Noise Management Plan

Much Fawley Farm Site

HR1 4SP

Prepared by

E&J Solutions Limited
Upper House, Brierley, Presteigne, Powys, LD8 2NA

Tel: (01544) 267931 / (07818) 084455 e-mail john@eandjsolutions.co.uk

Version 2 25-4-21

Contents

Record of Changes

Version	Date	Change
1.1	29/01/18	Add noise emitting equipment and site plan.
1.1	30/7/18	Improvement Programme Additions.
2.0	18/8/20	Add Matrix Acoustic Design Consultants Noise Impact Assessment Results and recommendations into the management plan.
2.0	11/3/21	Bring plan into line with “Horizontal Guidance for Noise Part 2 – Noise Assessment and Control.
2.0	27/4/21	Revise Plan for Permit Variation Application.
2.0	27-4-21	Add CAR Report Response 31-3-21 and amend Noise Plan as required.

Introduction

This Plan has been prepared in response to reported Noise Annoyance on 31-3-21 and as assessment of noise levels for the installation of the 2nd CHP and because there are sensitive receptors (neighbouring dwelling houses) within 75 metres of the installation.

The purpose of this Plan is to: -

- Establish the noise emitting equipment on the site and their locations in respect of the sensitive receptors near the site.
- Set out the mitigation to minimise the impact of noise from the equipment listed above.
- The role of this report is to integrate the Matrix Acoustic Design Consultants report of the 18th August 2020 and the Acoustic Note N01a 11th March 2021 into this Noise Management Plan.

The procedures to manage noise issues on the site should be based on the hierarchy for control measures as below:

The hierarchy for control should be to:

1 Prevent generation of noise at source by good design and maintenance.

2 Minimise or contain noise at source by observing good operational techniques and management practise.

3 Use physical barriers or enclosures to prevent transmission to other media.

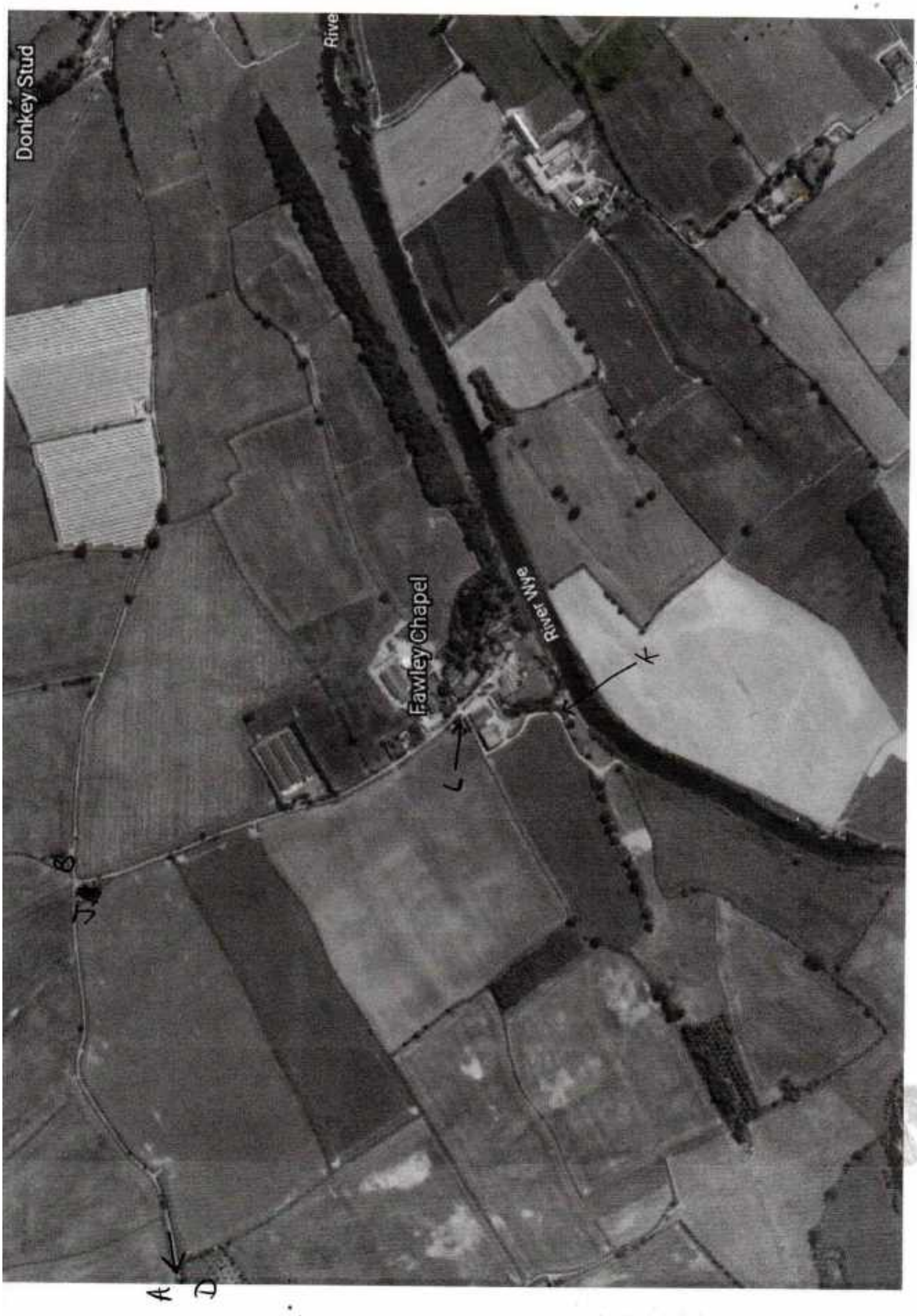
4 Increase the distance between the source and receiver.

5 Sympathetic timing and control of unavoidably noisy operations.

Receptors locations.

Receptor	*Receptor Reference*	*Direction*	*Distance to Installation Boundary Sources*
Fawley Court Farm Office	A	NW	1400m
Fawley Cross Cottage	B	NNW	700m
Fawley Chapel	C	SSW	165m
Greystones	D	NW	1400m
Leybourne	E	W	120m
Much Fawley Farm	F	SSE	180m
Seabournes	G	SSE	180m
The Lodge	H	SSW	75m
Tremelza	I	SSW	75m
Wyche Cottage	J	NNE	740m
Wye Cottage	K	SSW	290m
Strangford View	L	SW	140m
Seabourne Cottage	M	SSE	130m

Receptors Locations

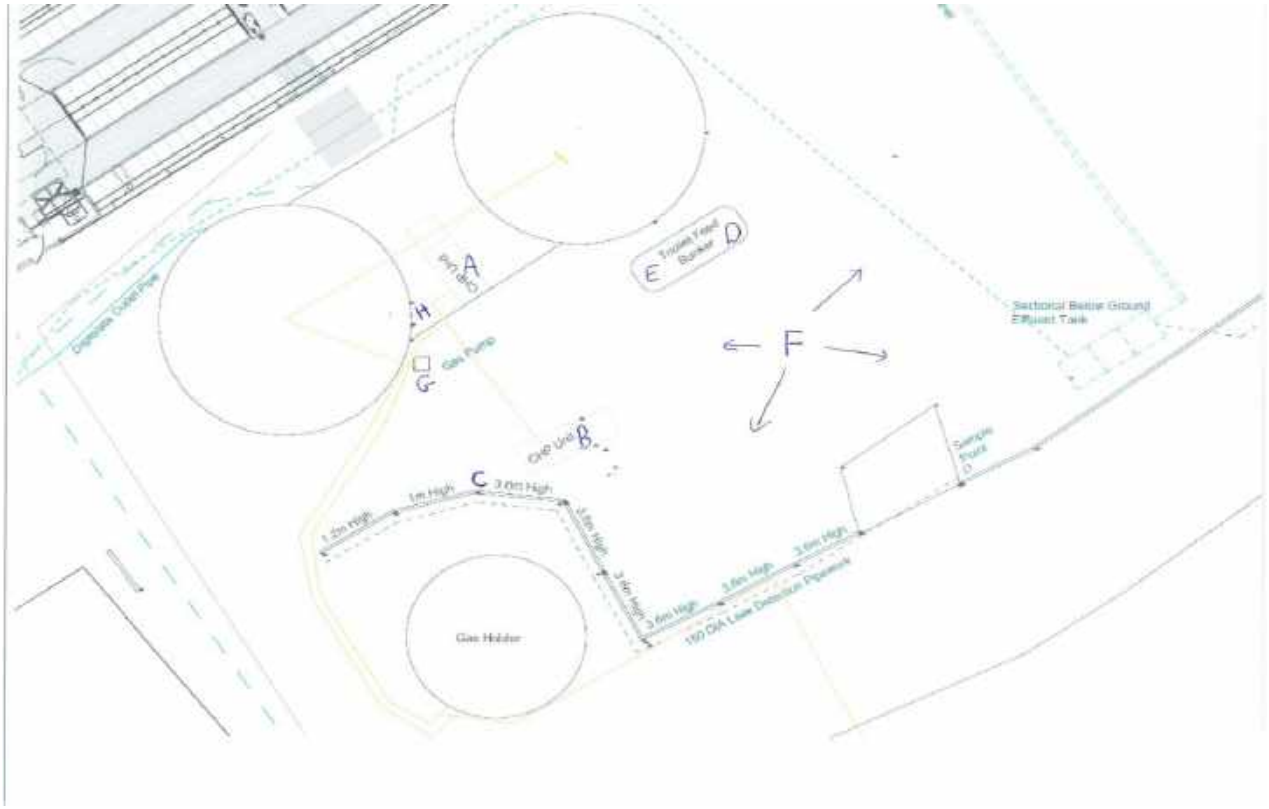

Donkey Stud
Rive
River Wye
Fawley Chapel
K
L
B
J
A
D

Noise Sources

Indentify Sources Of Noise And/Or Vibration	*Operational Times*	*Source Reference*	*Describe The Nature Of The Noise Or Vibration*	*Noise Emissions Levels*	*Contribution To Overall Emission*
CHP 1					
Power Systems	Continuous	A	Located in the service building - background noise damping in addition to acoustic container.Three high hortizontal panels from visual and noise abatement properties to south east location senstive receptors.	75 db at 1m.	Medium
CHP 2					
Habo BV	Continuous	B	Located in as built acoustic container, Soundproofed exhaust gas system - resonance and absorption, silencer. Located immediately behind 3 high horizontal concrete panel bund wall. See plan for bund heights as built. Ascoustic container walls and roof galvanised plate with rumble damping 8kg/m2, isolation 100mm(50mm high density, 50mm low density, glass fibre and proforated sheet.	75 db at 1m.	Medium
CHP 1 and CHP2- Run in isolation- never together.					
CHP Heat Exchanger - External					
AIA Heat Exchanger	Intermittent Regular	C	Bolted concrete floor adjacent to CHP. Located to maximise air flow to efficently cool engine coolingsystem. Partial line of site to southwest sensitive receptors. Installed vertically. Air flow south west to noth east to help noise damping. "Whisperer" technology very low noise emmissions.	Not known	Medium
Diet Feeder					
Solo Mix 3-6000	Intermittent Regular	D	Located behind 3 horizontal concrete panel wall and adjacent to primary digester tank. Predominatley kept full. Noise output rated empty. Feedstock bulk aids sound damping. Intermittent regular output as regular feed to AD plant. No line of site to south west sensitive receptors.	70db (continuous operation)	Low

Quickmix (Under Triolet) Roto Pumps 64	Intermittent Regular	E	Under Triolet operation as per triolet. No line of sight to south west receptors	69 db at 1m	Low
Wheeled Loader					
JCB TM310S	Within working hours as per planning condition. Intermittent regular	F	Silage clamp operation and loading diet feeder. Intermittent operation. Primarily to fill feederwagon and handle feedstock in clamp. Site is designed to ensure the majority of operation in behind 3 horizontal concrete panel silage clamp and bund walls. Exhaust silencer fitted and maintained	107 db	Low
Gas Pump					
Meindinger - P-GRN48/120/500/2G	Continuous	G	Continuous operation. As site plan is located adjacent to the secondary digester tank. No DSEAR guarding or impact protection around this pump. 1.2 metre high horizontal panle damping to provide partial but not full height line of site protection to south west sensitive receptors	81 db at 1m	High
Quickmix (Service Building) Roto Pumps - RM 64	Intermittent Regular	H	Pump located in service building. Sound Proofing from service building structure and CHP and 3 panel horizontal concrete panle bund wall effectively sheilding from south west sensitive receptors.	69 db at 1m	Low

Location of Noise Sources



Noise Minimisation.

Source	*Potential Failure Scenarios*	*What Measures Have Been Put Into Place To Prevent The Failure Or To Reduce The Impact*	*What Is The Environmental Impact/Outcome If There Is A Failure*	*What Actions Are Taken If This Occurs And Who Is Responsible*
A	Doors left open.	Located in service buildig - background noise damping in addition to acoustic container. Three high horizontal panles from visual and noise abatement properties to south east location of sensitive receptors. Closing doors.	Annoyance neighbours to the south south west.	Nigel Green
B	Doors left open.	Located in as built acoustic container. Soundproofed exhaust gas system - resonance and absorption silencer. Located immediatley behind 3 high horizontal concrete panle bund wall. See plan for bund heights as built. Acoustic container walls and roof galvanised plate with rumble damping 8kg/m2, isolation 100mm (50mm density, 50mm low density, glass fibre and proforated sheet.	Annoyance neighbours to the south south west.	Nigel Green
C	Component Failer generating additional noise.	Bolted to concrete floor adjacent to CHP. Located to maximise air flow to efficiently cool engine cooling system. Partial line of site to south east sensitive receptors. Installed vertically. Air flow soth west to north east to help noise damping. Following Matrix report will extend the height of the bund wall to further reduce impact. Awaiting planning decision on this matter currently.	Annoyance neighbours to the south south west.	Nigel Green
D	None	Located behind 3 horizontal concrete panel wall and adjacent to primary digester tank. Predominantly kept full. Noise output rated empty. Feedstock bulk aids sound damping . Intermittent regular output as regular feed to AD plant. No line of site to soth west sensitive receptors.	Annoyance neighbours to the south south west but there is no line of sight visual.	Nigel Green
E	None	Under triolet peration as per triolet. No line of sight to south west sensitive receptors.	Annoyance neighbours to the south south west but there is no line of sight visual. Pump has had no issues and	Nigel Green
F	None	Silage clamp operation and loading diet feeder. Intermittent operation. Primarily to fill feederwagon and handle feedstock in clamp. Site is so designed to ensure the majority of operation in behind 3 horizontal concrete panle silage clamp and bundwalls. Exhaust silencer fitted and maintained.	Annoyance neighbours to the south south west. Maintain working hours and machinery maintenance.	Nigel Green
G	Out of hours annoyance.	Continuous operation. As site plan pump is located adjacent to the secondary digester tank. No DSEAR guarding or impact protection around this pump. 1.2 metre high horizontal panel damping to provide partial but not height line of site protcetion to soth east sensitive receptors.	Annoyance neighbours to the south south west. Will be adopting the Matrix Acoustics report recommendations about extending the height of the bund wall. Using the existing galebreaker to screen an additional section to mitigate the impact on those receptors to the south west.	Nigel Green
H	None	Pump located in service building. Sound proofing from service building structure and CHP and 3 panel horizontal concrete panle bund wall effectively shielding from south west sensitive receptors.	Annoyance neighbours to the south south west. Maintain existing levels of machinery maintenance.	Nigel Green

Noise Monitoring and Complaint Procedures

1. Any noise complaint received will be dealt with by either Mr Nigel Green or Mrs Sally Green (the owners and operators of the farm and the named permit holders). In their absence a designated trained operator of the plant will deal with all complaints. This operator shall be trained in the full operation (and shutdown) of the plant, the emergency procedures, and the contents of this noise management plan.

2. Appendix A is for completion when doing additional Noise Assessments when doing site walkabouts. This may be due to additional site checks to ascertain existing noise levels.

3. If a complaint is made, the form included in Appendix B of this Plan will be completed and this will be available for inspection by the Environment Agency. Any calls received will be investigated immediately and contact made with the complainant to confirm the action which has/is being undertaken in order to stop the noise issue. This may potentially include shutting down of the plant until the problem can be resolved.

4. In the event of a perceived elevated noise level and in absence of a formal complaint Appendix C Noise Diary should be completed. This will act as a record of the incident in the event that a formal complaint may be made.

5. All these records to be filed within the Environment Management System and kept as a record for audit purposes.

6. After details of the complaint have been compiled, the cause(s) will be investigated, with reference to:

   The activities taking place on the farm at the time.

   The timing of the complaint and whether weekday, weekend etc.

7. The daily monitoring regime at the site boundary & the complainant's property will also be undertaken to identify the noise issue which is the cause of complaint.

8. The likely reasons for the complaint will be added to the form and the complainant will be contacted as appropriate.

9. The feasibility of making changes to the activities responsible for the complaint will be considered. Should changes be possible, the operating procedures shall be amended such that there is no repeat of the noise generation? A record of the change will also be recorded within the Record of Change section of this Noise Management Plan.

10. Further Noise Monitoring shall be undertaken at the site boundary and the location of the complainant to confirm that the noise annoyance has been resolved.

11. If changes are made, the Noise Management Plan will be amended accordingly.

Review Procedures

The Noise Impact Plan shall be reviewed at least every three years or as soon as practicable after a complaint (whichever is the earlier) and changes recorded in the "Record of Changes" Table in this plan.

Review Actions 27-4-21

Additional response to the EA CAR Report

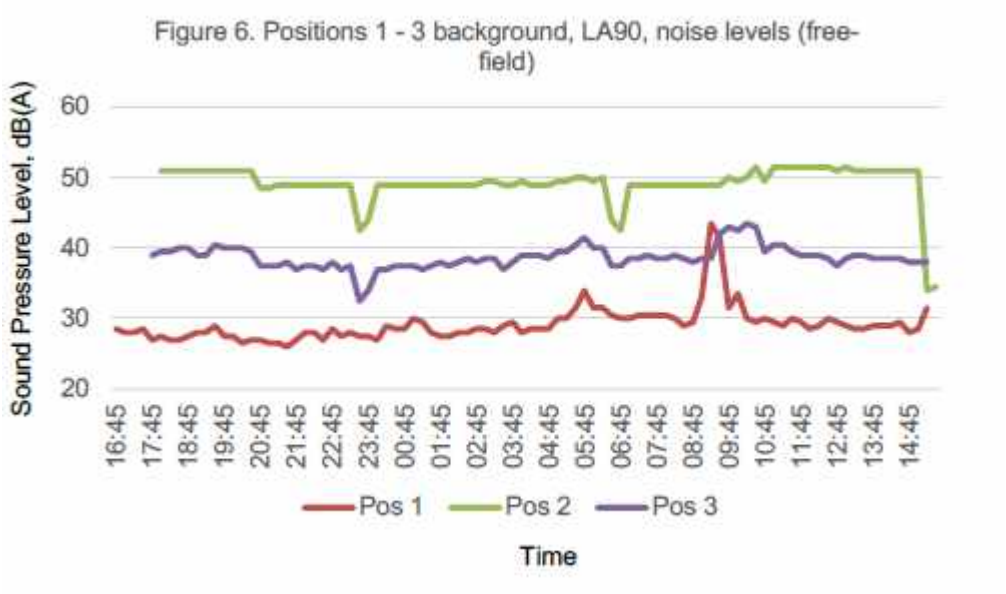
On the 31-3-21 the CAR Report states that whilst stood beyond the south west corner of the permitted AD site between the gas storage vessel and nearby residential property noise at a level likely to cause pollution was experienced.

In response to this we would like to include extracts from a Noise Impact Assessment report completed on the 18th August 2020 for which noise monitoring was completed over the period Tuesday 11th – Wednesday 12th August 2020. Report is also attached to this Management Plan. It was completed according to BS4142 Standards and although was completed to quantify the impact of the second (emergency) CHP on the site the background noise assessment levels are useful to justify the noise levels currently found on site. The Acoustics Report 2020/R01 report was carried out by MATRIX Acoustic Design Consultants by Paul Smith.

Whilst the conclusions of the report were of relevance it is the background noise levels without the use of this emergency CHP that are of relevance especially the results from position 2 (25m to the southwest of the CHP unit (unobstructed noise path to the CHP unit and 30 degrees lateral from the cooling fans) location which matches the site that you recorded the issue.

The report notes that with the emergency CHP Unit running (without cooling fans) spot measurements of LAeq 42 Db were recorded.

The attached figure 6 from the same report also shows the background levels in position 2 are at a maximum of just over 50 dB. In sound terms a 'quiet library' type experience. It should also be noted that no equipment changes or component replacements on these noise producing elements on site have occurred since this monitoring was carried out.



The conclusions of this report state "During the night (23:00 – 07:00hrs) the representative typical background noise level and established attenuated Rating Levels are very low".

The above report shows that sound levels are assessed to be acceptable, but we still intend to install mitigation to reduce the impact still further on site to address your personal assessments carried out on the 31st March 2021.

Additional Mitigation being done as below:

- Heston Straw bales surrounding gas pump to further suppress noise levels while awaiting planning decisions on acceptable materials to combine equipment protection with sound mitigation.

Additional Mitigation measures planned:

As a result of the Matrix Design Consultants Acoustics Report 2020/R01 Report the following noise abatement actions are being planned. The choice of solutions has been affected by engineering considerations on the site and the solution options are awaiting confirmation from planners regarding materials and visual impact but in principle.

- New 3.6m high 22m timber panel barrier.
- Awaiting confirmation of gas pump noise suppression shrouding which needs to comply with DSEAR requirements and visual impact for planners
- The existing galebreaker windbreak sheet which is currently being used to suppress noise from the emergency CHP is being planned to be moved across to continue the wooden panelling that has been recommended as part of the MATRIX Acoustic Design Consultants Plan and as part of the M2030 Much Fawley Farm Acoustic Note No1a (Also attached). Extending the wooden panelling being installed to further suppress CHP noise (this sheet will be redundant anyway when the wooden panelling is installed to suppress the CHP noise). This additional and extended acoustic feature will protect those dwellings to the south west further.

The Environmental Management System and Noise Management Plan have both been updated in response to this CAR Report 31-3-21 – Amenity – Odour and Noise Response.

Improvement Programme To Reduce Noise

Date	Action	Who Will Implement	Date Completed
11-3-21	Installation of 22mm timber panel barrier to be installed on bund wall adjacent to CHP.	Nigel Green	
11-3-21	Installation of galebreaker on top of bund wall to the west of the 22mm timber panel barrier.	Nigel Green	

Any other relevant information not specifically detailed above could be given or referenced here e.g monitoring schedules, alarm- testing, arrangements, maintenance procedures etc.

- Logs of processes and checks carried out to minimise noise emission from normal operations.
- Log of processes and checks carried out to minimise noise emission from failures and other factors. This includes reactive maintenance where required to address increased noise or vibration emissions, replacement of equipment and the like.
- Log of monitoring and compliance checks undertaken note: The operational log should normally be completed within 14 days of taking the measurements or actions. All sound level monitoring to be undertaken and reported in accordance with the relevant British Standards.

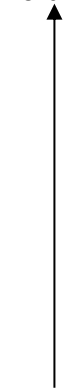
Appendix A – Noise Report Form

Date

Time of test					
Location of test					
Wind strength (none, light, steady, strong, gusting)					
Wind direction (e.g. from NE)					
Intensity (see below)					
Duration (of test)					
Constant or intermittent in this period					
Location sensitivity (see below)					
Is the source evident?					
Any other comments or observations					

Sketch a plan of where the tests were taken, the potential source(s).

North



Intensity (Detectability)	**Location sensitivity where noise detected**
1 No detectable noise 2 Faint noise (barely auduble, need to stand still and face into the wind) 3 Moderate noise (noise easily detected while walking & moving normally) 4 Loud noise 5 Very loud noise	0 not detectable 1 Remote (no housing, commercial/industrial premises or public area within 500m) 2 Low sensitivity (no housing, etc. within 100m of area affected by noise) 3 Moderate sensitivity (housing, etc. within 100m of area affected by noise) 4 High sensitivity (housing, etc. within area affected by noise) 5 Extra sensitive (complaints arising from residents within area affected by noise)

Appendix B - Noise Complaint Report Form

Time and date of complaint:	Name and address of complainant:
Telephone number of complainants:	

Date of noise:		
Time of noise:		
Location of noise, if not at above address:		
Weather conditions (i.e., dry, rain, fog, snow):		
Wind strength (none, light, steady, strong, gusting):		
Wind direction (eg from NE):		
Complainant's description of noise: ○ What does it sound like?		
○ Intensity (see below):		
○ Duration (time):		
○ Constant or intermittent in this period:		
○ Does the complainant have any other comments about the noise?		
Are there any other complaints relating to the installation, or to that location? (either previously or relating to the same exposure):		
Any other relevant information:		
Do you accept that noise is likely to be from your activities?		
What was happening on site at the time the noise occurred?		
Operating conditions at time the noise occurred		
Actions taken:		
Form completed by:	Date	Signed

Intensity (Detectability)
1 No detectable noise
2 Faint noise (barely audible, need to stand still and face into the wind)
3 Moderate noise (noise easily detected while walking & moving normally)
4 Loud noise
5 Very loud noise

Appendix C Noise Diary	Sheet No

Name: Telephone Number:	Address:

Date of noise:				
Time of noise:				
Weather conditions (dry, rain, fog, snow etc):				
Wind strength (none, light, steady, strong, gusting):				
Wind direction (eg from NE):				
What does it sound like? How unpleasant is it?				
Intensity – How loud was it? (see below 1-5):				
How long did go on for? (time):				
Was it constant or intermittent in this period:				
What do believe the source/cause to be?				
Any actions taken or other comments:				

Intensity (Detectability)
1 No detectable sound
2 Faint noise (barely detectable, need to stand still and listen facing into the wind)
3 Moderate noise (noise easily detected while walking & moving normally)
4 Loud noise
5 Very loud noise

Appendix D - Contact Information Sheet

Much Fawley Anaerobic Digester
Much Fawley Farm
Fawley,
Herefordshire
HR1 4SP

Emergency and Complaints Contact Information

Should you wish to make a complaint about emissions from this plant, or in case of emergency, please contact the following;

Mr Nigel Green	Tel: 07970 194271
Farm Office	Tel: 01432 840632
Dairy Office	Tel: 01432 840821

Any comments you wish to make in writing should be made to the above address, or by e-mail to:

green@muchfawley.co.uk

MATRIX ACOUSTIC DESIGN CONSULTANTS

Backup CHP Unit
Much Fawley Farm
Fawley
Herefordshire
HR1 4SP

NOISE IMPACT ASSESSMENT

Acoustics Report 2020/R01
18th August 2020

To: Acorus Rural Planning Services Ltd
Addlepool Business Centre
Woodbury Road
Clyst St George
Exeter
EX3 0NR

By: Paul Smith BSc MIOA

Brookfield Coach House
Weston Lane
Bath BA1 4AG

M: 07765 518035
T: 01225 667 470
E: mail@matrixacoustics.co.uk

1. Introduction

This acoustic report documents a BS4142 Noise Impact Assessment for the backup Combined Heat and Power (CHP) unit at Much Fawley Farm, Fawley, Herefordshire; Figure 1 and 2.

The assessment has been requested by Herefordshire District Council as part of the retrospective planning application for the plant.

The report is divided into the following sections:

- Section 2: Overview of the Development
- Section 3: BS4142
- Section 4: Noise Survey
- Section 5: Noise Impact Assessment
- Section 6: Conclusion
- Appendix A: Noise monitor and weather station data
- Appendix B: Calculations

2. Overview

2.1 Backup CHP Unit

The backup CHP unit is housed within a metal container (5m long, 2.8m wide and 2.8m high), with a separate control room attached to the east of the unit. The container has access doors on the south and north façades; Figures1 and 3.

On the roof of the container is an exhaust duct (duct termination at 3.4m above local ground) and two rectangular air intake ducts (2.2m x 2.25m x 1m & 1m x 1.5m x 1.6m x 1m).

To the west of the CHP container are two cooling fans, with the centre of the fans at 1.2m above local ground. These are only operated during periods of very high external temperatures when additional cooling of the CHP unit is required.

The CHP unit is located to the south of existing livestock barns, biomass digestion storage tanks and an enclosed CHP unit. Note that these include a number of items of plant such as exhaust ducts and motors.

We understand that the CHP unit that is the subject of the retrospective planning application is for backup purposes only, though when in operation could potentially operate over a full 24hr period.

To the south of the CHP unit is a 200mm thick concrete wall, ranging between 1m - 3.6m high; Figure 2. The 1m high section of the wall directly in front of the cooling fans has a lightweight screen above; this can be seen in Photos 2 and 4 in Figure 3.

2.2 Noise sensitive receptors

The closest dwellings, labelled Receptors A and B in Figure 1, are 55m and 75m respectively from the backup CHP unit.

Receptors A's garden is to the south of the house; the house itself is therefore the closest element of the residence to the CHP unit. Receptors B's garden however, which lies to the east of the house, is closer to the CHP unit at 50m from mid garden to the CHP.

Currently there is an unobstructed noise path between the CHP unit and both Receptors A and B.

2.3 Site Context

Operating 24/7 are existing Much Fawley plant associated with the biomass digestion storage and the main CHP unit. The noise environment of the locality therefore includes the contribution of these noise sources.

Figure 1. Aerial view (source: bing.com) showing location of backup CHP and nearest noise sensitive receptors

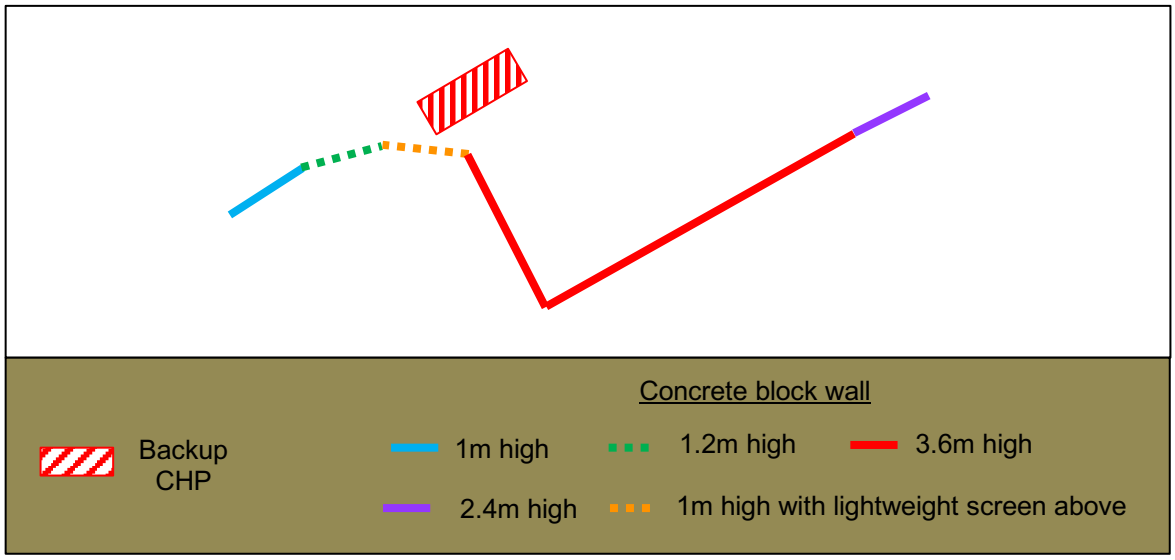


Figure 2. Sketch showing heights of the concrete block wall

Photo 1. View of north elevation of CHP unit

Photo 2. View of CHP unit looking south-east

Photo 3. View of CHP unit and 3.6m high concrete wall looking south-west

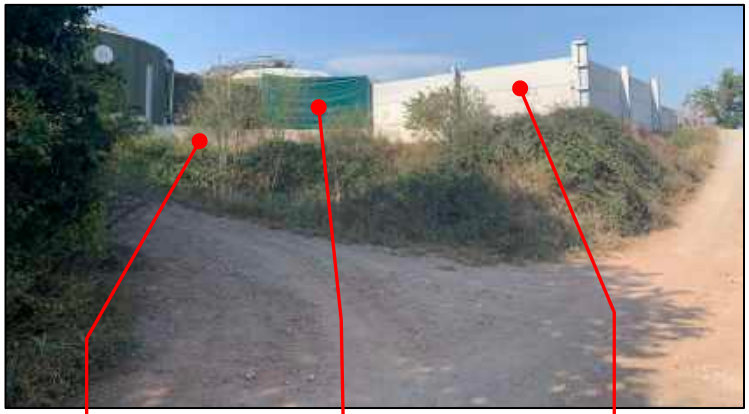


Photo 4. View looking north-east of the 1m - 3.6m high concrete wall and lightweight screen

Figure 3. Site photos

3. Noise Criteria

To assess the impact of CHP noise emissions at the nearest noise sensitive receptors the following guidance documents have been considered.

3.1 BS4142:2014

BS4142:2014 provides a methodology to assess the impact of industrial and commercial noise affecting dwellings, whereby the 'typical' background noise level is deducted from the industrial noise Rating Level (industrial noise corrected to account for the 'on-time' and noise character of the noise source). The following guidance is given based on the established difference:

- A difference of around +10dB or more is likely to be an indication of significant adverse impact, depending on context
- A difference of +5dB is likely to be an indication of an adverse impact, depending on 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 a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on context

Context, as defined in BS4142:2014, includes the consideration of the following factors:

- The absolute level of the noise emissions
- Character and level of the residual sound compared to the character and level of the Specific Level
- Sensitivity of the receptor and any acoustic design measures (e.g. façade sound insulation, use of mechanical ventilation and acoustic screening) incorporated at premises used for residential purposes

Where background noise and Rating Levels are low, BS4142:2014 states that *'absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night'*. Low background noise and rating levels are not defined. However, in BS4142:1997 it states that '*background noise levels below 30dB and rating levels below about 35dB are considered to be very low'*.

To take account of industrial/commercial noise sources that do not operate continually an 'on-time' correction is applied using:

$$- 10 \log (r/r_{ref})$$

Where:

$r_{ref.}$ = reference time (1hr between 07:00 – 23:00hrs and 15 minutes between 23:00 – 07:00hrs)

r = total 'on-time' during the reference period

Note that the shorter reference time interval between 23:00 – 07:00hrs is designed to penalise industrial/commercial noise events that occur during the night.

BS4142 provides four noise character correction categories with associated penalties that must be applied when determining the Rating Level, namely:

- **Tonality:** if the noise source can be measured BS4142:2014 provides an 'object' assessment method to determine tonality. Here a 6dB tonality correction is applicable if the level difference between **both** adjacent $L_{Zeq,T}$ one-third-octave bands is equal or exceeds:
  - 15dB in the low frequency one-third-octave bands (25Hz – 125Hz)
  - 8dB in the middle-frequency one-third-octave bands (160Hz – 400Hz)
  - 5dB in the high-frequency one-third-octave bands (500Hz – 10kHz)

- **Impulsivity:**
  - Not perceptible = 0dB
  - Just perceptible = +3dB
  - Clearly perceptible = +6dB
  - Highly perceptible = +9dB
- **Intermittency:** +3dB if the intermittency of operation is readily distinctive against the residual noise environment
- **Other:** +3dB applied if the specific sound is neither tonal or impulsive but features noise characteristics that are readily distinctive against the residual noise environment

4. Noise Survey

A noise survey has been conducted to establish the source noise levels and character of the backup CHP unit and the underlying noise environment of the local area to the two nearest dwellings (A and B, Figure 2).

- **Survey dates**: Tuesday 11th – Wednesday 12th August 2020
- **Weather:** Dry with wind speeds < 5m/sec; the weather conditions will not have adversely affected the noise measurements.
- **Equipment:** Brüel & Kjær Type 2260 (spot measurements) and Brüel & Kjær Type 2238 (24hr measurements)
- **Noise monitor locations:**
  - Spot measurements:
    - 4m from the south side of the CHP unit (cooling fans off)
    - 30m south-west and on-axis of the cooling fans
  - 24hr measurements
    - Position 1: 190m north-west of the CHP unit. Noise path fully acoustically shielded by livestock barns/biomass digestive stores
    - Position 2: 25m to the south-west of the CHP unit. Unobstructed noise path to the CHP unit, and 30° lateral from the cooling fans
    - Position 3: 50m south-east of the CHP unit. Noise path fully blocked by 3.6m high concrete wall
- **Calibration:** Noise monitors calibrated before and after the survey using a Brüel & Kjær Type 4231 calibrator with no deviations found

All noise measurements are free-field. Full tabulated results are given in Tables A1 and A2, Appendix A.

Note that:

- other Much Fawley plant was operating throughout the survey
- due to the very hot conditions during the survey (day time temperatures of between 30 – 33°C) the backup CHP was operating together with the cooling fans for the majority of the survey. We understand that the cooling fans are typically only required during these periods of very hot weather, and consequently the surveyed operation does not represent the typical operation of the backup CHP unit.

4.1 Survey observations

During the survey it was observed that:

- Without the backup CHP unit operating the general noise environment of the locality consisted of other Much Fawley plant and agricultural vehicle movements. The other plant was audible at both Dwellings A and B.
- The dominant noise source of the backup CHP was the cooling fans; this was clearly audible above the general noise environment at both Dwellings A and B

- Without the cooling fans running there was a significant reduction in overall noise levels at Dwellings A and B; the backup CHP noise emissions however were still audible above the general noise environment
- The existing 3.6m concrete wall provided significant shielding attenuation of the CHP unit; at measurement Position 3 noise emissions from the cooling fans, though reduced, were still audible together with other Much Fawley plant. The plant noise levels however were considered subjectively to be not intrusive when taking context into consideration the site context
- At Position 1 (190m north-west of the CHP unit) the general noise environment was considered to be very quiet, with plant noise just audible on occasion. The type/source of the plant could not be identified. Note that the resident of the dwelling adjacent to Position 1 informed us that they were not adversely affected by noise from the existing Much Fawley plant, and considered the general noise environment to be quiet.

4.2 Findings

Figures 4 and 5 show the 1/3 octave band frequency data of the spot measurements made of the CHP unit and cooling fans.

Figure 4. CHP noise emissions at 4m without cooling fans opperating

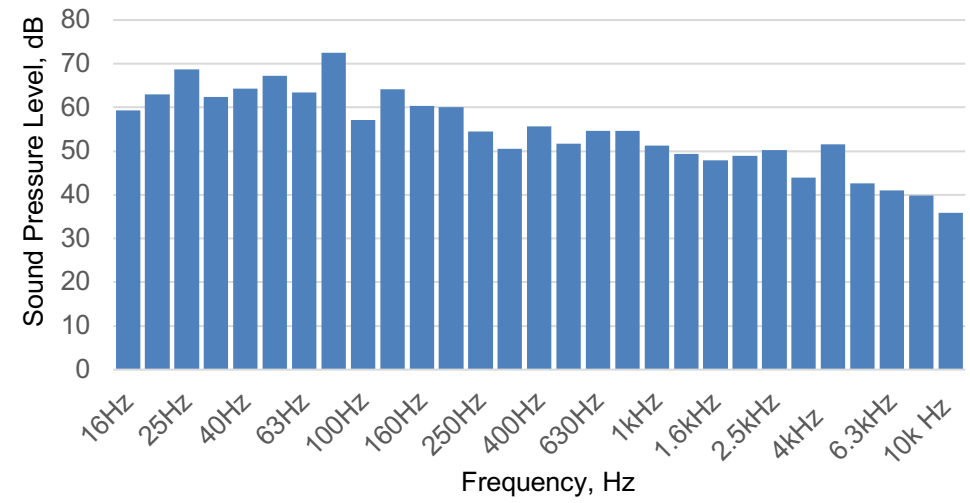
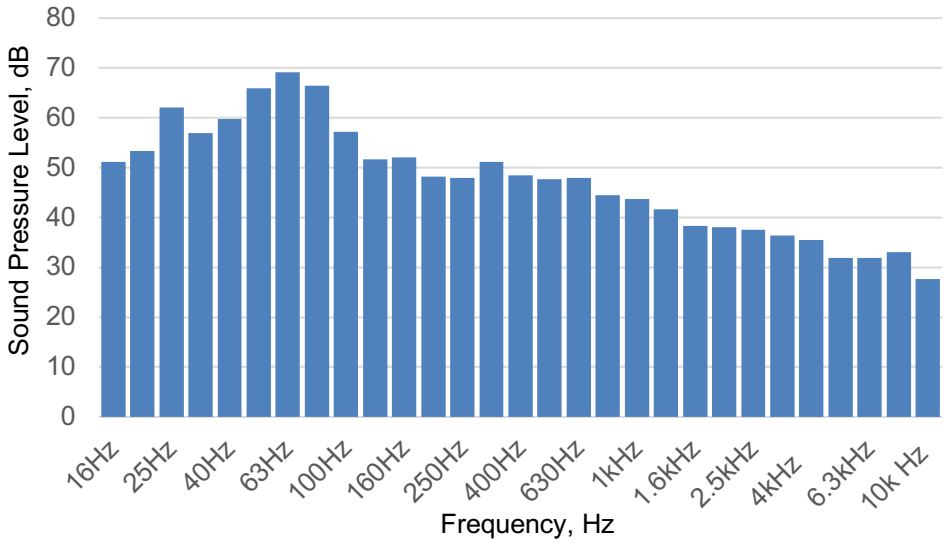


Figure 5. CHP cooling fans on-axis at 30m



From the data the source noise levels and characteristics have been established as:

- **CHP unit (without cooling fans running):**
  - Noise level: L_{Aeq} 62dB at 4m
  - Noise characteristics: Noise emissions are not tonal according to BS4142 'objective' method and do not contain impulsive elements. The noise emissions however have the potential to be intermittent and therefore a 3dB intermittency correction is applicable.
- **Cooling fans:**
  - Noise level: L_{Aeq} 55dB at 30m on-axis
  - Noise characteristics: Noise emissions are not tonal according to BS4142 'objective' method and impulsive noise was not observed. The noise emissions however have the potential to be intermittent and therefore a 3dB intermittency correction is applicable.

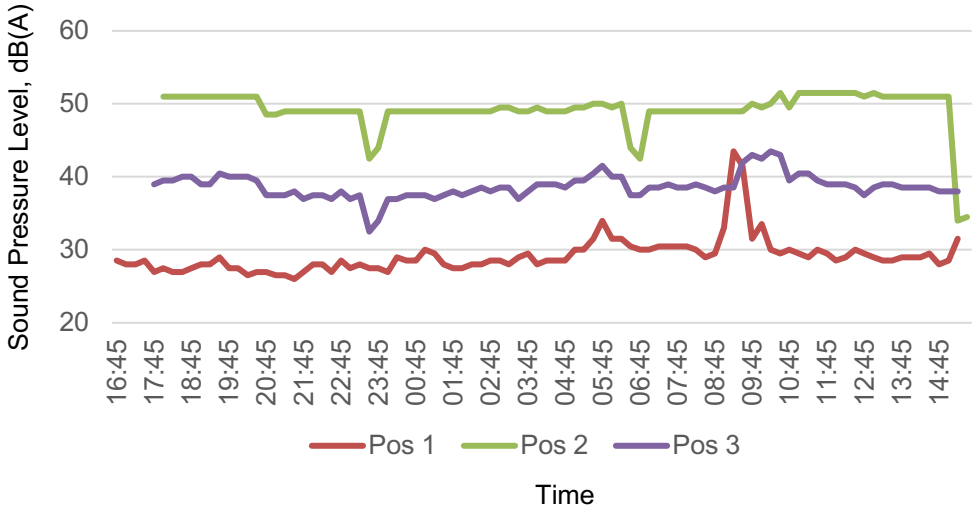
Spot measurements made adjacent to Dwelling A recorded the following levels:

- CHP unit (without cooling fans): L_{Aeq} 42dB
- Cooling fans: L_{Aeq} 46dB

Note that the above noise levels also included the contribution of other Much Fawley plant.

Figure 6 provides the recorded background noise levels obtained at Position 1 – 3.

Figure 6. Positions 1 - 3 background, LA90, noise levels (free-field)



Where there is limited variation in background noise levels it is a good indication of the influence of continuously operating noise sources such as the CHP unit and other Much Fawley plant.

As can be seen there is generally limited variation in the obtained background noise levels at all three measurement positions, in particular at Position 2, which indicates the influence of plant noise emissions throughout the survey.

There are however identifiable troughs at Positions 2 and 3. The first two drops in noise level, which are particularly pronounced at Position 2, are likely to be due to short periods when the cooling fans were not operating (we were informed that the cooling fans do turn off on occasion even during periods of very hot weather).

This finding is in line with the survey observations that the cooling fans are the dominant plant noise source when operating.

The final drop at the end of the survey was observed to be when both the CHP and the majority of the other Much Fawley plant were not operating; this lasted for approximately 20 minutes. During this period a forklift was unloading a truck in the yard; as this noise source was not continuous it will have had a limited impact on the recorded background noise levels.

The resultant reduced background noise level of around L_{A90} 35dB recorded at Position 2 is considered a good indication of the underlying noise level during the day without the CHP operating.

The background noise levels obtained at Position 1, though indicating some influence of plant noise emissions, are very low. The noise levels here are not considered representative to those that will occur at Receptors A and B as the influence of existing Much Fawley plant will be significantly reduced. However, as a conservative measure and in acknowledgement of the very low background noise levels of the area without the contribution of plant noise, we have taken a background noise level of < L_{A90} 30dB as representative during the night period.

For the purpose of the assessment we therefore considered representative typical background noise levels at Receptors A and B without the contribution of the backup CHP unit to be:

- Day (07:00 – 23:00hrs): L_{A90} 35dB
- Night (23:00 – 07:00hrs): < L_{A90} 30dB (assumes that the majority of the existing other plant is not operating)

Note that the above noise levels are low.

5. Noise Impact Assessment

5.1 Deviation of Specific and Rating Levels

Using the measured source noise levels, the Specific and Rating Levels of the backup CHP and cooling fans have been calculated at Receptors A and B based on:

- **Distance correction:** 20 x log (d_1/d_0), where d_1 = distance between receptor and the noise source and d_0 = measurement distance
- **Shielding correction:** The barrier attenuation has been calculated in accordance with Maekawa's "Noise Reduction by Screen" (1968) using:

$$-1\ [10\log(3+\{(40 \times \mathbf{pd} \times \mathbf{f})/344\})]$$

Where,

pd = path difference
f = octave frequency band in question

- **BS4142 character corrections:** 3dB intermittency correction
- **On-time:** Assumed to be operating continuously over the BS4142 assessment period i.e. no on-time correction

The full calculations are provided in Appendix B with the resultant Rating Levels summarised in Table 1.

Note that for the calculations the receiver height in the gardens has been taken to be 1.7m above ground (represents someone standing) and 4.5m above ground at the dwellings (represents the 1st floor level).

To confirm the accuracy of the calculations noise emissions have been calculated at the measurement locations, with the resultant values in line with those surveyed.

5.2 Existing Noise Impact

We define Assessment Level = Rating Level – representative typical L_{A90} dB

Table 1 provides the resultant day period Assessment Levels at Receptors A and B (at the dwelling and mid garden).

Table 1. Calculated Rating and Assessment Levels during the day

Representative 'typical' background noise level: L_{A90} 35dB

Noise Source	Receptor	Existing				With increased height of existing concrete wall; Figure 7			
		Dwellings		Garden		Dwellings		Garden	
		Rating Level, dB	Assessment Level, dB	Rating Level, dB	Assessment Level, dB	Rating Level, dB	Assessment Level, dB	Rating Level, dB	Assessment Level, dB
CHP unit	A	43	8	41	6	26	-9	24	-11
	B	40	5	44	9	24	-11	28	-7
Cooling Fans	A	52	17	51	16	36	1	35	0
	B	50	15	53	18	34	-1	38	3

Where the Rating Level is at parity with the typical background noise level (Assessment Level = 0 dB) BS4142 states that the Specific Level will have a low impact; an adverse impact is indicated where the Rating Level is ≥ 5dB and <10dB above the typical background noise level and a 'significant adverse ' impact for Assessment Levels >10dB.

As can be seen in Table 1 the existing Assessment Levels indicate an **'adverse'** and **'significantly adverse'** noise impact for the backup CHP and associated cooling fans respectively. This finding is in line with the survey observations, particular regarding the cooling fans.

Mitigation measures are therefore advised in order to reduce the noise emissions of the backup CHP.

5.3 Mitigation measure

Significant acoustic shielding can be provided by extending the existing 1 – 1.2m high concrete wall to 3.6m (Figure 7), which will fully block the noise path between the backup CHP/cooling fans and Receptors A and B.

Table 1 provides the resultant reduced Rating Levels and corresponding day period Assessment Levels with the implementation of the increased height concrete wall.

As can be seen in Table 1 the Assessment Levels of the backup CHP unit without the cooling fans operating (which we understand is the typical operation mode) are in all cases significantly below zero. This indicates that the noise impact will be **very low**.

With the contribution of the cooling fans the Assessment Level at highest is 3dB, which occurs at the mid garden of Receptor B. Taking into account that the operation of the cooling fans will typically be infrequent combined with the Assessment Levels being below the 'adverse' threshold, we consider that the attenuated noise emissions of the cooling fans will be acceptable.

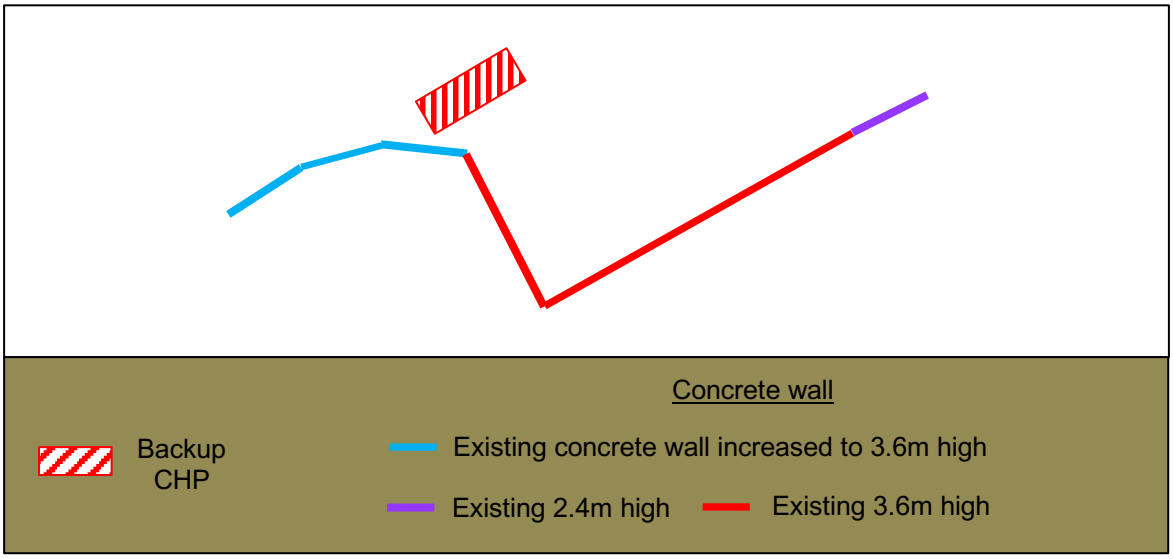


Figure 7. Sketch indicating the advised increased height concrete wall

During the night (23:00 – 07:00hrs) the representative typical background noise level and established attenuated Rating Levels are very low. We therefore consider, in accordance with BS4142, that the absolute noise levels at Receptors A and B during the night are of more relevance in determining the noise impact than the Assessment Levels in this case.

We consider it is reasonable to assume the context that the occupiers of Receptors A and B will be within their houses during the night period. A façade with an open window will provide between 10 - 15dB sound reduction. Using the lower l 10dB reduction, the resultant noise ingress will be:

- Receptor A: 13dB and 23dB
- Receptor B: 11dB and 21dB

The above noise ingress levels are very low, being significantly below the representative background noise level and BS8233 L_{Aeq} 30dB noise ingress limit for bedrooms (noise limit applicable to road traffic noise and continuous operating plant). We therefore conclude that the noise impact during the night, with the increased height concrete wall, will be **low**.

5.4 Calculation uncertainty

With all calculations there is a level of uncertainty, which in this case we do not expect to be greater than +/-3dB (3dB is a just perceptible change in noise level). This small level of uncertainty is not considered to have any significance to the outcome of the assessment.

6. Conclusion

A noise survey has been conducted to determine the:

- noise emissions from the backup CHP unit at Much Fawley Farm, Fawley, Herefordshire; Figures 1 & 2
- underlying noise environment at the nearest noise sensitive receptors: A & B, Figure 1

Using the survey data Rating Levels of the backup CHP unit have been determined via calculation (Appendix B) at Receptors A and B.

Currently the CHP unit Rating Levels relative to the established representative typical background noise levels indicate an ‘adverse’ to ‘significant adverse’ noise impact according to BS4142. This is in line with both observed and surveyed noise emission levels. Noise mitigation measures are therefore advised.

By increasing the height of the existing 1 – 1.2m high concrete wall to 3.6m (Figure 7) a significant reduction of CHP unit noise emissions at Receptors A and B will be achieved. Via calculation the highest attenuated day period Assessment Levels (Rating Level – typical background noise level) have been established as ≤ -7dB for the CHP unit and ≤ 3dB for the associated cooling fans; Table 1.

This indicates a very low noise impact for the CHP unit (without cooling fans operating) and a marginal impact for the cooling fans. Taking into account that the operation of the cooling fans will typically be infrequent combined with the Assessment Levels being below the 'adverse' threshold, we consider that the attenuated noise emissions of the cooling fans will be acceptable.

Due to the very low attenuated Rating Levels and representative typical background noise level during the night the absolute noise levels have been assessed to review acceptability; this is in accordance with guidance given in BS4142.

Taking into account the context that the occupiers are expected to be indoors at night, noise ingress via an open window has been reviewed. Here the ambient noise ingress has been established to be significantly below the representative low background noise level and >10dB below BS8233's noise ingress limits for bedrooms (note the limits are applicable to road traffic and continuous operating plant). We therefore conclude that the backup CHP noise emissions during the night will result in a low noise impact.

We therefore conclude that by increasing the height of the existing concrete wall as indicated in Figure 7, the backup CHP noise emissions can be reduced to acceptable levels.

Table A1. Positions 1 - 3 noise monitor data (free-field)																				
Start Time	Position 1			Position 2			Position 3			Start Time	Position 1			Position 2			Position 3		
	$L_{Amax,F}$ dB	L_{Aeq} dB	L_{A90} dB	$L_{Amax,F}$ dB	L_{Aeq} dB	L_{A90} dB	$L_{Amax,F}$ dB	L_{Aeq} dB	L_{A90} dB		$L_{Amax,F}$ dB	L_{Aeq} dB	L_{A90} dB	$L_{Amax,F}$ dB	L_{Aeq} dB	L_{A90} dB	$L_{Amax,F}$ dB	L_{Aeq} dB	L_{A90} dB
16:45	59.7	37.1	28.5							04:15	48.8	31.9	28.5	53.5	50.8	49.0	45.0	40.5	39.0
17:00	62.6	40.2	28.0							04:30	41.5	31.1	28.5	53.6	50.5	49.0	43.8	40.2	39.0
17:15	60.1	41.9	28.0							04:45	33.7	30.0	28.5	57.3	50.6	49.0	48.8	40.1	38.5
17:30	61.7	41.9	28.5							05:00	44.9	31.5	30.0	63.2	51.3	49.5	49.9	40.8	39.5
17:45	50.3	32.0	27.0				62.2	40.7	39.0	05:15	47.0	33.8	30.0	60.4	51.3	49.5	60.5	44.0	39.5
18:00	65.1	42.5	27.5	63.2	52.0	51.0	56.4	41.0	39.5	05:30	71.4	46.6	31.5	63.9	52.6	50.0	55.9	43.0	40.5
18:15	73.5	47.6	27.0	56.7	51.8	51.0	53.3	40.5	39.5	05:45	51.8	38.4	34.0	69.4	52.1	50.0	57.9	43.8	41.5
18:30	63.4	42.9	27.0	60.3	52.0	51.0	57.7	41.6	40.0	06:00	70.0	45.6	31.5	59.8	51.4	49.5	60.6	42.5	40.0
18:45	43.6	30.7	27.5	56.4	51.9	51.0	58.3	41.0	40.0	06:15	56.5	36.5	31.5	62.2	51.4	50.0	60.7	42.2	40.0
19:00	47.7	31.9	28.0	61.5	51.8	51.0	60.6	42.3	39.0	06:30	45.5	33.6	30.5	69.0	50.5	44.0	54.6	41.0	37.5
19:15	61.2	40.1	28.0	65.8	51.8	51.0	59.1	42.1	39.0	06:45	63.5	34.1	30.0	64.3	50.3	42.5	64.1	43.8	37.5
19:30	64.2	39.9	29.0	65.6	52.2	51.0	62.9	45.0	40.5	07:00	64.6	35.4	30.0	56.6	49.8	49.0	60.8	41.0	38.5
19:45	46.7	32.7	27.5	74.0	53.4	51.0	63.4	43.5	40.0	07:15	61.6	38.6	30.5	62.4	50.0	49.0	58.9	40.8	38.5
20:00	61.7	41.2	27.5	56.6	51.8	51.0	48.3	41.1	40.0	07:30	67.6	43.5	30.5	73.1	50.6	49.0	62.7	42.1	39.0
20:15	60.4	35.3	26.5	60.8	51.8	51.0	45.3	41.1	40.0	07:45	65.7	40.8	30.5	63.2	49.8	49.0	65.4	42.6	38.5
20:30	44.6	30.5	27.0	56.6	51.7	51.0	60.1	40.9	39.5	08:00	62.7	40.1	30.5	62.7	50.3	49.0	61.6	42.2	38.5
20:45	51.8	29.6	27.0	56.4	50.5	48.5	63.4	41.2	37.5	08:15	70.5	47.4	30.0	66.0	50.3	49.0	58.7	41.9	39.0
21:00	37.9	28.3	26.5	59.5	50.3	48.5	59.1	40.7	37.5	08:30	63.8	38.2	29.0	65.0	49.9	49.0	54.8	39.9	38.5
21:15	42.1	29.5	26.5	53.7	51.3	49.0	44.9	40.0	37.5	08:45	65.3	42.0	29.5	63.4	50.3	49.0	56.2	40.7	38.0
21:30	61.2	38.1	26.0	53.6	51.2	49.0	50.0	40.8	38.0	09:00	70.4	49.1	33.0	65.7	51.1	49.0	57.1	42.5	38.5
21:45	46.5	32.4	27.0	58.7	50.7	49.0	49.1	39.7	37.0	09:15	63.1	46.8	43.5	66.6	51.5	49.0	60.6	43.3	38.5
22:00	48.3	30.9	28.0	53.8	50.3	49.0	53.5	39.5	37.5	09:30	67.7	48.7	41.5	67.2	51.7	49.0	65.4	48.5	42.0
22:15	62.0	36.6	28.0	53.7	50.5	49.0	47.1	39.1	37.5	09:45	67.1	49.5	31.5	75.1	54.1	50.0	63.0	48.5	43.0
22:30	65.9	40.5	27.0	53.1	49.9	49.0	47.0	38.6	37.0	10:00	68.0	45.4	33.5	73.8	54.1	49.5	61.8	45.7	42.5
22:45	59.5	35.1	28.5	53.4	50.3	49.0	42.8	39.3	38.0	10:15	71.8	47.4	30.0	68.4	52.9	50.0	66.4	49.9	43.5
23:00	59.9	30.7	27.5	53.2	50.3	49.0	56.5	38.5	37.0	10:30	44.5	32.6	29.5	67.7	52.7	51.5	68.8	48.8	43.0
23:15	39.4	29.9	28.0	53.3	50.6	49.0	41.6	39.1	37.5	10:45	67.3	44.5	30.0	67.4	52.0	49.5	67.8	43.6	39.5
23:30	39.6	29.7	27.5	66.3	49.0	42.5	51.4	37.6	32.5	11:00	75.0	50.1	29.5	66.2	52.7	51.5	67.0	44.3	40.5
23:45	37.5	29.2	27.5	73.0	51.3	44.0	49.3	38.1	34.0	11:15	59.4	39.7	29.0	74.9	53.8	51.5	54.0	44.1	40.5
00:00	42.4	28.6	27.0	51.1	49.5	49.0	41.3	38.2	37.0	11:30	66.9	45.1	30.0	60.1	52.4	51.5	62.4	43.9	39.5
00:15	38.6	30.3	29.0	51.1	49.5	49.0	41.5	38.0	37.0	11:45	69.8	48.5	29.5	62.2	52.2	51.5	57.1	41.9	39.0
00:30	57.4	34.7	28.5	53.2	50.3	49.0	44.5	39.3	37.5	12:00	67.8	42.1	28.5	63.6	52.6	51.5	56.8	42.8	39.0
00:45	38.7	30.0	28.5	53.2	50.6	49.0	43.6	39.0	37.5	12:15	67.3	42.5	29.0	65.5	52.3	51.5	53.6	40.9	39.0
01:00	41.5	31.4	30.0	53.1	50.7	49.0	44.1	38.9	37.5	12:30	73.2	50.5	30.0	68.4	52.9	51.5	54.4	40.8	38.5
01:15	33.6	30.6	29.5	53.0	50.2	49.0	41.7	38.5	37.0	12:45	67.5	43.1	29.5	59.8	51.9	51.0	46.1	38.9	37.5
01:30	33.2	29.5	28.0	53.2	50.6	49.0	42.4	39.5	37.5	13:00	62.6	41.7	29.0	54.4	52.2	51.5	53.8	40.2	38.5
01:45	39.2	29.2	27.5	53.7	50.7	49.0	43.2	40.0	38.0	13:15	69.2	43.2	28.5	57.7	52.1	51.0	47.5	40.3	39.0
02:00	35.6	29.4	27.5	53.6	50.6	49.0	43.1	39.6	37.5	13:30	71.0	48.1	28.5	65.7	52.1	51.0	63.3	43.1	39.0
02:15	36.6	29.4	28.0	53.3	50.7	49.0	42.9	39.6	38.0	13:45	63.5	41.9	29.0	53.7	51.6	51.0	49.5	40.0	38.5
02:30	36.2	29.6	28.0	53.3	50.7	49.0	43.2	39.9	38.5	14:00	76.7	46.6	29.0	57.8	51.8	51.0	46.7	39.9	38.5
02:45	33.1	29.5	28.5	53.1	50.7	49.0	42.2	39.5	38.0	14:15	71.0	46.9	29.0	56.6	52.0	51.0	49.1	40.3	38.5
03:00	40.2	29.9	28.5	54.1	51.1	49.5	43.5	40.4	38.5	14:30	56.8	40.8	29.5	56.2	51.8	51.0	47.5	39.7	38.5
03:15	32.9	29.2	28.0	53.7	51.2	49.5	42.9	40.2	38.5	14:45	69.0	48.5	28.0	54.0	51.8	51.0	45.3	39.5	38.0
03:30	33.7	30.4	29.0	53.2	50.0	49.0	42.0	38.6	37.0	15:00	66.5	42.2	28.5	53.7	51.8	51.0	44.4	39.3	38.0
03:45	35.0	30.4	29.5	53.6	50.9	49.0	43.1	39.8	38.0	15:15	63.8	44.6	31.5	55.7	50.5	34.0	65.2	41.1	38.0
04:00	43.6	30.9	28.0	53.3	51.0	49.5	44.9	40.5	39.0	15:30				60.3	42.5	34.5			

Table B1. Calculation of Specific and Rating Levels at Receptor A and B's houses; Figure 1

Receiver	Receptor A		Receptor B		Receptor A		Receptor B	
	Cooling Fans				CHP			
	Existing	With upgraded concrete wall	Existing	With upgraded concrete wall	Existing	With upgraded concrete wall	Existing	With upgraded concrete wall
Noise source	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq
Path A: Noise source to barrier		3.0		3.3		2.4		2.7
Path B: Barrier to dwelling		53.7		71.3		53.7		71.3
Path C: Direct path	55.5	55.5	73.5	73.5	55.5	55.5	73.5	73.5
Path difference, m		1.22		1.09		0.64		0.48

Centre Frequency, Hz	Source Levels: Cooling fans at 30m on-axis	Source Levels: CHP unit at 4m	Shielding attenuation	Shielded level, dB	Shielding attenuation	Shielded level, dB	Shielding attenuation	Shielded level, dB	Shielding attenuation	Shielded level, dB	Shielding attenuation	Shielded level, dB	Shielding attenuation	Shielded level, dB	Shielding attenuation	Shielded level, dB
63	72	74	0	72.1	-11	61.3	0	72.1	-10	61.7	0	74	-8.9	65.1	0	74	-8.1	65.9
125	59	6.2	0	59.2	-13	46	0	59.2	-13	46.4	0	6.2	-11	-4.7	0	6.2	-10	-3.8
250	54	61	0	54.1	-16	38.2	0	54.1	-15	38.7	0	61	-13	48.1	0	61.4	-12.3	49.1
500	53	59	0	52.8	-19	34.1	0	52.8	-18	34.6	0	59	-16	43.1	0	59.1	-14.9	44.2
1000	48	57	0	48.2	-22	26.6	0	48.2	-21	27.1	0	57	-19	38.1	0	57	-17.7	39.3
2000	43	54	0	42.8	-25	18.2	0	42.8	-24	18.7	0	54	-22	32.1	0	53.9	-20.6	33.3
4000	40	53	0	39.8	-28	12.2	0	39.8	-27	12.7	0	53	-25	27.9	0	52.7	-23.5	29.2
dB(A)	55	62		54.6		38.4		54.6		38.8		62		45.5		62.3		46.6
Shielding Attenuation, dB(A)				0		16.2		0		15.8		0		16.8		0		15.7
Distance attenuation				5.3		5.3		7.8		7.8		23		22.8		25.3		25.3
On time				60		60		60		60		60		60		60		60
On time correction				0		0		0		0		0.0		0		0		0
Specific Level				49		33		47		31		40		23		37		21
BS4142 character correction				3		3		3		3		3		3		3		3
Rating Level				52		36		50		34		43.0		26		40		24

Table B2. Calculation of Specific and Rating Levels at Receptor A and B's gardens; Figure 1

Receiver			Receptor A		Receptor B		Receptor A		Receptor B	
			Cooling Fans				CHP			
			Existing	With upgraded concrete wall	Existing	With upgraded concrete wall	Existing	With upgraded concrete wall	Existing	With upgraded concrete wall
Noise source			Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq
Path A: Noise source to barrier				3.0		3.3		2.4		2.7
Path B: Barrier to dwelling				63.7		46.5		63.7		46.4
Path C: Direct path			65.5	65.5	48.6	48.6	65.5	65.5	48.7	48.7
Path difference, m				1.22		1.10		0.63		0.46
Centre Frequency, Hz	Source Levels: Leq cooling fans at 30m	Source Levels: CHP unit at 4m	Shielding attenuation / Shielded level, dB	Shielding attenuation / Shielded level, dB	Shielding attenuation / Shielded level, dB	Shielding attenuation / Shielded level, dB	Shielding attenuation / Shielded level, dB	Shielding attenuation / Shielded level, dB	Shielding attenuation / Shielded level, dB	Shielding attenuation / Shielded level, dB
63	72	74	0 72.1	-11 61.3	0 72.1	-10 61.7	0 74	-8.8 65.2	0 74	-8 66
125	59	6.2	0 59.2	-13 46	0 59.2	-13 46.4	0 6.2	-11 -4.6	0 6.2	-9.9 -3.7
250	54	61	0 54.1	-16 38.2	0 54.1	-15 38.7	0 61.4	-13 48.1	0 61.4	-12.1 49.3
500	53	59	0 52.8	-19 34.1	0 52.8	-18 34.5	0 59.1	-16 43.1	0 59.1	-14.7 44.4
1000	48	57	0 48.2	-22 26.6	0 48.2	-21 27	0 57	-19 38.2	0 57	-17.5 39.5
2000	43	54	0 42.8	-25 18.2	0 42.8	-24 18.7	0 53.9	-22 32.2	0 53.9	-20.4 33.5
4000	40	53	0 39.8	-28 12.2	0 39.8	-27 12.7	0 52.7	-25 28	0 52.7	-23.4 29.3
dB(A)	55	62	54.6	38.4	54.6	38.8	62.3	45.6	62.3	46.8
Shielding Attenuation, dB(A)			0	16.2	0	15.8	0	16.7	0	15.5
Distance attenuation			6.8	6.8	4.2	4.2	24.3	24.3	21.7	21.7
On time			60	60	60	60	60	60	60	60
On time correction			0	0	0	0	0.0	0	0	0
Specific Level			48	32	50	35	38	21	41	25
BS4142 character correction			3	3	3	3	3	3	3	3
Rating Level			51	35	53	38	41.0	24	44	28

M2030 Much Fawley Farm
ACOUSTIC NOTE N01a

11th March 2021

Timber Noise Barrier

Ref Document:
Backup CHP Unit – Noise Impact Assessment (M2020/R01 dated 18/8/20)

1. Revised Noise Barrier Construction

Our noise impact assessment for the backup CHP unit at Much Fawley Farm identified that a noise barrier, as indicated in Figure 1, was required in order to reduce the noise emissions from the plant to acceptable levels.

It was proposed in our report that the noise barrier would be constructed of concrete panels, matching the existing adjacent barrier i.e., the proposed scheme was to extend the length of the existing barrier.

However, due to the proposed new barrier's proximity to a 2 – 3m drop in ground level, we have been informed that concrete panels will not be possible due to their weight. Taking the weight limitations into account, a 22mm timber panel barrier is now proposed.

The noise attenuation provided by a barrier is a combination of noise travelling over/around and through the barrier. Provided the extent and height of the barrier does not change from that originally proposed, the only difference in the performance of alternative barrier constructions will be the noise transmission through the barrier itself i.e., the sound reduction of the material used. Ideally it is designed that the noise transmission through the barrier is 10dB below the noise transmission over/around the barrier.

The noise transmission through the revised barrier construction has been calculated based on:

- Noise levels of the CHP unit: octave band source levels derived from the survey data as detailed in our noise impact assessment report
- The area of the barrier: 10 x Log (A), where A is the total noise radiating area of the barrier
- Sound reduction of the construction: R_w 26dB - Calculated using Insul acoustic software
- Distance losses between the barrier and receptor: 10 x Log (2 x π x d^2), where d is the distance between the barrier and the receptor

The resultant aggregate CHP noise emissions have been calculated by the logarithmic addition of the noise levels over/around and through the barrier. This has established that, when compared with the previous proposed concrete panel barrier, the revised timber construction will result in a:

- 1dB increase in noise emissions from the CHP unit at the adjacent dwellings/gardens. This increase is acceptable as the Rating Level will still be significantly below the typical background noise level during the day (i.e., a low noise impact) and result in noise ingress levels via an open window below BS8233 noise ingress limits during the night.
- 2dB increase in the cooling fan noise emissions. This increase is considered acceptable when taking into consideration context; a 2dB change in noise level is not perceptible and the infrequent operation of the cooling fans (the fans are only required on very hot days)

It should be highlighted the CHP unit is now the secondary standby engine (a new primary engine has been installed internally within a nearby barn) and consequently it's operation will be significantly reduced.

Brookfield Coach House
Weston Lane
Bath BA1 4AG

T: 01225 667470
M: 07765518035
E: mail@matrixacoustics.co.uk

If it is found that the barrier, once constructed, is providing insufficient sound reduction there is scope for further upgrades, consisting of:

- Adding an additional timber board layer; this would increase the sound reduction of the barrier
- Increase the height and/or length of the barrier; this would increase the noise path over/around the barrier, resulting in greater barrier attenuation

It is not envisaged however that these additional measures will be required.

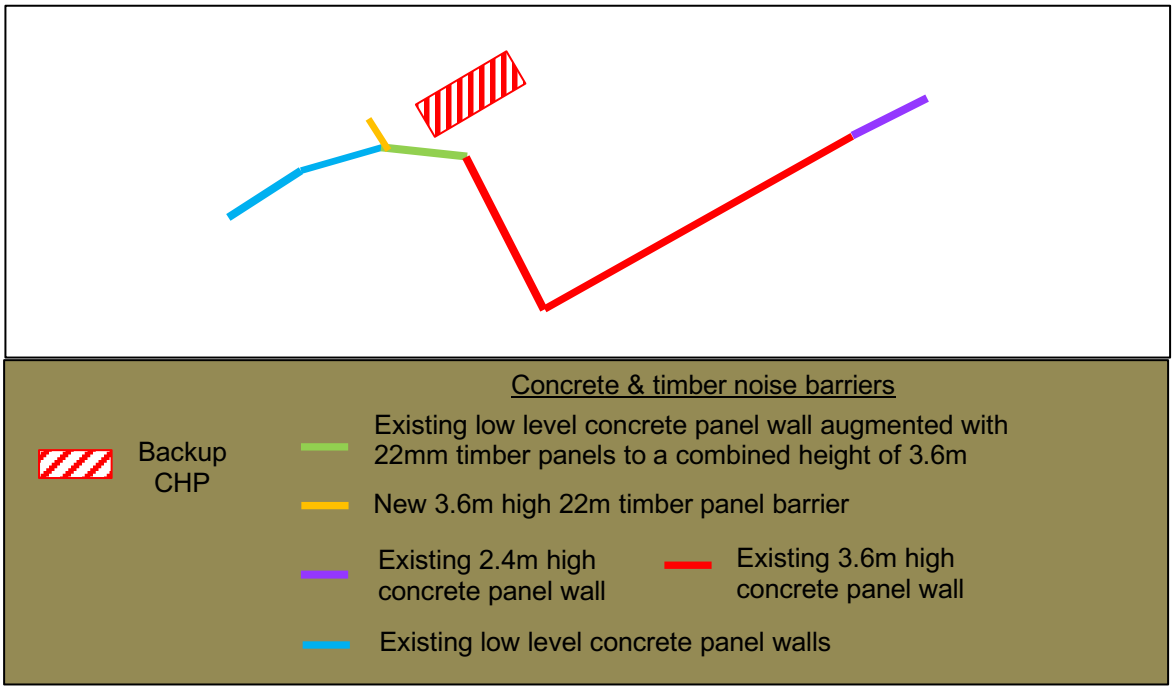


Figure 1. Sketch indicating the advised increased height concrete wall

2. Maintenance Schedule

The proposed barrier will use pre-treated timber and consequently there should be minimal maintenance required (treated timbers typical last between 15 – 25years). There will however be gradual age related degrade of the barrier construction, which could include warping of the timber or gaps in the construction.

A maintenance schedule is therefore proposed, consisting of:

- Visual Inspection: The noise barrier will be inspected upon completion, and thereafter on a monthly basis and additional after any adverse weather. The condition of the timbers, including any signs of warping, will noted with any defects identified addressed as a matter of urgency.
- Audible Observation:
    - CHP unit: Any increase in the CHP noise emissions, including change in the character of noise (e.g., rattles, whines etc) will be investigated as a matter of urgency, with maintenance work carried out as required.
    - Barrier: Once a month, during the periods the CHP unit is operating, its noise emissions will be at checked by listening in the near vicinity of the adjacent dwellings;

if the noise levels are considered intrusive, the noise barrier/CHP unit will be checked for any defects/maintenance issues.

It should be highlighted that the barrier will be designed to withstand wind loads consistent with the area and, due to its installation on top of an existing concrete wall, there is a low risk of damage by vehicle movements.

If any noise complaints are received, these will be investigated fully. The following details will be recorded:

- Name and contact details of complaint
- Time and nature of reported adverse noise
- Weather conditions
- Plant operating and/or any other noise producing activities

If the noise complaint is established to be due to the operation of the CHP unit, both the noise barrier and the unit itself will be inspected.