LAWNS FARM, BURTON ON TRENT

NOISE ASSESSMENT:
SITE OUTLINE DESIGN
IN RELATION TO ROAD TRAFFIC NOISE

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Figure 1 Aerial photograph, showing the site and monitoring positions.
Figure 2 Indicative site masterplan, showing land allocation for various uses.
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Appendix B Survey results
Summary

Design of the scheme in relation to the existing environment
Advice is given on the sound insulation requirements for various aspects of the scheme, in relation to the current masterplan. Unscreened housing near the A38 would require very high performance glazing and ventilation systems. Screening is recommended, using other less sensitive buildings (e.g. industrial/commercial buildings where possible), or a high boundary fence. Advice is given in relation to the proposed location of the primary school, and office accommodation.

Impact of the scheme on the existing environment
During construction, there will be some noise arising from the site, but the impact of this can be minimised using normal good practice, and by limiting site operating hours when working close to existing residential areas. Further work may be required on this aspect.

Once the scheme is complete, there will be a limited impact on surrounding areas arising from increased road traffic.

Plant noise arising from the new industrial/commercial areas and perhaps the school and hotels would need to be controlled to acceptable levels by planning condition in the normal way.

Details are given in the report.
1.0 Introduction

An application is being prepared for a very large mixed scheme on part of Lawns Farm, Burton on Trent, to provide new housing with a range of mixed uses, including employment areas, retail, sports and community facilities, and a possible new primary school.

Indicative masterplan option 3 is given as Figure 1.

This report details the existing noise environment of the site and assesses what measures would be required to protect the sensitive parts of the scheme – particularly residential aspects (including hotel accommodation) and the school - from existing environmental noise. The report also discusses in outline what the impact of the proposed development would be on noise to existing land uses nearby, and also briefly considers the noise impact of construction work.

The existing farm buildings on the site may be demolished.

An aerial photo of the site is given as Figure 1, showing the noise monitoring positions.
2.0 Noise issues affecting the scheme

When considering the noise implications of a large scheme, there are several separate aspects to consider:

(a) **Effect of ‘existing on new’:** The effect of the existing noise environment on the design of the scheme – keeping unwanted noise out of the new buildings. This involves assessing the existing noise environment, making best use of the site masterplan to mitigate the main noise impacts, and then insulating the buildings to control any remaining noise so that satisfactory internal noise levels can be achieved. The design standards applied to this aspect are considered in section 4.

(b) **Effect of ‘new on existing’:** The effect of the proposed new land uses on the existing environment, particularly arising from newly generated road traffic, noise from new plant and equipment, and other noise from new activity on the site. The traffic generated by the site is considered, and some general advice is given on the layout of the site. There will also be some impact on nearby dwellings arising from construction work.

(c) **Effect of ‘new on new’:** The effect of the noise arising from the proposed new land uses on other proposed land uses within the scheme.

The baseline conditions of the site are discussed in section 3, and each of the above aspects is discussed in subsequent sections.
3.0 Baseline noise conditions

3.1 Site description
The site is fairly flat, and forms an irregular long triangle, with one long side bounded by the A38, which carries moderately heavy traffic day and night, and the other long side bounded by a wooded slope to the northwest. (Some of) the hillside forms part of the National Forest, and is to remain as woodland and open space.

To the northeast, the site narrows to about 25 metres, beyond which there is a further small area, approximately oval in shape, which is bounded to the northeast by buildings backing onto Shobnall Road. One of these is a hotel/restaurant, which has car parking to the rear. The other buildings nearby appear to be residential.

The short side of the site to the southwest is bounded by Branston Road, a country lane, which carries intermittent vehicles, mostly travelling quickly (estimated speeds 50-60 kph).

The Trent and Mersey canal passes through the southeastern part of the site.

3.2 Noise survey details

Survey details are given in Appendix A.

Two fixed monitoring positions were used for the survey, one on the A38 boundary of the site, and one on the Branston Road boundary. Both were set up to record typical daytime noise levels and overnight levels. Monitoring positions are shown on Figure 2.

The survey was not fully attended, but observations were made around the site while the survey was being set up.
3.3 Survey findings

Results are summarised below and presented graphically in Appendix B.

<table>
<thead>
<tr>
<th>Boundary</th>
<th>LAeq</th>
<th>LAF(max)</th>
<th>LAF(min)</th>
<th>L_A1</th>
<th>L_A10</th>
<th>L_A90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Branston Road/ Tatenhill Road boundary: (3.5m from kerb, 520m from A38)</td>
<td>day</td>
<td>66.4</td>
<td>83.3</td>
<td>46.5</td>
<td>77.5</td>
<td>68.3</td>
</tr>
<tr>
<td></td>
<td>night</td>
<td>57.7</td>
<td>74.9</td>
<td>41.7</td>
<td>62.4</td>
<td>52.1</td>
</tr>
<tr>
<td>A38 boundary: (6m from kerb)</td>
<td>day</td>
<td>76.9</td>
<td>86.4</td>
<td>55.1</td>
<td>83.7</td>
<td>80.4</td>
</tr>
<tr>
<td></td>
<td>night</td>
<td>75.3</td>
<td>87.0</td>
<td>49.2</td>
<td>84.0</td>
<td>76.9</td>
</tr>
</tbody>
</table>

Noise to the site is primarily attributed to the A38. The graph of noise from the A38 shows very constant noise conditions, and further monitoring in relation to noise from the A38 was judged unnecessary.

There is a substantial industrial estate to the east of site, on the far side of the A38. At no time was any noise from this area audible over the general noise from the A38. There is no evidence of industrial noise (e.g. fans or other constant noise sources) in the graphs of the overnight monitoring, and neither is there any evidence of intermittent noise at levels which would be audible over the A38.

There are no other significant noise sources known around the site.

For design purposes, the noise environment of the site is entirely dominated by the A38.
3.4 Noise Exposure Categories – PPG 24

PPG 24 provides a method for categorizing proposed residential sites according to the noise affecting them. The method is useful as a broad-brush indication of baseline conditions, but care must be taken to allow for potential mitigation, as screening provided by other buildings or boundary treatment, as here, can make a very substantial difference to the effective conditions at the developed site.

PPG 24 advises that sites affected by road traffic noise are divided into four categories, as follows:

**NOISE LEVELS CORRESPONDING TO THE NOISE EXPOSURE CATEGORIES FOR NEW DWELLINGS L_{Aeq,T}**

<table>
<thead>
<tr>
<th>NOISE SOURCE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road traffic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0700-2300</td>
<td>&lt;55</td>
<td>55-63</td>
<td>63-72</td>
<td>&gt;72</td>
</tr>
<tr>
<td>2300-0700</td>
<td>&lt;45</td>
<td>45-57</td>
<td>57-66</td>
<td>&gt;66</td>
</tr>
</tbody>
</table>

For each category, general planning advice is given, as follows:

<table>
<thead>
<tr>
<th>NEC</th>
<th>Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection from noise.</td>
</tr>
<tr>
<td>B</td>
<td>Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.</td>
</tr>
<tr>
<td>C</td>
<td>Planning permission should normally be refused.</td>
</tr>
</tbody>
</table>

A plan of the site showing the approximate Noise Exposure Categories for nighttime noise (reference PPG 24) is given as Figure 3. Nighttime is the more demanding condition at this site, as noise from the A38 is only slightly less at night, while the NEC upper limits are substantially lower, particularly for NEC A.
4.0 Effect of the existing noise environment on the design of the site

4.1.1 Design standards in relation to existing environmental noise affecting proposed uses on the site

PPG 24 and BS 8233 give guidance on suitable noise levels for areas intended for residential development, and in particular BS 8233 advises on the internal noise levels which are to be achieved for reasonable living and working conditions.

4.1.2 Design standards: Dwellings and other ‘residential’ buildings (e.g. hotels)

BS 8233 defines a ‘good’ standard and a ‘reasonable’ standard for dwellings and other ‘residential’ buildings (e.g. hotels). These lower and upper limits are as follows:

<table>
<thead>
<tr>
<th>Living rooms:</th>
<th>30-40 dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedrooms</td>
<td>30-35 dBA</td>
</tr>
</tbody>
</table>

The following noise levels are adopted as the design standard for residential aspects (including hotel accommodation), based on the recommendations in BS 8233. (These will need be confirmed with the local authority.)

<table>
<thead>
<tr>
<th>Living rooms:</th>
<th>35 $L_{Aeq}$(day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedrooms:</td>
<td>30 $L_{Aeq}$(night), and</td>
</tr>
<tr>
<td></td>
<td>45 $L_{Amax}$ (average).</td>
</tr>
<tr>
<td>Outdoor amenity areas:</td>
<td>55 $L_{Aeq}$(day)</td>
</tr>
</tbody>
</table>

The WHO guidance, on which BS 8233 is based, advised that the number of noise events exceeding 45 $L_{Amax}$ should not typically exceed 10-15 occurrences. There is no equivalent recommendation for daytime, but experience suggests that where maximum noise levels regularly exceed 55 $L_{Amax}$ during the daytime, complaints tend to arise, even where the $L_{Aeq}$ meets other guidance levels.
4.1.3 Design standards: Schools

For schools, there is detailed specialist guidance given in Building Bulletin 93 (BB93). This document specifies internal noise levels in various parts of a typical school, and gives other advice on the internal acoustic conditions within the building, specifically reverberation times and the sound insulation between adjoining areas. The detailed advice in BB93 will need to be applied to any school buildings erected on the site.

In overview, BB93 asks for the following internal noise levels in the main areas of a primary school:

- Classrooms/playrooms: 35 LAeq(30 min)
- Other areas (e.g. assembly and sports halls etc): 40 LAeq(30 min).

The conditions on site will be assessed and guidance given on the type of measures likely to be required to achieve the necessary internal conditions.

4.1.4 Design standards: Offices, retail, other commercial areas

The internal noise levels required for employment uses will vary with the type of employment use proposed.

An indicative required level of 40 L<sub>Aeq</sub>(day) is taken, so that an estimate of the sound insulation requirements for a typical building shell can be given.
4.2 Masterplan-level site design comments

4.2.1 Overview

Noise to the site is dominated by the A38. Housing, hotels, and schools are sensitive to excessive noise, and would be best located away from the A38 and buffered by other land uses where possible. Industrial and commercial areas tend to be the least sensitive to road noise, and can therefore be located in buffer zones to protect other uses behind. Obviously, the industrial and commercial uses must themselves be compatible with residential areas, and not generate significant noise themselves, to avoid creating new problems.

4.2.2 Housing

Masterplan option 3 shows a substantial buffer zone formed by ‘employment uses’, separating the main part of the site from the A38. The distance separation and screening by the bulk of new buildings will reduce traffic noise to these areas substantially.

No detail is yet available on the type or design of housing, but it is presumed at this stage that it will mostly be medium-density 2-storey traditional dwellings, and possibly some flats.

In areas where a buffer zone is not practical, then residential accommodation will need to be protected from noise from the A38 using a roadside barrier 3.5-4m high, or substantially uprated sound insulation. The barrier needs to screen upper floor windows from line-of-sight to the top of car wheels.

The following indicative solutions are given for housing in various parts of the site, to achieve the internal noise levels given in section 2. In intermediate areas, then there will be intermediate solutions possible – the following are given to assist with the further development of the masterplan.
<table>
<thead>
<tr>
<th>HOUSING – Indicative noise mitigation requirements</th>
<th>External noise levels</th>
<th>Glazing</th>
<th>Ventilation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing immediately alongside A38, no roadside barrier</td>
<td>74-day 72-night</td>
<td>Deep-void glazing to all windows with line-of sight to the road</td>
<td>Heat Recovery*</td>
</tr>
<tr>
<td>(a) Housing immediately alongside A38, 4m roadside barrier, or (b) housing in a ‘second row’ behind other housing alongside an otherwise unscreened A38.</td>
<td>60-day 67-night</td>
<td>Heavy duty double glazing to bedrooms. Ordinary glazing to living rooms.</td>
<td>Heat recovery to bedrooms. Acoustic airbricks to living rooms.</td>
</tr>
<tr>
<td>Housing protected from A38 by substantial (50m) buffer zone of industrial/commercial buildings or other housing</td>
<td>54-day 52-night</td>
<td>Ordinary glazing</td>
<td>Ordinary trickle vents.</td>
</tr>
</tbody>
</table>

* Heat recovery – this is a very high performance ventilation system, which provides forced-air ventilation through ducting. The ducting and other features of the basic design provide very high levels of acoustic insulation against external noise. Other high-performance systems are available. Where ‘heat recovery’ specified above, then acoustic airbricks and acoustic trickle ventilators are NOT SUITABLE.

Flats: Note that large blocks of flats can be used to screen dwellings behind, and can be used to good effect to break up an otherwise long line of fencing. The ‘noisy’ side of any such block would need to be insulated to the highest standards given in the table above (i.e. deep-void glazing and heat-recovery ventilation).

4.2.3 Schools

On Masterplan option 3, the school is shown in the centre of the site, approximately 500m from the A38, buffered partly by employment areas, and partly by some housing and public open space.
Noise levels to this part of the site, once developed, will be around 52dBA, +/- 3dBA depending on detailing of the masterplan. Classroom windows facing the A38 will need to remain closed to achieve acceptable internal noise levels, and will need a suitable ventilation system which can draw adequate air in through trickle ventilators or similar.

Classroom windows facing away from the A38 can be opened to provide suitable ventilation without exceeding noise level targets.

Some areas in schools are required to achieve better control of external noise (e.g. specialist music areas, recording studios, and some accommodation intended for children with hearing difficulties.). Typically, these areas do not occur in mainstream primary schools, but if any such accommodation is intended, then specialist advice will need to be sought.

The detail of any school building would need careful design to meet the requirements of BB93, but in principle the centre of the site, as shown on Masterplan option 3, provides an acceptable environment in which most windows can be opened to provide adequate ventilation without causing excessive internal noise levels.

### 4.2.4 Offices, retail and commercial areas

Generic office, retail and commercial buildings would be best designed with no windows to sensitive areas facing the A38 boundary. If windows must be installed to sensitive rooms (e.g. meeting rooms, private offices etc.), they will either need (a) to be protected by a high fence, or (b) glazing and ventilation will need to be uprated accordingly, to standards similar to that required for residential accommodation.
5.0 Effect of the proposed scheme on the existing noise environment

There will be some noise generated by construction work at the site, and the related traffic generation.

Once completed the site will generate additional traffic to the road network, and there will be some potential for noise arising from the proposed new uses on the site, although most of this will be controlled by planning condition in the normal way (such as noise from new plant, etc).

Each of these aspects is considered in turn:

5.1 Construction noise

This aspect can be examined further when details are known. The phasing of the site is not yet known, and the construction methods also unknown at this time.

There is little existing habitation around most of the site, except at the northern end, and the southern corner.

Construction noise can be high during particular operations, but note that background noise levels at the site are generally high already, and will provide some masking of any new noise.

Existing habitation is all less than 2-3 stories, and the ground floor will be reasonably well-protected from activity nearby by normal site hoardings.

When working near to existing habitation, it will be necessary to operate construction works in a considerate manner, using quieter methods where possible (e.g. auger piling rather than impact piling).

It is anticipated that the hours of operation at the site will be limited in the usual way when works are close enough to have a significant impact on those living nearby.
5.2 Construction traffic

This aspect will require further consideration when access arrangements for the site are known.

Existing habitation which has the potential to be affected by construction traffic include the hotel and nearby houses on Shobnall Road; housing near the roundabout on Branston Road; and the solitary house near the existing site access off Branston Road.

Site access for construction traffic would be best achieved from the roundabout directly off the A38 to the south of the scheme.

5.3 Completed site traffic

*To be considered further when transport assessment is available.*

5.4 New industrial noise

It is anticipated that noise from any new industrial or commercial building will be controlled by conditions and/or restrictions on permitted Use Classes which require activity to be compatible with residential areas. Any proposed use which does not strictly comply with these restrictions will need to be examined in detail, and considered on its merits. It is likely that some noise-generating uses could be accommodated alongside the A38 in the industrial/commercial zone without difficulty. HGV access to the new residential streets would be best controlled to daytime only. Nighttime access to the industrial areas will need to be via a separate access to the site, away from residential areas.

5.5 New Plant noise

Noise arising from any new fixed plant, such as air conditioning and extract systems, can be controlled by planning condition in the normal way, and is not considered further.
6.0 Impact assessment

The noise impact of a new development on the existing environment is normally categorised according to the following scale:

<table>
<thead>
<tr>
<th>Change in noise level $L_{Aeq,t}$ dB</th>
<th>Response</th>
<th>Impact</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3</td>
<td>Imperceptible</td>
<td>None</td>
<td>Negligible</td>
</tr>
<tr>
<td>3-5</td>
<td>Perceptible</td>
<td>Slight/Marginal</td>
<td>Minor</td>
</tr>
<tr>
<td>6-10</td>
<td>Up to a doubling of loudness</td>
<td>Significant</td>
<td>Moderate</td>
</tr>
<tr>
<td>11-15</td>
<td>Over a doubling of loudness</td>
<td>Substantial</td>
<td>Major</td>
</tr>
<tr>
<td>&gt;15</td>
<td></td>
<td>Severe</td>
<td></td>
</tr>
</tbody>
</table>

The following impacts have been identified and categorised as follows:

<table>
<thead>
<tr>
<th>Cause</th>
<th>Affected location</th>
<th>Change in noise level</th>
<th>Duration/extent</th>
<th>Impact/significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction noise:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwellings near A38/Tatenhill road roundabout</td>
<td>+5 when working close to boundary</td>
<td>Short term/ Immediate locality of site</td>
<td>Slight impact</td>
<td>Minor significance</td>
</tr>
<tr>
<td>Dwellings on Shobnall Road, near site</td>
<td>+10 when working close to boundary</td>
<td>Short term/ Immediate locality of site</td>
<td>Significant impact</td>
<td>Moderate significance</td>
</tr>
<tr>
<td>Increase in road traffic:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwellings near A38/Tatenhill road roundabout</td>
<td>&lt;3dBA</td>
<td>Long term</td>
<td>Immediate locality of site</td>
<td>Slight-marginal impact.</td>
</tr>
<tr>
<td>Dwellings on Shobnall Road, near site</td>
<td>&lt;3dBA</td>
<td>Long term</td>
<td>Immediate locality of site</td>
<td>Slight-marginal impact.</td>
</tr>
<tr>
<td>Other dwellings affected by noise from A38 generally</td>
<td>&lt;0.5dBA</td>
<td>Long term</td>
<td>Immediate locality of site</td>
<td>No impact.</td>
</tr>
</tbody>
</table>

There are not predicted to be any significant noise impacts to any other locations further from the site.
FIGURE 1

AERIAL PHOTOGRAPH, SHOWING THE SITE IN CONTEXT, AND SHOWING OVERNIGHT MONITORING POSITION
FIGURE 2

PROPOSED MASTERPLAN
(NB REFER TO PLANNING DRAWINGS FOR FULL DETAILS)
FIGURE 3

NOISE EXPOSURE CATEGORIES
APPENDIX A

SURVEY DETAILS
Appendix A:

Survey details

1. Locations for overnight survey –
   (a) microphone located on site boundary behind A38 layby, approximately 2.5m above grade, approximately 6m from kerb.
   (b) microphone located on site boundary with Tatenhall Road, approximately 1.8m above grade, 3.5m from kerb.

2. Date: 13-14\textsuperscript{th} May 2010

3. Personnel: Catherine Day, Sharps Redmore Partnership

4. Equipment: Norsonics 118 type 1 automatic logging environmental sound level meter, fitted with weather protection kits. SRP reference sets A and G were used for this survey.

5. Calibration: Equipment was calibrated to within 0.5 dBA before and after use with a pure-tone electronic calibrator. No drift was found to have occurred. Calibration standards are checked regularly and are traceable via NAMAS to national standards held at NPL.

APPENDIX B

SURVEY RESULTS
Burton on Trent - Environmental Noise monitoring, Lawns Farm 12-13 May 2010

Meter located alongside Tatenhall Road, approximately 3.5m from kerbline, 2.5m above grade, approximately 520m from A38
Environmental Noise monitoring -
Burton on Trent - Lawns Farm: A38 boundary, 6m from kerb 2.5m above grade

Time, date

level, dBA

- **LAeq**
- **LAF(max)**
- **LAF(min)**
- **LA1**
- **LA10**
- **LA90**

Day/night averages