

# **A509 Isham Bypass**

## **Options for Noise Mitigation to Properties at Winston Drive and Fairfield Road, Isham**

March 2007

## Document History

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## EXECUTIVE SUMMARY

1. On 5<sup>th</sup> May 2006, Northamptonshire County Council granted Planning Permission for construction of the A509 Isham Bypass on land to the west of the Village of Isham in Northamptonshire.
2. Twenty conditions were imposed by the County Council's Head of Sustainable Development, of which two were specifically related to the interest of residential amenity, and in particular properties in Winston Drive and Fairfield Road. These were as follows:-
  - Condition 4** The road shall be constructed utilising a low noise surface material as proposed in the submitted application and all maintenance thereafter shall utilise the same type of low road noise construction materials.
  - Condition 20** Except as may otherwise be agreed in writing by the County Planning Authority, prior to the commencement of the development a scheme of hard and soft landscaping proposals to assist with the noise mitigation measures near to properties in Winston Drive shall be submitted to, and approved in writing by the County Planning Authority. The approved scheme shall be implemented prior to the new road first coming into use.
3. Five properties in Winston Drive (No's 17, 19, 21, 23 & 25) and one property in Fairfield Road (No 68) are in close proximity to the proposed A509 Isham Bypass and directly adjacent to the top of the proposed carriageway cutting (See Appendix 1).
4. These six properties presently have open outlooks to arable land and the County Planning Authority require the development of noise mitigation measures to reduce the impact from noise from the A509 Isham Bypass.
5. It should be emphasised that the most effective means for reducing impact and noise from traffic on new roads is to locate them in cuttings below adjacent ground levels. The A509 Isham Bypass has been designed with regard to this principle and consequently is located within a 9 metre deep cutting in proximity to the six properties. This effective noise mitigation technique has been adopted and therefore makes substantial further reduction in noise levels difficult to achieve.
6. This report, in section 2, has identified the consequential increases in noise levels that would be experienced by each of the six properties if the A509 Isham Bypass was constructed in a 9 metre deep cutting, but with no other mitigation measures.

7. The report, in section 3, then considers the reduction in noise levels that could be achieved for each of the six properties by providing a low noise road surface. This material will be used for the carriageway surface if the A509 Isham Bypass is constructed. This is a condition of the Planning Approval.
8. In section 4, a noise barrier has been assessed in combination with the low noise road surface. Two lengths of barrier were considered; one of 715 metre length and one of 210 metre length. Their locations are shown at Appendix 2. The findings were that the longer barrier offered only negligible benefits over the shorter barrier in reducing noise to the six properties, and the conclusion is that the extra cost does not represent good value for money.
9. Having established that a shorter length of noise barrier in combination with a low noise road surface would provide tangible reductions in noise at the six properties, four alternative locations for such a provision were tested.
10. In section 5, it was concluded that the most effective location for a noise barrier would be to locate it at to the top of the cutting. This is a consequence of it being at the closest point to the noise source whilst not offsetting the benefits achieved from locating the carriageway within a deep cutting.
11. In conclusion, the provision of a 210 metre length of noise barrier located at the top of the A509 Isham Bypass cutting slope would offer additional benefits in reducing noise. However, other factors such as maintenance, aesthetics and security, should also be considered in consultation with residents. Preference for a noise barrier on or near property boundaries, should the residents prefer this, would only slightly compromise the noise reduction benefits.
12. A noise barrier, in combination with a low noise road surface, would provide a noticeable reduction in noise for all six properties, at a cost that represents fair value for money. It is recommended such a provision be incorporated into the proposed A509 Isham Bypass Scheme, should it proceed to construction. Its exact location in relation to property boundaries should be identified following consultations with residents.

## 1. ASSESSMENT METHODOLOGY AND SCENARIOS

### ASSESSMENT METHODOLOGY

#### Calculation Method Used

- 1.1 The current assessment of potential noise mitigation measures was obtained using Atkins' noise modelling programme NoiseMap 2000 (V2.51), which itself is based on the Department of Transport's 'Calculation of Road Traffic Noise' 1988 (CRTN) methodology, as recommended in the Design Manual for Roads and Bridges (DMRB<sup>1</sup>). The models included important factors that influence noise, relating to traffic data and characteristics of the study area, such as those identified in Table 1-1.

**Table 1-1 – Factors used in the Determination of Noise from Roads**

Traffic Data		Study Area Characteristics	
Traffic Flow	(18-hr AAWT)	Road:	Type eg single / dual etc
Heavy Goods Vehicles	(%)		Width and Length
Average Vehicular Speed	(kph)		Surface Type
		Landform:	Gradient
			OS Contours
			Cuttings / embankments
		Receivers:	Acoustic Type - Soft eg grass. Hard eg concrete, tarmac, brick
			Distance Attenuation
			Screening / Angle of View
		'Barriers':	Reflections eg building / façade
			Building ridge lines etc.
			Purpose-built mitigation.

<sup>1</sup> Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7 (August 1994).

### Description of Noise Level Changes Used

- 1.2 There are no British Standard definitions currently available to define the significance of noise level changes. However, the terms identified in Table 1-2 are in general use and may assist in giving an improved understanding of the relevance of the differences between the noise levels identified in this report.

**Table 1-2 – Generally Used Descriptions of Noise Level Changes**

Noise Level Change dB(A) <sup>2</sup>	Effect Description
1 < 3	Slight effect
3 < 5	Moderate effect
5 < 10	Significant effect
> 10	Substantial effect

## ASSESSED SCENARIOS

### Properties Assessed

- 1.3 The properties at the western end of Fairfield Road and Winston Drive, Isham, listed below, will be the most adversely affected by changes in noise levels if the A509 Isham Bypass is constructed:

- No. 68 Fairfield Road
- No. 25 Winston Drive
- No. 23 Winston Drive
- No. 21 Winston Drive
- No. 19 Winston Drive
- No. 17 Winston Drive

- 1.4 These properties have therefore been assessed with regards to potential mitigation measures that may improve their traffic noise environment when the proposed Isham Bypass is in operation. Appendix 1 shows the location of these properties in relation to the proposed A509 Isham Bypass.

<sup>2</sup> These dB(A) bands are similar to those identified in earlier versions of DMRB, Vol 11, Sect 3, Part 7, Para 8.9

### **Bypass Location and Topography**

- 1.5 The assessed alignment of the preferred Isham Bypass runs to the west of Isham, commencing from the existing A509 just south of the A14 in the north and rejoining the A509 south of Hill Top. The Bypass was assessed as dual carriageway from its northern start to the proposed roundabout at Hill Top, with single carriageway from this roundabout to the existing A509.
- 1.6 In the vicinity of the area under assessment, the proposed Bypass will be located in a cutting with side slopes graded at 1 in 2 for the top  $\frac{1}{4}$  of the cutting and 1 in 3 for the bottom  $\frac{3}{4}$  of the cutting. For simplicity of noise calculations a constant side slope of 1 in 3 has been assumed which will slightly understate the calculated reduction in noise levels.
- 1.7 Details of the cutting side-slopes are contained in an Atkins report on the “stability of cuttings adjacent to Winston Drive”

### **Traffic Data Used**

- 1.8 In the current mitigation calculations the traffic data used is that which formed the basis of the latest version of the Isham Bypass Environmental Impact Assessment, reported in August 2005. This traffic data had been revised in order to include the anticipated impacts from the Office of the Deputy Prime Minister’s (ODPM) housing allocation for Milton Keynes and South Midlands determined in 2004, and for the proposed WEAST Development. The traffic data was provided and assessed for future demands based on Regional Planned Growth (RPG). The July 2005 assessment was based on the Opening and Design Years of 2009 and 2024 respectively.

### **Assessed Scenarios**

- 1.9 A range of mitigation provisions have been assessed in this report, including the following:-
- i) Standard mitigation of the road being in a deep cutting (Section 2);
  - ii) Additional single mitigation measure of a low noise road surface (Section 3);  
and
  - iii) Additional combined mitigation of low noise road surface & a noise barrier (Sections 4 & 5).
- 1.10 Noise barriers have been assessed over 'Long' (715 metres) and 'Short' (210 metres) lengths in order to analyse their relative benefits and costs. These are considered in Section 4.
- 1.11 In addition, further assessment has been undertaken to identify the most effective location of a noise barrier. In Section 5 the following locations have been considered:
- i) Base of Cutting;
  - ii) Top of Cutting;
  - iii) 4 metres west of the Property Boundary Line of Nos.25 to 17 Winston Drive's rear gardens; and
  - iv) On the Property Boundary Line.
- 1.12 The noise barriers discussed in this report are 1.8 metre high, timber fence type barriers. Alternative barrier types are described in Appendix 4.

1.13 Table 1-3 summarises the various scenarios assessed in this report.

**Table 1-3 – Assessed Scenarios**

Assessed Scenario	Bypass Road Surface	Barrier	
		Length *	Location
<b>Standard Mitigation</b> <i>(Road in a Deep Cutting)</i>	Conventional <sup>\$</sup>	-	-
<b>Additional Single Mitigation</b> <i>(Low Noise Road Surface)</i>	Low Noise	-	-
<b>Additional Combined Mitigation</b> <i>(Low Noise Road Surface and Noise Barrier)</i>	Low Noise	Long	Top of Cutting
		Short	Top of Cutting
			Property Boundary Line
			4m west of Property Boundary Line
			Base of Cutting (back of verge)

<sup>\$</sup> Conventional - hot rolled asphalt.

\* Long - between approximate Chainages 1250 and 1965, with a gap for Ruts Accommodation Bridge.  
Short - between approximate Chainages 1540 and 1750.  
For further explanation see Section 4.

## EXISTING SITUATION

1.14 The properties under consideration to the west of Isham currently experience relatively low background noise levels. They overlook a rural environment, and would therefore be expected to have low noise levels in the future under a Do Minimum Scenario. However, these properties will be exposed to traffic noise from the proposed Bypass if constructed.

## 2. STANDARD MITIGATION: ROAD IN DEEP CUTTING

2.1 Table 2-1 summarises the modelled noise levels for the properties under consideration to the west of Isham without (Do Minimum) and with (Do Something) the Bypass in operation in the Design Year 2024. Building the Bypass in deep cutting would reduce noise levels and no further mitigation is considered in this standard mitigation option.

**Table 2-1 – Predicted Noise Levels for the Design Year 2024 (Standard Mitigation)**

RECEIVER			PREDICTED NOISE LEVELS dB(A) *		
			NB A Positive Difference represents a DETERIORATION in Future Noise Lvl's		
Property	Façade	Floor	Do Minimum	DO SOMETHING	Difference
68 Fairfield Road	NW Rear	Ground	49.6	60.0	+ 10.4
		1 <sup>st</sup>	50.6	61.6	+ 11.0
25 Winston Drive	NW Rear	Ground	48.4	60.8	+ 12.4
		1 <sup>st</sup>	49.3	62.8	+ 13.5
23 Winston Drive	W Rear	Ground	46.1	61.1	+ 15.0
		1 <sup>st</sup>	47.3	63.9	+ 16.6
21 Winston Drive	NW Rear	Ground	43.5	60.8	+ 17.3
		1 <sup>st</sup>	44.4	63.5	+ 19.1
19 Winston Drive	SW Rear	Ground	44.0	60.5	+ 16.5
17 Winston Drive	SW Rear	Ground	44.7	58.8	+ 14.1

\* dB(A) is a standardised unit for measuring sound or noise. The (A) weighted scale has frequencies that most closely associate with the average human ear and is therefore used for measuring traffic noise.

2.2 The Do Minimum Noise Levels presented in Table 2.1 for the properties are obtained from a Noise Model of the 2024 traffic flows assuming no bypass has been built. In November 2004, short term (30 minute) noise surveys were carried out at the properties under consideration. These results substantiated the predicted Do Minimum noise levels obtained through the modelling process. Both actual readings and modelled information methods categorised the properties within the same TAG Band (<57 dB(A)).

- 2.3 The variation in Do Minimum 2024 Noise Levels shown in Table 2.1 is due to the nature of the intervening topography and presence of buildings between the existing A509 and the 6 properties. The open outlook across the valley from No.68 Fairfield Road to the north-east, with the A509 and A14 present, results in it experiencing the highest noise levels of the 6 properties. Slightly lower levels are predicted for No.25 and lower still for No.23 Winston Drive, which benefit from shelter of adjacent houses. In contrast, the flat plateaux at 85 metres to the south-east of the six properties and the presence of buildings in between these properties and the existing A509 results in Nos.17 and 19 Winston Drive experiencing comparatively lower noise levels. No.21 Winston Drive is the most sheltered of the six properties and consequentially experiences the lowest noise levels.
- 2.4 The impact of the proposed Bypass on these, and other dwellings to the west of Isham, is reduced from its potential maximum adverse impact due to the fact that where the Bypass runs closest to these properties it is located in a cutting of up to 9 metres. Typically this would reduce noise levels by 7dB(A) at ground floor level and 6dB(A) at first floor level, when compared to building the road at existing ground level.
- 2.5 The cutting is an effective noise mitigation measure since it prevents a direct line of sight to the Bypass for most properties in this area, therefore placing these properties in the 'shadow zone'. Consequently, the design of the Bypass in a deep cutting is the most effective means for noise mitigation and any significant further reductions in noise are relatively difficult to achieve.
- 2.6 In the terms presented in Table 1-2, all 6 properties are predicted to experience 'substantial' (ie >10dB(A)) deteriorations to their noise environment with the Bypass in operation. The least difference is experienced by No.68 Fairfield Road because of the higher Do Minimum noise levels experienced as a consequence of its location with open outlooks to the north and east that contain existing traffic corridors. The levels of increase in road noise are due to the fact that the outlook of the properties concerned will change from a generally rural environment, to include the direct effect of traffic noise from the proposed Bypass.

### 3. ADDITIONAL SINGLE MITIGATION: LOW NOISE ROAD SURFACE

- 3.1 Traffic noise generated from the proposed Isham Bypass could be further reduced for properties at the western end of Fairfield Road and Winston Drive by utilising a low noise surface on the proposed road.
- 3.2 As an example, a road surface with the impact of reducing noise levels at source by 3dB(A) was included within the noise models for the Do Something 2024 situation. This low noise road surface was modelled on the entire length of the proposed Bypass, including the three spurs linking the Scheme to the existing road network.
- 3.3 The results of this modelling are summarised in Table 3-1.

**Table 3-1 – Comparison of DS2024 Results with a -3dB(A) Road Surface to Without**

RECEIVER			PREDICTED NOISE LEVELS dB(A)					
			NB A Positive Difference represents a DETERIORATION in Future Noise Levels NB A Negative Difference represents an IMPROVEMENT in Future Noise Levels					
Property	Façade	Floor	Do Minimum	DS Low Noise Surface	Difference	DS Std Mit	DS L.N.S	Diff
68 Fairfield Road	NW Rear	Ground	49.6	57.8	+ 8.2	60.0	57.8	- 2.2
		1 <sup>st</sup>	50.6	59.4	+ 8.8	61.6	59.4	- 2.2
25 Winston Drive	NW Rear	Ground	48.4	58.6	+ 10.2	60.8	58.6	- 2.2
		1 <sup>st</sup>	49.3	60.7	+ 11.4	62.8	60.7	- 2.1
23 Winston Drive	W Rear	Ground	46.1	58.9	+ 12.8	61.1	58.9	- 2.2
		1 <sup>st</sup>	47.3	61.7	+ 14.4	63.9	61.7	- 2.2
21 Winston Drive	NW Rear	Ground	43.5	58.7	+ 15.2	60.8	58.7	- 2.1
		1 <sup>st</sup>	44.4	61.3	+ 16.9	63.5	61.3	- 2.2
19 Winston Drive	SW Rear	Ground	44.0	58.3	+ 14.3	60.5	58.3	- 2.2
17 Winston Drive	SW Rear	Ground	44.7	56.6	+ 11.9	58.8	56.6	- 2.2

- 3.4 Table 3-1 demonstrates that utilising a low noise road surface that reduces road noise at source by 3dB(A) along the entire length of the proposed Scheme can reduce the predicted future Do Something 2024 noise levels by approximately 2dB(A) for the properties assessed. The precise reduction is dependent on the location and elevation of the receiver.
- 3.5 A low noise road surface would reduce future noise levels, as can be seen in Table 3-1. The increase in noise levels from the equivalent Do Minimum Scenario is expected to remain within the same category of 'substantial' for the 5 properties in Winston Drive. However No.68 Fairfield Road would reduce from a 'substantial' to 'significant' category. Changes are also compared in Table 3-1 to standard mitigation measures in place.

#### **4. ADDITIONAL COMBINED MITIGATION: LOW NOISE ROAD SURFACE AND NOISE BARRIER – LONG & SHORT**

- 4.1 An enhanced mitigation option considered to reduce noise for properties at the western end of Fairfield Road and Winston Drive, is construction of a noise barrier. Such a provision would effectively increase the depth of the Bypass cutting.
- 4.2 As an example, a 1.8 metre high noise barrier, located at the top of the cutting on the eastern side of the Bypass, by Winston Drive, was included within the noise models for the Do Something 2024 situation. Two different lengths of noise barrier were modelled for comparison. A Long Barrier was modelled between Chainages 1250 and 1965, incorporating a gap for the Ruts Accommodation Bridge, but with no returns at either the northern or southern ends of the barrier. A Short Barrier was modelled between Chainages 1540 and 1750, with a single return along the fence that abuts No.25 Winston Drive and No.68 Fairfield Road's boundary line. These options are shown at Appendix 2 and a cross-section of the barrier position is shown at Location 1 of Appendix 3.
- 4.3 Table 4-1 demonstrates that constructing a 1.8 metre high noise barrier at the top of the cutting in combination with a low noise road surface on the Bypass, can reduce the predicted future Do Something 2024 noise levels by between approximately 3.1dB(A) and 5.4dB(A) for the properties concerned, depending on the location and elevation of the receiver and the length of the modelled barrier.
- 4.4 Table 4-1 indicates that greater improvements in noise reduction can be achieved with a longer noise barrier, however the additional improvements of a Long Barrier over a Short Barrier are only negligible (in the range of zero reduction to 1.1 dB(A) reduction). The costs of the longer barrier (715 metres) over the shorter barrier (210 metres) would be more than 300%. Having regard to the limited improvements in noise mitigation, and the substantial additional costs associated with provision and maintenance, the Long Barrier provision has been discounted as an effective option.

- 4.5 The improvement to future noise levels with the proposed Isham Bypass in operation potentially offered by constructing a noise barrier in combination with a low noise road surface would reduce the increase in noise levels to varying extents for each of the properties concerned. For Nos.17 and 25 Winston Drive and No.68 Fairfield Road, changes in noise levels would fall within the 'significant' (ie 5 - 10dB(A)) category of change rather than the 'substantial' (ie > 10dB(A)) category.
- 4.6 The increase in noise levels from the equivalent Do Minimum Scenario would remain within the 'substantial' (ie > 10dB(A)) category of change for Nos.19, 21 and 23 Winston Drive, although there would be a noticeable reduction in noise of up to 5.4dB(A) compared to a 'standard mitigation provision'.
- 4.7 In comparison to the noise reductions offered by the additional single mitigation of a low noise road surface, discussed in Section 3, the additional combined mitigation measures of a low noise road surface and barrier are more effective by between 0.9 and 3.2dB(A), depending on the location and elevation of the receiver and the length of the modelled barrier.

**Table 4-1 – Comparison of DS2024 Results with and Without a 1.8m High Noise Barrier of Varying Lengths (Includes Low Noise Surface)**

RECEIVER			PREDICTED NOISE LEVELS dB(A)												
			NB A Positive Difference represents a DETERIORATION in Future Noise Levels; A Negative Difference represents an IMPROVEMENT in Future Noise Levels												
Property	Façade	Floor	Long Barrier at Top of Cutting						Long vs Short	Short Barrier at Top of Cutting					
			Do Minimum	DS Long Barrier	Difference	DS Std Mit	DS Long Barrier	Diff		DM	DS Short Barrier	Diff	DS Std Mit	DS Short Barrier	Diff
68 Fairfield Road	NW Rear	Ground	49.6	55.9	+ 6.3	60.0	55.9	- 4.1	- 1.0	49.6	56.9	+ 7.3	60.0	56.9	- 3.1
		1 <sup>st</sup>	50.6	57.3	+ 6.7	61.6	57.3	- 4.3	- 1.1	50.6	58.4	+ 7.8	61.6	58.4	- 3.2
25 Winston Drive	NW Rear	Ground	48.4	56.3	+ 7.9	60.8	56.3	- 4.5	- 0.4	48.4	56.7	+ 8.3	60.8	56.7	- 4.1
		1 <sup>st</sup>	49.3	58.0	+ 8.7	62.8	58.0	- 4.8	- 0.6	49.3	58.6	+ 9.3	62.8	58.6	- 4.2
23 Winston Drive	W Rear	Ground	46.1	56.4	+ 10.3	61.1	56.4	- 4.7	0.0	46.1	56.4	+ 10.3	61.1	56.4	- 4.7
		1 <sup>st</sup>	47.3	58.5	+ 11.2	63.9	58.5	- 5.4	- 0.2	47.3	58.7	+ 11.4	63.9	58.7	- 5.2
21 Winston Drive	NW Rear	Ground	43.5	56.1	+ 12.6	60.8	56.1	- 4.7	- 0.1	43.5	56.2	+ 12.7	60.8	56.2	- 4.6
		1 <sup>st</sup>	44.4	58.2	+ 13.8	63.5	58.2	- 5.3	- 0.2	44.4	58.4	+ 14.0	63.5	58.4	- 5.1
19 Winston Drive	SW Rear	Ground	44.0	55.8	+ 11.8	60.5	55.8	- 4.7	- 0.1	44.0	55.9	+ 11.9	60.5	55.9	- 4.6
17 Winston Drive	SW Rear	Ground	44.7	54.3	+ 9.6	58.8	54.3	- 4.5	- 0.2	44.7	54.5	+ 9.8	58.8	54.5	- 4.3

## 5. SHORT NOISE BARRIER – ALTERNATIVE LOCATIONS

- 5.1 Section 4 identified that provision of a Long Noise Barrier offered negligible additional attenuation from road noise in comparison with a Short Barrier. Further tests were therefore undertaken to assess the effectiveness of the Short Barrier provision.
- 5.2 The benefits of a 1.8 metre high Short Noise Barrier were modelled between Chainages 1540 and 1750 at the following four positions:
- Location 1: Top of Cutting;
  - Location 2: Boundary Line of No.s 25 to 17 Winston Drive's rear gardens;
  - Location 3: 4m west of this Property Boundary Line; and
  - Location 4: Base of Cutting.
- 5.3 Locations 1, 2 and 3 were assessed with a single return along the fence that abuts No.25 Winston Drive and No.68 Fairfield Road's northern boundary line. Location 4 was modelled with no returns. The different lengths of noise barrier and associated returns that were modelled are shown in Appendix 2 and a cross-section of the barrier positions is given in Appendix 3. Location 1 of Appendix 3 was the position assessed and discussed in Sections 4.
- 5.4 The four locations of the Short Barrier were tested in combination with a low noise surface on the proposed Bypass. The results of this modelling are summarised in Table 5-1.

**ADDITIONAL COMBINED MITIGATION MEASURES****Potential Impact of a 1.8m Short Noise Barrier at Various Locations, Combined with a Low Noise Road Surface on Isham Bypass**

- 5.5 Table 5-1 identifies that constructing a 1.8 metre high noise barrier at Locations 1, 2 or 3, in combination with a low noise road surface on the Bypass, can reduce the predicted future Do Something 2024 noise levels by between approximately 2.9dB(A) and 5.2dB(A) for the properties concerned, depending on the location and elevation of the receiver and the location of the modelled barrier. Table 5-1 indicates that the most effective position of the Short Barrier is the top of the cutting.
- 5.6 The improvement to future noise levels with the proposed Isham Bypass in operation potentially offered by constructing a Short Noise Barrier, in combination with a low noise road surface, may reduce the increase in noise levels from the equivalent Do Minimum Scenario to such an extent that the assigned category of change can be reduced as follows:
- The ground floor of No.68 Fairfield Road is expected to improve from the 'significant' (ie 5-10dB(A)) category of change to the 'moderate' (ie 3-5 dB(A)) category when the Short Barrier is at Locations 1, 2 or 3.
  - No.25 Winston Drive is predicted to improve from the 'substantial' (ie > 10dB(A)) category of change to the 'significant' (ie 5-10dB(A)) category at both ground floor and 1<sup>st</sup> floor elevations when the Short Barrier is at Locations 1, 2 or 3, and for the ground floor elevation only when positioned at Location 4.
  - No.17 Winston Drive is predicted to improve from the 'substantial' (ie > 10dB(A)) category of change to the 'significant' (ie 5-10dB(A)) category when the Short Barrier is at Locations 1 or 3.

- 5.7 The increase in noise levels from the equivalent Do Minimum Scenario is still expected to remain within the same category of change for the following:
- 1<sup>st</sup> Floor elevation noise levels at No.68 Fairfield Road are expected to remain within the 'significant' category of change, regardless of where the Short Barrier is sited. When the barrier is at Location 4, ground floor noise levels are also expected to remain within this category of change.
  - 1<sup>st</sup> Floor elevation noise levels at No.25 Winston Drive are predicted to remain within the 'significant' category of change if the barrier is at Location 4.
  - No.17 Winston Drive is predicted to remain within the 'significant' category when the barrier is at Locations 2 or 4.
  - The increase in noise levels from the equivalent Do Minimum Scenario is still expected to remain within the 'substantial' (ie > 10dB(A)) category of change for Nos.19, 21 and 23 Winston Drive, at both ground floor and 1<sup>st</sup> floor elevations, when the Short Barrier is positioned at any of the four Locations.
- 5.8 The noise barriers discussed in Sections 5 and 6 are 1.8 metre high, timber noise fence type of barrier. Alternative barrier types are provided in Appendix 4.
- 5.9 This section identifies that a barrier located at the top of the cutting is more effective for noise mitigation than other barrier locations. However, if the barrier is to remain in the ownership of the Northamptonshire County Council, consideration will need to be considered for future maintenance, particularly to enable access by workmen and equipment. The requirement to accommodate access for future maintenance, will impact on the proposals for landscaping provided at the top of the cutting.
- 5.10 The land between the top of the proposed cutting and the existing six property boundaries has been identified for acquisition in the Compulsory Purchase Order to undertake mitigation landscaping. The distance varies from a minimum of 4 metres at No.25 Winston Drive to 13 metres at No.17 Winston Drive. Having regard to Section 5.9 above, landscape mitigation benefits at No.25 will be significantly compromised by the requirements for maintenance if the noise barrier is located at the top of the cutting.

**Table 5-1 – Comparison of DS2024 Results with and Without a 1.8m High Short Noise Barrier at Various Locations (Includes Low Noise Surface )**

RECEIVER			PREDICTED NOISE LEVELS dB(A)								
			NB A Positive Difference represents a DETERIORATION in Future Noise Lvl's; A Negative Difference represents an IMPROVEMENT in Future Noise Lvl's								
Property	Façade	Floor	Do Minimum	DS Short Location 1	Difference	DS Short Location 2	Difference	DS Short Location 3	Difference	DS Short Location 4	Difference
68 Fairfield Road	NW Rear	Ground	49.6	56.9	+ 7.3	57.0	+ 7.4	56.9	+ 7.3	57.7	+ 8.1
		1 <sup>st</sup>	50.6	58.4	+ 7.8	58.7	+ 8.1	58.5	+ 7.9	59.3	+ 8.7
25 Winston Drive	NW Rear	Ground	48.4	56.7	+ 8.3	56.9	+ 8.5	56.8	+ 8.4	58.3	+ 9.9
		1 <sup>st</sup>	49.3	58.6	+ 9.3	59.1	+ 9.8	58.8	+ 9.5	60.4	+ 11.1
23 Winston Drive	W Rear	Ground	46.1	56.4	+ 10.3	56.5	+ 10.4	56.5	+ 10.4	58.6	+ 12.5
		1 <sup>st</sup>	47.3	58.7	+ 11.4	59.8	+ 12.5	59.3	+ 12.0	61.4	+ 14.1
21 Winston Drive	NW Rear	Ground	43.5	56.2	+ 12.7	56.3	+ 12.8	56.2	+ 12.7	58.4	+ 14.9
		1 <sup>st</sup>	44.4	58.4	+ 14.0	59.7	+ 15.3	59.1	+ 14.7	61.0	+ 16.6
19 Winston Drive	SW Rear	Ground	44.0	55.9	+ 11.9	55.8	+ 11.8	55.9	+ 11.9	58.1	+ 14.1
17 Winston Drive	SW Rear	Ground	44.7	54.5	+ 9.8	54.7	+ 10.0	54.6	+ 9.9	56.3	+ 11.6

RECEIVER			PREDICTED NOISE LEVELS dB(A)								
Property	Façade	Floor	DS Std Mitigation	DS Short Location 1	Difference	DS Short Location 2	Difference	DS Short Location 3	Difference	DS Short Location 4	Difference
68 Fairfield Road	NW Rear	Ground	60.0	56.9	- 3.1	57.0	- 3.0	56.9	- 3.1	57.7	- 2.3
		1 <sup>st</sup>	61.6	58.4	- 3.2	58.7	- 2.9	58.5	- 3.1	59.3	- 2.3
25 Winston Drive	NW Rear	Ground	60.8	56.7	- 4.1	56.9	- 3.9	56.8	- 4.0	58.3	- 2.5
		1 <sup>st</sup>	62.8	58.6	- 4.2	59.1	- 3.7	58.8	- 4.0	60.4	- 2.4
23 Winston Drive	W Rear	Ground	61.1	56.4	- 4.7	56.5	- 4.6	56.5	- 4.6	58.6	- 2.5
		1 <sup>st</sup>	63.9	58.7	- 5.2	59.8	- 4.1	59.3	- 4.6	61.4	- 2.5
21 Winston Drive	NW Rear	Ground	60.8	56.2	- 4.6	56.3	- 4.5	56.2	- 4.6	58.4	- 2.4
		1 <sup>st</sup>	63.5	58.4	- 5.1	59.7	- 3.8	59.1	- 4.4	61.0	- 2.5
19 Winston Drive	SW Rear	Ground	60.5	55.9	- 4.6	55.8	- 4.7	55.9	- 4.6	58.1	- 2.4
17 Winston Drive	SW Rear	Ground	58.8	54.5	- 4.3	54.7	- 4.1	54.6	- 4.2	56.3	- 2.5

## 6. CONCLUSION

- 6.1 The proposed Isham Bypass is located in a 9 metre deep cutting in the vicinity of Winston Drive, which is an effective noise mitigation measure since it prevents a direct line of sight to the Bypass for most properties in the area of concern, therefore placing these properties in the 'shadow zone'. The noise mitigation obtained from this standard mitigation is typically 6dB(A) at first floor level and 7dB(A) at ground floor level. Consequently any significant further reductions in noise from the standard mitigation of a deep cutting will be difficult to achieve.
- 6.2 With standard mitigation, from the road in deep cutting, the 6 properties assessed are predicted to experience 'substantial' (ie >10dB(A)) deteriorations to their noise environment with the Bypass in operation. These increases are a result of the existing background noise levels for this area being relatively low due to the generally rural vicinity.
- 6.3 Laying a low noise road surface that reduces road noise at source by 3dB(A) along the entire length of the proposed Isham Bypass is predicted to offer an improvement of approximately 2dB(A) at the facades of all 6 properties. However, the Councils Development Control Committee has, in making its decision to grant planning permission for the bypass, required that a scheme of hard and soft landscaping proposals to assist with the noise mitigation measures to properties in Winston Drive shall be submitted to the County Planning Authority.
- 6.4 Schemes to further improve noise mitigation in the form of a noise barrier of varying lengths and positions have been assessed in combination with the low noise road surfacing. These shall be discussed with the County Planning Authority.

- 6.5 This assessment estimates that only marginal improvements in noise can be achieved with a Long rather than a Short Noise Barrier. For the properties concerned, the additional improvements offered by the Long Barrier over the Short Barrier are only negligible. A Short Barrier offers value for money and it is recommended that this be provided.
- 6.6 The assessment indicates that the most effective location for a Short Noise Barrier is at the top of the cutting. However, there could be a problem with future maintenance of a barrier in this location. The proposal to utilise the area between the top of cutting and the property boundaries for landscaping would necessitate no planting adjacent to the fence over a distance of approximately 2 metres.
- 6.7 If a noise barrier is to be constructed, wooden close-boarded fencing should be utilised since this is a cost-effective alternative to specifically manufactured noise fences, whilst still offering effective attenuation of road noise. Such a close-boarded fence must be of a minimum weight in order to achieve the best possible noise attenuation. This would be weather boarding at least 22mm thickness providing a minimum weight of 7.7Kg/m<sup>2</sup>.
- 6.8 The additional combined mitigation measures of low noise road surface and barrier are more effective than the noise reductions offered by a low noise road surface alone, by between 0.9 and 3.2dB(A), depending on the location and elevation of the receiver and the length of the modelled barrier.
- 6.9 Having regard to the effectiveness of noise reduction, costs and aesthetic considerations, the provision of a short noise barrier located near the top of the cutting is recommended. This, when combined with a low noise road surface, would offer perceptible levels of noise reduction to the properties in Winston Drive and Fairfield Road considered in this report.
- 6.10 In making the recommendation in Section 6.9 above, the emphasis has been placed on noise attenuation. Having regard to Section 6.6, and the limited reduction that would be experienced in noise attenuation, by locating the barrier on or close to the property boundary line, the opinions of residents should be taken into account. They may prefer, for aesthetic and security reasons, to accept marginally lower noise benefits in favour of these other factors.

- 6.11 Although the recommendation in Section 6.9 would improve future noise levels with the proposed Isham Bypass in operation, the increase in noise levels from the equivalent future Do Minimum Scenario is still expected to remain. For Nos.17 and 25 Winston Drive and No.68 Fairfield Road, when the mitigation measures in Section 6.9 are taken into account, the reduction in noise levels from the Bypass may be sufficient to be re-classified as 'significant' instead of 'substantial'. For Nos.19, 21 and 23 Winston Drive the category of change would remain as 'substantial', although residents would benefit from reductions in noise of between 4.6 – 5.2dB(A).
- 6.12 The area of land between the property boundaries and the proposed highway boundary is to be acquired for landscaping, to mitigate for residents the adverse impacts from the proposed A509 Isham Bypass. Whilst this landscaping provision would have some further beneficial impacts for noise reduction, it is not calculable and therefore the noise reduction benefits from landscaping have not been considered in this report.

## **APPENDICES**

**APPENDIX 1**

**SITE LOCATION PLAN**





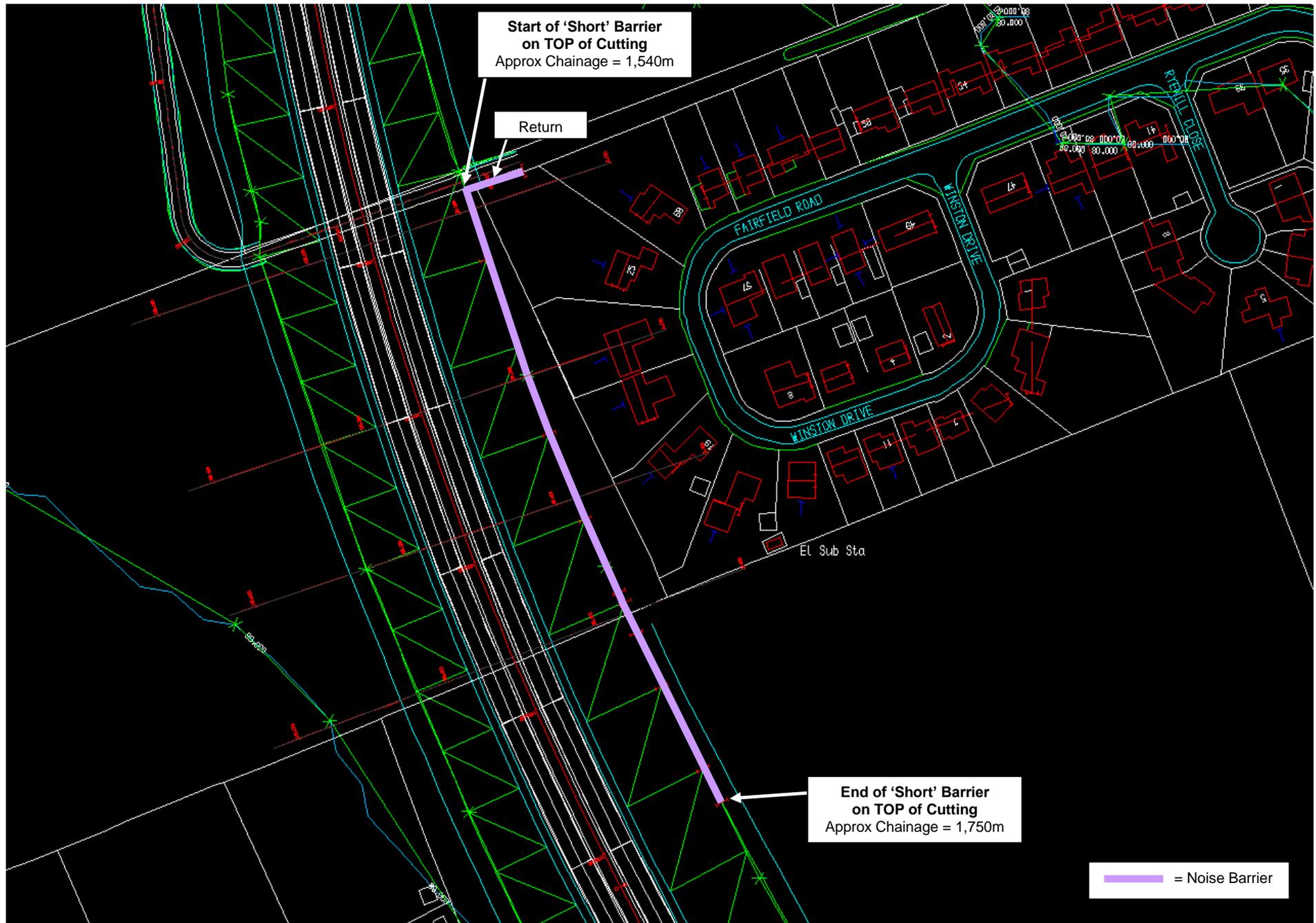


## **APPENDIX 2**

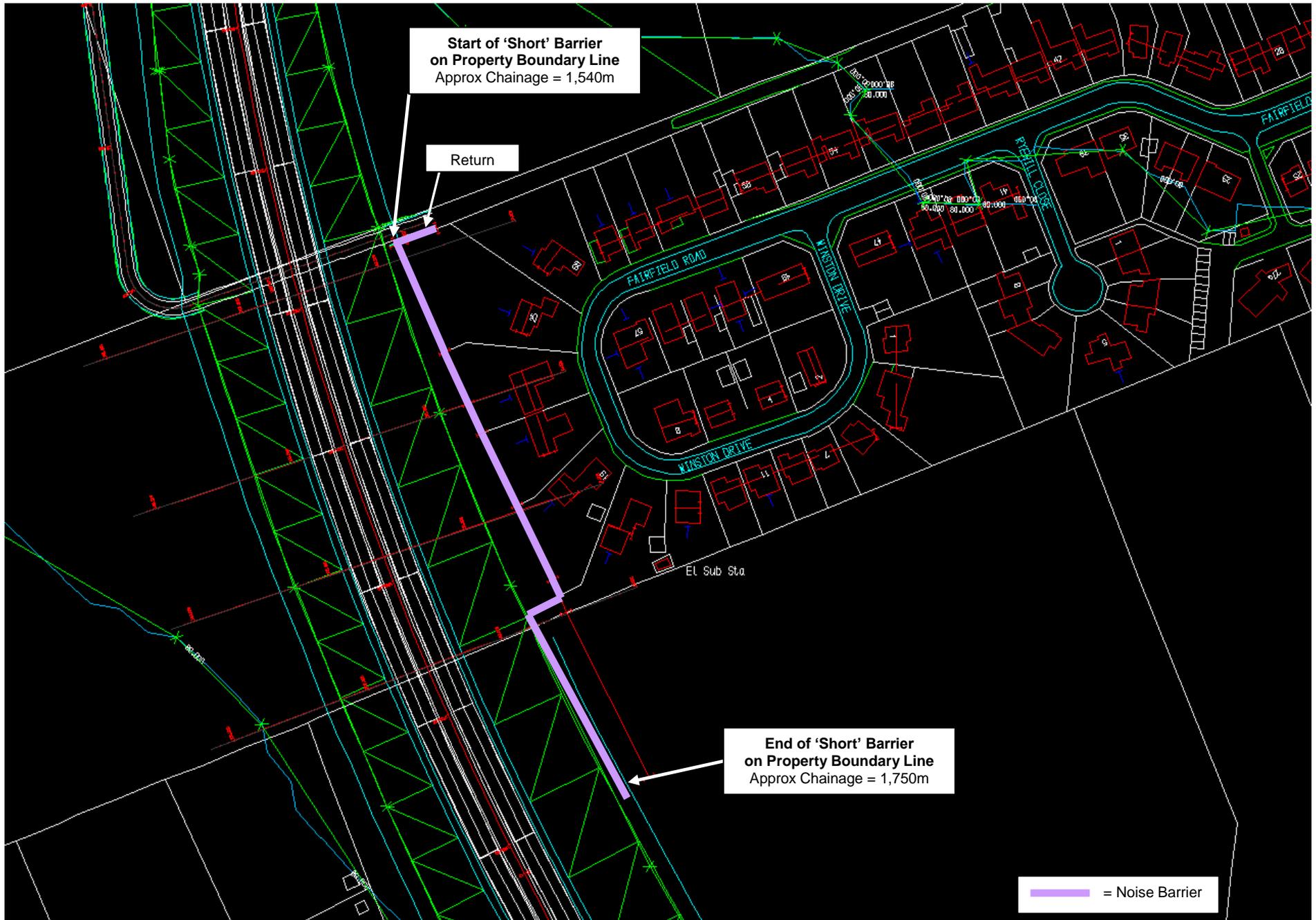
### **BARRIER LOCATIONS**



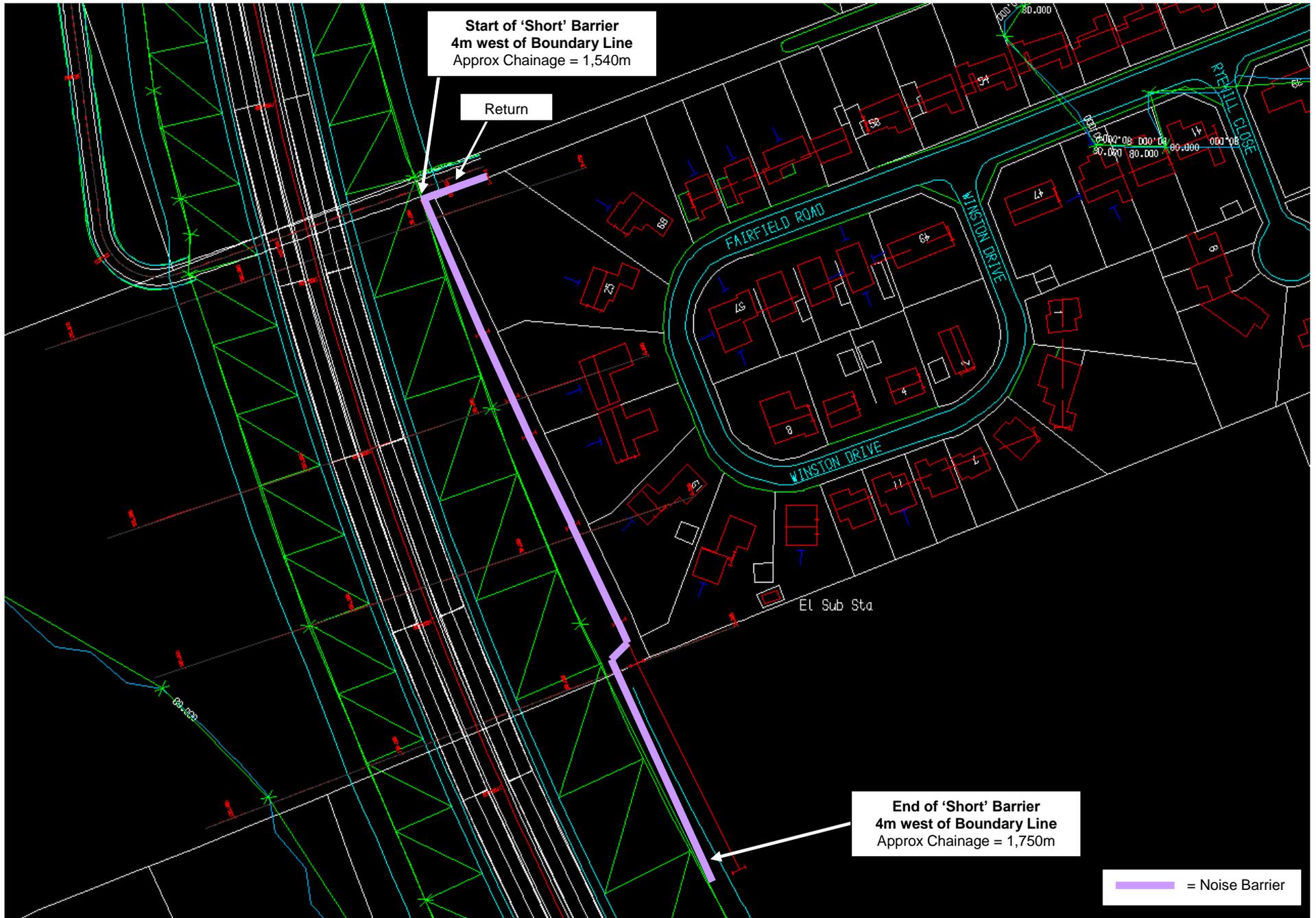




**'Short' Barrier** (ie 1.8m Noise Barrier at **Property Boundary 1 RETURN** with Conventional or Quiet Surface on **WHOLE Bypass**)    Approx Chainages: **1,540m - 1,750m**

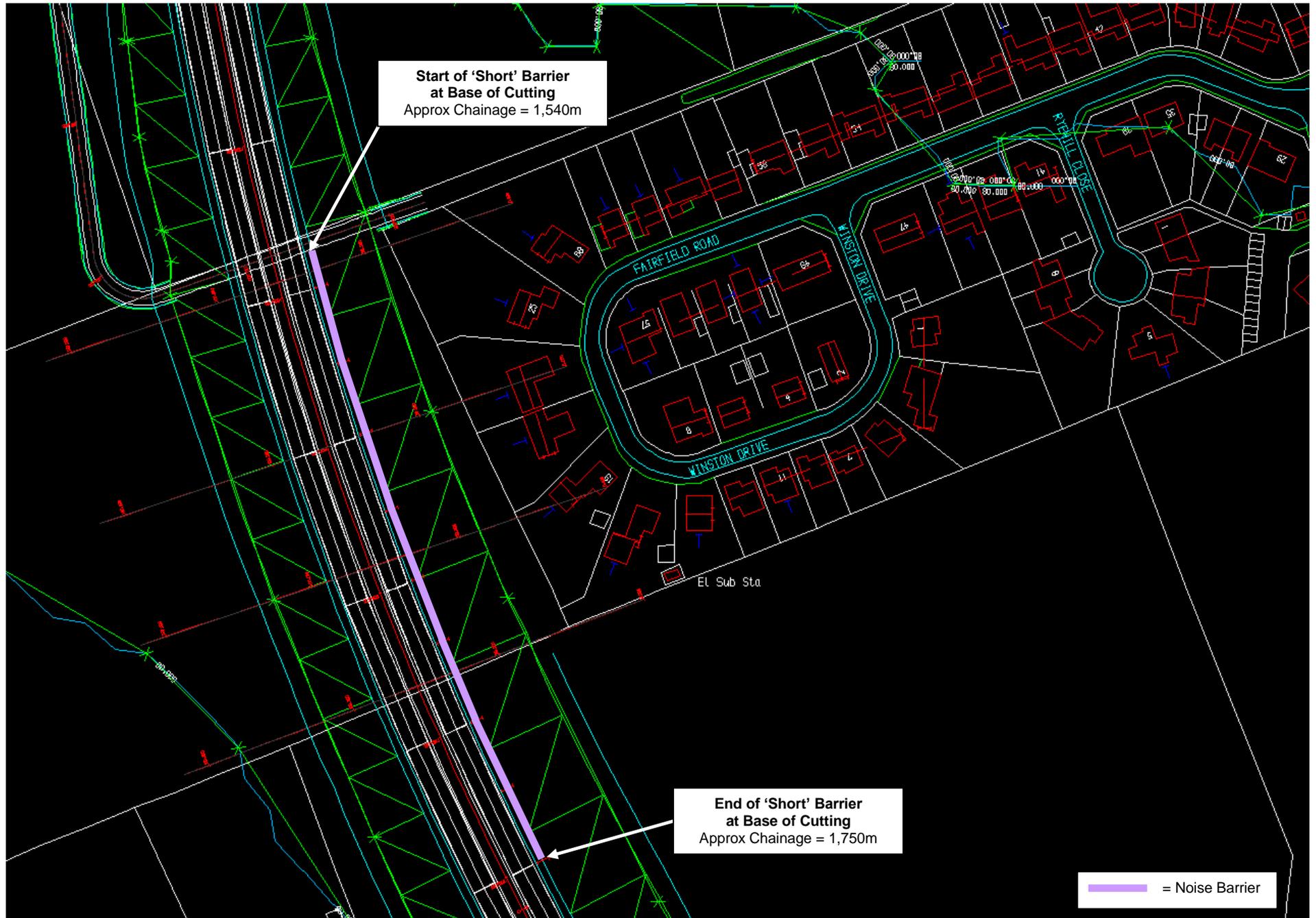


**'Short' Barrier** (ie 1.8m Noise Barrier 4m from Property Boundary 1 RETURN with Conventional or Quiet Surface on WHOLE Bypass) Approx Chainages: 1,540m - 1,750m



Appendix 2-4

**'Short' Barrier** (ie 1.8m Noise Barrier at **Base of Cutting NO RETURNS** with Conventional or Quiet Surface on **WHOLE Bypass**) Approx Chainages: **1,540m - 1,750m**

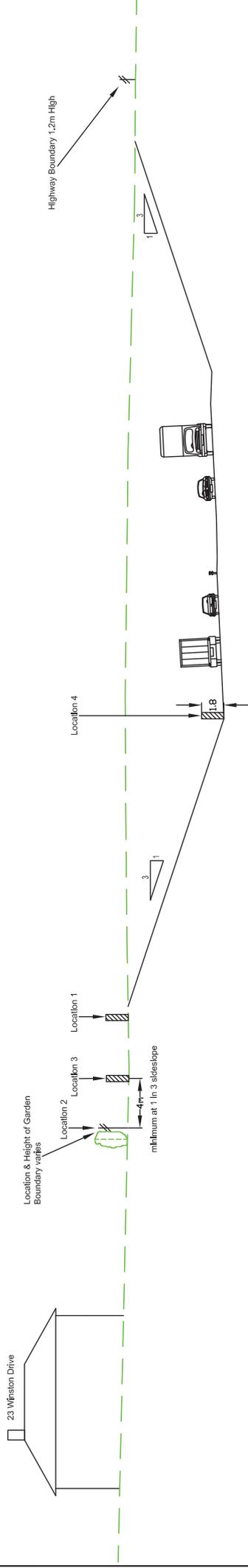




## **APPENDIX 3**

### **BARRIER LOCATIONS CROSS SECTION**





**KEY**

- Location 1 - Top of Cutting
- Location 2 - On the Property Boundaries
- Location 3 - 4m West of Property Boundaries
- Location 4 - Base of Cutting

Barrier = 1.8m High



Scale: NTS

A509 ISHAM BYPASS

**BARRIER LOCATION CROSS SECTION**

FIGURE NUMBER: **APPENDIX 3**



## **APPENDIX 4**

### **ALTERNATIVE NOISE BARRIER OPTIONS**



## **Alternative Noise Barrier Options**

The noise barriers assessed in this report are 1.8 metre high, solid barriers. Alternative barrier types are provided below.

### ***Close-boarded Fence***

Wooden close-boarded fences are regularly used as noise barriers alongside road schemes since they offer a cost-effective alternative to specifically manufactured noise fences, whilst still offering effective attenuation of road noise. A 1.8 metre high fence would cost approximately £50 per metre. A close-boarded fence must be of a minimum weight in order to achieve the required noise attenuation and a 22mm thick provision at 7.7Kg/m<sup>2</sup> is recommended.

### ***Landscaped Earth Bund***

If a landscaped earth bund was preferred, it would have to be greater than 1.8 metres high at its maximum, in order to achieve the same noise reductions as those discussed in this report. This is because a vertical noise barrier can be located closer to the noise source itself, and as such is more effective in reducing noise.

### ***'Living' Barriers***

Noise barriers have traditionally been constructed from hard materials such as metal or concrete, however 'living' barriers of willow or similar woody plants are a potential alternative. Such 'green' barriers are typically constructed with an earth core and integrated drip-irrigation system, but can also incorporate an absorbent soundproof core of a suitable material, such as Rockwool. The quick-growing deciduous willow has generally been used for such barriers, however evergreen species such as Sporan and ivy are also considered to be successful in providing noise attenuation. A 'living' willow wall may have a normal life expectancy of approximately 25 years if well maintained. Data on their acoustic performance is not comprehensive at present, but usually noise reduction is achieved by a man-made core, with the living element providing a decorative cover.

'Living' barriers are considered to be attractive noise control options since they can provide good absorption of traffic noise, do not reflect noise, can be simple to construct and can offer an attractive aesthetic alternative to the more commonly used hard materials. In addition, such barriers can provide a habitat for a wealth of flora and fauna and to some degree can improve air quality through absorption of CO<sub>2</sub>, release of oxygen and arresting particles, such as dust. However, against these apparent advantages must be weighed the costs of the maintenance required to ensure that the barrier retains its acoustic performance (eg watering, trimming, fertilizing, weeding, disease control, protection from wildlife attack and replacement of damaged sections etc). In addition, there are still doubts about the acoustic performance and longer term effectiveness of such barriers and some locations may not be suitable (e.g. shady locations or sloping locations which result in the loss of water).

In relation to the A509 Isham Bypass Scheme specifically, a 'living' barrier would be difficult to accommodate within the boundaries of the proposed Scheme and may in fact not compliment the local environment.

### ***Summary***

Whichever material is chosen to construct a noise barrier, it should be noted that to be effective a noise barrier must not contain any holes and must be of a minimum size and mass.

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**Atkins Ltd**  
The Octagon  
Pynes Hill Court  
Rydon Lane  
EXETER EX2 5AZ  
Devon  
England

**Telephone +44 (0)1392 352900**  
Fax +44 (0)1392 352999

**info@atkinsglobal.com**  
[www.atkinsglobal.com/dee](http://www.atkinsglobal.com/dee)

