



**Gloucestershire**  
COUNTY COUNCIL



# **A419 Stonehouse**

## Noise Scoping Assessment for Business Case

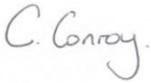
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## **1 Introduction**

### **1.1 Background to the scheme**

1.1.1 Amey has been requested by Gloucestershire County Council (GCC) to design improvements to four junctions along the A419 close to Stonehouse with the aim of reducing traffic congestion whilst also providing adequate provision for pedestrians and cyclists. The junctions comprise of the following:

- Chipmans Platt Roundabout
- Oldends Lane Roundabout
- Downton Road
- Horsetrough Roundabout

### **1.2 Purpose and scope of report**

1.2.1 The purpose of this report is to provide an input into the business case based on permanent noise effects arising from the proposed scheme. In particular, the key requirements of the assessment are to identify the change in noise at receptors in close proximity to the scheme (and if required identify any mitigation measures necessary) and to identify receptors that could potentially qualify under Part 1 and Part 2 of the Land Compensation Act (Ref. 1).

## **2 Legislation and Guidelines**

### **2.1 Transport Analysis Guidance**

2.1.1 The Department for Transport (DfT) has published guidance entitled 'Transport Analysis Guidance Unit A3 environmental impacts' (Ref. 2) on the appraisal of the environmental impacts of transport schemes. Noise is one of several environmental topics covered and the guidance deals with the impacts on both the built and the natural environment, as well as on people. The guidance discusses the relationship between environmental impact appraisal and environmental impact assessment and the need to tailor the level of appraisal to the stage of development of the proposal.

### **2.2 Land Compensation Act 1973**

2.2.1 Under Part 1 of the Land Compensation Act 1973 (Ref. 1) compensation can be claimed by people who own and who also occupy property that has depreciated in value (by more than £50) due to physical factors caused by the use of a new or altered road.

2.2.2 The physical factors are: noise, vibration, smell, fumes, smoke, artificial lighting and the discharge on to the property of any solid or liquid substance.

2.2.3 The cause of the physical factors must be due to the use of the new or altered road. For example, if a road is altered, the noise and other adverse effects must arise from the traffic using the altered section of road. Part 1 compensation cannot be claimed for the effects of traffic further down the road where no alteration has taken place.

2.2.4 Under the provisions of the Act, a road is altered only when there is a change to the location, width or level of the carriageway or an additional carriageway is provided beside, above or below an existing one. Part 1 compensation is not payable when the carriageway has simply been resurfaced.

2.2.5 Part 1 compensation is also not payable where part of the affected property has been compulsorily purchased for the construction of the new or altered road. This is because the effect of the use of the road on the value of the rest of the property must be taken into account in calculating the compensation for the part of the property taken.

2.2.6 Loss of view or privacy, personal inconvenience and physical factors arising during the construction of the road are also not included under Part 1 compensation.

## **2.3 Noise Insulation Regulations 1975 (as amended 1988)**

- 2.3.1 The Noise Insulation Regulations 1975 (Ref. 3) provide for the insulation of buildings against noise caused or expected to be caused by traffic using new highways or certain altered highways and were developed under Part 2 of the Land Compensation Act.
- 2.3.2 Regulation 2 interprets concepts used in the regulations. Some of them, used later in regulations 3 and 4, are the specified level (i.e. 68 dB  $L_{A10,18h}$ ), the prevailing noise level (i.e. the noise level immediately before the construction of the scheme begins) and the relevant noise level (i.e. the highest noise level between twelve months and fifteen years after the opening of the scheme).
- 2.3.3 The Regulations describe the procedure governing the making and the accepting of offers to carry out insulation work or to make a grant as well as the conditions to be complied with. The Regulations also provide information for reviewing the entitlement to noise insulation (Regulation 13), as well as details for local authorities to act as agents of highway authorities (Regulation 14) and details of specifications for insulation work (Schedule 1).
- 2.3.4 The regulations provide for noise levels to be determined in accordance with the technical memorandum entitled, Calculation of Road Traffic Noise (CRTN) 1988 (Regulation 6).

## **2.4 National Planning Policy Framework**

- 2.4.1 The National Planning Policy Framework (NPPF) (Ref. 4) states (in paragraph 123) that planning policies and decisions should aim to:
- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
  - mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
  - recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and

- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”

2.4.2 Further guidance on the NPPF is located in the Planning Practice Guidance Notes (PPGN).

## **2.5 Noise Policy Statement for England**

2.5.1 The Noise Policy Statement for England (NPSE) (Ref. 5) of March 2010 describes the effective management and the control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development. The main aims of the policy statement are to:

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

## **2.6 Environmental Noise (England) Regulations 2006**

2.6.1 The Environmental Noise (England) Regulations 2006 (Ref. 6) were introduced for England in order to implement Directive 2002/49/EC (Ref. 7) relating to the assessment and management of environmental noise, known as the Environmental Noise Directive (END). The aims of the END are to define a common approach in order to avoid, prevent or reduce the harmful effects of environmental noise.

2.6.2 The END intends to develop a long-term EU strategy, which includes objectives to reduce the number of people affected by noise in the longer term, and provides a framework for developing existing community policy concerning noise reduction from source. Some of the tools used by the END (and which are updated every 5 years) are:

- Production of Strategic Noise Maps in order to monitor the environmental noise problem (i.e. the identification of noise ‘hotspots’ and quiet areas) and, inform and consult the public (in line with the principles of the Aarhus Convention); and
- Production of Noise Action Plans in order to address local noise issues (in particular to noise ‘hotspots’ and quiet areas).

- In England, the noise 'hotspots' (i.e. areas where the most people affected by noise live) have become known as Noise Important Areas (NIAs). In the current period (END second round 2012-2017), the NIAs are identified in the Noise Action Plans of January 2014 (Ref. 8 and 9). They can be consulted from the Government's Open Data website (Ref. 10).

## **2.7 Noise Action Plans and Noise Important Areas**

2.7.1 As stated Noise Important Areas (NIAs) are identified in both Noise Action Plans dated January 2014 (Ref. 8 and 9). The Noise Action Plan: Roads (Including Major Roads) (Ref. 9) states that Defra has asked the relevant highways authorities to examine the Noise Important Areas and form a view about what measure, if any, might be taken in order to assist with the implementation of the Government's policy on noise.

2.7.2 The process is set out below:

- For each Important Area the relevant highway authority will consider what, if any, actions might be taken.
- If a certain length of highway is associated with several Important Areas, the relevant highway authority should consider measures that could address the noise issues at all the locations concurrently. This might include, for example, the development of a highway scheme to provide an alternative route.
- The highway authority should also take account of any existing plans (e.g. any local transport plans or land-use plans) or any specific noise mitigation schemes that are already in preparation that may affect the Important Areas.
- For each Important Area, the highway authority will identify proposed actions that will meet the vision and aims set out in the Government's policy on noise or state why, in their view, no further action can or needs to be taken in order to meet this objective.

- In forming their view about possible action, the relevant highway authority should take account of any benefit that might also be achieved for any other noise sensitive premises either in the vicinity of the Important Area being investigated or elsewhere. Furthermore, consideration should be given to integrating noise management actions at an Important Area with the concurrent implementation of other environmental or related initiatives for example in managing air quality, or protecting any formally identified quiet areas.

2.7.3 Six outcomes are available, which are as follows:

- A: It is possible to be able to implement an action and there are financial resources immediately available to do so.
- B: It is possible to be able to implement an action but there are no immediately available financial resources to do so.
- C: It is not possible to implement any action because there is no scope for doing so or there is some overriding technical issue that prevents implementation.
- D: It is not possible to implement any action because there would be large adverse non-acoustics effects that could not be accommodated by the proposed measure.
- E: Nothing further needs to be done as the noise level at each dwelling in the Important Area is below 65 dB  $L_{A10,18hr}$ , ignoring the effect of reflection from the facade of the relevant dwelling.
- A/B: Both Outcomes A and B apply.

### 3 Methodology

#### 3.1 Permanent (operational) effects

##### **DMRB HD 213/11**

3.1.1 The assessment of permanent effects follows the guidance stated in the Design Manual for Roads and Bridges (DMRB) 11.3.7 (Ref. 11), in relation to the potential noise effects that occur during the operational phase of the project.

3.1.2 The assessment considers the noise effects both with the scheme (referred to as the Do-Something scenarios) and without the scheme (referred to as the Do-Minimum scenarios). The scenarios are assessed for a baseline year and for a future year. The baseline year is the opening year of the scheme (in this case 2020) and the future assessment year is the worst year in the first fifteen years after the opening of the scheme (in this case 2035).

3.1.3 In order to determine the impact of the scheme in the short and the long term the following comparisons are considered between scenarios in the baseline year and the future year:

- Do-Minimum scenario in the baseline year (2020) compared with the Do-Something scenario in the baseline year (2020), i.e. the short term.
- Do-Minimum scenario in the baseline year (2020) compared with the Do-Something scenario in the future assessment year (2035), i.e. the long term.

3.1.4 DMRB 11.3.7 classifies the magnitude of traffic noise change into levels of impact in order to assist with the interpretation of the road project. The DMRB states that 'a change in road traffic noise of 1 dB  $L_{A10,18h}$  in the short term (i.e. when a project is opened) is the smallest that is considered perceptible. In the long term (typically 15 years after project opening), a 3 dB  $L_{A10,18h}$  change is considered perceptible. Table 1 and Table 2 below show the classification of magnitude of the traffic noise change in the short term and in the long term, respectively.

**Table 1: Classification of magnitude of noise change in the short-term**

Noise change, dB $L_{A10,18h}$		Magnitude of change
Increase	5+	Major adverse
	3 – 4.9	Moderate adverse

Noise change, dB L <sub>A10,18h</sub>		Magnitude of change
	1 – 2.9	Minor adverse
	0.1 – 0.9	Negligible adverse
No change	0	No change
Decrease	0.1 – 0.9	Negligible beneficial
	1 – 2.9	Minor beneficial
	3 – 4.9	Moderate beneficial
	5+	Major beneficial

**Table 2: Classification of magnitude of noise change in the long-term**

Noise change, dB L <sub>A10,18h</sub>		Magnitude of change
Increase	10+	Major adverse
	5 – 9.9	Moderate adverse
	3 – 4.9	Minor adverse
	0.1 – 2.9	Negligible adverse
No change	0	No change
Decrease	0.1 – 2.9	Negligible beneficial
	3 – 4.9	Minor beneficial
	5 – 9.9	Moderate beneficial
	10+	Major beneficial

**Definition of the significance of effect in terms of NPSE**

3.1.5 The current DMRB HD 213/11 is not in line with the National Planning Policy Framework (NPPF) or the Noise Policy Statement for England (NPSE) and it does not define a methodology to define the significance of effect. Therefore, in addition to the methodology described in DMRB HD 213/11, this report defines values for the Significant Observed Adverse Effect Level (SOAEL) and the Lowest Observed Adverse Effect Level (LOAEL) for the operational road traffic noise. Data exists to support certain assumptions relating to the LOAEL, however there is no standard definition of the SOAEL (Ref. 12).

- 3.1.6 This report defines values for the Significant Observed Adverse Effect Level (SOAEL) of noise above which exposure is considered undesirable, see Table 3 below for details. The SOAEL is in line with the noise level that would trigger mitigation under Regulation 2 of the Noise Insulation Regulations (NIR) which is 68dB  $L_{A10,18h}$  façade.
- 3.1.7 NPPF states that the planning process should be used to avoid significant effects when they are as a result of the scheme. To determine whether the effects are the result of the scheme, this assessment looks at whether the scheme causes an increase in noise levels of at least 1dB  $L_{A10,18h}$  in the long term. If this is the case it is considered that the scheme causes a significant adverse effect (see Table 4 below).
- 3.1.8 It should be highlighted that the DMRB states that increases between 1 and 3dB in the long term are negligible since they are imperceptible. However, the Planning Practice Guidance on Noise also states that in cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect occurring, even though little or no change in behaviour is likely to occur. This is reinforced for some emerging evidence that suggests that in the area where noise becomes a health effect the mechanism that causes the adverse effect is not consciously felt (Ref. 13) and therefore the selection of 1dB change due to the scheme as a trigger is considered justified.
- 3.1.9 This report also defines values for the Lowest Observed Adverse Effect Level (LOAEL) of noise. Noise levels between the LOAEL and SOAEL should be mitigated and minimised where these are as a result of the scheme. The effects between the LOAEL and SOAEL are considered to be caused by the scheme where they are perceptible in the long term, that is if they are at least of 3dB  $L_{A10,18h}$ .
- 3.1.10 Under NPPF, avoidance of effects above the SOAEL or mitigation and minimisation of effects between the LOAEL and SOAEL must be done only if it is sustainable to do so. This means that mitigation measures must also take into account the economic and social benefits and whether a mitigation measure delivers value for money or not.

3.1.11 The values adopted for the SOAEL and LOAEL in this chapter come from different sources. Both the  $L_{A10,18h}$  façade noise level and  $L_{Aeq,16h}$  free-field noise level are shown due to the different parameters used in different sources. Conversion from  $L_{A10,18h}$  to  $L_{Aeq,16h}$  uses the relationship as set out in WebTAG unit A3 ( $L_{Aeq,16h} = L_{A10,18h} - 2dB$ ) (Ref. 14) with a further subtraction of 2.5 dB for conversion from façade to free-field. Values of 67.5 dB  $L_{A10,18h}$  would be rounded up to 68 dB  $L_{A10,18h}$  for purposes of the Noise Insulation Regulations and hence an additional 0.5 dB has been allowed for in the conversion for both the LOAEL and the SOAEL.

**Table 3: SOAEL and LOAEL for long-term road traffic noise**

Parameter	Value
Significant adverse effects (SOAEL)	68dB $L_{A10,18h}$ (façade)
	63dB $L_{Aeq,16h}$ (free-field)
Adverse effects (LOAEL)	55dB $L_{A10,18h}$ (façade)
	50dB $L_{Aeq,16h}$ (free-field)

*Source: Noise Insulation Regulations relevant noise level for daytime SOAEL. Guidelines for community noise, WHO, 1999 for daytime LOAEL (from the 50dB  $L_{Aeq,16h(7-23)}$  outdoors for the onset of moderate community annoyance).*

3.1.12 Table 4 summarises when an effect due to the scheme is considered a significant adverse effect and when it is considered an adverse effect. As previously stated significant adverse effects (highlighted in orange below) should be avoided if it is sustainable to do so and adverse effects (highlighted in yellow below) should be mitigated and minimised if it is sustainable to do so.

**Table 4: Significance of effect in terms of NPSE**

Change in noise level		Daytime/Night-time		
		At or above SOAEL	Between LOAEL and SOAEL	Below LOAEL
Increase in noise level, dB $L_{A10,18h}$ dB $L_{night}$	1 – 3	Significant adverse	Neutral	Neutral
	3 – 5	Significant adverse	Adverse	Neutral
	5 – 10	Significant adverse	Adverse	Neutral
	10+	Significant adverse	Adverse	Neutral
Negligible	-1 – 1	Neutral	Neutral	Neutral

Change in noise level		Daytime/Night-time		
change				
Decrease in noise level, dB L <sub>A10,18h</sub> dB L <sub>night</sub>	-3 – -1	Significant beneficial	Neutral	Neutral
	-5 – -3	Significant beneficial	Beneficial	Neutral
	-10 – -5	Significant beneficial	Beneficial	Neutral
	-10+	Significant beneficial	Beneficial	Neutral

3.1.13 Road traffic noise levels were calculated using the CRTN calculation method of the noise modelling software, Noisemap 5.

### 3.2 Scoring Criteria for the Appraisal Summary Table

3.2.1 Table 5 below shows the appraisal scoring criteria that was used to assess the noise change for representative receptors. The appraisal score for noise impacts will be included in the overall business case for the scheme.

**Table 5: Scoring criteria for the appraisal summary table**

Appraisal Rating	Appraisal Score
Large Beneficial	3
Moderate Beneficial	2
Slight Beneficial	1
Neutral	0
Slight Adverse	-1
Moderate Adverse	-2
Large Adverse	-3

## 4 Baseline Conditions

### 4.1 Noise Character of the Area

4.1.1 A noise survey was carried out on Wednesday 19 April 2017 at the locations of all four schemes, the results of which are shown in Table 6 below. Noise levels were measured for 45 minutes at each scheme. The modelled noise levels were compared to the measured noise levels and were found to be within a confidence level of 95% at two of the locations, Chipmans Platt and Horsetrough Roundabout. However at the other two locations (Oldends Lane roundabout and Downton Road) the confidence level is outside the 95%. This is due to other noise sources being present including noise from industrial areas close to the schemes. Noise measurement sheets and calibration certificates are included in Appendix B.

**Table 6: Results of noise survey, Stonehouse**

Position	Date and Time	Measured dB L <sub>A10,45min</sub>	Modelled dB L <sub>A10,18h</sub>	Modelled – Measured	Within 95% confidence level**
Chipmans Platt Roundabout	19/04/17 10:00 – 10:45am	69.1	68.0	-1.1	Yes
Oldends Lane	19/04/17 11:00 – 11:45am	73.3	67.9	-5.4	No
Downton Road	19/04/17 12:00 – 12:45pm	78.8	68.1	-10.7	No
Horsetrough Roundabout	19/04/17 13:00 – 13:45pm	72.9	70.1	-2.8	Yes

*\*\* 95% confidence = within 2 standard errors as reported in DMRB HD 213/11 Table A4.1 with reference to the BRE National Noise Survey 2000.*

### 4.2 Traffic Data

4.2.1 Traffic data for the noise assessment was taken from the S-Paramics model of the A419 Stonehouse improvements. Full details of the traffic flows including the percentage of Heavy Goods Vehicles (HGVs) and average speeds can be found in Appendix C.

### 4.3 Value (Sensitivity) of Resource (Receptor)

4.3.1 Noise Sensitive Receptors (NSRs) are defined as receptors which are potentially sensitive to noise and vibration. Examples include dwellings, hospitals, schools, community facilities, designated areas (e.g. AONB, National Park, SAC, SPA, SSSI, SAM) and public rights of way.

#### **Chipmans Platt Roundabout**

4.3.2 There are 16 residential receptors and no community receptors within 300m of the Chipmans Platt Roundabout scheme. Table 7 below shows the number of receptors distributed in distance bands up to 300m and this is also illustrated in Drawing 001, Appendix A.

**Table 7: Noise sensitive receptors within 300m of Chipmans Platt Roundabout**

Distance bands (m)	Residential	Community	Total Number of Noise Sensitive Receptors
0 – 50	2	0	2
50 – 100	1	0	1
100 – 150	7	0	7
150 – 200	2	0	2
200 – 300	4	0	4
<b>Total</b>	<b>16</b>	<b>0</b>	<b>16</b>

#### **Oldends Lane Roundabout**

4.3.3 There are 58 residential receptors and 1 community receptor within 300m of the Oldends Lane Roundabout scheme. Table 8 below shows the number of receptors distributed in distance bands up to 300m and this is also illustrated in below.

4.3.4 Drawing 002, Appendix A also shows the location of two Noise Important Areas (ID 3866 and ID 3867) where traffic noise is considered an issue and where steps should be taken to reduce noise levels if practicable.

**Table 8: Noise sensitive receptors within 300m of Oldends Lane Roundabout**

Distance bands (m)	Residential	Community	Total Number of Noise Sensitive Receptors
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Distance bands (m)	Residential	Community	Total Number of Noise Sensitive Receptors
0 – 50	20	0	20
50 – 100	25	0	25
100 – 150	0	0	0
150 – 200	0	0	0
200 – 300	13	1	14
<b>Total</b>	58	1	59

***Downton Road/Horsetrough Roundabout***

4.3.5 There are 627 residential receptors and 4 community receptors within 300m of the Downton Road and Horsetrough Roundabout schemes although the majority of the receptors are close to the Downton Road scheme. Table 9 below shows the number of receptors distributed in distance bands up to 300m and this is also illustrated in below.

4.3.6 Drawing 003, Appendix A also shows the location of a Noise Important Area (ID 3868) where traffic noise is considered an issue and where steps should be taken to reduce noise levels if practicable.

**Table 9: Noise sensitive receptors within 300m of Downton Road and Horsetrough Roundabout**

Distance bands (m)	Residential	Community	Total Number of Noise Sensitive Receptors
0 – 50	42	1	43
50 – 100	88	0	88
100 – 150	112	2	114
150 – 200	112	1	113
200 – 300	273	0	273
<b>Total</b>	627	4	631

## 5 Noise Assessment

### Permanent (Operational) Effects

#### *Chipmans Platt Roundabout*

- 5.1.1 Drawing 004, Appendix A illustrates the change in noise levels as a result of the Chipmans Platt scheme in the short term. The red in the figure show the areas where there is an increase in noise levels of more than 1dB i.e. a perceptible increase in noise levels. The reason for this is due to the expected increase in traffic speed on the A419 as a result of the scheme. This area contains around 6 residential receptors including 6 Chipmans Platt and some of these properties already experience noise levels above 68dB  $L_{A10,18h,façade}$  which is considered the SOAEL. Therefore the scheme is expected to cause perceptible increases in noise levels at properties already subject to noise levels above the SOAEL. The green area shows where there is a noise change between -1dB and +1dB.
- 5.1.2 Drawing 005, Appendix A illustrates the noise change in the long term. The yellow shows where the noise levels are expected to increase by between 1dB and 3dB which is not a perceptible increase in noise levels. The light green in the figure shows the area where the noise levels are expected to change by between -1dB and +1dB while the blue shows the area where the noise levels are expected to decrease by between 1dB and 3dB. The small red area shows where noise levels are expected to increase by more than 3dB however there are no sensitive receptors contained in this location.
- 5.1.3 Table 10 below shows details of predicted noise levels at 2 receptors close to the proposed scheme, the locations of which can be seen in and . At the closest receptors (e.g. 6 Chipmans Platt) the scheme is expected to result in an increase in noise levels of more than 1dB in the short term and the existing noise levels are already above the SOAEL of 68dB  $L_{A10,18h,façade}$ . Therefore, according to Table 4 above, this represents a significant adverse impact and mitigation measures should be considered. In the long term the noise change at the closest receptors is less than 3dB which represents a negligible adverse impact. It should be highlighted that no receptors would qualify under the Noise Insulation Regulations 1975.

**Table 10: Predicted noise levels at representative receptors – Chipmans Platt Roundabout**

Representative Receptor	DM 2020	DS 2020	Short term change	DS 2035	Long term change	Magnitude of Change	
	dB L <sub>A10, 18h</sub>	Short Term	Long Term				
Olbury Lodge, Eastington, Stonehouse	63.4	64.2	+0.8	64	+0.6	Negligible adverse	Negligible adverse
6 Chipmans Platt, Stonehouse	68.9	70.3	+1.4	70.2	+1.3	Minor adverse	Negligible adverse

**Oldends Lane Roundabout**

- 5.1.4 Drawing 006, Appendix A below illustrates the change in noise levels as a result of the scheme in the opening year i.e. the short term. The red in the figure shows the areas where there is an increase in noise levels of more than 1dB i.e. a perceptible increase in noise levels however there are no sensitive receptors in this location. The majority of the predicted noise changes are between -1dB and +1dB i.e. in the green area. This is because the scheme is not expected to result in an alignment change or cause a change in traffic flow, speed or composition of HGVs sufficient to produce a 1dB change.
- 5.1.5 Drawing 007, Appendix A below illustrates the noise change in the long term. The light green in the figure shows the area where the noise levels are expected to change by between -1dB and +1dB while the blue shows the area where the noise levels are expected to decrease by between -1dB and -3dB. The small yellow area shows where the noise is expected to increase by between 1dB and 3dB which is not a perceptible increase in noise levels.
- 5.1.6 Table 11 below shows details of predicted noise levels at 2 receptors close to the proposed scheme, the locations of which can be seen in and . At the closest receptors the Oldends Lane scheme is not expected to result in perceptible changes in noise levels in either the short term or the long term. It should be highlighted that no receptors would qualify under the Noise Insulation Regulations 1975. However there is a Noise Important Area (ID 3866) located within the study area for the Oldends Lane roundabout scheme and if this is the case mitigation measures should be considered.

**Table 11: Predicted noise levels at representative receptors – Oldends Lane Improvements**

Representative Receptor	DM 2020	DS 2020	Short term change	DS 2035	Long term change	Magnitude of Change	
	dB L <sub>A10</sub> , 18h	Short Term	Long Term				
1 Avenue Terrace, Stonehouse	71.5	72.2	+0.7	72.2	+0.7	Negligible adverse	Negligible adverse
29 Avenue Terrace, Stonehouse	63.8	64.1	+0.3	64.0	+0.2	Negligible adverse	Negligible adverse

***Downton Road /Horsetrough Roundabout***

5.1.7 Drawing 008, Appendix A illustrates the change in noise levels as a result of the Downton Road and the Horsetrough Roundabout schemes in the short term. The red shows the areas where there is an increase in noise levels of more than 1dB i.e. a perceptible increase in noise levels. The small red areas close to the Downton Road scheme show where predicted noise levels are expected to increase by more than 1dB as a result of the proposed carriageway widening at this location. The large red area close to the Horsetrough roundabout shows a noise increase as a result of the proposed carriageway widening at this location as well as an expected increase in traffic flows and average traffic speed as a result of the scheme. The green area shows where noise changes are expected to be change by between -1dB and +1dB.

5.1.8 Drawing 009, Appendix A illustrates the noise change in the long term. The yellow area shows where the noise levels are expected to increase by between 1dB and 3dB which is not a perceptible increase in noise levels. The light green in the figure shows the area where the changes in noise levels are expected to be between -1dB and +1dB while the blue shows the area where the noise levels are expected to decrease by between -1dB and -3dB.

5.1.9 The Downton Road scheme is expected to result in perceptible changes in noise levels in the short term at the closest receptors particularly in the Boakes Drive area where existing noise levels are already above the SOAEL. This is due to the realignment moving the noise source closer to the properties however in the long term the noise changes are not expected to be perceptible. In total the following five receptors are expected to qualify under the Noise Insulation Regulations: 95, 105, 107, 109 and 111 Boakes Drive.

**Table 12: Predicted noise levels at representative receptors – Downton Road Improvements**

Representative Receptor	DM 2020	DS 2020	Short term change	DS 2035	Long term change	Magnitude of Change	
	dB L <sub>A10</sub> , 18h	Short Term	Long Term				
95 Boakes Drive, Stonehouse	70.2	71.6	+1.4	71.2	+1	Minor adverse	Negligible adverse
Wycliffe College Loosley Halls, Stonehouse	70.9	71.1	+0.2	71.1	+0.2	Negligible adverse	Negligible adverse

5.1.10 The Horsetrough Roundabout scheme is expected to result in perceptible changes in noise levels in the short term at the closest receptors particularly around Wycliffe College however existing noise levels are below the SOAEL. This is due to the realignment moving the noise source closer to the properties, however in the long term the noise changes are not expected to be perceptible and no properties qualify under the Noise Insulation Regulations 1975. Also there are relatively few receptors close to the scheme.

**Table 13: Predicted noise levels at representative receptors – Horsetrough Roundabout Improvements**

Representative Receptor	DM 2020	DS 2020	Short term change	DS 2035	Long term change	Magnitude of Change	
	dB L <sub>A10</sub> , 18h	Short Term	Long Term				

Cotswold Gables Browns Lane, Stonehouse	63.2	63.7	+0.5	63.5	+0.3	Negligible adverse	Negligible adverse
Jacobs Cottage, Ryeford, Stonehouse	61.1	61.2	+0.1	61.0	-0.1	Negligible adverse	Negligible beneficial
Wycliffe College	66.5	68.0	+1.5	67.7	+1.2	Minor adverse	Negligible adverse

5.1.11 Table 14 below shows the appraisal score for the four schemes in both the short term and the long term. The appraisal rating for 3 of the schemes (Chipmans Platt Roundabout, Oldends Lane and Downton Road) is expected to be slight adverse while the appraisal rating for the Horsetrough Roundabout scheme is expected to be neutral.

**Table 14: Appraisal rating for the Stonehouse schemes**

Scheme	Appraisal Rating		Appraisal Score	
	Short Term	Long Term	Short Term	Long Term
Chipmans Platt Roundabout	Slight adverse	Neutral	-1	0
Oldends Lane	Slight adverse	Neutral	-1	0
Downton Road	Slight adverse	Neutral	-1	0
Horsetrough Roundabout	Neutral	Neutral	0	0

5.1.12 Table 15 below shows the results from the TAG Unit A3 noise assessment worksheets. The WebTAG output worksheets are enclosed in Appendix D. Three of the schemes (Chipmans Platt Roundabout, Oldends Lane and Downton Road) show negative values (i.e. a disbenefit in terms of noise) and the same three schemes also show a slight adverse impact as per Table 14 above. The Horsetrough Roundabout scheme shows a positive WebTAG result, which reflects a benefit. The positive result in Table 15 below is caused by the 3dB bands resolution advised in WebTAG Unit A3, which may be sometimes misleading for relative small schemes with no clear trend. The worksheet for Horsetrough Roundabout in Appendix D show a mix of positive and negative results for sleep disturbance, annoyance and different health effects. Therefore, as said above in Table 14, the result for the Horsetrough Roundabout is better defined as a neutral.

**Table 15: Results of TAG Unit A3 Noise Assessment**

<b>Scheme</b>	<b>Net present value of change in noise (£)</b>
Chipmans Platt Roundabout	-£22,218
Oldends Lane	-£41,870
Downton Road	-£55,704
Horsetrough Roundabout	£31,545

## 6 Mitigation and Enhancement Measures

### 6.1 General

6.1.1 Mitigation measures should be considered at the Chipmans Platt Roundabout, the Oldends Lane roundabout and the Downton Road schemes where an adverse impact on the noise environment is expected.

### 6.2 Mitigation measures

6.2.1 The following list (taken from DMRB HD 213/11) contains measures which potentially could contribute to the reduction of current noise levels in within the footprint of the schemes:

- i. Horizontal alignment (ie moving a route away from sensitive receptors).
- ii. Vertical alignments (ie use natural screening such as cuttings and, in exceptional circumstances, sub surface or surface tunnels). In tunnels, care is necessary in order to reduce the reverberant noise at either end of the tunnel.
- iii. Noise barriers, in the form of earth mounds or noise fencing. Noise barriers are usually only effective in reducing noise but not vibration. Earth mounds may be provided where a lowering of a road into cutting generates extra fill.
- iv. Low-noise surfaces, which are especially effective at speeds of at least 75km/h.
- v. Speed and volume restrictions. However, these measures are rarely introduced and they should certainly be avoided in a new scheme.

#### ***Chipmans Platt Roundabout***

6.2.2 No feasible mitigation measures have been identified at the area of Chipmans Platt Roundabout before the provision of noise insulation under the Noise Insulation Regulations. A noise barrier is unlikely to provide value for money. Low noise road surfacing should also be considered though it may not be effective or feasible in close proximity to a roundabout. The other possible measures including horizontal and vertical realignment and speed and volume restrictions are not considered feasible.

6.2.3 The property at 6 Chipmans Platt is expected to qualify for insulation in three of its façades.

## **6.3 Enhancement measures**

6.3.1 The study area of the Oldends Lane roundabout and the Downton Road schemes include the Noise Important Areas ID 3866 and ID 3868 respectively. As stated in section 2.7 above, the highways authority should consider actions to reduce noise within Noise Important Areas.

### ***Oldends Lane Roundabout***

6.3.2 For the Oldends Lane roundabout scheme a 3m noise barrier to protect properties in Avenue Terrace would provide value for money and would reduce the existing noise levels within Noise Important Area ID 3866 (see Drawing 010, Appendix A). Use of low noise surface is not considered feasible as traffic speeds are less than 75km/h and the other possible measures are also not considered feasible.

### ***Downton Road***

6.3.3 For the Downton Road , as with the Oldends Lane scheme use of low noise surface is not considered feasible as traffic speeds are less than 75km/h and the other possible measures are also not considered feasible. Noise barriers 3m high at each side of the road are proposed to mitigate the noise levels within Noise Important Area 3868 (see Drawing 010, Appendix A). If no noise barrier was provided the properties at 95 and 105 Boakes Drives are likely to qualify for noise insulation under the Noise Insulation Regulations.

## **6.4 Updated WebTAG net present value after the provision of mitigation and enhancement measures**

6.4.1 Above we have discussed measures to mitigate the adverse effects of the scheme where feasible which was part of the original scope of the project. However, the available mitigation measures are of limited effect.

6.4.2 Nevertheless, we have also identified opportunities for the enhancement of the current noise levels at Noise Important Areas ID 3866 and ID 3868. This is not part of the original scope of the business case and it would be for the council to decide whether these measures to address actions requested by Defra as part of the Noise Action Plans should be included in the final business case report or not. No opportunities were identified for the Noise Important Area ID 3867 due to challenges of installing a noise barrier at that location that could reduce noise levels at the level of the first floor.

6.4.3 The provision of 3m high noise barriers at the area of Oldends Lane and Downton Road would deliver benefits for Oldends Lane and Downton Road (see Table 16 below).

**Table 16: Results of TAG Unit A3 Noise Assessment**

<b>Scheme</b>	<b>Net present value of change in noise (£)  Effects of the scheme</b>	<b>Net present value of change in noise (£)  Effects of the scheme including enhancement measures</b>
Chipmans Platt Roundabout	-£22,218	-£22,218
Oldends Lane	-£41,870	+£557,883
Downton Road	-£55,704	+£1,043,112
Horsetrough Roundabout	+£31,545	+£31,545

## **7 Summary**

- 7.1.1 The Noise Policy Statement for England (NPSE) aims to (i) avoid significant adverse effects, (ii) mitigate and minimise adverse effects and (iii) contribute to improvements in health and quality of life. Significant adverse effects may typically occur where noise changes are perceptible both in the short and long terms or where noise levels are already above a noise level known as the Significant Observed Adverse Effect Level (SOAEL). Noise levels above the SOAEL are considered noticeable and disruptive. In this case the SOAEL is considered to be 68 dB  $L_{A10,18h}$  as Defra has advised that there is no requirement to investigate noise levels below this.
- 7.1.2 Adverse effects may typically occur where noise changes are perceptible in the short term but not in the long term or where noise levels are already above a noise level known as the Lowest Observed Adverse Effect Level (LOAEL) but below the SOAEL. Noise levels between the LOAEL and the SOAEL are considered noticeable and intrusive but not disruptive.
- 7.1.3 The Department for Environment, Food and Rural Affairs (Defra) regularly publishes statutory documents called Noise Action Plans which identify priority areas where the responsible highways authority should consider improvements in the current noise levels (in line with the third aim of the NPSE). These areas are known as Important Areas.
- 7.1.4 In order to determine the impact of the schemes, noise changes in both the short term and the long term have been considered. The DMRB HD 213/11 states that 'a change in road traffic noise of 1 dB  $L_{A10,18h}$  in the short term (i.e. when a project is opened) is the smallest that is considered perceptible.' In the long term (typically 15 years after project opening), a 3 dB  $L_{A10,18h}$  change is considered perceptible.

- 7.1.5 The Chipmans Platt scheme is expected to result in an increase in noise levels of more than 1dB in the short term at around 6 properties close to the scheme. This is due to an expected increase in average speed along the A419 as a result of the scheme. An increase in noise levels of more than 1dB is considered perceptible in the short term. In the long term the expected increase in noise levels is less than 3dB which is not considered perceptible. Some of these properties already experience noise levels above 68dB  $L_{A10,18h,façade}$  which is considered the SOAEL. The property at 6 Chipmans Platt is expected to qualify for noise insulation under the Noise Insulation Regulations. The overall effect of the Chipmans Platt scheme is considered slight adverse since it will cause perceptible increases in noise levels in the short term in an area with sensitive receptors already subject to noise levels above the SOAEL.
- 7.1.6 The Oldends Lane scheme is not expected to result in perceptible changes in noise levels in either the short term or the long term. The study area for the scheme includes the noise Important Area Id 3866 where Gloucestershire County Council is the responsible highways authority. Since the Oldends Lane scheme does not produce perceptible increases in noise the overall effect of the scheme is considered neutral.
- 7.1.7 If the council decided to address the existing noise levels at the Noise Important Area Id 3866 as part of the Oldends Lane scheme adding a 3m high barrier at the area of Avenue Terrace in line with the third aim of the NPSE (i.e. to contribute to improvements in health and quality of life); then the scheme would deliver a benefit in terms of noise.
- 7.1.8 The Downton Road scheme is expected to result in perceptible changes in noise levels in the short term as a result of the proposed carriageway widening and at least two residential properties would qualify for insulation under the Noise Insulation Regulations 1975 (although this number could increase up to five). In the long term the expected changes in noise levels are not considered perceptible. The overall effect of the Downton Road scheme is considered slight adverse since it will cause increases in noise levels (which will be perceptible in the short term) in an area with sensitive receptors already subject to noise levels above the SOAEL.
- 7.1.9 If the council decided to address the existing noise levels at the Noise Important Area Id 3868 as part of the Downton Road scheme providing a 3m high noise barrier at either side of the road as per Drawing 010, Appendix A; then the scheme would deliver a benefit in terms of noise.

7.1.10 The Horsetrough Roundabout scheme is expected to result in noise changes of more than 1dB in the short term which is considered perceptible however in the long term the noise changes are expected to be less than 3dB and therefore not considered perceptible. No properties qualify for noise insulation since most of the properties in the area close to the scheme are non-residential. Therefore, due to the relatively few properties close to the scheme, the overall effect of the Horsetrough Roundabout scheme is considered neutral.

7.1.11 In summary, since most of the schemes do not address the current noise levels in their study areas and in some cases may cause perceptible increases in noise in the short term, the effects in terms of noise ranges from slight adverse to neutral for the Chipmans Platt, Oldends Lane and Horsetrough Roundabout. For the Downton Road scheme, due to the unintended potential triggering of insulation under the Noise Insulation Regulations, the scheme may end up providing slight beneficial effects. If the council decided to include noise barriers in order to address the existing noise levels at the Noise Important Areas Id 3866 and Id 3868 within the study area of Oldends Lane and Downton Road scheme respectively, then these two schemes would provide beneficial effects.

## 8 References

- Ref. 1 United Kingdom, [Land Compensation Act 1973 \(as amended\)](#).
- Ref. 2 Department for Transport, [Transport Analysis Guidance \(TAG\) Unit A3 – Environmental Impact Appraisal](#), November 2014.
- Ref. 3 United Kingdom, [The Noise Insulation Regulations 1975 \(as amended 1988\)](#).
- Ref. 4 Department for Communities and Local Government, National Planning Policy Framework, March 2012
- Ref. 5 DEFRA, The Noise Policy Statement for England, March 2010
- Ref. 6 ENGLAND (2006), *The Environmental Noise (England) Regulations 2006*.
- Ref. 7 EUROPEAN UNION (2002), *Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise*.
- Ref. 8 DEFRA (Department for Environment, Food & Rural Affairs) (2014), *Noise Action Plan: Agglomerations. Environmental Noise (England) Regulations Policy 2006, as amended*.
- Ref. 9 DEFRA (Department for Environment, Food & Rural Affairs) (2014), *Noise Action Plan: Roads (Including Major Roads). Environmental Noise (England) Regulations Policy 2006, as amended*.
- Ref. 10 DEFRA (Department for Environment, Food & Rural Affairs) (2015), *Noise Action Planning Important areas Round 2 England*. Available on <https://data.gov.uk/dataset/noise-action-planning-important-areas-round-2-england>.
- Ref. 11 The Highways Agency et al, [Design Manual for Roads and Bridges \(DMRB\) Volume 11 Environmental Assessment Part 3 Environmental Assessment Techniques Section 7 Rev 1 HD 213/11 Noise and Vibration](#), November 2011.
- Ref. 12 ABBOT et al. (2015), *Possible Options for the Identification of SOAEL and LOAEL in Support of the NPSE*, AECOM on behalf of Defra.
- Ref. 13 RECIO, A. et al (2016), *Road traffic noise effects on cardiovascular, respiratory, and metabolic health: An integrative model of biological mechanisms*, Environmental Research 146 (2016) 359-370.

Ref. 14 DEPARTMENT FOR TRANSPORT (2015), *Transport Analysis Guidance (TAG)*  
*Unit A.3 Environmental Impact Appraisal.*

## **Appendix A Drawings**

## **Appendix B Noise measurement sheets and calibration certificates**

## **Appendix C Traffic data**

## **Appendix D WebTAG output worksheets**

