

Acoustic Report

**Environmental Noise Survey for the
Change of Use Commercial Units at
The Swan Service Station,
962 Huddersfield Road, Mirfield, WF14 9HS**

Our Reference – J3331

Report compiled by - Paul Horsley MIOA

Date of Survey: 1st April 2025

DOCUMENT ISSUE RECORD

Revision	Date of Issue	Status	Mods	Author:	Checked:	Approved:
0	14.04.25	Report	N/A	Paul Horsley MIOA	Paul Horsley MIOA	Paul Horsley MIOA

Limitations

The assessments and interpretation have been made in line with legislation and guidelines in force at the time of writing, representing best practice at that time.

All of the comments and opinions contained in this report, including any conclusions, are based on the information obtained by Paul Horsley Acoustics Ltd during our investigations.

There may be other conditions prevailing on the site which have not been disclosed by this investigation which have not been considered by this report. Responsibility cannot be accepted for conditions not revealed by the investigation.

Any diagram or opinion of the possible configuration of the findings is conjectural and given for guidance only and confirmation of intermediate ground conditions should be considered if deemed necessary.

Except as otherwise requested by the Client, Paul Horsley Acoustics Ltd is not obliged and disclaims any obligation to update the report for events taking place after:

- a) the date on which this assessment was undertaken; and
- b) the date on which the final report is delivered.

Paul Horsley Acoustics Ltd makes no representation whatsoever concerning the legal significance of its findings or to other legal matters referred to in the following report.

This report has been prepared for the sole use of the Client. No other third parties may rely upon or reproduce the contents of this report without the written permission of Paul Horsley Acoustics Ltd. If any unauthorised third party comes into possession of this report, they rely on it at their own risk and the authors do not owe them any Duty of Care or Skill.

CONTENTS

1.0	Agent
2.0	Subject
3.0	Aims
4.0	Location and Description of Existing Site
5.0	Guidance on the Assessment of Noise levels
5.1	BS4142:2014+A1:2019 'Method for Rating and Assessing Industrial and Commercial Sound'
5.2	BS8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'
5.3	Subjective Impression of Noise Level Differences
6.0	Survey Equipment
7.0	Survey Method
8.0	Prevailing Weather Conditions
9.0	Noise Survey Results
10.0	Noise Survey Results Tables
10.1	Noise Survey Results Table
10.2	Noise Monitoring Time History Graph
11.0	Results Analysis
12.0	Design Target
13.0	Impact Assessment of Fixed Plant
13.1	BS4142:2014+A1:2019 Assessment
13.2	Mitigation Recommendations
14.0	Report Summary
Appendix A-1	Locational Outline and Monitoring Points
Appendix A-2	Retail Unit Fitout Proposals
Appendix A-3	Site Photos of Retail Units
Appendix B	Noise Survey Frequency Analysis Results Table
Appendix C-1	Impact Assessment Calculation Tables
Appendix C-2	Barrier Calculation

1.0 Agent

Acumen Designers and Architects Ltd
Headrow House
19 Old Leeds Road
Huddersfield
HD1 1SG

2.0 Subject

Planning No 2025/90284 : The Swan Service Station, 962, Huddersfield Road, Mirfield, WF14 9HS.

Change of use from 'Retail' to 'Retail, Hot and Cold Food and Hot Food Takeaway'.

3.0 Aims

The aim of this report is to determine the existing baseline background noise environment levels affecting the nearby noise sensitive residential premises within the vicinity of the units in accordance with the requirements of BS4142:2014+A1:2019.

Provide an assessment of the results in accordance with the recommendations laid down in BS4142:2014+A1:2019 and BS8233:2014 for the units with respect to noise.

Provide an impact assessment of the potential incumbent noise sources with respect to the closest existing noise sensitive premises due to the proposed unit change of use, prior to occupation commencing.

Provide mitigating noise control advice relating to the achievement of an acceptable internal environment for the residential development as recommended within BS8233:2014.

4.0 Location and Description of Existing Site

There is a proposal for the change of use of the 3 No approved retail units located at the side of the Swan Service Station site.

The site as a whole is approximately 90m x 35m and is best described as rectangular in shape and is located on a plot at the junction of Steanard Lane and Huddersfield Road to the North of the A644, Huddersfield Road. The site is on a relatively flat plot of land which is sloping up slightly from Huddersfield Road which is a primary link road between Dewsbury and Huddersfield. The 3 No retail units occupy the western side of the site, approximately 375 m².

The site is bounded to the south by Huddersfield Road, with a detached residential property to the west No 970 and industrial premises beyond the northern boundary. There is a further residential property to the east, at a distance of 120m from the retail units' boundary.

The closest noise sensitive residential premises to the site are located as noted above beyond the eastern and western site boundaries, with the western boundary premises at No 970 under consideration within this report.

The proposal includes for a change of use for the 3 No retail units on site from purely retail to retail, hot and cold food and hot food takeaway units. These retail units will make use of the existing car parking spaces already in operation on site, therefore, no car parking is applicable to the use of the units.

The existing noise climate is made up of general traffic movements passing along Huddersfield Road in both directions with local traffic the dominant noise source throughout.

5.0 Guidance on the Assessment of Noise Levels

The purpose of any criterion or standard for environmental noise should be to safeguard against unacceptable levels of community response, deemed as a feeling of annoyance during daytime or disturbance at night. WHO defines annoyance as "...a feeling of displeasure evoked by noise."

The main source of information relating to noise and the community response are field studies including noise measurements and social surveys. These studies then attempt to establish a correlation between the two sets of results.

In the absence of any definitive guidance and in order to establish suitable noise criteria, it is necessary to rely on general guidance and assessment methods used for community noise sources. Discussions on the current methods are given below.

5.1 BS4142:2014+A1:2019 'Method for Rating and Assessing Industrial and Commercial Sound'

This standard provides a method for rating and assessing sound of an industrial and/or commercial nature. The method uses outdoor sound levels to assess the likely effect of sound on people who might be inside or outside a dwelling or premises used for residential purposes. It is limited to applicable sounds and is not intended for noise amounting to nuisance or rating noise outside the scope of the Standard.

Unlike the previous version of the Standard, rating levels are not prescriptive, but more context based, with the following applicable to rating values:

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

The Standard introduces additional rating elements, these being subject assessments of tonality, and impulsivity of a sound source, with weighted rating values accordingly applied at the judgment of the assessor.

The introduction of Uncertainty has been applied to the measured values; again, consideration of this is left to the professional executing the survey and assessment. However, steps are provided within the Standard for the reduction of uncertainty in both measurement and calculations of the sound source and rating value.

Actual meteorological conditions are now required to be recorded and reported upon for the survey and report.

5.2 British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'

The scope of British Standard 8233: 2014: *Sound insulation and noise reduction for buildings* is the provision of guidance for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations; the primary intention of these is to guide the design of new buildings or refurbished buildings undergoing a change of use rather than to assess the effect of changes in the external noise climate.

The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings, as shown in Table below.

Indoor Ambient Noise Levels in Spaces When They Are Unoccupied

Activity	Typical Situations	Design Range LAeq, T dB	
		0700h to 2300h	2300h to 0700h
Resting	Living rooms	35	--
Dining	Dining Room / Area	40	--
Sleeping	Bedrooms	35	30

BS8233 states in Note 4 that:

"Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values."

As such it has been considered appropriate to define a limit for regular maximum indoor noise levels of 45 dB(A) with sporadic events not exceeding 50 dB(A).

BS8233 also suggests noise limits for external areas or a property such as gardens or balconies. It states that:

'For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.'

5.3 Subjective Impression of Noise Level Differences

The following Table provides a semantic scale that may be used to "subjectively" rate changes in sound pressure level.

Subjective effect of changes in sound pressure level

Change in sound level dB	Change in Power		Change in apparent loudness
	Decrease	Increase	
3	1/2	2	Just perceptible
5	1/3	3	Clearly noticeable
10	1/10	10	Half / Twice as loud
20	1/100	100	Much quieter / louder

After Bies and Hansen

The above table is taken from Professor Colin H Hansen's publication "Fundamentals of Acoustics" page 41, for the Department of Mechanical Engineering, University of Adelaide.

This table also appears in "Engineering Noise Control" by Colin Hansen and David Bies, a comprehensive reference book, amongst others.

6.0 Survey Equipment

The noise assessment conducted included for attended monitoring.

Below are the equipment details used.

Svantek Sound Analyser, SV 979, Type 1, Serial No 92932

Svantek SV 17 Microphone Serial No 106523

Castle dBCal Calibrator Serial No 074042

90mm Windshield

Tripod

7.0 Survey Method

The writer carried out an attended noise monitoring survey of the noise climate for the area of the site under consideration.

The attended survey was executed during a daytime and evening period on 1st April 2025 in accordance with the requirements of BS4142:2014+A1:2019 to coincide with the proposed operational times of the units, advised as daytime only from 07.00 to 22.30 hours. This was conducted at the western site boundary adjacent to the premises of No 970 Huddersfield Road.

The Sound Level Meter was mounted on a tripod at a height of 1.5m above the floor. The meter was set to record 1/1 Octave Centre Band frequency data with the following indices recorded.

LA_{eq}, LA₁₀, LA₉₀, and LA_{Max} indices sound measurements were taken using the sound analyser.

The measurement indices noted above are defined as follows:

- LA_{eq}, T the "A" weighted equivalent continuous noise level of sample period T
- LA₁₀, T the "A" weighted level exceeded for 10% of sample period T
- LA₉₀, T the "A" weighted level exceeded for 90% of sample period T
- LA_{max}, T the "A" weighted maximum level during the sample period T

The sound level meter was calibrated before and after the measurements using the calibrator to ensure accuracy of the results. No variations were noted between calibrations and the results obtained can be deemed to be an accurate representation of the levels recorded.

Pre-Monitoring Calibration Reading 94 (-0.14) dB

Post-Monitoring Calibration Reading 94 (-0.17) dB

8.0 Prevailing Weather Conditions

Date	Period	Temp °C	Relative Humidity Rh %	Barometric Pressure mb	Wind Speed mph	Wind Direction	Precipitation	Cloud Cover %
01.04.25	Daytime	14	49	1027	0-4	E	None	20
	Evening	10	70	1027	0-2	E	None	10

9.0 Noise Survey Results

During the attended noise monitoring periods samples were recorded, using 1/1 Octave Centre Band analysis.

During the monitoring data was logged over daytime and evening periods to coincide with the proposed opening times of the units. The data was recorded and logged every 15 minutes. This was to establish the general noise levels experienced by the site externally at the most noise sensitive position, along the western site boundary.

The close quarters noise monitoring of the existing cooking canopy plant located at the garage retail area was assessed externally and demonstrated a steady state noise output, relevant to an extraction fan. The same fan selections are proposed for the individual units to serve their cooking canopies.

The results collected during the monitoring session can, therefore, be deemed as representative of the site noise output levels accordingly.

10.0 Noise Survey Results Tables

Below are the results tables completed for the noise assessment conducted on site. The results are based upon overall noise at the western site boundary adjacent to the residential premises of No 970 Huddersfield Road and the close quarters plant output with the variable setting operational at 100%, worst-case scenario.

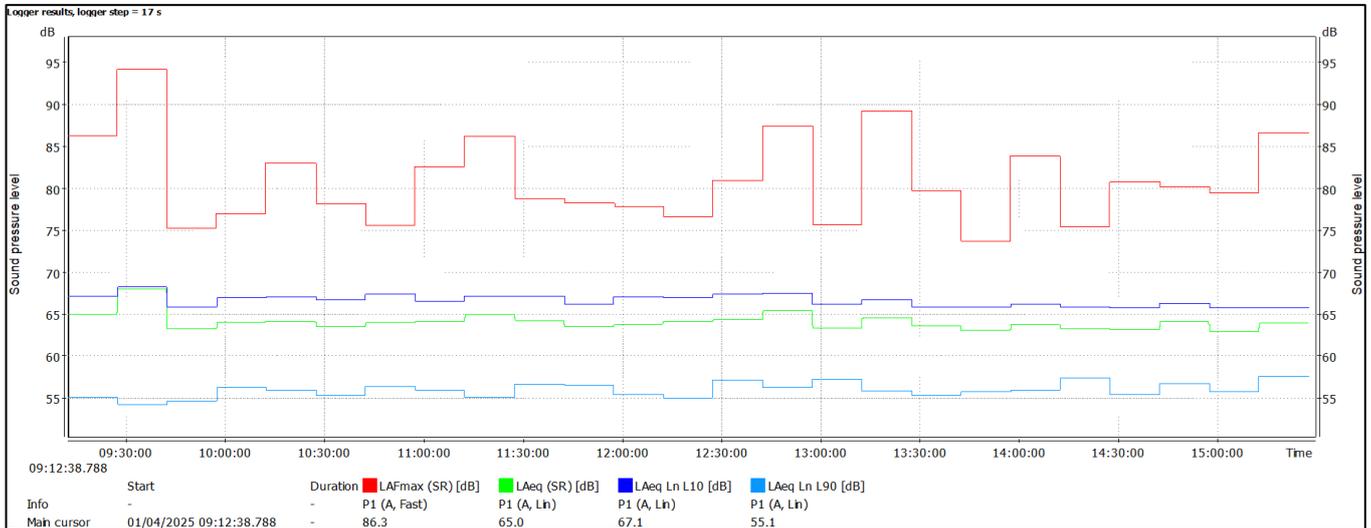
10.1 Noise Survey Results Table

Location	Position	Period	Data ID	Start date & time	Duration	LAMax dB	LAeq dB	LA10 dB	LA90 dB	Source
1	Western Site Boundary	Daytime	1	01/04/2025 09:12	06:15:00	94.1	64.2	66.6	56.0	Traffic along Huddersfield Road dominant
		Evening	2	01/04/2025 20:01	03:00:00	85.0	61.5	64.9	49.9	Traffic along Huddersfield Road dominant
2	1m From External Kitchen Canopy Extract Cowl	Daytime	1	01/04/2025 15:44	00:03:00	70.4	68.7	69.7	67.7	Extract fan dominant and none tonal drone output

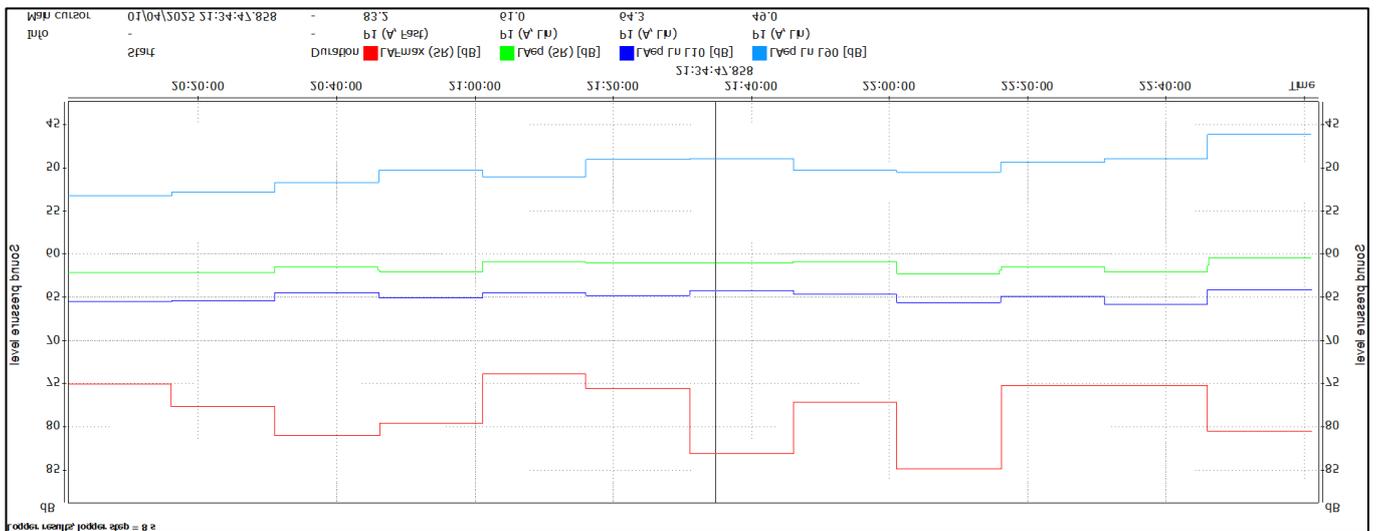
Refer to Appendix B for frequency analysis results table

10.2 Noise Monitoring Time History Graph

The time history graph shows the results for the monitoring period.



Daytime Period



Evening Period

11.0 Results Analysis

The above noise survey, carried out on 1st April 2025, and was chosen as a representative period to reflect the typical noise climate for the area surrounding the site.

The noise survey results obtained for the site can, therefore, be deemed to be representative of normal activities for the area and will be used as the base for analysis and assessment purposes below.

Assessments of the results indicate that the site is affected primarily by road traffic movements along Huddersfield Road and the local road network. Industrial plant and activities could also be heard from the existing industrial site north of the site.

From the data acquired during the remote monitoring assessment period the following baseline exposure noise levels have been established for the nearby noise sensitive receptor locations.

Table of Baseline Exposure Levels

Exposure Levels	Recorded Noise Level
Daytime (0700 – 1900 Hrs)	LAeq - 64 dB LA90 - 56 dB LAFmax (Average) - 94 dB
Evening (1900 – 2300 Hrs)	LAeq - 62 dB LA90 - 50 dB LAFmax (Average) - 85 dB

The above baseline noise levels will be utilized within the impact assessment for the proposed change of use occupation of the 3 No units at the site.

12.0 Design Target

In order not to unduly affect the existing amenity of the nearby noise sensitive locations following the commissioning of the 3 No units, it is advisable to take reference from the available standards and guidance, noted in Section 5 above.

The proposed change of use of the 3 No retail units to allow hot and cold takeaway food tenancies of the units would require the inclusion of cooker hoods within the individual premises. Each cooker hood would include for 1 No extraction fan. This fan would be installed at high level along the rear elevation of the individual units, as indicated on the site plant proposal included in Appendix C. The extraction fan selection and installation will be identical to the one installed within the Swan Service Station main building and exhausting along the eastern façade of the building. Therefore, the noise associated with the operation of the fan has been monitored and the data used within the impact assessment presented below. The proposed operational time of the individual units has been advised as follows.

Advised Trading Hours	Monday to Sunday	07.00 to 22.30
-----------------------	------------------	----------------

It is assumed that the extraction fan will operate for the same time periods whilst the units are trading.

This places the trading hours within daytime periods only.

If we consider BS4142:2014+A1:2019, we find that a noise level rating of a difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending upon the context. A difference of around +5 dB is an indication of an adverse impact, depending upon the context. The lower the rating level is relative to the measured sound level, the less it is that the specific sound source will have an adverse impact or a significant impact. Where the rating does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending upon context.

As can be seen from 5.3 above, an increase in noise levels of up to +3 dB is just perceptible and not likely to give rise to complaints. However, the baseline should not be increased such that it exceeds the BS4142:2014+A1:2019 limits, and as such it is intended that the design target for the fixed plant and on-site operations should be in line with this figure so that the amenity is preserved when the site is fully operational.

Taking account of the above standards and the existing noise climate for the specific area, it would be prudent to set the design target noise levels in accordance with accepted limits recognised both nationally and internationally and in keeping with the local noise climate without the proposed noise source present.

To ensure that there is no increase existing background levels when considered at the closest noise sensitive dwellings, a value of -10 dBA below the existing values is recommended, as per the table below.

Recommended Design Target Noise Limits

Period	Existing Background Level	Cumulative Design Target Contribution Level
Daytime (0700 – 1900 Hrs)	56 LA90 dB	46 LAeq dB
Evening (1900 – 2300 Hrs)	50 LA90 dB	40 LAeq dB *

*It is assumed that the new plant will operate with consistent operational modes, therefore, lowest output noise level limit has been utilised for the design target.

The above recommendations assume that the noise output is the cumulative total value for all items operating simultaneously for the 3 No units and these items will be non-tonal in nature without any significant acoustic features, when considered against the context of the local environment.

13.0 Impact Assessment of Fixed Plant

To determine the effect that the proposed change of use of the 3 No units is likely to have on the noise sensitive dwelling identified to the west of the site, No 970 Huddersfield Road, it is necessary to use the recorded data to assess the baseline data and then add the contribution of the proposed incumbent noise sources.

In this case the introduced noise sources are the extraction fans associated with the change of use of the 3 No units to takeaways. Each unit is proposed as having 1 No kitchen canopy extraction hood with 1 No extraction fan, located at high level through the rear wall of the individual unit. The fan selection is identical to the one serving the Service Station food outlet canopy to the east of the site, therefore the monitored noise output value recorded for the fan is relevant to all 3 No units.

Taking account of the distance, topography of the land, location and barrier corrections, as necessary, it is possible to determine the total contribution of the existing site at these premises.

Below is a table of results indicating the noise contribution of the 3 No units operating their proposed extraction fans simultaneously on 100% load, the worst-case scenario possible.

CALCULATION OF PLANT CONTRIBUTION AT RESIDENTIAL PREMISES WEST OF SITE BOUNDARY - No 970 HUDDERSFIELD RD

Plant Reference	Monitored Noise Level, dBA	Assessment Distance, m	Distance to Recipient, m	Distance Correction, dB	Barrier Correction	Location Correction	Contribution Value, dBA
Unit No 964	69	1	40	-32	-19	6	24
UnitNo 966	69	1	30	-30	-19	6	26
Unit No 968	69	1	25	-28	-19	6	28
Cumulative Fixed Plant Contribution							31

Refer to Appendix C for full calculation assessment details.

As can be seen from the above results to design target set of -10 dB below the existing background level has been achieved and indeed exceeded. The resultant 30 dBA due to the cumulative operation of 3 No extract fans represents a value of -19 dB below background, when considered at the nearby residential premises of No 970 Huddersfield Road.

To determine if this value is deemed acceptable, a further assessment of the results can be made in accordance with the requirements of BS4142:2014+A1:2019.

13.1 BS4142:2014+A1:2019 Assessment

The following is an assessment in accordance with BS4142 2014+A1:2019, which has been based upon the assessed noise levels for the fans when considered outside no 970 Huddersfield Road.

All readings have been rounded to the nearest whole number.

Description	Indices	Sound Level Daytime	Comments
Resultant Contribution Due to Fixed Plant	dBA	31 dB	Calculated value for all 3 No fans
Residual Sound Level taken from outside premises	L _{Aeq}	62 dB	Traffic dominant sources during evening period.
Background Noise Level	L _{A90}	50 dB	Background level consisted of the above.
Specific sound source value	L _{Aeq}	31 dB	Non applicable as this is a calculated value.
Acoustic feature correction		0 dB Tone 0 dB Intermittent 0 dB Impulse	Acoustic feature Corrections at Premises
Rating Level		31 dB	
Background Noise Level	L _{A90}	50 dB	
Excess of Rating over background sound level	Plant - BG	= -19 dB	
Comment			
The excess rating values of -19 dB during the quieter evening period is a clear indicator that noise from the operation of the fixed plant is not likely to result in any adverse comment or result in any justifiable complaints.			
Uncertainty of the assessment			
There is uncertainty in the calculation as it is based upon a calculated noise value with a correction applied which may account for a minimal variation in the actual values for the plant at this location. The uncertainty is not significant as the ratings are low, and the values are in context with the actual area.			
The measurements presented accord with the sound levels recorded outside the premises. There is confidence that the rating values used are based upon monitored data and the background is based upon measured values during weather conditions considered acceptable for executing a noise survey.			

The justification for each acoustic penalty is provided below.

- *Intermittency – No penalty has been applied as the sound is not intermittent in nature when considered against the baseline noise climate which is in context with the local environment.
- **Tonality – No tonal penalty has been applied to the sound levels recorded outside the premises does not indicate any tonal content when considered against the baseline noise climate which is in context with the local environment.

- ***Impulsivity – No impulsivity penalty has been applied to the sound levels recorded outside the premises when considered against the baseline noise climate which is in context with the local environment.

As can be seen from the above BS4142:2014+A1:2019 assessment, the proposed fixed plant noise output is not likely to produce any adverse impact on the nearby noise sensitive dwellings. This is a clear indicator that the site is likely to operate at an acceptable level and not produce any adverse comments relating to noise.

13.2 Mitigation Recommendations

Based upon the results of the impact assessment completed for the proposed change of use of the retail premises to takeaway units, including kitchen canopies and accompanying extraction fans, it has been demonstrated that the fans will operate below the background level and as such no additional mitigation is required.

14.0 Report Summary

In order to inform Planning No 2025/90284 for the change of use of the 3 No retail units on site to 'Retail, Hot and Cold Food and Hot Food Takeaway', a noise survey was carried out of the existing baseline environmental noise climate on 1st April 2025.

The results indicate that the baseline noise climate is primary due traffic movement along Huddersfield Road and the local road network.

From the data collected an assessment of the maximum permissible daytime and evening noise levels have been calculated. The emissions from the retail units should be kept to a maximum of 40 dBA, representing a -10 dBA value below the existing 50 dBA evening period background level, recorded outside the residential premises of No 970 Huddersfield Road, the closest noise sensitive property to the west of the site.

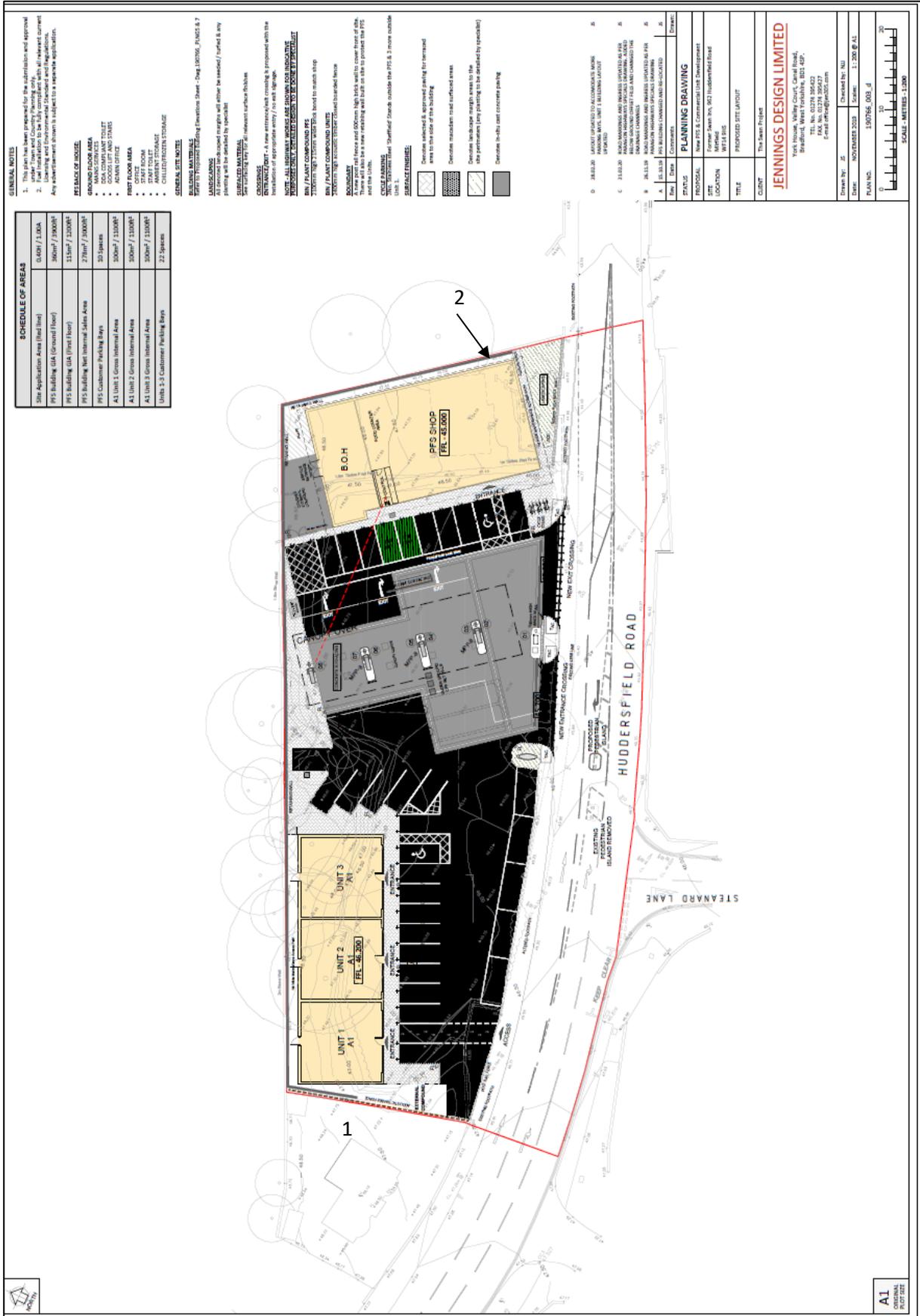
An impact noise assessment has been carried out for the prime sources associated with the change of use, namely the introduction of fixed plant within the individual units. It has been concluded that the noise from these sources, following change of use, are not likely to have a detrimental effect or undue impact on the amenity of the closest noise sensitive residential premises, No 970 Huddersfield Road, west of the site.

Additional mitigating noise control, over and above the existing acoustic barriers located along the western boundary, are not required for the fixed plant items for the change of the use units to guarantee maintenance of the existing noise levels for the advised time periods of operation, and to ensure that the amenity is not going to be unduly affected.

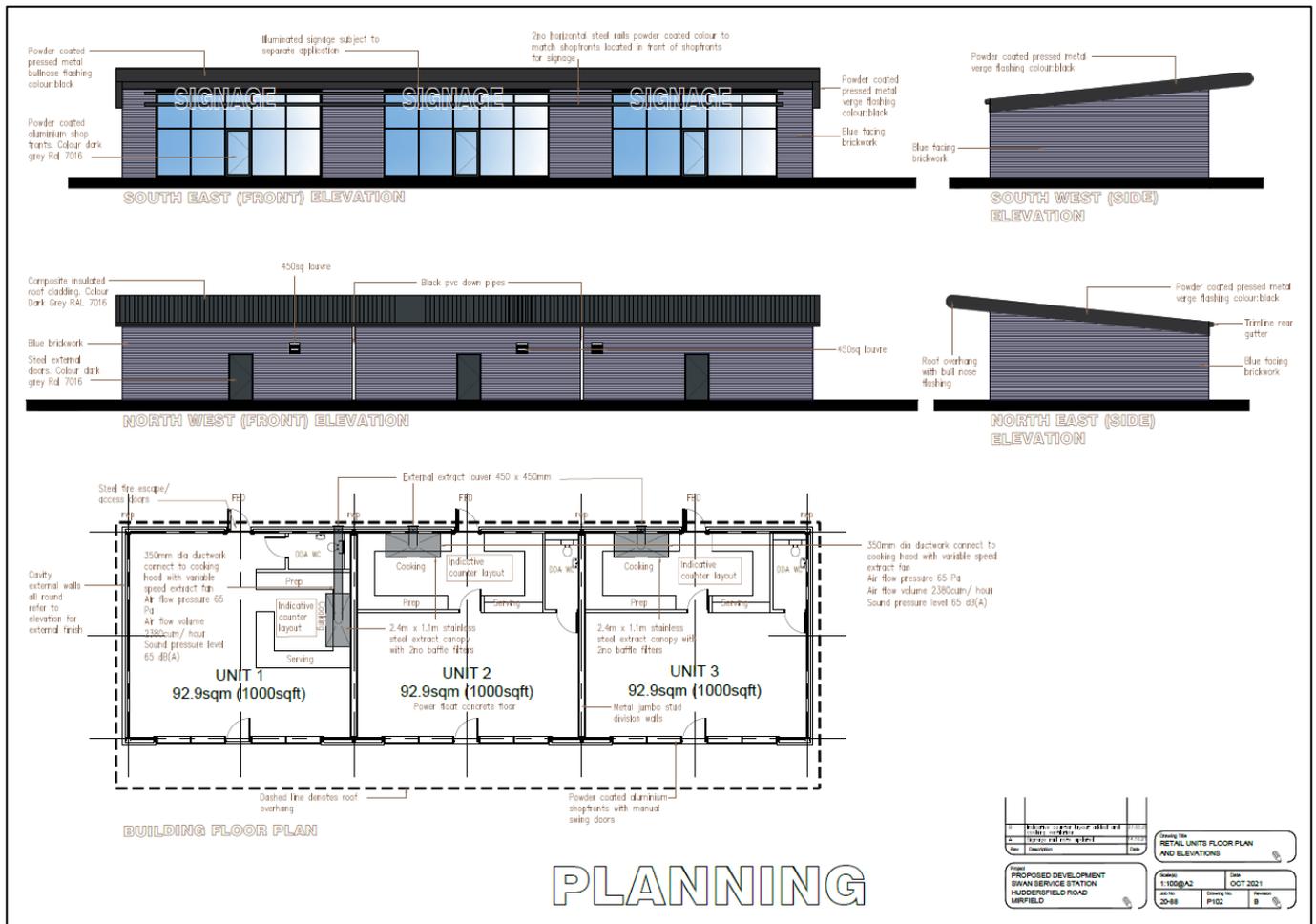
Provided that the noise limitations noted are adhered to there is not going to be any detrimental loss of existing amenity for the residential premises, noted above.

Appendix A-1

Locational Outline and Monitoring Points



Appendix A-2 Retail Unit Fitout Proposals



Appendix A-3

Site Photos of Retail Units



Rear Path Behind Units West View



Rear path Behind Units East View



View of No 970 Huddersfield Road Premises and Boundary Fence

Appendix B Noise Survey Frequency Analysis Results Table

Location	Position	Period	Data ID	Start date & time	Duration	L _A Max dB	L _A eq dB	L _A 10 dB	L _A 90 dB	1/1 Oct LZeq (SR) [dB]								1/1 Oct L90 (SR) [dB]							
										63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
1	Western Site Boundary	Daytime	1	01/04/2025 09:12	06:15:00	94.1	64.2	66.6	56.0	69.7	65.5	62.0	60.5	60.8	56.3	49.5	41.7	59.3	54.7	53.4	51.4	52.6	47.5	38.3	28.1
		Evening	2	01/04/2025 20:01	03:00:00	85.0	61.5	64.9	49.9	66.7	60.9	59.0	56.9	58.6	53.7	45.4	35.9	53.7	48.1	46.6	45.5	46.8	41.6	31.3	19.9
2	1m From External Kitchen Canopy Extract Cowl	Daytime	1	01/04/2025 15:44	00:03:00	70.4	68.7	69.7	67.7	63.9	66.1	64.6	65.6	63.9	60.0	57.5	60.0	60.1	63.3	62.7	64.3	62.1	58.6	57.0	59.1

Appendix C-1 Impact Assessment Calculation Tables

Unit No 964									
Frequency Hz	63	125	250	500	1k	2k	4k	8k	dBA
Fan at 1m	64	66	65	66	64	60	58	60	69
Distance Correction, dB	-32	-32	-32	-32	-32	-32	-32	-32	-32
Location Correction, dB	6	6	6	6	6	6	6	6	6
Resultant Fan Contribution dB	38	40	39	40	38	34	32	34	43

Unit No 966									
Frequency Hz	63	125	250	500	1k	2k	4k	8k	dBA
Fan at 1m	64	66	65	66	64	60	58	60	69
Distance Correction, dB	-30	-30	-30	-30	-30	-30	-30	-30	-30
Location Correction, dB	6	6	6	6	6	6	6	6	6
Resultant Fan Contribution dB	40	42	41	42	40	36	34	36	45

Unit No 968									
Frequency Hz	63	125	250	500	1k	2k	4k	8k	dBA
Fan at 1m	64	66	65	66	64	60	58	60	69
Distance Correction, dB	-28	-28	-28	-28	-28	-28	-28	-28	-28
Location Correction, dB	6	6	6	6	6	6	6	6	6
Resultant Fan Contribution dB	42	44	43	44	42	38	36	38	47

Resultant at No 970 Huddersfield Road

Frequency Hz	63	125	250	500	1k	2k	4k	8k	dBA
Resultant 3 No fans	45	47	46	47	45	41	39	41	50
Barrier Correction *	11	12	14	18	20	23	25	25	19
Total Resultant for 3 No Fans at Receiver	34	35	32	29	25	18	14	16	31

*See Barrier Calculation Data Sheet

Appendix C-2

Barrier Calculation

Project: J3331 - Swan Service Station - Retail Units

Freq, Hz	63	125	250	500	1k	2k	4k	8k
Plant Contribution	45	47	46	47	45	41	39	41

POSITIVE SCREEN

Source to Barrier	10	
Barrier to Receiver	3	(estimated distance to receiver)
Barrier Height	6	
Source Height	3	
Receiver Height	3	(direct line of sight assumed between source & receiver)
Path Difference	1.34	

Attenuation due to Screens

Path Difference	63	125	250	500	1k	2k	4k	8k
-0.30	1	0	0	0	0	0	0	0
-0.20	2	1	0	0	0	0	0	0
-0.10	3	2	1	0	0	0	0	0
-0.05	3	3	2	1	0	0	0	0
-0.01	4	4	4	3	3	2	1	1
0.00	5	5	5	5	5	5	5	5
0.01	5	6	6	6	7	8	8	8
0.05	7	7	8	9	10	12	13	13
0.10	7	8	9	10	11	14	16	16
0.20	8	9	10	11	14	16	19	19
0.30	8	9	10	13	16	18	20	20
0.40	9	10	12	14	17	20	22	22
0.50	9	10	12	15	18	20	23	23
1.00	11	12	14	18	20	23	25	25
2.00	14	15	18	20	24	27	29	29
3.00	15	17	20	22	25	28	30	30
4.00	16	18	20	24	26	30	31	31
5.00	16	18	21	25	27	30	32	32

Screening Effect from above table (B):	11	12	14	18	20	23	25	25	
SRI of Screen Panels (C):	15	18	21	25	28	30	30	30	
Level at Receiver due to Screening Effect (A - B)=D:	34	35	32	29	25	18	14	16	
Level at Receiver due to Direct Transmission (A - C)=E:	30	29	25	22	17	11	9	11	
Resultant Level at Receiver (log add'n of D & E):	35	36	33	30	26	19	15	17	
NR Level Required:	NR35	63	52	45	39	35	32	30	28
Additional Attenuation Required:	-28	-16	-12	-9	-9	-13	-15	-11	

dBA Correction:	-26	-16	-9	-3	0	1	1	-1
A-Weighted Equivalent:	8	19	23	26	25	19	15	15

dBA Level at Receiver (with no additional attenuation): **31 dBA**

NR65	87	78	72	68	65	62	61	59
NR60	83	74	68	63	60	57	55	54
NR55	79	70	63	58	55	52	50	49
NR50	75	65	59	53	50	47	45	43
NR45	71	61	54	48	45	42	40	38
NR40	67	57	49	44	40	37	35	33
NR35	63	52	45	39	35	32	30	28
NR30	59	48	40	34	30	27	25	23
NR25	55	44	35	29	25	22	20	17

Completed By: _____ Paul Horsley _____

Date: _____ 14.04.25 _____