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Noise control measures - Clyst St Mary

The **Industrial Noise and Vibration Centre (INVC)** was requested by Chris Roberts from AM Project Services to provide some noise control measures for the Clyst St Mary plant. This report follows a site visit on Wednesday 3 November 2021 and two noise assessments documented in **INVC** report number 9365C and 10047B.

The pieces of equipment covered are the mixers and agistators on the digester's roof, the dryer fan, the dryer infeed conveyor motor, the dryer outfeed conveyor, the dryer fan motor, the DMT and the gas booster fans for CHP1 and CHP2.

All the stated dimensions must be checked by the installer before installation.

1.0 Mixers and agitators on digester roof

Regarding the mixer motors, an acoustic shield is required with the section shown in Figure 1. The recommended absorbent is Rockwool RWA45, which is widely available from building merchants or engineering material suppliers.

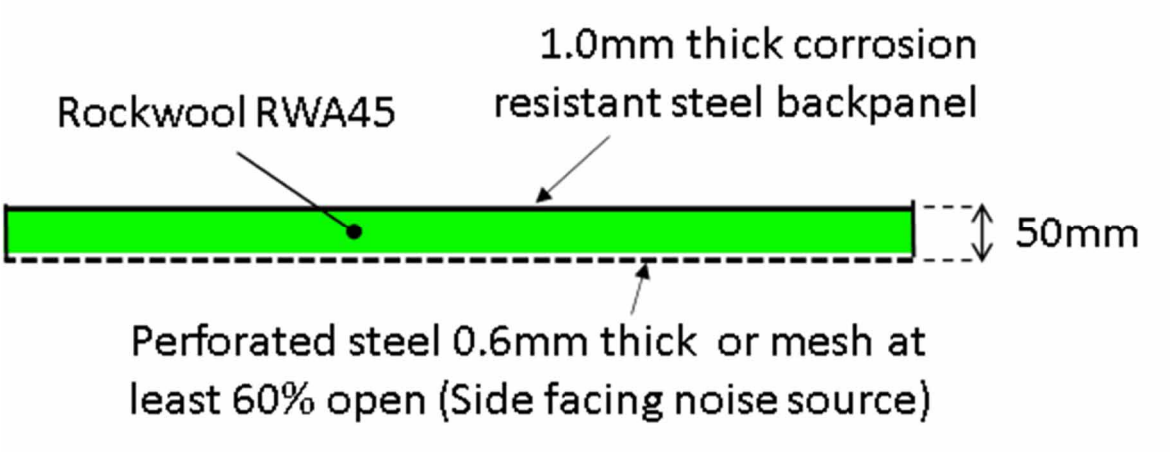

Figure 1 Acoustic panel section

The shield arrangements are shown in Figures 2, 3 and 4. The top cover prevents a direct line of sight to the motor fan, but is placed to leave a 40mm gap to allow the cooling airflow to escape. The bottom side is left open for the same reason.

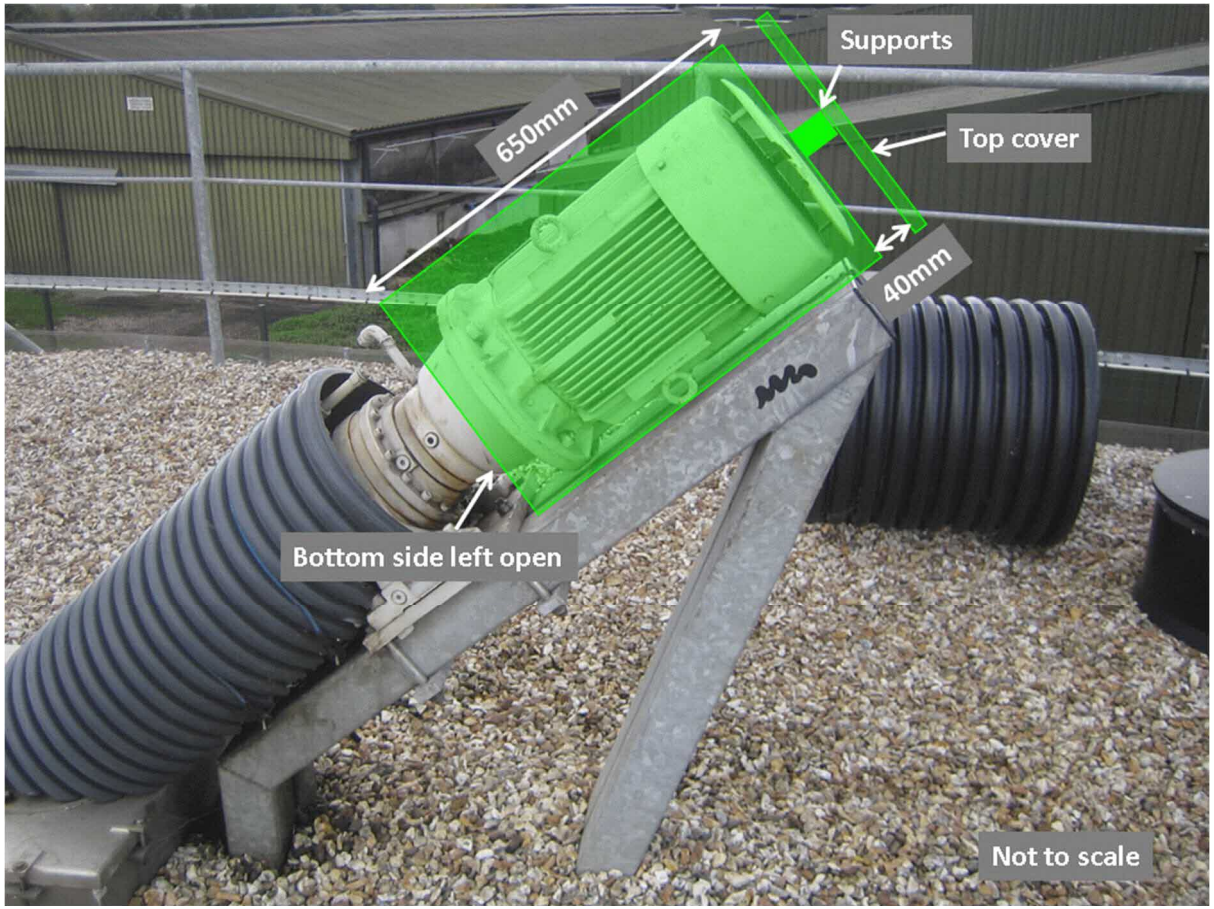

Figure 2 **Shield arrangement (green), side view**

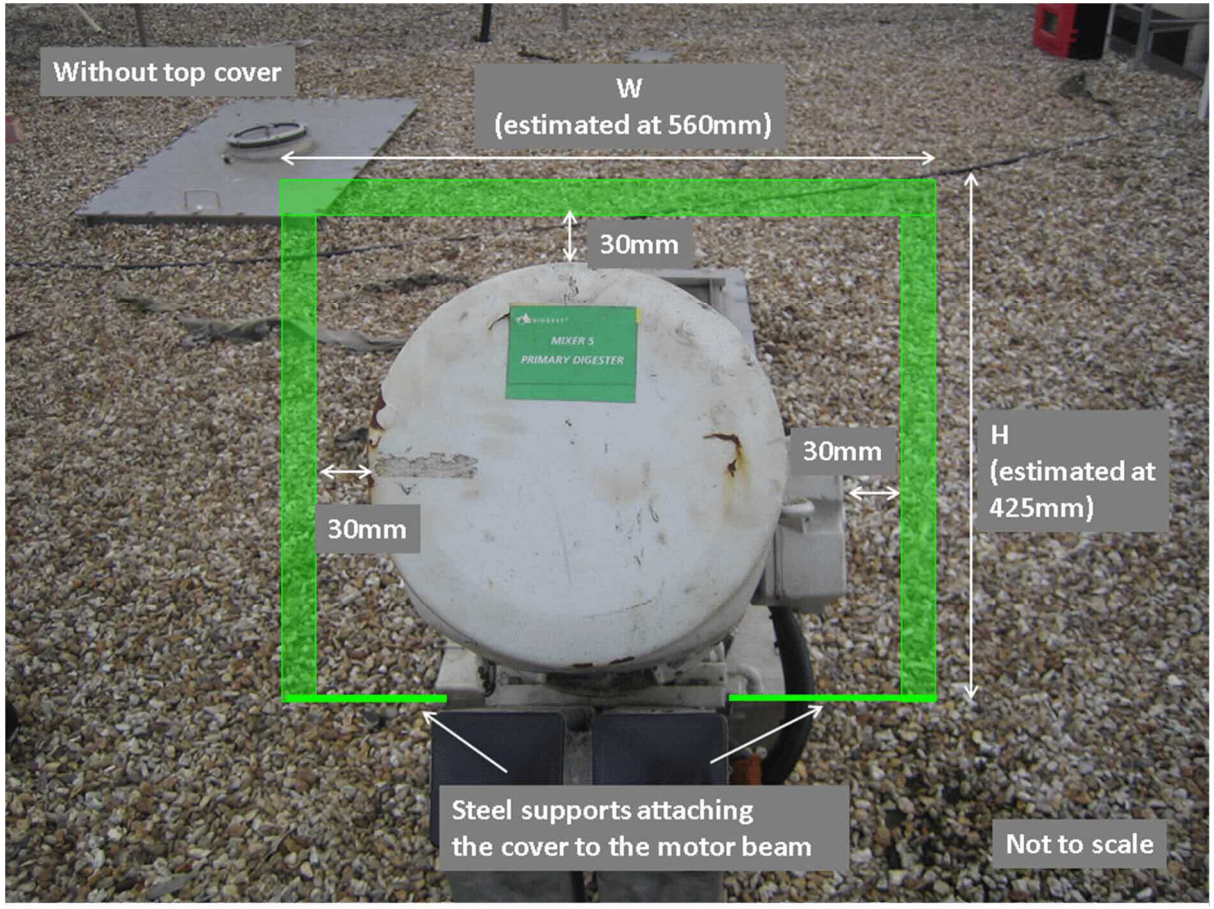

Figure 3 **Shield arrangement (green), top view, without top cover**

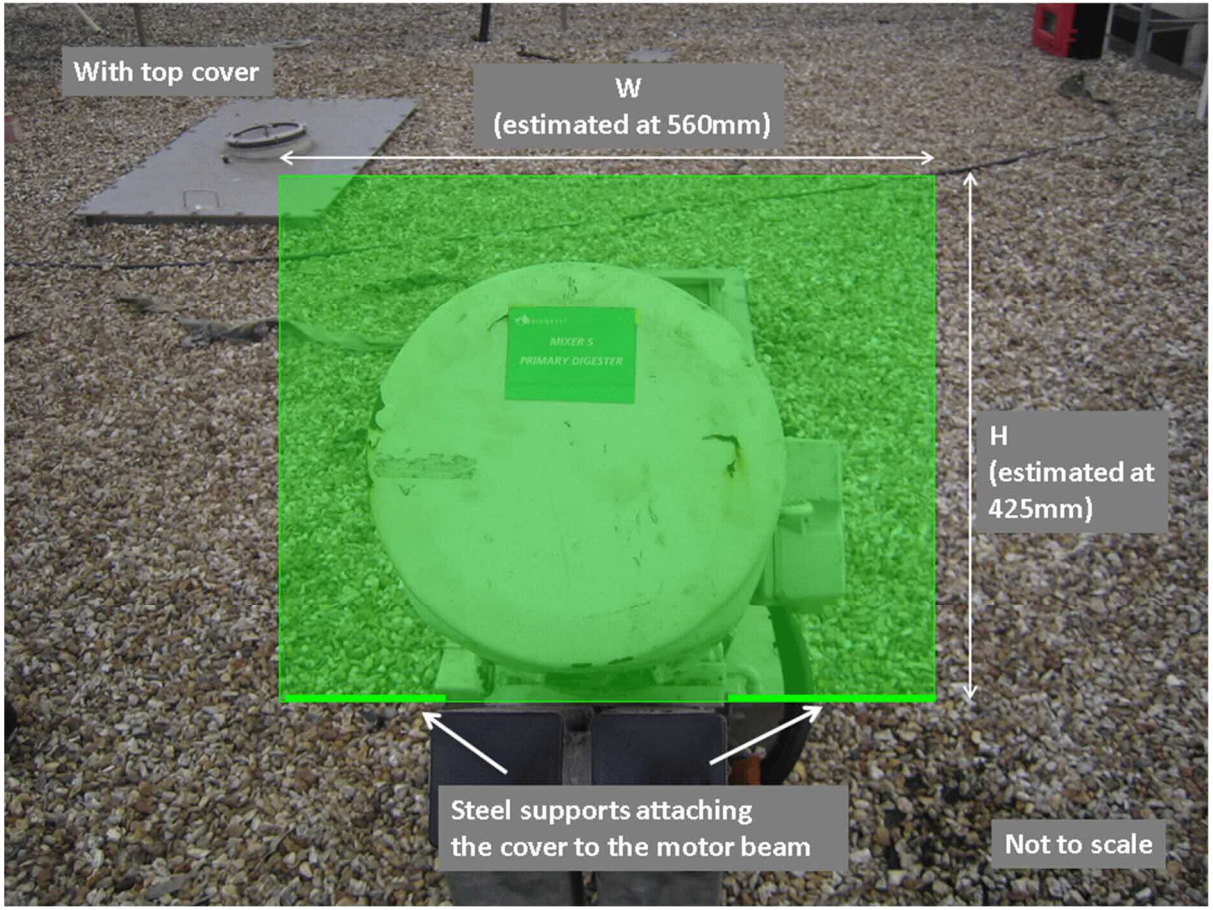

Figure 4 **Shield arrangement (green), top view, with top cover**

The details for the support are left to the judgement of the installer. From a noise reduction point of view, the most important feature is that the main motor body is shielded, that absorbent is introduced, and that the line of sight to the fan is blocked.

A shield with the same section is required around the agitator, as shown in Figure 5. Only the south-east side (ie away from the residences to the north) can be left open, all the three other sides and the top must be covered. The final height of the shields can be adjusted as required.

All the agitators and all the mixers require treatment.

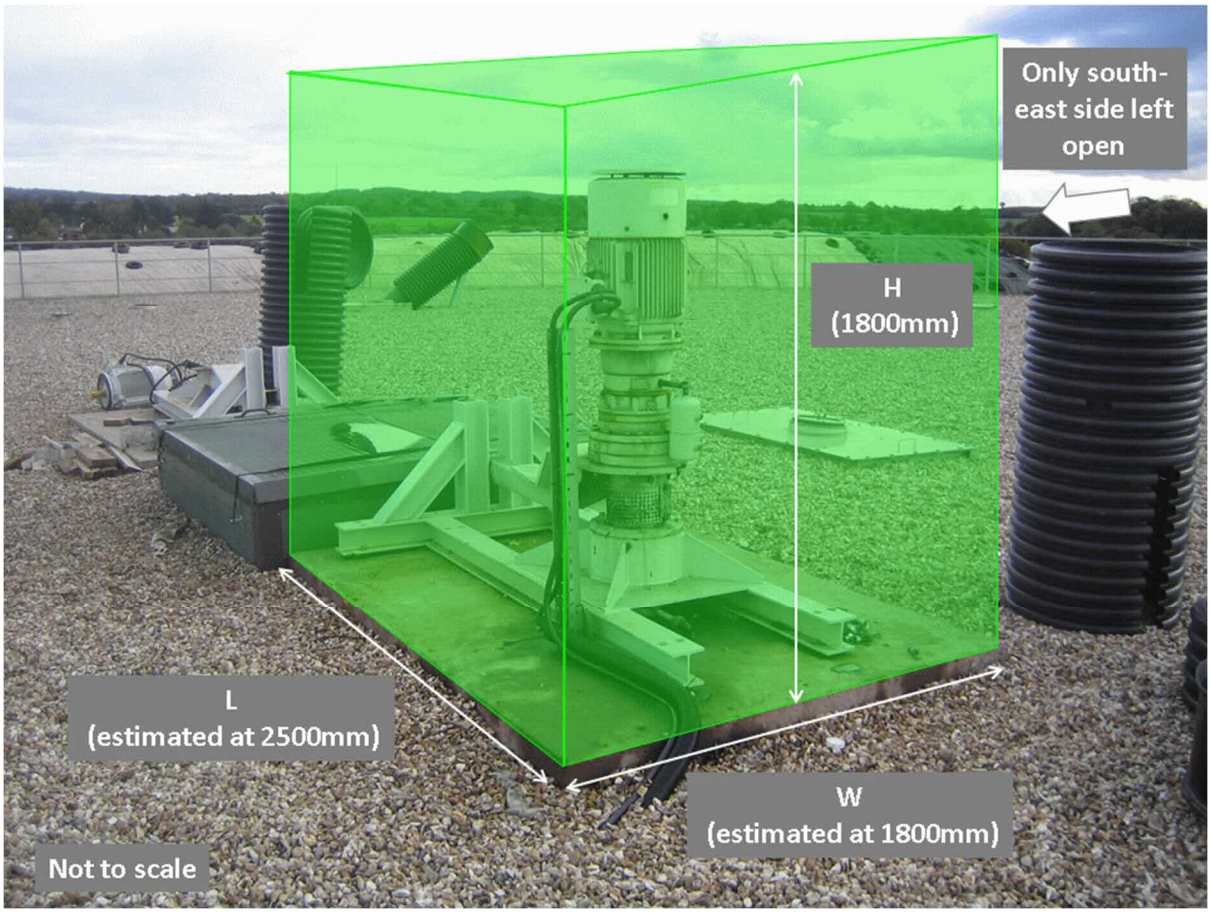

Figure 5 Shields arrangement (green) around the agitator

2.0 Dryer fan

A shield arrangement with the section described in Figure 1 is required around the fan. Four vertical shields are required, as shown in Figure 6.

The two vertical shields near the fan require a cover at the top. Two vertical shields are also required on the wall to the south of the fan to prevent the noise from channelling in the small corridor between the dryer and the building. There must be no gaps between the shields, and the whole height must be covered.

Support can be taken on any existing structure. The dimensions and locations can be adjusted to fit the existing configuration, please contact **INVC** if any changes are required.

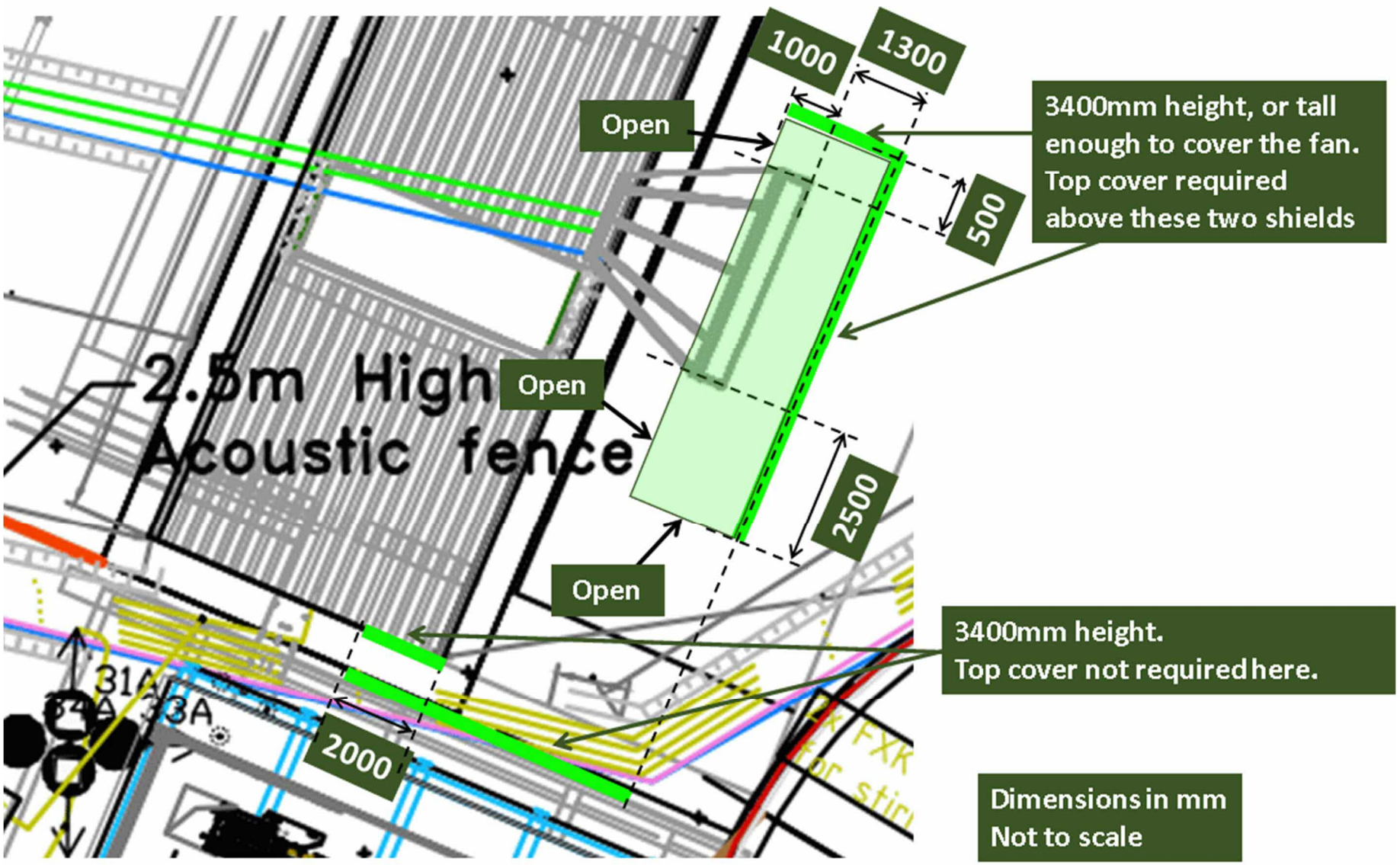

Figure 6 **Acoustic shields arrangement around dryer fan**

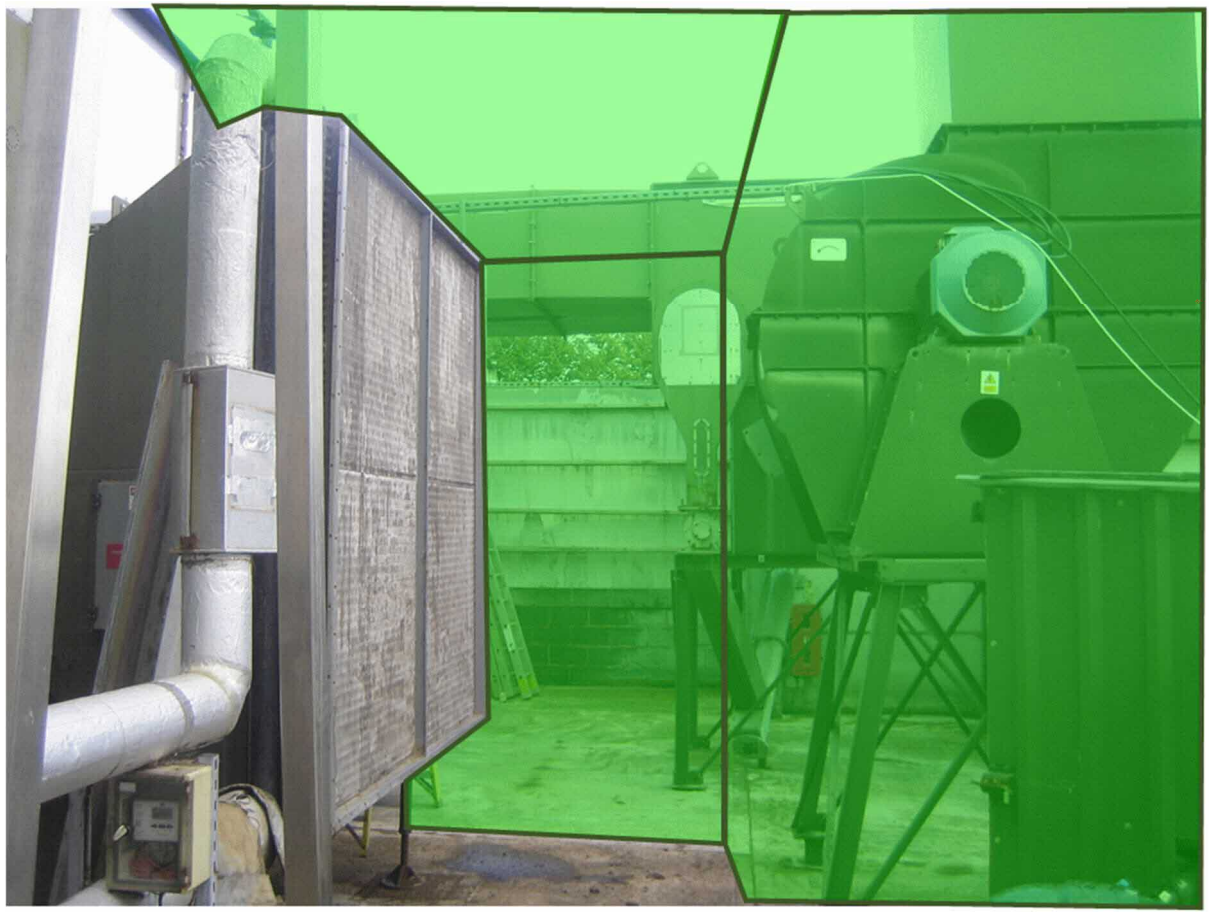

Figure 7 **Acoustic shields (green) overview, around fan**

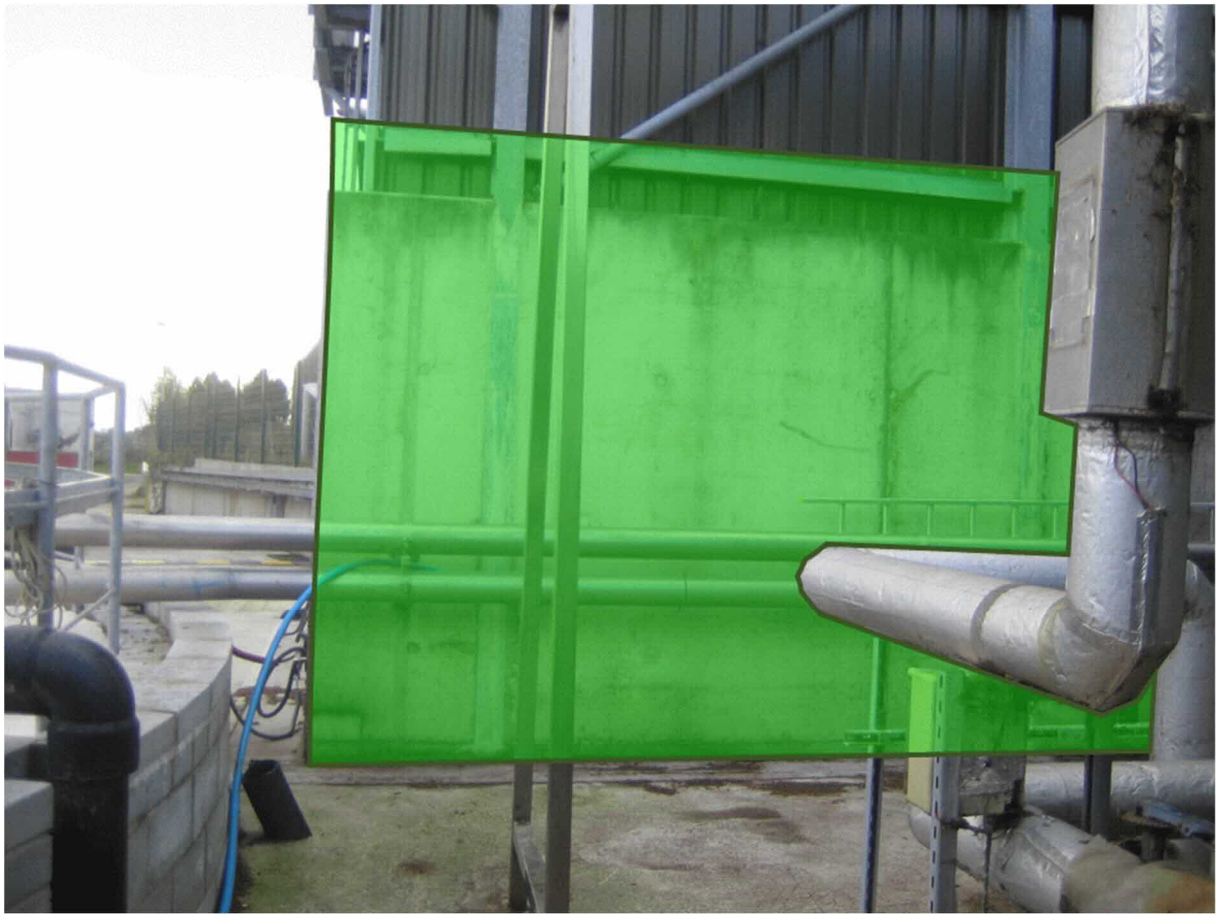

Figure 8 **Acoustic shield overview, nearby building**

3.0 Dryer infeed conveyor motor

A similar arrangement to the mixer fan is required., with the same section shields on the four sides of the motor and a cover arrangement which allows air movement but not a direct line of sight to the motor cowl, as shown in Figures 9 and 10.

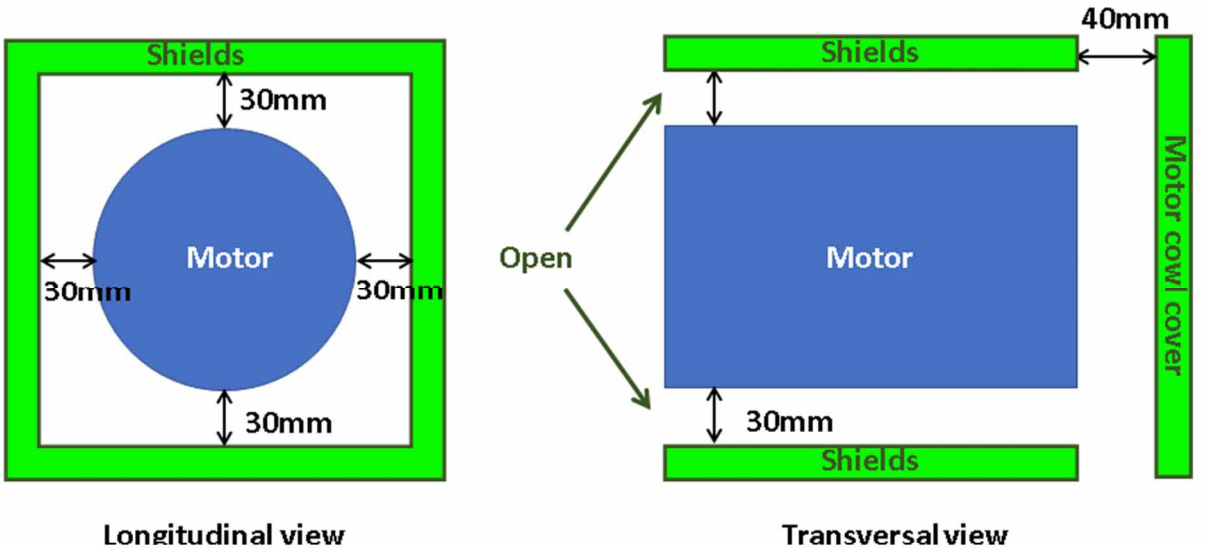

Figure 9 **Shields arrangement around infeed conveyor motor**

Figure 10 **Dryer fan infeed conveyor motor**

4.0 Dryer outfeed conveyor

It is advised by Gorst Energy that they will be replacing the dryer outfeed conveyor with a new chainless conveyor. Thiswill contribute to the reduction of the noise impact from the site and is an appropriate action, no other action is required.

5.0 Dryer fan motor

The dryer fan motor requires shields with the same section as in Figure 1, on the inside of the motor recess, shown in Figure 11, and an additional front shield, shown in Figure 12. Gaps are left to allow for air circulation.

Figure 11 Shields location in motor recess (green)

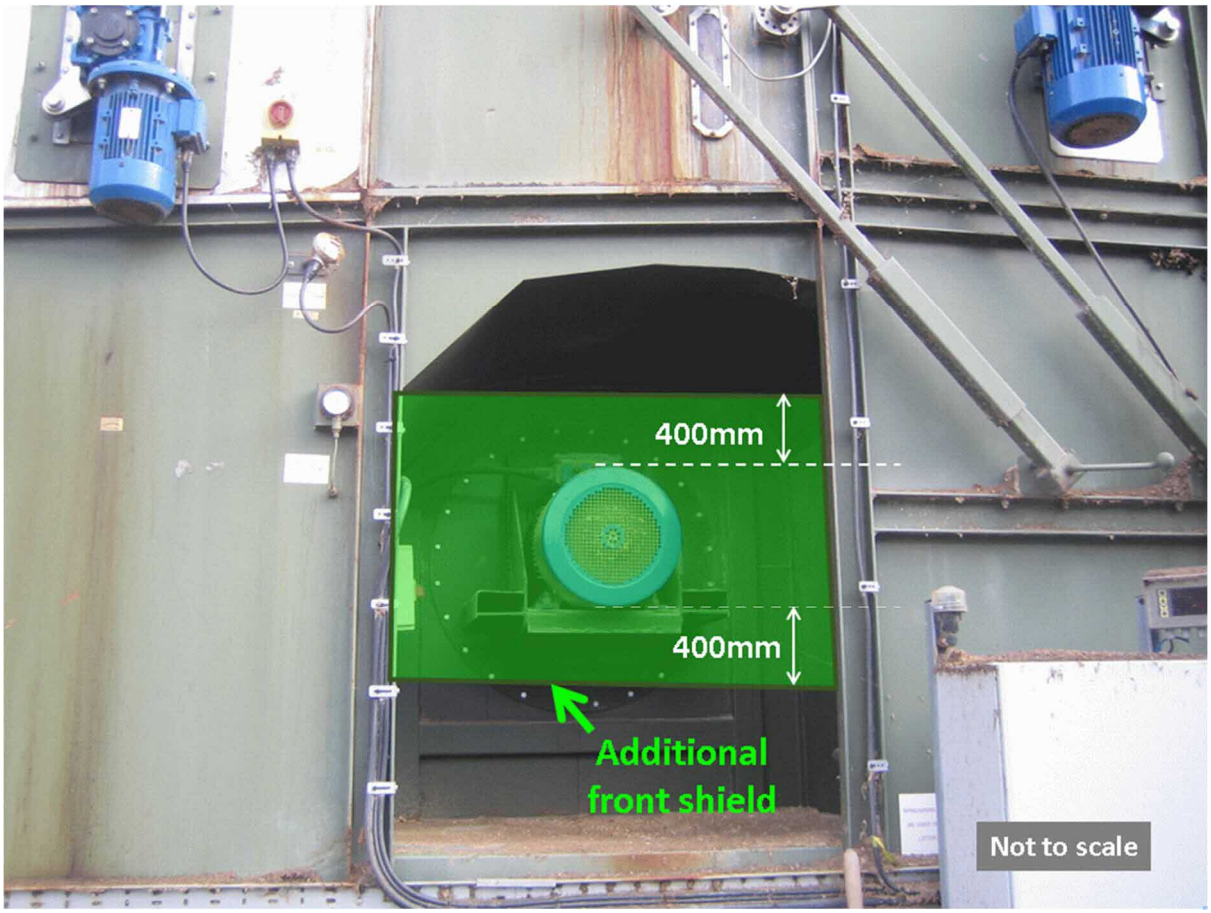

Figure 12 Front shield (green)

6.0 DMT

The DMT and the Mink compressors compartments are very reverberant and require the introduction of acoustic absorbent panels. The panels can have the construction shown in Figure 13, with the perforated side towards the inside of the container.

The larger the treated area, the better. However, the practicalities of installation are more important than maximum coverage, and it is best to introduce large panels in a time and cost-efficient manner rather than trying to cover small and awkward areas. As long as more than 60% of the doors, walls and ceiling of the two compartments are covered by absorbent, it will have an effect.

The absorbent panels will have the additional effect of reducing the noise inside the compartments, making it easier for engineers to work on the plant.

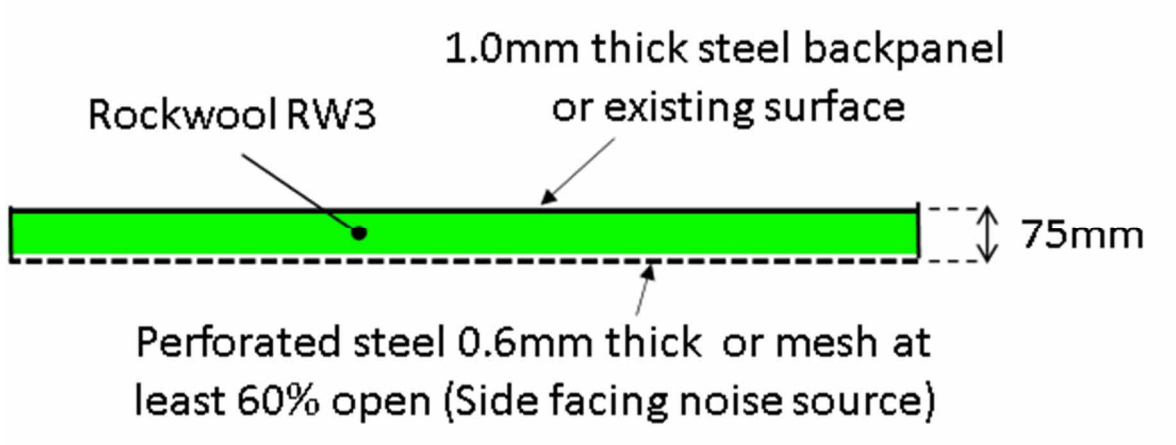

Figure 13 **Absorbent panels**

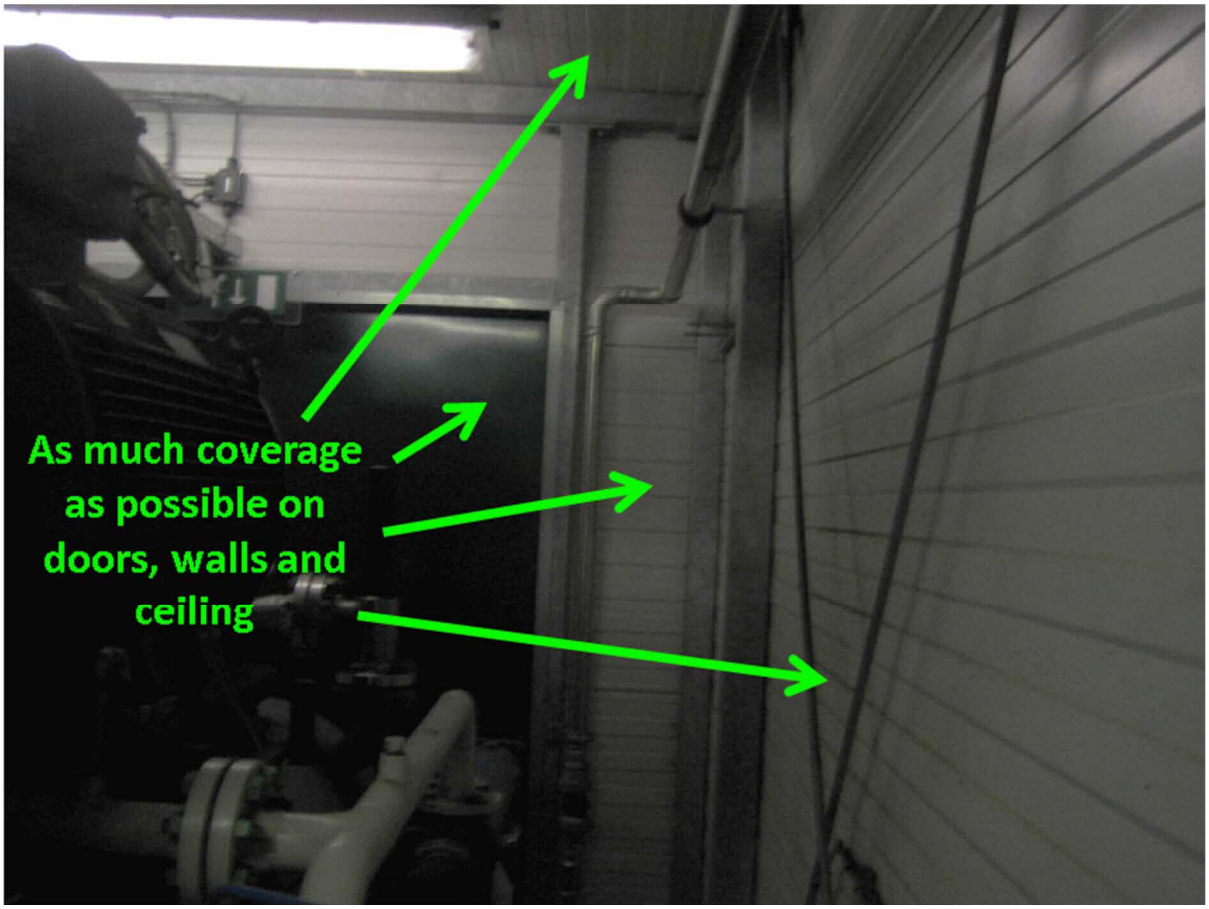

Figure 14 **Absorbent panel coverage in DMT**

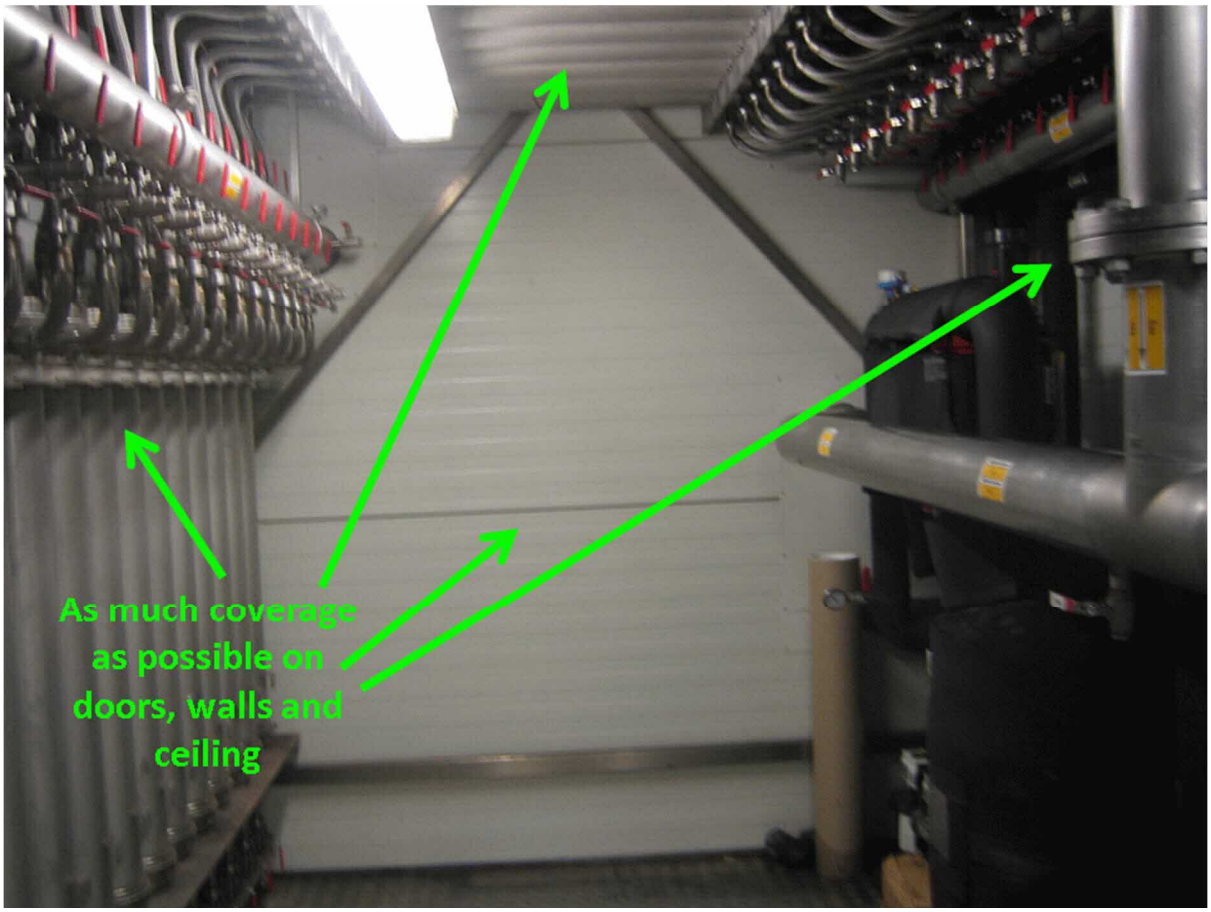

Figure 15 Absorbent coverage in DMT- Mink compressor

In addition, a double skin is required around the DMT container, covering at least the DMT and Mink compressor compartment sides. The double skin should have the section shown in Figure 16.

It is critical that the external backpanel is not supported on the container, but on the ground instead, to avoid vibrational shortcuts resulting in noise radiation. Vertical supports must be introduced at 600mm centres. No hard connections are allowed between the container and the backpanel. To cover the top of the panel, a small horizontal projection from the backpanel can be used, provided it is always clear of the container.

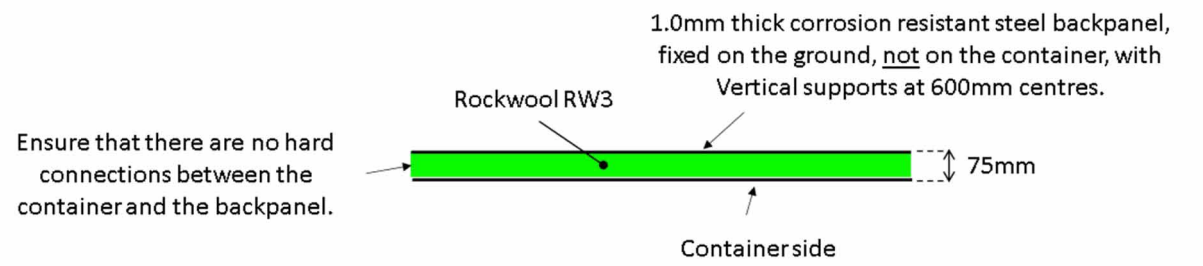

Figure 16 Container double skin

The current doors do not contain the noise effectively. From discussions with the engineering manager, double doors have been considered. These will also help to contain the noise, but they must have seals on all sides (top, sill and jambs), have a good locking mechanism which makes a positive seal, and must be carefully maintained. Please contact **INVC** to review the door specifications.

There is a ventilation outlet in the Mink container, and an acoustic shield of the same section as detailed in Figure 1 must be introduced, as shown in Figure 17. A 50mm gap must be left between the shield and the outlet to allow the air to exit the compartment.

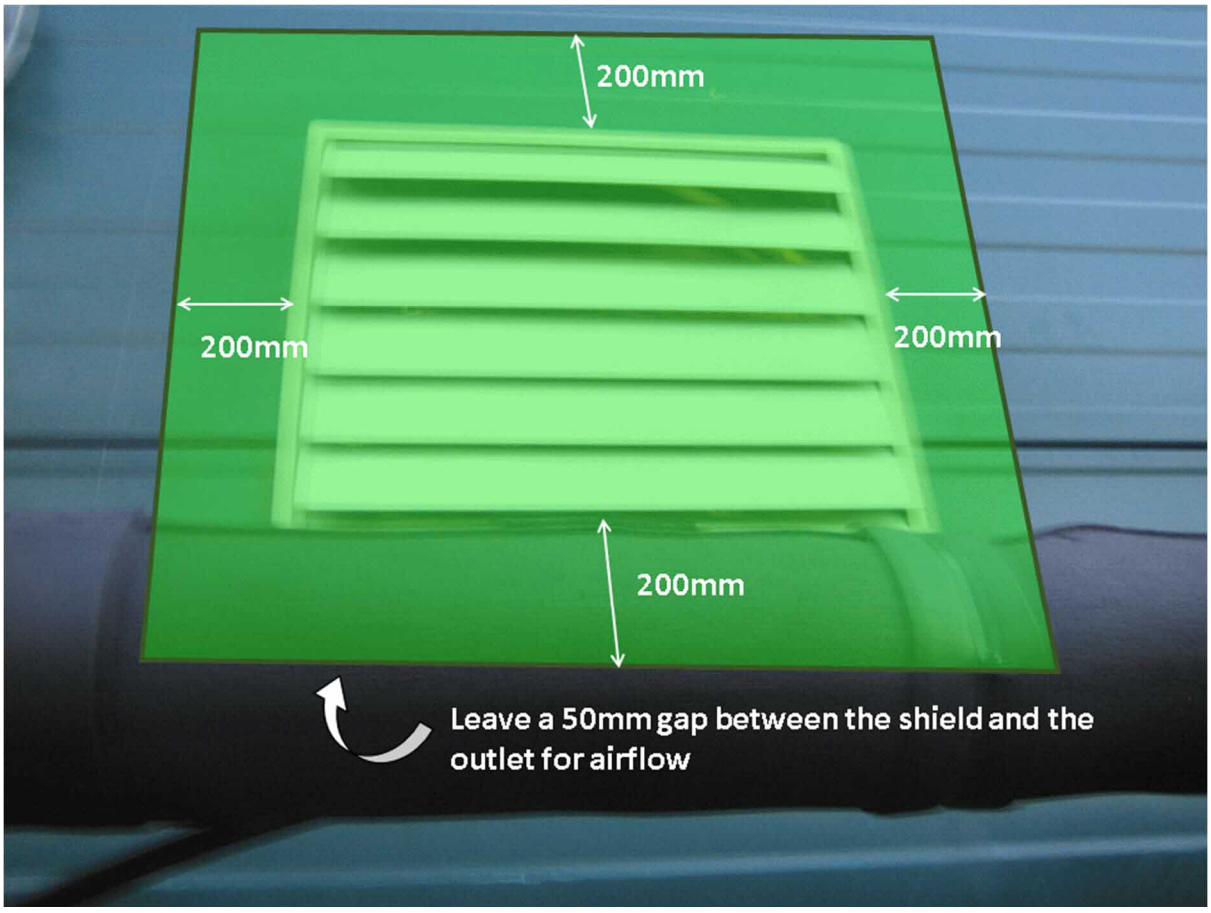

Figure 17 Acoustic shield (green) above Mink compartment air outlet

7.0 Gas booster fans CHP 1 and CHP2

The small enclosures around the two booster fans should be replaced by a version using the same section as detailed in Figure 1. The dimensions are left to the judgment of the installer, provided that all the five sides are covered. Both fans require treatment. If ventilation is required, then the same strategy as described in Figure 17.can be used, with a cover leaving a 50mm gap over an air outlet.

Figure 18 Improved enclosure around gas booster fan

8.0 Summary

The noise control measures detailed in the previous sections are targeted to reduce the tonal noise of the related pieces of equipment experienced by the nearby residents (detailed in **INVC** report number 10047B). This work will also result in lower noise emissions from the site, with also less perceivable tonality, which will reduce the noise impact of the site. A noise level of no louder than background level is being sought.

Note that the measures have to be assessed by the installer before implementation, and all dimensions checked. If some amendments are required, please contact **INVC**.

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Matthieu Folzan

Revision	Date	Revision History	Prepared
00	22 November 2022	First report	MF
01	1 April 2022	Gorst Energy will replace the conveyor and Section 4 has been amended to reflect this.	MF