Changes to Fuel Pump Services: Proposed EV Chargers, Substation and Jet Wash Bays

Oldham Service Station, 571 Oldham Road
Manchester, M40 5AF

soundsolution CONSULTANTS

Noise Impact Assessment

TECHNICAL REPORT

39086-R1

Changes to Fuel Pump Services: Proposed EV Chargers, Substation and Jet Wash Bays

Noise Impact Assessment

Prepared for: Wyeth Project Services Ltd., The Cart Shed, Amberley Court, Amberley Lane, Milford, Surrey, GU8 5EB

Site location: Oldham Service Station, 571 Oldham Road Manchester, M40 5AF

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soundsolution CONSULTANTS
Cornwall Suite, Dencora Business Centre, Whitehouse Road, Ipswich IP1 5LT
Tel: 01473 464 727 | info@sscmail.co.uk | www.soundsolutionconsultants.co.uk
VAT No. 844 9267 90 | Registration No. 5651834
Registered Address: 2 Lemons Hill, Tattingstone, Ipswich, Suffolk IP9 2NH

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ORIGINATED		CHECKED	
D. Attwell BEng. (Hons) MIOA Senior Acoustic Consultant		L. Denson BSc. (Hons) MSc MIOA Principal Acoustic Consultant	
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1 INTRODUCTION

1.1 A development has been proposed at Oldham Service Station, 571 Oldham Road Manchester, M40 5AF (hereinafter, "The Site"). A plan highlighting the boundary of The Site has been provided in Appendix B with development proposal drawings in Appendix C.

1.2 This document has been prepared to support a planning application at an existing fuel service station comprising 5no. EV charging bays with 1no. substation (with enclosure), and to replace an automated car wash unit with 3no. jetwash bays and 1no. air/water/vacuum combi unit.

1.3 Concern has been noted to the potential noise impact and loss of amenity due to the proposed activities and operation of the proposed plant. This report has been prepared to inform of commercial noise impacts accordingly.

1.4 The area surrounding The Site has been noted to be mixed industrial and commercial, with Oldham Road bounding the development site to the southeast. The closest potential residential dwelling has been identified as a first floor flat along Beckford Street, nominally 120 m southwest of development proposals. The nearest commercial use has been established to be the Fine Casting commercial premises adjacent The Site to the southeast, but this has not been considered a sensitive use for the purposes of this assessment.

1.5 The proposal has been considered in line with potential day and night-time operating periods.

1.6 A Glossary of Acoustic Terms has been provided in Appendix A that may assist with the terminology used within this report.

2 NOISE CRITERIA

2.1 The Department for Communities and Local Government introduced the National Planning Policy Framework (NPPF) in March 2012. The latest revision of the NPPF is dated July 2021, which increased the focus on design quality.

2.2 The Framework replaced most planning policy, circulars and guidance including Planning Policy Guidance 24: Planning and Noise (1994). The NPPF defines the Government's planning policies for England and sets out the framework, within which local authorities must prepare their local and neighbourhood plans, reflecting the needs and priorities of their communities. The Government's stated purpose in producing the NPPF was to streamline policy so the planning process is less restrictive, to give a more easily understood framework for delivering sustainable development.

2.3 Under the heading of "Conserving and Enhancing the Natural Environment", specific noise pollution aims are detailed in Section 15 of the NPPF. It is stated that planning policies and decisions should contribute to and enhance the natural and local environment by:

"preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of … noise pollution…"

2.4 Considering "Ground Conditions and Pollution" it is also stated in paragraph 185 of the NPPF that planning policies and decisions should also ensure that any new development is appropriate for its location considering the likely effects of pollution on health, living conditions, the natural environmental, sensitivity of the site and wider area and impacts that could arise from the development. The aims in doing so should:

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

2.5 It is stressed that the above references to noise should not be considered in isolation and that the theme, referred to as the "golden thread" of sustainability that runs through the NPPF is integral to noise.

2.6 The NPPF acknowledges that there is a host of existing sources of national and international guidance which can be used, in conjunction with the Framework, to inform the production of Local Plans and decision making.

NOISE POLICY STATEMENT FOR ENGLAND (NPSE)

2.7 The Noise Policy Statement for England (NPSE) was published in March 2010. It sets out the long-term vision of government noise policy, which is fundamentally to: "Promote good health and good quality of life through the effective management and control of noise within the context of Government policy on sustainable development". The vision is supported by three key aims:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and reduce to a minimum, other adverse impacts on health; and
- Where possible, contribute to the improvement of health and quality of life.

2.8 The NPSE should apply to all forms of noise including environmental noise, neighbour noise and neighbourhood noise but does not apply to noise in the workplace. The NPSE adopts the following concepts, to help consider whether noise is likely to have "significant adverse" or "adverse" effects on health and quality of life:

SOAEL – Significant Observed Adverse Effect Level.

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

LOAEL – Lowest Observed Adverse Effect Level.

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

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.

2.9 The NPSE emphasises that:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available (Defra, 2010)."

NATIONAL PLANNING PRACTICE GUIDANCE (PPG)

2.10 Revised Planning Practice Guidance was released in March 2014 to support the NPPF and last updated in July 2019. The Guidance stipulates that Local Planning Authorities' plan making and decision making should take account of the acoustic environment and in doing so consider:

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

2.11 The table below is in the Guidance to assist recognising "when noise could be a concern".

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

Table 1 – Planning Practice Guidance to Support National Planning Policy Framework.

BS 4142:2014+A1:2019 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

2.12 The British Standard BS 4142:2014 +A1:2019 "Methods for Rating and Assessing Industrial and Commercial Sound" describes methods for rating and assessing sound of an industrial or commercial nature. The scope of the standard includes relevant topics for commercial development, such as sound from fixed installations (mechanical and electrical plant and equipment). The standard is applicable to the determination of rating levels for sources of sound as well as ambient, background and residual levels. The Standard was amended in June 2019.

2.13 Certain acoustic features can increase the significance of impact that might be expected from a comparison of the specific sound level to the background sound level where these features are likely to affect perception and response. Where such features are present at the assessment location, a character correction (or penalty) to the specific sound level is made to obtain the rating level. This can be approached from subjective, objective and reference methods.

+ Tonality: A correction of 0 dB to + 6 dB for sound ranging from not tonal to prominently tonal.

+ Impulsivity: A correction of up to + 9 dB can be applied for sound that is impulsive.

+ Intermittency: A penalty of + 3 dB can be applied if on/off conditions are readily distinctive within the reference time interval over the period of the greatest amount of on-time.

+ Other characteristics: A penalty of + 3 dB can be applied in the absence of all other defined characteristics, where the specific sound contains a distinctive feature in the residual acoustic environment.

2.14 Character corrections are normally added arithmetically where more than one feature is present, however, if any single feature is dominant to the exclusion of others, then it may be appropriate to reduce the correction or apply a zero correction for the minor characteristics. The rating sound level is equal to the specific sound level if there are no acoustic features present or expected to be present.

2.15 The significance of sound depends upon both the margin by which the rating level exceeds the background sound level and the context in which the sound occurs. An initial estimate of the impact of the specific sound is made by subtracting the measured background sound level from the rating level. The context of the development is important in assessing the impact.

- Typically, the greater this difference, the greater the magnitude of the impact.

- A difference of around + 10 dB or more is likely to be an indication of a significant adverse impact, depending on the context. A difference of around + 5 dB 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 sound 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 exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

2.16 The scope of the Standard recognises that human response to sound can be subjective and is affected by many factors, both acoustic and non-acoustic. The significance of its impact can depend on various factors such as the exceedance to the background level, its absolute level, time of day and change in environment, as well as local attitudes to the source of sound and character of the neighbourhood.

3 ENVIRONMENTAL SURVEY SUMMARY

3.1 An environmental survey has been undertaken between 16th to 21st November 2022 to quantify sound levels at the development site in accordance with BS 4142. Details of the study have been provided in Appendix D with results summarised herein this section.

3.2 The 'typical' background sound levels have been reported in this section in accordance with BS 4142 as established from histograms of the recorded dB $L_{A90,\ 15min}$ data at Position 1, shown in Appendix D. The microphone was set back from the dominant noise source (Oldham Road) at the same distance as the nearest noise sensitive receptor (NNSR), and therefore the measurements captured at this position have been considered representative of the underlying sound climate at the boundary of the nearest sensitive location during proposed operating periods.

3.3 In line with Section 8.1.4 of BS 4142, the monitoring duration should reflect the range of background noise levels for the period assessed. In practice, there is no single level for background sound as this is a fluctuating parameter, although a representative value of the period should be used. Note this is not either the lowest or mean average value of dB $L_{A90,\ 15min}$.

Measurement Data		Free Field Sound Pressure Level, dB $L_{A90,\ T}$ re. 20µPa		
Date Range	Time HH:MM	Position 1		
		Range	Representative	Period Description
17 – 19/10/2022	07:00 – 23:00	47 – 63	55	Day
	23:00 – 07:00	40 – 57	45	Night

Table 2 – Background sound level summary, dB $L_{A90,\ T}$.

3.4 The residual sound level data in this section have been summarised from raw data in Appendix D, generally in accordance with the requirements of BS 4142. The snapshots of environmental sound are taken to be representative of the underlying noise climate without the development in operation and are used to evaluate the environmental noise impact for the development.

Measurement Data		Free Field Sound Pressure Level, dB $L_{Aeq,\ T}$ re. 20µPa		
Date Range	Time HH:MM	Position 1		
		Range	Representative*	Period Description
17 – 19/10/2022	07:00 – 23:00	58 – 71	62	Day
	23:00 – 07:00	53 – 65	59	Night

** Representative values of residual have been noted at times of representative background sound.*

Table 3 – Residual sound level summary, dB $L_{Aeq,\ T}$.

3.5 A survey was also undertaken at Wednesbury Service Station (WS10 9HA) in the early hours of 04/11/2022. Sound measurements were taken of existing Alpitronic Hypercharger "HYC150" EV charging units operating under maximum load (150 kW, rapid charging). Sound emissions were found to radiate from the systems' fan units, located at the top of the chargers. The fans/units were measured at varying distances and angles to establish typical noise emissions about the plant and to ascertain any potential characteristics of the sound which may be notable (e.g., tonality).

3.6 A breakdown of all EV charger source measurements (including 1/3 and 1/1 octave-band centre frequencies) has been included in Appendix D, Tables D3 – D4.

4 NOISE IMPACT ASSESSMENT

4.1 The impact of commercial sound from the proposed development on the surrounding environment would depend on several factors, including (but not limited to) the time of day, frequency of occurrence and nature of sound sources. Development activities would naturally pose a greater risk of impact where they are permissible during noise sensitive periods, where the likelihood of annoyance or sleep disturbance increases. Human response to sounds of a commercial or industrial nature depends on sociological factors, attitudes and perceptions which can be difficult to define and account for any individual case.

4.2 The recognised methodology for assessment has been taken from BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* which includes consideration of sound from fixed plant installations. The numerical assessment has been provided below for relevant periods of proposed operation, following the definition of specific sound levels.

PROPSOED PLANT AND PREDICTED SOUND LEVELS

4.3 Reference measurement/source data for the proposed EV charging points, associated substation, jet wash bays, and combi unit have been provided in Appendix C and D of this document and described further below.

4.4 The proposed development would incorporate 4no. *"HYC150"* and 1no. *"HYC300"* Alpitronic Hypercharger electric vehicle (EV) charging stations, to be located externally in the northeast corner of The Site, as illustrated in Figure C1 in Appendix C. Each of the 4no. *"HYC150"* bays would comprise a single charging station, whereas the *"HYC300"* unit would serve 2no. bays. It is understood that all bays would include a solid rear backing and a glass overhanging canopy roof with lighting, similar to those described in Figure C2 in Appendix C.

4.5 Detailed sound emission data on the proposed Hypercharger units has not been made available by the manufacturer, and therefore in the absence of detailed test report information, SSC have undertaken source measurements of HYC150 units charging vehicles at an existing MFG service station in Wednesbury (as detailed in the above section).

4.5.1 The average broadband sound level at the front and rear of the charging units (at a nominal distance of 1 m) has been summarised in Table 4 below.

Summary of Alpitronic Hypercharger "HYC150" operational source measurements			
Description of measurement	**Distance measured (m)**	**Measured sound level, dB(A)**	**Average sound level corrected to 1 m, dB(A)**
Front of unit	0.25	59	**46**
Back of unit	0.25	57	**44**

All measurements were taken close-to-source to minimise the contribution from residual sounds in the surrounding area.

Table 4 – Summary of Alpitronic Hypercharger "HYC150" operational source measurements undertaken at Wednesbury Service Station, WS10 9HA (04/11/2022)

4.6 The sounds emitting from the EV chargers were not noted to contain any acoustically distinguishing characteristics at 1 m from the source; however, to inform a robust assessment, an objective assessment of tonality has been undertaken based on the "One-third octave method" presented in Annex C of BS 4142:2014+A1:2019.

4.6.1 As defined by BS 4142:2014, the test for the presence of a prominent, discrete-frequency spectral component (tone) compares the time-average linear sound pressure levels ($L_{Zeq,\,T}$) in a one-third-octave band with sound pressure levels in the adjacent one-third-octave bands. For a tone to be identified, the sound pressure level in the one-third-octave band of interest is required to exceed the sound pressure levels of both adjacent one-third-octave bands by a certain level difference.

4.6.2 The measured one-third octave band sound pressure levels of the proposed Hypercharger "HYC150" (shown in Table D4 of Appendix D) have been reviewed using the above methodology, and it has been shown in Tables E4 – E6 (Appendix E) that a prominent tone was not present either at the front or rear of the EV charger unit.

4.6.3 It has therefore been concluded that the sound produced by the proposed EV charger units would not require a tonal character correction according to both subjective and objective methodology (as specified in BS 4142:2014).

4.6.4 Based on Alpitronic datasheets (provided in Appendix E), it has been established that the 'HYC300' series units could produce sound levels up to 3 dB higher than the lower power 150 kW product. This item has therefore been predicted to produce the following average sound pressure levels at 1 m: 49 dB(A) at the front and 47 dB(A) at the rear of the unit.

4.7 To understand a specific sound level for the purposes of assessment, it has been necessary to make some level of assumption to the proposed usage/on-times of the above plant/operations.

4.7.1 It is understood that a typical vehicle charging session lasts approximately 30 – 40 minutes, and it is projected that each charging bay would likely be used 5 no. times per day (equating to approximately 30 no. vehicles charging at The Site per typical 24-hours). Figure 1 below has been included to illustrate the typical distribution of charging sessions by time of day, where 10:00 – 20:00 represent the busiest times.

4.7.2 From the figure below, it is evident that multiple EV charging bays could be in use throughout a typical daytime hour (identified as the correct period of assessment between 07:00 – 23:00). To assume a realistic worst-case, it has therefore been assumed that each of the 6no. bays could be in use in an hour (N = 6) for a total of 30 minutes each (equivalent to a 50 % on-time).

4.7.3 According to BS 4142, over the night-time the appropriate period of assessment would be a realistic worst-case 15-minutes (between 23:00 – 07:00). Where the distribution graph has shown significantly decreased activity over the night-time period, it has been assumed that only half of the bays would be in operation over a realistic worst-case; however, the on-time would be 100% of this 15-minute period of assessment.

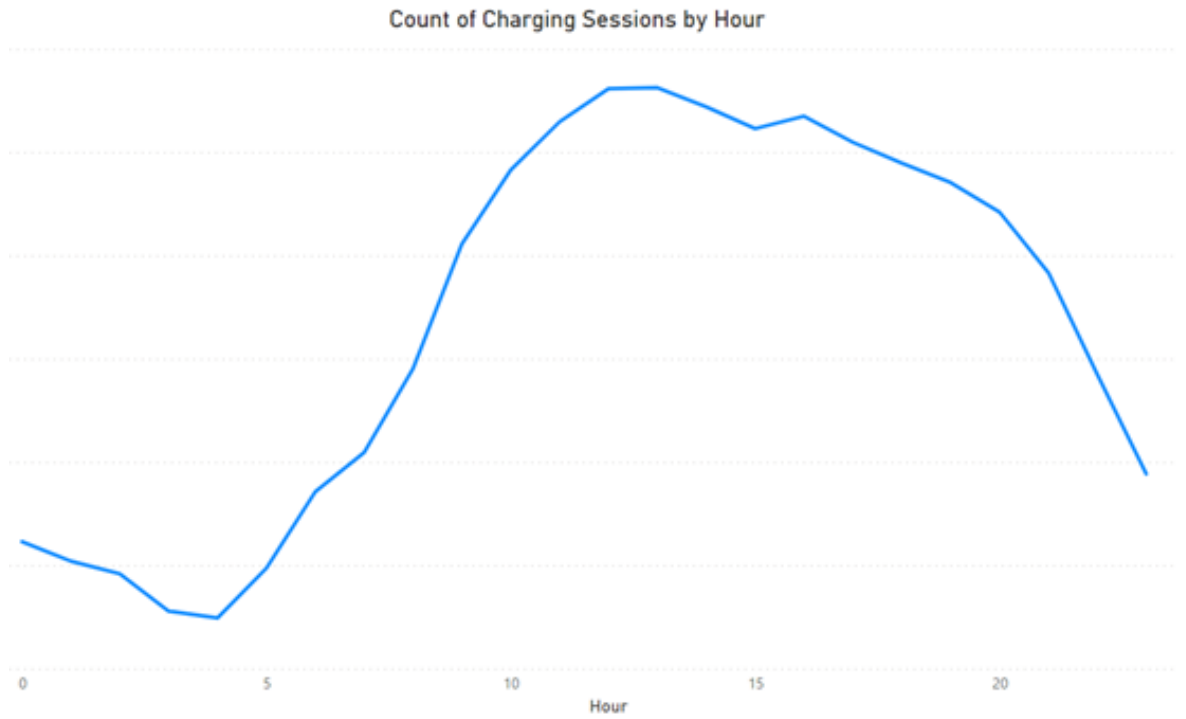


Figure 1 – Graph showing distribution of charging sessions over typical day/night.

4.8 To power the proposed EV charging units, the development would include the erection of a substation with enclosure, designed similar to the designs shown in Appendix C, Figure C3.

4.9 The enclosure design would comprise a solid steel construction (both for walls and roofing) with louvered vents where required.

4.9.1 A conservative 15 dB R_W has been assumed in this assessment, in lieu of a more rigorous calculation of enclosure break-out. It has been assumed that the enclosure would likely mitigate any acoustically distinguishing characteristics of the substation sound emissions, including as any low frequency components which may be generated (such as low, electrical "hum").

4.10 In the absence of specific source data for the substation, a sound power level of 61 dB(A) has been used in this assessment, based upon Wilson Power Solutions data sheet for a substation of the transformer rating (1,500 kVA). The data sheet has been provided in Appendix E, Table E1 for reference.

4.10.1 Due to the nature of operation, it has been assumed that the substation could operate continuously throughout the day and night-time period.

4.11 3no. jet wash bays have also been proposed at the north of The Site to replace the existing automated carwash. A highest-measured sound level of 70 dB $L_{Aeq,\,T}$ at 1 m has been noted from a 'high pressure shampoo' activity (measured at existing services by SSC and outlined by *Istobal* technical specifications in Figure C4). This worst-case sound level has been used to assess the potential noise impact from the proposed jet wash bays in the assessment.

4.12 It is understood that jet wash activity would not take place outside of the daytime period (07:00 – 23:00); and therefore, a realistic worst-case daytime hour must be assessed.

4.13 Jet wash bay use would inherently include a period of no plant noise (e.g., patron arrival / departure / setup). It has not been possible to ascertain accurate usage estimates from the developer to how often the jet wash bays might be used (as sales information is generally not available in such format). It has, however, been noted from the similar, and approved planning application at Desford Crossroads Service Station that 25 % usage times were accepted for jet wash activities, equating to a 6 dB reduction in the hourly specific sound level. To provide a more-conservative estimate at The Site, the assessment has assumed that the jet wash bays may all be used continuously for half of the time in a worst-case hour, allowing for a nominal 50 % (or 3 dB) reduction.

4.14 Similarly, the proposed combi unit has been assumed to operate for 50% of a worst-case daytime hour but is unlikely to be used during the night-time period. To inform a realistic worst-case, it has been included in the assessment with a 3 dB reduction (day and night).

4.15 It has been determined that the principal noise sources relating to the development proposals would be the operation of proposed plant items (jet wash bays, EV charger units, and associated substation). It has been reviewed that the LV panel would not produce any notable noise emissions and sounds from vehicular movements relating to the charger bays would be nominal, particularly in the context of the existing site where road traffic noise generally dominates the noise climate and vehicular movements within the service station would not be materially altered as a result of the development proposals.

ASSESSMENT AT NEAREST NOISE SENSITIVE RECEPTOR

4.16 The nearest noise sensitive receptor (NNSR) has been noted as the potential residential flat along Beckford Street, with the closest sensitive windows identified at the first floor (northeast-facing façade).

4.17 The cumulative specific sound level from the above listed commercial/industrial sources at the NNSR has been calculated in Appendix E, based on the assumed on-times and derived sound levels; incorporating relevant mitigation measures (both existing and proposed).

4.18 A summary of sound pressure level emissions at the closest residential windows has been provided in the below table. All calculations have represented a 'realistic worst-case', based on a review of operational hours through the day and night-time assessment periods.

Plant Item/Unit	Sound pressure level (L_P) at façade of receptor, dB	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
EV Charger HYC150 (1)	2	2
EV Charger HYC150 (2)	2	2
EV Charger HYC150 (3)	2	2
EV Charger HYC150 (4)	2	2
EV Charger HYC300	5	5
1500 kVA Substation	12	12
Jet Wash (1)	25	-

Plant Item/Unit	Sound pressure level (L_P) at façade of receptor, dB	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Jet Wash (2)	25	-
Jet Wash (3)	25	-
Combi Unit	21	24
Cumulative sum at receptor ('specific sound level'):	**31**	**25**

Table 5 – Summary of specific sound level prediction at the closest residential window (NNSR).

4.19 The realistic worst-case specific sound levels for the development have been summarised in the table above as 31 dB $L_{Aeq,\,T}$ during the day and 25 dB $L_{Aeq,\,T}$ during the night.

4.20 The following numerical assessments have been provided in accordance with BS 4142 to provide a comparison between the rating sound level of the proposal against the background sound level existing prior to development.

BS 4142 Assessment of EV chargers and substation operation noise at NNSR			
Result	**Day 07:00 – 23:00**	**Night 23:00 – 07:00**	**Commentary**
Background sound level, dB $L_{A90,\,T}$	55	45	Estimated as representative from histogram of background sound levels, from Table 2 and Appendix D.
Residual sound level, dB $L_{Aeq,\,T}$	62	59	Representative based on the underlying range of measured levels in Table 3.
Reference time interval	1-hour	15-minute	Relevant time interval for assessment period from BS 4142.
Specific sound level, dB $L_{Aeq,\,T}$	31	25	As derived in Table 5 above (accounting for no. of plant operating and the predicted on-times of plant (in a realistic worst-case).
Acoustic feature correction, dB	+3	+0	Jet wash operation would generally incur an impulsive correction in the region of 6 dB (where clearly perceptible at the receptor). However, where the sound climate has been noted to already contain impulsive sounds from the automated wash unit, this correction has been reduced to a 3 dB correction during proposed daytime operation. It has been shown in 4.6 above that the EV chargers would not produce any distinctive tonal features. It is anticipated that the bespoke substation enclosure would also mitigate any operational power "hum".

BS 4142 Assessment of EV chargers and substation operation noise at NNSR			
Result	**Day 07:00 – 23:00**	**Night 23:00 – 07:00**	**Commentary**
Rating level, dB $L_{Ar, Tr}$	34	25	The rating level is equal to the specific sound level plus acoustic feature corrections.
Excess of rating level over background sound level	-21	-20	
Assessment indicates likely indication of: *depending on the context	Low Impact	Low Impact	Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.
Uncertainty of the assessment	*Low uncertainty*		See Statement of Uncertainty.

Table 6 – Numerical assessment in accordance with BS 4142 at nearest noise sensitive location.

4.21 The numerical assessments in Table 6 have highlighted a low impact at the nearest noise sensitive location during periods of proposed day and night-time operation, where the rating sound level is predicted to lie 21 dB or below the representative background sound level in the day and 20 dB below during the night.

4.22 It has been acknowledged that the assessment in Table 6 must be considered in context, following the requirements of BS 4142. The concept of "context" has been notably emphasised in Section 11 of BS 4142 when considering numerical impacts established from applying the standard.

4.23 The development would introduce 5no. electric vehicle chargers (with canopies) and 1no. substation (enclosed) within the existing forecourt of a Shell fuel service station. The development would also involve the removal of 1no. automated car wash with air/water/vac facilities, to be replaced by 3no. jetwash bays and a combi unit.

4.23.1 The context of the nearest receptor is a potential residential 1F flat nominally 125 m west of The Site. These (possibly) sensitive windows would be partially screened from the proposed development by an existing commercial/industrial building (Jewson Manchester Central). It has also been acknowledged that this receptor would already have significant commercial noise incident on its façade from Jewson industrial activities, directly adjacent the receptor off Beckford Stret.

4.23.2 The service station has been noted to include automated car washing facilities, mechanical plant operations, and water/air system pumping facilities.

4.23.3 Contextually, the development would not be introducing any new vehicular noise sources, and the proposed plant would not be out of character with the commercial operations currently occurring within the service station forecourt.

4.24 During the worst-case daytime hour and 15-minutes in the night, predicted rating sound levels from proposed plant would be significantly below the representative background sound levels, and significantly below the residual sound level (made up by dominant continuous road traffic noise, and vehicles visiting the service station), by 28 dB in the day and 34 dB in the night.

4.24.1 Where there are large differences between the residual sound level over the specific sound level, of > 10 dB(A) (in this case > 28 dB(A)), then it has been realised in context that the ambient sound level should not change by any perceptible degree due to the instatement of the development, regardless of daytime or night-time usage times.

4.24.2 Due to significant masking noise already incident on the receptor, it has been reviewed that the proposal would have a low – negligible impact on any surrounding premises.

4.25 The consideration of context relevant to the assessed sound sources has been viewed to support the notion of a "negligible" to "low impact" assessment in accordance with BS 4142 whereby the possible effects of the proposal have been considered in context. Mitigation in the form of a bespoke substation enclosure has been viewed as one appropriate method to attenuate sound levels from proposed plant and operations, to provide a low impact at the nearest sensitive receptor.

STATEMENT OF UNCERTAINTY

4.26 Uncertainty inevitably limits the accuracy associated with all steps of any noise assessment, including measurement, calculation, or prediction. Factors include, but are not limited to:

- The inherent accuracy limitation of methodology in Standards and guidance.
- Variability in meteorological conditions.
- The accuracy of sound source input data of a calculation.

4.27 It is imperative to minimise the uncertainty to a level commensurate with the intention of the assessment objective. Measures taken in this assessment to minimise uncertainty are:

- Baseline sound levels have been measured over a reasonably long period and therefore provide a good indication of representative background and residual sound levels.
- Baseline sound level measurements were undertaken in accordance with recognised Standards, using a tall environmental windshield and were undertaken during reasonable weather conditions e.g., acceptably low wind speeds and precipitation.
- A direct measurement location was used and is considered to provide a representative basis for background noise levels at the nearest receiver locations to the development.
- Field calibration checks were undertaken before and after measurements to record very low levels of equipment drift.

- The sound source data has been provided from manufacturer's data sheets, sound tests of comparative products and close-to-source measurements of proposed items operating the field.
- The calculations have been conservative as not to under-predict the resulting impacts.

4.28 The aforementioned measures have been considered to reduce uncertainty to a level considered not to have any significance to the outcome of this assessment.

5 PREDICTED NOISE IMPACTS AND PLANNING

5.1 The evaluated noise impacts in this report should be considered by Central Bedfordshire Council mindful of the National Planning Policy Framework and Noise Policy Statement for England, which currently define the policy and decision-making requirements for planning and noise.

5.2 In deciding a suitable planning outcome, it must be recognised that noise management is a complex issue and at times requires complex solutions. There is no European or national noise limit which must be met. To assist in defining what level of noise impacts should be acceptable in sustainable development, the NPSE refers to established concepts from toxicology that are currently being applied to noise impacts.

5.3 The NPSE suggests that noise levels above the SOAEL should be avoided and that if noise levels fall between the LOAEL and SOAEL all reasonable steps should be taken to minimise and mitigate adverse effects while also considering the guiding principles of sustainable development. This does not mean that adverse effects cannot occur from a noise-generating development.

5.4 The range of noise impacts reviewed for the proposed development have been deemed acceptable with respect to overarching requirements for planning and noise, where resulting impacts have been anticipated around the LOAEL (tending towards the NOEL) threshold of the NPSE.

5.5 **It is expected that the development sound resulting from the proposed development will be largely unnoticeable, even during the most noise sensitive periods of assessment. In the worst-case, it is possible for the sound to be audible, but the sound is not expected to cause any change in behaviour or attitude.**

5.6 In accordance with overarching planning requirements, measures have been satisfactorily considered to "*mitigate and minimise adverse impacts on health and quality of life"* which can be secured on the development by conditional approval, if necessary, to include:

- Installation of EV charging bay canopies (as proposed).
- Construction of substation enclosure (as proposed).

6 CONCLUSIONS

6.1 An assessment of environmental sound levels has been carried out for a proposed development at Oldham Service Station, 571 Oldham Road Manchester, M40 5AF. Environmental sound levels have been taken from a site survey at the boundary of the development site and the closest sensitive receptor.

6.2 A noise impact assessment has been carried out in line with BS 4142 methodology. Cumulative rating sound levels have been predicted at the nearest residential receptor, based on manufacturer sound data and operations defining the development emission of proposed use.

6.3 The numerical assessment in Section 4 has predicted rating levels 20 dB or more below the background sound level during the day and night, which indicate the likelihood of a low impact at the closest receptors. Predicted noise impacts have been modified to a “negligible” or “low impact” when considering the context of the site.

6.4 It has been concluded from the findings of this assessment that noise should not present reasonable grounds for planning refusal. The likely acoustic effects have been established about the LOAEL threshold of the NPSE, such that noise may be heard but does not cause any change in behaviour or attitude. It may slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

Appendix A: Glossary of Acoustic Terms

'A' weighting dB(A): Correction applied to the frequency range of a noise in order to approximate the response of the human ear. Noise measurements are often A-weighted using an electronic filter in the sound level meter.

Attenuation: Sound reduction, measured in decibels (dB).

Ambient Sound: The totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far. Note: The ambient sound comprises the residual sound and the specific sound when present.

Background sound level: A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

Calibration: A check of the function of a sound level meter by comparing the meter reading with a known sound pressure level.

Decibel (dB): The unit of sound level and noise exposure measurement. The range of audible sound pressures is approximately 0 dB to 140 dB.

Frequency (Hz): The pitch of the sound, measured in Hertz.

LAeq,T: The A-weighted equivalent continuous sound pressure level during a period. It is the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period, T.

Octave-bands: A division of the frequency range into recognised bands.

Rating level, LAr,Tr: The specific sound level plus any adjustment for the character of the sound.

Residual sound: Ambient sound remaining in the absence of the specific sound or that it is supressed as not to contribute to the ambient sound level.

Residual sound level, Lr or Leq,T: The equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given reference time interval, T.

Sound pressure level (SPL): The basic measure of sound, expressed in decibels, usually measured with an appropriate frequency weighting (e.g. the A-weighted SPL in dB(A)).

Sound power level (Lw): The sound energy radiated per unit time by a sound source measured in watts (W). Sound power can be weighted (e.g. A-weighted) and is not influenced by environmental or physical factors such as weather or distance.

Specific sound: Sound source being assessed.

Specific sound level, Ls or Leq,T: The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval, T.

Appendix B: Annotated Location Plan

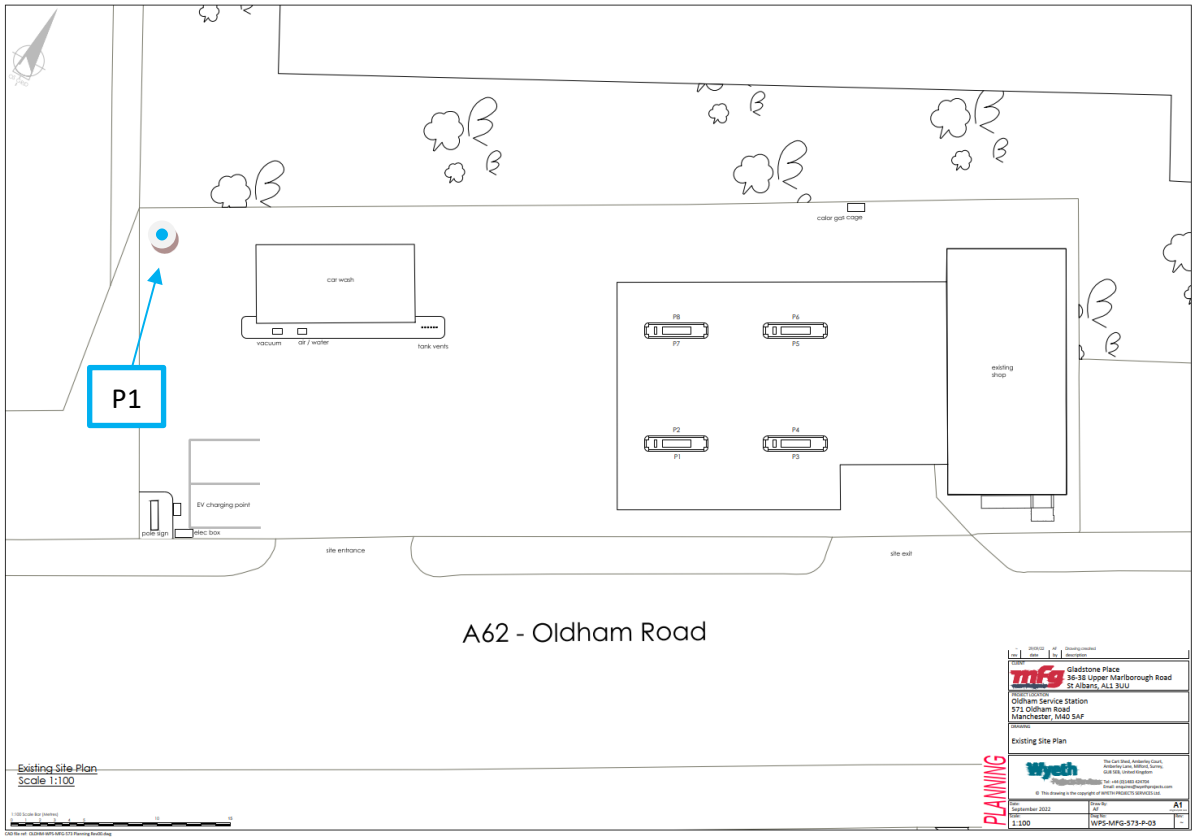


Figure B1 – Location plan, with measurement position annotated.

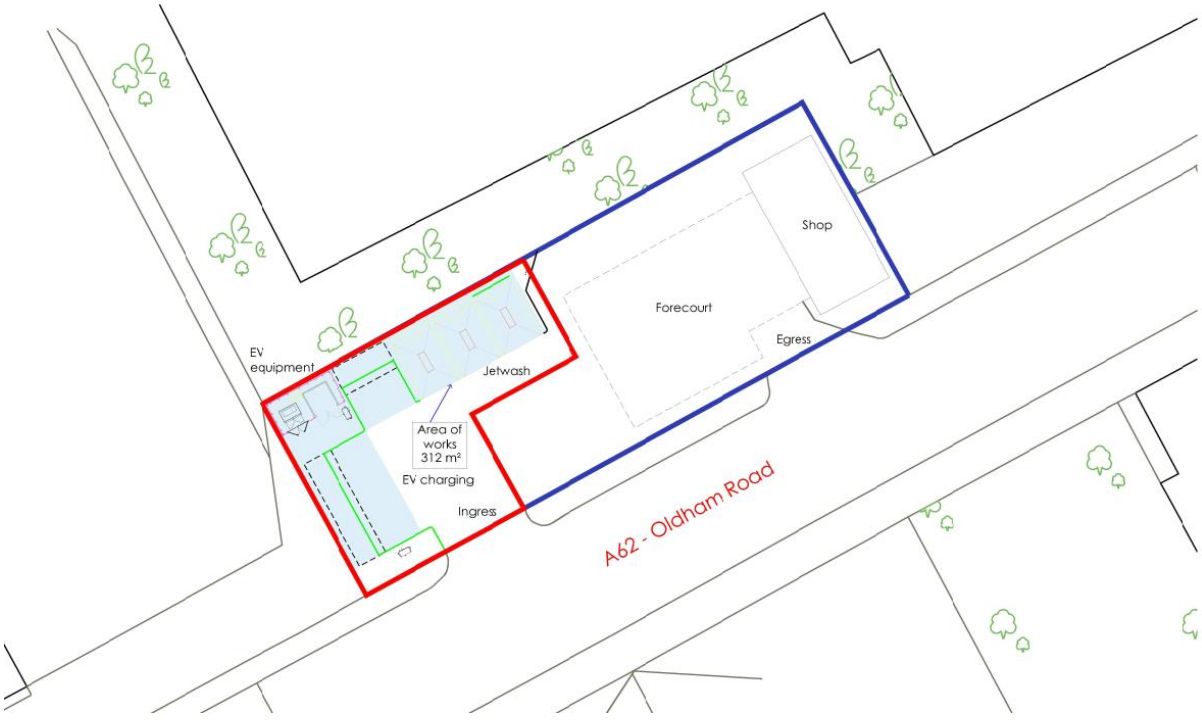


Figure B2 – Proposed development site plan (red-line drawing).

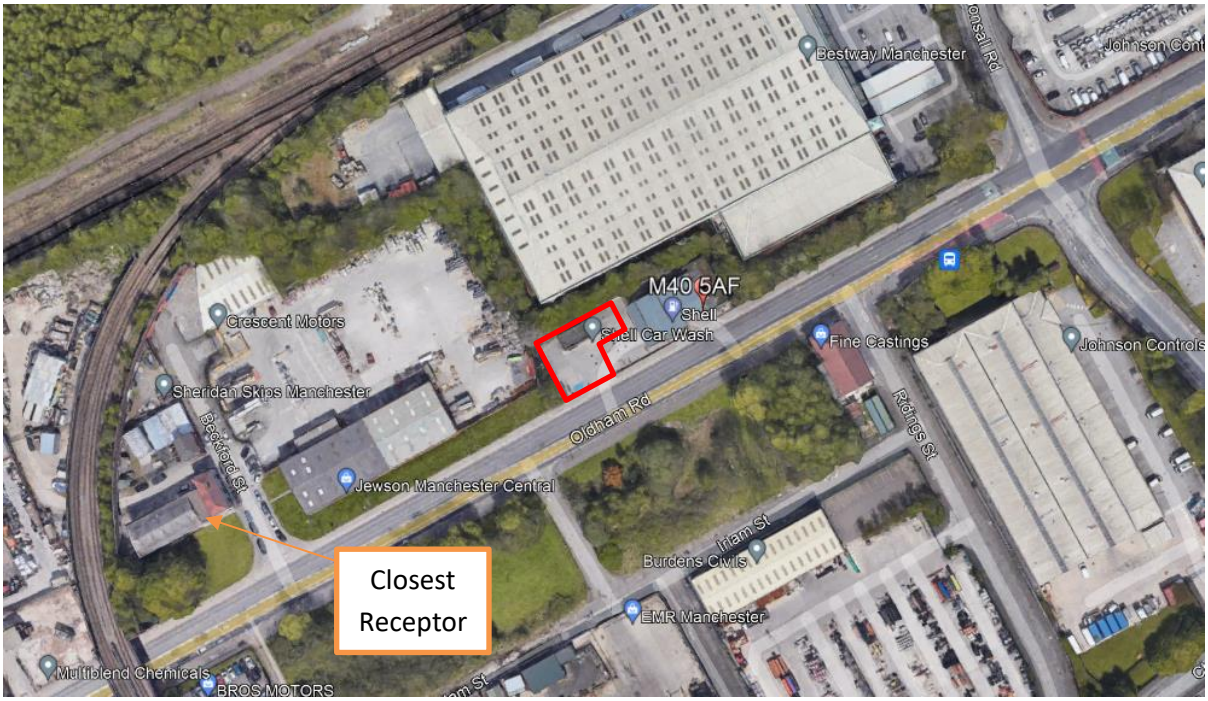


Figure B3 – Location Plan, closest receptor annotated.

Appendix C: Scheme Design

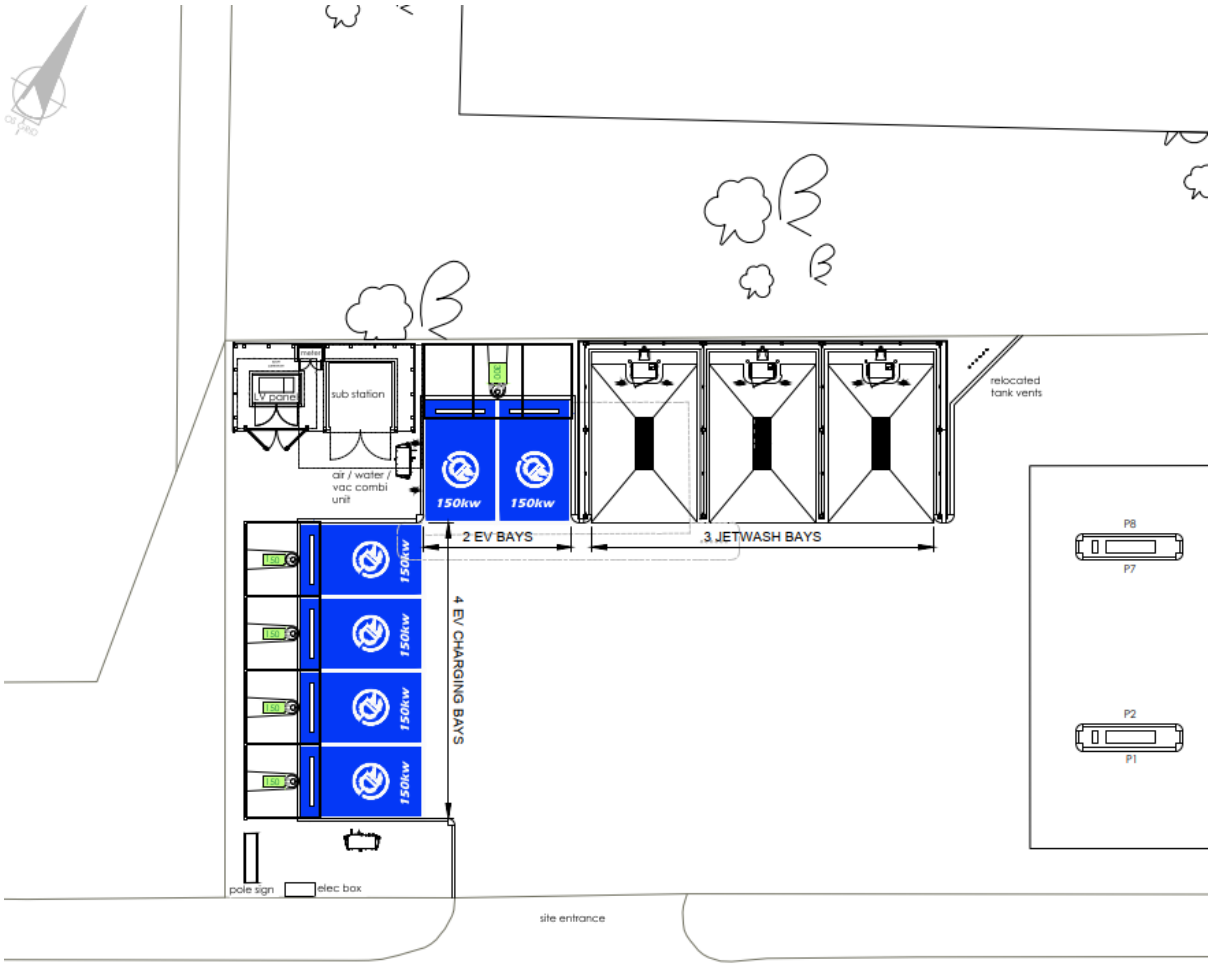


Figure C1 – Proposed development site plan.

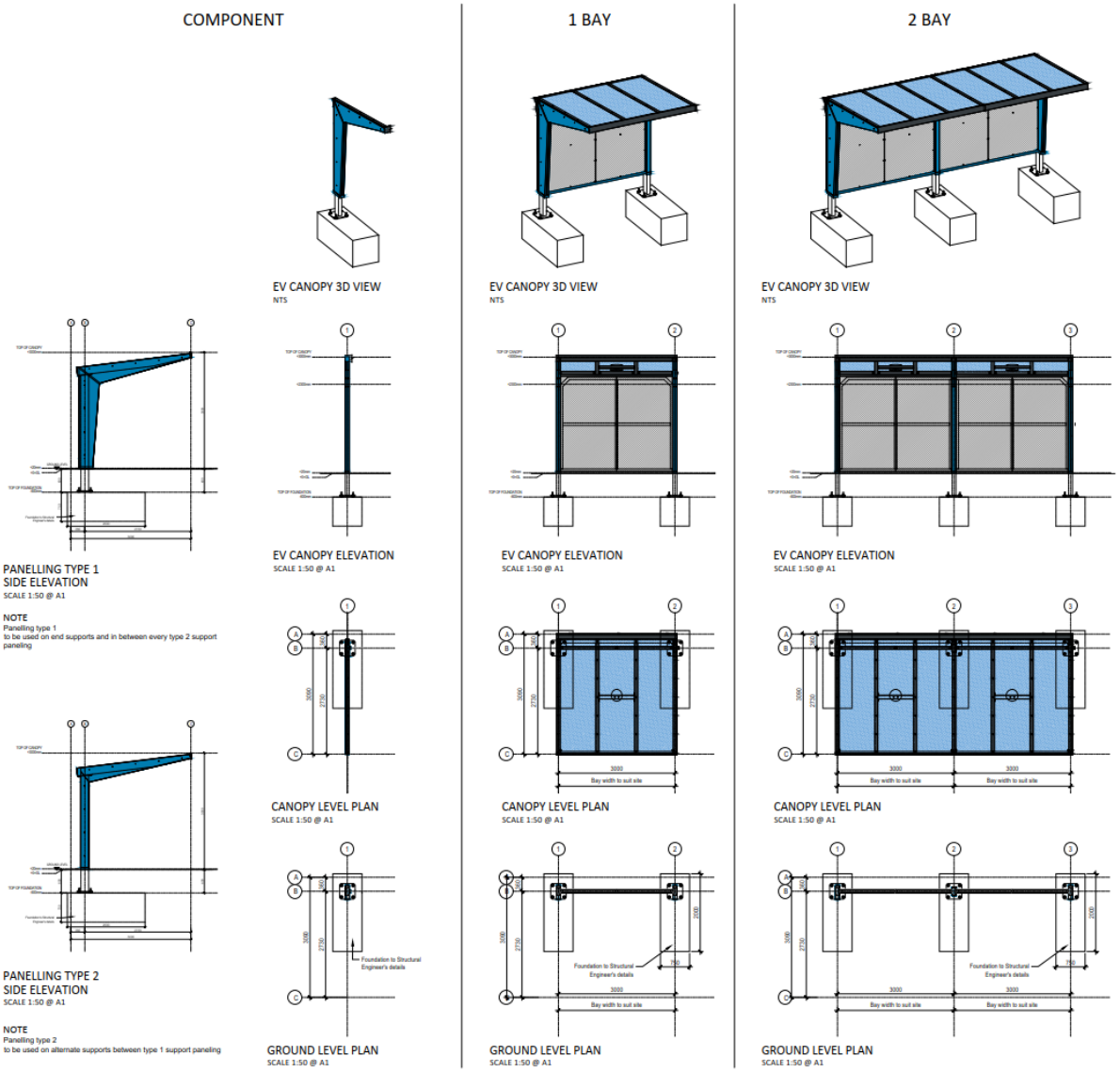




Photo
Representative Example - refer to drawing for accurate interpretation



Photo
Representative Example - refer to drawing for accurate interpretation

Examples of a similar installation

Figure C2 – Comparable EV chargers canopy design.

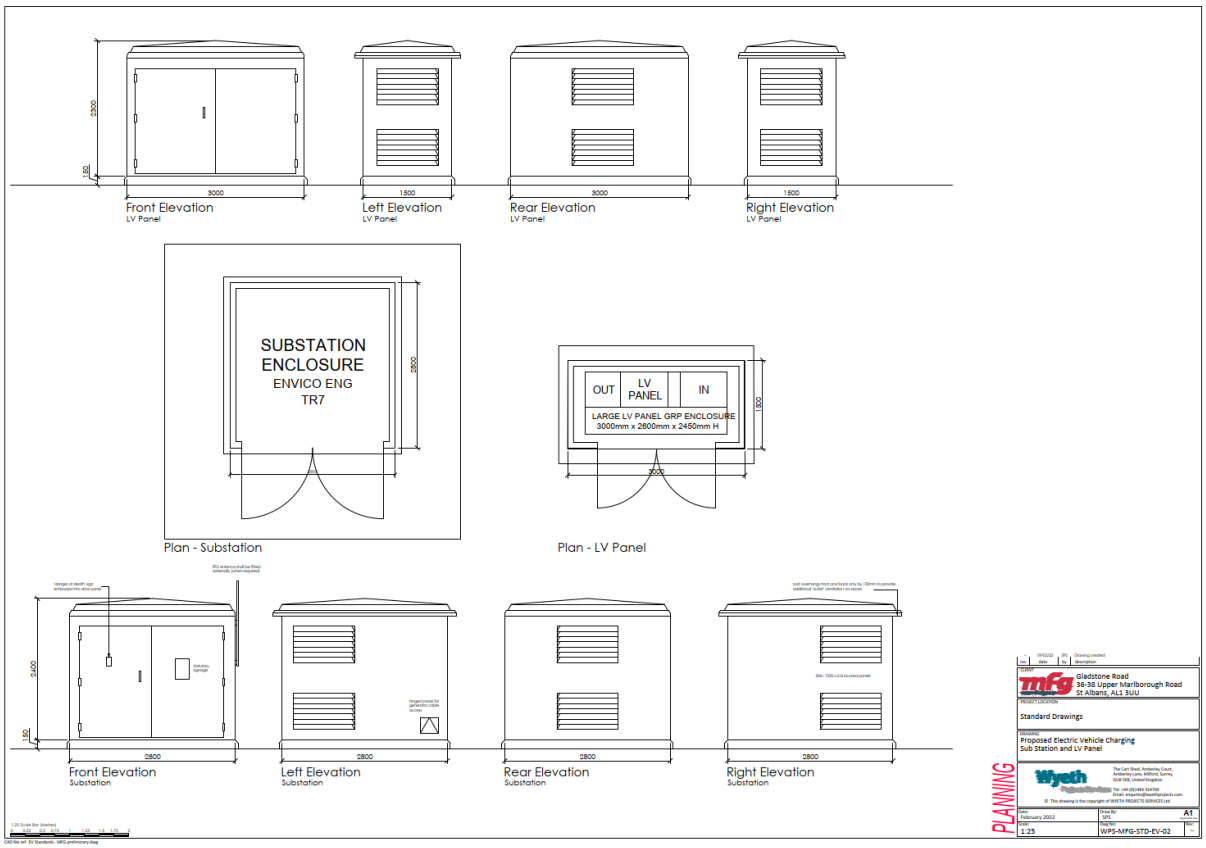


Figure C3 – indicative substation enclosure design.

Technical Specification -

Istobal Valeting Equipment

ISTOBAL
Vehicle Wash & Care

4CA2000 Jet Wash

Water consumption	12 Litres per minute on highest the function
Operating Pressure	65 Bar
Sound level	70 db
Electrical supply requirement	Single phase 40 amp or 3 phase N + E 20 amp
Water supply requirement	Recommended 20mm MDPE with isolation valve or a suitable pipe capable of delivering a minimum of 12 litres per minute.

4KA0000 Combo Unit

Water consumption	4 Litres per minute
Sound level	65.6 db
Electrical supply requirement	Single phase 16 amp
Water supply requirement	Recommended 20mm MDPE with isolation valve or a suitable pipe capable of delivering a minimum of 4 litres per minute.

4AA1000 Vacuum

Sound level	65.6 db
Electrical supply requirement	Single phase 16 amp
Water supply requirement	N/A

4VA1100 Air / Water / Screenwash

Water consumption	4 Litres per minute (If an Air only is being installed this is N/A)
Sound level	70 db
Electrical supply requirement	Single phase 16 amp
Water supply requirement	Recommended 20mm MDPE with isolation valve or a suitable pipe capable of delivering a minimum of 4 litres per minute. (If an Air only is being in-

Figure C4 – Technical specifications of speculative/comparable valeting equipment.

Appendix D: Environmental Survey Summary

The equipment used conforms to BS EN 61672-1:2003 (Class 1) for sound level meters and BS EN 60942 (Class 1) for sound calibrators; with at least traceable calibration history valid; no greater than two years for sound level meters and one year for sound calibrators, relevant to the times of the site assessment.

Position No.	Manufacturer	Model No.	Description	Serial No.
1	Larson Davis	LxT (ST)	3rd octave band sound level meter	4170
	Larson Davis	PRMLxT1L	Microphone preamplifier (low range)	36076
	Larson Davis	337B02	½" electret microphone	151485
	Larson Davis	CAL200	Sound level calibrator	11165
2	Larson Davis	LxT (ST)	3rd octave band sound level meter	2680
	Larson Davis	PRMLxT1L	Microphone preamplifier (low range)	29299
	Larson Davis	337B02	½" electret microphone	122141
	Larson Davis	CAL200	Sound level calibrator	12016

Table D1 – Sound monitoring equipment.

Validation checks at the end of the survey demonstrated acceptable drift across all parts of the study, across the sound level measurement equipment used, of ≤ 0.20 dB. Interval data was recorded at the measurement location at 1-minute and 15-minute periods, time synchronised to BST.

Weather conditions at the times of site attendance were deemed acceptable for surveying.

Weather conditions	16th Nov	17th Nov	18th Nov	19th Nov	20th Nov	21st Nov
Wind velocity	< 2 m/s average	< 3 m/s average	< 3 m/s average	< 2 m/s average	< 2 m/s average	< 2 m/s average
Wind direction	East	Northwest	West	East	Southwest	East
Cloud cover/rain	100 %, no rain	50 %, no rain	50 %, no rain	100 %, no rain	100 %, no rain	25%, no rain
Temperature	8 °C	8 °C	9 °C	7 °C	6 °C	6 °C

Table D2 – Recorded weather conditions.

A brief description of the measurement position has been provided below:

Position 1) Microphone set at approximately 2.2 m AGL in a free-field location approximately 25 m from Oldham Road (A62). Incident sound was observed predominantly from road traffic to the southeast of the site and vehicular/commercial activity associated with the existing fuel station/car wash. The dominant commercial source was associated with the automated car wash in the centre of The Site, while operating. Other sounds included people talking, petrol pump noises and air pumping sounds associated with the air/water machine.

Position 2) A survey was also undertaken at Wednesbury Service Station (WS10 9HA) in the early hours of 04/11/2022. Weather conditions were suitable for surveying during measurements, which were all captured in the free-field locations. Sound measurements were taken of existing Alpitronic Hypercharger "HYC150" EV charging units operating under maximum load (150 kW, rapid charging. The charger units were not subjectively noted to contain any particular tonal components during periods of operation. A breakdown of all EV charger source measurements (including 1/3 and 1/1 octave-band centre frequency values) have been included in Tables D3 – D5 below.

Measurement No.	Description of measurement	Distance Measured (m)	Measured sound level, dB (A)	Linear sound pressure level, dB							
				Octave band centre frequency (Hz)							
				63	125	250	500	1 k	2 k	4 k	8 k
1	Back of unit	0.05	59.5	55	54	61	60	54	46	38	33
2	Front of unit	0.25	59.3	56	58	65	57	52	45	38	31
3	Back of unit	0.25	56.5	54	53	58	56	53	42	33	23
4	Front of unit	0.25	56.7	55	56	62	53	51	41	35	28
5	Front of unit	0.01	63.9	55	63	70	61	55	50	44	35

Table D3 – Overview of HYC150 source measurements (with octave band centre frequency values).

Measurement No.	Description of measurement	Linear sound pressure level, dB																												
		1/3 octave band centre frequency (Hz)																												
		8	10	12.5	16	20	25	31.5	40	50	63.0	80	100	125	160	200	250	315	400	500	630	800	1 k	1.25 k	1.6 k	2 k	2.5 k	3.15 k	4 k	5 k	6.3 k	8 k	10 k
1	Back of unit	50	49	49	52	49	48	46	47	53	48	46	47	48	52	53	58	55	57	54	53	51	50	46	43	41	40	37	29	28	24	27	30
2	Front of unit	50	51	51	49	50	48	45	47	54	49	47	48	51	56	59	64	53	53	53	50	47	47	46	43	39	36	35	33	30	27	27	25
3	Back of unit	44	45	46	53	46	46	47	49	51	49	45	47	47	50	52	55	48	52	51	50	50	47	44	39	36	35	31	25	25	20	17	18
4	Front of unit	52	51	49	50	52	50	47	45	49	50	51	47	49	53	55	61	50	49	49	46	47	47	44	39	36	34	31	30	28	25	23	22
5	Front of unit	51	50	51	51	51	54	56	50	50	50	50	51	55	62	63	68	57	58	57	56	50	51	49	48	44	41	41	39	36	32	30	26

Table D4 – Overview of HYC150 source measurements (1/3 octave band centre frequency values).

Description of measurement	Distance measured (m)	Measured sound level, dB(A)	Average sound level corrected to 1 m, dB(A)	A-weighted sound pressure level, dB(A)							
				Octave band centre frequency (Hz)							
				63	125	250	500	1 k	2 k	4 k	8 k
Front of unit	0.25	59	**46**	29	41	55	52	51	45	37	29
Back of unit	0.25	57	**44**	27	37	49	53	53	43	34	22

Table D5 – Overview of average HYC150 source measurements (with A-Weighted octave band centre frequency values).

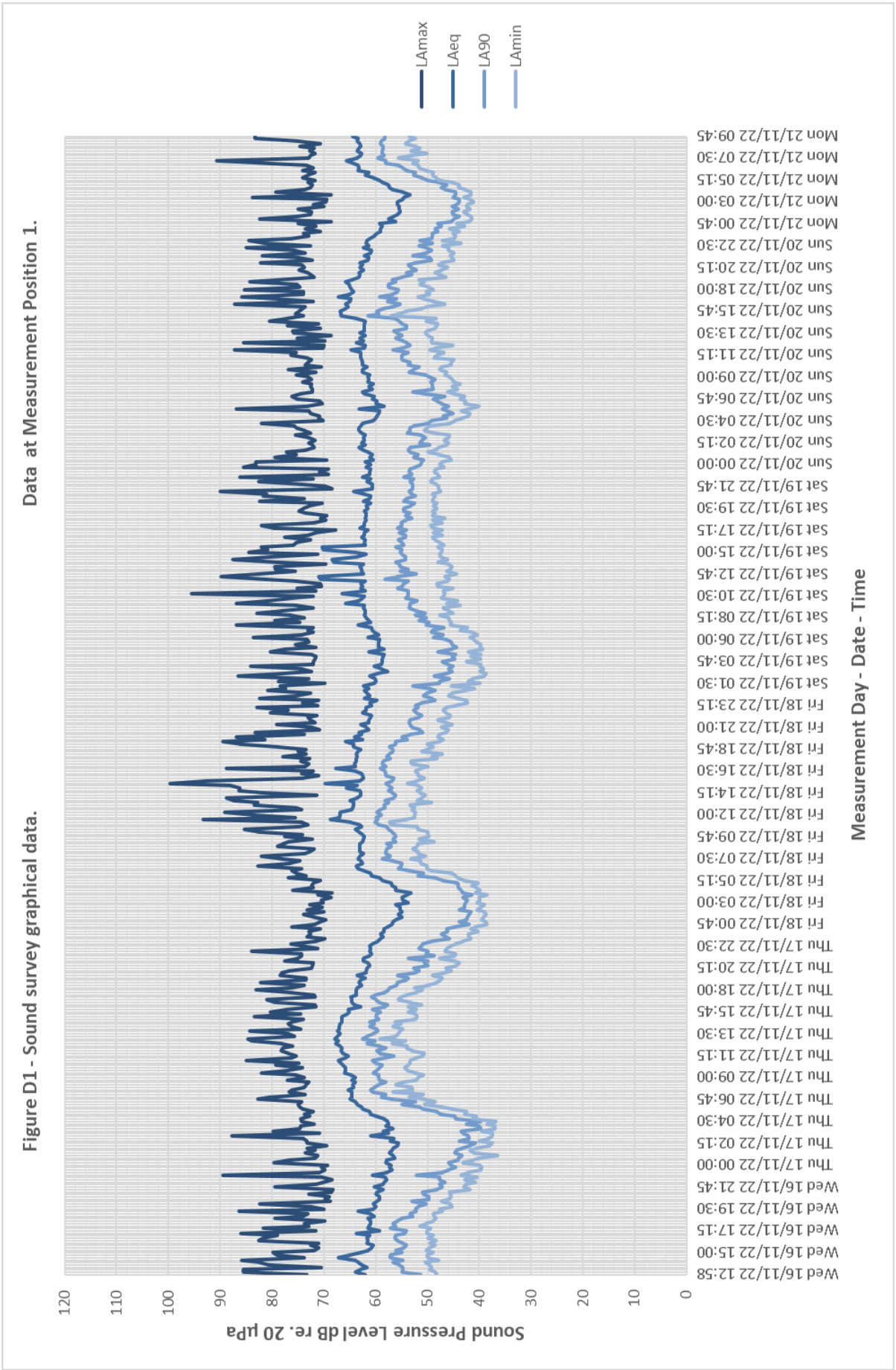


Figure D1 - Sound survey graphical data. Data at Measurement Position 1.

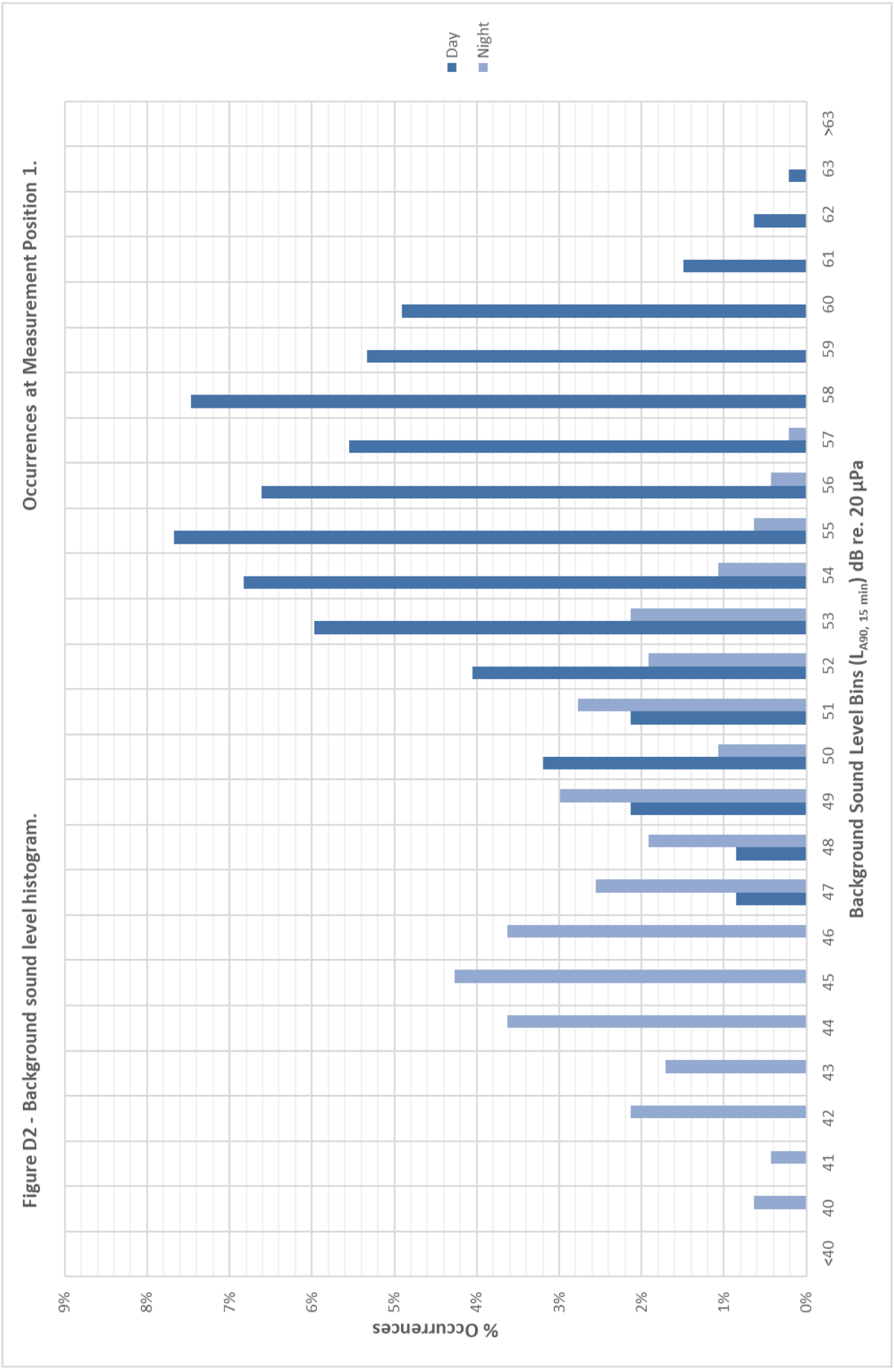


Figure D2 - Background sound level histogram.

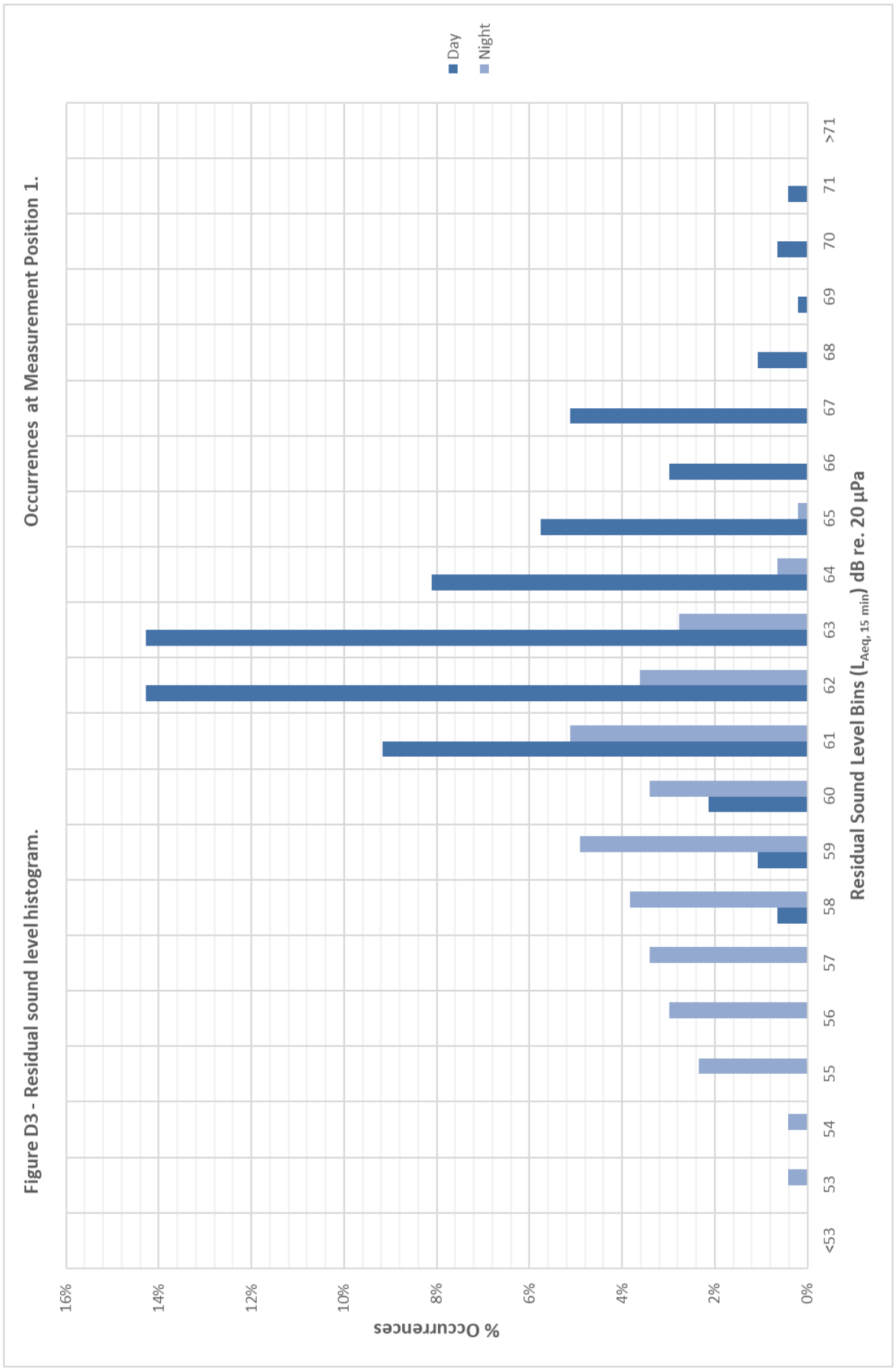


Figure D3 - Residual sound level histogram.

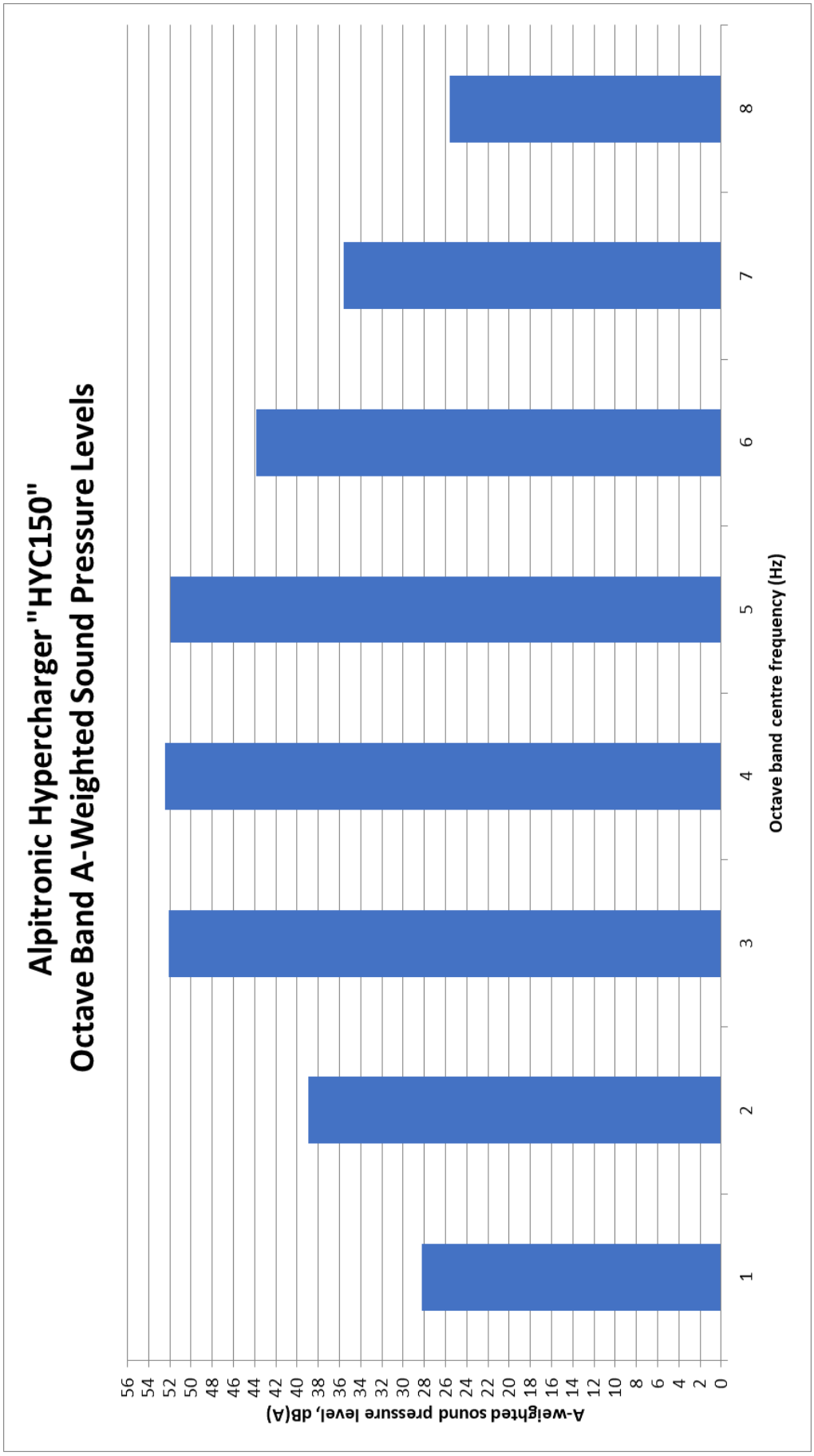


Figure D4 – Alpitronic Hypercharger (HYC150) A-Weighted Spectral Results (average).

Appendix E: Technical Data Sheets and Calculations



Figure E1 – Alpitronic Hypercharger HYC150 Technical Data Sheet.



Figure E2 – Alpitronic Hypercharger HYC300 Technical Data Sheet.

TRANSFORMER DATA SHEET		
Project Name:		--
Quote Number:		--
Manufacturer:		Wilson Power Solutions Ltd
Applicable Standard:		IEC 60076
General Arrangement Dwg #:		WPS-1500 AL-GA
Transformer Rating:	kVA	1500
Rated High Voltage @ No Load:	Volts	11000
Rated Low Voltage @ No Load:	Volts	415
Minimum Insulation class HV LI:	kV	75
Minimum Insulation class HV AC:	kV	28
Minimum Insulation class LV LI:	kV	-
Minimum Insulation class LV AC:	kV	3
Insulating Fluid:		Mineral Oil
Fans:		No
Pumps:		No
Type of Cooling:		ONAN
Number of Phases:		3
Frequency:	Hz	50
Vector Group:		Dyn11
Impedance Voltage (Z):	%	5.5
Core Material:		CRGO steel
No Load Losses:	W	1125
Load Losses @ 75°C:	W	13140
Losses as per EU Regulation No. 548/2014		Meets Tier-1 Requirement
Resistance	%	0.88
Reactance	%	5.43
Regulation type:		DETC
Tapping on HV:	%	+7.5,+5.0, +2.5, 0.0, -2.5, -5
Design Ambient Temperature:	°C	40
Temp Rise of Top Oil:	°C	60
Temp Rise of Winding:	°C	65
Altitude:	m	<1000
Pollution class:		C4
Sound Power Level:	dB(A)	61

Table E1 – Comparative 1,500 kVA substation sound data (Wilson Power Solutions).

Calculation procedure of commercial plant to NNSR (Beckford Street - 1F Flat)																		
Unit	Sound pressure level (L_p) at 1 m from source front, dB	Sound pressure level (L_p) at 1 m from source back, dB	Distance to nearest noise sensitive receptor, m		Distance attenuation, dB		Reflections, dB		Façade correction, dB		Screening attenuation		On-time correction (assumed 50% in period)		Sound pressure Level (L_p) at façade of receptor, dB	
			Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
HYC150 (1)	46	44	127	127	-42	-42	3	3	3	3	-5	-5	-3	-3	2	2
HYC150 (2)	46	44	126	126	-42	-42	3	3	3	3	-5	-5	-3	-3	2	2
HYC150 (3)	46	44	125	125	-42	-42	3	3	3	3	-5	-5	-3	-3	2	2
HYC150 (4)	46	44	125	125	-42	-42	3	3	3	3	-5	-5	-3	-3	2	2
HYC300	49	47	130	130	-42	-42	3	3	3	3	-5	-5	-3	-3	5	5
1500 KVA Substation	53	N/A	131	131	-42	-42	3	3	3	3	-5	-5	0	0	12	12
Jet Wash (1)	70	N/A	134	-	-43	-	3	-	3	-	-5	-	-3	-	25	-
Jet Wash (2)	70	N/A	135	-	-43	-	3	-	3	-	-5	-	-3	-	25	-
Jet Wash (3)	70	N/A	137	-	-43	-	3	-	3	-	-5	-	-3	-	25	-
Combi Unit	66	N/A	133	133	-42	-42	3	3	3	3	-5	-5	-3	0	21	24
													Sum at receptor:		**31**	**25**
													With character:		**34**	**28**

Table E2 – Calculation procedure of specific sound level at Beckford Street – 1F Flat.

OBJECTIVE METHOD FOR ASSESSING THE AUDIBILITY OF TONES IN SOUND: ONE-THIRD OCTAVE METHOD

As defined by BS 4142:2014+A1:2019, the test for the presence of a prominent, discrete-frequency spectral component (tone) compares the ($L_{Zeq,T}$) sound pressure level averaged over the time in a one-third-octave band with the time-average linear sound pressure levels in the adjacent one-third-octave bands.

For a prominent tone to be identified, the time-averaged sound pressure level in the one-third-octave band of interest is required to exceed the time-averaged sound pressure levels of both adjacent one-third-octave bands by a certain level difference, as listed below:

- 15 dB in the low-frequency one-third-octave bands (25 Hz to 125 Hz);
- 8 dB in middle-frequency one-third-octave bands (160 Hz to 400 Hz);
- 5 dB in high-frequency one-third-octave bands (500 Hz to 10 000 Hz).

The measured 1/3 octave band sound pressure levels of the operating Alpitronic Hypercharger "HYC150" has been provided in Table D4 above. The presence of a tone has been calculated using the one third octave method, with the calculations shown in three-parts the in Tables E4 – E6 below:

Tonality Assessment: Objective One-Third Octave Method (8 Hz - 125 Hz: 15 dB level difference in both adjacent bands)														
Description of measurement	Linear sound pressure level, dB													
	1/3 octave band centre frequency (Hz)													
		10		16		25		40		63		100		
	8		12.5		20		31.5		50		80		125	
Front of unit	1	1	-1	-2	1	-2	-3	2	7	-5	-2	1	3	5
Back of unit	0	0	-3	2	1	-2	-3	-2	4	0	1	-4	2	4

Table E3 – Tonality Assessment of Alpitronic Hypercharger "HYC150" using the "Objective One-Third Octave Method" (8 Hz - 125 Hz: 15 dB level difference in both adjacent bands).

Tonality Assessment: Objective One-Third Octave Method (160 Hz - 400 Hz: 8 dB level difference in both adjacent bands)						
Description of measurement	Linear sound pressure level, dB					
	1/3 octave band centre frequency (Hz)					
	160		250		400	
		200		315		
Front of unit	5	3	5	-10	0	0
Back of unit	4	2	5	-10	-1	0

Table E4 – Tonality Assessment of Alpitronic Hypercharger "HYC150" using the "Objective One-Third Octave Method" (160 Hz - 400 Hz: 8 dB level difference in both adjacent bands).

Tonality Assessment: Objective One-Third Octave Method (500 Hz - 10 kHz: 5 dB level difference in both adjacent bands)															
Description of measurement	Linear sound pressure level, dB														
	1/3 octave band centre frequency (Hz)														
		630		1 k		1.6 k		2.5 k		4 k		6.3 k		10 k	
	500		800		1.25 k		2 k		3.15 k		5 k		8 k		
Front of unit	0	-2	-3	0	-1	-4	-3	-3	-1	-2	-3	-3	-1	-1	-2
Back of unit	0	-3	1	0	-3	-5	-3	-2	-3	-1	-2	-3	-2	-2	-1

Table E5 – Tonality Assessment of Alpitronic Hypercharger "HYC150" using the "Objective One-Third Octave Method" (500 Hz - 10 kHz: 5 dB level difference in both adjacent bands).

The difference calculations in the above tables have not revealed a prominent tone from the Hypercharger (HYC150) sound emissions, where the time-averaged sound pressure levels of both adjacent one-third-octave bands have not exceeded the specified constant values.

Appendix F: Acousticians Qualifications and Status

Dominic Attwell BEng. (Hons) MIOA

Position Held: Senior Acoustic Consultant.

Qualifications: BEng. (Hons) Audio Acoustics.

Affiliations: Member of the Institute of Acoustics.

Acoustics Experience: 6 years.

Lee Denson BSc. (Hons) MSc. MIOA

Position Held: Principal Acoustic Consultant.

Qualifications: BSc. (Hons) Music Technology.

MSc. Music Technology.

Institute of Acoustics Diploma in Acoustics and Noise Control.

Affiliations: Member of the Institute of Acoustics.

Acoustics Experience: 9 years.