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**Proposed Residential Development,
Mill Green Road, Pinchbeck, PE11 3PU**

Vibration Assessment Report

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On behalf of
AMJ Construction Ltd

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1.0 INTRODUCTION

- 1.1 Blue Tree Acoustics has been appointed by AMJ Construction Ltd to carry out a vibration assessment for a proposed residential development on land off Mill Green Road, Pinchbeck.
- 1.2 The development site is situated to the east of Mill Green Road. The site is currently in use as a nursery consisting of greenhouses, poly tunnels, a field, and 2no residential plots.
- 1.3 The site is to the west of a railway line serving the East Midlands, connecting Spalding to Sleaford.
- 1.4 The surrounding area is a mix of residential use, commercial use, and farmland, including Houghton Produce and Anglia UK Debt Management to the southwest of the site on Mill Green Road. There is also Highfield Kennels 200m northwest of the site along High Fields Lane.
- 1.5 The vibration impact assessment has included:
 - i) Inspection of the site and surroundings.
 - ii) Vibration monitoring surveys undertaken at locations on the site during daytime and nighttime.
 - iii) Evaluation of the site in accordance with relevant planning policy guidance.
 - iv) Evaluation of the site in accordance with *BS6472:2008 'Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)'*.

2.0 EXISTING VIBRATION SOURCES

Rail

- 2.1 The railway line passing the site is the only potentially significant source of vibration as experienced on the eastern side of the development site. The railway serves the East Midlands, connecting Spalding to Sleaford. The line is relatively busy, with both passenger and freight train movements passing the site. Passing trains are less frequent during nighttime hours, and there is no service on Sundays.

3.0 VIBRATION SURVEY

- 3.1 Vibration monitoring was undertaken by Blue Tree Acoustics to determine the existing vibration levels experienced at the site. Measurements were taken during representative daytime and nighttime survey periods, such that 24 hours' worth of data could be collected.
- 3.2 A vibration survey was undertaken at the site on Wednesday 25th to Thursday 26th January 2017.
- 3.3 The instrumentation used for the surveys was 1no Svan 958A Type 1/Class 1 vibration level meter with VDV tri-axial transducer. The meter was within a valid period of laboratory calibration. Calibration checks were carried out both before and after the measurements, with no variance observed.
- 3.4 Weather conditions were dry and calm between Wednesday 25th to Thursday 26th January 2017, apart from one period of rain on the 25th. Weather data from a nearby weather station is shown in Appendix II. Weather conditions do not affect vibration results other than the remote possibility of increasing measurement results due to rain falling on or around the accelerometers.
- 3.5 Data for trains passing Pinchbeck typically show 8no freight movements in the day (0700-2300 hours) and 8no freight movements at night (2300-0700 hours). Passenger train movements are shown as being 16no in the day and 1no at night. These figures tally with scheduled train times passing through the area. The freight movements in the day can vary depending on the weekly schedule and cancellations.

4.0 VIBRATION ASSESSMENT

- 4.1 Guidance on assessing the potential annoyance resulting from vibration in buildings is set out in *British Standard 6472: 2008 'Guide to the evaluation of human exposure to vibration in buildings'* (BS6472). The standard includes a section on intermittent vibrations, which requires the vibration exposure to be determined in terms of a 'vibration dose value' (VDV). This takes into account the magnitude of the vibration and the duration of the exposure. (VDV is defined as a cumulative measurement of the vibration level received over a given period; it is the integrated fourth power vibration value with units $\text{ms}^{-1.75}$ and has the advantage of sensitivity to vibration peak levels.)
- 4.2 Vibration dose values ($\text{ms}^{-1.75}$) in residential buildings at which various degrees of adverse comment may be expected are quoted in BS6472 and are reproduced below:

Vibration dose value ranges which might result in various probabilities of adverse comment within residential buildings

Place and time	Low probability of adverse comment $\text{m}\cdot\text{s}^{-1.75\ 1)}$	Adverse comment possible $\text{m}\cdot\text{s}^{-1.75}$	Adverse comment probable $\text{m}\cdot\text{s}^{-1.75\ 2)}$
Residential buildings 16 h day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8 h night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

- 4.3 The vibration survey has gathered a series of measurements of VDV in each of the three orthogonal directions taken at the measurement location indicated in Figure 1. From these measurements, the 16-hour or 8-hour VDV may be estimated. The total day or night VDV can be evaluated using the following relationship for (N) number of vibration episodes during the assessment period:

$$\text{VDV} = (\sum_{i=1-N} \text{VDV}_i^4)^{0.25}$$

- 4.4 There was no perceptible vibration underfoot, but the objective measurement is deemed more critical than the subjective assessment on site.
- 4.5 Based on the data collected, the following table sets out the highest calculated VDV occurring on the development site:

Table 1: Calculated 16-hour and 8-hour day/night VDV ($\text{ms}^{-1.75}$)

Time Period	VDV
Day (0700-2300 hours)	0.08
Night (2300-0700 hours)	0.07

- 4.6 As can be seen above, vibration levels are below the 'low probability of adverse comment' threshold, and are therefore within acceptable limits. This is considered no worse than any other similar location within Lincolnshire or the UK. The results are considered worst-case for the site, as measurements were made at the site boundary with the railway line, whereas the nearest new houses will be some 20m from the railway. There are also existing residential properties at similar proximity to the railway in the immediate vicinity.
- 4.7 In the extreme case where the highest vibration event occurred continuously for 24 hours, the daytime result would be 0.30 VDV ($\text{ms}^{-1.75}$) with 0.24 VDV ($\text{ms}^{-1.75}$) at night. Clearly, this is impossible, as each train event occurs for less than 1 minute, rather than over 24 hours, but even in this case, the impact is just into the 'adverse comment possible' region at night and only 'low probability of adverse comment' during the day.
- 4.8 If twice as many trains were to pass the site, daytime and nighttime results would both remain below 0.1 VDV ($\text{ms}^{-1.75}$).

5.0 SUMMARY AND CONCLUSIONS

- 5.1 A vibration assessment has been carried out on behalf of AMJ Construction Ltd for a proposed residential development on land off Mill Green Road, Pinchbeck.
- 5.2 The assessment has included measurements of the vibration levels at the site during representative daytime and nighttime periods. Rail traffic is the only potentially significant vibration source at the development site.
- 5.3 Levels of vibration were found to be below the 'low comment probability of adverse comment' threshold, and therefore within suitable limits for residential development.
- 5.4 The above conclusions are also corroborated somewhat by the fact that there are existing residential properties in the immediate vicinity that will experience broadly the same degree of vibration exposure as at the development site.
- 5.5 In addition, the assessment has been undertaken in accordance with the *National Planning Policy Framework* (NPPF). On this basis, we consider that the vibration assessment methodology and conclusions meet the principles set out in the NPPF.

FIGURE 1 – APPROXIMATE VIBRATION MONITORING LOCATION



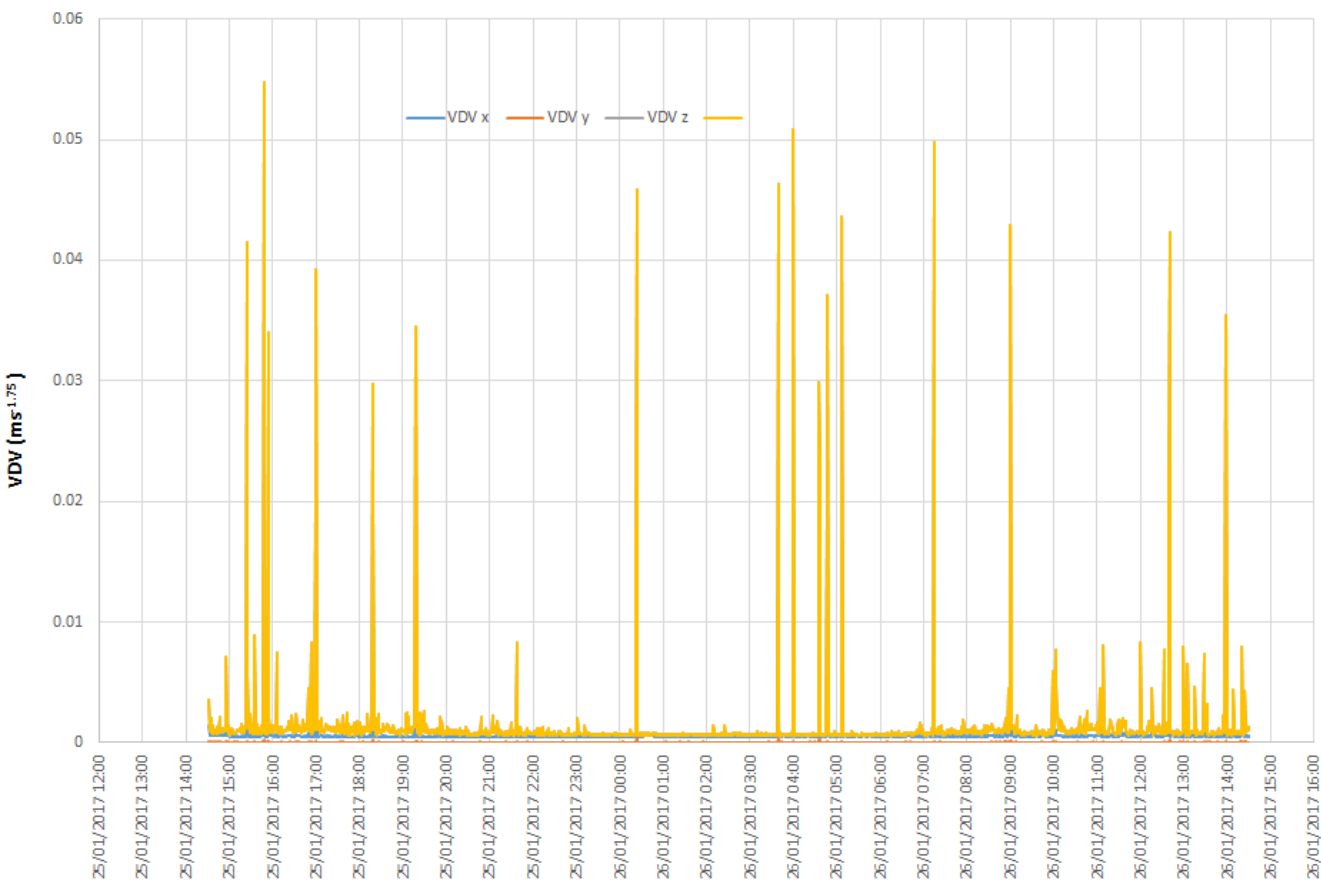
FIGURE 2 – INDICATIVE PROPOSED DEVELOPMENT PLAN



APPENDIX I – VIBRATION SURVEY DATA

Chart 1: Location A – Eastern edge of development site at boundary with railway

Svan 958A all values VDV, 1-minute duration



APPENDIX II – WEATHER DATA

Archival weather data from station in Spalding between 25-26th January 2017.

January 25, 2017 - January 26, 2017

