Noise Impact Assessment

Southam Road and Ruscote Avenue, Banbury

Presented to **Lysander**

Issued: October 2021

Delta-Simons Project No. 21-1553.05

deltasimons

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Report Details

Client	Lysander
Report Title	Noise Impact Assessment
Site Address	Banbury 200 Site, Southam Road, Banbury OX16 3AE
Project No.	21-1553.05
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Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
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Delta-Simons is proud to be a founder member of the Inogen Environmental Alliance, enabling us to efficiently deliver customer projects worldwide by calling upon over 5000 resources in our global network of consultants, each committed to providing superior EH&S and sustainability consulting expertise to our customers. Through Inogen we can offer our Clients more consultants, with more expertise in more countries than traditional multinational consultancy.

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Executive Summary

Site and Report Context	Delta-Simons, working with our approved technical specialist Professional Consult, was instructed by Lysander to prepare a Noise Impact Assessment in support of a planning application for a proposed commercial development (the 'Proposed Development') located off Southam Road in Banbury, OX16 3AE. Reference should be made to Figure 1 for a map of the Site and surrounding area. The Site comprises a parcel of land located to the south of the Douwe Egberts factory which lies within a commercial and industrial area. Proposals include for use of the site for the storage of operational vehicles, together with elevational and site alterations, associated parking, welfare facilities, vehicle barrier and other associated infrastructure.
Summary	This assessment has been undertaken to identify the key noise sources associated with the proposal which may have the potential to impact upon the closest existing residential dwelling. Accordingly, this assessment has been completed with due regard to the National Planning Policy Framework (NPPF) including 2021 update and its associated National Planning Policy Guidance (NPPG) and BS4142:2014+A1:2019.
Conclusions and Recommendations	This Assessment has used traffic data in order to calculate anticipated noise impacts at the closest residential dwellings to the Site, together with a background sound survey at the Site in order to establish the existing background sound climate at the closest residential dwellings in the absence of the development. Accordingly, this Assessment has shown that the rated level of noise from Light Goods Vehicles (LGV) operations at the Site will meet the typical daytime background sound levels. This includes electrical plant (i.e. existing transformers) which has been calculated together with the LGV movements to assess the overall noise emitted by the Proposed Development. Details of any proposed mechanical plant for the proposed development have not been supplied and so mechanical plant noise emission limits have been set relative to the typical background sound level.
This is intended as a summary only. Further detail and limitations of the assessment is provided within the main body of the Report.	

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1.0 Introduction

1.1 Appointment

1.1.1 Delta-Simons, working with our approved technical specialist Professional Consult, was instructed by Lysander to prepare a Noise Impact Assessment in support of a planning application for a proposed commercial development (the 'Proposed Development') located off Southam Road in Banbury, OX16 3AE. Reference should be made to **Figure 1** for a map of the Site and surrounding area.

1.2 Site Location and Context

1.2.1 The Site is located to the west of Southam Road and currently exists as industrial buildings associated with Douwe Egberts. The Site is located within an industrial area with the nearest receptors located 70m to the south-east off Nursery Drive and Garden Close.

1.2.2 Proposals include for use of the site as storage of operational vehicles, together with elevational and site alterations, associated parking, welfare facilities, vehicle barrier and other associated infrastructure. This assessment has been undertaken to identify the key noise sources associated with the proposal which may have the potential to impact upon the closest existing residential dwellings.

1.2.3 Accordingly, this Assessment has been completed with due regard to the National Planning Policy Framework (NPPF) and its associated National Planning Policy Guidance (NPPG) and BS4142:2014+A1:2019.

1.2.4 The standard limitations associated with this assessment are presented in **Appendix A.**

1.2.5 A glossary of terms used in this report is provided in **Appendix B.**

2.0 Legislation and Policy

2.1 Planning Policy

2.1.1 A summary of the national and local planning policy relevant to the Proposed Development is provided below.

National Planning Policy Framework and National Planning Practice Guidance

2.1.2 The Government published the revised National Planning Policy Framework (NPPF) in February 2019, updated in July 2021, and the National Planning Practice Guidance (NPPG) in July 2019. Together, the NPPF and NPPG set out what the Government expects of local authorities. The overall aim is to ensure the planning system allows land to be used for new homes and jobs, while protecting valuable natural and historic environments.

2.1.3 The NPPG adds further context to the NPPF and it is intended that the two documents should be read together.

2.1.4 Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. When preparing local or neighbourhood plans, or taking decisions about new development, there may also be opportunities to consider improvements to the acoustic environment.

2.1.5 Local planning authorities' plan-making and decision making should take account of the acoustic environment and in doing so consider:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur; and
- Whether or not a good standard of amenity can be achieved.

2.1.6 In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.

2.1.7 The Observed Effect Levels are as follows:

- Significant observed adverse effect level: This is the level of noise exposure above which significant adverse effects on health and quality of life occur;
- Lowest observed adverse effect level: This is the level of noise exposure above which adverse effects on health and quality of life can be detected; and
- No observed effect level: This is the level of noise exposure below which no effect at all on health or quality of life can be detected.

2.1.8 **Table 1** summarises the noise exposure hierarchy, based on the likely average response.

Table 1 - Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Adverse Effect Level			
Not Noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	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.	No Observed Adverse Effect	No specific measures required

Perception	Examples of Outcomes	Increasing Effect Level	Action
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	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.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	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.	Significant Observed Effect	Avoid
Noticeable and very disruptive	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	Unacceptable Adverse Effect	Prevent

2.2 Local Planning Policy

Cherwell District Council Local Plan 2011 - 2031

2.2.1 Policy BSC8 'Securing Health and Well-Being' states the following with regards to noise:

> *'Planning decisions can have an effect on travel to work, schools, noise and air quality, access to services, climate change and social networks which can all contribute to health and well-being'*

BS4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

2.2.2 Published by the Department of Transport in 1993 (amended August 2008), this document sets out procedures for undertaking the environmental assessment of new road schemes, including the assessment of noise impacts from road traffic. In particular, it describes a method for assessing the severity of a noise impact, in terms of the number of people who will be bothered from any noise increase due to a new road scheme. In undertaking a DMRB assessment, the calculation of traffic noise levels uses the methodology contained within the Calculation of Road Traffic Noise (CRTN) Memorandum as described below. This Standard describes methods for rating and assessing sound of an industrial or commercial nature which includes:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and / or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from processes or premises, such as that from forklift trucks, or that from train or ship movements on or around an industrial or commercial Site.

2.2.3 The procedure detailed in the Standard compares the measured or predicted noise level 'the specific noise level' from any of the above detailed noise sources with the background sound level at a residential dwelling. The measured background sound level at a receptor should be reliable and should not necessarily ascertain a lowest measured background sound level, but rather to quantify what is 'typical'.

2.2.4 The specific noise level also acknowledges the following reference time intervals depending upon whether the noise source operates during daytime or night-time periods:

- Daytime (07:00 - 23:00): 1 hour; and
- Night-time (23:00 - 07:00): 15 minutes.

2.2.5 There are a number of 'character corrections' which can be attributed to the specific sound level, either subjectively or objectively, depending upon the 'acoustic features' of the sound level under investigation. These character corrections vary in their weighting depending upon the severity of the acoustic feature, as follows (with regards to the subjective method):

Tonality

- +2dB: where the tonality is just perceptible;
- +4dB: where the tonality is clearly perceptible; and
- +6dB: where the tonality is highly perceptible.

Impulsivity

- +3dB: where the impulsivity is just perceptible;
- +6dB: where the impulsivity is clearly perceptible; and
- +9dB: where the impulsivity is highly perceptible.

Intermittency

- +3dB: where the intermittency is readily distinctive against the acoustic environment.

2.2.6 Where the assessment is carried out using the objective method, the tonality character correction is either 0dB or 6dB and the impulsivity character correction can range from 0dB up to 9dB in increments of 1dB, depending on the level of impulsivity identified.

2.2.7 In addition to the above acoustic features, there is also a penalty for 'other sound characteristics' of +3dB where a sound exhibits characteristics that are neither tonal nor impulsive, though is readily distinctive against the acoustic environment at the receptor.

2.2.8 BS4142 goes on to state that the rating level is equal to the specific sound level if there are no such features present or expected to be present.

2.2.9 Assessment of the rating level relative to the background noise level can yield the following commentary:

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

2.2.10 Whilst the Standard does make various references to it not being intended to assess noise impacts at indoor locations, Section 1.1 does state:

> 'The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident'.

2.2.11 Example 6 in the Standard states:

> 'In addition to the rating/background sound level comparison shown in Table A.6, the primary concern is the potential for disturbance of residents who could be sleeping with open bedroom windows. Other guidance, such as BS 8233, might also be applicable in this instance'.

2.2.12 Furthermore, Example 8, which considers night-time commercial noise impacts at a dwelling, states:

'BS 8233 indicates that 40 dBA sound level from the plant, equating to an internal level of around 30 dBA or possibly lower, but with some acoustically distinguishing characteristics, may not be suitable for a bedroom.'

2.2.13 With the above in mind, and for a clear need to ensure that any potential commercial or industrial noise impacts do not give rise to sleep disturbance in bedrooms, this assessment will ensure that the predicted rating level (specific sound level including any character corrections) does not exceed 30dBA $L_{Aeq\ 8hr}$ in bedrooms.

BS8233:2014 'Guidance on sound insulation and noise reduction for buildings'

Noise Criteria Limits

2.2.14 The scope of this Standard is the provision of recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new buildings or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate.

2.2.15 The Standard suggests suitable internal noise levels within different types of buildings, including dwellings, as shown in **Table 2**.

Table 2 - BS8233:2014 Internal Target Noise Levels

Criterion	Typical Situation	Design $L_{Aeq,t}$ (dB)
Suitable resting / sleeping conditions	Living Room	35
	Bedroom*	30
*For a Reasonable standard in bedrooms at night, individual noise evens (measured with fast time weighting) should not exceed 45dB L_{max}		

Ventilation Requirements

2.2.16 Where a partially open window cannot be relied upon to provide an adequate level of façade sound insulation performance, it is necessary to consider alternative ventilation for habitable rooms. Section 8.4.5.4 within BS8233 states:

'The Building Regulations' supporting documents on ventilation [48, 49, 50] recommend that habitable rooms in dwellings have background ventilation. Where openable windows cannot be relied upon for this ventilation, trickle ventilators can be used, and sound attenuating types are available. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice.

2.2.17 Alternatively, acoustic ventilation units (see comments on Section 7.7.2 of BS8233 below) are available for insertion in external walls. These can provide sound reduction comparable with double glazed windows. However, ducted systems with intakes on the quiet side of the building might be required in very noisy situations, or where appearance rules out through-the-wall fans.'

2.2.18 Section 7.7.2 states:

'NOTE 5 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.'

Cherwell District Council Environmental Health Department

2.2.19 Cherwell District Council were contacted in order to obtain agreement on the rated level of noise not exceeding the background sound level. The following consultation was provided:

'We have been appointed by a client to complete a Noise Impact Assessment in support of a proposed distribution centre on a parcel of land located off Southam Road in Banbury OX16 3AE. Please see attached the red line boundary.

In order to complete the Assessment, a background sound survey has been undertaken which measures the background sound climate in a location considered to be representative of the

closest residential dwellings to the Site, over a full weekday and weekend period. The nearest residential receptor to the Site has been identified to the south west off Nursery Drive.

A Noise Impact Assessment will be completed for any noise associated with noise from vehicles manoeuvring on Site upon the closest residential dwellings and this will be completed in line with the guidance provided in BS4142:2014+A1:2019. The Noise Impact Assessment will also consider the potential noise impact of any proposed mechanical and electrical plant if installed on the Site. Where exceedances are predicted, we will specify appropriate noise mitigation measures to ensure compliance with the criteria.

Professional Consult will issue a Noise Impact Assessment to the client which will be suitable for accompanying the scheme planning application.

If you have any comments or any specific criteria that you need the Noise Impact Assessment to adhere to, then please advise.

2.2.20 At the time of issuing this report no response had been received, however the above methodology is considered robust.

3.0 Scope and Methodology

3.1 Scope

3.1.1 The scope of the assessment has been determined in the following way:

- Analysis of the Site and the surrounding area was completed using available aerial photography in order to identify the location of the closest existing residential dwellings to the Site; and
- Analysis of the surrounding local road network in order to identify any noise-sensitive residential receptors which may be subject to changes in road traffic noise levels.
- Noise Impact Assessment has used supplied noise level data to complete an assessment in line with BS4142:2014+A1:2019 whereby the rated level of noise is compared against the typical measured background sound level at the closest residential receptor to the Site.

3.2 Operational Noise - BS4142:2014+A1:2019 Assessment

3.2.1 In order to assess the noise levels associated with the proposed development at the closest receptors, spreadsheet calculations have been undertaken.

3.2.2 A typical van movements process has been adopted for the assessment, which was measured on a similar project**.**

3.2.3 To assess the likely noise impact of van movements, an assessment has been carried out only for day period. This has been undertaken to demonstrate a worst-case assessment where only external noise sources are assessed (i.e. LGV movements).

3.2.4 To determine the impact of noise levels that could be produced from the proposed operations of the Site, the assessment has been undertaken using methods from BS 4142: 2014+A1:2019. The specific noise levels of the operational processes are assessed against the background noise level at the identified receptors.

3.2.5 This assessment considers a $L_{Aeq,1\ hour}$ reference time which have been applied for the activities accordingly in correspondence to the reference time interval for day. Supporting calculations can be found in **Appendix D**.

3.3 Plant Noise Limit - BS4142:2014+A1:2019 Assessment

3.3.1 At this stage the exact details and location of fixed plant (i.e. refrigeration units, chillers units and air handling units) to be installed on the proposed store is not known. Therefore, as a conservative approach a plant noise limit is provided that the development must not exceed when measured in free-filed conditions at the receptor assuming continuous 24-hour operational noise and based on assumptions described below.

3.3.2 It is assumed that the plant will most likely be installed on the roof of the building. To ascertain worst case locations for the plant it is also assumed that plant may be installed at the south of the proposed building façade (facing Nursery Drive residencies). On this basis a plant noise limit can be given for the receptors.

3.4 Traffic Noise - CRTN & DMRB Assessment

3.4.1 Given the location of the site directly onto an arterial route for the industrial estate, with an existing high level of industrial traffic, it is considered that a spreadsheet calculation of basic traffic noise changes would be sufficient to identify the level of impact from the proposed development. Supporting calculations are provided in **Appendix E.**

3.4.2 Traffic flows for the surrounding road network, presented in **Appendix E**, have been provided by Vectos Transport Consultant in order to assess the noise impact from additional traffic as a result of the development. Traffic data is provided as 18-hour Annual Average Weekly Traffic (AAWT).

3.5 Significance criteria

3.5.1 Where the rated level of noise exceeds the adopted noise criteria level as per BS4142:2014+A1:2019 at the residential receptor, a substantial adverse impact will be observed depending on the context and level of exceedance.

Baseline

3.6 Introduction

Background Sound Survey

3.6.1 A background sound survey has been completed over a full weekday and weekend period as follows:

- Noise Measurement Position 1: 10:00 on Thursday 14th January 2021 - 10:00 on Tuesday 19th January 2021. The microphone of the sound level meter was located within the south western area of the Site at the bottom of the exiting embankment facing the receptors off Nursery Drive. The microphone was located in free-field conditions. The sound climate at the microphone location comprised generally of road traffic noise using the distant road traffic and intermittent commercial sound from the Site to the north.

3.6.2 Reference should be made to **Figure 1** for a map of the Noise Measurement Position and Measured Sound Pressure Level Data is presented in **Appendix C**.

3.6.3 **Table 3** summarises the measured noise levels and the full measured noise levels are presented in **Appendix C**.

Table 3 – Summary of Measured Ambient Sound Level

Period	Measured Free-Field Sound Pressure Level (dB)	
	Range $L_{A90,1hr}$	Typical $L_{A90,1hr}$
Daytime (07:00 - 19:00)	40.0 – 46.0	43.0
Evening (19:00 – 23:00)	36.0 – 44.0	40.0
Night-time (23:00 - 07:00	34.0 – 46.0	40.0

Survey Equipment

3.6.4 The following equipment was used for the Noise Survey.

Table 4 - Noise Measurement Equipment

Measurement Position	Equipment Description	Manufacturer & Type No	Serial No.	Calibration Due Date
NMP1	Sound Level Meter	01dB Fusion	11755	3rd July 2022
	Pre-amplifier	01dB PRE22	1707173	
	Microphone	GRAS 40CD	291693	
	Calibrator	01dB CAL-31	84086	2nd July 2021

3.6.5 The sound level meter was field calibrated prior to and following the survey and no significant drift was identified.

3.6.6 **Table 5** summarises the measured wind speeds during the noise survey at the measurement location.

Table 5 - Range of Measured Wind Speeds

Period	Range of Measured Wind Speeds (m/s)	Rainfall Recorded?
During Background sound survey	0 – 0	Yes
Various periods of rainfall were measured during the background sound survey and these have been removed from further analysis.		

4.0 Assessment

4.1 BS4142:2014+A1:2019 Assessment

4.1.1 The Site lies in a commercial area with the closest residential dwellings lying to the south of the external parking. It is understood that there will be van parking provision for 574 light goods vehicles (LGVs), out of which 284 external and 290 internal. Thus, there may be adverse noise impacts produced by the movement of LGVs at the closest residential dwellings.

4.1.2 In order to inform a reliable Assessment, library noise level data for the following has been adopted:

- Library noise level data held which has been used in a previous similar assessment is 61dB(A) at 4m for an LGV pass-by;
- Background sound level: The background sound level measured on the Site has been used and the typical background sound level for daytime period when the LGVs can operate has been adopted, in line with the requirements of BS4242:2014+A1:2019;
- From previous assessment it is understood that the peak movements take place between 8am - 9am and 5pm - 6pm, therefore only the daytime period has been considered for LGV calculations in the assessment as there are a significantly less movements outside of these hours;
- The proposed development is for the storage of LGVs, the loading of the LGVs will take place at the existing facility to the north of the Site. Therefore, it is considered that the main noise producing operations will be that of LGVs during the movement of vehicles; and
- It is assumed that in any given hour, 284 movements will occur externally and 290 movements internally, as a worst-case scenario. A -10dB correction has been applied to the internal noise levels to account to the line-of-sight removal due to the building façade.
- To the south of the west parking lot there is an existing barrier and the embankment itself which was considered to provide a -10dB reduction to the receptors.

4.1.3 The following has been considered in determining if any acoustic features exist in the predicted specific noise level at the closest residential receptor:

- Tonality - In determining if any tones exist in the measured noise levels, the methodology set out in BS4142:2014 has been followed using the objective method - either a 0dB penalty is allocated where no tones are present or 6dB penalty is allocated where tonality is present;
- Impulsivity - in determining if any impulsiveness is evident in the measured noise levels, the methodology set out in BS4142:2014 has been followed using the objective method which can result in a penalty from 0dB to 9dB being allocated depending upon the extent of impulsiveness;
- Intermittency - whether or not the measured operations turn on or off during the assessment period; and
- Other sound characteristics - where no penalties are allocated for the above features, but there will be an audible noise at the closest receptor.

4.1.4 **Table 6** allocates character corrections to the various specific noise sources. Given the dominance of road traffic at the receptor and the characteristics of LGV movements, it is considered that tonality, Impulsivity will not be perceptible at the receptor due to the existing ambient noise levels. A correction has been applied for intermittency. However, fixed plant noise will be present and just perceptible in periods of time when no LGV movements are happening so, tonality penalty is applied to the calculations.

Table 6 - Allocation of Character Corrections

Operation	Tonality Penalty (dB)	Impulsivity Penalty (dB)	Intermittency Penalty (dB)	Other sound characteristics Penalty (dB)
LGV Movements	0	0	3	0
Fixed Plant	3	0	0	0
Total Penalty	**3**	**0**	**3**	**0**

4.1.5 **Table** completes the BS4142 Assessment during the most active periods for LGV movement periods.

Table 7 - BS4142:2014 Assessment

Receptor	Mitigation	Period	Calculated Specific Noise Level, (dB)	Total Acoustic Character Correction (dB)	Calculated Rating Level (dB)	Typical Background Sound Level (dB)	Difference +/- (dB)
Nursery Drive (R1)	No	Daytime	36	6	42	43	-1
	No	Night-time	23	3	26	40	-14
Garden Close (R2)	No	Daytime	33	6	39	43	-4
	No	Night-time	19	3	22	40	-18

4.1.6 **Table** shows that the rating level of noise will fall below the existing background sound level at the receptors during a worst-case scenario in which all parking bays are used in any given 1-hour daytime period.

4.1.7 The worst-case scenario, leads to an external noise level, including BS4142 penalties 42 dB $L_{Ar,Tr.}$. Allowing 15dB attenuation for a partially open window leads to 27dB in bedrooms at night. This therefore falls below the BS8233 guidance level for sleeping conditions in bedrooms of 30 dB $L_{Aeq,t}$.

4.2 Fixed Plant Emission

4.2.1 Details of any mechanical plant for proposed development (i.e. ventilation system) have not been supplied and so it is necessary to set mechanical plant noise emission limits relative to the typical background sound level. **Table** sets the mechanical plant limits.

Table 8 – Mechanical and Electrical Plant Noise Emission Limits

Receptor	Period	Modal Background Sound Level LA90,t (dB)	Distance from Proposed Façade to Receptor (m)	Distance Attenuation (dB)	Total Acoustic Character Correction (dB)	Maximum Plant Limit @ 1m (dB)
Nursery Drive	Daytime	43	70	-37	+6	74
	Night time	40	70	-37	+6	71
Garden Close	Daytime	43	85	-39	+6	76
	Night time	40	85	-39	+6	73

4.2.2 The mechanical plant noise emission limits defined in **Table** contain acoustic character corrections for tonality (clearly perceptible penalty) and so the actual level of noise (specific noise level) at the closest Receptor may need to be adjusted for other types of plant noise.

4.2.3 Once the full details of the proposed plant and operations are known it is advised that a full detailed assessment be conducted which also accounts for LGV movements along with any proposed plant items.

4.3 Traffic Noise - CRTN & DMRB Assessment

4.3.1 No baseline traffic flow on the surrounding roads was available at the time of assessment. However, the existing traffic flow to and from the site is known, and this can be compared to the predicted flow associated with the development. The data provided is shown in **Appendix E**.

4.3.2 Using the Basic Noise Level (BNL) method shown in Calculation of Road Traffic Noise (CRTN) the noise level associated with the site flow only, and not corrected for any gradients, barriers or road surface types, can be compared for the two scenarios.

4.3.3 The choice of road traffic data for Ruscote Avenue was based on its close proximity to the noise sensitive receptors and the access to the Site.

4.3.4 The results of the BNL calculations are shown in **Table 9**.

Table 9 – Basic Noise Level, $L_{A10,18hour}$ dB, with and without the development

Road	**Scenario**	**Total Vehicles, AAWT,18hour**	**Percentage HGV**	**BNL $L_{A10,18hour}$ dB**
Ruscote Avenue North of Cafe Site Access	Existing	19811	1%	70.3
	Proposed	19824	1%	70.3
Ruscote Avenue South of Cafe Site Access	Existing	19811	1%	70.3
	Proposed	19824	1%	70.3
			Difference	**0**

4.3.5 It can be seen from the table above that the net number of vehicles is predicted not to change and there is no difference in the existing and proposed traffic flows. Therefore, it can be seen there is a **negligible** change in noise levels due at receptor locations due to traffic associated with the site.

4.4 Mitigation

4.4.1 It has been shown in **Table 7** that the predicted noise levels of the proposed use would not exceed the estimated background noise level at receptor locations, except for one night-time receptor position. The 1dB difference is considered negligible. It should be noted that the Assessment considers worst-case scenarios. Therefore, **no mitigation** is specified for the Site.

5.0 Summary and Conclusions

5.1.1 Delta-Simons, working with our approved technical specialist Professional Consult, was instructed by Lysander to prepare a Noise Impact Assessment in support of a planning application for a proposed commercial development (the 'Proposed Development') located off Southam Road in Banbury, OX16 3AE. Reference should be made to Figure 1 for a map of the Site and surrounding area.

5.1.2 The Site is located to the west of Southam Road and currently exists as industrial buildings associated with Douwe Egberts. The Site is located within an industrial area with the nearest receptors located 70m to the south-east off Nursery Drive and Garden Close.

5.1.3 This assessment has been undertaken to identify the key noise sources associated with the proposal which may have the potential to impact upon the closest existing residential dwellings.

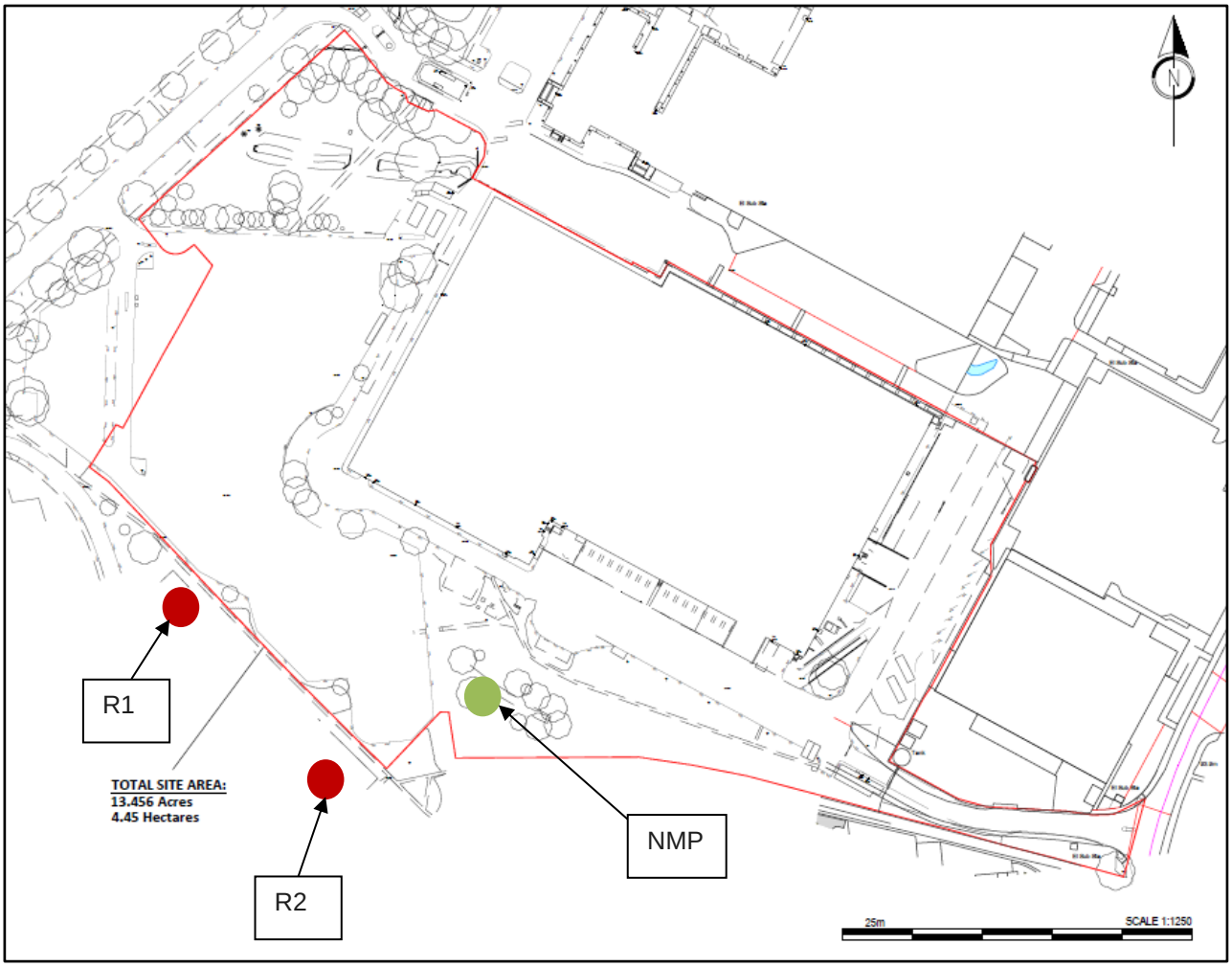
5.1.4 Accordingly, this Assessment has been completed with due regard to the National Planning Policy Framework (NPPF) and its associated National Planning Policy Guidance (NPPG) and BS4142:2014+A1:2019.

5.1.5 This Assessment has used traffic data in order to calculate anticipated noise impacts at the closest residential dwellings to the Site, together with a background sound survey at the Site in order to establish the existing background sound climate at the closest residential dwellings in the absence of the development. Accordingly, this Assessment has shown that the rated level of noise from Light Goods Vehicles (LGV) operations at the Site will meet the typical daytime background sound levels. This includes electrical plant (i.e. existing transformers) which has been calculated together with the LGV movements to assess the overall noise emitted by the Proposed Development.

5.1.6 Details of any proposed mechanical plant for the proposed development have not been supplied and so mechanical plant noise emission limits have been set relative to the typical background sound level. This assessment has shown that the level of noise generated by the Site at the closest residential dwelling to the south-west will result in a **negligible** noise impact during daytime or night-time.

Figures

Figure 1 – Site Layout and Measurement Position



Appendices

Appendix A - Limitations

Limitations

The recommendations contained in this Report represent Delta-Simons professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Delta-Simons obtained, reviewed and evaluated information in preparing this Report from the Client and others. Delta-Simons conclusions, opinions and recommendations has been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

This Report was prepared by Delta-Simons for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. In particular, Delta-Simons does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client. Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by the Consultant.

Appendix B - Glossary

Glossary

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

An indication of the range of sound levels commonly found in the environment is given in the following table.

Table B1 - Typical Sound Pressure Levels

Sound Pressure Level (dB)	Location/Example
0	Threshold of hearing
20 - 30	Quiet bedroom at night
30 - 40	Living room during the day
40 - 50	Typical office
50 - 60	Inside a car
60 - 70	Typical high street
70 - 90	Inside factory
100 - 110	Burglar alarm at 1m away
110 - 130	Jet aircraft on take off
140	Threshold of pain

Table B2 - Terminology

Descriptor	Explanation
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10-5Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq, T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} & L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.
Free-field Level	2A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Fast	A time weighting used in the root mean square section of a sound level meter with a 125millisecond time constant.
Slow	A time weighting used in the root mean square section of a sound level meter with a 1000millisecond time constant.

Appendix C – Measured Noise Levels

Table C1 - Measured Noise Level Data

Period start		Measured Sound Pressure Level, dB	
		L_{Aeq}	L_{A90}
14/01/2021	10:00:00	48.6	44.3
14/01/2021	11:00:00	45.2	42.2
14/01/2021	12:00:00	48.4	43.4
14/01/2021	13:00:00	48.8	45.3
14/01/2021	14:00:00	49.3	46.6
14/01/2021	15:00:00	49.7	47.6
14/01/2021	16:00:00	49.1	46.0
14/01/2021	17:00:00	47.3	45.7
14/01/2021	18:00:00	46.7	45.0
14/01/2021	19:00:00	46.7	44.3
14/01/2021	20:00:00	44.8	42.9
14/01/2021	21:00:00	43.5	40.6
14/01/2021	22:00:00	41.8	40.0
14/01/2021	23:00:00	41.8	40.2
15/01/2021	00:00:00	42.3	40.5
15/01/2021	01:00:00	41.3	39.5
15/01/2021	02:00:00	41.0	39.3
15/01/2021	03:00:00	40.0	38.4
15/01/2021	04:00:00	40.6	38.8
15/01/2021	05:00:00	49.0	39.9
15/01/2021	06:00:00	50.4	41.9
15/01/2021	07:00:00	47.3	42.4
15/01/2021	08:00:00	45.9	41.7
15/01/2021	09:00:00	46.0	41.8
15/01/2021	10:00:00	45.5	41.9
15/01/2021	11:00:00	45.7	40.4
15/01/2021	12:00:00	43.9	39.8
15/01/2021	13:00:00	45.4	40.6
15/01/2021	14:00:00	53.2	41.6
15/01/2021	15:00:00	47.2	41.9
15/01/2021	16:00:00	51.8	42.1
15/01/2021	17:00:00	46.1	43.7
15/01/2021	18:00:00	46.1	44.7
15/01/2021	19:00:00	45.7	44.2
15/01/2021	20:00:00	44.3	42.6
15/01/2021	21:00:00	43.2	41.7
15/01/2021	22:00:00	42.4	40.6
15/01/2021	23:00:00	42.1	39.9
16/01/2021	00:00:00	41.2	39.6
16/01/2021	01:00:00	41.3	39.2
16/01/2021	02:00:00	41.7	39.6
16/01/2021	03:00:00	51.0	41.1
16/01/2021	04:00:00	53.1	46.0
16/01/2021	05:00:00	49.7	46.4
16/01/2021	06:00:00	52.4	47.6
16/01/2021	07:00:00	49.3	46.4

Period start		Measured Sound Pressure Level, dB	
		L_{Aeq}	L_{A90}
16/01/2021	08:00:00	48.8	45.5
16/01/2021	09:00:00	52.5	45.6
16/01/2021	10:00:00	52.7	44.3
16/01/2021	11:00:00	46.3	42.5
16/01/2021	12:00:00	46.8	42.6
16/01/2021	13:00:00	50.8	43.5
16/01/2021	14:00:00	47.4	42.5
16/01/2021	15:00:00	46.6	43.2
16/01/2021	16:00:00	46.2	42.6
16/01/2021	17:00:00	45.2	42.1
16/01/2021	18:00:00	43.3	41.4
16/01/2021	19:00:00	42.9	40.3
16/01/2021	20:00:00	41.0	38.4
16/01/2021	21:00:00	41.8	38.3
16/01/2021	22:00:00	39.0	36.7
16/01/2021	23:00:00	36.8	35.1
17/01/2021	00:00:00	36.7	34.7
17/01/2021	01:00:00	36.3	34.6
17/01/2021	02:00:00	39.8	34.1
17/01/2021	03:00:00	37.3	34.9
17/01/2021	04:00:00	40.2	35.6
17/01/2021	05:00:00	50.9	38.0
17/01/2021	06:00:00	50.5	39.2
17/01/2021	07:00:00	48.9	40.3
17/01/2021	08:00:00	45.9	40.2
17/01/2021	09:00:00	49.6	41.1
17/01/2021	10:00:00	50.1	42.9
17/01/2021	11:00:00	49.2	42.8
17/01/2021	12:00:00	47.4	42.8
17/01/2021	13:00:00	46.4	41.6
17/01/2021	14:00:00	50.0	41.2
17/01/2021	15:00:00	48.5	41.4
17/01/2021	16:00:00	51.1	40.8
17/01/2021	17:00:00	44.4	39.7
17/01/2021	18:00:00	41.2	39.5
17/01/2021	19:00:00	41.0	39.1
17/01/2021	20:00:00	40.3	38.6
17/01/2021	21:00:00	40.1	37.9
17/01/2021	22:00:00	38.5	36.3
17/01/2021	23:00:00	37.3	35.1
18/01/2021	00:00:00	37.0	34.8
18/01/2021	01:00:00	35.6	34.2
18/01/2021	02:00:00	35.6	34.2
18/01/2021	03:00:00	37.3	34.6
18/01/2021	04:00:00	48.2	35.9
18/01/2021	05:00:00	49.7	38.8
18/01/2021	06:00:00	44.8	40.0
18/01/2021	07:00:00	53.7	42.6

Period start		Measured Sound Pressure Level, dB	
		L_{Aeq}	L_{A90}
18/01/2021	08:00:00	51.9	43.5
18/01/2021	09:00:00	48.3	43.3
18/01/2021	10:00:00	47.1	42.8
18/01/2021	11:00:00	47.2	41.5
18/01/2021	12:00:00	52.8	41.9
18/01/2021	13:00:00	49.2	42.6
18/01/2021	14:00:00	48.5	42.4
18/01/2021	15:00:00	50.4	44.1
18/01/2021	16:00:00	49.7	43.1
18/01/2021	17:00:00	45.2	43.0
18/01/2021	18:00:00	44.3	42.3
18/01/2021	19:00:00	45.1	41.6
18/01/2021	20:00:00	42.2	40.3
18/01/2021	21:00:00	41.8	39.7
18/01/2021	22:00:00	40.9	39.0
18/01/2021	23:00:00	40.2	38.4
19/01/2021	00:00:00	41.3	38.2
19/01/2021	01:00:00	43.3	39.9
19/01/2021	02:00:00	42.5	39.7
19/01/2021	03:00:00	44.0	40.4
19/01/2021	04:00:00	57.0	40.9
19/01/2021	05:00:00	57.8	42.2
19/01/2021	06:00:00	55.6	42.8
19/01/2021	07:00:00	54.5	44.3
19/01/2021	08:00:00	54.5	44.9
19/01/2021	09:00:00	52.8	44.3
Note: Red text denotes periods of poor weather			

Appendix D – Operational Noise Calculations

Figure D1 - Daytime Operational Noise Calculations

DAY										
Plant	Noise Data			Distance from source to receiver, m	Number of sources	Time & number of correction	Screening correction, dB	Distance correction, dB	Total Correction/ dB	Total L_p dBA)
	On time (sec)	Distance from source to measurement, m	L_p dB(A)							
TX1	3600	0.3	63	52	1	0.0		-45	-45	18
TX2	3600	0.3	63	115	1	0.0		-52	-52	11
TX3	3600	0.3	63	45	1	0.0		-44	-44	19
Indoor TX	3600	0.3	63	70	7	8.5	-10.0	-47	-49	14
West Parking	30	4	61	75	115	-0.2		-25	-26	35
South-East Parking	30	4	61	135	169	1.5	-10	-31	-39	22
Indoor LGV	30	4	61	160	290	3.8	-10	-32	-38	23
									Day Combined	36
TX4	3600	0.3	63	70	1	0.0		-47	-47	16
TX5	3600	0.3	63	100	1	0.0		-50	-50	13
TX6	3600	0.3	63	170	1	0.0		-55	-55	8
Indoor TX	3600	0.3	63	85	7	8.5	-10.0	-49	-51	12
West Parking	30	4	61	130	115	-0.2		-30	-30	31
South-East Parking	30	4	61	85	169	1.5	-10	-27	-35	26
Indoor LGV	30	4	61	147	290	3.8	-10	-31	-37	24
									Day Combined	33

Table

Figure D2 – Night-Time Operational Noise Calculations

Night										
Plant	Noise Data			Distance from source to receiver, m	Number of sources	Time & number of correction	Screening correction, dB	Distance correction, dB	Total Correction/ dB	Total L_p dBA)
	On time (sec)	Distance from source to measurement, m	L_p dB(A)							
TX1	900	0.3	63	52	1	0.0		-45	-45	18
TX2	900	0.3	63	115	1	0.0		-52	-52	11
TX3	900	0.3	63	45	1	0.0		-44	-44	19
Indoor TX	900	0.3	63	70	7	8.5	-10.0	-47	-49	14
									Night Combined	23
TX4	900	0.3	63	70	1	0.0		-47	-47	16
TX5	900	0.3	63	100	1	0.0		-50	-50	13
TX6	900	0.3	63	170	1	0.0		-55	-55	8
Indoor TX	900	0.3	63	85	7	8.5	-10.0	-49	-51	12
									Night Combined	19

Appendix E – Traffic Noise Calculations

Figure E1 - Traffic Flow Data Provided

2021 Baseline Traffic Flows

Road	18 Hr AAWT				
	Lights	HGV	TOTAL	% HGV	Speeds
2. Ruscote Avenue North of Cafe Site Access	19558	254	19811	1%	40 mph
8. Ruscote Avenue South of Cafe Site Access	19558	254	19811	1%	40 mph

2021 with Development (P1 & P2)

Road	18 Hr AAWT				
	Lights	HGV	TOTAL	% HGV	Speeds
2. Ruscote Avenue North of Cafe Site Access	19571	253	19824	1%	40 mph
8. Ruscote Avenue South of Cafe Site Access	19571	253	19824	1%	40 mph

Figure E2 - CRTN Calculations Ruscote Avenue North of Cafe Site Access

			Existing	Proposed
flow		vehicles	19811	19824
1 hour or 18 hour flow (1) or (18)			18	18
Vehicle speed =		km/h	64	64
HGVs			254	253
% HGV =		%	1	1
Gradient =		%	0	0
Revised Speed =		km/h	64.4	64.4
Gradient Correction =		dB	0.0	0.0
Concrete (C) or Bitumous(B) Surface ?			b	b
Pervious (P) or Impervious (I) Surface ?		P or I	I	I
Texture Depth in mm =		mm	2	2
Correction for Impervious Concrete Surfaces, V > 75 km/h =			3.2	3.2
Correction for Impervious Bitumous Surfaces, V > 75 km/h =			0.0	0.0
Correction for Impervious Concrete or Bitumous Surface, V < 75 =			-1.0	-1.0
Correction for *ANY* Pervious Surface, *ANY* speed =			**-3.5**	-3.5
Surface Correction to Use =			-1.0	-1.0
Basic value for 1 hour or 18 hour flows data			**29.1**	**29.1**
BNL =		LA10,T dB	70.3	70.3
Difference				**0.0**

Figure E3 - CRTN Calculations Ruscote Avenue South of Cafe Site Access

			Existing	Proposed
flow		vehicles	19824	19824
1 hour or 18 hour flow (1) or (18)			18	18
Vehicle speed =		km/h	64	64
HGVs			254	253
% HGV =		%	1	1
Gradient =		%	0	0
Revised Speed =		km/h	64.4	64.4
Gradient Correction =		dB	0.0	0.0
Concrete (C) or Bitumous(B) Surface ?			b	b
Pervious (P) or Impervious (I) Surface ?		P or I	I	I
Texture Depth in mm =		mm	2	2
Correction for Impervious Concrete Surfaces, V > 75 km/h =			3.2	3.2
Correction for Impervious Bitumous Surfaces, V > 75 km/h =			0.0	0.0
Correction for Impervious Concrete or Bitumous Surface, V < 75 =			-1.0	-1.0
Correction for *ANY* Pervious Surface, *ANY* speed =			**-3.5**	-3.5
Surface Correction to Use =			-1.0	-1.0
Basic value for 1 hour or 18 hour flows data			**29.1**	**29.1**
BNL =		LA10,T dB	70.3	70.3
Difference				**0.0**