ENVIRONMENTAL STATEMENT ADDENDUM - NOISE

WOLBOROUGH BARTON, NEWTON ABBOT

PREPARED FOR

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1.0 Introduction

1.1 Purpose of Addendum

1.1.1 This Environmental Statement Addendum (ES Addendum) has been prepared to supplement the Environmental Statement (Volumes 1 to 3, dated June 2017) and ES Addendum (dated December 2017) submitted to Teignbridge District Council (TDC) in respect of a hybrid mixed proposal for the development of a local plan allocation (NA3) to the south of Newton Abbot (application reference: 17/01542/MAJ), which is now the subject of a non-determination planning appeal (APP/P1133/W/18/3205558).

1.1.2 The need for the provision of this ES Addendum has arisen following a request from the Planning Inspectorate for the assessment of noise to be included in the Environmental Impact Assessment.

1.2 Introduction to Addendum

1.2.1 This ES Addendum has been prepared by PCL Planning Ltd and Inacoustic to consider the potential noise impacts and likely effects of the proposed development; specifically, the effects of predicted noise conditions on the proposed development and the effects likely to be generated by the proposed development on noise sensitive receptors within the study area.

1.2.2 In the context of this assessment, noise is defined as unwanted or undesirable sound derived from sources such as road traffic or construction works that interfere with normal activities, including conversation, sleep or recreation.

1.2.3 The Addendum describes the legislation and planning policy of relevance to the Site in the context of noise; the baseline conditions currently existing at the Site; the methods used to assess the potential impacts and likely impacts arising from the proposed development; and the residual effects following consideration of mitigation measures.

1.2.4 Specifically, this Chapter considers the likely significant effects of noise and vibration associated with the construction and operation of the proposed development. The specific objectives are to:

- describe the acoustic baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address likely significant effects; and
- assess the residual effects remaining following the implementation of mitigation.

1.2.5 The chapter is supported by:

- Technical Appendix A: An Introduction to Acoustics;
- Technical Appendix B: Noise Survey Data;
- Technical Appendix C: Traffic Flows used in the Assessment.

2.0 Legislative and Policy Framework

2.1 Legislation

Control of Pollution Act

2.1.1 The Control of Pollution Act, 1974, Part III - Noise (Ref 1.1) is a combination and refinement of three earlier Acts: the Public Health Act, 1936 (replaced by the Public Health Act 1990, Part III), the Noise Abatement Act 1960 and the Public Health Act 1990, Part III). Section 60 of the Act enables a local planning authority to serve a notice on a person (this includes a company) who is carrying out, or who are planning to carry out, works of construction, demolition, road works, railway maintenance etc. in order to control the noise from those operations. Section 61 (S61) of the Act also enables such a person to apply to the local authority for consent in respect of such works.

2.1.2 The Act introduces the concept of using 'Best Practicable Means' (BPM) to control the impact of noise, where significant impacts are likely to occur. BPM essentially means selection of the quietest techniques and equipment, in addition to considering factors such as timing, duration, location and opportunities for acoustic screening or separation, to ensure that impacts are controlled in so far as is reasonably practicable. The demonstrable use of BPM can also be used as a defense to enforcement action under nuisance legislation.

National Policy

National planning Policy Framework, 2018

2.1.3 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England. Planning policy requires that applications for planning permission must be determined in accordance with the development plan, unless material considerations indicate otherwise.

2.1.4 The NPPF is also a material consideration in planning decisions. It sets out the Government's requirements for the planning system and how these are expected to be addressed.

2.1.5 Under Section 15; Conserving and Enhancing the Natural Environment, in Paragraph 170, the following is stated:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *e) preventing both new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability".*

Paragraph 180 of the document goes on to state:

> *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> *a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
> *b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

2.1.6 As stated above, this document refers to avoiding noise generation from new developments that would adversely impact on health and quality of life. Paragraph 180 refers to the Noise Policy Statement for England, which is considered overleaf.

Noise Policy Statement for England, 2010

2.1.7 The underlying principles and aims of existing noise policy documents, legislation and guidance are clarified in *DEFRA: 2010: Noise Policy Statement for England* (NPSE)[1]. The NPSE sets out the *"Long Term Vision"* of Government noise policy as follows:

[1] Department for Environment, Food and Rural Affairs (DEFRA), 2010. Noise Policy Statement for England. DEFRA.

"Promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development".

2.1.8 The NPSE outlines three aims for the effective management and control of environmental, neighbour and neighbourhood noise:

- *"Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life".*

2.1.9 The guidance states that it is not possible to have a single objective noise-based measure that defines *"Significant Observed Adverse Effect Level (SOAEL)"* that is applicable to all sources of noise in all situations and that not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.

National Planning Policy Guidance in England: Noise, 2014

2.1.10 Further guidance in relation to the NPPF and the NPSE has been published in the *National Planning Practice Guidance in England: Noise* (NPPG Noise)[2], which summarises the noise exposure hierarchy, based on the likely average response. The following three observed effect levels are identified below:

- *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 Adverse Effect Level: This is the level of noise exposure below* which no effect at all on health or quality of life can be detected.

2.1.11 Criteria relating to each of these levels are reproduced in Table 2.1.

[2] Department for Communities and Local Government (DCLG), 2014. National Planning Practice Guidance for England: Noise. DCLG.

Table 2.1: Significance Criteria from NPPG in England: Noise

Perception	Examples of Outcomes	Increasing Effect Level	Action
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
		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	Significant Observed Adverse Effect	Avoid

Perception	Examples of Outcomes	Increasing Effect Level	Action
	change in acoustic character of the area.		
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

3.0 Methodology and Scope

3.1 Residential Amenity

3.1.1 BS 8233:2014 draws on the results of research and experience to provide information on achieving internal acoustic environments appropriate to their functions. The guideline values provided are in terms of an average (L_{Aeq}) level.

3.1.2 The standard advises that, for steady external noise sources, it is desirable for internal ambient noise levels to not exceed the guidance values, as detailed below in Table 3.1.

Table 3.1: BS8233:2014 Indoor Ambient Noise Levels

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

3.1.3 BS8233:2014 goes on to suggest that where development is considered necessary or desirable, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions will still be achieved.

3.1.4 With regard to maximum noise levels, the standard identifies that regular individual noise events (such as passing trains or scheduled aircraft etc) can cause sleep disturbance. The standard does not provide a guideline design target, but simply goes on to suggest that a guideline value may be set in terms of SEL or $L_{Amax,F}$, depending upon the character and number of events per night. It goes on to suggest that more sporadic noise events could require separate values.

3.1.5 In respect of external noise levels, the guidance in BS8233:2014 suggests that "it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments". Accordingly, the design criteria adopted for this assessment will ensure that noise within external amenity areas will be adequately controlled.

3.1.6 BS8233:2014 provides a much more detailed narrative on noise levels in external amenity areas and acknowledges that it may not always be necessary or feasible to ensure that noise levels remain within these guideline values.

3.1.7 In respect of gardens and patios, BS8233:2014 states;

> "*however, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited*".

3.1.8 In respect of balconies, roof gardens and terraces, BS8233:2014 states,

> "*Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses; however, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB* $L_{Aeq,T}$ *or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space*".

3.1.9 It is clear from the narrative of BS8233:2014, that proposed development within noisy environments should be designed to ensure that the recommended internal design standards are achieved, and that noise levels in external amenity areas are designed to effectively control and reduce noise levels, although it acknowledges that in certain circumstance meeting the external design recommendations may not be feasible, or necessary, especially where the provision of such spaces is desirable for other technical, planning or policy reasons.

3.1.10 The following noise level criteria have been adopted for this assessment, which will ensure no adverse impact:

- Living Rooms - 07:00-23:00 - 35 dB L_{Aeq}
- Bedrooms - 07:00-23:00 - 35 dB L_{Aeq}

  - 23:00-07:00 - 30 dB L_{Aeq} and 45 dB L_{AMax}
- Dining Rooms - 07:00-23:00 – 40 dB L_{Aeq}
- External Living Areas - 07:00-23:00 – 55 dB L_{Aeq}

3.2 Educational Suitability

3.2.1 Building Bulletin 93 (BB93) stipulates the maximum indoor ambient noise levels (IANL), $L_{Aeq,30mins}$, in unoccupied, critical spaces should not exceed certain values, in order to provide clear communication of speech between teacher and student and suitable study conditions. In addition, it advises that noise intrusion levels should not regularly exceed 60 dB $L_{A1,30mins}$ in the rooms having limits of 40 dB $L_{Aeq,30mins}$ or less for their IANL. The recommended maximum internal ambient noise levels apply to the contributions from both external noise sources (excluding noise from staff/pupils/equipment and playgrounds) and internal building services systems associated with the school itself.

3.2.2 The limits for the indoor ambient noise levels for this development are detailed below in Table 3.2.

Table 3.2: Upper Limit for Indoor Ambient Noise Level

Type of Room	Limit for the Indoor Ambient Noise Level $L_{Aeq,30mins}$ dB
Teaching space intended specifically for students with special hearing or communication needs (Classrooms, Studios & Group Rooms)	30
Corridors	45
WCs	50

3.2.3 In order to protect students from regular discrete noise events, eg, aircraft, trains or HGV movements, indoor ambient noise levels should not exceed 60 dB $L_{A1,30mins}$. This is achieved by default for spaces with IANLs up to 40 dB $L_{Aeq,30mins}$, but requires assessment in spaces with higher IANL limits, eg, 45 and 50 dB.

However, it should be noted that the only rooms types with IANLs higher than 40 dB are spaces that are not considered critical for learning (i.e. corridors and WCs), as such, no further consideration has been given the 60 dB $L_{A1,30mins}$ criteria.

3.3 New Noise Sources

3.3.1 The assessment of the sound impact of the proposed development should be made in accordance with British Standard 4142:2014 Method for Rating and Assessing Industrial and Commercial Sound.

3.3.2 BS 4142 sets out a method to assess the likely effect of sound from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises, on people who might be inside or outside a dwelling or premises used for residential purposes in the vicinity.

3.3.3 The procedure contained in BS 4142 for assessing the effect of sound on residential receptors is to compare the measured or predicted sound level from the source in question, the $L_{Aeq,T}$ 'specific sound level', immediately outside the dwelling with the $L_{A90,T}$ background sound level.

3.3.4 Where the sound contains a tonality, impulsivity, intermittency and other sound characteristics, then a correction depending on the grade of the aforementioned characteristics of the sound is added to the specific sound level to obtain the $L_{Ar,Tr}$ 'rating sound level'. A correction to include consideration of a level of uncertainty in sound measurements, data and calculations can also be applied when necessary.

3.3.5 BS 4142 states: "The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs". An estimation of the impact of the specific sound can be obtained by the difference of the rating sound level and the background sound level and considering the following:

- *"Typically, the greater this difference, the greater the magnitude of the 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."*
- *"The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."*

3.3.6 For the daytime, the assessment is carried out over a reference time period of 1-hour, but at night-time it is carried out over a 15-minute period. The periods associated with day or night, for the purposes of the Standard, are considered to be 07.00 to 23.00 and 23.00 to 07.00, respectively.

3.4 Road Traffic Noise

3.4.1 The impact of any changes in $L_{A10,18hour}$ road traffic noise levels due to the Completed Development traffic were assessed in accordance with the principles and guidance presented within the Design Manual for Roads and Bridges (DMRB).

3.4.2 The DMRB states that "*The impact of a project at any location can be reported in terms of changes in absolute noise level. In the UK the standard index used for traffic noise is the* $L_{A10,18hour}$ *level, which is quoted in decibels*".

3.4.3 In order to determine whether changes in traffic noise levels are likely to occur as a result of the proposed development, noise levels were predicted in accordance with the methodology contained within the Calculation of Road Traffic Noise (CRTN).

3.4.4 The calculation method uses a number of input variables to predict the $L_{A10,18hour}$ noise level for any receptor point at a given distance from the road. However, in this assessment, the key factors are changes in traffic flows and the composition of the traffic (i.e. percentage HGVs). Therefore, the likely increase in road traffic noise levels as a direct result of the proposed development has been calculated in accordance with the Basic Noise Level (BNL) prediction method detailed in

CRTN. This method considers the relative change in noise level for a notional road-side receptor at a distance of 10 m from the kerb and at a height of 1.5 m (free-field).

3.4.5 The traffic data used in the assessment (provided by the Applicant's Transport Consultant) is provided in Appendix 3. The data includes details of Annual Average Weekday Traffic flows (AAWT) for the following assessment scenarios:

- Existing 2015 Baseline;
- Future Baseline plus Committed Development (2020, 2024 and 2027);
- 2020 Baseline plus Development and No Link Road;
- 2024 Baseline plus Development and No Link Road;
- 2027 Baseline plus Development and No Link Road; and
- 2027 Baseline plus Development and Link Road.

3.4.6 The DMRB presents a significance matrix for assessing the magnitude of changes in noise level as a result of traffic, which is reproduced in Table 3.3. This has been used in this assessment to consider the effect of any changes in road traffic noise levels. An increase in noise level represents an adverse effect whilst a reduction in noise represents a beneficial effect.

Table 3.3: Road Traffic Noise Significance Criteria

Change in Noise Level, dB(A)	Significance of Effect
0.0	No Change - No Effect
0.1 - 0.9	Negligible
1.0 - 2.9	Minor
3.0 - 4.9	Moderate
>5.0	Major

4.0 Baseline Conditions

4.1 Baseline Noise Survey

4.1.1 The noise conditions in the area have been determined by an environmental noise survey conducted during both daytime and night-time periods of Monday 14th to Tuesday 15th January 2019.

4.1.2 All noise measurements were undertaken by a consultant certified as competent in environmental noise monitoring, and, in accordance with the principles of BS 7445.

4.1.3 All acoustic measurement equipment used during the noise survey conformed to Type 1 specification of British Standard 61672. A full inventory of this equipment is shown in Table 4.1 below.

Table 4.1: Inventory of Sound Measurement Equipment

Measurement Position	Make, Model & Description	Serial Number
MP1	Rion NL-52 Sound Level Meter	00764926
	Rion NH-25 Preamplifier	76427
	Rion UC-59 Microphone	12922
MP2	Rion NL-52 Sound Level Meter	00453871
	Rion NH-25 Preamplifier	43913
	Rion UC-59 Microphone	07960
MP3	Rion NL-52 Sound Level Meter	00965159
	Rion NH-25 Preamplifier	65386
	Rion UC-59 Microphone	10288
All	Cirrus CR:515 Calibrator	76798

4.1.4 Unattended noise measurements were undertaken at several locations, which are described below and identified on Figure 4.1:

- Position 1 – Ambient noise measurement towards the western edge of the site, at a distance of circa 14 metres from the eastern carriageway edge of Totnes Road, intended to provide both a quantification of noise within the

western extent of the development and an ambient/background sound level for existing receptors in the vicinity. The microphone was located under free-field conditions and at a height of 1.5 metres above ground level. The noise climate was influenced by road traffic on Totnes Road.

- Position 2 – Ambient noise measurement towards the centre of the site, at a higher elevation, overlooking Newton Abbot and Abbotskerswell, intended to provide both a quantification of noise within the centre of the development and an ambient/background sound level for proposed receptors in the vicinity. The microphone was located under free-field conditions and at a height of 1.5 metres above ground level. The noise climate was influenced by road traffic on the surrounding roads.
- Position 3 – Ambient noise measurement towards the east of the site, at a location overlooking Kingskerswell Road, the railway and A380, intended to provide both a quantification of noise within the east of the development and an ambient/background sound level for proposed receptors in the vicinity. The microphone was located under free-field conditions and at a height of 1.5 metres above ground level. The noise climate was influenced by road traffic on the A380 and rail traffic on eth nearby line.

Figure 4.1: Noise Measurement Positions

4.1.5 The summarised results of the environmental noise measurements are presented in Table 4.2, with time histories and statistical analyses presented under Appendix B.

Table 4.2: Summary of Noise Measurement Results

Measurement Position	Period	Noise Level, dB			
		$L_{Aeq,T}$	L_{A90}	L_{A10}	L_{Amax}
MP1	Daytime	59.0	48.0	61.8	76.4
	Night-time	49.1	26.0	41.4	68.5
MP2	Daytime	43.7	42.0	44.4	57.8
	Night-time	34.0	24.0	33.6	50.6
MP3	Daytime	45.0	42.0	44.4	64.2
	Night-time	33.1	24.0	32.2	50.2

4.2 Sensitive Receptors

4.2.1 The following receptors, largely comprising the closest to the Site, set out in Table 4.3 have been afforded due consideration within the assessment.

Table 4.3: Receptors

Sensitivity	Receptor
High	1 – Proposed residential dwellings within the proposed development. 2 – Proposed school within the proposed development. 3 – Residential properties to the west of Totnes Road, on Denbury Road/Westwood Road 4 – Residential dwellings in the vicinity of the off-site highway network, predicted to experience a change in traffic flow
Moderate	1 – Church yard to the south of Old Totnes Road 2 – Ecological receptors in and around the masterplan area
Low	1 – Commercial receptors in the vicinity of the off-site highway network, predicted to experience a change in traffic flow

5.0 Identification and Evaluation of Key Impacts

5.1 Construction

5.1.1 Noise and vibration levels generated by construction activities have the potential to impact upon nearby and on-site noise-sensitive receptors.

5.1.2 The magnitude of the potential impact depends upon a number of variables, including: type of activity; periods of operation; source to receiver distance; ground absorption and reflections.

5.1.3 The site and surrounding area is rural and suburban in nature with a combination of residential and religious land uses within close proximity to some parts of the site. Additionally, there are ecological receptors both on-site and in the immediate surrounding area. The potential therefore exists (in the absence of mitigation) for minor to moderate adverse noise impacts on these sensitive receptors when development is taking place.

5.2 Operational

5.2.1 The Site is located in an area containing a number of roads, which run through noise-sensitive areas, including the town of Newton Abbot and village of Abbotskerswell. These roads are the primary influence acting upon the acoustic environment of the area and primarily comprise:

- A381 Totnes Rd;
- A381 East St;
- A381 Torquay Rd;
- A381 Torquay Rd (Penn Inn);
- A380 South of Penn Inn;
- Kingskerswell Rd South;
- Kingskerswell Rd North;

- Keyberry Rd;
- Decoy Rd;
- Coach Rd;
- Old Totnes Rd; and
- A381 Totnes Rd South.

5.2.2 Therefore, there is the potential for noise from transport infrastructure to impact upon the occupants of proposed residential dwellings, including from the proposed link road through the site.

5.2.3 The Proposed Development would also generate its own traffic flows, with the potential to increase levels of road traffic noise in the area.

5.2.4 The Proposed Development will be residential-led, with a design approach which adopts natural ventilation throughout.

5.2.5 The Proposed Development will also incorporate community and educational facilities, which will be noise-sensitive and treated in the same manner as the residential development. Some small-scale M&E plant will be incorporated within these development components, but are not considered likely to be significant noise generators; however, the detailed design will consider the background noise climate and no problems are foreseen with the engineering of these elements, insofar as minimising any acoustic impact.

5.2.6 The development does; however, incorporate areas of employment allocation on land on the western and south-eastern areas of the masterplan. The precise details are not yet known, so this assessment has focussed on setting appropriate noise limits for this development component, which can be utilised as a design target, once the end uses are known and used to inform any noise-related planning conditions. This approach is typical for such masterplan proposals, where specific details aren't known.

Residential Amenity

5.2.7 The predicted 2027 traffic flows contained in Appendix C have been processed in accordance with CRTN methodology to determine the noise levels for the adjacent roads, with the additional contributions of all committed development traffic, traffic associated with the Proposed Development itself and the link road. These have subsequently been used, in conjunction with the measured levels set out in Table 5.2 to predict future noise levels at key locations within the proposed residential areas of the Development. This approach enables the consideration of the future conditions, which are predicted to include the highest levels of development traffic and is therefore considered to represent robust basis for the assessment of future residential amenity.

5.2.8 In order to achieve appropriate noise levels within internal living spaces, the dwellings themselves need to be considered with regard to the level of façade mitigation required in order to achieve internal noise levels of $L_{Aeq,16\text{-}hour}$ <35 dB in habitable rooms during the day, $L_{Aeq,8\text{-}hour}$ 30 dB during the night and L_{AFMax} <45 dB during the night.

5.2.9 The glazing and ventilation elements are typically the weakest acoustic link in the construction of a building facade. Therefore, in order to assess the acoustic performance of the proposed dwellings, it is appropriate in the first instance to explore the level of protection that will be afforded by the performance of the glazing elements.

5.2.10 Windows do not reduce noise equally across the entire frequency spectrum, so the frequency content of the sound will influence the overall sound reduction performance of a given window and by extension, the resulting noise levels within the receiving room.

5.2.11 Many glazing manufacturers test their products under laboratory conditions using a typical road traffic noise frequency spectrum source. The resultant measured noise attenuation, in dB, gives a very useful guide to in-situ sound reduction

performance of the window for situations where road traffic noise dominates. This performance index is known as the R_{TRA}, or $R_w + C_{tr}$.

5.2.12 Table 1 in Annex 6 of PPG 24, which is now superseded, but does contain some useful and relevant information, provides examples of typical noise reductions for a dwelling façade with windows set in a brick/block wall. The table shows various levels of noise reduction provided by different glazing configurations and for different noise sources. The values shown are the level difference (in dBA) between the outside and the inside of a typical dwelling and to represent worst case, it is assumed that the outside level is a façade measurement and that the relative contribution though any ventilation elements is negligible.

5.2.13 For a $R_w + C_{tr}$, PPG24 states that standard thermal double glazing will provide a façade sound insulation performance of 33 dB(A), which for free-field noise levels as predicted in this case would be 30 dB(A). As an example of a glazing unit that could achieve the above performance, the glazing manufacturer SG states that its 4/12/4 double glazed window unit has a $R_w + C_{tr}$ of 27 dB. This is considered to be a reliable performance expectation in the context of what would be installed on the quietest facades of the development. The 4/12/4 notation refers to a glazing unit comprising a 4 mm pane of glass and a 4 mm pane of glass, separated by a 12 mm air gap.

5.2.14 The Building Regulations recommend on ventilation that habitable rooms in dwellings have background ventilation. Internal noise levels should be considered in the context of room ventilation requirements. In this instance, the target internal noise levels will only be achieved in the majority of dwellings when windows are closed. An alternative means of ventilation will therefore be required to comply with the requirements of the Building Regulations Approved Document F.

5.2.15 In order to achieve the target daytime and night-time internal noise levels, it is necessary to determine the minimum acoustic performance requirements of both the glazing and ventilation system. It is assumed that the default choice of glazing for the habitable rooms of the proposed development will be thermal

double glazing and the default choice for ventilation will be a hit and miss, window-mounted trickle vent system.

5.2.16 As already stated; in order to provide a robust assessment and a high quality living environment for future residents, providing internal noise levels of <35 dB(A) by day and <30 dB(A) by night as defined in BS 8233 has been adopted as the design target for the proposed development. For robustness, the façade specification has been determined based on the most noise-affected storey at each location.

5.2.17 To determine the glazing and ventilation requirements in order to provide an adequate level of protection against external noise intrusion, $L_{Aeq,16hour}$ daytime and $L_{Aeq,8hour}$ night-time noise levels have been predicted at the building façade, via the use of a Cadna/A noise modelling exercise.

5.2.18 Accordingly, the required composite $R_w + C_{tr}$ sound reduction performance for the building facade locations identified in Table 5.1; being the most potentially noise-affected parts of the site, to provide appropriate internal noise levels during both daytime and night-time periods, as described, is identified in Figure 5.1.

Table 5.1: Required Sound Level Difference Outside to Inside – dB

Location	Predicted Free-field Noise Level, dB		Target Internal Noise Level - dB		Required Sound Level Difference, dB
	Day	Night	Day	Night	
1	62	52	35.0	30.0	27
2	53	43	35.0	30.0	18
3	60	50	35.0	30.0	25
4	60	50	35.0	30.0	25
5	59	50	35.0	30.0	24
6	45	33	35.0	30.0	10

Figure 5.1: Assessment Locations

5.2.19 Table 5.1 identifies that noise will not be a determining factor in the design of the external building envelope of dwellings within the proposed development, with the façade insulation requirements being comfortably within the range typically afforded by traditional thermally insulating façade treatments, as described above. Furthermore, the reasonable internal requirements (criteria relaxed by +5 dB) are capable of being achieved with windows partially open for ventilation (assuming a 15 dB rate of attenuation) throughout the interior of the development.

5.2.20 It should also be noted that the sound reductions detailed in Table 5.1 apply to habitable rooms such as living rooms, dining rooms and bedrooms only. For non-habitable rooms such as kitchens, bathrooms, stairways, halls, landings, lower performance standards would be permissible.

5.2.21 The acoustic performances of a typical thermally insulating façade specification is set out in Table 5.2.

Table 5.2: Acoustic Performances for Dwelling Facades

Example Glazing	Sound Reduction Performance, R dB					
	Frequency, Hz					dB(A)
	125	250	500	1000	2000	
4/12/4 Double Glazing	24	20	25	34	37	31
Example Ventilation	**Element Normalised Level Difference (D,n,e) dB**					
	Frequency, Hz					dB(A)
	125	250	500	1000	2000	
Trickle Vent	32	32	31	33	31	32
Example Walls	**Sound Reduction Performance, R dB**					
	Frequency, Hz					dB(A)
	125	250	500	1000	2000	
Brick/Block Cavity	41	45	45	54	58	52

5.2.22 The above specification demonstrates that appropriate internal noise levels are achievable throughout the development with the use of façade treatments, typically required for thermal insulation.

5.2.23 The assessed impact on residential amenity is therefore negligible.

Educational Suitability

5.2.24 The area of the site allocated for educational use, lies towards the northern area of the masterplan area, to the north of dwellings fronting onto the western section of the internal link road.

5.2.25 This area, being more distant from the sources of noise in the area and screened by the built form of the residential development is predicted to experience noise levels of below 55 dB(A) during the day and will consequently be suitable for educational use, with no significant external acoustic design measures considered necessary to achieve the acoustic requirements of BB93.

5.2.26 The impact on the education use within the site is therefore assessed as being negligible.

Road Traffic Noise

5.2.27 The daily traffic flows presented by the Transport Consultant have been used as the basis of the road traffic noise assessment. The likely change in road traffic

noise levels as a direct result of the Proposed Development has been determined by comparing predicted noise levels for the Future Baseline scenario (without the Proposed Development), with relevant Proposed Development scenario, for each key phase year of the development, plus a completed situation with the fully open link road.

5.2.28 The calculations reflect the predicted change in traffic flows on key routes around the Proposed Development.

5.2.29 The traffic noise predictions have been undertaken in accordance with the BNL principles detailed within CRTN. These predictions consider the relative changes in noise level that is likely as a result of the Proposed Development at a notional roadside receptor for each considered road link.

5.2.30 The predicted changes in noise level are presented in Table 5.3.

Table 5.3: Predicted Future Changes in Road Traffic Noise

Route	Predicted Change in LA10,18-hour	Significance of Effect
2020 – Without Link Road		
1 - A381 Totnes Rd	-2.2	Minor Beneficial
2 - A381 East St	-2.4	Minor Beneficial
3 - A381 Torquay Rd	-2.4	Minor Beneficial
4 - A381 Torquay Rd (Penn Inn)	0.0	No Change – No Effect
5 - A380 South of Penn Inn	0.0	No Change – No Effect
6 - Kingskerswell Rd South*	0.2	Negligible Adverse
7 - Kingskerswell Rd North	0.1	Negligible Adverse
8 - Keyberry Rd	0.0	No Change – No Effect
9 - Decoy Rd	0.3	Negligible Adverse
10 - Coach Rd	0.3	Negligible Adverse
11 - Old Totnes Rd*	0.3	Negligible Adverse
14 - A381 Totnes Rd South	0.1	Negligible Adverse
2024 – Without Link Road		
1 - A381 Totnes Rd	-1.8	Minor Beneficial
2 - A381 East St	-2.3	Minor Beneficial
3 - A381 Torquay Rd	-2.3	Minor Beneficial
4 - A381 Torquay Rd (Penn Inn)	0.1	Negligible Adverse
5 - A380 South of Penn Inn	0.0	No Change – No Effect
6 - Kingskerswell Rd South*	0.9	Negligible Adverse
7 - Kingskerswell Rd North	0.6	Negligible Adverse

Route	Predicted Change in LA10,18-hour	Significance of Effect
8 - Keyberry Rd	0.0	Negligible Adverse
9 - Decoy Rd	1.0	Minor Adverse
10 - Coach Rd	1.3	Minor Adverse
11 - Old Totnes Rd*	3.5	Moderate Adverse
14 - A381 Totnes Rd South	0.3	Negligible Adverse
2027 – Without Link Road		
1 - A381 Totnes Rd	-1.3	Minor Beneficial
2 - A381 East St	-2.0	Minor Beneficial
3 - A381 Torquay Rd	-2.0	Minor Beneficial
4 - A381 Torquay Rd (Penn Inn)	0.2	Negligible Adverse
5 - A380 South of Penn Inn	0.0	No Change – No Effect
6 - Kingskerswell Rd South*	1.4	Minor Adverse
7 - Kingskerswell Rd North	1.0	Minor Adverse
8 - Keyberry Rd	0.0	No Change – No Effect
9 - Decoy Rd	1.7	Minor Adverse
10 - Coach Rd	2.0	Minor Adverse
11 - Old Totnes Rd*	4.7	Moderate Adverse
14 - A381 Totnes Rd South	0.5	Negligible Adverse
2027 – With Link Road		
1 - A381 Totnes Rd	-2.7	Minor Beneficial
2 - A381 East St	-3.3	Moderate Beneficial
3 - A381 Torquay Rd	-3.1	Moderate Beneficial
4 - A381 Torquay Rd (Penn Inn)	-0.1	Negligible Beneficial
5 - A380 South of Penn Inn	0.4	Negligible Adverse
6 - Kingskerswell Rd South*	5.0	Major Adverse
7 - Kingskerswell Rd North	1.4	Minor Adverse
8 - Keyberry Rd	0.8	Negligible Adverse
9 - Decoy Rd	-1.7	Minor Beneficial
10 - Coach Rd	-0.4	Negligible Beneficial
11 - Old Totnes Rd*	6.3	Major Adverse
14 - A381 Totnes Rd South	0.8	Negligible Adverse
* Denotes road running through largely non-residential area		

5.2.31 The results presented in Table 5.3 identify that the development is predicted to engender a beneficial change in road traffic on the major routes through the area, under the future scenarios. These routes dominate the overall soundscape of the area, thus diluting the localised acoustic effects of other, less busy routes.

5.2.32 Two major adverse impacts are identified under the 2027 with Link Road scenario; however, Kingskerswell Road South runs through a largely commercial area, while Old Totnes Road is a short link, connecting to the A381 that currently

carries very low levels of road traffic and will be acoustically diluted by the A381. This route also passes only one dwelling, which will continue to be more acoustically influenced by road traffic noise arising from the A381.

5.2.33 On balance, when considered as a whole, the overall wide road traffic noise impacts of the development will be Negligible to Minor adverse.

Building Services

5.2.34 The Proposed Development would incorporate external plant items. As the design of the development is not yet finalised and plant specifications not yet derived, limiting criteria derived in accordance with BS4142:2014 have been derived.

5.2.35 The noise criteria set out in Table 5.4 have been proposed based on the measured background daytime and night-time noise levels in the area, at Noise Measurement Positions 1 and 3 (See Figure 5.1).

Table 5.4: Plant and Commercial noise Limiting Criteria

Period	Limiting Criteria LARTr
West of Site (near MP1)	
Daytime (07:00-23:00)	48
Night-time (23:00-07:00)	26
East of Site (near MP3)	
Daytime (07:00-23:00)	42
Night-time (23:00-07:00)	24

5.2.36 The limits in Table 5.4 would apply to the total noise emission levels from all static plant and operations at existing and potential future receptors forming part of the proposed development. Individual plant items may need to be designed to a lower limit such that the overall total achieves the stated criteria above.

5.2.37 Compliance with the above limiting noise levels for building services plant would result in a negligible impact to existing and future residents and accordingly no further mitigation measured are considered necessary.

Commercial Noise

5.2.38 The potential exists for minor adverse noise impacts on neighbouring land uses (existing and proposed) to arise from servicing of the commercial elements within the development.

5.3 Summary of Impacts

5.3.1 Table 5.5 sets out a summary of the predicted noise-related impacts.

Table 5.5: Summary of Impacts

Impact	Receptor Sensitivity	Direct or Indirect	Positive / Negative	Permanent / Temporary	Magnitude	Significance
Construction						
Residential amenity, religious site and ecology	High & Moderate	Direct	Negative	Temporary	Moderate	Minor to Moderate adverse
Operational						
Residential Amenity	High	Direct	N/A	Permanent	Negligible	Negligible - Insignificant
Educational Suitability	High	Direct	N/A	Permanent	Negligible	Negligible - Insignificant
Off-site road traffic noise	High	Direct	Negative	Permanent	Negligible to Minor	Negligible to Minor Adverse – Low Significance
Building services	High, Medium & Low	Direct	Negative	Permanent	Negligible	Negligible - Insignificant
Commercial noise	High, Medium & Low	Direct	Negative	Permanent	Minor	Minor adverse

6.0 Mitigation Measures

6.1 Construction

6.1.1 The identified construction impacts need to be appropriately managed and controlled by imposing a condition requiring a Construction Environmental Management Plan (CEMP) to be prepared and agreed in advance of construction activities commencing. The CEMP should cover the following matters to ensure that construction noise impacts are effectively mitigated:

- A table (logical framework) showing the objectives, expected results, activities (mitigation/optimisation measures), and responsibilities for the implementation of those activities;
- The broad plan of the phasing of the work and its context within the whole project;
- Inclusion of baseline levels for noise, vibration and dust and monitoring protocols;
- Setting of 'Threshold' and Action Levels' for noise, vibration and dust to warn of activities that may require particular care and control;
- Details of prohibited or restricted operations (location, hours etc.);
- A monitoring and supervision plan (including appropriate indicators, frequency of monitoring, means to gather and analyse the data, reporting system);
- A response plan in case unexpected results from the environmental monitoring;
- The details of proposed routes for heavy goods vehicles travelling to and from the Site.

6.2 Operational

Residential Amenity

6.2.1 Noise will not be a determining factor in the design of the external building envelope of any dwelling within the proposed development, with the necessary acoustic attenuation rates being within the typical performance range of

traditional, thermally insulating façade constructions. No mitigation is therefore required.

Educational Suitability

6.2.2 The area proposed for a new school is predicted to experience noise levels of below 55 dB(A) during the day and will consequently be suitable for educational use, with no significant external acoustic design measures considered necessary to achieve the acoustic requirements of BB93. Additionally, the precise layout and design of the school will ultimately steer the requirement for acoustic treatment, but no external measures are considered necessary, beyond those typically required to ensure appropriate thermal and ventilation standards. No mitigation is therefore required.

Offsite road traffic noise

6.2.3 The offsite road traffic noise impacts identified are an unavoidable/inherent impact of the proposed development which cannot be mitigated.

Building Services

6.2.4 Compliance with the standard limiting noise levels for building services plant would result in a negligible impact to existing and future residents, accordingly, no further mitigation is required.

Commercial activities

6.2.5 Where determined as necessary at the detailed design stage, noise impacts related to commercial activities should be mitigated through layout and building design solutions and by imposing noise-limiting conditions. For example:

- designing a layout so that the location of delivery bays maximises separation distances and screening between the source and receiver will help avoid and minimise impacts; and
- The adoption of appropriate delivery and servicing management plans.

7.0 Residual Effects

7.1.1 Table 7.1 sets out a summary of the predicted noise impacts post implementation of the specified mitigation.

Table 7.1 Summary of Residual Effects

Impact	Mitigation / Enhancement	Residual Effect Magnitude	Residual Effect Significance
Construction			
Residential amenity / religious sites / ecology	Construction Environmental Management Plan	Minor	Negligible to Minor adverse
Operational			
Residential Amenity	None Required	Negligible	Negligible - Insignificant
Educational Suitability	None required	Negligible	Negligible - Insignificant
Off-site Traffic	n/a	Negligible to Minor	Negligible to Minor Adverse – Low Significance
Building services	None required	Negligible	Negligible - Insignificant
Commercial activities	Detailed layout and building design solution / Noise limiting condition	Negligible	Negligible - Insignificant

8.0 Cumulative Effects

8.1.1 Consideration has given to the potential for cumulative effects as a result of committed development and 'other' planned development. A number of major projects within the Newton Abbot area have been identified to be assessed for cumulative effects (see Chapter 2 of Volume 2 of the Environmental Statement).

8.1.2 It is important to note that the developments assessed all involve (or will when taken forward) the implementation of mitigation measures as required to reduce and avoid adverse construction and operational noise impacts.

8.1.3 Apart from the remainder of the NA3 allocation, none of the projects identified are expected to result in any cumulative effects because they are all located some distance away from the proposed development being assessed.

8.1.4 The remainder of the Wolborough Barton allocation is however located to the immediate east of the proposed development site. The potential therefore existing for cumulative effects to arise during construction and once operational. As with the proposed development, it is expected/assumed that the development of the site will involve a range of necessary mitigation to ensure that adverse impacts will be avoided, minimised and reduced (as has been set out in this chapter).

8.1.5 In terms of the construction phase, there is the potential for the proposed development to be constructed at the same time as the remainder of the allocation and therefore lead to cumulative effects. It will therefore be necessary for the LPA and developers to appropriately manage and coordinate the developments and put in place Construction Environmental Management Plans.

8.1.6 In terms of operational noise; due to the low impact nature of the proposed development, cumulative operational noise impacts are considered to be limited to road traffic noise only (which cannot be mitigated).

9.0 Summary and Conclusions

9.1.1 This ES Addendum has considered and assessed the noise related impacts arising from the construction and operational phases of the proposed development. A summary of the predicted impacts is presented in Table 9.1.

9.2 Construction

9.2.1 The noise and vibration impacts associated with the construction of the proposed development will be managed and controlled by condition requiring a Construction Environmental Management Plan to be agreed. As a result there will be a negligible to minor adverse impact (of a temporary nature).

9.3 Operational

9.3.1 The impact of ambient noise on the Proposed Development has been determined by considering both the baseline noise measurement results and predicted future levels, calculated on the basis of traffic data provided by the Applicant's Transport Consultant. These calculations have been based on the Future 2027 scenario, taking account of traffic associated with the proposed link road and development itself.

9.3.2 The predicted noise levels identify that noise levels across the site are of a level that will require no specific acoustic treatment in order to achieve the criteria set out in BS8233: 2014, with most of the site achieving this target with windows open for ventilation. The precise façade treatments would be determined at the detailed design stage; however, this exercise has demonstrated that traditional thermal façade construction techniques are considered to be suitable. The residual effect on residential amenity is therefore predicted to be negligible.

9.3.3 Changes in traffic flows as a direct result of the Proposed Development have been assessed. Predicted changes in noise level on the road network as of result of changes to traffic flows vary locally, but overall would have a negligible to minor effect.

9.3.4 Noise impacts associated with proposed commercial activities and buildings services will be controlled by condition and are consequently negligible.

Table 9.1: Summary Table for Noise

Impact	Impact Significance	Direct/ Indirect	Positive/ Negative	Temporary/ Permanent	Summary of Mitigation/ Enhancement	Residual Effect significance	Positive/ Negative	Temporary/ Permanent	Confidence level
Construction									
Residential amenity / religious sites / ecology	Minor to moderate adverse	Direct	N/A	Permanent	Construction Environmental Management Plan	Negligible to minor adverse – low significance	Negative	Permanent	High
Operational									
Residential Amenity /	Negligible - Insignificant	Direct	N/A	Permanent	No specific mitigation required	Negligible - Insignificant	N/A	Permanent	High
Educational Suitability	Negligible - Insignificant	Direct	N/A	Permanent	No specific mitigation required	Negligible - Insignificant	N/A	Permanent	High
Off-site Traffic noise	Negligible to Minor Adverse – Low Significance	Indirect	Negative	Permanent	None – unavoidable impact	Negligible to Minor Adverse – Low Significance	Negative	Permanent	High
Building services	Negligible - Insignificant	Direct	Negative	Permanent	None required.	Negligible - Insignificant	Negative	Permanent	High
Commercial activities	Minor adverse	Direct	Negative	Permanent	Noise limiting condition / layout / building design	Negligible - Insignificant	Negative	Permanent	High

Appendix A – An Introduction to Acoustics

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20μPa (20x10-6 Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1 / s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
Leq,T	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
Lmax,T	A noise level index defined as the maximum noise level during the period T. Lmax is sometimes used for the assessment of occasional loud noises, 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.
L90,T	A noise level index. The noise level exceeded for 90% of the time over the period T. L90 can be considered to be the "average minimum" noise level and is often used to describe the background noise.
L10,T	A noise level index. The noise level exceeded for 10% of the time over the period T. L10 can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Facade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS 5969.

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street

70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

In accordance with logarithmic addition, combining two sources with equal noise levels would result in an increase of 3 dB(A) in the noise level from a single source.

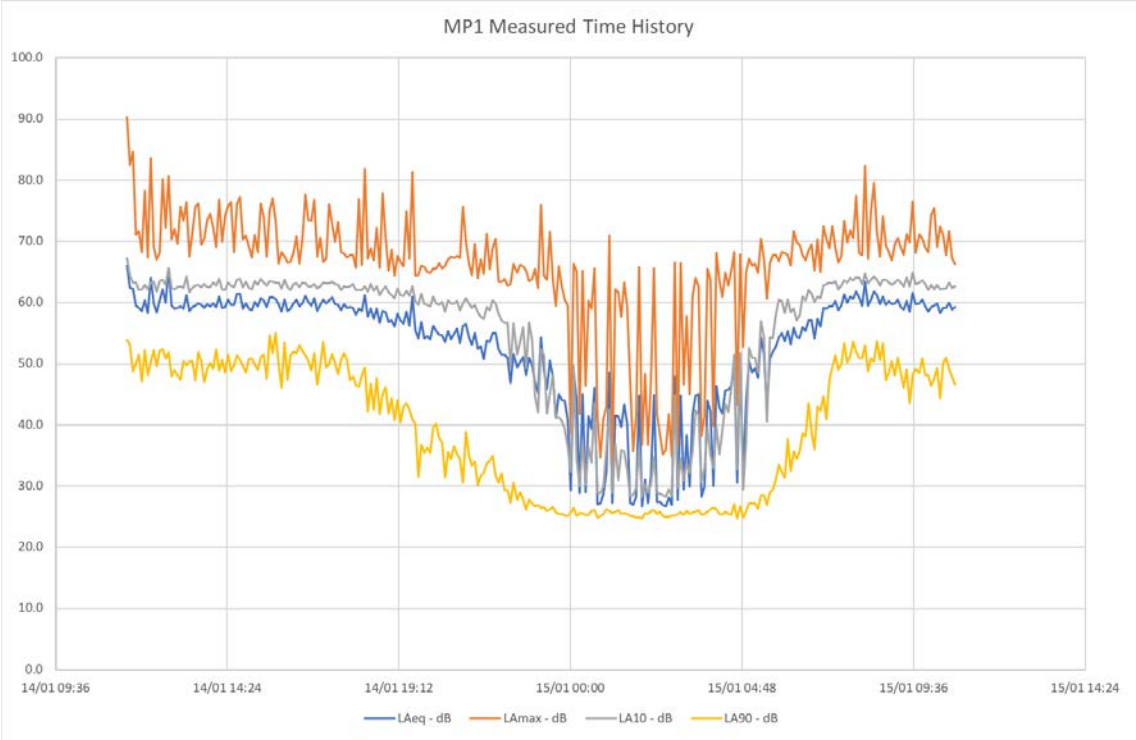
A change of 3 dB(A) is generally regarded as the smallest change in broadband continuous noise which the human ear can detect (although in certain controlled circumstances a change of 1 dB(A) is just perceptible). Therefore, a 2 dB(A) increase would not be normally be perceptible. A 10 dB(A) increase in noise represents a subjective doubling of loudness.

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs.

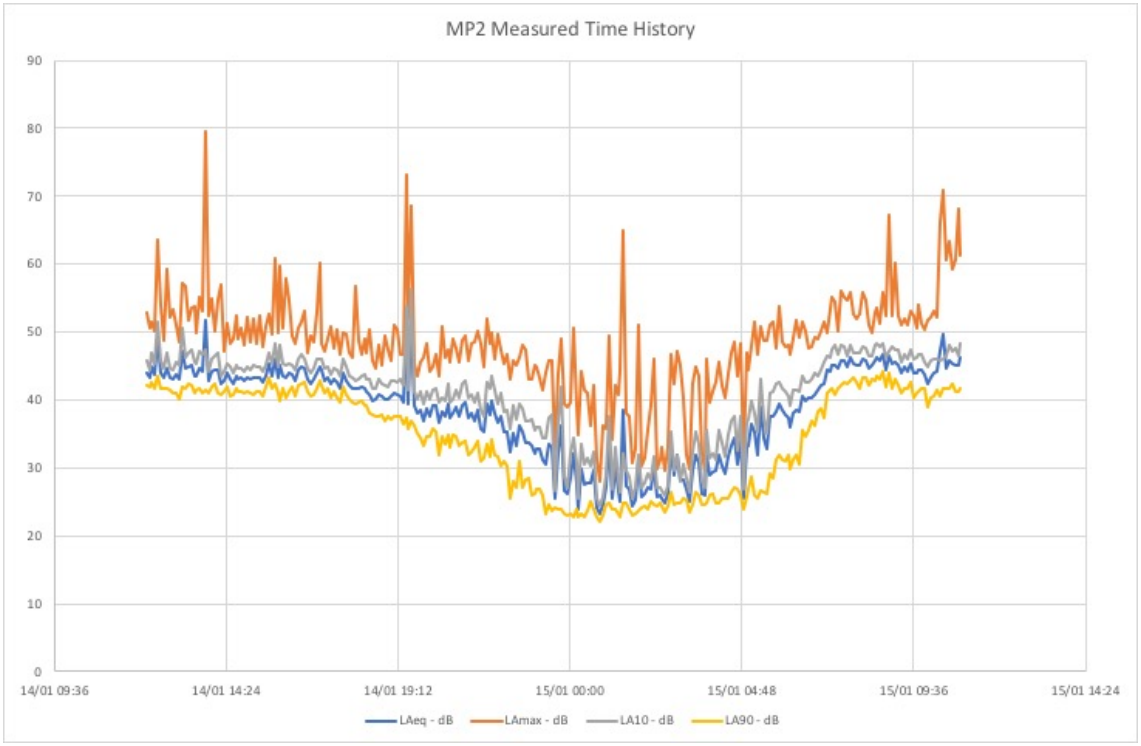
For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest. In the UK, traffic noise is measured as the L_{A10}, the noise level exceeded for 10% of the measurement period. The LA_{90} is the level exceeded for 90% of the time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, L_{Aeq}.

Appendix B – Noise Survey Data

Measured Time History – MP1



Measured Time History – MP2



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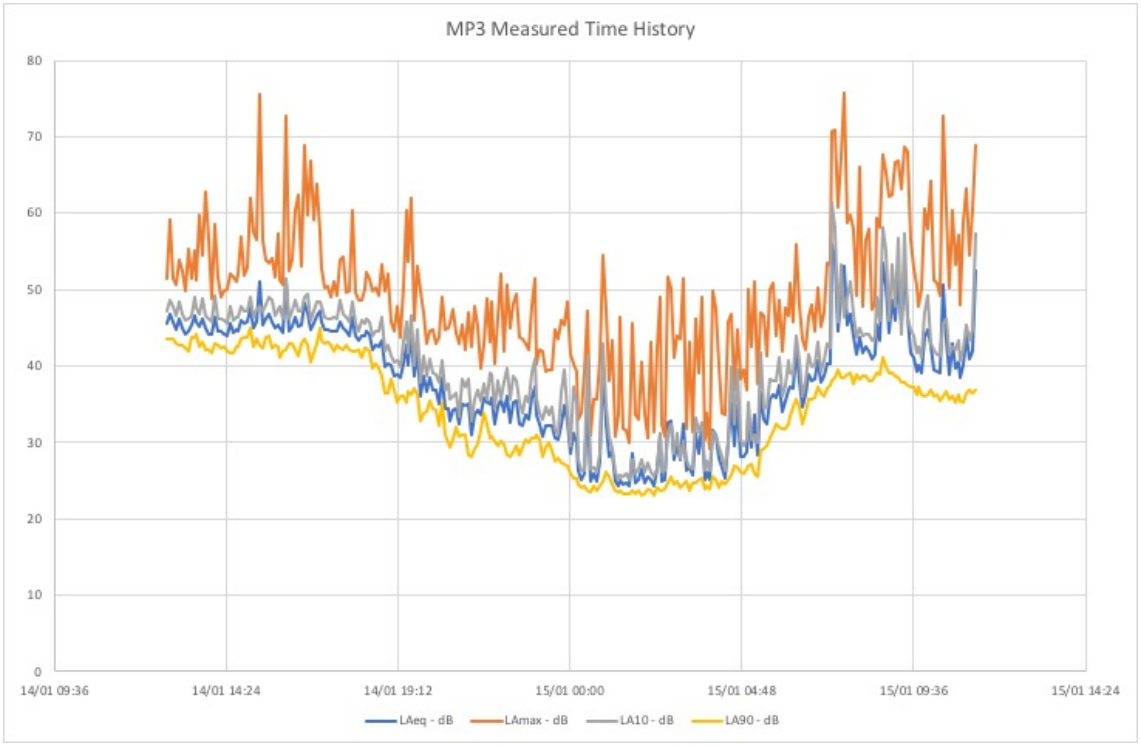
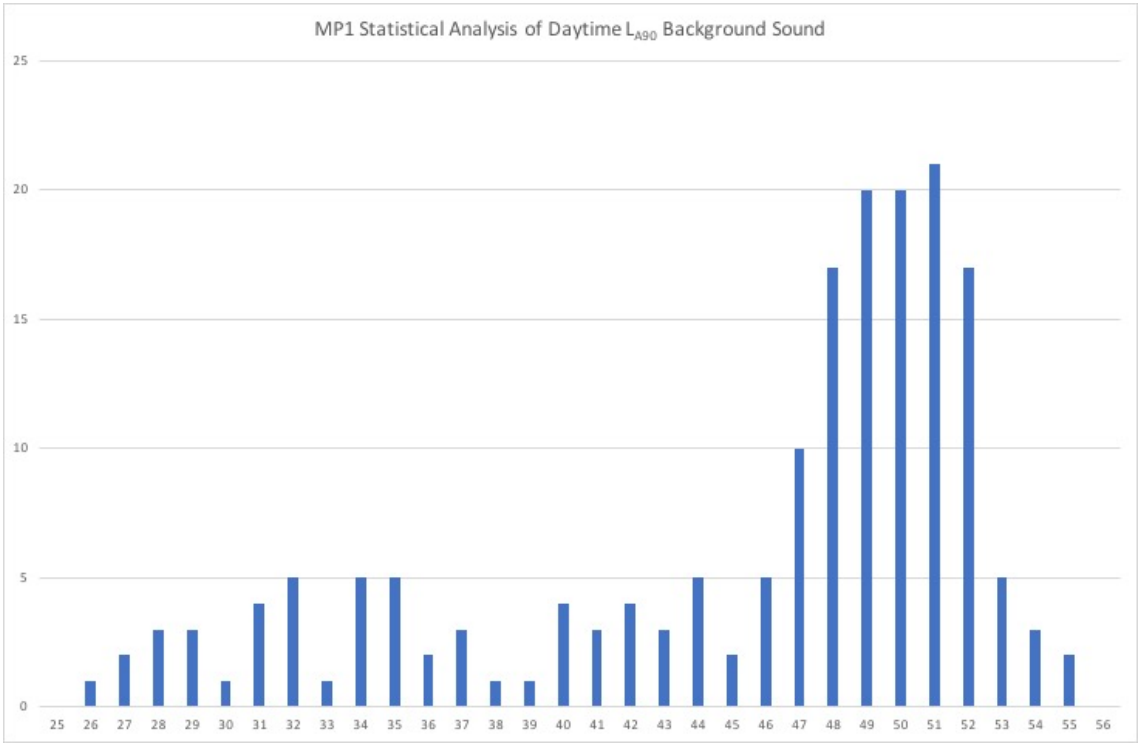
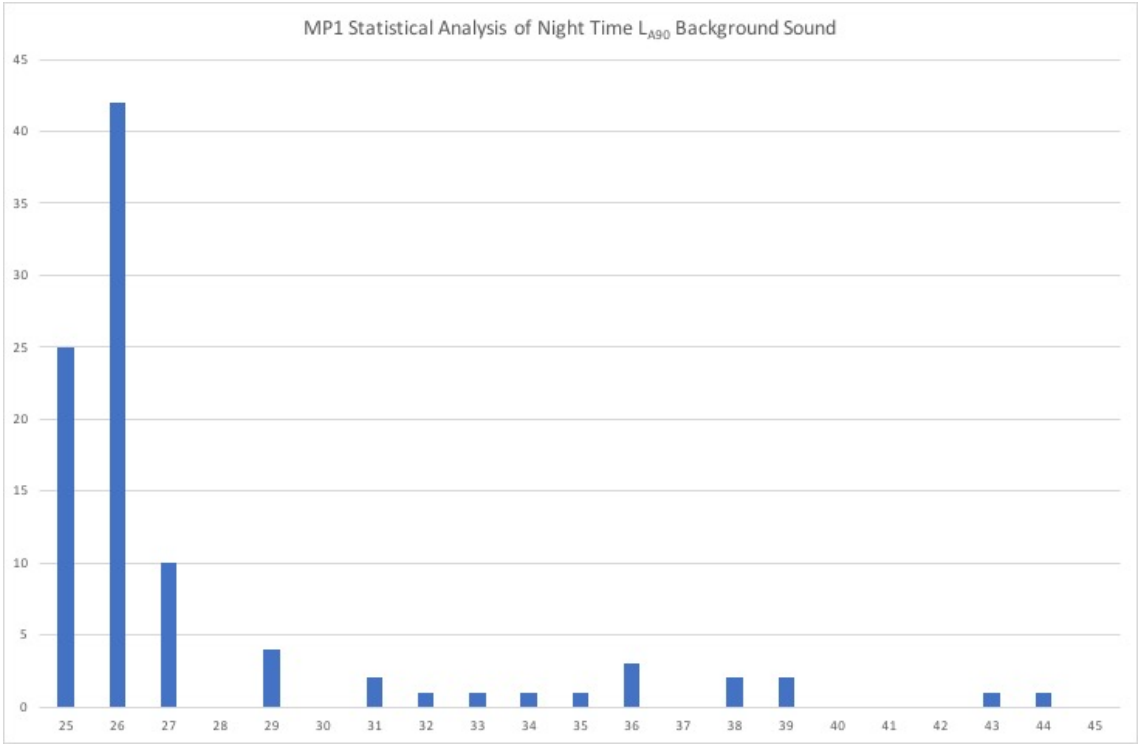


Statistical Analysis of LA90 Background Sound Daytime – MP1



Statistical Analysis of LA90 Background Sound Night-time – MP1



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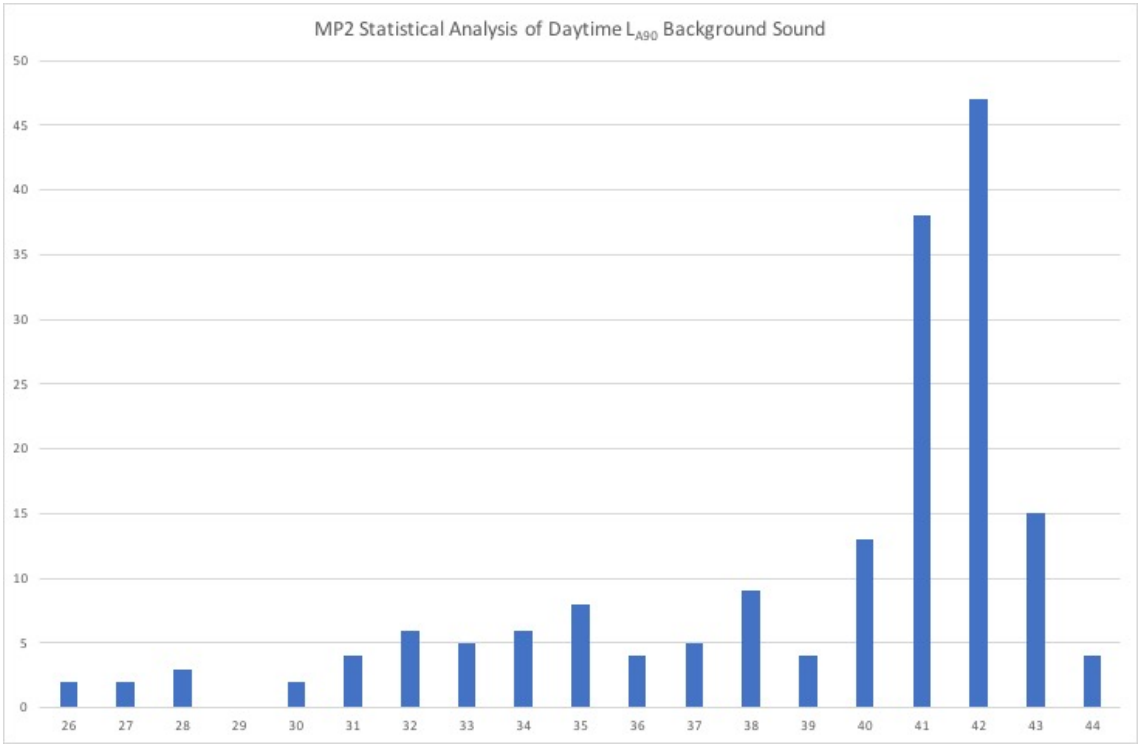
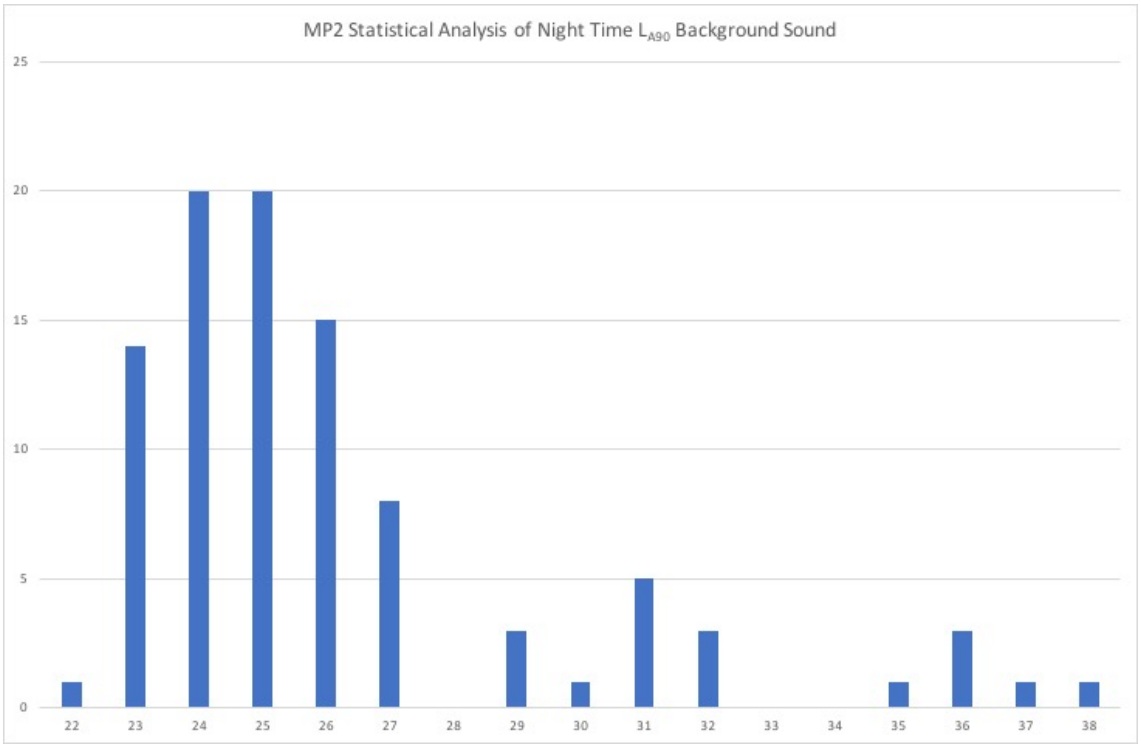
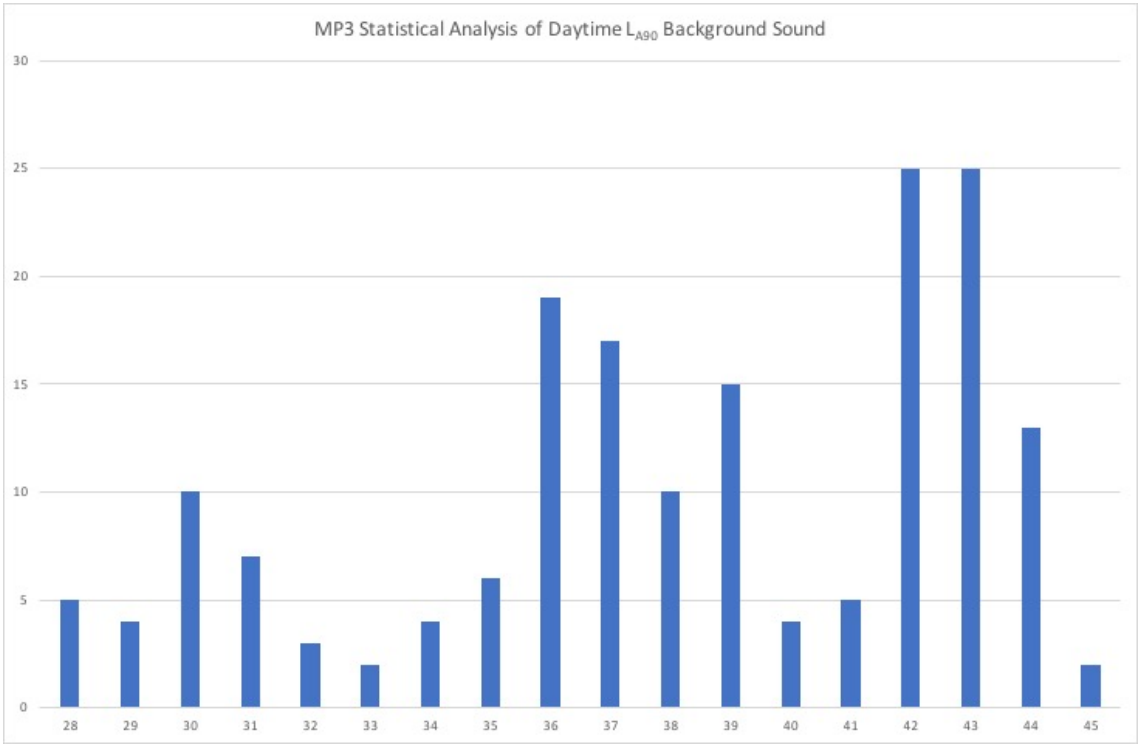


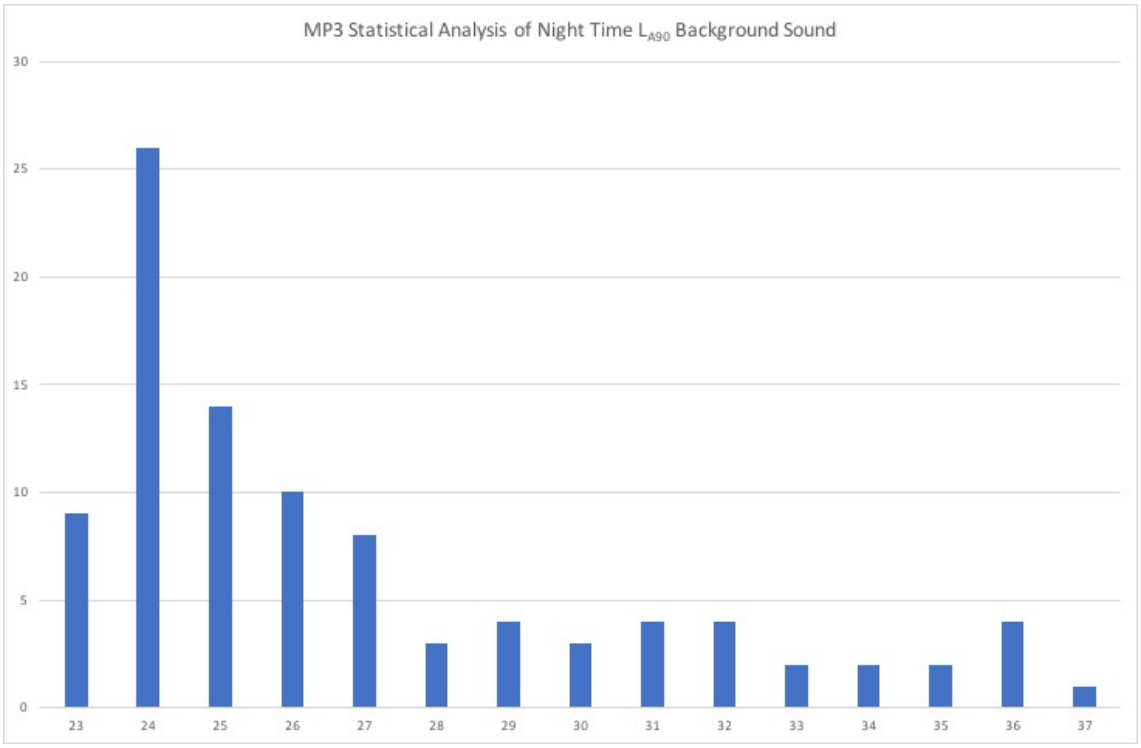
Statistical Analysis of LA90 Background Sound Night-time – MP2



Statistical Analysis of LA90 Background Sound Daytime – MP3



Statistical Analysis of LA90 Background Sound Night-time – MP3



Appendix C – Traffic Flows Used in the Assessment

Baseline Traffic Flows

Link Number	Link Description	%HGV	Speed Kmh-1	2015 Surveyed Base	2020 Base + Committed (also for 2024, 2027 as no BG growth applied)
1	A381 Totnes Rd	2.5	48	16777	16422
2	A381 East St	1.9	48	18246	18288
3	A381 Torquay Rd	1.9	48	15584	17611
4	A381 Torquay Rd (Penn Inn)	3.5	48	38999	45370
5	A380 South of Penn Inn	5.0	120	32505	49536
6	Kingskerswell Rd South	1.1	48	5011	2765
7	Kingskerswell Rd North	1.1	48	5940	3713
8	Keyberry Rd	0.3	48	7692	6932
9	Decoy Rd	0.8	48	3935	2622
10	Coach Rd	1.1	48	3165	3188
11	Old Totnes Rd	1.1	48	3127	3149
12	Wolborough Link West	-	48	0	0
13	Wolborough Link East	-	48	0	0
14	A381 Totnes Rd South	2.3	48	12708	12162

Future Traffic Flows

Link Number	Link Description	2020 Base + Development (No Link Road)	2024 Base + Development (No Link Road)	2027 Base + Development (No Link Road)	2027 Base + Development (With Link Road)
1	A381 Totnes Rd	17471	19260	21455	15863
2	A381 East St	18851	19262	20372	15131
3	A381 Torquay Rd	18155	18528	19552	15322
4	A381 Torquay Rd (Penn Inn)	45887	46623	47896	43906
5	A380 South of Penn Inn	49708	49709	50086	54075
6	Kingskerswell Rd South	2886	3305	3718	8580
7	Kingskerswell Rd North	3823	4244	4619	5129
8	Keyberry Rd	6932	6953	6972	8381
9	Decoy Rd	2759	3242	3719	1921
10	Coach Rd	3364	4249	5016	2920
11	Old Totnes Rd	3340	6898	9271	13153
12	Wolborough Link West	0	4524	4658	10534
13	Wolborough Link East	0	0	2311	8809
14	A381 Totnes Rd South	12419	13061	13570	14744