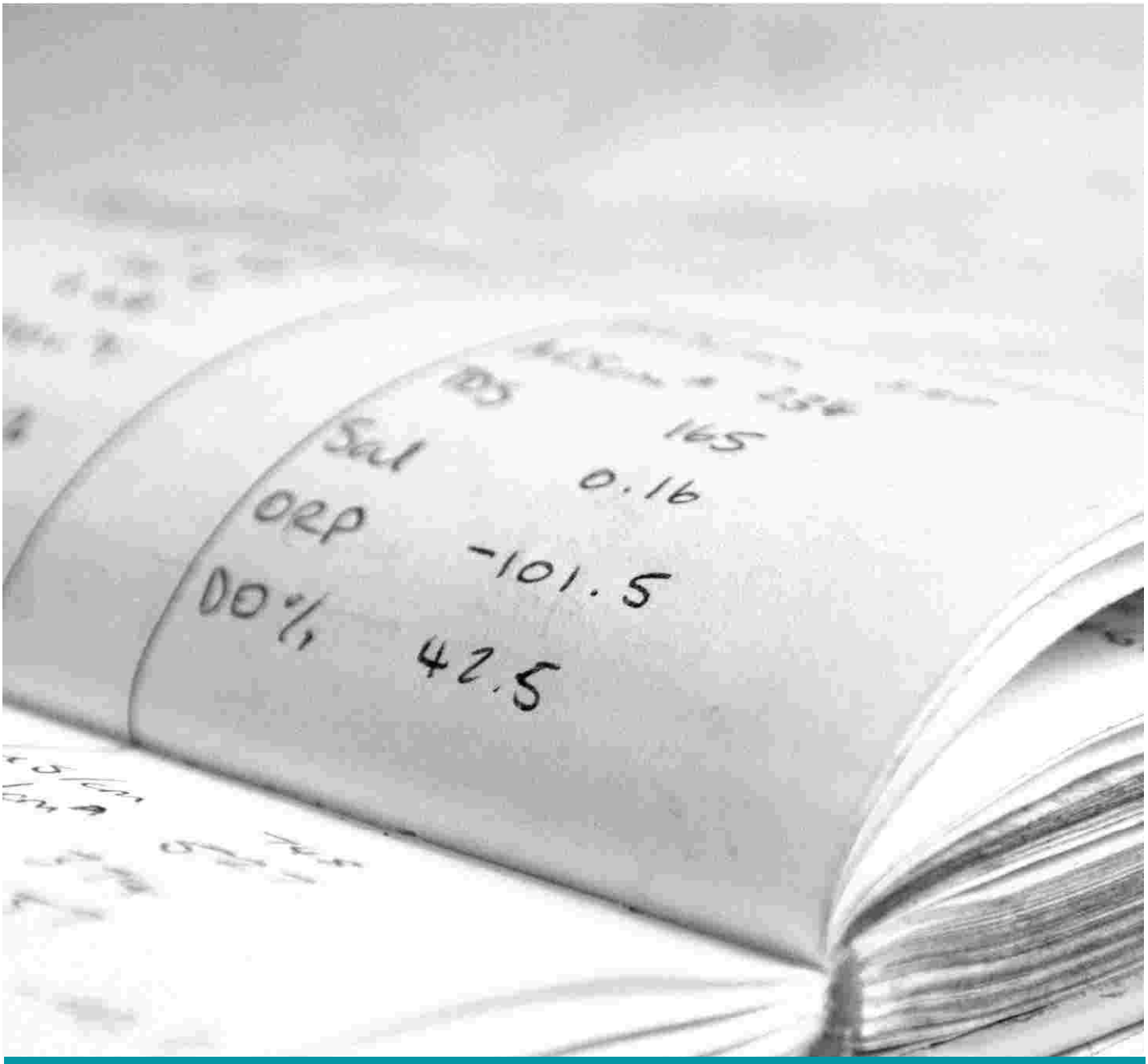

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WSP

Noise Assessment Report

New Road Link - Kings Road, Newbury

July 2012

QM

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Contents

1 Introduction

1.1 REPORT SCOPE

1.1.1 WSP Environmental Ltd. has been commissioned to carry out an assessment of the potential noise effects at existing dwellings associated with the operation of a new road link and the proposed heavy goods vehicle (HGV) restrictions on Kings Road, Newbury.

1.1.2 As requested by West Berkshire Council (WBC), the assessment has been undertaken based on the methodology described in the Transport Analysis Guidance (TAG), which can be obtained from the Department for Transport's (DfT) website (www.dft.gov.uk/webtag), and hence is referred to as WebTAG. Specifically, an assessment has been undertaken in accordance with TAG Unit 3.3.2: The Noise Sub-Objective, which is described later in this report.

1.1.3 Accordingly, through a combination of measurements and predictions, and through the use of the automated spreadsheets provided on the DfT website, the likely positive and negative noise effects, as well as the effect on house prices, associated with the proposed scheme have been determined.

1.1.4 It is not a requirement of WebTAG for an assessment in accordance with the Noise Insulation Regulations to be undertaken; however, it is a requirement that reference be made to any dwellings experiencing noise levels (with the scheme) above 68 dB ($L_{Aeq,18hr}$), which has been done. Where this threshold is not exceeded – which is effectively lower than the equivalent threshold in the Regulations – at any dwellings predicted to experience an increase in noise levels, then, even without having undertaken a full assessment in accordance with the Regulations, it can be concluded that no dwellings would be eligible for noise insulation.

1.1.5 This report is necessarily technical in nature and contains a certain amount of terminology relating to noise. The terminology used in this chapter is defined and explained in Appendix A.

1.2 THE PROPOSED SCHEME

1.2.1 The proposals comprise an HGV restriction for Boundary Road and Mill Road and a new road link (referred to hereafter as the Kings Road Link). The Kings Road Link will connect the existing Sainsbury's roundabout with Kings Road itself, close to the Boundary Road/Hambridge Road junction. The Kings Road Link will provide an alternative route to the Sainsbury's roundabout, avoiding Kings Road and the dwellings located either side of this road.

1.2.2 A plan showing the proposed Kings Road Link is presented as Figure 1.1 overleaf.

Figure 1.1: The proposed Kings Road Link

2 Assessment Methodology

2.1 TAG UNIT 3.3.2: NOISE SUB-OBJECTIVE

2.1.1 As stated in the Introduction, this assessment has been undertaken in accordance with TAG Unit 3.3.2: Noise Sub-Objective. Given the relatively limited scale of the scheme (as shown in Figure 1 above), however, where the effects will be relatively localised, an assessment has been undertaken for a smaller area that would otherwise be required. This is discussed further below.

2.1.2 The UK has well established procedures for assessing the nuisance to people caused by road traffic-related noise. These procedures have been developed from surveys of the impacts of noise from transport on people, including dissatisfaction, annoyance and disturbance.

2.1.3 Although individuals vary widely in their response to the same level of noise, even when it arises from the same source, the average or community response from a large number of people exposed to the same source of noise is relatively stable and a community average degree of annoyance can be associated with long-term average noise exposure. The concept of annoyance is generally recognised as a robust and well-established measure for identifying the long term noise impacts from roads.

2.1.4 More recently, the DfT commissioned a research study aimed at putting a monetary value on the impact of noise. The guidance document incorporates those monetary values in to its existing noise assessment guidance. It is used to aid decision-makers when appraising the impacts of transport schemes. The monetary values are national average values per household per year at 2002 prices. These are increased in line with forecasts of GDP per household and discounted over the appraisal period to give a present value of noise.

2.1.5 The appraisal involves two steps. The first, based on the concept of noise annoyance, involves calculating the difference in the estimated population who would be annoyed by the source (or sources) of noise, comparing the do-minimum (without development) and do-something (with development) scenarios.

2.1.6 The second is based on the effect of noise on house prices and involves calculating the present value of households' willingness to pay to avoid transport related noise over the whole appraisal period for each scenario. This valuation is based primarily on the findings of the study: Valuation of Transport-Related Noise in Birmingham (Bateman, Day and Lake, 2004).

2.1.7 The TAG Noise Spreadsheet automates the calculations. This automation requires the cross-tabulation of households experiencing different noise level bands between the do-minimum and do-something scenarios.

Methodology for Plan Level Appraisals

2.1.8 Unit 3.3.2 contains methodologies for ‘strategic’ and ‘plan’ level appraisals. The former is used when multiple route options are being considered, whilst the latter, which has been followed here, is for more detailed assessments, where, typically only one route is being considered and detailed traffic data are available.

2.1.9 At plan level, four steps are required to calculate the noise impacts:

- The Noise Spreadsheet requires noise data to be in 3 dB bands. These bands are <45, 45-47.9, 48-50.9, 51-53.9, 54-56.9, 57-59.9, 60-62.9, 63-65.9, 66-68.9, 69-71.9, 72-74.9, 75-77.9, 78-80.9 and >81 dB in terms of $L_{Aeq,18hr}$. Noise levels should be estimated for all residential properties within 600m of the transport infrastructure concerned.

- For noise annoyance, populations within these noise bands should be estimated. In the TAG Noise Spreadsheet this is calculated automatically once the user inputs an estimate of average household size.
- Based on the annoyance functions and monetary values of changes in noise presented in the TAG Unit, and the monetary value is calculated by the Noise Spreadsheet.
- The impact, expressed in terms of differences in population annoyed, is derived by subtracting, for each noise band, the population annoyed in the do-minimum from the population annoyed in the do-something scenario and summing over all noise contours. Both this and the present value of the change in noise are automatic outputs of the TAG Noise Spreadsheet.

2.1.10 Noise levels are required for the do-minimum scenario and the do-something scenario in order to derive the change in noise present at each residential property. Noise levels would typically be estimated for all residential properties within 600m of the transport infrastructure associated with the scheme. However, given the limited scale of the proposed scheme, a smaller study area has been adopted, as described in the following Section.

2.1.11 In accordance with WebTAG, a correction of -2.5 dB has been applied to the predicted noise levels, which initially are in terms of $L_{A10,18hr}$ noise levels, as per the Calculation of Road Traffic Noise (described later in this Section), to determine the equivalent $L_{Aeq,18hr}$ noise levels.

Appraisal Summary Table

2.1.12 The key assessment findings are to be presented in the Appraisal Summary Table (AST). The AST has been designed to make the appraisal process more transparent by drawing together and summarising all relevant impacts (Economic, Environmental (including noise), Social and Public Accounts) to enable the impacts, and options, where relevant, to be considered in a concise and consistent manner.

2.1.13 With respect to noise, the following information is required:

Quantitative column

2.1.14 The entries in the quantitative column of the AST should show the estimated number of people who are likely to be annoyed in the longer term in the do-minimum scenario and the do-something scenario in the fifteenth year.

Overall assessment score

2.1.15 The entry in the Overall Assessment column should show:

- The net difference in the estimated population who are likely to be annoyed in the longer term as a result of the option compared to the do-minimum scenario in the fifteenth year; and
- The estimated present value of the change in noise (at 2002 prices) discounted over the 60 year appraisal period. These are both calculated as outputs from the TAG Noise Spreadsheet.

Qualitative comment

2.1.16 A qualitative entry in the AST should be used to highlight any factors which cannot be readily understood from the numbers in the Quantitative and Overall Assessment columns. For example, there may be a significant impact on night-time noise, or instances of properties experiencing noise levels in excess of 80 dB $L_{Aeq,18hr}$. For noise insulation issues the number of properties experiencing noise levels above 68 dB $L_{Aeq,18hr}$ in the Do-Something scenario should be highlighted. Also the appraiser may wish to comment on whether noise impacts on potentially sensitive non-residential receptors (for example schools or hospitals), both nearer and further than 600m from the road, are

likely to be significant. An indication can be given of the main factors causing any change in noise conditions.

2.2 CALCULATION OF ROAD TRAFFIC NOISE

2.2.1 The Calculation of Road Traffic Noise (CRTN, 1988) describes a step-by-step method for predicting road traffic noise levels in terms of L_{A10} for both a 1-hour period and an 18-hour period (between 06:00 hours and midnight).

2.2.2 The prediction method takes into account the following factors to generate a Basic Noise Level (BNL) at a notional distance (typically 10m) from the kerb:

- traffic flow (1-hour or 18-hour);
- mean vehicle speed;
- the percentage of heavy duty vehicles; and
- the road surface and gradient.

2.2.3 The procedures also enable the noise level at specific receptors to be determined by taking the BNL and applying corrections for distance, the presence of screening (barriers, buildings and topography), the type of intervening ground cover between the road and receiver, the angle of view of the road and reflections from façades.

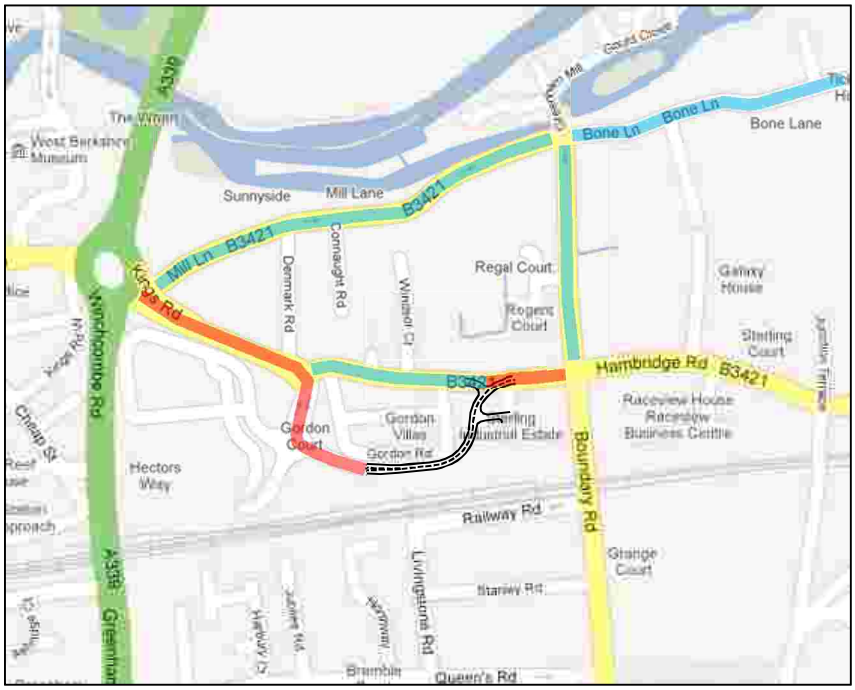
2.2.4 The procedures assume typical traffic and noise propagation conditions that are consistent with moderately adverse wind velocities and directions.

3 Study Area

3.1 ROAD SEGMENTS TO BE CONSIDERED

3.1.1 According to guidance in the Design Manual for Roads and Bridges (DMRB HD213/11, 2011), following a change in traffic flow, improvements or deterioration in the noise environment may be perceived when the changes are as low as 1 dB(A). This is equivalent to an increase in traffic flow of 25% or a decrease of 20%. Accordingly, the traffic data have been screened to identify where changes of +25% and -20% are predicted as a result of the future do-something (with development) scenarios. The results of this screening are shown in the following figure.

Figure 3.1: Links predicted to experience changes in flows +20% (highlighted in red) and -20% (highlighted in blue)



3.1.2 Accordingly, in the first instance it is proposed to consider the dwellings overlooking/ fronting the links shown in the figure above. The noise impact at all other receptors is anticipated to be insignificant.

3.1.3 This does not mean that the un-highlighted roads were ignored, however. In order that realistic (do-minimum and do-something) noise levels are predicted, the local roads, highlights or otherwise, for which traffic data has been provided, have been included.

3.2 PROPERTY NUMBERS

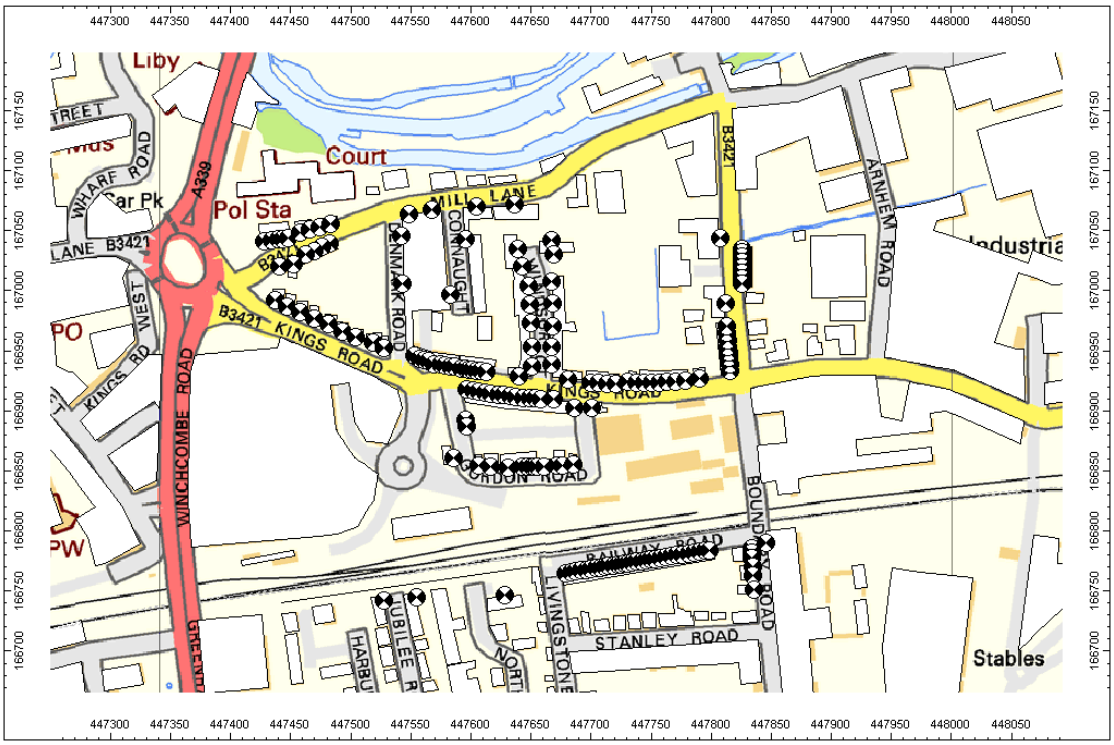
3.2.1 WebTAG advises that it is possible that the resident population in the affected properties or the number of properties in the study area will change over time, but that, as a general rule, appraisers should assume a constant number of households over time.

3.2.2 Other than as a result of the residential development that is being considered for the Sterling Industrial Estate, which would be accessed via the Kings Road Link, it is considered unlikely that the population within the study area will changed significantly. And given that the proposed dwellings would not be occupied until after the Kings Road Link would have been constructed, and would not experience any change in noise levels, therefore, it is not necessary to include them within this assessment.

3.3 DWELLINGS CONSIDERED

3.3.1 In keeping with the links identified as experiencing potentially significant increases and decreases in traffic flows, the following dwellings have been included in the assessment. The dwellings are identified by the black and white circles. Some dwellings are marked individually, whilst others, particularly the various blocks of flats, are marked by a single circle.

Figure 3.2: Dwellings considered



4 Source Data

4.1 ROAD TRAFFIC DATA

4.1.1 The road traffic data has been provided by WSP UK Ltd.

4.1.2 As required by WebTAG, the data have been provided for the future with (do something) and without (do minimum) scenarios, and for the Year of Opening, 2012, and for the worst case future year after the opening of the scheme, the Design Year, taken to be 2026.

4.1.3 The AAWT (18 hour) flows (and associated percentage heavy goods vehicles and average speeds) for the key roads are as follows:

Table 4.1: Traffic Data for the Year of Opening Do-Minimum Scenario (no Kings Road Link)

Link	18 Hour AAWT	%HGV	Average Speed
Bone Lane (east of Boundary Road)	6997	2.2	31
Bone Lane (north of Hambridge Road)	6651	0.6	28
Boundary Road (north of Queen's Road)	4788	1.5	42
Boundary Road (one way) (north of Kings Road)	2532	0.0	30
Boundary Road (one way) (south of Mill Lane)	2368	0.2	43
Boundary Road south (north of Stanley Road)	4907	1.4	10
Boundary Road south (railway over bridge)	4907	1.4	12
Boundary Road south (south of Hambridge Road)	4907	1.4	13
Boundary Road south (south of Queen's Road)	2708	0.3	41
Hambridge Road (east of Boundary Road)	13087	2.2	42
Hambridge Road (west of Bone Lane)	13083	2.1	41
Hambridge Road (west of Junction Terrace)	13103	2.1	43
Hectors Way	3951	0.1	14
Kings Road (one way) (Link Road to Boundary Road)	N/A	N/A	N/A
Kings Road (one way) (east of Hectors Way)	10412	2.1	26
Kings Road (at junction with Winchcombe Road rndabt)	11529	1.9	48
Kings Road (west of Hectors Way)	2035	0.3	14
Kings Road (west of Link Road)	10182	2.2	41
Link Road (Kings Road to new dev. access)	N/A	N/A	N/A
Link Road (New dev. access to Scats access)	N/A	N/A	N/A
Link Road (Existing roundabout to Scats access)	850	0.0	18
Mill Lane (one way) (east Winchcombe Road roundabout)	7846	2.0	42
Mill Lane (one way) (west of Boundary Road)	8011	1.9	45
Winchcombe Road	41918	1.9	64
A339	42408	2.2	58

Table 4.2: Traffic Data for the year of Opening Do-Something Scenario

Link	18 Hour AAWT	%HGV	Average Speed
Bone Lane (east of Boundary Road)	4364	0.1	31
Bone Lane (north of Hambridge Road)	4269	3.3	28
Boundary Road (north of Queen's Road)	5607	1.5	42
Boundary Road (one way) (north of Kings Road)	1485	0.1	28
Boundary Road (one way) (south of Mill Lane)	1324	0.4	44
Boundary Road south (north of Stanley Road)	5480	1.5	9
Boundary Road south (railway over bridge)	5365	1.5	12
Boundary Road south (south of Hambridge Road)	5365	1.5	12
Boundary Road south (south of Queen's Road)	3383	0.2	40
Hambridge Road (east of Boundary Road)	15592	2.8	41
Hambridge Road (west of Bone Lane)	15719	2.6	41
Hambridge Road (west of Junction Terrace)	15753	2.6	42
Hectors Way	12100	3.0	15
Kings Road (one way) (Link Road to Boundary Road)	3972	3.7	31
Kings Road (one way) (east of Hectors Way)	3287	0.0	14
Kings Road (at junction with Winchcombe Road rndabt)	14946	2.4	48
Kings Road (west of Hectors Way)	14946	2.4	25
Kings Road (west of Link Road)	3054	0.0	15
Link Road (Kings Road to new dev. access)	11043	3.2	40
Link Road (New dev. access to Scats access)	11266	3.2	39
Link Road (Existing roundabout to Scats access)	11554	3.1	25
Mill Lane (one way) (east Winchcombe Road roundabout)	4162	0.0	15
Mill Lane (one way) (west of Boundary Road)	4323	0.0	16
Winchcombe Road	41577	1.9	64
A339	42093	2.3	58

Table 4.3: Traffic Data for the 2026 Do-Minimum Scenario (no Kings Road Link)

Link	18 Hour AAWT	%HGV	Average Speed
Bone Lane (east of Boundary Road)	8190	2.0	31
Bone Lane (north of Hambridge Road)	7552	0.7	27
Boundary Road (north of Queen's Road)	4770	1.2	42
Boundary Road (one way) (north of Kings Road)	8030	0.0	30
Boundary Road (one way) (south of Mill Lane)	7850	0.1	42
Boundary Road south (north of Stanley Road)	4689	1.3	9
Boundary Road south (railway over bridge)	4680	1.3	11
Boundary Road south (south of Hambridge Road)	4680	1.3	13
Boundary Road south (south of Queen's Road)	3686	0.4	41
Hambridge Road (east of Boundary Road)	20053	1.2	44
Hambridge Road (west of Bone Lane)	19416	1.3	41
Hambridge Road (west of Junction Terrace)	20053	1.2	45
Hectors Way	8125	0.1	13
Kings Road (one way) (Link Road to Boundary Road)	0	0.0	0
Kings Road (one way) (east of Hectors Way)	14001	1.3	26
Kings Road (at junction with Winchcombe Road rndabt)	33089	1.1	48
Kings Road (west of Hectors Way)	7066	0.2	8
Kings Road (west of Link Road)	13650	1.4	39
Link Road (Kings Road to new dev. access)	0	0.0	0
Link Road (New dev. access to Scats access)	0	0.0	0
Link Road (Existing roundabout to Scats access)	951	0.0	18
Mill Lane (one way) (east Winchcombe Road roundabout)	13942	1.2	39
Mill Lane (one way) (west of Boundary Road)	14201	1.2	44
Winchcombe Road	57545	1.8	64
A339	52190	2.0	61

Table 4.4: Traffic Data for the 2026 Do-Something Scenario

Link	18 Hour AAWT	%HGV	Average Speed
Bone Lane (east of Boundary Road)	5958	0.2	31
Bone Lane (north of Hambridge Road)	5593	2.8	28
Boundary Road (north of Queen's Road)	6013	1.5	42
Boundary Road (one way) (north of Kings Road)	3382	0.2	13
Boundary Road (one way) (south of Mill Lane)	3223	0.4	43
Boundary Road south (north of Stanley Road)	5781	1.6	7
Boundary Road south (railway over bridge)	5781	1.6	10
Boundary Road south (south of Hambridge Road)	5781	1.6	11
Boundary Road south (south of Queen's Road)	4831	0.5	41
Hambridge Road (east of Boundary Road)	21573	2.1	35
Hambridge Road (west of Bone Lane)	21022	2.1	41
Hambridge Road (west of Junction Terrace)	21573	2.1	44
Hectors Way	21479	1.7	22
Kings Road (one way) (Link Road to Boundary Road)	10386	1.7	32
Kings Road (one way) (east of Hectors Way)	4808	0.0	10
Kings Road (at junction with Winchcombe Road rndabt)	25263	1.5	48
Kings Road (west of Hectors Way)	26525	1.4	3
Kings Road (west of Link Road)	4452	0.0	15
Link Road (Kings Road to new dev. access)	12855	1.5	40
Link Road (New dev. access to Scats access)	17862	2.1	37
Link Road (Existing roundabout to Scats access)	18185	2.0	24
Mill Lane (one way) (east Winchcombe Road roundabout)	4463	0.0	15
Mill Lane (one way) (west of Boundary Road)	4698	0.0	16
Winchcombe Road	57421	1.8	64
A339	53222	2.0	61

4.2 NON-ROAD TRAFFIC DATA

4.2.1 A scaled three-dimensional noise model has been created using DataKustic's CadnaA mapping software based on the following datasets:

- Integrated Transport Network® (ITN), from which road centre lines were extracted.
- OS MasterMap® base mapping, from which the building outlines were obtained, along with parcels of land with reflective (rather than absorptive) qualities.

4.2.2 The CadnaA noise model has been set-up in the following way:

Roads

- Each section of Link Road and the relevant existing road has been allocated a traffic flow, heavy duty vehicle percentage and speed in line with the data provided and the requirements of CRTN.

All roads, including the Link Road, have been assumed to have a bituminous, impervious surface (i.e. standard hot rolled asphalt (HRA)) with a texture depth of 2mm.

Buildings

- All building heights have been estimated from web-based photography, based on the number of storeys. A height of 3m per floor has been assumed, with a further 2m for pitched roofs.

Ground cover

- With the exception of the ground between the Kings Road Link and the nearest dwellings in Gordon Road, which has been assumed to be acoustically absorbent, all ground cover has been assigned as acoustically reflective.

4.3 RAIL TRAFFIC NOISE

4.3.1 As described in the following section, the railway is a significant source of noise in the vicinity of the Kings Road Link. Accordingly, the noise from the trains has been included in the model based on the result of the baseline noise survey, which are described in the following section.

4.4 SCATS DELIVERY NOISE

4.4.1 As described in the following section, deliveries to Scats – the large retail unit – were clearly audible at the nearest dwellings; although, this was primarily as a result of the reversing alarm on the store's forklift truck, which was also used outside of deliveries. However, the effect that these activities have on the overall daily noise levels – the 18 hour period between 06:00 hours and midnight being relevant to the WebTAG assessment – is anticipated to be limited, such that the noise from these activities have not been included in the model.

5 Existing Conditions

5.1 BASELINE NOISE SURVEY

5.1.1 Whilst the majority of the assessment is necessarily based on predictions made using the 3D noise model, it was appropriate to establish the existing, baseline noise levels at a number of positions in the vicinity of the proposed Kings Road Link, which have been used to verify the model.

5.1.2 Accordingly, the noise levels were undertaken as follows.

Measurement positions

5.1.3 The survey comprised a combination of longer-term unattended measurements (Position 1) and short-term attended measurements (Positions 2-5). The longer-term measurements commenced at approximately 11:10 hours on Monday 25th June 2012 and finished 25½ hours later at approximately 12:40 hours on Tuesday 26th. The first of the short-term measurements (Position 2) was undertaken on the Monday, for a three hour period between 11:30 and 14:30 hours, whilst the remaining measurements were undertaken on the Tuesday, between 11:30 and 12:40 hours, and were 15 minutes in duration each.

5.1.4 The measurement locations are described as follows and shown in Figure 5.1 below. A description of the noise sources audible at the measurement locations is also provided below.

- **Position 1 (+24-hour):** On the boundary of Scats overflow car park, at the foot of the embankment below Gordon Road. The microphone was mounted on a pole, above the metal fencing, such that it was approximately 2m above the ground and within free-field conditions. This location was selected as representing a secure locations in order to obtain continuous day and night-time noise levels in the vicinity of the nearest dwellings to the Kings Road Link.

  Noise Sources: The trains were observed to be the most significant source of noise in the area. The noise from the regular deliveries to Scats were also clearly audible (both at this location and the nearest dwellings), particularly the reversing alarm (“bleeper”) on the store’s (electric) forklift truck.

- **Position 2 (3-hour):** Outside 148 Kings Road. The microphone was mounted on a tripod such that it was approximately 1.5m above the ground, 1m from the building façade and 5m from the nearest kerb (but with the passing traffic being a further 3m away). This location was selected in order to obtain noise levels outside a typical property along Kings Road.

  Noise Sources: The road traffic on Kings Road was the dominant (and only) source of noise at this location.

- **Position 3 (15min):** Outside the flats (Nos.40-50) in Northway (on the other side of the railway). The microphone was mounted on a tripod such that the microphone was approximately 1.5m above the ground, 4.5m from the flats, and thus within free-field conditions. This location was selected in order to gain an appreciation of the noise levels at some of the nearest dwellings to the Kings Road Link on the other side of the railway.

  Noise Sources: The trains were observed to be the most significant source of noise at this location. The noise from a delivery to Scats was audible, together with distant building works, noise from within the flats and leaves rustling.

- **Position 4 (15min):** Outside No.3 Railway Road (on the other side of the railway). The microphone was mounted on a tripod such that the microphone was approximately 1.5m above the ground, 4.5m from the houses, and thus within free-field conditions. Like Position 3, this location was selected in order to gain an appreciation of the noise levels at some of the nearest dwellings to the Kings Road Link on the other side of the railway.

  Noise Sources: The trains were observed to be the most significant source of noise at this location. The noise from a delivery to Scats was audible, together with distant road traffic and leaves rustling.

- **Position 5 (15min):** Outside Five Ham Villas, Gordon Road. The microphone was mounted on a tripod such that the microphone was approximately 1.5m above the ground, 5m from the houses, and thus within free-field conditions. This location was selected, in addition to Position 1, in order to gain an appreciation of the noise levels outside the nearest dwellings to the Kings Road Link.

  Noise Sources: The trains were observed to be the most significant source of noise at this location. The noise from a delivery to Scats was clearly audible, together with HGV movements associated with Sainsbury's and distant road traffic.

Weather conditions

5.1.5 The conditions throughout the survey period were conducive to the measurement of noise, being dry and with wind speeds less than 5m/s.

Measurement equipment

5.1.6 The equipment used during the survey and at the positions described above is detailed in the following table.

Table 5.1: Noise monitoring equipment

Position(s)	Equipment (WSP ID)	Make	Model	Serial Number
1	Sound Level Meter (Solo 3)	01dB	Solo Master	10712
	Pre-amplifier	01dB	Pre 21 S	11447
	½ inch condenser microphone	Microtech Gefell GmbH	MCE212	142836
2-5	Sound Level Meter (Solo 4)	01dB	Solo Master	10706
	Pre-amplifier	01dB	Pre 21 S	11662
	½ inch condenser microphone	Microtech Gefell GmbH	MCE212	57729
All	Acoustic calibrator (CAL21 C)	01dB	Cal 21	51031263

5.1.7 The meters were calibrated before and after each set of measurements using the acoustic calibrator detailed above, which itself had been calibrated within the preceding twelve months by a UKAS accredited calibration laboratory. No significant drift in the calibration level was found.

Measurement results

5.1.8 At each location, the $L_{Aeq,T}$, $L_{A10,T}$, $L_{90,T}$ and L_{AFmax} noise indices were measured for the duration of each measurement.

5.1.9 The full set of measurement results are presented in Appendix B. The noise levels of most interest are the $L_{Aeq,T}$ noise levels, particularly those over the 18 hour period between 06:00 and midnight, as

adopted by WebTAG. The $L_{Aeq,18hr}$ can be determined directed from the measurements at Position 1 (by using the noise levels between 12:00 hours and midnight on day two of the survey and those between 06:00 and 12:00 hours on day one). The measurements at Position 2 were undertaken in accordance with the 'shortened measurement procedure' described in CRTN, and can be used, therefore, to estimate the equivalent 18 hour noise level (by a combination of the guidance in both CRTN and WebTAG). This has been achieved by arithmetically averaging the three $L_{A10,1h}$ noise levels, subtracting 1 dB (to represent the $L_{A10,18h}$), then a further 2.5 dB (to represent the $L_{Aeq,18h}$).

5.1.10 In terms of the measurements at Positions 3, 4 and 5, the equivalent 18 hour noise levels can be determined by comparison with the noise levels at Position 1. It can reasonably be assumed that the hourly variations in noise levels at Position 1 will be similar to those at Positions 3, 4 and 5, where the trains were also the dominant source of noise.

5.1.11 The resultant $L_{Aeq,18h}$ noise levels are presented in Table 5.2 below.

Table 5.2: Summary of baseline noise levels

Position	Existing $L_{Aeq,18h}$ Noise Levels, dB
1. On Scats' boundary	60.1
2. Outside houses in Kings Road	72.3
3. Outside flats in Northway	53.9
4. Outside houses in Railway Road	68.4
5. Outside houses in Gordon Road	53.3

6 Predicted Noise Levels

6.1 NOISE CONTOUR PLOTS

6.1.1 It is not a requirement of WebTAG to produce noise contour plots (or noise maps, as they also known); however, apart from providing a visual representation of the predicted noise levels, they also serve as a useful checking tool.

6.1.2 Accordingly, the noise contour plots for the four key scenarios are presented below. The plots are in terms of $L_{A10,18h}$ (dB) noise levels 4m above the ground. WebTAG does not state at what height the noise levels should be predicted; however, based on guidance in the Design Manual for Roads and Bridges document HD 213/11, and the fact that all dwellings in question comprise at least two storeys, a height of 4m is typically adopted. This is considered to be worse case since the effect of topography any (existing or proposed) screening will typically be less at 4m than at 1.5m, which is otherwise used to represent the ground floor.

Figure 6.1: Noise contour plot: Existing Situation ($L_{A10,18h}$ (dB) at 4m above the ground)

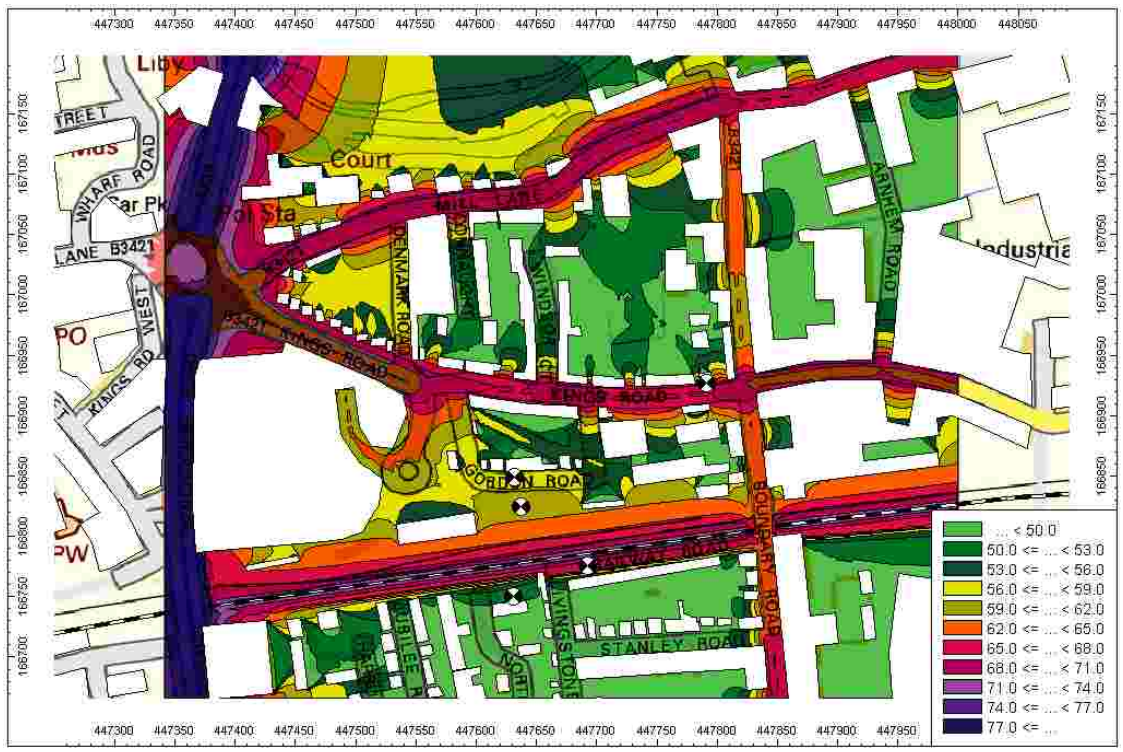


Figure 6.2: Noise contour plot: Future Situation (no Kings Link Road) ($L_{A10,18h}$ (dB) at 4m above the ground)

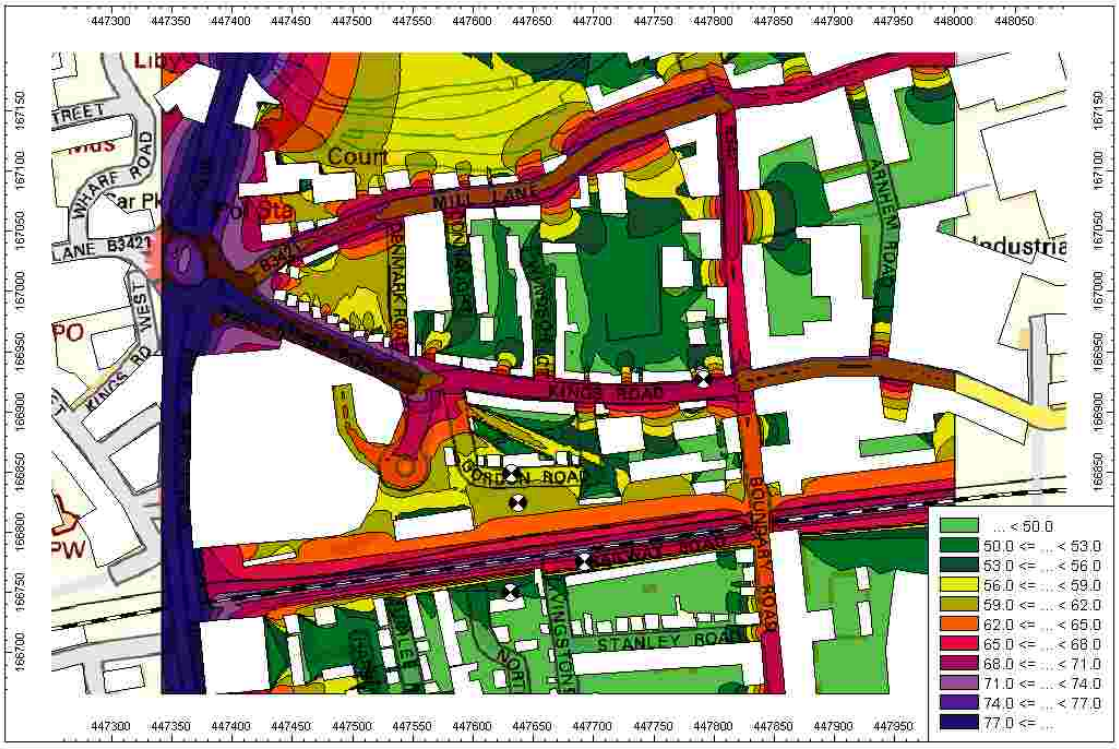


Figure 6.3: Noise contour plot: Near Future Situation with Kings Link Road ($L_{A10,18h}$ (dB) at 4m above the ground)

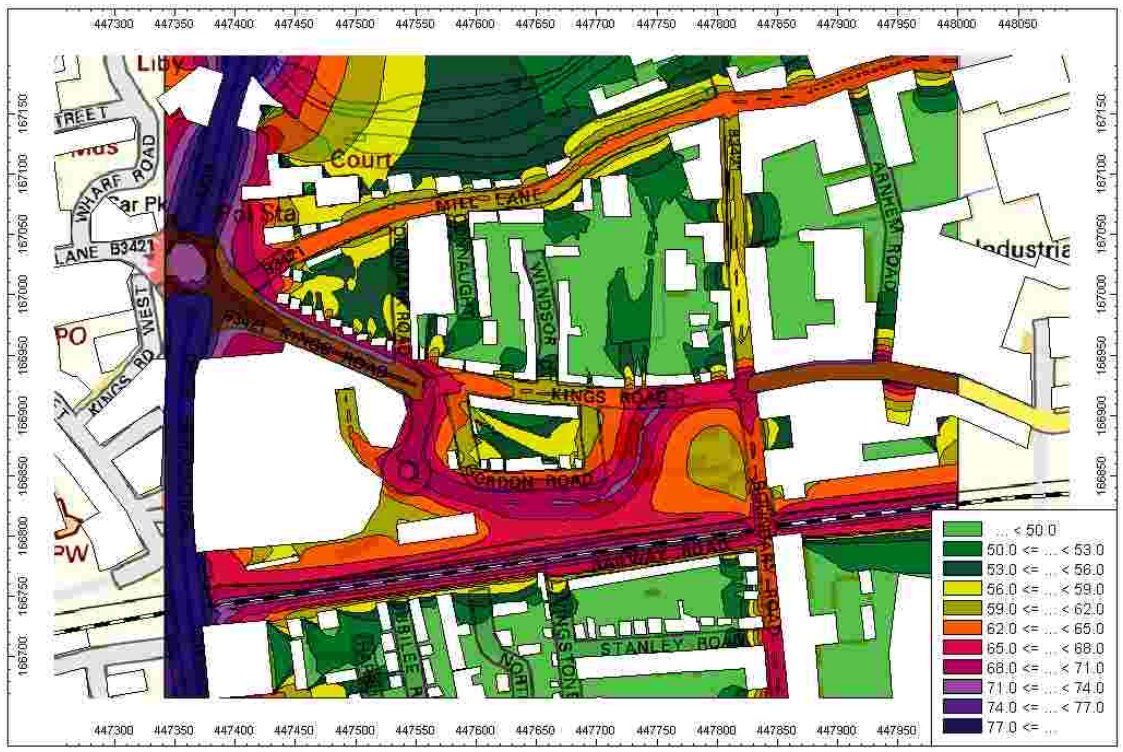
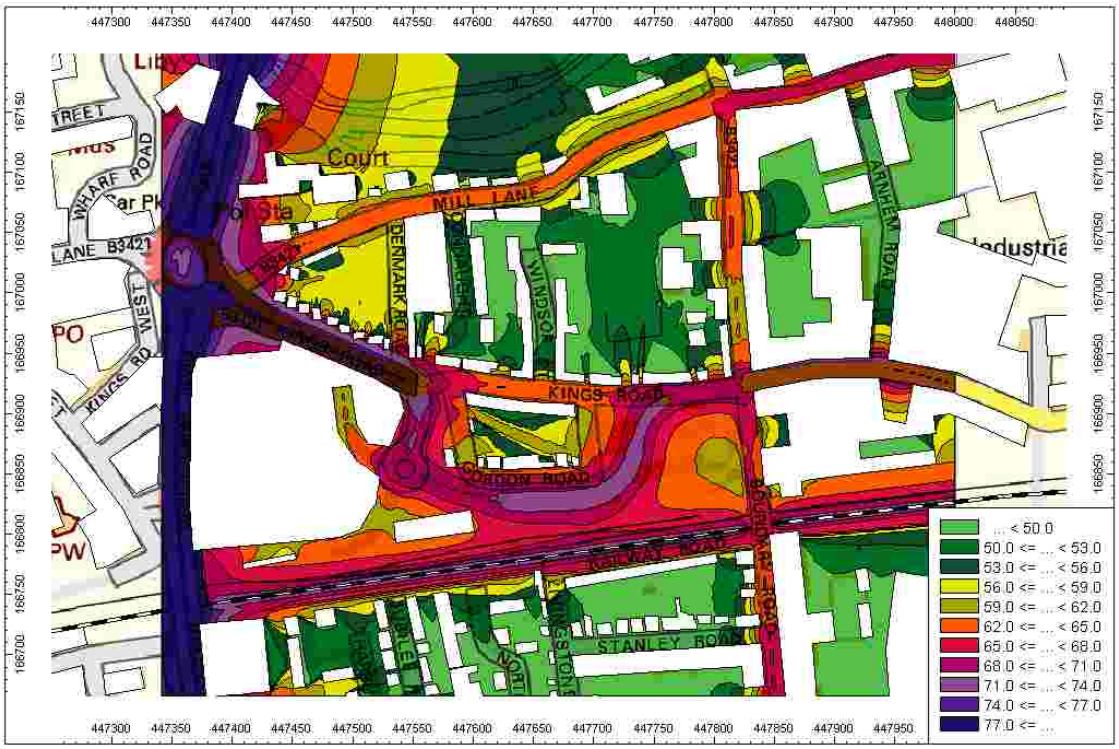


Figure 6.4: Noise contour plot: Distant Future Situation with Kings Link Road ($L_{A10,18h}$ (dB) at 4m above the ground)



6.1.3 In the latter two plots, showing the near and distant future scenarios with the scheme, the introduction of Kings Road Link in the middle of the lower half of the figures can clearly be seen, as can the reduction in noise levels along the mid-section of Kings Road.

6.1.4 It is also possible within the modelling software to compare the contour plots, and produce plots showing the 'change' in noise levels. This has been done for the following three scenarios:

- Existing Vs Distant Future without the Scheme
- Existing Vs Near Future with the Scheme
- Existing Vs Distant Future with the Scheme

6.1.5 The resultant figures are presented below.

Figure 6.5: Noise 'change' contour plot: Existing Vs Distant Future without Scheme (dB)

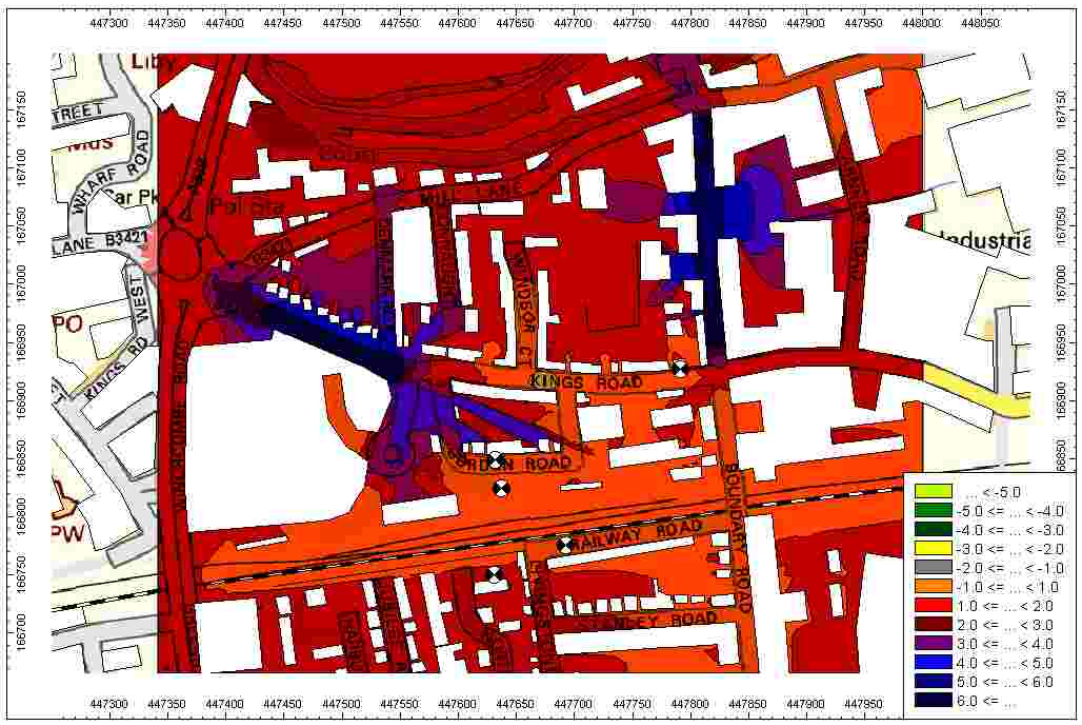


Figure 6.6: Noise 'change' contour plot: Existing Vs Near Future with Scheme (dB)

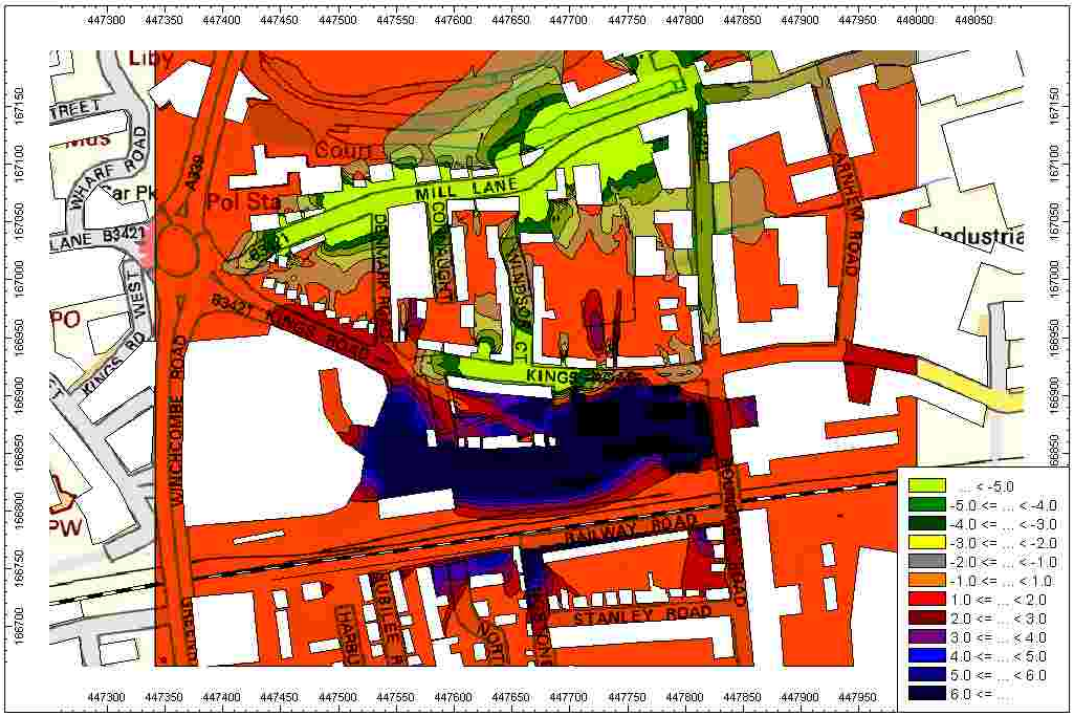
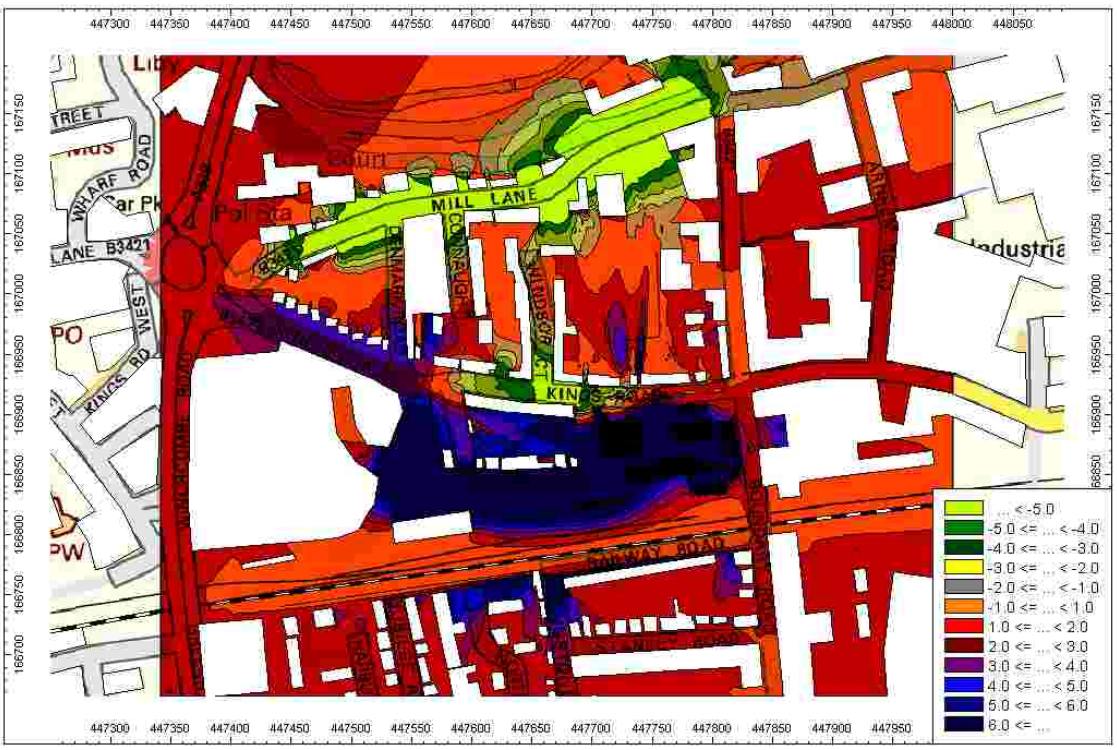


Figure 6.7: Noise 'change' contour plot: Existing Vs Distant Future with Scheme (dB)



6.1.6 From Figure 6.5, which shows the predicted situation were the scheme not to go ahead, it can been seen that increases in road traffic noise levels are anticipated throughout the study area, but particularly in the vicinity of Kings Road, as it passes the superstore, Hector Way and the northern section of Boundary Way (between Kings Road and Mill Lane).

6.1.7 From the latter two figures the increases in noise levels in the vicinity of Kings Road Link, and the decreases in noise levels on Mill Lane and the mid-section of Kings Road, can be clearly seen. The differences between these two Figures – which indicate how, with the scheme in place, the noise levels are predicted to change over time, are more subtle. As indicted by Figure 6.5, however, it can been seen that, in particular, noise levels are predicted to increase along the section of Kings Road as it passes the superstore, and on the northern section of Boundary Road.

6.1.8 The significance of the predicted changes in noise levels is considered in the following subsections.

6.2 TAG NOISE SPREADSHEET

6.2.1 In addition to producing the noise contour plots, the modelling software has been used to predict the noise levels outside each façade of each residential property at a height of 4m above the ground. The highest noise levels at each dwelling have then been determined for the four scenarios – 2014 do minimum and do something and 2029 do minimum and do something – and arranged in a spreadsheet into the WebTAG 3 dB bands. This information has then been entered into the TAG Noise Spreadsheet and a copy of which is presented in the tables below.

Table 6.1: TAG Noise Spreadsheet Part 1

APPRAISAL - NOISE POLLUTION

Proposal Opening Year:	2012
Average Household Size:	2.36
Project (Road or Rail):	Road

No. of households experiencing 'Do Minimum' & 'Do Something' noise levels (given in dB_{Leq}) in Opening Year

Do Minimum \ Do Something	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45	1													
45-47.9	7	2												
48-50.9		1	2	1										
51-53.9		11		7	1									
54-56.9						51	18							
57-59.9			2	7	9	4	12							
60-62.9				1	2	2	9	1						
63-65.9						103	42	22	4					
66-68.9						21	42		5					
69-71.9														
72-74.9														
75-77.9														
78-80.9														
81+														

Table 6.2: TAG Noise Spreadsheet Part 2

No. of households experiencing 'Do Minimum' & 'Do Something' noise levels (given in dB_{Leq}) in 14th Year After Opening

Do Minimum \ Do Something	<45	45-47.9	48-50.9	51-53.9	54-56.9	57-59.9	60-62.9	63-65.9	66-68.9	69-71.9	72-74.9	75-77.9	78-80.9	81+
<45														
45-47.9	4	2												
48-50.9		3	2	3										
51-53.9		1	10	1										
54-56.9				1	7	41	18							
57-59.9				1			12							
60-62.9					9		18							
63-65.9						11	96	19						
66-68.9						38	66	17	1					
69-71.9									1	8				
72-74.9														
75-77.9														
78-80.9														
81+														

Net Present Value of Noise of Proposal (60 Year Period)	£1,511,938.01	*positive value reflects a **net benefit** (i.e. noise reduction)
Estimated Population Annoyed (Do-Minimum):	**220.6848179**	
Estimated Population Annoyed (Do-Something):	**167.8239342**	
Net Noise Annoyance Change in 15th Year After Opening (no. of people):	-53	*positive value reflects an **increase** in people annoyed by noise

6.2.2 A red box has been added to each table to highlight the figures that indicate the number of people that are with the same 3 dB band with and without the scheme, for whom, therefore, the effects are limited. The figures below this diagonal line represent the numbers of people for whom the noise levels reduce with the scheme such that they are now in a lower 3 dB band. Although, where the figure is only one cell left of the line, it doesn't necessarily mean that the reduction in noise levels is any greater than for those than that haven't changed band. The figures above the line represent the numbers of people for whom the noise levels increase with the scheme such that they are now in a higher 3 dB band.

6.2.3 It should be noted that the figures presented in the TAG Noise Spreadsheet are representative of the number of people within the adopted study area, which are determined by multiplying the number of dwellings in the 3 dB bands by 2.36. It should also be noted that the noise annoyance change is a 'net' figure, based on the overall effects throughout the study area.

6.2.4 See Section 6.6 *Appraisal Summary Table* where the results are summarised.

6.3 TAG WORKSHEET 1

6.3.1 In order to provide information required for the AST, it is also necessary to complete Worksheet 1 *Environment: Noise - Plan Level*. Worksheet 1 is reproduced at Table 6.3 below.

Table 6.3: Worksheet 1: Calculation of Estimated Population Annoyed (EPA) by Noise

Option Name: Kings Road Link Year: 2012 Mode: Road					
Noise Level ($L_{Aeq,18hr}$ dB))	Opening Year			14th Year After Opening	
	Estimated Population Exposed – Without scheme	Estimated Population Exposed – With scheme		Estimated Population Exposed – Without scheme	Estimated Population Exposed – With scheme
<45	17	101		0	85
45<48	118	101		85	83
48<51	97	66		163	35
51<54	57	54		38	113
54<57	97	50		113	9
57<60	116	227		45	158
60<63	198	264		170	361
63<66	172	31		208	47
66<69	50	26		73	7
69<72	0	0		26	21
72<75	0	0		0	0
75<78	0	0		0	0
78<81	0	0		0	0
81+	0	0		0	0

6.3.2 See also Section 6.6 *Appraisal Summary Table*.

6.4 APPRAISAL SUMMARY TABLE

Quantitative comment

6.4.1 The estimated number of people who are likely to be annoyed in the longer term (in the 14th year after the year of opening):

- in the do-minimum scenario: 220; and
- in the do-something scenario: 167

Qualitative comment

6.4.2 Noise levels at negatively affected properties will change by up to 4.8 dB as a result of the scheme, which represents a significant impact; although, for 85% of the dwellings within the study area, increases will be less than 3 dB, representing a minor impact; for 58%, the increases will be less than 1 dB; and for 56%, there will be no increase or a reduction in noise levels. Accordingly, for the 15% minority it will be appropriate for additional mitigation measures to be investigated. Noise levels at positively affected properties will reduce by up to 8.1 dB, which represents a significant benefit.

6.4.3 No properties are predicted to experience noise levels over 80 dB in any of the scenarios. A number of properties are predicted to experience noise levels over 68 dB ($L_{Aeq,18h}$, in both future-year scenarios), and changes 1 dB or more, and so it is likely that some dwellings could be eligible for noise insulation under the terms of the Noise Insulation Regulations.

6.4.4 Other than the dwellings considered within the assessment, there are considered to be no other receptors particularly sensitive to noise that would be adversely affected by the proposed scheme.

Overall Assessment Score

- The net difference in the estimated population who are likely to be annoyed in the longer term as a result of the scheme compared to the do-minimum scenario in the fourteenth year is -53 (representing a slight decrease in people annoyed)
- The estimated present value of the change in noise (at 2002 prices) discounted over the 60 year appraisal period is £1,511,938.01 (representing a net benefit following a net reduction in noise levels)

7 Mitigation Measures

7.1 ROAD HEIGHT

7.1.1 Were it possible to place the Kings Road Link in a significant cutting, then some degree of attenuation would be achieved by the sides of the cutting acting as a barrier. It would also make any barrier on top of the cutting more effective. However, given the scale of the scheme and that access is required at a couple of locations along the Kings Road Link, placing it in cutting is not considered to be an option.

7.2 ROAD SURFACE

7.2.1 Owing to the relatively low speeds that the vehicles will be travelling on the Kings Road Link, whereby engine and exhaust noise will predominate, as opposed to noise from the interaction of the tyres with the road surface, there is little benefit to be gained from using a quiet road surface.

7.3 SCREENING

7.3.1 The most effective and viable way of reducing noise levels is by introducing additional screening (as opposed to placing the road in cutting as discussed above), which would typically be in the form of a noise barrier (or acoustic fence) or earth bunding, or a combination of the two; although, owing to limited space, it is assumed earth bunds can be ruled out in this instance, and that acoustic fencing represents the only option in this regard.

7.3.2 Given that the dwellings in Gordon Road are located above the Kings Road Link, a barrier immediately alongside the road is unlikely to be very effective. Acoustically, the only viable location for such a barrier is along the edge of Gordon Road, at the top of the existing embankment. The erection of a barrier would require suitable permission, and would need to be structurally sound, which may be harder to achieve in such a location. It would also reduce the residents' view to the south. Such a barrier would need careful consideration, therefore, by others, and so is presented here based on its acoustic merits alone.

7.3.3 The barrier would need to be acoustically absorptive on the road-side surface, in order to limit the degree of noise reflected back towards the properties on the other side of the railway.

7.3.4 The location of the barrier is shown in the following figure.

Figure 7.1: Proposed noise barrier

7.3.5 The resultant noise levels at the worst affected receptors are shown in the table below. All those receptors predicted to experience a short-term increase of 3 dB or more are included in the table. The receptors are arranged in order of maximum increase in noise levels over the do-minimum noise levels.

Table 7.1: Predicted noise levels worst affected dwellings with and without the proposed 2m barrier

Receptor	Do-Something Façade Noise Levels, $L_{A10,18h}$, dB (the increase over the Do-Minimum is shown in brackets)	
	No Barrier	With 2m Barriers
Charial, Gordon Road	60.1 (4.8)	55.4 (0.1)
Providence Cottage, Gordon Road	60.0 (4.1)	54.8 (-1.1)
Hill View, Gordon Road	60.3 (4.1)	54.9 (-1.3)
1 Railway Road	57.8 (3.8)	57.8 (3.8)
2 Railway Road	57.9 (3.8)	57.9 (3.8)
Flats 1-5 Roman Court, Gordon Road (5no.)	60.4 (3.8)	54.9 (-1.7)
Flats 1-6 Ham Villas, Gordon Road	60.9 (3.8)	55.3 (-1.8)
Highland Villa, Gordon Road	60.3 (3.8)	54.7 (-1.8)
3 Railway Road	57.9 (3.7)	57.9 (3.7)
4 Railway Road	58.0 (3.7)	58.0 (3.7)
5 Railway Road	58.0 (3.7)	58.0 (3.7)
6 Railway Road	58.1 (3.7)	58.1 (3.7)
4 Ham Villas, Gordon Road	60.9 (3.7)	55.2 (-2.0)

Continued overleaf/…

Table 7.1: Predicted noise levels worst affected dwellings with and without the proposed 2m barrier continued/…

Receptor	Do-Something Façade Noise Levels, $L_{Aeq,18h}$, dB (the increase over the Do-Minimum is shown in brackets)	
	No Barrier	With 2m Barriers
3 Ham Villas, Gordon Road	60.9 (3.7)	55.1 (-2.1)
2 Ham Villas, Gordon Road	60.9 (3.7)	55.1 (-2.1)
1 Ham Villas, Gordon Road	60.9 (3.7)	55.1 (-2.1)
7 Railway Road	58.1 (3.6)	58.1 (3.6)
4 Gordon Road	60.8 (3.6)	55.1 (-2.1)
Shortland Villa, Gordon Road	60.7 (3.6)	55.1 (-2.0)
8 Railway Road	58.1 (3.5)	58.1 (3.5)
30-50 Northway (20no.)	51.6 (3.4)	51.6 (3.4)
10 Railway Road	58.2 (3.4)	58.2 (3.4)
9 Railway Road	58.1 (3.4)	58.1 (3.4)
13 Railway Road	58.2 (3.3)	58.2 (3.3)
11 Railway Road	58.2 (3.3)	58.2 (3.3)
12 Railway Road	58.2 (3.3)	58.2 (3.3)
14 Railway Road	58.2 (3.2)	58.2 (3.2)
15 Railway Road	58.1 (3.1)	58.1 (3.1)
16 Railway Road	58.1 (3.0)	58.1 (3.0)

7.3.6 It can be seen that the barrier provides worthwhile screening to the properties in Gordon Road, such that there are now negative values shown in brackets in the majority of instances, which indicates that noise levels would actually be slightly lower than they are currently. This would be as a result of the barrier also screening noise from the trains, as it will the noise from Scat deliveries, but which haven't been included in the model.

7.3.7 It can also be seen that, crucially, the barrier has no effect on the noise levels at the properties on the other side of the railway. This is because it has been assumed that such a barrier would be acoustically absorptive on the road-side surface, in order to limit the degree of reflected noise.

7.3.8 Should such a barrier not be feasible, the only remaining measure would be to fit the effected properties with noise insulation solutions, and this is discussed further below.

7.4 NOISE INSULATION

7.4.1 Worthwhile noise reduction within dwellings can be achieved through the installation of secondary glazing and/or mechanical ventilation (so that windows can be kept closed and the occupants have the facility to achieve sufficient levels of ventilation). Whilst the dwellings listed in the table above wouldn't be eligible under the terms of the Noise Insulation Regulations on account of the noise levels be less than 68 dB ($L_{A10,18hr}$), such that the Council would not, therefore, have a duty to offer secondary glazing or mechanical ventilation, such measures do remain an option.

7.4.2 There are, however, some drawbacks associated with secondary glazing and mechanical ventilation. The additional glazing – typically in the form of sliding windows, 100-200mm from the existing window (on the inside) – takes up the space of the window sill, and can be awkward to clean, whilst the mechanical ventilation units will emit some noise of their own, and will require mains power and some degree of maintenance.

7.4.3 They also do not help in terms of external noise levels, such as within gardens and other amenity space; although, most of such spaces associated with the worst effected dwellings are located away from the Kings Road Link.

7.5 LAND COMPENSATION ACT

7.5.1 Under the Land Compensation Act, certain landowners in certain circumstances may be paid compensation in respect of the depreciation in the value of their land or property by certain physical factors, i.e. noise, vibration, smell, fumes, smoke, artificial lighting, etc., caused by the use of a new or altered highway, aerodrome or other public works. The Land Compensation Act does not cover intensification of use of an existing road where no alterations have taken place.

7.5.2 Claims should be made within a limited period of time that comes into force one year after the opening of the new or altered road. The assessment of the change in noise level should be based on the traffic flows one year after the opening of the road.

7.5.3 No specific criteria are set against which the claims are assessed. The decision on eligibility for compensation, and the level of compensation to be paid, rests with the District Valuer's office.

7.5.4 The provisions under Part 1 of the Land Compensation Act are applicable in addition to any noise insulation that may have been offered, though this may be taken into account by the District Valuer in the decision making process.

8 Conclusions

8.1 WEBTAG

8.1.1 WSP has undertaken a Plan level assessment of the proposed Kings Road Link in accordance with the Transport Analysis Guidance Unit 3.3.2: The Noise Sub-Objective. The only deviation from the guidance was to adopt a smaller study area, but which is considered to be in keeping with the scale of scheme.

8.1.2 The assessment, therefore, has been undertaken using a combination of measurements and predictions, and through the use of the automated spreadsheets provided on the DfT website, whereby the likely positive and negative noise effects, as well as the effect on house prices, associated with the proposed scheme, have been determined.

8.1.3 The results of the assessment are presented in Section 6 of this report. It has been found that whilst there are both positive and negative noise effects associated with the scheme, on balance, in terms of the dwellings falling within the study area, there is predicted to be a reduction in the number of people annoyed by noise – the reduction is equivalent to 53 people. There is also, again on balance, predicted to be an increase in property prices to a total value of £1,511,938.01.

8.1.4 No properties are predicted to experience noise levels over 80 dB in any of the scenarios. A number of properties are predicted to experience noise levels over 68 dB, however (by the year 2026, with and without the scheme), and changes 1 dB or more, such that there a chance some dwellings may be eligible for noise insulation under the terms of the Noise Insulation Regulations.

8.2 MITIGATION

8.2.1 It has been found that worthwhile reductions in noise levels at the nearest and worst effected dwellings in Gordon Road would be achieved with the erection of a 2m high barrier along the top of the existing embankment. Such a barrier would need to acoustically absorptive on the roadside surface in order to limit the noise reflected back towards the dwellings on the other side of the railway.

8.2.2 Should such a barrier not be feasible, and which wouldn't benefit the dwellings in Railway Road, which are also predicted to experience potentially significant increases in noise levels, then the only remaining measure is considered to be to install noise insulation equipment within the dwellings themselves, in the form of secondary glazing and mechanical ventilation. Whilst none of the worst effected dwellings would qualify for noise insulation under the terms of the Noise Insulation Regulations, it is considered that noise insulation remains a consideration nonetheless.

Appendices

Appendix A Glossary of Terminology

Noise is defined as unwanted sound. Human hearing is 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, which reduces the importance of lower and higher frequencies in a similar manner to human hearing.

The 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 Glossary explains the acoustic terminology that is used in this Report.

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 found commonly in the environment is given in Table A1.

Table A1: Typical sound levels found in the environment

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

The subjective response to a noise is dependent not only upon the sound pressure level and its frequency, but also its intermittency. Various indices have been developed to try and correlate annoyances with the noise level and its fluctuations. The indices and parameters used in this report are defined below:

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 20 Pa.

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.

Equivalent Continuous Sound Pressure Level (L_{Aeq}): The A-weighted sound pressure level of a steady sound that has, over a given period, the same energy as the fluctuating sound under.

$L_{10,T}$: A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.

Façade: Within 1 m from a hard, vertical surface – typically a residential building façade.

Free-field: At least 3.5m away from any hard, acoustically reflective vertical surfaces.

Appendix B Noise Survey Results

Position 1	On the boundary of Scats overflow car park, at the foot of the embankment below Gordon Road. The microphone was mounted on a pole, above the metal fencing, such that it was approximately 2m above the ground and within free-field conditions			
Period start	**$L_{Aeq,1hr}$ (dB)**	**L_{AFmax} (dB)**	**$L_{AF90,1hr}$ (dB)**	**$L_{AF10,1hr}$ (dB)**
25/06/2012 12:00	55	83	45	54
25/06/2012 13:00	60	86	45	59
25/06/2012 14:00	60	85	44	57
25/06/2012 15:00	62	89	45	55
25/06/2012 16:00	63	85	46	55
25/06/2012 17:00	59	85	45	57
25/06/2012 18:00	61	87	46	58
25/06/2012 19:00	61	85	47	57
25/06/2012 20:00	59	87	45	52
25/06/2012 21:00	55	78	40	52
25/06/2012 22:00	51	79	36	46
25/06/2012 23:00	50	78	33	41
26/06/2012 00:00	63	84	30	41
26/06/2012 01:00	62	84	30	39
26/06/2012 02:00	61	85	30	39
26/06/2012 03:00	58	84	28	42
26/06/2012 04:00	60	84	33	56
26/06/2012 05:00	52	77	38	49
26/06/2012 06:00	64	86	39	55
26/06/2012 07:00	57	81	43	58
26/06/2012 08:00	59	87	43	56
26/06/2012 09:00	60	88	43	52
26/06/2012 10:00	59	86	44	56
26/06/2012 11:00	64	88	45	58

Position	Description	Start Time (hh:mm)	Duration (min)	Free-field Noise Levels, dB			
				$L_{Aeq,T}$	L_{AFmax}	$L_{AF90,T}$	$L_{AF90,T}$
2	Outside 148 Kings Road. The microphone was mounted on a tripod such that it was approximately 1.5m above the ground, 1m from the building façade and 5m from the nearest kerb (but with the passing traffic being a further 3m away)	11:33	60	70	84	57	75
		12:33	60	72	96	57	76
		13:33	60	71	86	55	76
3	Outside the flats (Nos.40-50) in Northway (on the other side of the railway). The microphone was mounted on a tripod such that the microphone was approximately 1.5m above the ground, 4.5m from the flats, and thus within free-field conditions	11:31	15	57	80	42	49
4	Outside No.3 Railway Road (on the other side of the railway). The microphone was mounted on a tripod such that the microphone was approximately 1.5m above the ground, 4.5m from the houses, and thus within free-field conditions	11:51	15	71	95	44	55
5	Outside Five Ham Villas, Gordon Road. The microphone was mounted on a tripod such that the microphone was approximately 1.5m above the ground, 5m from the houses, and thus within free-field conditions	12:23	15	56	75	49	55