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Project:

MFG Witney

Title:

Noise Impact Assessment

quietly moving forward

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CONTENTS:

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 four new electric vehicle charging bays and their associated supporting infrastructure at the existing MFG Witney service station.

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.

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 service station is located in a predominantly residential area of Witney.

2.02 The following Google Maps image has been annotated to identify the MFG Witney site and the most affected noise sensitive residential properties to the proposed new EV charging bays and associated infrastructure. The measurement location used for the noise survey is also marked.

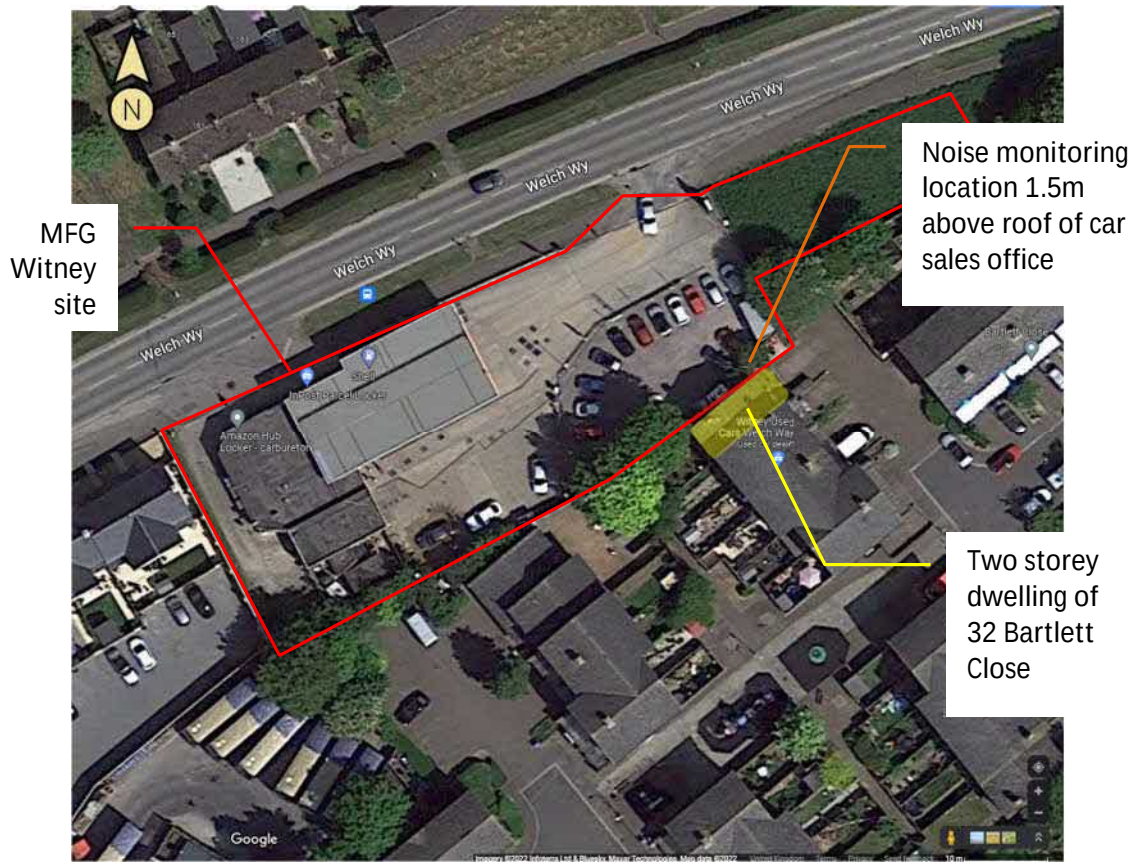


Figure 1: Site layout and nearest dwellings

2.03 The most affected noise sensitive receptor to the proposed plant items is the following:

- The two storey dwelling of 32 Bartlett Close to the south of the service station

2.04 All other noise sensitive receptors are at a greater distance from the proposed location of the new facilities or are protected by more screening by intervening boundary structures and as such will be subject to lower levels of noise.

2.05 This application is for the installation of four dedicated electric vehicle charging bays. The electrical infrastructure required to support the charging bays consists of a two HYC-300 Alpitronic charging station and a new LV Panel within a GRP enclosure. The new charging bays will replace an existing car sales area that shares the service station forecourt. A large scale plan layout of the new site is presented in Appendix B. Figure 2 below overlays this plan onto a Google Maps image to put the layout in context.

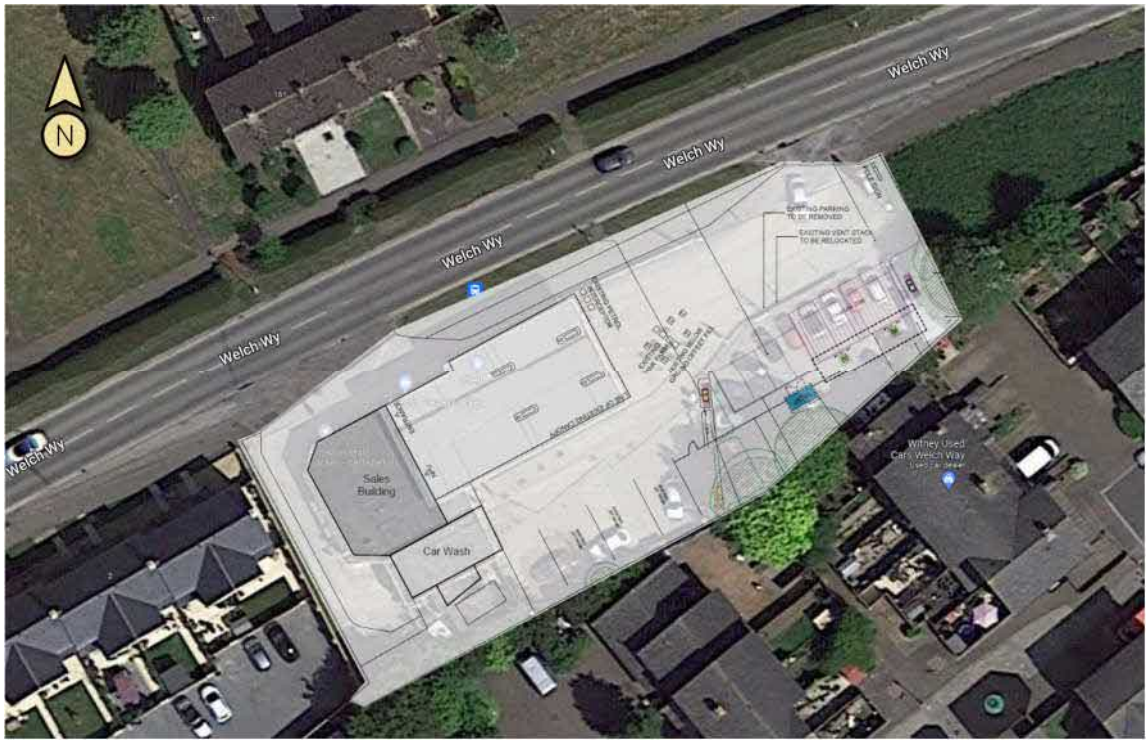


Figure 2: Proposed new site layout and existing surroundings.

2.06 The LV panel does not produce any noise within the only noise generating elements of the proposed new system being the charging stations which will have a solid barrier to the rear and cantilevered over the top of the charging bays that will offer some visual and acoustic screening to some of the surrounding properties.

3 GUIDANCE

3.01 A summary of the current National Planning Policy Framework including the Noise Policy Statement for England is presented in Appendix C of this document. 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.

4 MEASUREMENTS

4.01 Environmental noise measurements were carried out over a weekend period, between 1130 hours on Friday 21st October 2022 and concluded 0915hours Monday 24th October 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 at a height of approximately 1.5 metres above the above the roof the existing offices of the car sales operation. The measurement was not located within 3.5 metres of any reflecting surfaces, other than the mounting surface.

4.03 This position is considered to be representative of the typical noise levels that could be experienced outside the nearest windows of the surrounding dwellings with the controlling influence on noise levels being activity on the garage forecourt and traffic flow along the surrounding roads.

5 EQUIPMENT

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

- 01dB Cube Integrating Sound Level Meter conforming to Class 1 BS EN 61672, Type 1 BS EN 60804 & BS EN 60651: 1994;
- GRAS 40CD Condenser Microphone, PRE22 S Pre-amp and Connecting Leads;
- Tripod.

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

Sound Level Meter 01dB Cube	Serial No.	11165
	Calibration Date	18th February 2021
	Cal Certificate No.	10328
½" Condenser Mic. GRAS 40CD	Serial No.	287995
	Calibration Date	18th February 2021
	Cal Certificate No.	10328
Calibrator CAL 31	Serial No.	89090
	Calibration Date	12th January 2021
	Cal. Certificate No.	U36745

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 generally suitable for noise measurement, it being dry with little wind for the majority of the survey.

6.02 Noise sources at the site include local and distant road traffic and activity on the garage forecourt that includes some plant and existing jet wash and air/water facilities. There were no other significant sources of noise during the survey.

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 lowest measured background levels over the measurement periods are shown in Table 6.1. The L_{A90} is based on fifteen minute measurements in the specified period. The summary data presented below is for the whole survey period as there did not appear to be any significant difference in noise levels between weekday and weekend data.

Period	Average $L_{Aeq,T}$ – dB	Minimum L_{A90} – dB	Maximum L_{A90} – dB	Modal L_{A90} – dB	Mean L_{A90} – dB
Day time (0700-1900 hrs)	57.0	39	57	49	49
Evening (1900-2300 hrs)	54.7	37	51	43	43
Night-time (2300-0700 hrs)	50.5	30	53	37	37

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

7 PLANT ASSESSMENT

7.01 This application is for the installation of eight new electric vehicle charging bays. 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 noise from the operation of the Alpitronic HYC-150 charging station when in use. The proposed scheme will use a new range of charger (Alpitronic HYC-300) that utilises the same internal elements as the HYC-150 but has double the quantity. The published data for the HYC-150 and HYV-300 shows an increase in noise level of 3dB for the larger HYC-300 units and this accords with acoustic theory. Accordingly we have added 3dB on to the third octave data we have HYC-150 charging stations. This measured data has been used which has been used in these calculations. The measured data is in line with the manufacturer's broad brush published data. Copies of the manufacturer's datasheets for the charging stations are included in Appendix F along with the full third octave data used for the charging stations.

Charging Station	Alpitronic HYC-300	<65dBA at 1m (published)
	(measured level for HYV-150 – 55dBA at 1m +3db for HYC-300)	

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.

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 outside the nearest noise sensitive receivers due to the operation of a worst case of all EV charging bays being in use and the substation operating.

7.05 The results of the noise modelling show that the nearest and most affected dwellings will be as follows:

- 32 Bartlett Place 26 dB(A) All charging bays and substation in operation

Figure 3: Worst case specific noise levels for all charging stations operating at any time

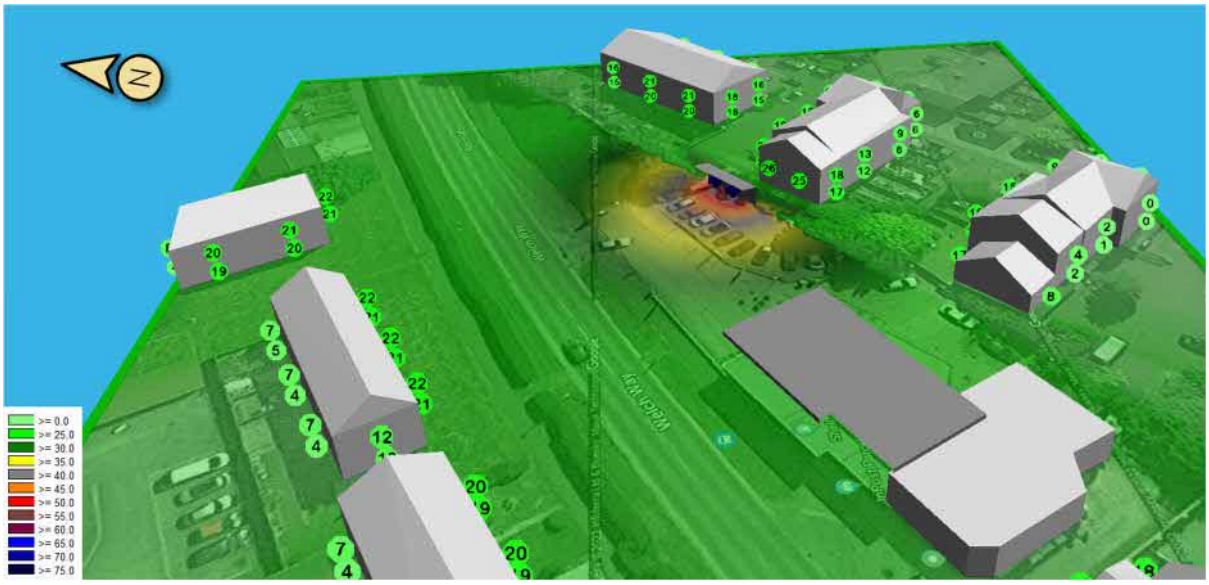


Figure 4: Worst case specific noise levels for operation of all plant

8 BS4142 ASSESSMENT

8.01 The impact noise due to the operation of the new facilities would typically be assessed in accordance with BS4142.

8.02 As the plant will operate at any time over a 24 hour period it is proposed that the assessment should be undertaken against the quietest period which is the night time period. To provide a robust assessment it is proposed to use the lowest recorded background noise level across the weekend survey period 30 dB(A) L_{90}. The modal average, night time background noise levels all exceed this value and thus the following assessment is considered to be conservative and likely over predicts impacts.

8.03 The following table shows the BS4142 assessment procedure for the operation of the plant 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.

8.04 The assessment refers only to worst-case site-wide noise impact at the most affected property, of 32 Bartlett Close.

8.05 All other receptors are either further away or are subject to less noise than those noted above.

32 Bartlett Close– Night time

Results		Relevant Clause	Commentary
Assessment made during the night time, so reference time interval is 15 minutes		7.2	
Calculated Specific Noise	26 dB $L_{Aeq,15\ min}$	7.3.6	Noise modelled using CadnaA, assumes continuous operation of substation and charging stations
Acoustic Character Correction	+ 3 dB	9.2	Possible tonal noise from plant operating
Rating Sound Level	(26+3) dB = 29 dB	9.2	Overall 15 minute level
Background Noise Level	30 dB $L_{A90,15mins}$	8	Lowest background during night time
Difference	(29-30) 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 be significant and is below the average lowest background at any time.
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 operation of the 2 No. charging stations and substation during the night time

8.06 As indicated in the above BS4142 assessment, the operational noise from the EV charging facility is not expected to have any adverse impact.

8.07 The resultant rating noise level is no more than the lowest background noise level that was recorded during the weekend survey period and is significantly below the modal average night time background noise level of 37 dB(A). The calculated noise levels are a worst-case noise level for all bays being in operation which is not expected to occur during the quietest times of night when activity at the service station is also expected to be at its lowest. The ambient level during this time is also significantly higher than the modelled source noise levels which was above 40 dB(A) throughout the night time periods.

8.08 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'.

8.09 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.

8.10 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.

8.11 Table 8.2 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. A minimal loss of 15dB could be expected for noise passing through a partially open window. Table 8.2 presents the noise levels that could be expected within the dwellings against the relevant BS 8233 design criteria.

Location	Condition	Calculated $L_{Aeq,1hour}$ external	Minimum sound reduction loss	Resultant internal ambient noise level	BS8233 Design Criterion
32 Bartlett Place	Windows Closed	26 dB	20 dB	6 dB(A) $L_{eq,15minutes}$	30dB(A) $L_{eq,8\ hour}$
	Windows Open	26 dB	15dB	11 dB(A) $L_{eq,15\ minutes}$	30dB(A) $L_{eq,8\ hour}$

Table 8.2: Calculated Worst Case Internal Ambient Noise levels within closest dwelling

8.12 The resultant noise levels within the dwellings will also satisfy current World Health Organisation and British Standard Guidance for resting and sleeping.

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 Witney 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 an extended period including a weekend.

9.03 A noise assessment has been undertaken to evaluate the potential worst case noise impact of the proposed operation of the equipment.

9.04 The assessment has shown that during the respective daytime and night time operation from the new plant associated with the proposed new EV Charging bays will be of low impact at all the nearest receptors when considered in the context of the existing activities around the site.

9.05 On the basis of this assessment it is considered that noise does not pose a material constraint to planning permission for the alterations to the site being granted.

APPENDIX A

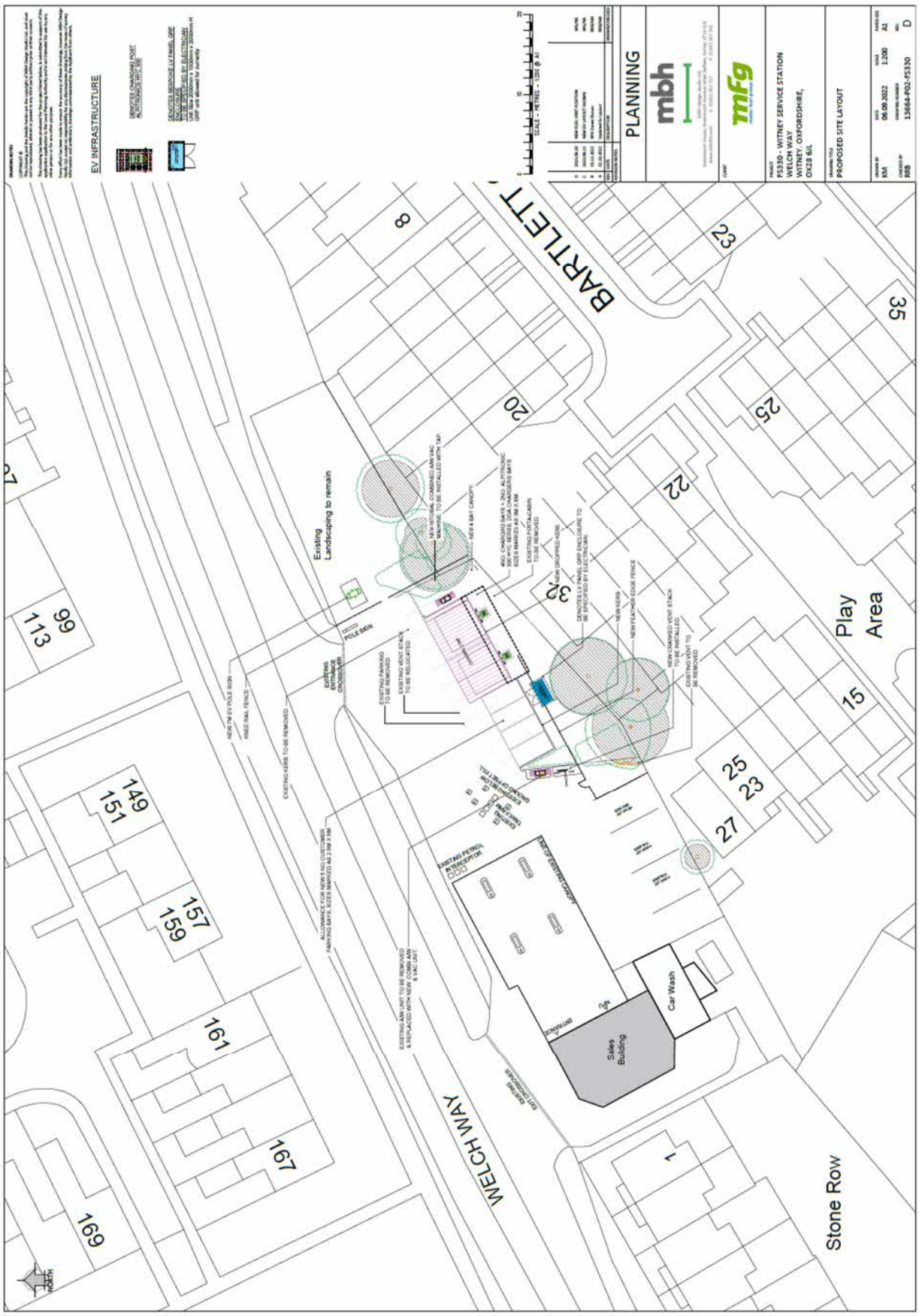
GLOSSARY OF TECHNICAL TERMS

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



APPENDIX C

PLANNING POLICY AND GUIDANCE

PLANNING POLICY AND GUIDANCE

National Planning Policy Framework and the Noise Policy Statement for England

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 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.'

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 19527 - MFG Witney

MBH Design Studio Ltd

Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
11:30	55.4	65.0	49.3
11:45	56.6	65.9	50.7
12:00	57.1	63.8	52.8
12:15	56.5	67.2	52.1
12:30	59.0	65.5	52.7
12:45	57.9	66.0	54.3
13:00	61.7	70.9	57.1
13:15	60.3	69.6	55.8
13:30	59.7	69.1	55.7
13:45	56.2	64.9	51.0
14:00	57.0	82.3	51.8
14:15	58.7	66.5	53.9
14:30	57.1	64.5	52.0
14:45	63.5	91.8	56.9
15:00	59.2	65.8	55.7
15:15	59.4	66.8	56.2
15:30	60.4	74.9	55.6
15:45	59.2	66.3	55.9
16:00	57.2	68.8	52.9
16:15	56.3	75.3	52.3
16:30	57.5	70.5	52.3
16:45	57.5	66.7	53.2
17:00	58.6	69.4	54.1
17:15	57.8	67.3	53.8
17:30	57.4	78.4	51.3
17:45	55.7	65.4	50.3
18:00	55.3	66.3	50.0
18:15	54.6	67.0	49.0
18:30	54.9	68.4	49.3
18:45	58.2	66.5	54.0
19:00	56.3	65.4	51.4
19:15	56.5	65.9	51.3
19:30	54.4	64.0	49.5
19:45	54.6	64.8	48.0
20:00	54.0	68.1	47.8
20:15	54.7	65.6	48.1
20:30	54.4	74.1	45.7
20:45	54.0	67.1	46.3
21:00	53.2	66.4	46.3
21:15	60.9	70.0	50.8
21:30	56.2	67.7	46.4
21:45	51.8	62.7	43.8
22:00	51.8	67.7	42.7
22:15	58.5	76.5	41.7
22:30	49.5	64.7	39.5
22:45	52.8	72.1	40.7
23:00	51.3	71.5	38.7
23:15	47.3	60.8	37.1

Time	L_{Aeq}	L_{AMax}	L_{A90}
23:30	49.2	64.8	39.6
23:45	47.4	62.0	38.1
00:00	46.6	64.5	37.0
00:15	47.2	65.4	35.4
00:30	48.1	67.0	36.5
00:45	48.3	66.0	37.5
01:00	47.1	66.9	36.9
01:15	45.4	60.0	36.3
01:30	45.8	65.1	33.2
01:45	39.7	56.4	32.2
02:00	44.3	64.9	32.8
02:15	43.4	61.2	33.4
02:30	45.1	64.4	34.3
02:45	44.0	68.5	34.1
03:00	43.0	65.3	31.8
03:15	46.9	67.5	34.7
03:30	47.9	61.1	35.7
03:45	49.0	64.8	39.1
04:00	46.0	64.6	36.5
04:15	49.7	65.7	40.5
04:30	43.3	65.1	35.8
04:45	45.1	65.7	35.5
05:00	48.1	64.5	37.2
05:15	43.7	60.7	36.1
05:30	47.5	65.1	38.4
05:45	46.8	72.6	38.6
06:00	49.3	68.3	38.2
06:15	62.4	94.1	43.1
06:30	51.9	72.3	42.7
06:45	51.2	65.5	43.3
07:00	51.2	66.5	42.6
07:15	54.4	68.6	47.0
07:30	55.5	85.9	44.6
07:45	55.4	69.2	46.8
08:00	62.2	98.9	46.1
08:15	54.2	65.5	45.9
08:30	55.3	67.4	48.1
08:45	55.3	63.9	48.8
09:00	57.4	83.5	49.3
09:15	55.1	63.9	47.2
09:30	55.2	72.4	48.9
09:45	56.3	66.2	49.7
10:00	55.8	68.0	49.2
10:15	55.6	65.9	49.3
10:30	56.2	73.2	49.6
10:45	55.7	68.1	49.8
11:00	55.4	67.9	49.9
11:15	56.4	70.4	51.1

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Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
11:30	56.1	74.9	51.0
11:45	58.9	69.2	49.1
12:00	56.3	74.0	49.1
12:15	57.8	81.5	48.6
12:30	56.2	77.2	50.2
12:45	55.2	63.4	49.8
13:00	56.9	75.2	50.0
13:15	55.5	70.7	48.8
13:30	58.6	67.8	49.6
13:45	55.2	77.9	47.0
14:00	58.4	70.5	48.4
14:15	59.6	83.2	48.0
14:30	55.8	79.9	49.2
14:45	56.4	71.7	49.6
15:00	56.3	66.3	49.3
15:15	55.9	68.8	48.3
15:30	63.1	98.6	47.7
15:45	58.8	87.0	48.7
16:00	56.1	74.1	48.6
16:15	54.8	64.1	46.4
16:30	55.6	64.1	48.4
16:45	55.4	73.3	46.8
17:00	58.1	83.7	46.7
17:15	55.4	71.4	46.6
17:30	55.4	67.6	46.4
17:45	57.2	75.5	47.2
18:00	54.3	68.8	45.8
18:15	54.8	67.3	45.6
18:30	54.1	71.8	45.4
18:45	54.4	70.5	44.3
19:00	54.2	67.6	44.0
19:15	53.2	63.4	42.7
19:30	52.8	63.2	41.7
19:45	63.6	92.6	45.1
20:00	53.2	63.7	43.5
20:15	53.7	69.1	41.6
20:30	52.8	64.6	42.4
20:45	56.3	71.5	43.8
21:00	53.4	68.9	43.6
21:15	55.3	64.0	43.4
21:30	52.8	66.6	42.6
21:45	50.9	64.8	40.3
22:00	51.8	70.0	38.9
22:15	51.0	71.1	37.8
22:30	49.9	63.0	38.1
22:45	50.5	64.5	37.8
23:00	50.0	70.7	38.4
23:15	49.7	65.1	37.7

Time	L_{Aeq}	L_{AMax}	L_{A90}
23:30	49.8	63.5	37.1
23:45	49.3	66.3	35.3
00:00	48.1	70.2	36.6
00:15	48.7	63.7	36.5
00:30	47.5	61.6	37.1
00:45	47.6	71.5	35.8
01:00	46.4	67.1	33.7
01:15	47.5	63.8	35.4
01:30	47.3	64.4	32.5
01:45	46.2	62.1	34.5
02:00	46.5	64.1	34.5
02:15	43.7	61.6	31.4
02:30	40.0	63.9	31.3
02:45	41.5	63.7	30.0
03:00	41.5	58.3	30.2
03:15	43.6	64.3	29.5
03:30	44.4	61.4	37.1
03:45	44.0	63.9	30.7
04:00	39.3	57.9	31.0
04:15	44.3	64.1	29.8
04:30	44.3	63.5	30.0
04:45	38.6	58.2	29.7
05:00	44.3	70.2	30.3
05:15	46.8	66.0	31.6
05:30	45.1	63.6	32.8
05:45	58.0	70.3	32.4
06:00	62.3	72.8	52.5
06:15	54.4	66.5	44.7
06:30	49.5	69.2	39.9
06:45	47.9	63.6	38.1
07:00	56.0	64.4	38.8
07:15	59.5	69.1	54.4
07:30	55.3	67.8	44.7
07:45	54.6	64.6	46.9
08:00	53.4	68.9	45.4
08:15	64.0	84.1	54.8
08:30	56.2	65.0	50.7
08:45	53.5	65.3	46.7
09:00	54.9	65.8	46.3
09:15	55.0	66.0	49.4
09:30	53.5	64.7	44.4
09:45	53.9	64.1	44.1
10:00	57.1	68.0	50.0
10:15	56.4	65.7	48.5
10:30	54.3	67.5	45.1
10:45	54.9	69.1	45.9
11:00	54.6	63.4	45.7
11:15	56.5	81.9	48.6

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MBH Design Studio Ltd

Tabulated Noise data

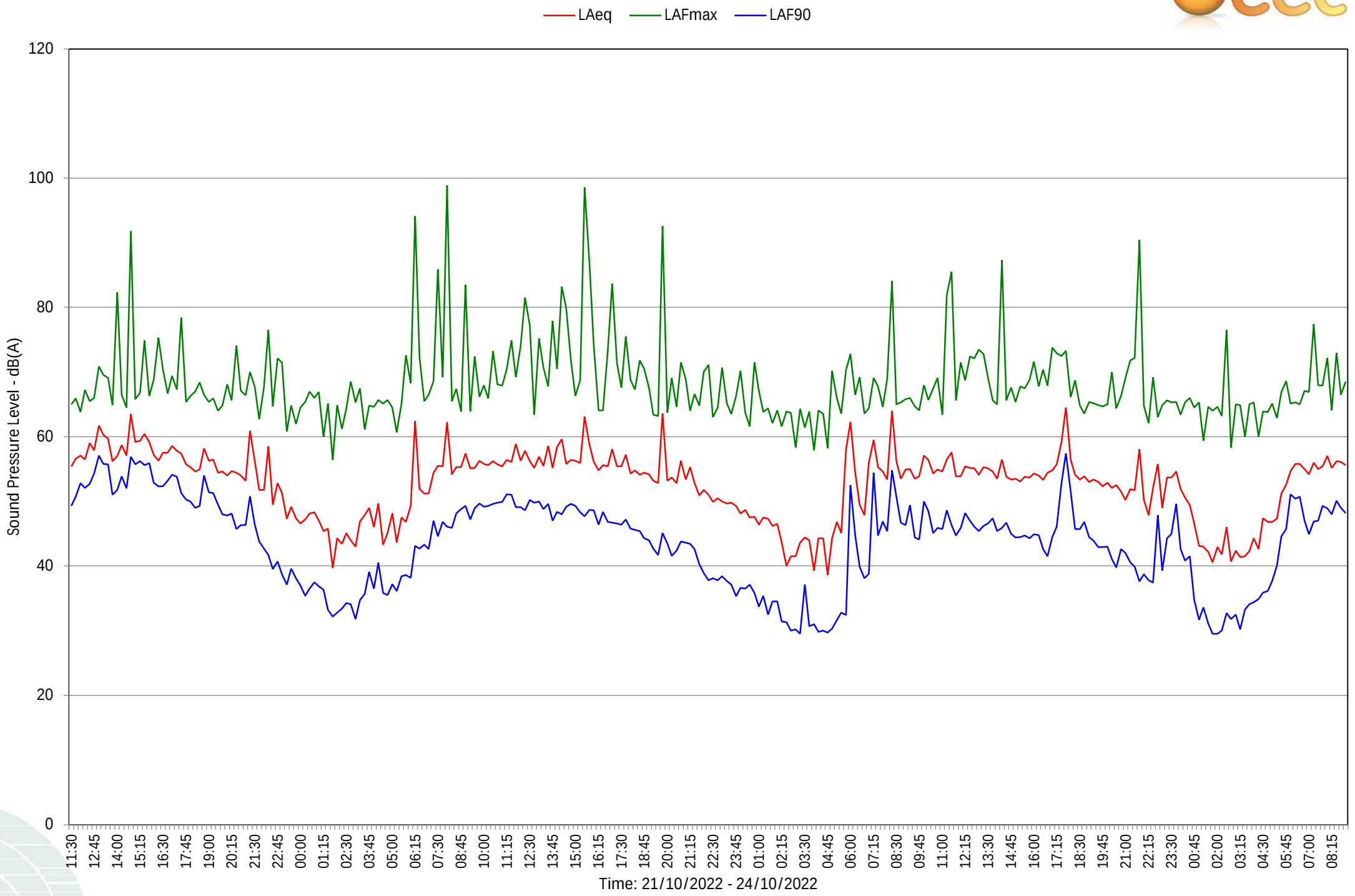
Time	L_{Aeq}	L_{AMax}	L_{A90}
11:30	57.6	85.5	46.3
11:45	53.9	65.6	44.7
12:00	53.9	71.5	45.9
12:15	55.4	68.7	48.2
12:30	55.2	72.4	47.0
12:45	55.1	72.1	46.1
13:00	54.1	73.5	45.4
13:15	55.3	72.8	46.2
13:30	55.1	69.2	46.6
13:45	54.6	65.6	47.4
14:00	53.5	65.0	45.4
14:15	56.5	87.3	45.9
14:30	53.8	65.6	46.7
14:45	53.4	67.6	45.0
15:00	53.5	65.4	44.4
15:15	53.1	67.8	44.5
15:30	53.8	67.5	44.7
15:45	53.7	68.8	44.3
16:00	54.3	71.6	44.9
16:15	54.0	67.8	44.8
16:30	53.3	70.4	42.6
16:45	54.4	67.9	41.5
17:00	54.8	73.8	44.5
17:15	55.7	72.9	46.1
17:30	59.2	72.5	52.8
17:45	64.5	73.3	57.4
18:00	56.5	66.1	51.5
18:15	54.1	68.7	45.7
18:30	53.4	64.8	45.7
18:45	53.9	63.6	46.8
19:00	53.0	65.4	44.5
19:15	53.4	65.2	43.9
19:30	53.0	64.9	42.9
19:45	52.3	64.7	42.9
20:00	52.9	65.0	43.0
20:15	52.1	70.0	41.1
20:30	52.5	64.4	39.8
20:45	51.5	66.3	42.6
21:00	50.2	69.1	42.0
21:15	51.9	71.8	40.6
21:30	51.7	72.2	39.9
21:45	58.1	90.5	37.6
22:00	50.2	64.8	38.7
22:15	47.9	62.1	37.8
22:30	52.1	69.2	37.4
22:45	55.8	63.0	47.9
23:00	49.0	64.9	39.3
23:15	53.7	65.6	44.3

Time	L_{Aeq}	L_{AMax}	L_{A90}
23:30	53.7	65.3	45.0
23:45	54.6	65.4	49.6
00:00	51.9	63.4	42.6
00:15	50.6	65.3	40.8
00:30	49.4	66.0	41.5
00:45	46.6	64.5	34.8
01:00	43.1	65.3	31.7
01:15	43.0	59.4	33.6
01:30	42.2	64.6	31.1
01:45	40.6	64.0	29.5
02:00	42.9	64.6	29.5
02:15	41.8	63.2	30.0
02:30	46.0	76.5	32.7
02:45	40.7	58.3	31.8
03:00	42.4	65.0	32.5
03:15	41.4	64.9	30.2
03:30	41.5	60.0	33.3
03:45	42.3	65.0	34.1
04:00	44.3	65.3	34.4
04:15	42.6	60.0	34.9
04:30	47.4	63.9	35.9
04:45	46.8	63.8	36.1
05:00	46.8	65.1	37.7
05:15	47.3	62.9	40.1
05:30	51.2	66.9	44.6
05:45	52.6	68.6	45.7
06:00	54.7	65.1	51.1
06:15	55.8	65.3	50.4
06:30	55.8	65.0	50.7
06:45	55.0	67.1	47.0
07:00	54.2	66.9	44.9
07:15	56.0	77.4	46.9
07:30	55.0	68.0	47.0
07:45	55.4	67.9	49.3
08:00	57.0	72.2	48.9
08:15	55.2	64.1	48.0
08:30	56.2	73.0	50.1
08:45	56.1	66.5	49.0
09:00	55.6	68.5	48.2

APPENDIX E

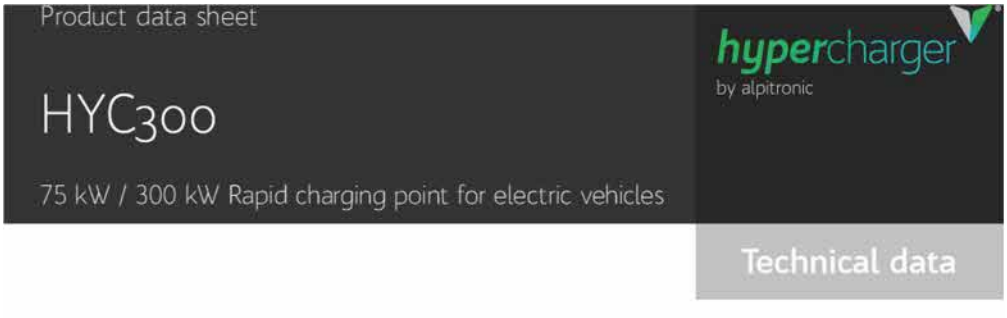
SURVEY RESULTS
(GRAPHICAL)

Noise Level Time History at MFG Witney



APPENDIX F

PUBLISHED PLANT NOISE DATA

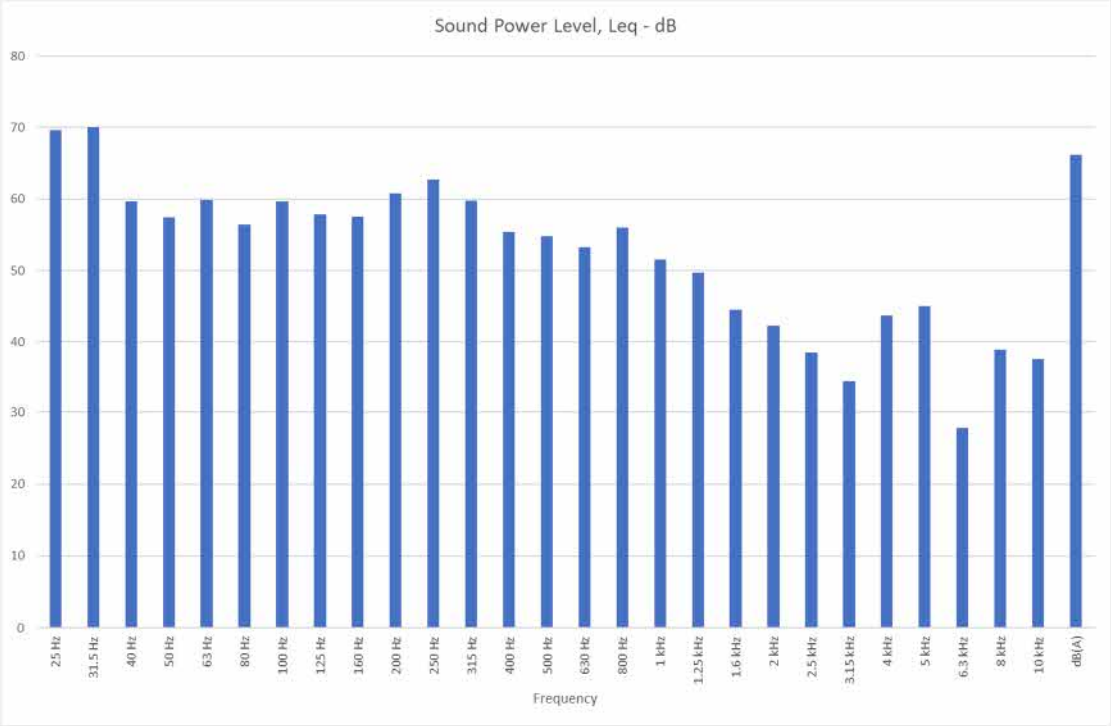


SYSTEM SPECIFICATIONS	
DC interfaces	CCS2 up to 500 A CHAdeMO up to 200 A CCS1 (for vehicle multicharger) GB/T (for vehicle multicharger)
AC interfaces	22 kW AC socket/cable (optional)
Payment system	Choose between different card readers for credit cards or EC cards
Load and charging management	Smart, 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 (1K22*/1Z2/1B1/1C1/1S10/1M10) * Minimum temperature in deviation from the standard
Environmental conditions, under transport	-40° up to +70° C (2K12*/2B1/2C1/2S1/2M4) * 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	<65 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)

EEC Measured Data of HYC150 Alpitronic Charging station which is 3dB quieter than HYC-300 unit

	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