# APPENDIX 11.1:

# DESCRIPTION OF NOISE AND VIBRATION UNITS

## APPENDIX 11.1 DESCRIPTION OF NOISE AND VIBRATION UNITS

| | |
|---|---|
| Decibels (dB) | Noise can be defined as unwanted sound. Sound in air can be considered as the propagation of energy through the air in the form of oscillatory changes in pressure. The size of the pressure changes in acoustic waves is quantified on a logarithmic decibel (dB) scale firstly because the range of audible sound pressures is very great, and secondly because the loudness function of the human auditory system is approximately logarithmic.<br><br>The dynamic range of the auditory system is generally taken to be 0dB to 140dB. Generally, the addition of noise from two sources producing the same sound pressure level, will lead to an increase in sound pressure level of 3dB. A 3dB noise change is generally considered to be just noticeable, a 5dB change is generally considered to be clearly discernible and a 10dB change is generally accepted as leading to the subjective impression of a doubling or halving of loudness.<br><br>Examples of typical sound intensity levels within the decibel range of 0 to 120dB are listed below:<br>• Four engine jet aircraft at 100m — 120dB<br>• Riveting of steel plate at 10m — 105dB<br>• Pneumatic drill at 10m — 90dB<br>• Circular wood saw at 10m — 80dB<br>• Heavy road traffic at 10m — 75dB<br>• Telephone bell at 10m — 65dB<br>• Male speech, average at 10m — 50dB<br>• Whisper at 10m — 25dB<br>• Threshold of hearing, 1000Hz — 0dB |
| Frequency | Frequency (or pitch) of sound is measured in units of Hertz. 1 Hertz (Hz) = 1 cycle/second. The range of frequencies audible to the human ear is around 20Hz to 18,000Hz. The capability of a person to hear higher frequencies will reduce with age. The ear is more sensitive to medium frequency than high or low frequencies. |
| A-Weighting | The auditory system is not equally sensitive throughout this frequency range. This is taken into account when making acoustic measurements by the use of A-weighting, a filter circuit which has a frequency response similar to the human auditory system. All the measurement results referred to in this report are A-weighted. |
| Sound Power Level ($L_W$) and Sound Pressure Level ($L_P$) | These two units are used to express sound level. Sound power level is the inherent property of a source, whilst sound pressure level is dependent on surroundings/distance/directivity etc. The sound level that is measured on a meter is the sound pressure level, $L_P$. |
| $L_{Aeq,T}$ | The A-weighted sound pressure level of the steady sound which contains the same acoustic energy as the noise being assessed over a specific time period, T. |
| $L_{A10}$ | The noise level exceeded for 10% of the measurement period. It has been used in the UK for the assessment of road traffic noise. |
| $L_{A90}$ | The noise level exceeded for 90% of the measurement period. It is generally used to quantify the background noise level, the underlying level of noise which is |

| | |
|---|---|
| | present even during the quieter parts of the measurement period. |
| $L_{Amax}$ | Maximum value that the A-weighted sound pressure level reaches during a measurement period. $L_{Amax\ F}$, or Fast, is averaged over 0.125 of a second and $L_{Amax\ S}$, or Slow, is averaged over 1 second. Maximum noise levels were all monitored using the Fast response. |
| $L_{10,1\text{-hour}}$ | The $L_{10}$ level measured over a 1 hour period. |
| $L_{10,18\text{-hour}}$ | The arithmetic average of the $L_{10,1\text{-hour}}$ levels for the 18 hour period between 06:00 hours and 24:00 hours on a normal working day. It is a common traffic noise descriptor. |
| Ambient noise | The totally encompassing sound in a given situation. |
| Free Field | Free field noise levels are measured or predicted such that there is no contribution made up of reflections from nearby building façades. |
| Façade Noise Level | A noise level measured or predicted at the façade of a building, typically at a distance of 1m, containing a contribution made up of reflections from the façade itself (+3dB). |
| Sound Reduction Index (R) | The sound reduction index is a single-number rating of the sound reduction through a wall or other building element. Since the sound reduction may be different at different frequencies, test measurements are subjected to a standard procedure which yields a single number that is about equal to the average sound reduction in the middle of the human hearing range. |
| Weighted Sound Reduction Index ($R_W$) | The $R_W$ incorporates a correction for the ears' response. It is derived from comparing the window sound insulation to frequency curve with a family of reference curves. |
| $R_{TRA}$ | Traffic noise reduction – by adopting an idealised but typical spectrum of road traffic noise dominated by low frequencies, an index $R_{TRA}$ (reduction of road traffic noise) is derived. By comparing this with the sound reduction of the window in dB(A) it represents the likely in service performance for road traffic noise attenuation. |
| Vibration Dose Value (VDV, $ms^{-1.75}$) | VDV, specified in BS 6472, is used as a basis for assessing human exposure to vibration over a given period of time. |

# APPENDIX 11.2:

# NOISE AND VIBRATION SURVEY PROCEDURES AND RESULTS

# Appendix 11.2 Noise Survey Procedure and Results

## Baseline Noise Surveys

The parameters logged throughout the survey period were $L_{Aeq}$, $L_{Amax}$, $L_{Amin}$, $L_{A90}$ and $L_{A10}$. The $L_{Aeq}$ level is the equivalent continuous sound pressure level over the measurement period; $L_{Amax}$ is an indicator of the highest sound level during the measurement period; the $L_{Amin}$ is the lowest level during the measurement period; $L_{A90}$ is used as a descriptor of background noise levels and $L_{A10}$ is the noise level which is achieved for 10% of the monitoring period and is often used to describe road traffic noise.

The sound level meters were calibrated both before and after each monitoring period; no drift from the reference level of 94dB was recorded.

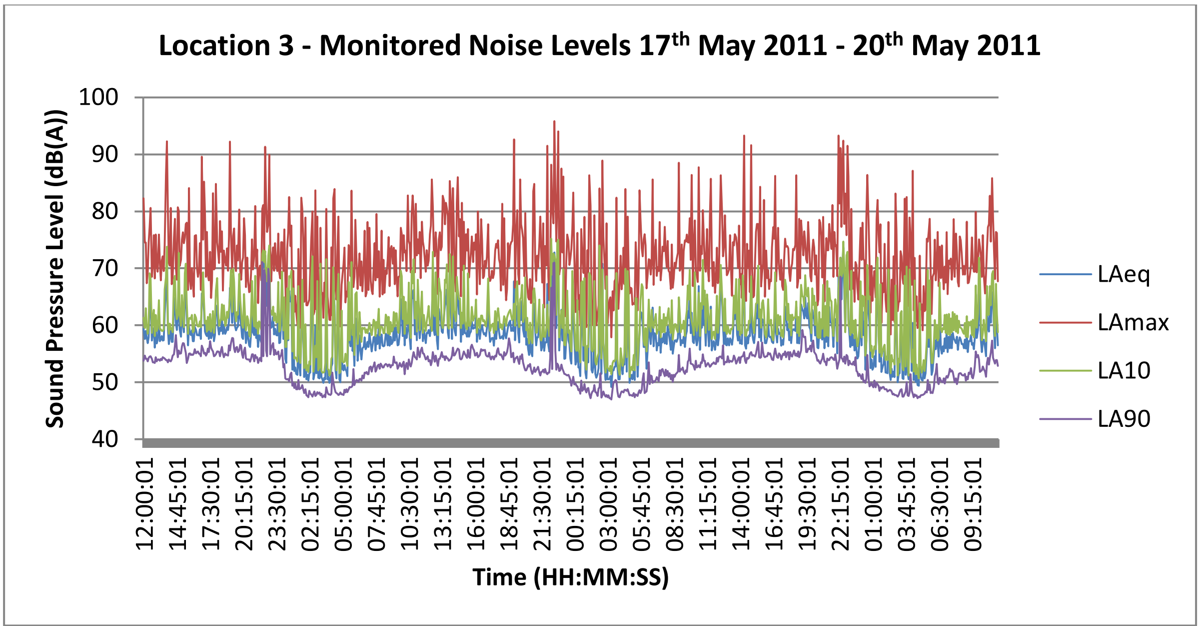
Monitoring was undertaken by trained and competent staff and are members of the IOA. The measurements are summarised below.

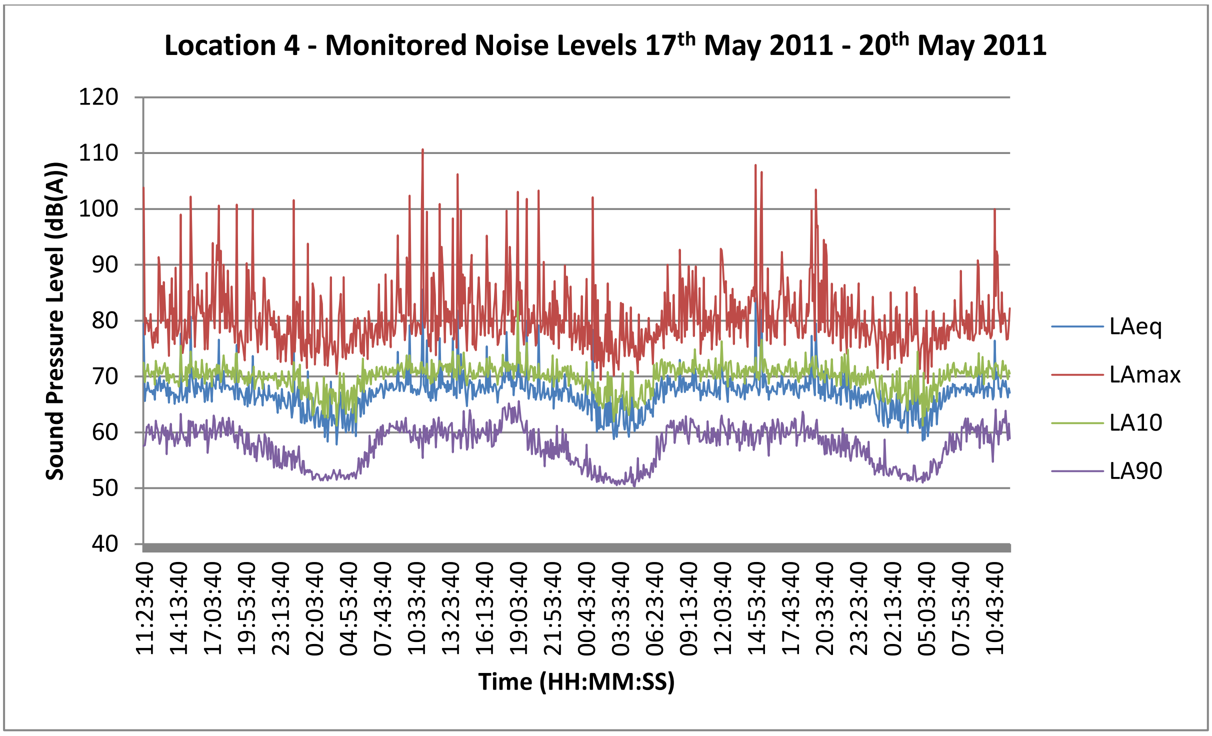
**Location 1 – Castlehaven Road adjacent to northwest site boundary**

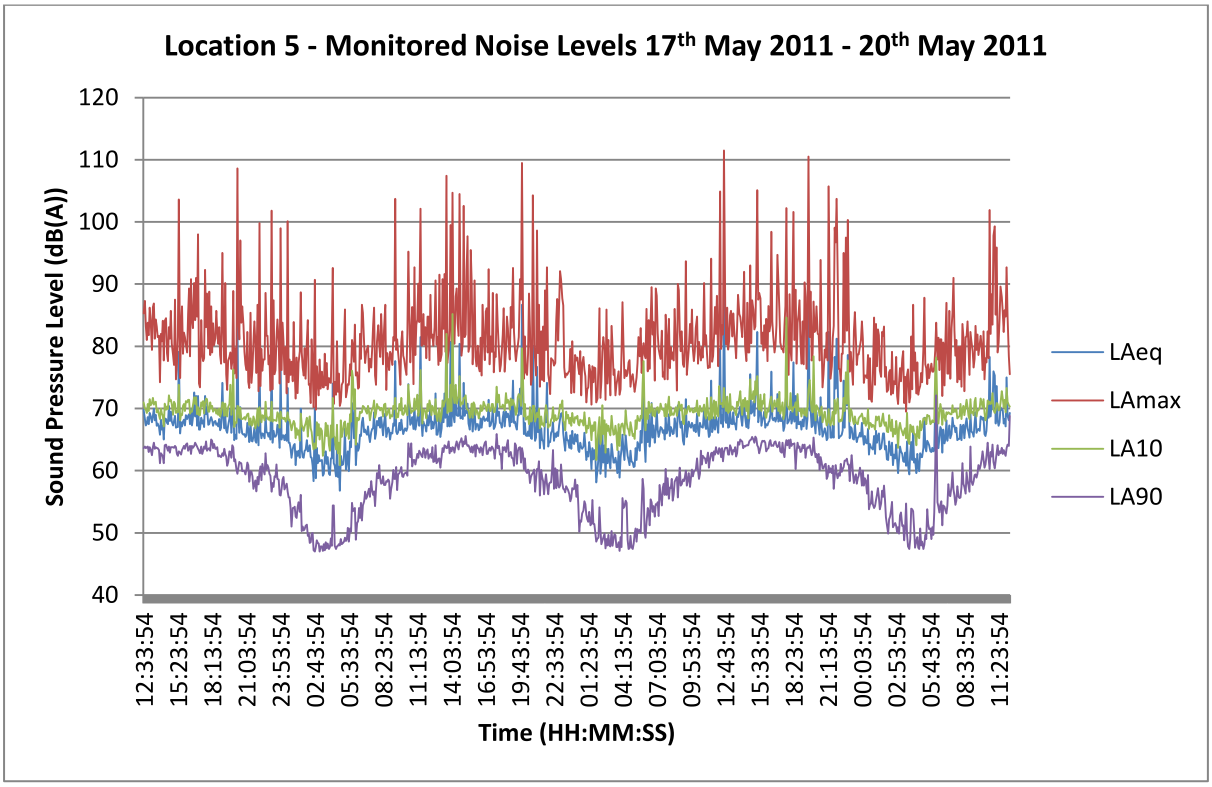
| Rec | Date | Time | Duration (min) | $L_{Aeq}$ | $L_{Amax}$ | $L_{A10}$ | $L_{A90}$ |
|---|---|---|---|---|---|---|---|
| 1 | 20/05/2011 | 10:10 | 5 | 61.2 | 80.0 | 63.7 | 55.7 |
| 2 | 20/05/2011 | 10:15 | 5 | 64.1 | 78.7 | 65.4 | 55.4 |
| 3 | 20/05/2011 | 10:20 | 5 | 62.5 | 71.4 | 66.0 | 54.8 |
| 4 | 20/05/2011 | 10:25 | 5 | 52.3 | 55.1 | 52.9 | 51.2 |
| Average | | | | 62.6 | 80.0 | 63.7 | 55.3 |

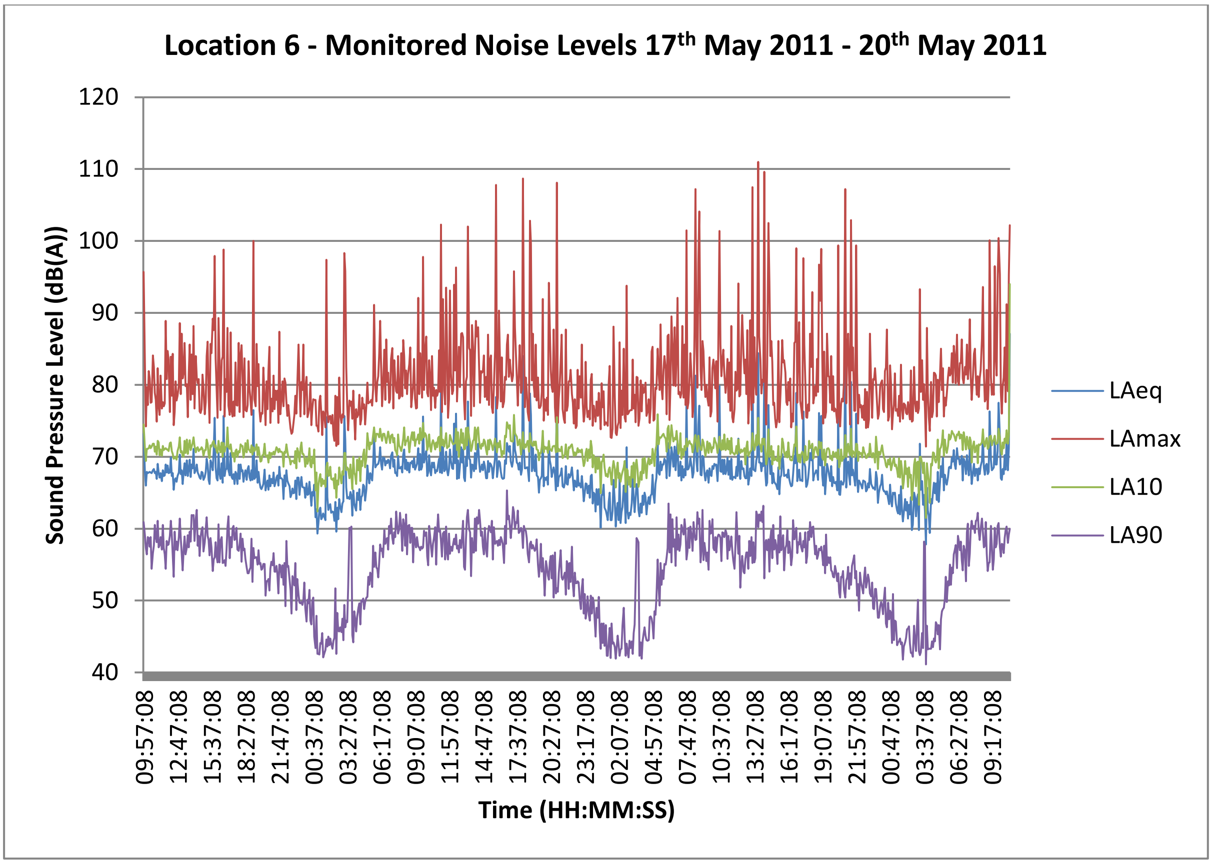
**Location 2 – Haven Street**

| Rec | Date | Time | Duration (min) | $L_{Aeq}$ | $L_{Amax}$ | $L_{A10}$ | $L_{A90}$ |
|---|---|---|---|---|---|---|---|
| 1 | 20/05/2011 | 15:50 | 5 | 64.9 | 78.6 | 68.5 | 56.4 |
| 2 | 20/05/2011 | 15:55 | 5 | 66.0 | 77.9 | 69.8 | 57.8 |
| 3 | 20/05/2011 | 16:00 | 5 | 64.0 | 74.6 | 68.1 | 57.0 |
| 4 | 20/05/2011 | 16:05 | 5 | 61.8 | 61.8 | 62.3 | 61.4 |
| Average | | | | 65.0 | 78.6 | 68.1 | 57.1 |




Location 4 - Monitored Noise Levels 17th May 2011 - 20th May 2011
Sound Pressure Level (dB(A))
120
110
100
90
80
70
60
50
40
11:23:40
14:13:40
17:03:40
19:53:40
23:13:40
02:03:40
04:53:40
07:43:40
10:33:40
13:23:40
16:13:40
19:03:40
21:53:40
00:43:40
03:33:40
06:23:40
09:13:40
12:03:40
14:53:40
17:43:40
20:33:40
23:23:40
02:13:40
05:03:40
07:53:40
10:43:40
Time (HH:MM:SS)
LAeq
LAmax
LA10
LA90


Location 5 - Monitored Noise Levels 17th May 2011 - 20th May 2011
Sound Pressure Level (dB(A))
120
110
100
90
80
70
60
50
40
12:33:54
15:23:54
18:13:54
21:03:54
23:53:54
02:43:54
05:33:54
08:23:54
11:13:54
14:03:54
16:53:54
19:43:54
22:33:54
01:23:54
04:13:54
07:03:54
09:53:54
12:43:54
15:33:54
18:23:54
21:13:54
00:03:54
02:53:54
05:43:54
08:33:54
11:23:54
Time (HH:MM:SS)
LAeq
LAmax
LA10
LA90



Location 6 - Monitored Noise Levels 17th May 2011 - 20th May 2011
Sound Pressure Level (dB(A))
120
110
100
90
80
70
60
50
40
09:57:08
12:47:08
15:37:08
18:27:08
21:47:08
00:37:08
03:27:08
06:17:08
09:07:08
11:57:08
14:47:08
17:37:08
20:27:08
23:17:08
02:07:08
04:57:08
07:47:08
10:37:08
13:27:08
16:17:08
19:07:08
21:57:08
00:47:08
03:37:08
06:27:08
09:17:08
Time (HH:MM:SS)
LAeq
LAmax
LA10
LA90

waterman

# APPENDIX 11.3:

# CONSTRUCTION NOISE AND VIBRATION ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

## Appendix 11.3 Construction Assessment Methodology and Significance Criteria

**Construction Noise Assessment**

The significance criteria for the construction noise assessment are based on 'The ABC Method' from BS 5228-1:2009. An extract describing this method is provided below.

**Example Method 1 – The ABC Method**

Table E.1 shows an example of the threshold of significant effect at dwellings when the total noise level rounded to the nearest decibel, exceeds the listed value. The table can by used as follows: for the appropriate period (night, evening/weekends or day), the ambient noise level is determined and rounded to the nearest 5 dB. This is then compared with the total noise level, including construction. If the total noise level exceeds the appropriate category value, then a significance effect is deemed to occur.

Table E.1 **Example threshold of significant effect at dwellings**

| **Assessment category and threshold value period ($L_{Aeq}$)** | **Threshold value, in decibels (dB)** | | |
|---|---|---|---|
| | **Category A[A)]** | **Category B[B)]** | **Category C[C)]** |
| Night-time (23.00-07.00) | 45 | 50 | 55 |
| Evenings and weekends[D)] | 55 | 60 | 65 |
| Daytime (07.00-19.00) and Saturdays (07.00-13.00) | 65 | 70 | 75 |

NOTE1 A significance effect has been deemed to occur if the total $L_{Aeq}$ noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.

NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total $L_{Aeq}$ noise level for the period increases by more than 3 dB due to construction activity.

NOTE 3 Applied to residential receptors only.

[A)] Category A: threshold values to use when ambient noise levels ( when rounded to the nearest 5 dB) are less than these values.

[B)] Category B: threshold values to use when the ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

[C)] Category C: threshold values to use when the ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

[D)] 19.00-23.00 weekdays, 13.00-23.00 Saturdays and 07.00-23.00 Sundays.

*(Source: BS 5228-1:2009, Page119)*

Calculations have been undertaken using the data and procedures of BS 5228 for the noisiest construction phases, to derive indicative noise levels at selected NSRs. The highest noise levels tend to be associated with plant that would be employed during piling, earthmoving, concreting and road pavement:

- Demolition 93 dB(A) at 10m
- Earth moving 85 dB(A) at 10m
- Concreting 86 dB(A) at 10m

- Piling 85 dB(A) at 10m

| NSR | Parameter | Construction Phase | | | |
|---|---|---|---|---|---|
| | | Demolition | Earth moving | Piling | Road Pavement |
| NSR A – 20a-22a Castlehaven Road and 19-22b Hawley Road | Total Noise Level (dB(A)) | 85 | 81 | 86 | 85 |
| | Threshold (dB(A))* | 75 | 75 | 75 | 75 |
| | Significance | **Substantial Adverse** | **Moderate Adverse** | **Substantial Adverse** | **Substantial Adverse** |
| NSR B – Welford Court | Total Noise Level (dB(A)) | 76 | 72 | 77 | 76 |
| | Threshold (dB(A))* | 70 | 70 | 70 | 70 |
| | Significance | **Moderate Adverse** | **Minor Adverse** | **Moderate Adverse** | **Moderate Adverse** |
| NSR C – 1a Hawley Road | Total Noise Level (dB(A)) | 91 | 86 | 92 | 91 |
| | Threshold (dB(A))* | 70 | 70 | 70 | 70 |
| | Significance | **Substantial Adverse** | **Substanti al Adverse** | **Substantial Adverse** | **Substantial Adverse** |
| NSR D – 55 Kentish Town Road | Total Noise Level (dB(A)) | 79 | 74 | 80 | 79 |
| | Threshold (dB(A))* | 70 | 70 | 70 | 70 |
| | Significance | **Moderate Adverse** | **Minor Adverse** | **Moderate Adverse** | **Minor Adverse** |
| NSR E – 17-29 Hawley Crescent | Total Noise Level (dB(A)) | 72 | 69 | 73 | 72 |
| | Threshold (dB(A))* | 70 | 70 | 70 | 70 |
| | Significance | **Minor Adverse** | **Negligible** | **Minor Adverse** | **Minor Adverse** |
| NSR F – 250 Camden High Street | Total Noise Level (dB(A)) | 76 | 72 | 77 | 76 |
| | Threshold (dB(A)) | 70 | 70 | 70 | 70 |
| | Significance | **Moderate Adverse** | **Moderate Adverse** | **Moderate Adverse** | **Moderate Adverse** |

# APPENDIX 11.4:

# ROAD TRAFFIC NOISE ASSESSMENT

# APPENDIX 11.4 ROAD TRAFFIC NOISE ASSESSMENT

***Assessment of $L_{A10}$ 18-hour basic noise levels at 10m from road on Completion of the Development***

| | | Base Year | | | Base Year + Development | | | | BNL 18hr | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2024 | | | 2024 | + Development | | | | | |
| **Road** | | **% HGV** | **Speed kph** | **Flow** | **% HGV** | **Speed kph** | **Flow** | **% Flow Change** | **Base Year** | **Base Year + Development** | **Change** |
| 1 | A Castlehaven Road | 0 | 24 | 10737 | 0 | 24 | 10672 | -0.6 | 63.4 | 63.3 | 0.0 |
| 2 | B Hawley Road | 0 | 22 | 10640 | 0 | 22 | 10582 | -0.5 | 63.3 | 63.3 | 0.0 |
| 3 | C Leybourne Road | 0 | 16 | 482 | 0 | 16 | 502 | 4.1 | 50.2 | 50.4 | 0.2 |
| 4 | D Kentish Town Road | 0 | 20 | 12997 | 0 | 20 | 12988 | -0.1 | 64.2 | 64.2 | 0.0 |
| 5 | E Hawley Cresent | 0 | 17 | 4337 | 0 | 17 | 4338 | 0.0 | 59.7 | 59.7 | 0.0 |
| 6 | F  Camden High Street | 0 | 17 | 10643 | 0 | 17 | 10628 | -0.1 | 63.7 | 63.7 | 0.0 |
| 7 | G Chalk Farm Road | 0 | 17 | 14680 | 0 | 17 | 14623 | -0.4 | 65.0 | 65.0 | 0.0 |