. The proposed new jet wash bays will have local screening to the sides and over the top of two of the three bays the peak noise emissions reaching the dwellings (as modelled) will be 42dB(A) which is quieter than the existing jet and car wash noise and the existing ambient.
- 8.11 Based on the additional context noted above, the existing noise impact of site vehicle cleaning operations is expected to reduce. The noise impact of EV charging activities in isolation is also low based on a worst case of full occupation at the quietest time of night.
- 8.12 Additional reviews of the operational noise levels are presented below in the context of established and accepted absolute design targets and metrics for noise in dwellings as described in BS8233:2014, 'Guidance on sound insulation and noise reduction for buildings'.
- The following review considers levels of noise that will result within the properties accounting for the noise reductions that will occur as sound passes across the building facades.
- 8.13 The sound insulation of the façade is very much governed by the type of glazing and whether the windows are open or not. Both cases are considered here assuming minimum levels of 20dB sound insulation likely from basic closed thermal double glazed windows. A typical loss of 15dB could be expected for noise passing through a partially open window.
- 8.14 Table 8.5 presents the noise levels that could be expected within the dwellings against the relevant BS 8233 design criteria. We have presented the summary based on the most affected receptors during the daytime and night time. A minimal loss of 15dB could be expected for noise passing through a partially open window.

Period	Condition	Calculated $L_{Aeq,1hour}$ external	Minimum sound reduction loss	Resultant internal ambient noise level	BS8233 Design Criterion
Daytime	Windows Closed	42 dB	20 dB	<22 dB(A) $L_{eq,15minutes}$	35dB(A) $L_{eq,16 hour}$
	Windows Open	42 dB	15dB	27 dB(A) $L_{eq,15 minutes}$	35dB(A) $L_{eq,16 hour}$
Night time	Windows Closed	27 dB	20 dB	<7 dB(A) $L_{eq,15minutes}$	30dB(A) $L_{eq,8 hour}$
	Windows Open	27 dB	15dB	12 dB(A) $L_{eq,15 minutes}$	30dB(A) $L_{eq,8 hour}$

**Table 8.5: Calculated Worst Case Internal Ambient Noise levels
within closest dwellings**

- 8.15 The assessment demonstrates that the guideline internal noise values should be achieved with windows open or closed based on the intermittent use of the jet wash bays over a 16 hour period. The noise survey showed that the existing ambient noise levels were consistently above 55dB(A) during the daytime period and there is an expectation that residents will currently be adopting mitigation strategies to control this existing higher noise source (if and where required). The introduction of this new noise source will have negligible impact on the existing ambient noise and thus is not expected to lead to any behavioural changes or additional mitigation needs by the occupants of these dwellings.
- 8.16 The operational noise of the substation and EV charging stations should not be perceptible within the dwellings even with the windows open.

9 CONCLUSIONS

- 9.01 MBH Design Studio Ltd has appointed Environmental Equipment Corporation Limited to undertake a noise assessment for the new fit out of the MFG Thames Valley service station.
- 9.02 The assessment has been carried out in accordance with national planning guidance and current British Standard guidance and is based on an environmental noise survey conducted at the site over a weekend period.
- 9.03 A noise assessment has been undertaken to evaluate the potential worst case noise impact of the proposed operations and equipment.
- 9.04 The assessment has shown that, when considered in context of the existing activities around the site, the existing ambient noise climate and the expected reduction in overall noise affecting the closest noise sensitive receivers, the overall noise impact of site operations is expected to reduce as a result of the proposed changes. The impact of the proposed site operations (BS4142)_ is considered to be low and also further mitigated by a number of considerations.
- 9.05 During the night time it is assumed that the jet wash bays will be closed with the potential that only the EV charging bays will be kept open. The noise impact from these activities during the night time would be considered to be low.
- 9.06 On the basis of this assessment it is considered that noise does not pose a material constraint to planning permission for the redevelopment of the site being granted.

APPENDIX A

GLOSSARY OF TECHNICAL TERMS

ACOUSTIC TERMINOLOGY

Absorption Classes	The sound absorption of a material is rated from Class A to Class E, where Class A materials provide the highest level of sound absorption.
Ambient Noise Levels	Noise levels measured in the absence of noise requiring control, frequently measured to determine the situation prior to the additional of a new noise source.
dB	Decibel. The logarithmic unit of sound level.
dBA	A-weighted decibel. The A-weighting approximates the response of the human ear.
$D_{nT,w}$	Weighted standardized level difference. A single number quantity of the sound level difference between two rooms. $D_{nT,w}$ is typically used to measure the on-site sound insulation performance of a building element such as a wall, floor or ceiling. Measured in accordance with BS EN ISO 16283-1 and weighted in accordance with BS EN ISO 717-1.
$D_{n,e,w}$	The weighted element-normalized level difference. A single number rating of the sound reduction provided by a sound passing through an individual element. $D_{n,e,w}$ is typically used to define the sound insulation provided by ventilators. Measured in accordance with BS EN ISO 10140-2:2010 and rated in accordance with BS EN ISO 717-1.
Flanking	Transmission of sound energy through paths adjacent to the building element being considered. For example, sound may be transmitted around a wall by travelling up into the ceiling space and then down into the adjacent room.
Frequency	Sound can occur over a range of frequencies extending from the very low, such as the rumble of thunder, up to the very high such as the crash of cymbals. Sound is generally described over the frequency range from 63Hz to 4kHz, roughly equal to the range of frequencies on a piano.
Impact Sound	Sound produced by an object impacting directly on a building structure, such as footfall noise or chairs scrapping on a floor.
$L_{Aeq,t}$	The equivalent continuous sound level measured in dBA. This is commonly referred to as the average noise level. 't' is the interval time for the measurement. Typically 't' of 16hrs and 8hrs is used for day and night time ambient noise respectively or 't' is defined by the period of interest in BS4142 assessments.
$L_{A90,t}$	The noise level exceeded for 90% of the measurement period, measured in dBA. This is commonly referred to as the background noise level.
$L'_{nT,w}$	Weighted, standardized impact sound pressure level. A single number rating of the impact sound insulation of a floor/ceiling when impacted on by a standard "tapper" machine. The lower the $L'_{nT,w}$, the better the acoustic performance. Measured in accordance with BBS EN ISO 140-7 and rated in accordance with BS EN ISO 717-2.
NR	Noise Rating. A single number rating which is based on the sound level in the octave bands 31.5Hz – 8kHz inclusive, generally used to assess noise from mechanical services in buildings.
Octave Band	Frequencies are often grouped together into octaves for analysis. Octave bands are labelled by their centre frequency which are: 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz and 4kHz.
Reverberation Time (T_{mf})	Reverberation time is used for assessing the acoustic qualities of a space. It is defined as the time it takes for an impulse to decay by 60dB. T_{mf} is the arithmetic average of the reverberation time in the mid frequency bands (500Hz, 1kHz and 2kHz).
R_w	Weighted sound reduction index. A single number rating of the sound insulation performance of a specific building element. R_w is measured in a laboratory. R_w is commonly used by manufacturers to describe the sound insulation performance of building elements such as plasterboard and concrete. Measured in accordance with BS EN ISO 10140-2:2010 and rated in accordance with BS EN ISO 717-1.
Sound Absorption	When sound hits a surface, some of the sound energy is absorbed by the surface material. Sound absorption refers to the ability of a material to absorb sound, rated from 0, complete reflection, to 1, complete absorption.
Sound Insulation	When sound hits a surface, some of the sound energy travels through the material. 'Sound insulation' refers to the ability of a material to prevent the travel of sound.
Structure-borne transmission	Transmission of sound energy as vibrations via the structure of a building.

APPENDIX B

**PROPOSED
SITE PLAN**

quietly moving forward

APPENDIX C
PLANNING POLICY
AND GUIDANCE

National Planning Policy Framework

The Department for Communities and Local Government published the National Planning Policy Framework (NPPF) on 27th March 2012 (as amended on 20th July 2021) and upon its publication, the majority of planning policy statements and guidance notes were withdrawn, including Planning Policy Guidance 24 Planning and Noise, which previously presented the government's overarching planning policy on noise.

Paragraph 174 in Section 15 of the NPPF (2021), entitled Conserving and enhancing the natural environment, states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability..."

Paragraph 185 in Section 15 also states that:

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

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason..."

The Department for Environment Food and Rural Affairs published the Noise Policy Statement for England (NPSE) in March 2010. The explanatory note of NPSE defines the following terms used in the NPPF:

"NOEL – No Observed Effect Level

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

LOAEL – Lowest Observed Adverse Effect Level

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

2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

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

The NPSE does not define any of the above effect levels numerically.

The NPSE presents the Noise Policy Aims as:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy and sustainable development:

avoid significant adverse impacts on health and quality of life;

mitigate and minimise adverse impacts on health and quality of life; and

where possible, contribute to the improvement of health and quality of life.”

It can be seen that the first two bullet points are similar to Section 11 of the NPPF, with a third aim that seeks to improve health and quality of life. The NPSE later expands on the Noise Policy Aims, stating:

2.23 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development (paragraph 1.8).

2.24 The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

2.25 This aim (the third aim), seeks where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development (paragraph 1.8), recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.”

It is clear that noise described in the NPSE as SOAEL that would lead to significant adverse effects should be avoided, although there is no definition as to what constitutes a significant adverse effect. Similarly, noise should be mitigated where it is high enough to lead to adverse effects, termed the LOAEL, but not so high that it leads to significant adverse effects.

British Standard 4142

To assess the acceptability of the resultant noise levels we have consulted the relevant standards. BS 4142:2014 ‘Methods for rating and assessing industrial and commercial sound’ has been used to assess the likelihood any adverse impacts based on the resultant noise level from the new plant item, including any corrections for the character of the noise against the existing background noise level.

BS4142 gives guidance on assessing the likelihood of adverse impacts by calculating a ‘rating level’ of the new noise source and comparing its magnitude at noise sensitive locations to the existing or underlying background noise level. The background noise level is subtracted from the ‘rating level’ to assess the likelihood of complaints:

- The greater the difference the greater the likelihood of complaints.
- A difference of around +10dB or more is an indication of a significant adverse impact, depending on the context.

- A difference of +5dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background noise level, the less likely it is that the specific sound source will have an adverse impact or 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 sound impact, depending on the context.

This assessment is carried out over a one hour period for the daytime and a fifteen minute period for the night-time. For the purposes of the standard it states that daytime and night-time are typically 07:00 to 23:00 hours and 23:00 to 07:00 hours respectively.

The 'rating level' of the noise source is obtained taking the following factors into consideration:

- The new plant noise (the specific noise) is measured or predicted in terms of L_{Aeq} .
- An additional correction shall be included if the noise contains a distinguishable, discrete continuous note, if the noise contains distinct impulses or if the noise is irregular enough to attract attention. The value for any tonal noise can be an addition of up to 6dB and for impulsive noise of up to 9dB.

BS 4142 goes on to state that:

'The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level 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.'

BS4142 has been referenced in setting noise limits for any fixed plant proposed as part of the proposed development.

APPENDIX D

SURVEY RESULTS
(TABULAR)

EC 19644 - MFG Thames Valley

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Tabulated Noise data

Sheet 1 of 3

Time	L _{Aeq}	L _{AMax}	L _{A90}
10:30	62.4	85.6	56.4
10:45	58.8	68.3	56.1
11:00	58.6	71.0	56.2
11:15	60.4	69.7	56.1
11:30	58.8	65.2	56.5
11:45	60.9	78.5	56.6
12:00	58.8	67.1	56.3
12:15	60.2	69.7	56.7
12:30	58.5	68.0	56.1
12:45	59.2	69.6	56.6
13:00	57.9	65.9	55.0
13:15	58.0	64.9	55.1
13:30	59.0	69.2	56.7
13:45	59.1	70.6	56.2
14:00	59.7	71.5	56.0
14:15	59.5	71.0	55.1
14:30	58.7	73.9	56.4
14:45	59.1	67.4	55.3
15:00	57.6	63.3	55.3
15:15	59.4	66.8	55.4
15:30	59.5	66.6	55.4
15:45	58.0	70.0	54.4
16:00	59.2	72.6	53.9
16:15	57.1	70.6	54.4
16:30	58.6	81.8	54.3
16:45	59.9	69.7	55.5
17:00	58.4	71.4	55.3
17:15	56.6	70.7	53.9
17:30	56.1	64.3	53.7
17:45	60.5	73.6	56.1
18:00	63.0	81.7	54.4
18:15	61.0	70.1	55.8
18:30	59.1	76.4	54.2
18:45	59.6	84.5	54.0
19:00	59.1	67.2	54.3
19:15	57.1	64.1	53.6
19:30	59.4	74.8	53.7
19:45	58.9	67.2	53.3
20:00	58.8	70.9	53.0
20:15	56.2	69.8	53.1
20:30	56.0	74.2	52.1
20:45	55.8	65.4	52.4
21:00	55.9	68.3	52.1
21:15	55.6	63.0	52.1
21:30	55.2	63.2	52.0
21:45	55.6	69.5	52.1
22:00	55.1	71.4	51.0
22:15	55.7	74.3	50.1

Time	L _{Aeq}	L _{AMax}	L _{A90}
22:30	54.1	66.6	49.3
22:45	52.8	71.0	44.1
23:00	54.3	78.2	43.8
23:15	52.4	62.5	41.6
23:30	51.6	61.9	42.4
23:45	52.2	66.6	42.0
00:00	51.7	63.5	42.4
00:15	50.5	61.3	40.3
00:30	48.6	62.4	37.8
00:45	51.0	61.9	39.1
01:00	47.7	62.1	38.0
01:15	49.8	66.5	38.8
01:30	51.1	70.6	37.4
01:45	47.4	64.8	36.7
02:00	48.1	64.2	36.2
02:15	47.8	61.7	35.5
02:30	42.4	59.0	34.6
02:45	45.8	61.9	35.5
03:00	47.4	65.9	35.5
03:15	45.6	60.8	36.0
03:30	47.3	61.0	36.6
03:45	47.2	66.6	36.7
04:00	46.3	60.2	38.0
04:15	46.5	59.9	37.2
04:30	47.3	62.9	37.5
04:45	46.6	63.8	37.0
05:00	48.0	61.6	38.9
05:15	48.8	61.5	39.1
05:30	49.5	68.4	38.7
05:45	48.7	64.5	37.6
06:00	53.5	72.4	39.9
06:15	52.8	79.7	39.8
06:30	54.0	76.2	44.4
06:45	60.4	86.1	45.0
07:00	53.3	69.4	45.2
07:15	53.4	64.3	46.3
07:30	55.8	71.5	48.8
07:45	56.0	65.4	48.7
08:00	55.4	66.9	48.6
08:15	59.1	67.3	51.3
08:30	56.8	65.4	51.1
08:45	57.0	70.7	51.3
09:00	61.1	73.1	54.5
09:15	58.6	71.4	54.3
09:30	57.1	70.5	52.6
09:45	58.2	68.0	54.2
10:00	60.4	66.8	53.5
10:15	60.2	70.8	53.3

EC 19644 - MFG Thames Valley

MBH Design Studio

Tabulated Noise data

Sheet 2 of 3

Time	L _{Aeq}	L _{AMax}	L _{A90}
10:30	57.2	77.7	52.6
10:45	56.3	68.7	52.0
11:00	59.1	66.7	52.8
11:15	59.6	73.9	53.5
11:30	61.6	81.9	54.9
11:45	64.1	81.9	52.2
12:00	60.3	68.4	53.6
12:15	57.0	72.8	52.1
12:30	67.0	95.8	52.3
12:45	59.8	67.2	53.6
13:00	59.9	66.7	55.0
13:15	61.0	71.9	54.9
13:30	60.7	74.3	54.3
13:45	59.0	66.8	52.7
14:00	59.2	78.0	54.4
14:15	61.2	75.0	55.3
14:30	59.6	67.3	52.7
14:45	60.0	68.2	54.6
15:00	61.2	76.1	55.7
15:15	59.5	71.8	54.1
15:30	62.5	85.4	53.6
15:45	59.4	74.2	53.9
16:00	60.2	77.0	54.9
16:15	60.7	69.2	54.2
16:30	59.4	67.1	54.1
16:45	57.4	68.0	53.5
17:00	57.0	71.0	53.5
17:15	56.7	66.3	52.9
17:30	57.1	64.1	53.5
17:45	56.6	66.8	53.1
18:00	57.2	69.4	53.0
18:15	57.3	73.8	52.5
18:30	57.0	72.3	53.2
18:45	56.0	71.4	52.1
19:00	55.8	68.0	51.2
19:15	56.2	70.9	50.4
19:30	57.4	73.2	51.8
19:45	55.2	64.9	50.1
20:00	57.5	82.5	50.4
20:15	55.6	72.5	50.2
20:30	55.2	68.7	49.4
20:45	54.9	68.9	50.0
21:00	54.4	64.6	48.2
21:15	56.2	76.2	47.8
21:30	55.6	69.1	48.2
21:45	54.5	70.7	48.2
22:00	53.5	71.6	46.5
22:15	59.1	86.7	46.1

Time	L _{Aeq}	L _{AMax}	L _{A90}
22:30	52.5	63.9	43.9
22:45	52.2	61.9	42.1
23:00	53.2	62.3	43.1
23:15	53.2	65.8	43.6
23:30	52.1	64.2	41.1
23:45	51.6	62.6	40.5
00:00	52.4	69.7	39.4
00:15	51.4	69.3	39.9
00:30	50.2	62.6	36.9
00:45	49.3	61.5	37.3
01:00	50.0	63.6	37.1
01:15	48.7	61.3	35.1
01:30	48.8	62.5	35.0
01:45	49.0	65.3	34.0
02:00	48.4	65.9	34.6
02:15	47.2	65.1	34.1
02:30	47.3	62.6	33.0
02:45	44.6	61.6	33.1
03:00	45.7	62.3	32.7
03:15	45.9	62.0	31.9
03:30	45.6	61.4	31.7
03:45	48.2	69.0	33.3
04:00	46.5	62.8	32.4
04:15	48.0	62.3	33.3
04:30	46.7	64.9	32.7
04:45	44.5	61.8	32.7
05:00	45.0	61.1	32.6
05:15	46.5	60.1	34.6
05:30	46.8	60.4	33.7
05:45	48.9	63.1	36.4
06:00	49.6	64.4	35.9
06:15	49.5	68.3	36.8
06:30	49.5	62.4	36.1
06:45	49.8	64.7	37.5
07:00	52.0	70.1	40.7
07:15	51.3	64.7	40.6
07:30	53.9	68.9	45.7
07:45	54.8	68.1	45.4
08:00	53.1	65.3	42.5
08:15	54.3	68.5	44.7
08:30	54.3	63.4	47.1
08:45	54.4	67.9	46.9
09:00	55.1	65.9	47.6
09:15	55.6	65.6	48.5
09:30	59.2	66.6	50.9
09:45	59.2	67.6	51.9
10:00	59.6	67.5	51.6
10:15	62.2	89.4	52.1

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Tabulated Noise data

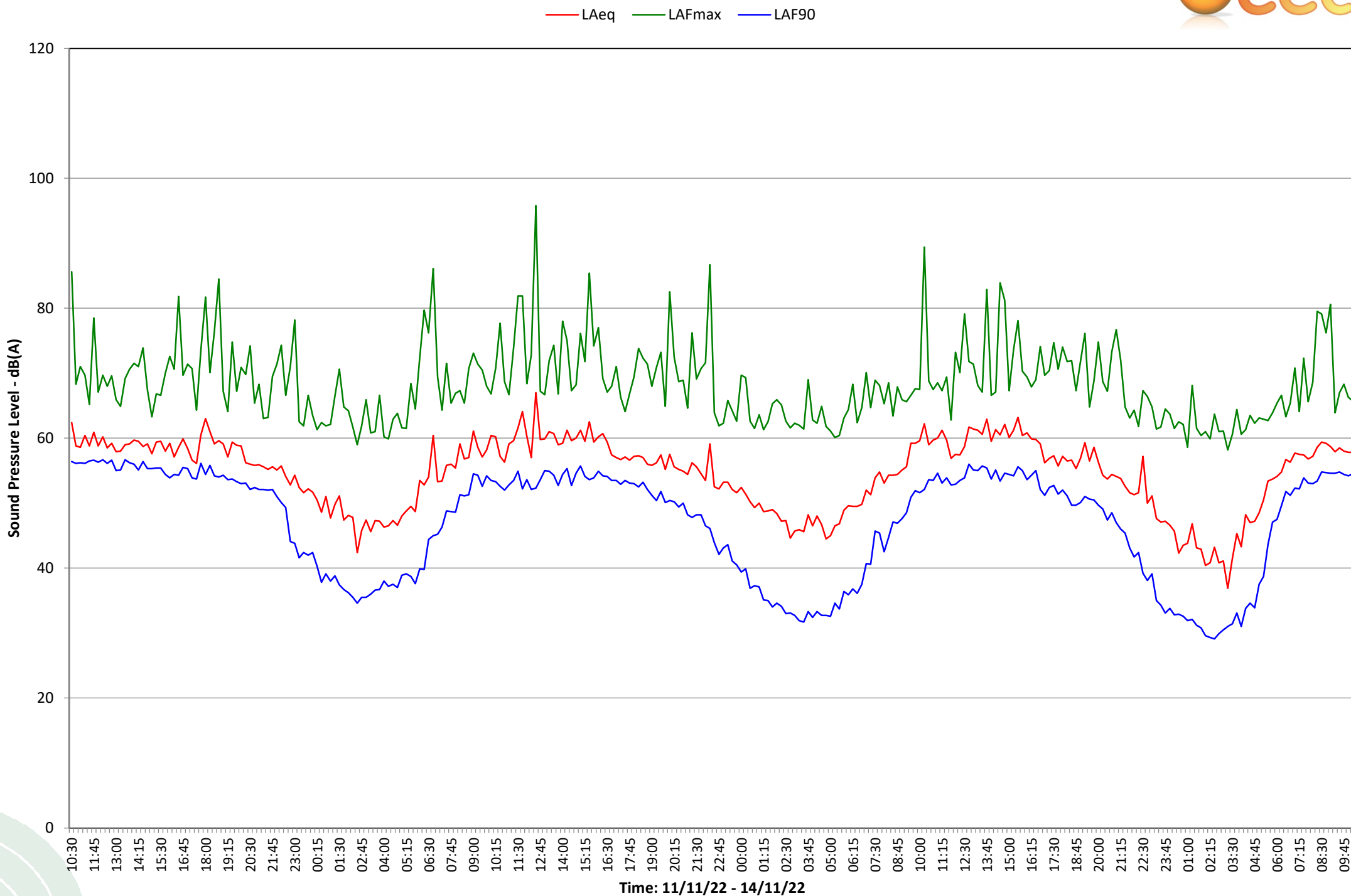
Sheet 3 of 3

Time	L _{Aeq}	L _{AMax}	L _{A90}
10:30	59.0	68.8	53.6
10:45	59.7	67.5	53.5
11:00	60.0	68.5	54.6
11:15	61.2	67.3	53.1
11:30	59.7	69.4	53.9
11:45	56.9	62.8	52.8
12:00	57.5	73.2	52.9
12:15	57.4	70.1	53.5
12:30	58.7	79.1	53.9
12:45	61.7	71.8	56.0
13:00	61.4	71.4	55.1
13:15	61.2	68.1	55.0
13:30	60.6	67.1	55.7
13:45	62.9	82.9	55.4
14:00	59.5	66.6	53.7
14:15	61.3	67.1	55.1
14:30	60.5	83.9	53.4
14:45	62.1	81.2	54.6
15:00	60.1	67.3	54.4
15:15	61.2	73.6	54.2
15:30	63.2	78.1	55.6
15:45	60.4	70.3	55.0
16:00	60.8	69.4	53.6
16:15	59.9	67.9	54.3
16:30	59.8	69.0	55.0
16:45	59.1	74.1	52.1
17:00	56.2	69.7	51.2
17:15	56.9	70.4	52.4
17:30	57.3	74.7	52.7
17:45	55.7	70.6	51.4
18:00	57.2	74.0	52.0
18:15	56.5	71.8	51.1
18:30	56.6	71.9	49.7
18:45	55.3	67.3	49.7
19:00	56.9	71.8	50.1
19:15	59.3	76.1	51.0
19:30	56.5	64.8	50.6
19:45	58.6	68.8	50.5
20:00	56.3	74.8	49.7
20:15	54.3	68.7	49.1
20:30	53.7	67.2	47.4
20:45	54.4	73.3	48.5
21:00	54.1	76.7	47.0
21:15	53.8	72.0	46.0
21:30	52.6	64.8	45.4
21:45	51.6	63.1	43.1
22:00	51.3	64.3	41.7
22:15	51.6	61.8	42.4

Time	L _{Aeq}	L _{AMax}	L _{A90}
22:30	57.2	67.3	39.2
22:45	50.0	66.4	38.1
23:00	51.1	64.8	39.1
23:15	47.6	61.4	35.0
23:30	47.1	61.7	34.3
23:45	47.2	64.5	33.1
00:00	46.6	63.7	33.8
00:15	45.7	61.5	32.8
00:30	42.3	62.5	32.9
00:45	43.5	62.1	32.6
01:00	43.8	58.6	31.9
01:15	46.8	68.1	32.1
01:30	43.1	61.5	31.2
01:45	42.9	60.4	30.8
02:00	40.4	61.0	29.6
02:15	40.8	59.9	29.3
02:30	43.2	63.7	29.1
02:45	40.8	61.0	29.9
03:00	41.1	61.1	30.5
03:15	36.9	58.2	31.0
03:30	41.5	60.6	31.4
03:45	45.3	64.4	33.1
04:00	43.3	60.6	31.0
04:15	48.2	61.3	33.8
04:30	47.0	63.5	34.6
04:45	47.2	62.3	33.9
05:00	48.5	63.1	37.5
05:15	50.5	62.9	38.7
05:30	53.4	62.7	43.6
05:45	53.7	63.9	47.1
06:00	54.1	65.4	47.5
06:15	54.8	66.6	49.6
06:30	56.7	63.3	51.8
06:45	56.3	65.4	51.2
07:00	57.7	70.8	52.3
07:15	57.5	64.1	52.2
07:30	57.4	72.3	53.9
07:45	56.8	65.6	53.1
08:00	57.2	68.6	53.0
08:15	58.6	79.5	53.4
08:30	59.4	79.1	54.8
08:45	59.2	76.2	54.7
09:00	58.7	80.6	54.6
09:15	57.9	63.9	54.6
09:30	58.5	67.0	54.8
09:45	58.0	68.3	54.4
10:00	57.8	66.3	54.2
10:15	57.8	65.7	54.5

APPENDIX E
SURVEY RESULTS
(GRAPHICAL)

Noise Level Time History at MFG Thames Valley



APPENDIX F

PUBLISHED PLANT NOISE DATA



GENERAL DESCRIPTION 4CA20

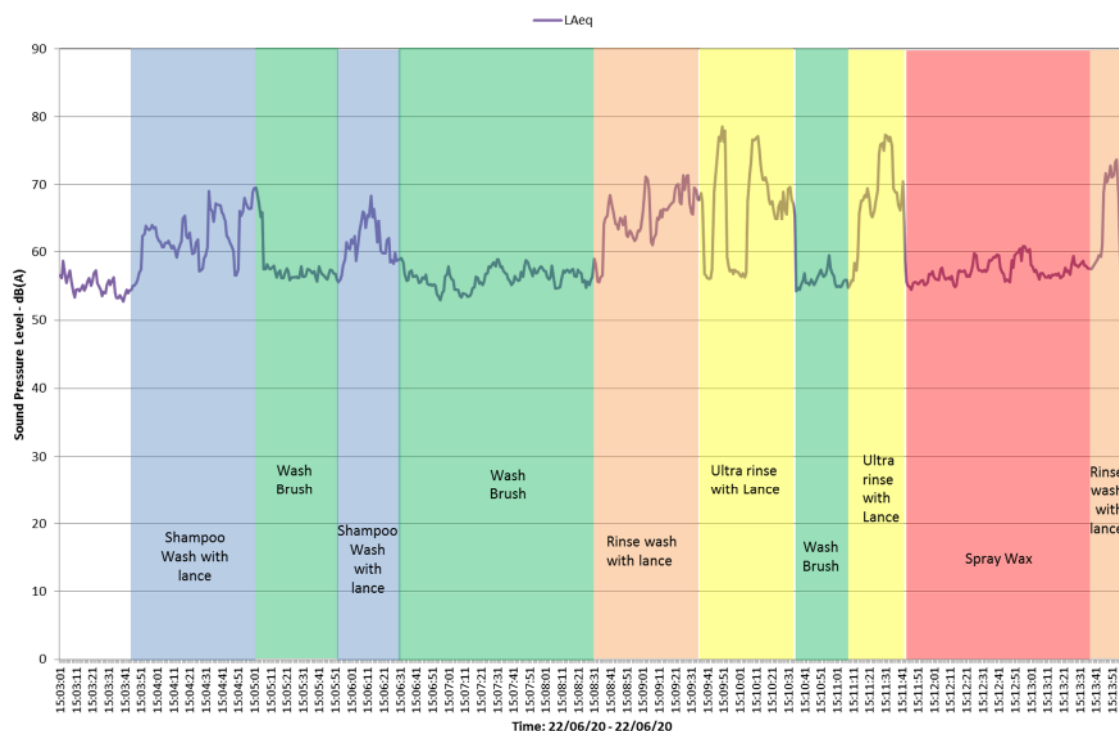
12

TECHNICAL SPECIFICATIONS

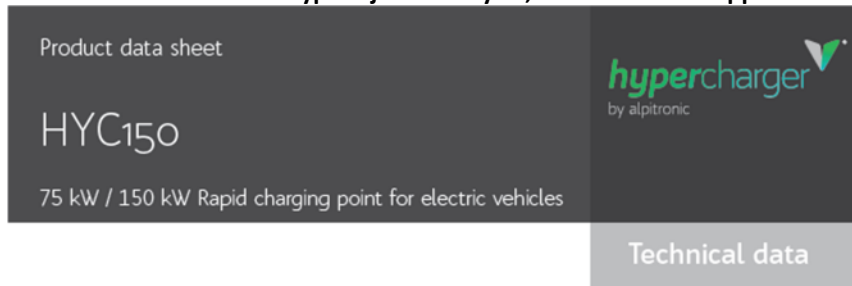
NOISE CONTROL

The level of sound pressure with equivalent weighing is less than 70 dB.

Noise Level Time History at Jet Wash Noise



EEC Ltd in-situ measurements of typical jet wash cycle, at a distance of approximately 1.5m.

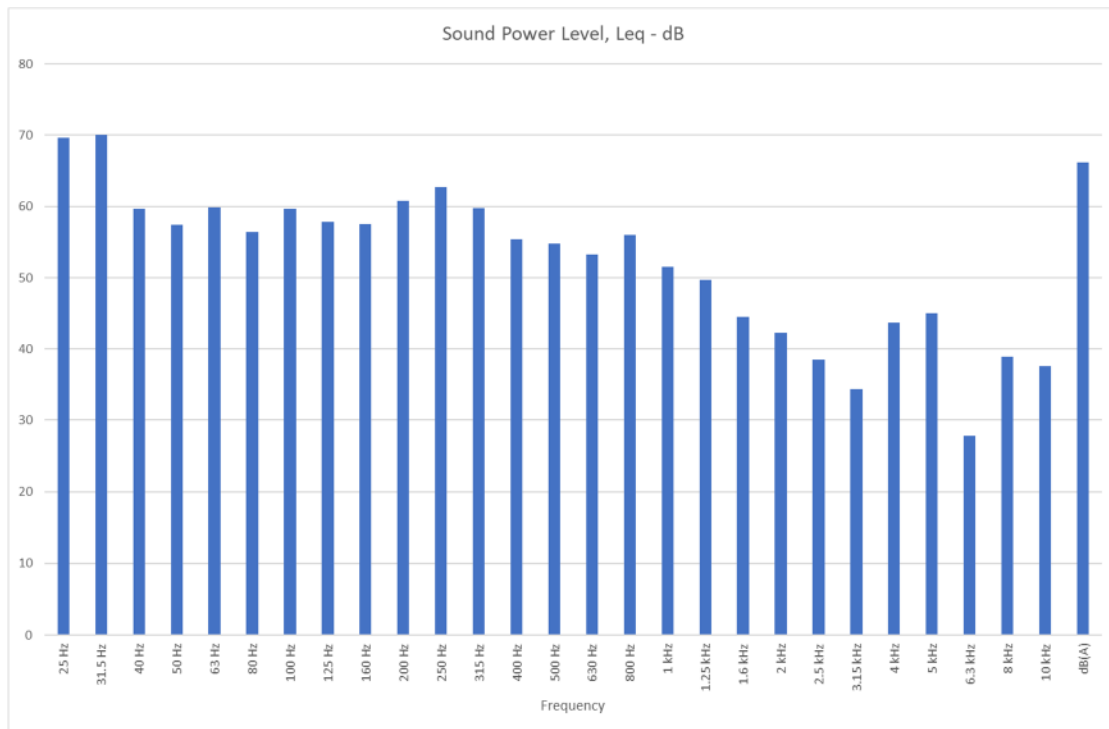


SYSTEM SPECIFICATIONS	
DC interfaces	CCS2 up to 500 A CHAdeMO up to 200 A
AC interfaces	22 kW AC socket/cable (optional)
Payment system	Choose between different card readers for credit cards or EC cards
Load and charging management	Smart, dynamic allocation of power modules and distribution of charging power to charging points
Environmental conditions, in operation	-30° up to +55° C (derating from 40° C), Operating height ≤ 2,000 m
Environmental conditions, in storage	-40° up to +55° C (IK22*/IK2*/IK1*/IK10*/IK100) * Minimum temperature in deviation from the standard
Environmental conditions, under transport	-40° up to +70° C (IK12*/IK2*/IK25*/IK25M4) * Minimum temperature in deviation from the standard
Humidity (in operation, storage)	0% - 95% relative (non-condensing)
Efficiency	>94% at full charge
Protective class	Class I (protective earth connection)
Degree of pollution	Class 3
Noise emission	<62 dB(A) at 1m distance (@22° C, at full charging (average value throughout entire charging process)) Option to set parameters for Silent Mode (reduction of noise emissions by means of power derating)
Installation location	Indoor and outdoor installation

EEC Measured Data of HYC150 Alpitronic Charging station

	Frequency – Hz													
	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500
Sound Power Level dB	70	70	60	57	60	56	60	58	58	61	63	60	55	55
	Frequency – Hz													
	630	800	1k	1.25k	1.6k	2k	2.15k	3.15k	4k	5k	6.3k	8k	10k	dB(A)
Sound Power Level dB	53	56	52	50	45	42	39	34	44	45	28	39	38	63

Calculated sound power levels for Alpitronic HYC-150 charging station based on measured data on site

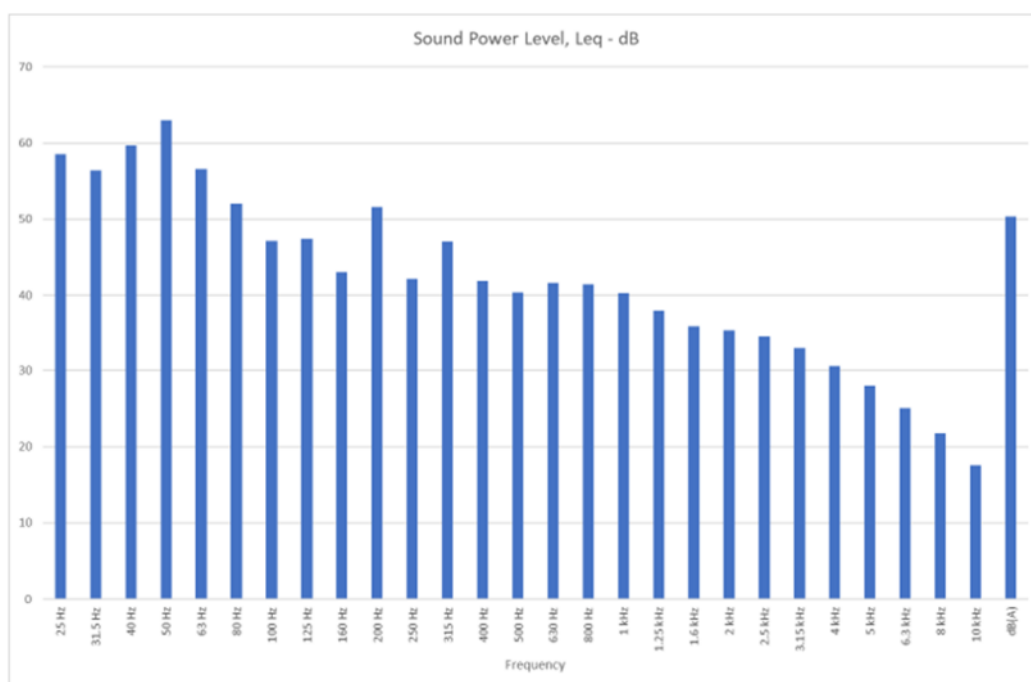


Graphical representation of calculated sound power levels of Alpitronic HYC-150

SUBSTATION NOISE DATA

	Frequency - Hz													
	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500
Sound Power Level dB	59	46	60	63	57	52	47	47	43	52	42	47	42	40
	Frequency - Hz													
	630	800	1k	1.25k	1.6k	2k	2.15k	3.15k	4k	5k	6.3k	8k	10k	dB(A)
Sound Power Level dB	42	41	40	38	36	35	35	33	31	28	25	22	18	50

Calculated sound power levels for substation based on lowest measured data on site to reduce the influence of surrounding activity on roads and forecourt



Graphical representation of calculated sound power levels of substation