NOISE IMPACT ASSESSMENT

LAND OFF FOWLMERE ROAD, FOXTON

HILL RESIDENTIAL LIMITED

RP01-17264
NOISE IMPACT ASSESSMENT

PROJECT: LAND OFF FOWLMERE ROAD, FOXTON

CLIENT: HILL RESIDENTIAL LIMITED

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<table>
<thead>
<tr>
<th>REVISION</th>
<th>ISSUE DATE</th>
<th>REPORT BY</th>
<th>CHECKED BY</th>
<th>NOTES</th>
</tr>
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<tr>
<td>0</td>
<td>17 March 2017</td>
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<td>Initial issue</td>
</tr>
<tr>
<td>1</td>
<td>27 September 2017</td>
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</tr>
</tbody>
</table>

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1. INTRODUCTION

1.1 Cass Allen Associates has been instructed by Hill Residential Limited to assess the noise impact of a proposed new Grain Store at land off Fowlmere Road, Foxton.

1.2 The assessment has been carried out in accordance with relevant local and national planning guidance.

1.3 The aim of the assessment was to assess the potential impact of noise emissions from mechanical plant and operational activities associated with the development at the positions of existing sensitive receptors in the area.

1.4 This report contains technical terminology; a glossary of terms can be found at www.cassallen.co.uk/glossary.
2. PROJECT DESCRIPTION

2.1 The site of the proposed grain store is located in a rural area between the villages of Fowlmere, to the south of the site, and Foxton to the north east. An annotated aerial photo of the area is shown in Figure 1 below. The nearest residential property to the site is a lone farmhouse on Fowlmere Road located approximately 230m to the south of the site. The nearest residential property in Foxton is approximately 925m away.

Figure 1  Annotated Aerial Photo of Site

2.2 The proposal is to build a new grain store on the site to replace an existing grain store on Fowlmere Road in Thriplow. The location of the existing grain store is shown in Figure 2 below.
2.3 The existing grain store is located around 50m from the nearest residential property on Fowlmere Road to the northeast.
3. PLANNING POLICY

National Policy

3.1 Outline guidance for the assessment of noise affecting new developments is given in the National Planning Policy Framework (NPPF). Section 109 of the NPPF states:

The planning system should contribute to and enhance the natural and local environment by…preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of…noise pollution.

and in section 123:

Planning policies and decisions should aim to:

- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- mitigate and reduce…other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established;
- and identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

Noise Policy Statement for England

3.2 The Noise Policy Statement for England (NPSE) was published in March 2010 and seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. It also sets out the long term vision of Government noise policy:

To promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

3.3 The NPSE clarifies that noise should not be considered in isolation of the wider benefits of a scheme or development, and that the intention is to minimise noise and noise effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.

3.4 The explanatory note of NPSE defines the terms used in the NPPF:

2.20: There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:
NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

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

2.21: Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

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

3.5 The NPSE does not define the SOAEL numerically, stating in paragraph 2.22:

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

Noise Planning Practice Guidance

3.6 The Noise Planning Practise Guidance (NPPG) was published on 6 March 2014. It provides further guidance on noise and reiterates the guidance within the NPPF and NPSE. It states that:

noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment.

3.7 The NPPG provides advice regarding how to determine the impact of noise, including whether or not a significant adverse effect or adverse effect is occurring or likely to occur and whether or not a good standard of amenity can be achieved.

3.8 It provides more descriptive detail for the definitions of NOEL, LOAEL and SOAEL than the NPSE, but does not specify numerical values. A summary of the advice given is reproduced in Table 1 below.
### Table 1  Observed Effect Levels due to Noise (NPPG)

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

**Local policy**

3.9 South Cambridgeshire Local Plan 2004, Part 1, Chapter 11 – Environmental Standards provides outline guidance on the assessment of noise and vibration affecting new development in the borough. In particular Policy ES6 states:

*The District Council will seek, by the means of appropriate planning conditions, to minimise the impact of noise and pollution on noise-sensitive development arising from any new industrial, commercial or recreational activities.*
11.28 Where new industrial, commercial or recreational development is proposed to be located near to noise-sensitive development, a condition may be placed on a planning permission so that noise levels arising from the development should not cause any significant increase above background noise levels in the gardens of nearby noise-sensitive development, having regard to the Council's adopted standards. Special attention to noise or vibration attenuation may be required where noise generated by any activity involves any noticeable acoustic characteristics, e.g. tonal, impulsive, irregular or intermittent noise, or where it is anticipated that any proposed activity will result in distinct levels of vibration to nearby noise sensitive development.

11.29 Industrial and commercial development should be designed and orientated so that, as far as practicable, noisy areas, plant and equipment outlets from the buildings face away from noise-sensitive areas and that reflected noise is minimised.

3.10 To address the requirements of the national and local policies, the key requirement is to ensure that noise emissions from the new grain store to not exceed acceptable levels at the positions of nearby residential properties.
4. PLANT NOISE IMPACT ASSESSMENT

Design criteria – Mechanical plant noise

4.1 BS4142:2014 – *Methods for rating and assessing industrial and commercial sound* (BS4142) can be used to assess the impact of noise from industrial and commercial facilities affecting nearby sensitive receptors.

4.2 The BS4142 assessment methodology can be summarised as follows:

1. Measure the existing background noise levels (LA90,T dB) at the locations of nearby noise sensitive receptors during the quietest periods when the noise source(s) under investigation will operate;

2. Predict or measure the noise emissions (LAEq,T dB) from the noise source(s) under investigation at the location(s) of the nearby sensitive receptors, including corrections for any distinguishable acoustic features (e.g. tones, whines, screeches, hisses etc);

3. Subtract the measured background noise levels (item 1 above) with the measured or predicted rating noise levels (item 2 above) at each sensitive receptor. BS4142 states that:

   a) Typically, the greater this difference, the greater the magnitude of the impact.

   b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

   c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

   d) 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 the context.

   NOTE Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

4.3 Appendix 11/1 of South Cambridgeshire’s *Environmental Standards* document sets out specific criteria for the acceptability of noise from new industrial facilities in the borough.

- Where background noise levels are measured between the hours of 0700hrs and 1900hrs and found to be 40 dB LA90 or lower, the maximum noise level from the industrial activities between these times shall be 40 dB LAeq,1min.

- Where background noise levels are measured between the hours of 1900hrs and 0700hrs and found to be 38 dB LA90 or lower, the maximum noise level from the industrial activities between these times shall be 38 dB LAeq,1min.
4.4 The Local Planning Authority’s (LPA) standard criteria is in line with BS4142 other than the assessment period, which is very short being 1 minute for the daytime and night-time. In our view longer assessment periods of 1 hour during the daytime and 15 minutes during evening and night would be more appropriate in this case and therefore have been adopted for the assessment.

Site noise survey

4.5 Background noise levels (LA90) at the site were measured as part of a site noise survey. The full results of the survey are outlined in Appendix 1.

4.6 The measured background noise levels have been used to develop limits for the grain store noise emissions at the position of the nearest residential property in accordance with the BS4142 assessment methodology and the LPA’s criteria (refer paragraph 4.3 above). The limits are shown in Table 2 below and include a minus 5 dB correction as noise from the grain store will be impulsive at times.

<table>
<thead>
<tr>
<th>Location</th>
<th>Period</th>
<th>Day-time (0700-1900hrs)</th>
<th>Evening &amp; Night-time (0700-1900hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nearest residential properties to new grain store</td>
<td>35 dB LAeq,T</td>
<td>33 dB LAeq,T</td>
<td></td>
</tr>
</tbody>
</table>

Note 1: The above limits include a -5 dBA correction assuming that the grain store activity noise will be impulsive at times.

Proposed grain store

4.7 The layout of the proposed grain store is shown in Appendix 1. The grain store has been planned and designed so that, where possible, the external plant that will potentially run during the night-time (cooling fans) are located on the northern façade of the building and screened from the nearest residential property.

4.8 A 5m high bund acoustic is also included in the design to screen this plant from the village of Foxton. The location of the bund is shown shown on the plan in Appendix 1. The bund will be 91m long by 17m wide by 5m high.

4.9 Based on discussions with the grain store operator, we understand that the grain store will operate as follows.

- Fixed plant:
  - 5 cooling fans will be located along the northern façade of the grain store building. These are used to aerate the grain in the grain store and will run up to 24 hours per day at times, although will not be used often. The currently proposed cooling fan units have a noise output of 82 dBA at 5m.
o A grain dryer will be located at the western end of the grain store building. The grain dryer will comprise 2x 22kW grain dryer fans, the exhausts of which will be fitted with inline silencers and located near the north western corner of the building so that they are acoustically screened from the nearest residential property. Sound power level (SWL) data for the fans (and silencers) has been provided by the fan supplier and show that the silenced exhausts will have a combined SWL of 100 dBA. The grain dryer will run up to around 10 days per year (the dryer will only be used when the harvested grain that arrives at the grain store is damp). The dryer could be used between 8am and 11pm (i.e. during the evenings on occasion).

• Mobile plant:
  o There will be up to around 10 grain deliveries/collections per day during harvest period. There may also be 1 or 2 miscellaneous deliveries per day however these are not expected to generate significant noise emissions in comparison with the grain deliveries. Deliveries will generally occur at the south eastern edge of the site. Delivery vehicles will be loaded or unloaded via a forklift truck. Deliveries will only occur between 8am and 5pm. Each delivery is expected to last around 25 minutes, comprising the following:
    ▪ 5 minutes of manoeuvring (including driving across the site, waiting on the weigh bridge, reversing etc).
    ▪ 15 minutes of unloading/loading. The delivery lorry would be parked to the south of the grain store building and the forklift would be used to move the grain between the delivery vehicle and the grain store. Importantly, the lorry would break line of sight between the forklift and the nearest residential property and therefore provide a degree of acoustic screening (assumed to be 5 dB in our calculations below).

4.10 A 3D noise model was used to predict noise emissions from grain store at the position of the nearest (and ‘worst case’) residential property. Noise data for the fixed and mobile plant given above was added to the model. Noise data for the delivery vehicles and forklift were taken from BS5228-1:2009. The 5m acoustic bund was also added to the model.

4.11 Two ‘worst typical case’ modelling scenarios were assessed based on guidance given in BS4142:

  • Scenario 1 – Worst case 1 hour period during the daytime:
    o 2 grain deliveries
    o Grain dryer running continuously
    o Cooling fans running continuously
  • Scenario 2 – Worst case 15 minute period during the evening / night-time:
    o Grain dryer running continuously (evenings only)
    o Cooling fans running continuously

4.12 It should be noted that the scenarios above will rarely occur. For example, over the period of a full year the grain dryer is only expected to run on up to 10 days. Similarly, the cooling fans will not need to be run often, and regular deliveries would only occur during the harvest season. Also, the grain dryer would not be used during the night-time (i.e. between 2300hrs and 0700hrs).
4.13 The results of the modelling predictions are shown in Appendix 3 and summarised in Table 3 below.

<table>
<thead>
<tr>
<th>Location</th>
<th>Period</th>
<th>Predicted Grain Store Noise Levels (L_{Aeq,T})</th>
<th>LPA Criteria (L_{Aeq,T})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nearest and ‘worst case’ residential property to the south (~230m away)</td>
<td>Daytime (0700-1900hrs)</td>
<td>37 dB</td>
<td>35 dB</td>
</tr>
<tr>
<td></td>
<td>Evening / Night-time (1900-0700hrs)</td>
<td>28 dB</td>
<td>33 dB</td>
</tr>
<tr>
<td>Nearest residential property in Foxton (~925m away)</td>
<td>Daytime (0700-1900hrs)</td>
<td>31 dB</td>
<td>35 dB</td>
</tr>
<tr>
<td></td>
<td>Evening / Night-time (1900-0700hrs)</td>
<td>31 dB</td>
<td>33 dB</td>
</tr>
</tbody>
</table>

4.14 It can be seen from Table 3 above that the LPA’s criteria is predicted to be complied with other than a 2 dB exceedance at the nearest residential property to the south during the daytime.

4.15 A 2 dB change in environmental noise levels is at the limit of perceptibility and therefore subjectively insignificant. Consequently this exceedance can be considered to be borderline compliant. It is also important to consider that this predicted exceedance is for a ‘worst case’ scenario that will rarely occur in reality due to the sporadic and seasonal operations of the grain store.

4.16 Furthermore, the predicted exceedance is due to noise from the delivery vehicles and the forklift. Noise emissions from these sources are unlikely to be dissimilar in character to activities that currently take place in the industrial facilities directly adjacent to the nearest residential property, as shown in Figure 3 below. This would further lessen the potential impact of the delivery and forklift noise emissions from the grain store at the residential property, which is likely to be significantly quieter than existing noise of this character.

4.17 The development will also allow the existing grain store on Fowlmere Road to cease operations. This will acoustically benefit the residents near to the existing facility, some of which are located significantly closer to the existing facility than the nearest residents to the proposed new grain store. Therefore, there would be a net benefit to the noise environment in the area with the relocation (and upgrading) of the grain store.
4.18 In summary therefore, in consideration of the design of the facility (which incorporates a number of noise mitigation measures), the predicted noise emissions and the anticipated operation of the facility; it is our view that the proposed grain store development is acoustically acceptable and that the proposals are compliant with both local and national noise planning policy.

4.19 In order to achieve the predicted noise levels given in this report it will be important to ensure that the noise mitigation measures (5m acoustic bund, screening of plant) are implemented and that the final selected plant items (i.e. dryer fans, attenuators and air cooling fans) achieve the noise levels in this report. This would be straightforward to achieve through the imposition of a suitable planning condition.
5. CONCLUSIONS

5.1 Cass Allen Associates was instructed by Hill Residential Limited to assess the suitability of the site for the proposed grain store development with regards to noise.

5.2 The assessment was carried out in accordance with relevant local and national planning guidance.

5.3 Measured noise levels at the site were used to develop appropriate noise criteria for the grain store noise emissions at nearby residential properties in accordance with the Local Planning Authority’s requirements and guidance given in BS4142.

5.4 Considering the design of the facility, the modelling predictions and the anticipated sporadic operation of the facility; it is our view that the site is suitable for the proposed development.

5.5 The development will allow the existing grain store on Fowlmere Road to cease operations. There would be a net benefit to the noise environment in the area with the relocation (and upgrading) of the grain store.

5.6 In order to achieve the predicted noise levels given in this report it will be important to ensure that the proposed noise mitigation measures are implemented and that the final selected plant items (i.e. dryer fans, attenuators and air cooling fans) achieve the noise levels in this report. This would be straightforward to achieve through the imposition of a suitable planning condition.
Survey Results

Survey Summary:
The survey comprised short-term operator attended noise measurements and longer-term unattended noise monitoring at the site. Noise levels at the site were generally dictated by road traffic on surrounding roads and natural sources (birds, etc).

Survey Period:
01/03/2017 to 06/03/2017

Survey Objectives:
- To identify noise sources that contribute to ambient noise levels at the site;
- To measure noise levels around the site over a typical day and night-time period.

Equipment Used (Appendix 1, Table 1):

<table>
<thead>
<tr>
<th>Type</th>
<th>Manufacturer</th>
<th>Model</th>
<th>Serial Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound level meter¹</td>
<td>Bruel &amp; Kjaer</td>
<td>2250 (G4)</td>
<td>3007539</td>
</tr>
<tr>
<td>Calibrator</td>
<td>Bruel &amp; Kjaer</td>
<td>4231</td>
<td>2115551</td>
</tr>
<tr>
<td>Sound level meter¹ (noise logger)</td>
<td>Rion</td>
<td>NL-32</td>
<td>00623765</td>
</tr>
<tr>
<td>Sound level meter¹ (noise logger)</td>
<td>Rion</td>
<td>NL-32</td>
<td>01161917</td>
</tr>
</tbody>
</table>

Note 1: All sound level meters were calibrated before and after measurement periods and no significant drift in calibration was found to have occurred. The results of the measurements are therefore considered to be representative.

Weather Conditions:
The observed weather conditions were acceptable for acoustic measurement throughout the attended survey periods (low-medium wind speeds and no rain). Weather records for the area confirmed that weather conditions were also generally acceptable for acoustic measurement during the unattended monitoring.

Measurement Positions (Appendix 1, Table 2):

<table>
<thead>
<tr>
<th>Position (refer plan below)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1</td>
<td>Attended noise monitoring position. 1.5m above ground. Free-field. Direct line of sight to nearby roads</td>
</tr>
<tr>
<td>L1</td>
<td>Unattended noise logging position. 2m above ground level. Free-field. Direct line of sight to nearby roads</td>
</tr>
</tbody>
</table>
Site plan showing Measurement Positions (Appendix 1, Figure 4):

Attended Noise Monitoring Results (Appendix 1, Table 3):

<table>
<thead>
<tr>
<th>Date</th>
<th>Position</th>
<th>Time</th>
<th>Meas. Length</th>
<th>LSeq, dB</th>
<th>LMax, dB</th>
<th>LA90, dB</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.03.17</td>
<td>N1</td>
<td>10:41</td>
<td>5 mins</td>
<td>62</td>
<td>80</td>
<td>35</td>
<td>Noise dictated by road traffic from Fowlmere Rd</td>
</tr>
<tr>
<td>01.03.17</td>
<td>N1</td>
<td>10:46</td>
<td>5 mins</td>
<td>52</td>
<td>77</td>
<td>33</td>
<td>Noise dictated by road traffic from Fowlmere Rd</td>
</tr>
<tr>
<td>01.03.17</td>
<td>N1</td>
<td>13:22</td>
<td>5 mins</td>
<td>61</td>
<td>81</td>
<td>35</td>
<td>Noise dictated by road traffic from Fowlmere Rd</td>
</tr>
<tr>
<td>06.03.17</td>
<td>N1</td>
<td>09:13</td>
<td>5 mins</td>
<td>65</td>
<td>63</td>
<td>40</td>
<td>Noise dictated by road traffic from Fowlmere Rd</td>
</tr>
</tbody>
</table>
Unattended Noise Monitoring Results (Appendix 1, Table 4):

<table>
<thead>
<tr>
<th>Meas. Period</th>
<th>Position</th>
<th>Daytime (0700-2300hrs)</th>
<th>Night-time (2300-0700hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>LAeq,16hr, dB</td>
<td>LA90,1hr dB↑</td>
</tr>
<tr>
<td>01.03.17 to 06.03.17</td>
<td>L1</td>
<td>65</td>
<td>37</td>
</tr>
</tbody>
</table>

**Note 1:** Typical lowest measured during the period shown.

**Note 2:** Highest typical maximum noise level during the night-time (not exceeded more than 10-15 times per night).

Unattended Noise Monitoring Results (Appendix 1, Figure 5):

<table>
<thead>
<tr>
<th>Meas. Period</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.03.17 to 06.03.17</td>
<td>L1</td>
</tr>
</tbody>
</table>
## Appendix 3 Modelling Results

<table>
<thead>
<tr>
<th>Modelling Software:</th>
<th>CADNA/A Version 4.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modelled Scenarios:</td>
<td>Day and night-time average noise levels across the site</td>
</tr>
</tbody>
</table>
| Data inputs:        | • Noise data for plant items  
                    | • Development layout |
Modelling Printout (Appendix 3, Figure 1):

Scenario 1  Daytime noise levels (L_{Aeq,1hr}) at 1.5m above ground level
Scenario 2  
Night-time noise levels (LAeq,1hr) at 1.5m above ground level

Day: 36.6 dBA  
Night: 27.8 dBA