HIGHWAYS AGENCY

An Executive Agency of THE DEPARTMENT OF TRANSPORT

A259 Bexhill and Hastings Western Bypass

Environmental Statement Volume 2 (Reports)

Part 3 of 3
Noise and Vibration
Air Quality
Vehicle Travellers
Pedestrians, Cyclists, Equestrians and Community Effects
Disruption due to Construction

September 1994

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REPORT 11

NOISE AND VIBRATION

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NOISE AND VIBRATION

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NOISE AND VIBRATION IMPACT ASSESSMENT

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1 INTRODUCTION

1.1 This report has been prepared generally in accordance with the Highways Agency's Design Manual for Roads and Bridges (DMRB) Volume 11 which covers environmental assessment.

1.2 Assessments reported include the following:

- Traffic noise and vibration impacts;
- Construction noise effects;
- Relief to the existing A259 corridor through Bexhill and Hastings as far as Ore.

Proposed mitigation measures are described.

2 ASSESSMENT METHODOLOGY

2.1 Description of Technical Terms

A description of noise and its effects unavoidably requires the use of technical terms. Definitions and explanations of the acoustical terms used in this report are given in Appendix A.

2.2 Traffic Noise

2.2.1 Traffic noise is conventionally described using the A-weighted statistical level L_{A10} averaged over the eighteen hours from 6.00am to midnight. Traffic noise levels quoted in this report follow this convention and are 'facade' levels except for open space forecast levels which are 'free field' (see Appendix A).

2.2.2 The calculation procedure is defined in the Department of Transport's Memorandum 'Calculation of Road Traffic Noise' (CRTN) [Ref 1].

The procedure may be summarised as follows:

(i) The road is divided into convenient segments.

(ii) For each segment, a basic noise level is determined from empirically based charts at a reference distance of 10m from the carriageway edge. This noise level includes the effect of 18 hour traffic flow, average speed, percentage of heavy goods vehicles, gradient and road surface type and texture.

(iii) Corrections for attenuation due to distance, ground absorption, angle of view and intervening obstructions are then applied to the basic noise level for each segment.

(iv) Finally, the results for each segment are summated and corrected where appropriate for facade reflection effects.

The calculations are normally executed by means of computer programs, which follow the CRTN method.

2.2.3 The assessment of traffic noise impact has been carried out on the assumption that the scheme opening year would be 1998 and the design year (15 years after opening) would be 2013. Noise has been assessed from the predicted traffic flows for these years which are shown on Figure 2 in Appendix B. The traffic predictions assume that high economic growth would occur.

Traffic flows have recently been reassessed and the year of opening of the scheme and design year revised to 2000 and 2015 respectively. Revised traffic flows for these years are given in Volume 1 (Drawings) of

this Statement. Changes in the results of the impact appraisal, from a reassessment using the revised flows are discussed in paragraph 4.2.5.

2.2.4 The noise impact assessment, in accordance with DMRB Volume 11, requires the comparison of forecast noise levels in the design year with those for the year of opening for the scheme. The resulting changes are presented for properties in noise increase or decrease bands, such as 3-5dB, in a series of tables. Each table summarises the impact on properties within a particular ambient noise level band such as 50-60dB. This method effectively groups together properties with the same current noise environment.

2.2.5 Relief to the existing A259, through Bexhill and Hastings as far as the B2093 junction at Ore, was assessed by forecasting the reduction in noise which would immediately occur after the opening of the bypass. Only properties fronting the A259 have been assessed for noise relief.

2.3 Noise Nuisance

2.3.1 The correlation between public satisfaction and traffic noise is based, in the main, on the results of two surveys carried out by the Building Research Station in 1968 and 1976, together with measurements carried out by the Transport Research Laboratory, published in 1977. More recent research indicates that people are more sensitive to abrupt changes in traffic noise associated with new road schemes than would be predicted by evidence of 'steady state' noise dissatisfaction. The assessment method takes account of noise increases or decreases in 1998, the year of opening for assessment purposes, and estimates changes in the percentage of people 'bothered very much or quite a lot' by the traffic noise in that year. Changes in noise nuisance are presented in ranges of 10 per cent and are summarised together with the noise level changes in the ambient level bands.

2.3.2 The likelihood of sleep disturbance, resulting from increased traffic flow at night, is assessed by establishing whether the average weekday flow between 10.00pm and 6.00am is likely to exceed 10% of the total and, if so, identifying properties where traffic noise would be increased above 68dB L_{A10} 18 hr.

2.4 Construction Noise

2.4.1 Since the methods of working, type, number and location of plant equipment cannot be known at this stage and would vary from day to day, precise predictions of construction noise cannot be made in advance. At best, only a broad assessment can be made, using the various methods described below. Construction noise is conventionally described using the equivalent continuous noise level, L_{Aeq} and peak level L_{Amax} (See Appendix A).

2.4.2 The principal sources of noise during the construction phase would be earthworks and piling, with other processes such as demolition, bridge and pavement construction contributing to a lesser degree, and over a shorter period.

2.4.3 For earthworks, a broad-brush method has been used, based on Appendix 3 of TRRL Report LR 756 [Ref 2].

2.4.4 For piling operations, noise has been estimated using the method and data given in Table 9 of CIRIA Report 64 [Ref 3] and other sources eg BS 5228 [Ref 4].

2.5 Vibration

2.5.1 Ground-borne vibration from road traffic can be generated if heavy vehicles pass over irregularities in the road. Properly designed and constructed road pavements are not sufficiently uneven to cause a problem.

2.5.2 Traffic-induced vibrations from low frequency sound emitted by vehicle engines and exhausts may also occur and on occasion result in perceptible vibrations in building elements, particularly loose fitting windows and doors.

It has been found that for a given increase in traffic noise, the increase in the percentage of people bothered by vibration is similar to that for noise over much of the exposure range.

3 EXISTING NOISE CLIMATE

3.1 Introduction

Since much of the route lies in a rural area, the existing noise levels are low except near the main roads, there being no major industrial sources of noise in the vicinity.

3.2 Ambient Noise Survey

3.2.1 A noise survey was undertaken in March 1992. Data was taken at 27 sites, selected as being representative of dwellings or sensitive locations likely to be most affected by the scheme, based on the shortened measurement procedure defined in CRTN. This requires three separate measurements of 15 minutes duration during three consecutive hours between 10.00am and 5.00pm on weekdays. From these, the 18 hour levels can be obtained. The results are summarised in Appendix C. The tabulated levels are free-field values in all cases.

3.2.2 Noise levels were measured using CEL sound level meters type 393A or 393B mounted on tripods 2.0 m above the ground.

3.3 Interpretation of Survey Results

Great care is needed in interpreting measured levels since they relate only to the particular conditions, for example, wind, local traffic and other activities, at the time of measurement and these can vary greatly. The measurements may therefore be unreliable as indicators of the existing noise environment.

3.4 Calculation of Existing Noise Levels

As a result of the above, where traffic is the dominant noise source, existing noise levels are determined by calculation from current traffic flows. This technique also has the advantage of being consistent with the method of forecasting future noise levels. However, in areas distant from roads carrying significant traffic flows both measurement and calculation methods may be inappropriate on occasion. In such a situation a typical value representative of the existing noise level (L_{A10}) in the area, for example 45 dB in a rural area or 51 dB within a housing estate, would be used to assess changes in noise level.

4 ASSESSMENT OF IMPACT

4.1 Introduction

4.1.1 The construction and opening of the bypass would result in noise and vibration impacts within the scheme corridor. The reduction in traffic flows along the A259 through Bexhill and Hastings would reduce the environmental impact of traffic on this route.

4.1.2 The noise impacts described take account of the proposed mitigation measures, described in Section 5 of this report, with the exception of the noise insulation measures which clearly do not affect the facade noise levels.

4.2 Traffic Noise Impact on Bypass Corridor

4.2.1 The incremental noise bands used in this report are as follows, together with an indication of the subjective reaction to the changes.

Change	
3 to 5 dB	A perceptible change in loudness.
5 to 10 dB	10 dB change is equivalent to a doubling or halving in loudness. A 5 - 10 dB change is accordingly significant.
10 to 15 dB	A more significant change, being equivalent to greater than a doubling or halving of loudness.
15 to 20 dB	A 20 dB change is equivalent to a quadrupling or quartering of loudness. 15 - 20 dB therefore represents a substantial change.

A change of 1 dB is considered to be just noticeable as an 'immediate' change in loudness, for example, as an increase at the day of scheme opening. It is not considered to be perceptible as a long term change where a 3 dB increase or decrease needs to occur for it to be noticeable to the average person. Consequently changes of 1 - 3 dB have not been forecast over the 15 year period from scheme opening to design year.

4.2.2 Changes in noise level are summarised in Appendix D and are shown on Figures 4 - 11 together with forecast levels at sample properties.

The noise impact is shown in incremental bands of noise change in Tables 1 to 4 inclusive. The changes can be summarised as 839 dwellings with an increase of 3-5 dB, 407 with 5-10 dB, 33 with 10-15 dB and one dwelling with an increase of 15-20 dB. Noise decreases forecast within the bypass corridor are 2 dwellings with 3-5 dB and 6 with 5-10 dB. (See Table 5)

4.2.3 Even if the bypass were not to be built there would be a gradual increase in traffic flows on the road network as a whole (see traffic flow diagram Figure 2 in Appendix B). Between 1998 and 2013 this traffic growth would result in a 1.5 dB increase in the vicinity of existing roads, if high economic growth were to occur.

4.2.4 By presenting noise increases as a comparison between forecast levels for the Published Scheme 15 years after its opening and those for 1998, the year of opening for assessment purposes, the impact of the scheme is exaggerated by the inclusion of the 1.5 dB referred to above.

4.2.5 A reassessment using revised traffic flows forecast for the years 2000 and 2015 (opening and design years) would affect impact assessment results in that the noise increases due to the bypass would be higher by up to 1 dB. Some forecast noise levels for 2000 and 2015 would be higher than those illustrated for 1998 and 2013 at locations where forecast traffic flows have been increased.

4.3 Noise Nuisance Effects

4.3.1 Unlike an assessment of noise level changes in dB, which can be measured or forecast, the concept of noise nuisance attempts to relate people's annoyance to the noise level or change in noise level which causes it. Individuals vary considerably in their sensitivity to noise which can be affected by various factors such as satisfaction with the neighbourhood in general and the visibility of traffic.

4.3.2 The changes, in numbers of properties subject to percentage increases or decreases in people "bothered very much or quite a lot", are presented in the tables in Tables 1 to 4 inclusive in Appendix D. The changes can be summarised as 1458 dwellings with increases of 20-30%, 270 with 30-40% and 45 with an increase of greater than 40%. Nuisance decreases calculated are 110 dwellings with 20-30%, 69 with 30-40% and 21 with 40-50%. (See Table 5)

4.3.3 Sleep disturbance has been assessed using April 1994 traffic data obtained from East Sussex County Council.

Night-time traffic flows between 10.00pm and 6.00am were extracted from the data for two locations on the A259. The first location on a rural section of the A259, to the west of Bexhill, showed that 4.9% of the 24 hour flow occurred overnight between the above hours. At Glyne Gap the overnight flow was 5.2% of the 24 hour flow.

From the above it is concluded that the traffic flow on the bypass between 10.00pm and 6.00am is very unlikely to exceed 10% of the total flow and that consequently increased sleep disturbance should not be a problem.

4.4 Relief to Existing A259 Corridor

4.4.1 Relief in terms of noise decreases along the existing A259 corridor through Bexhill and Hastings as far as the B2093 at Ore has been estimated by comparing the traffic forecasts in 1998, the year of opening for assessment purposes, with and without the bypass, giving an indication of the immediate relief likely to be experienced at the time of opening.

4.4.2 Using the above comparisons it has been estimated that 1373 dwellings on the existing A259 would benefit from noise reductions of between 3 and 6 dB and a number of shops, schools, a hospital, churches, public houses, hotels, and sports and other community facilities and commercial properties would also benefit in a similar way. Only properties fronting the A259 were considered. The number of dwellings assessed is therefore conservative. See Table 6 in Appendix D for more detail.

4.4.3 Noise nuisance decreases along the A259 have also been assessed and included in Table 6 in Appendix D. The assessment shows that 646 dwellings would have a reduction in nuisance levels of 30-40%, 1656 dwellings would have a reduction of 40-50% and 71 would have a reduction of greater than 50%.

4.5 Construction Noise Impact

4.5.1 There are difficulties in assessing the impact of noise from construction activity because of the temporary and intermittent nature of construction operations and the lack of details of the methods of working and the type, number and location of plant equipment which the contractor would use.

4.5.2 A preliminary assessment indicates that noise levels during construction would be quite high at all of the interchange locations and side road crossings where there would be earthworks and bridge construction taking place.

Piling is the main cause of high noise levels at bridge sites. The major structures that are expected to have piled foundations are given below:

Combined Footpath and Field Access Overbridge	(Figure 4)
Combined Culvert Farm Access and Footpath Underpass at Hooe Sewer	(Figure 4)
Whydown Road Overbridge	(Figure 4)
Combined Footpath and Access Overbridge at Sweet Willow Pumping Station	(Figure 5)
Peartree Lane Overbridge	(Figure 6)
Retaining Wall at A269 Junction	(Figure 6)
Bexhill Northern Approach Road (BNAR) Junction Underbridges	(Figure 7)
Combe Haven Viaduct	(Figure 7)
Railway Tunnel	(Figure 9)
Retaining Walls at Mayfield Farm Junction	(Figure 9)
Crowhurst Road Underbridge	(Figure 9)
Retaining Wall at High Beech Close	(Figure 10)

Retaining Wall at Beauport Home Farm Close	(Figure 10)
Retaining Walls at Whitworth Road	(Figure 11)

See 5.3.6 for estimated numbers of dwellings that would be affected by construction noise.

4.6 Community Land

Impact on Public Open Space and other community land has been assessed by forecasting 'free field' traffic noise levels at sample locations. The noise impact varies between increases of 4-5 dB at St Mary's Recreation Ground (Figure 6) and 28 dB at a location on the dismantled railway (Figure 8). The closest areas of Jack O'Boreham's Wood (Figure 5) and Ninfield Road allotments (Figure 6) would suffer increases of 18 and 20 dB respectively.

4.7 Comments on Traffic Induced Vibration

4.7.1 The percentage of people bothered by vibration is similar to that for traffic noise and can therefore be related to the L_{A10} 18hr index. There is little evidence that noise levels below 60 dB produce significant vibration nuisance. At 75 dB nuisance may be experienced by 50% of the people exposed to this level of noise.

4.7.2 It is important to note that traffic induced vibrations from low frequency sound do not cause structural damage to buildings. Such vibrations may occur in loose fitting doors or windows.

5 MITIGATION MEASURES

5.1 Introduction

There are a variety of mitigation measures which are proposed to minimise noise impacts. They include earth mounds, acoustic barriers and property sound insulation, which would reduce both construction and traffic noise. These measures, although primarily intended for mitigation of traffic noise, would be established at the earliest opportunity in order to reduce the construction noise impact.

5.2 Mitigation Measures for Road Traffic Noise

5.2.1 Barriers and Earth Mounds

Proposed measures are listed below and shown on Figures 4-11 as follows:

(1) 3 m high noise barrier of 270 m length on the north side of the eastbound exit slip at A269 Ninfield Road junction (Figure 6).

(2) 2 m high noise barrier of 310 m length on the south side of the westbound entry slip at A269 Ninfield Road junction (Figure 6).

(3) 2 m high false cutting of 370 m length on the south side of the westbound exit slip (Figure 6).

(4) 3 m high false cutting, 35 m long, on the north side of the bypass to the east of Watermill Lane (Figure 7).

(5) 2 m high noise barrier, 150 m long, on a 3 m false cutting mound on the south side of the bypass to the east of Watermill Lane, which would then continue as 4.5 m false cutting to merge with a deeper cutting around Chainage 7600 (Figure 7). A mound of varying height up to 4 m would extend to Buckholt Lane.

(6) 3 m high noise barrier, 270 m long, on the northwest side of the main carriageway to the west side of Mayfield Farm junction (Figure 9).

(7) 2 m high noise barrier about 85 m long, on a retaining wall adjacent to Hollyhocks Cottage, Crowhurst Road (Figure 9).

(8) 3 m high earth mound of 250 m length to the east of Mayfield Farm junction to mitigate noise in the Mayfield Farm area (Figure 9).

(9) 3 m high earth mound of 290 m length on the northwest side of the bypass north of the Castleham junction which would merge into a cutting around Chainage 13640 (Figure 10).

(10) 2 - 3 m high noise barrier of approximately 220 m length (to maintain a height of 2 m above garden level) partly on a retaining wall to protect properties in High Beech Close (Figure 10).

(11) 2 m high noise barrier, 760 m long, on the southeast side of the bypass from west of Battle Road to the Baldslow Roundabout (Figures 10 and 11).

(12) 3 m high earth mound, about 330 m long, on the northwest side of the eastbound exit slip at Baldslow to merge with item 13 below (Figure 11).

(13) 3 m high noise barrier, 290 m long, in places on low retaining wall for the benefit of properties in Beauport Gardens (Figure 11).

5.2.2 Sound Insulation

5.2.2.1 The Noise Insulation Regulations [Ref 5] impose a duty on the Department of Transport, as Highway Authority for trunk roads, to provide secondary glazing to qualifying windows of habitable rooms of dwellings adversely affected by traffic noise from the new scheme.

5.2.2.2 Secondary glazing must be provided where:

(a) The relevant noise level within fifteen years of scheme opening is greater than the specified level of 68 dB and

(b) The relevant noise level is greater than the prevailing level by more than 1 dB.

(c) Noise from the new carriageways makes an effective contribution to the relevant level of at least 1 dB and

(d) The property is within 300 m of the new (or altered) scheme.

(For definitions see Appendix A of this report).

5.2.2.3 Despite the proposed mitigation measures described in para 5.2.1, a number of dwellings would still experience levels which satisfy the above criteria. At this stage in the design, it is estimated that approximately 60 properties would qualify for secondary insulation against traffic noise under the Noise Insulation Regulations, assuming that the mitigation measures would be provided.

5.3 Mitigation Measures for Construction Noise

5.3.1 The Local Authorities have power under the Control of Pollution Act 1974 [Ref 6] to impose requirements as to the way in which the work would be carried out, and in particular:-

(i) the hours during which work may be carried out and

(ii) the level of noise which may be emitted.

5.3.2 These requirements are normally agreed with the Local Authorities and specified in the Contract. The Department's site representative would oversee the monitoring of noise levels and adherence to the limits on working hours, although ultimate control would remain with the Local Authorities' Environmental Health Officers.

5.3.3 The Contractor would be required to use equipment silenced in accordance with BS 5228 "Code of Practice for Noise Control on Construction and Open Sites" [Ref 4].

5.3.4 The Highway Authority has discretionary powers under the Noise Insulation Regulations to provide sound insulation where construction noise "... seriously affects or will affect for a substantial period of time the enjoyment of an eligible building adjacent to the site ..." even if no duty has arisen under the Regulations for traffic noise.

5.3.5 The criteria previously adopted for schemes within the Department's South East Region are:

(i) The predicted construction noise level, $L_{Aeq,}$ is expected to exceed 70 dB sustained over a period of several months, and

(ii) Construction noise levels alone are at least 1 dB greater than the prevailing ambient levels.

5.3.6 At this stage in the design, it is estimated that approximately 65 dwellings would experience levels of construction noise in excess of the criteria defined above. Many of these dwellings are included in those likely to qualify for insulation against traffic noise (see 5.2.2.3).

5.3.7 Wherever practical the noise barriers or earth mounds would be constructed at an early stage of construction to afford residents the benefits during construction.

5.4 Provisional Nature of Assessment

5.4.1 The numbers of dwellings estimated as being eligible for insulation for both traffic and construction noise are provisional and may alter with design changes.

5.4.2 When a final assessment has been made, after the Secretaries of State have issued a formal decision letter on the draft Orders, a list or map is published showing dwellings eligible for noise insulation. For traffic noise the Noise Insulation Regulations (Ref 5) allow two appeal periods where a review of noise calculations can be requested by anyone who feels that they should be entitled to an offer of insulation.

5.4.3 Since offers of insulation for construction noise are discretionary, there is no procedure for appeal against the lack of such offers.

6 SUMMARY OF EFFECTS

6.1 Bypass Corridor

6.1.1 A total of 1280 dwellings in the bypass corridor would be subject to noise increases of between 3 and 20dB. Eight residential properties would have decreases between 3 and 10 dB (See Table 5). The foregoing figures overstate the impact of the bypass since the increases quoted include 1.5 dB from the effect of traffic growth between 1998 and 2013, which would occur even if the bypass was not constructed. A reassessment of noise impact for the revised years of 2000 and 2015 (year of opening and design year) would lead to assessed noise increases being up to 1 dB greater.

6.1.2 There would be 1773 properties affected by increased noise nuisance and 200 subject to decreased nuisance. This reflects the shorter term reaction to perceived changes in the bypass year of opening. Increased sleep disturbance should not be a problem.

6.1.3 A total of 179 caravans and chalets would be subject to noise increases of 3 - 10 dB. There is some scope for relocation of units at Beauport Park.

6.2 Existing A259 Route

6.2.1 In 1998, the year of opening for assessment purposes, 1373 dwellings along the existing A259 through Bexhill and Hastings would experience decreases in noise levels in the range 3-6 dB.

6.2.2 Noise nuisance reductions indicate 2373 dwellings would benefit from the opening of the bypass. Again this reflects the reaction to short term changes.

6.3 Community Land Impact

Noise increases on areas of community land would vary between 4 and 28 dB. See Figures 5 to 10.

6.4 Noise Mitigation

6.4.1 Mitigation measures in the form of noise barriers and earth mounds would be provided to minimise the impact of the scheme. These, however, cannot fully obviate the need for secondary insulation to the dwellings but would provide the benefit of improving the noise climate of areas such as gardens.

6.4.2 It is estimated that approximately 60 dwellings would qualify for secondary insulation for traffic noise under the Noise Insulation Regulations. Approximately 65 dwellings would be likely to experience

construction noise levels above the criteria in 5.3.5 and many of these properties would be likely to be included in the above 60 dwellings.

6.4.3 Wherever practical, mitigation measures would be installed before the start of major operations to minimise the impact of construction noise.

7 REFERENCES

1 Calculation of Road Traffic Noise. DOT Memorandum 1988, HMSO

2 The Prediction of Noise from Road Construction. TRRL. Laboratory Report LR 756

3 Noise from Construction and Demolition Sites. CIRIA Report 64, April 1977

4 BS 5228 Part 1: 1984 and Part 4: 1992; Noise Control on Construction and Open Sites.

5 The Noise Insulation Regulations 1975 and Amendment 1988, HMSO

6 Control of Pollution Act 1974.

APPENDIX A

Explanation of Acoustical Terms

APPENDIX A

EXPLANATION OF ACOUSTICAL TERMS

1 Decibel, dB

Noise levels are usually quoted in decibels. This is the unit of measurement used for sound pressure levels. The decibel scale is logarithmic rather than linear. The threshold of hearing is zero decibels while, at the other extreme, the threshold of pain is 120 decibels. In practice these limits are seldom experienced and typical levels lie within the range of 30 dB - a quiet night-time level in a bedroom, to 90 dB - at a kerbside of a busy city street. Examples of typical levels of common sounds are presented in Figure 1.

2 The 'A' weighting

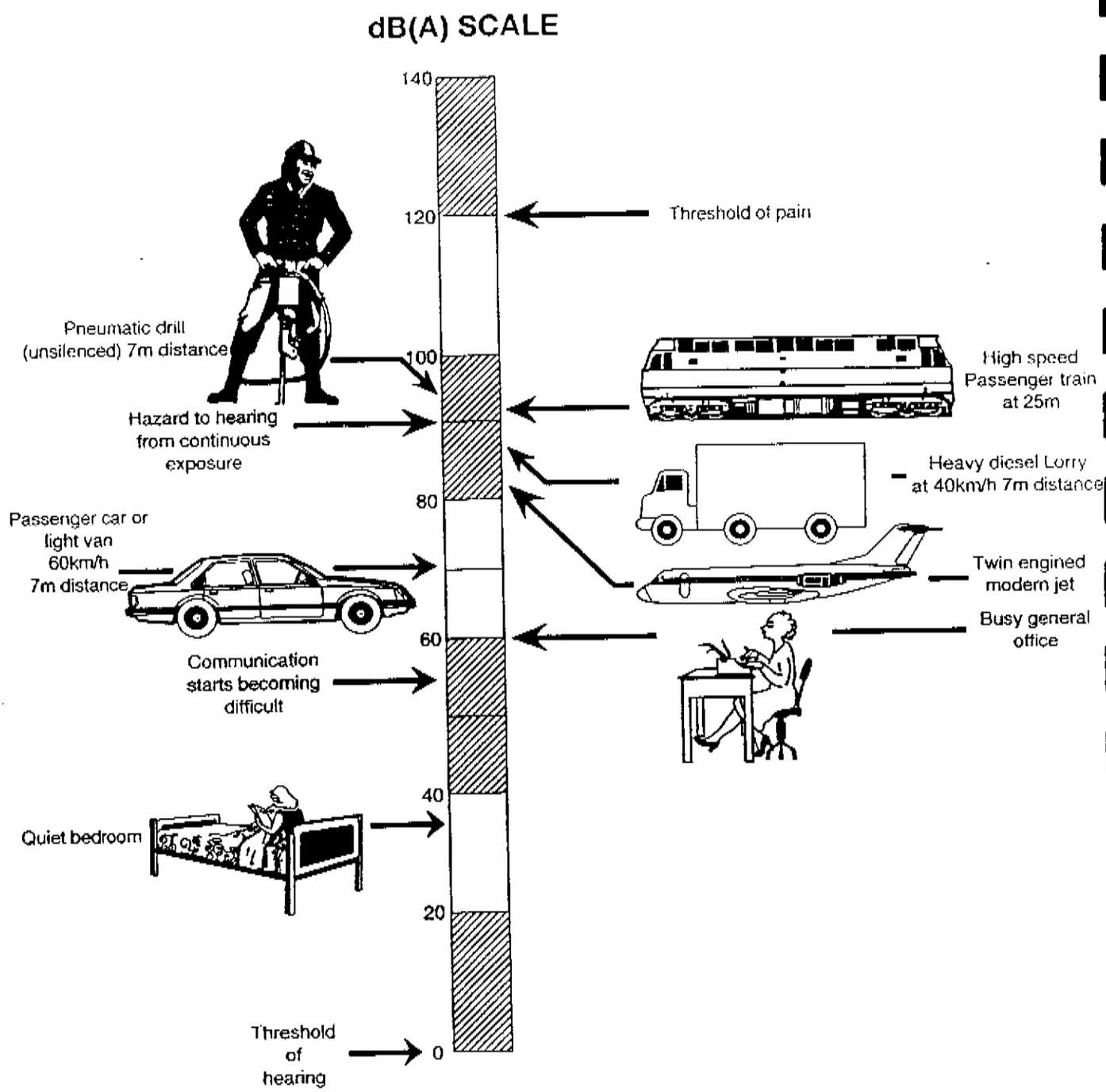
The human ear has a non-linear frequency response; it is less sensitive at low and high frequencies and most sensitive in the range 1 to 4 kHz (cycles per second). The 'A' weighting is applied to measured or calculated sound pressure levels so that these levels correspond more closely to the response of the human ear. A-weighted levels are often expressed in dB(A).

3 Statistical Sound Level Indices, L_{AN}

Noise from road traffic and other sources fluctuates continuously, both on a short and long term basis. It is therefore necessary to use indices which involve averaging over the appropriate time period. The A-weighted level L_{AN} is that level exceeded for N% of the time. The background noise level is commonly quoted using the L_{A90} index. From research over previous years it has been found that the human response to traffic noise is closely linked to the higher noise levels experienced and correlates well with the L_{A10} index.

4 The L_{A10} Index and L_{A10} (18 hour) index

L_{A10} is the sound level in dB which is exceeded for 10% of the measurement period. The L_{A10} (18 hour) index is the arithmetic mean of all the hourly L_{A10} measurements during a period from 0600 to 2400 hours on a normal working day. All traffic noise levels quoted in this report follow this convention and are facade levels.



The Level of Common Sounds on the dB(A) Scale
Figure 1

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5 **Free-field Noise Level**

Sound which is measured, or calculated, in the open, without any reflections from nearby surfaces. Sound is reflected from hard surfaces in a similar manner to light by a mirror.

6 **Facade Noise Level**

A facade noise level is the noise level 1 m in front of the most exposed window or door in a building facade. The effect of reflection, referred to above, is to produce a slightly higher (+ 2.5 dB) sound level than it would be if the building was not there.

7 **Relevant Noise Level**

The relevant noise level is the maximum facade noise level expected to be caused by road traffic within the 15 year period after scheme opening. It is quoted in dB using the L_{A10} (18 hour) index.

8 **Prevailing Noise Level**

A prevailing noise level is the facade noise level caused, or expected to be caused, by road traffic immediately prior to the commencement of construction operations. It is quoted in dB, using the L_{A10} (18 hour) index.

9 **The L_{Aeq} Index**

The equivalent continuous sound level L_{Aeq} is the level of a notional steady sound which, at a given position and over a defined period of time, would deliver the same A-weighted acoustic energy as the fluctuating noise.

10 **Peak Noise Level L_{Amax}**

The highest 'A' weighted value indicated on a sound level meter, which for measurement of construction noise is set to 'slow' response.

11 **Construction Noise Levels**

A construction noise level is the facade noise level expected to be caused by construction operations at their peak period. It is quoted in dB, using the L_{Aeq} index over a 12 hour period.

12 Ambient Noise

Ambient noise is defined as the total sound in a given situation at a given time usually composed of sound from many sources near and far.

APPENDIX B

Traffic Flow Diagram

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Average 18 hour August Flows
Figure 2

APPENDIX C

Ambient Noise Survey

APPENDIX C
TABLE C - AMBIENT NOISE MEASUREMENTS (dB FREE FIELD)

Site No	Location	L_{A90}	L_{A10} 18 hrs	L_{Aeq}	Remarks
1	New Lodge Cottages	54	60	60	
2	Court Lodge Cottage	43	47	47	
3	Quyddleswell Mount near Broad Green Farm	40	45	44	Traffic noise not audible
4	Holmes Farm Cottages	39	48	49	
5	Longdown Farm	35	49	45	Farm birds
6	Summerleas, Pear Tree Lane	37	53	55	
7	Brook Cottage, Pear Tree Lane	39	54	52	
8	On footpath behind Thorne Crescent	40	53	51	
9	Bramble Cottage, St Mary's Lane	49	59	57	
10	St Mary's Cottages	54	72	70	
11	End of Mayo Rise	49	56	54	
12	Preston Lodge	41	48	47	
13	Preston Hall	42	52	51	
14	End of Preston Road	41	51	49	
15	Acton's Farm	40	49	47	Traffic noise not audible
16	1 Worsham Lane	40	46	45	
17	Hillcroft Farm	38	50	48	
18	Adam's Farm	39	47	46	
19	Upper Wilting Farm	40	57	55	
20	Mayfield Farm	43	55	53	
21	1 Coneyburrow Gardens, off Ingleside	45	52	52	
22	High Beech Country Club	44	51	49	
23	High Beech Close	42	54	52	
24	Rear of 41 Augustus Way	49	62	60	
25	End of Beauport Gardens	46	56	54	
26	Beauport Caravan Park	39	44	43	
27	1 Westfield Lane	52	63	61	

Note: (For site locations refer to Figure 3). L_{A10} (18 hours) = Average of three sample periods less 1 dB

APPENDIX D

Summary Tables of Traffic Noise and Nuisance Impact

A259 BEXHILL AND HASTINGS WESTERN BYPASS

Noise Impact Assessment

Bypass Corridor

Table 1

Ambient Noise Band < 50 dB	Published Scheme				Do Minimum	Remarks
	Residential	Caravans/ Chalets	Commercial/ Industrial	Others		
Increase in Noise Level dB					Properties subject to increase of 1.5 dB where traffic is dominant noise source.	1 Caravans are static, approx numbers shown at The Kloofs, Whydown Road and Cobbs Hill Farm, Watermill Lane.
3-5	17	45 (Kloofs)	-	St Oswalds Church		
5-10	22	10 (Cobbs Hill)				
10-15	25					
Increase in Nuisance Level					-	2 No decreases in noise or nuisance.
20-30%	33	45 (Kloofs)	N/A	N/A		
30-40%	19	10 (Cobbs Hill)				
> 40%	27					

A259 BEXHILL AND HASTINGS WESTERN BYPASS
Noise Impact Assessment

Bypass Corridor

Table 2

Ambient Noise Band 50 < 60 dB	Published Scheme				Do Minimum	Remarks
	Residential	Caravans/ Chalets	Commercial/ Industrial	Others		
Increase in Noise Level dB						Chalets at High Beech Country Club and static caravans at Beauport Park.
3-5	664	106	5	High Beech Country Club, Bexhill Cemetery Chapel and The Grove School subject to 3 - 5 dB. Robsack Wood School subject to 5 - 10 dB.	Properties subject to increase of 1.5 dB where traffic is dominant noise source.	
5-10	334	12	52			
10-15	8					
15-20	1					
Increase in Nuisance Level						
20-30%	1233	145	N/A	N/A	-	
30-40%	210	6				
> 40%	18	1				
Decrease in Nuisance Level						Nuisance decreases due to decreases in noise level of < 3 dB.
20-30%	42	-	N/A	N/A	-	
30-40%	7	-				

A259 BEXHILL AND HASTINGS WESTERN BYPASS
Noise Impact Assessment

Bypass Corridor

Table 3

Ambient Noise Band 60 < 70 dB	Published Scheme				Do Minimum	Remarks
	Residential	Caravans/ Chalets	Commercial/ Industrial	Others		
Increase in Noise Level dB						
3-5	158	-	58	Hollington Lodge Country Club and Beauport Sports Club subject to 3 - 5 dB.	Properties subject to 1.5 dB increase in noise level.	
5-10	49	6 (Beauport Park)	35			
Increase in Nuisance Level						
20-30%	186		N/A	N/A	-	
30-40%	33	6				
Decrease in Noise Level dB						
3-5	2	-	-	-	-	
5-10	6	-	-			
Decrease in Nuisance Level						
20-30%	61	-	N/A	N/A	-	
30-40%	37	-				
40-50%	18	-				

A259 BEXHILL AND HASTINGS WESTERN BYPASS
Noise Impact Assessment

Bypass Corridor

Table 4

Ambient Noise Band > 70 dB	Published Scheme				Do Minimum	Remarks
	Residential	Caravans/ Chalets	Commercial/ Industrial	Others		
Increase in Noise Level dB 5-10	2	-	-	-	Properties subject to 1.5 dB increase in noise level.	
Increase in Nuisance Level 20-30% 30-40%	6 2	- -	N/A	N/A	-	
Decrease in Nuisance Level 20-30% 30-40% 40-50%	7 25 3	-	N/A	N/A	-	Nuisance decreases due to decreases in noise level of < 3 dB.

A259 BEXHILL AND HASTINGS WESTERN BYPASS
Noise Impact Assessment

Bypass Corridor

Table 5

Noise Impact - Summary of Changes to Residential Property (excluding caravans and chalets)

1 **Noise Level Changes**

Ambient Band (dB)	Increases (dB)				Decreases (dB)	
	3 - 5	5 - 10	10 - 15	15 - 20	3 - 5	5 - 10
< 50	17	22	25	-	-	-
50 < 60	664	334	8	1	-	-
60 < 70	158	49	-	-	2	6
> 70	-	2	-	-	-	-
Totals	839	407	33	1	2	6

Total Numbers of Property affected by:

1 Noise Increases 1280
2 Noise Decreases 8

2 **Noise Nuisance Changes**

Ambient Band (dB)	Increases %			Decreases %		
	20 - 30	30 - 40	> 40	20 - 30	30 - 40	40 - 50
< 50	33	19	27	-		-
50 < 60	1233	210	18	42	7	
60 < 70	186	39	-	61	37	18
> 70	6	2	-	7	25	3
Totals	1458	270	45	110	69	21

Total Numbers of Property affected by:

1 Noise Nuisance Increases 1773
2 Noise Nuisance Decreases 200

A259 BEXHILL AND HASTINGS WESTERN BYPASS
Noise Impact Assessment

Relief to Existing A259*

Table 6

Property Type	Noise Decreases dB		Remarks
	3 - 5	5 - 6	
Residential	1308	65	1 Noise decreases compare with and without scheme in 1998.
Commercial	60	4	
Hospitals, OAP Homes and Doctors' Surgeries	5		2 Total number of residential properties 1373. (Frontage properties only assessed.)
Schools	3		
Hotels, Guest Houses and Youth Hostels	6		
Public Houses and Clubs	5		
Sports facilities	1		
Churches	5		

Reduction in Noise Nuisance on Existing A259

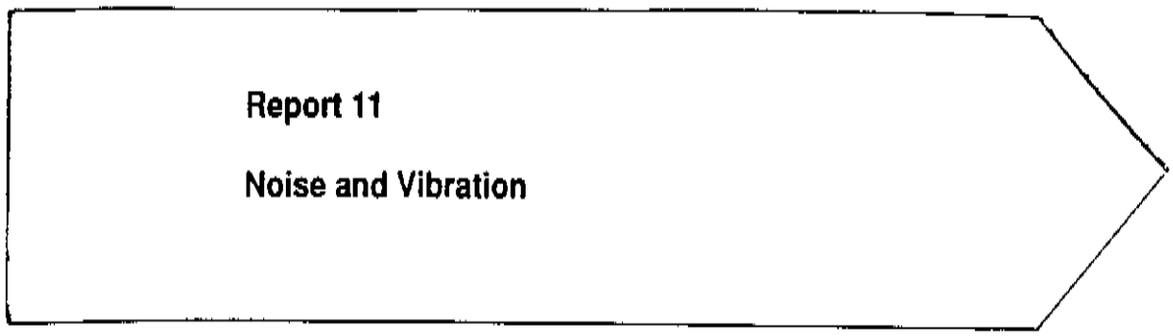
Nuisance Reduction %	30 - 40	40 - 50	> 50
Residential Property	646	1656	71

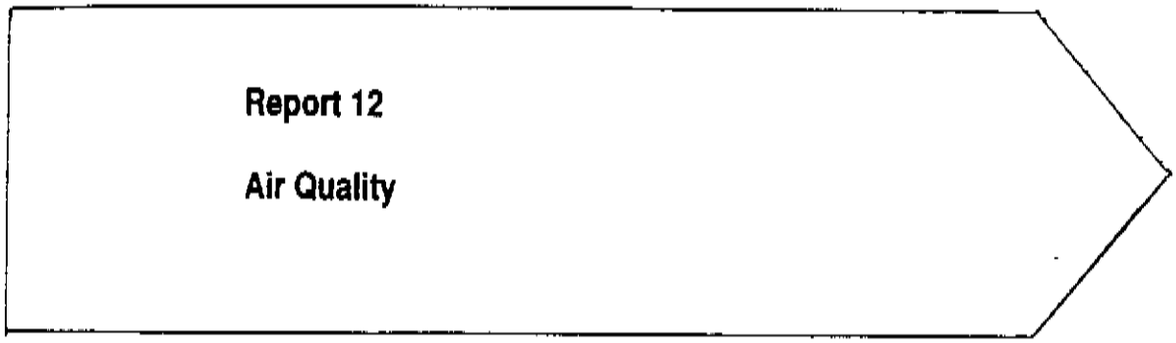
Total Number of Properties 2373

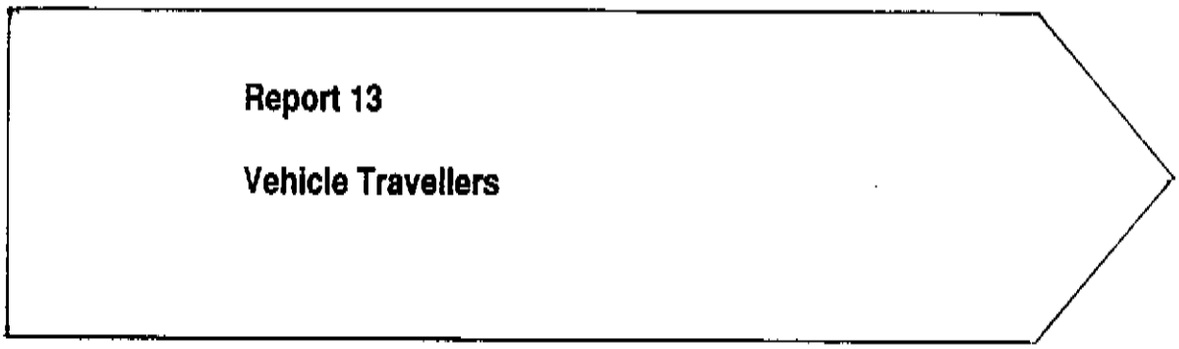
* Through Bexhill and Hastings as far as B2093 junction at Ore.

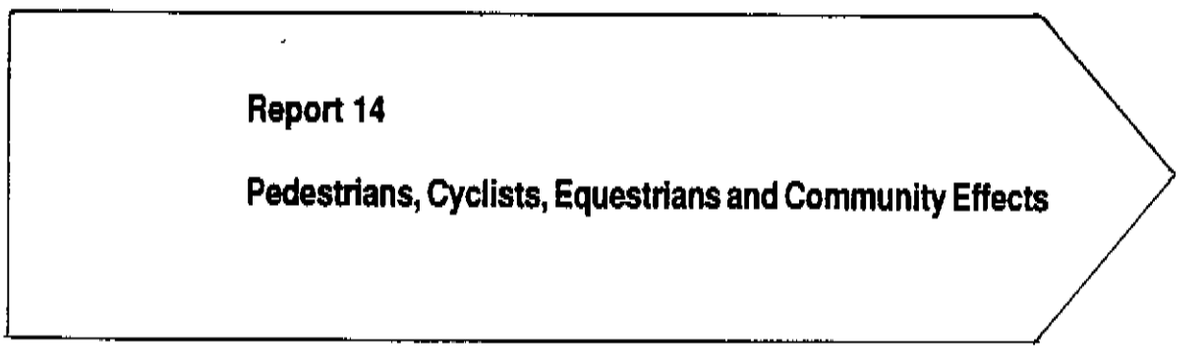
APPENDIX E

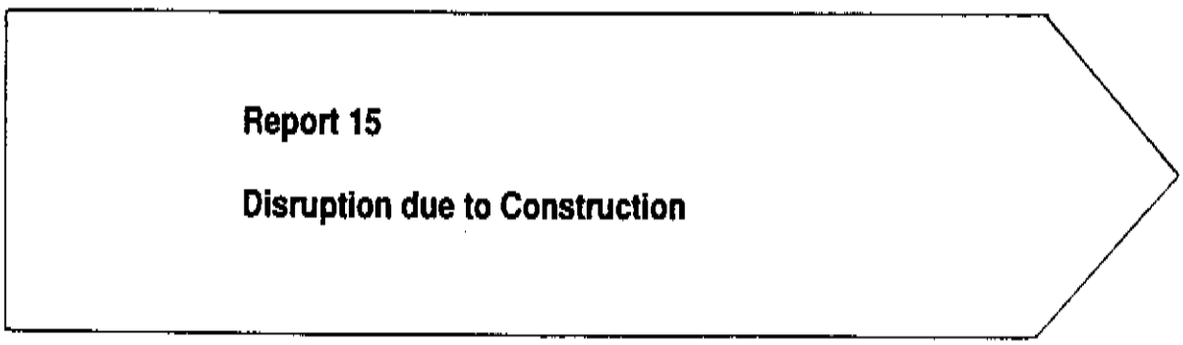
Traffic Noise Impact Plans


Report 11
Noise and Vibration


Report 12
Air Quality


Report 13
Vehicle Travellers


Report 14
Pedestrians, Cyclists, Equestrians and Community Effects


Report 15
Disruption due to Construction

Document Ref: 10059/RC/047/12/A
September 1994

REPORT 12

AIR QUALITY ASSESSMENT

September 1994

Document Ref: 10059/RC/047/12/A
September 1994

REPORT 12

AIR QUALITY ASSESSMENT

September 1994

Issue and Revision Record

Rev	Date	Originator	Checked	Approved	Description
P1	May 94	SM	JP	SFB	First Draft
A	September 94	SJM	JP	SFB	Publication Issue

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1 INTRODUCTION

1.1 Assessment of the effects of air pollution follows the methods given in Volume 11 of the Design Manual for Roads and Bridges (DMRB), incorporating up to date research into the effects of different pollutants and taking account of the introduction of unleaded petrol and catalytic converters. Increasingly stringent regulations mean that the output per vehicle of exhaust pollutants will reduce with time.

1.2 The purpose of this assessment is to establish whether or not a more detailed analysis by other methods is required.

2 EXHAUST EMISSIONS AND PROGRESS IN THEIR REDUCTION

2.1 Exhaust Pollutants and their Effects

2.1.1 Motor vehicles using hydrocarbon fuel (petrol, diesel or liquid petroleum gas) emit a wide variety of gaseous and particulate materials, of which only a small proportion are potentially harmful to people. The amount of pollution depends on the engine type, size, age, state of maintenance, speed and operating conditions. The concentration falls off rapidly with distance from the source as the emission disperses into the atmosphere or is deposited on the ground. Wind conditions in turn have a significant effect on the rate of dispersal into the atmosphere.

2.1.2 The combustion of the hydrocarbon fuel with air produces mainly carbon dioxide (CO_2), nitrogen (N_2) and water (H_20). Combustion engines are not perfectly efficient and some of the fuel is not burnt or only partly burnt. This results in the presence of hydrocarbons (HC), carbon monoxide (CO) and carbon (soot) in the exhaust emissions. The high temperatures and pressures in the engine's cylinders cause some of the nitrogen in the air and fuel to be oxidised forming mainly nitric oxide and a small amount of nitrogen dioxide.

2.1.3 Prior to the introduction of unleaded fuel, lead compounds were added to all higher octane petrols to aid the combustion properties of the fuel. Scavengers are added to 4 star petrol to help clear the lead compounds from the engine. They react with the lead additives during combustion to form fine particles of inorganic lead compounds and a small amount of volatile organic lead compounds.

Carbon Monoxide (CO)

Approximately 90% of the total UK emission (1991) of CO is from road transport, making its presence the most reliable indicator of air pollution due to traffic. CO is absorbed rapidly by the blood reducing its oxygen carrying capacity. It contributes indirectly to the greenhouse effect by depleting atmospheric levels of hydroxyl radicals and thus slowing the destruction of the powerful greenhouse gas methane.

Oxides of Nitrogen (NO_x)

Approximately 50% of NO_x produced in the UK is from road transport. Most is emitted as Nitric Oxide (NO). In the air the NO is oxidised to nitrogen dioxide (NO_2) which is more toxic, affecting the respiratory system. NO_x also contributes to photochemical smog formation and acid deposition. Nitrous oxide (N_2O) is a powerful greenhouse gas produced in very small amounts by conventional vehicles.

Hydrocarbons (HC)

Approximately 40% of HC produced in the UK is from motor vehicles. HC include all organic compounds emitted. Some HC are toxic or carcinogenic. They are important precursors of photochemical smog,

acidic and oxidising compounds. Methane contributes directly and non-methane hydrocarbons indirectly to the greenhouse effect.

Particulate Matter

Nearly half the black smoke in the UK is produced by motor vehicles. The emissions are mainly from diesel vehicles. The black smoke has a high staining power and soils buildings and other materials.

Lead (Pb)

Nearly all the lead in the air is emitted from motor vehicles using leaded petrol. Lead is toxic.

Carbon Dioxide (CO_2)

Approximately 20% of CO_2 produced in the UK is from motor vehicles. It is considered the least harmful of the major greenhouse gases, for a given volume, but it is also the largest contributor to total greenhouse gases in the atmosphere.

2.2 Reductions in Emissions

2.2.1 Since 1971 progressively more stringent regulations have been introduced governing the exhaust emissions of european cars. These regulations initially dealt with carbon monoxide and hydrocarbons and after 1977 also covered nitrogen oxides.

2.2.2 Over the same period the total amount of lead emitted has been reduced significantly by controlling the proportions of lead which is added to petrol to improve engine efficiency.

2.2.3 In particular a number of important steps have been taken in recent years to reduce emissions from road vehicles which are described in the following sections.

2.3 Lead in Petrol

2.3.1 Following legislation, manufacturers reduced the amount of lead in leaded petrol by 60% from the end of 1985 which led to a reduction in lead emitted by vehicles in the UK of over 50% in 1986.

2.3.2 Unleaded petrol is now sold at virtually all petrol stations. Since 1 October 1990 all new petrol engined cars have had to be capable of running on unleaded petrol. Indeed some vehicle manufacturers anticipated this requirement with lead-free engined models being available for several years prior to 1990.

2.3.3 Emissions of lead fell by a factor of about four between the early 1970s and 1990, due to reductions in the lead content of leaded fuel. They have fallen further as unleaded fuel has come into greater use.

2.4 Catalytic Converters

2.4.1 Since 1993 all new petrol engined cars are required to have catalytic converters fitted. These should remove 75% of harmful emissions from car exhausts.

2.4.2 Converters work by using the CO in exhaust fumes to reduce the NOx to inert nitrogen and then use the oxygen released by this process and oxygen from the air to oxidise the CO and some of the Hydrocarbons to produce CO_2 and water vapour.

2.4.3 However, the critical air/fuel ratio for operation of a converter is not the same as that for optimum fuel economy. There is therefore a trade-off between the substantial reduction of harmful emissions and the resulting increased generation of CO_2.

2.5 Emissions from Heavy Diesels

2.5.1 Fumes or smoke and smell are primarily the products of diesel engines which, it is estimated, produce 10 times as many particulates in their exhausts as petrol engines. Diesel emissions are obviously unpleasant due to their visibility, soiling properties and odour. However, no evidence of health effects from exposures to diesel fumes has been found, even amongst those continually exposed (eg bus garage employees). Thus, it is for amenity reasons that the UK has for over 20 years prohibited visible smoke emissions from diesel vehicles.

2.5.2 In 1990, the first stage of EC regulations to limit emissions from heavy diesels was introduced. Much more stringent emission standards for heavy duty diesel engines have been applied since 1993, with further reductions planned for 1996 which will reduce the emission of particulates by a factor of about six.

3 METHODOLOGY OF ASSESSMENT

3.1 Traffic Assumptions

3.1.1 The traffic forecasts assume the opening of the bypass together with the adjacent A259 Hastings Eastern Bypass and the Bexhill Northern Approach Road (BNAR).

3.1.2 The assessment of air quality impact has been carried out on the assumption that the scheme opening year would be 1998 and the design year (15 years after opening) would be 2013. Pollution levels have been calculated from predicted traffic flows including those forecast for 2013, which assume that high economic growth would occur.

3.1.3 Traffic flows have recently been reassessed and the year of opening of the scheme and design year revised to 2000 and 2015 respectively. Revised traffic flows for these years are given in Volume 1 of this Statement. Changes in the results of the impact assessment are discussed in paragraph 4.7.2 (iv).

3.2 Assessment Approach

3.2.1 Volume 11 Section 3 Part 1 of the DMRB describes the method of assessing Air Quality.

3.2.2 Air quality can be affected in two different ways by a road scheme:

(i) Localised changes, either improvements or reductions in air quality, along all or part of a scheme.

(ii) Overall changes in the quantity of emissions from the traffic on the road network.

4 LOCALISED AIR QUALITY ASSESSMENT

4.1 Pollutants

4.1.1 Pollutants considered for the localised assessment method are, Carbon Monoxide (CO), Oxides of Nitrogen (NO_x) and Hydrocarbons (HC).

Assessment of each pollutant is undertaken in a series of stages. The result is a function of traffic flow, percentage of heavy goods vehicles, speed, distance from the road and the year for which the calculations are being undertaken. Only roads within 200m of each calculation point are considered. The dispersion rate is such that at 200m the air pollution tends to reduce to the level of the background concentration.

4.1.2 Results for CO and HC are expressed as parts per million (ppm), while those for NO_x are expressed as parts per billion (ppb). For CO the average peak hour result is translated to an annual maximum 8 hour figure, while the average peak hour NO_x result is translated to the 98th percentile of 1 hour averages of NO_2. For HC 1.7ppm is added to the result to take account of naturally occurring background levels.

4.2 Assessment Criteria

The assessment is based on whether or not the following criteria are exceeded. These are set to protect human health.

(i) Carbon Monoxide: Annual maximum 8 hour average concentration of 9ppm. Based on the US National Ambient Air Quality Standard.

(ii) Nitrogen Dioxide: 98th percentile of 1 hour concentrations of 105ppb. Based on the European Community standard (85/203/EEC).

If either of the levels are exceeded in the scheme design year a more detailed assessment is required. Forecast hydrocarbon concentrations cannot readily be assessed with respect to air quality standards, they are calculated for completeness only.

4.3 Comparison with Existing Conditions

To assess the possible air pollution impacts, a three way comparison is required between current air quality levels, those expected in the design year if the scheme is not built, and those expected in the design year if the scheme is built.

4.4 Traffic Data

The traffic flows required for the assessment method are high growth average peak hour. These are not modelled and relate to the average of 500 peak hours per annum. The COBA computer program (Cost Benefit Analysis) outputs speeds and, indirectly, flows in the base year for four flow groups. Flow group 4 represents the average of the 380 highest peak hours and is the nearest to average peak hour flow available. COBA can also be manipulated to forecast flows and speeds for a selected year. Flows from Group 4 will be slightly higher than the desired average peak hour flow.

4.5 Receptors

Receptors were selected from properties nearest to both the proposed and existing routes. Locations are shown on Figures 1 to 9.

4.6 Results

Tables 1, 2 and 3 show the results in relation to the indicator criteria for the current situation (1994), 2013 without scheme and 2013 with Published Scheme respectively. Table 3 includes additional properties which are not near any existing roads and thus have no calculable levels of pollution unless a bypass is constructed. Table 4 summarises the first three tables.

4.7 Discussion

4.7.1 Impact on Properties within the Bypass Corridor

(i) Carbon Monoxide levels along most of the bypass route are insignificant in 1994. Only along the A269 in the area of the Highlands (Figure 2) are CO levels calculable at between 4 and 4.5 ppm, about half of the indicator criterion (9 ppm).

In 2013, whether or not the bypass is constructed, forecast CO levels are still insignificant with the levels at properties along the A269 having dropped from in excess of 4 ppm to levels that are not calculable.

(ii) Calculated hydrocarbon levels for 1994 show levels varying between about 1.7ppm in rural areas and 2ppm at the A269 properties, ie they are just above the background concentration level of 1.7ppm.

In 2013, whether or not the bypass was built, HC levels would be slightly lower than those calculated for 1994.

(iii) Nitrogen Dioxide levels in 1994 are calculated at between 7ppb in rural areas and 32 ppb at the most affected properties in the sample. Properties along the A269 are in the range 26-30ppb.

All levels are well below the indicator level of 105 ppb.

In 2013, if the bypass was not built, NO_2 levels would approximately halve with some properties dropping below calculable levels due to the increasing effect of improved vehicle emission control technology. If the bypass was to be constructed the following would occur:

- Properties in the rural areas would receive NO_2 levels of up to 21ppb.
- Along the A269 properties would have similar levels to the 'no bypass' situation in 2013, viz 13-15ppb. This would be due to a reduction in NO_2, resulting from a lower traffic flow on the A269, counterbalanced by an increase due to the bypass (Figure 3).
- Properties in the urban area, such as along Queensway (Figure 5), would receive a maximum of 25ppb which is less than the current levels (maximum 32ppb).

(iv) Sample checks on air quality using revised traffic flows for 2015 instead of 2013 as design year indicated the following effects on the assessed air pollution results at locations where traffic forecasts have been increased:

- CO levels would still be well below the indicator criterion of 9 ppm.
- Hydrocarbon levels would be slightly higher.
- NO_2 levels would be increased but still well below the indicator criterion of 105 ppb.

4.7.2 Relief to Existing A259 Route

(i) Carbon Monoxide levels along the existing A259 through Bexhill and Hastings vary between calculated levels of 4 and 12ppm in 1994. By 2013 these levels would drop to between 3 and 8ppm, if the bypass was not built. By the same year if the bypass was built the CO levels would fall to between 3 and 5 ppm. (Figures 6-9)

(ii) Calculated Hydrocarbon levels for 1994 vary between 2.07 and 2.66ppm. By 2013, if the scheme was not built, forecast HC levels would reduce to between 1.90 and 2.19ppm. If the scheme was built, by 2013 HC levels would be 1.76 to 1.92ppm.

(iii) Nitrogen Dioxide levels in 1994 are calculated at levels of between 110 and 217ppb, or from just above the indicator criterion of 105ppb to double this value.

In 2013, if the bypass was not built, the NO_2 levels would approximately halve to values below the indicator criterion. If the bypass was built, by 2013 the levels would be even lower at values between 27 and 60ppb as a result of the reduced traffic flows.

5 OVERALL IMPACT ASSESSMENT

5.1 Introduction

The contribution made by traffic to regional scale air pollution problems depends on the total amount of pollution emitted, and not on the concentration at any particular location. The overall impact assessment forecasts total emissions of Carbon Monoxide, Hydrocarbons, Oxides of Nitrogen and Carbon Dioxide. The last is included as, although it is harmless to health, it is the largest contributor to greenhouse gases in the atmosphere.

It is not possible to separate the effects of the Western Bypass from those of the Eastern Bypass. This assessment therefore examines the combined impact of the two schemes and duplicates the information included in Report 9 of Volume 2 of the Environmental Statement for the A259 Hastings Eastern Bypass.

5.2 Total Emissions Assessed

To show the effect of constructing the scheme a comparison is required between the total emissions estimated for the published schemes and the 'without schemes' situation, both in the year of opening and in the design year. (1998 and 2013 for assessment purposes).

5.3 Traffic Data

Input data for the overall assessment requires annual traffic flows on the road network in the appropriate year and corresponding average speeds. COBA was used to generate average hourly traffic flows in the program base year of 1976. These were adjusted to produce a yearly traffic flow, in the year under consideration, by the use of a factor which allowed for the mean traffic growth rate. Speeds from COBA Flow Group 2 were considered to be the nearest approximation to average speed throughout the day of those available. All roads included in the COBA network were assessed for changes in emissions.

5.4 Results and Discussion

5.4.1 The results are shown in Tables 5 and 6 which compare total pollutant emissions from the 'without schemes' situation with total emissions if the two bypasses were in existence, for the years 1998 and 2013.

5.4.2 Carbon monoxide totals show a reduction from 4553 tonnes, without the schemes in 1998, to 4021 tonnes in the same year if the schemes are constructed. The same comparison in 2013 shows a reduction from 3080 (without schemes) to 2699 tonnes (with schemes). The reduction being about 12% in both cases.

The lower totals in 2013, indicating a reduction of 32%, result from the improved vehicle emission control technology brought about by legislation. The 12% reduction is primarily the effect of the higher speeds of the rerouted traffic on the bypasses, which reduce emissions of CO.

5.4.3 Hydrocarbon totals show a pattern of reductions similar to Carbon Monoxide with 13-14% less emissions in 1998 and 2013 if the scheme is built. The reduction in emissions between 1998 and 2013 is 40% which is due to improved emission control equipment.

5.4.4 Oxides of nitrogen, however, show an increase from 1008 tonnes, without the schemes in 1998, to 1063 tonnes in the same year if the schemes are constructed. The same comparison in 2013 shows an increase from 597 (without schemes) to 629 tonnes (with schemes). The increase being 5.5% in both cases.

The increase is due to the higher speeds of the rerouted traffic on the bypasses which produce additional NO_x emissions, unlike CO emissions which behave differently in relation to speed. However, the 5.5% increase is small compared with the 40% reduction achieved between 1998 and 2013 as a result of improved vehicle emission control equipment.

5.4.5 Carbon dioxide shows slight decreases of 0.4% and 1% in 1998 and 2013 respectively, if the schemes are built. CO_2 overall would increase by 40% between 1998 and 2013. This would be due primarily to the general growth in traffic.

6 CONCLUSIONS

6.1 Properties within the bypass corridor, including those closest to the route, would not suffer from any air quality problems in the design year 2013. Carbon monoxide would be below the level at which it could be calculated and Nitrogen Dioxide levels would be well below the air quality indicator criterion, where further assessment would be warranted. A reassessment at the revised design year of 2015 would not change the above conclusions.

6.2 The existing A259 through Bexhill and Hastings is currently subject in places to air pollution levels of above the indicator criteria for CO and NO_2. By 2013, even if the bypass was not to be built, emissions would be considerably reduced to below the above limits. Construction of the bypass would further reduce emission levels.

6.3 The overall impact assessment shows that the two bypass schemes would reduce carbon monoxide and hydrocarbon emissions by 11-14% and carbon dioxide by 1% or less. The increase in emissions of oxides of nitrogen by 5.5% should be viewed in the context of a 40% reduction between 1998 and 2013 resulting from improved vehicle emission control equipment.

6.4 A more detailed assessment of air quality is unnecessary.

TABLE 1

CURRENT

Year: 1994

Ref No	Receptor Address	Total			Remarks
		Carbon Monoxide (CO) annual maximum 8 hour (ppm) * Where indicator criterion is exceeded (9 ppm)	Hydrocarbons (HC) average during the traffic peak hour (ppm)	Nitrogen Dioxide (NO_2) 98th percentile of 1 hour values (ppb) * Where indicator criterion is exceeded (105 ppb)	
3	TERINA	4.11	1.98	26.89	See Figure 3
6	FLAMBARDS A269	4.11	1.98	26.89	See Figure 3
8	1 ST. MARYS COTTAGE	4.42	2.01	29.72	See Figure 3
10	CARITAS COTTAGE A269	4.27	1.99	28.31	See Figure 3
15	UPPER WILTING FARM	Below threshold of assessment method	1.71	Below threshold of assessment method	See Figure 5
16	HOLLYHOCKS COTTAGE CROWHURST ROAD	Below threshold of assessment method	1.71	7.16	See Figure 5
17	1 UPPER WILTING COTTAGES	Below threshold of assessment method	1.71	7.16	See Figure 5
18	SANCTUAIRE	Below threshold of assessment method	1.72	7.90	See Figure 5
19	PETRARCH	Below threshold of assessment method	1.73	11.52	See Figure 5
20	SPECIAL SYSTEMS	Below threshold of assessment method	1.74	14.03	See Figure 5
21	PERIMETER HOUSE	Below threshold of assessment method	1.76	21.47	See Figure 5
22	15 HIGH BEECH CLOSE	Below threshold of assessment method	1.76	19.80	See Figure 5
23	41 AUGUSTUS WAY	Below threshold of assessment method	1.81	31.83	See Figure 5
24	1 BEAUPORT HOME FARM CLOSE	Below threshold of assessment method	1.82	31.97	See Figure 5
25	6 BEAUPORT GARDENS	Below threshold of assessment method	1.75	17.59	See Figure 5
26	1 BEAUPORT GARDENS	Below threshold of assessment method	1.77	24.91	See Figure 5
27	MYWAY LODGE	3.22	1.89	31.86	See Figure 5
29	8 LITTLE COMMON ROAD (EXISTING A259)	4.27	1.97	* 114.80	See Figure 6
30	WEST VIEW	5.29	2.07	* 129.43	See Figure 6
31	35 DE LA WARR ROAD	* 11.21	2.65	* 156.77	See Figure 7
32	391 BEXHILL ROAD	8.92	2.42	* 216.58	See Figure 7
33	WEST ST. LEONARDS COUNTY PRIMARY SCHOOL	* 11.16	2.65	* 193.34	See Figure 7
34	1 EVERSFIELD PLACE	* 10.32	2.57	* 142.99	See Figure 8
35	BARNHORN ROAD	7.07	2.26	* 110.47	See Figure 6
36	17 THE BOURNE	* 11.28	2.66	* 157.97	See Figure 9
37	476 OLD LONDON ROAD	* 9.50	2.49	* 129.22	See Figure 9

TABLE 2

WITHOUT SCHEME

Year: 2013

Ref No	Receptor Address	Total			Remarks
		Carbon Monoxide (CO) annual maximum 8 hour (ppm) * *Where indicator criterion is exceeded (9 ppm)*	Hydrocarbons (HC) average during the traffic peak hour (ppm)	Nitrogen Dioxide (NO_2) 98th percentile of 1 hour values (ppb) ^ *Where indicator criterion is exceeded (105 ppb)*	
3	TERINA	Below threshold of assessment method	1.83	13.48	See Figure 3
6	FLAMBARDS A269	Below threshold of assessment method	1.83	13.48	See Figure 3
8	1 ST. MARYS COTTAGE	Below threshold of assessment method	1.84	14.58	See Figure 3
10	CARITAS COTTAGE A269	Below threshold of assessment method	1.84	14.03	See Figure 3
15	UPPER WILTING FARM	Below threshold of assessment method	1.70	Below threshold of assessment method	See Figure 5
16	HOLLYHOCKS COTTAGE CROWHURST ROAD	Below threshold of assessment method	1.71	Below threshold of assessment method	See Figure 5
17	1 UPPER WILTING COTTAGES	Below threshold of assessment method	1.71	Below threshold of assessment method	See Figure 5
18	SANCTUAIRE	Below threshold of assessment method	1.71	Below threshold of assessment method	See Figure 5
19	PETRARCH	Below threshold of assessment method	1.71	Below threshold of assessment method	See Figure 5
20	SPECIAL SYSTEMS	Below threshold of assessment method	1.72	7.10	See Figure 5
21	PERIMETER HOUSE	Below threshold of assessment method	1.73	10.76	See Figure 5
22	15 HIGH BEECH CLOSE	Below threshold of assessment method	1.73	9.99	See Figure 5
23	41 AUGUSTUS WAY	Below threshold of assessment method	1.75	15.29	See Figure 5
24	1 BEAUPORT HOME FARM CLOSE	Below threshold of assessment method	1.75	15.38	See Figure 5
25	6 BEAUPORT GARDENS	Below threshold of assessment method	1.73	9.08	See Figure 5
26	1 BEAUPORT GARDENS	Below threshold of assessment method	1.74	13.92	See Figure 5
27	MYWAY LODGE	Below threshold of assessment method	1.78	15.55	See Figure 5
29	8 LITTLE COMMON ROAD (EXISTING A259)	Below threshold of assessment method	1.82	55.02	See Figure 6
30	WEST VIEW	3.65	1.90	61.05	See Figure 6
31	35 DE LA WARR ROAD	6.09	2.09	73.70	See Figure 7
32	391 BEXHILL ROAD	6.17	2.10	101.21	See Figure 7
33	WEST ST. LEONARDS COUNTY PRIMARY SCHOOL	7.24	2.19	90.94	See Figure 7
34	1 EVERSFIELD PLACE	5.66	2.06	67.78	See Figure 8
35	BARNHORN ROAD	4.65	1.98	53.26	See Figure 6
36	17 THE BOURNE	6.12	2.10	74.20	See Figure 9
37	476 OLD LONDON ROAD	5.25	2.03	61.86	See Figure 9

TABLE 3

PUBLISHED SCHEME

Year: 2013

Ref No	Receptor Address	Total: Carbon Monoxide (CO) annual maximum 8 hour (ppm) * Where indicator criterion is exceeded (9 ppm)	Total: Hydrocarbons (HC) average during the traffic peak hour (ppm)	Total: Nitrogen Dioxide (NO_2) 98th percentile of 1 hour values (ppb) * Where indicator criterion is exceeded (105 ppb)	Remarks
1	1 NEW LODGE COTTAGES	Below threshold of assessment method	1.71	Below threshold of assessment method	See Figure 1
2	SWEET WILLOW PUMPING STATION	Below threshold of assessment method	1.70	Below threshold of assessment method	See Figure 2
3	TERINA	Below threshold of assessment method	1.79	13.00	See Figure 3
4	28 THORN CRESENT	Below threshold of assessment method	1.71	Below threshold of assessment method	See Figure 3
5	THE SPINNEY ST MARYS LANE	Below threshold of assessment method	1.72	8.75	See Figure 3
6	FLAMBARDS A269	Below threshold of assessment method	1.80	13.76	See Figure 3
7	LITTLE BEARSDEN	Below threshold of assessment method	1.73	12.89	See Figure 3
8	1 ST. MARYS COTTAGE	Below threshold of assessment method	1.80	14.13	See Figure 3
9	12 ST. MARYS COTTAGE	Below threshold of assessment method	1.79	13.05	See Figure 3
10	CARITAS COTTAGE A269	Below threshold of assessment method	1.80	15.45	See Figure 3
11	KITEYE FARM	Below threshold of assessment method	1.72	9.82	See Figure 3
12	PRESTON COTTAGE	Below threshold of assessment method	1.72	10.94	See Figure 4
13	CHETWYND	Below threshold of assessment method	1.74	20.96	See Figure 4
14	PRESTON HALL	Below threshold of assessment method	1.70	Below threshold of assessment method	See Figure 5
15	UPPER WILTING FARM	Below threshold of assessment method	1.71	Below threshold of assessment method	See Figure 5
16	HOLLYHOCKS COTTAGE CROWHURST ROAD	Below threshold of assessment method	1.73	16.75	See Figure 5
17	1 UPPER WILTING COTTAGES	Below threshold of assessment method	1.75	20.95	See Figure 5
18	SANCTUAIRE	Below threshold of assessment method	1.74	16.15	See Figure 5
19	PETRARCH	Below threshold of assessment method	1.72	13.48	See Figure 5
20	SPECIAL SYSTEMS	Below threshold of assessment method	1.73	16.91	See Figure 5
21	PERIMETER HOUSE	Below threshold of assessment method	1.75	18.72	See Figure 5
22	15 HIGH BEECH CLOSE	Below threshold of assessment method	1.74	22.15	See Figure 5

TABLE 3

PUBLISHED SCHEME

Year: 2013

Ref No	Receptor Address	Total			Remarks
		Carbon Monoxide (CO) annual maximum 8 hour (ppm) * Where indicator criterion is exceeded (9 ppm)	Hydrocarbons (HC) average during the traffic peak hour (ppm)	Nitrogen Dioxide (NO_2) 98th percentile of 1 hour values (ppb) * Where indicator criterion is exceeded (105 ppb)	
23	41 AUGUSTUS WAY	Below threshold of assessment method	1.76	25.19	See Figure 5
24	1 BEAUPORT HOME FARM CLOSE	Below threshold of assessment method	1.76	24.19	See Figure 5
25	6 BEAUPORT GARDENS	Below threshold of assessment method	1.74	15.04	See Figure 5
26	1 BEAUPORT GARDENS	Below threshold of assessment method	1.77	12.90	See Figure 5
27	MYWAY LODGE	Below threshold of assessment method	1.78	14.12	See Figure 5
28	OFFICE RAMBLER BUS GARAGE	Below threshold of assessment method	1.72	10.31	See Figure 5
29	8 LITTLE COMMON ROAD (EXISTING A259)	Below threshold of assessment method	1.75	27.95	See Figure 6
30	WEST VIEW	Below threshold of assessment method	1.76	27.95	See Figure 6
31	35 DE LA WARR ROAD	Below threshold of assessment method	1.83	26.85	See Figure 7
32	391 BEXHILL ROAD	Below threshold of assessment method	1.76	24.02	See Figure 7
33	WEST ST. LEONARDS COUNTY PRIMARY SCHOOL	3.64	1.90	39.74	See Figure 7
34	1 EVERSFIELD PLACE	3.95	1.92	42.91	See Figure 8
35	BARNHORN ROAD	Below threshold of assessment method	1.79	26.63	See Figure 6
36	17 THE BOURNE	5.08	2.01	59.37	See Figure 9
37	476 OLD LONDON ROAD	4.53	1.97	51.50	See Figure 9

TABLE 4
RESULTS SUMMARY

Ref No	Receptor Address	Carbon Monoxide (CO)			Hydrocarbons (HC)			Nitrogen Dioxide (NO_2)		
			Year 2013			Year 2013			Year 2013	
		1994	Without Scheme	With Scheme	1994	Without Scheme	With Scheme	1994	Without Scheme	With Scheme
1	1 NEW LODGE COTTAGES			* 3.04			1.71			* 7.00
2	SWEET WILLOW PUMPING STATION			* 3.04			1.70			* 7.00
3	TERINA	4.11	* 3.04	* 3.04	1.98	1.83	1.79	26.89	13.48	13.00
4	28 THORN CRESENT			* 3.04			1.71			* 7.00
5	THE SPINNEY ST MARYS LANE			* 3.04			1.72			8.75
6	FLAMBARDS A269	4.11	* 3.04	* 3.04	1.98	1.83	1.80	26.89	13.48	13.76
7	LITTLE BEARSDEN			* 3.04			1.73			12.89
8	1 ST. MARYS COTTAGE	4.42	* 3.04	* 3.04	2.01	1.84	1.80	29.72	14.58	14.13
9	12 ST. MARYS COTTAGE			* 3.04			1.79			13.05
10	CARITAS COTTAGE A269	4.27	* 3.04	* 3.04	1.99	1.84	1.80	28.31	14.03	15.45
11	KITEYE FARM			* 3.04			1.72			9.82
12	PRESTON COTTAGE			* 3.04			1.72			10.94
13	CHETWYND			* 3.04			1.74			20.96
14	PRESTON HALL			* 3.04			1.70			* 7.00
15	UPPER WILTING FARM	* 3.04	* 3.04	* 3.04	1.71	1.70	1.71	* 7.00	* 7.00	* 7.00
16	HOLLYHOCKS COTTAGE CROWHURST ROAD	* 3.04	* 3.04	* 3.04	1.71	1.71	1.73	7.16	* 7.00	16.75
17	1 UPPER WILTING COTTAGES	* 3.04	* 3.04	* 3.04	1.71	1.71	1.75	7.16	* 7.00	20.95
18	SANCTUAIRE	* 3.04	* 3.04	* 3.04	1.72	1.71	1.74	7.90	* 7.00	16.15
19	PETRARCH	* 3.04	* 3.04	* 3.04	1.73	1.71	1.72	11.52	* 7.00	13.48
20	SPECIAL SYSTEMS	* 3.04	* 3.04	* 3.04	1.74	1.72	1.73	14.03	7.10	16.91
21	PERIMETER HOUSE	* 3.04	* 3.04	* 3.04	1.76	1.73	1.75	21.47	10.76	18.72
22	15 HIGH BEECH CLOSE	* 3.04	* 3.04	* 3.04	1.76	1.73	1.74	19.80	9.99	22.15
23	41 AUGUSTUS WAY	* 3.04	* 3.04	* 3.04	1.81	1.75	1.76	31.83	15.29	25.19
24	1 BEAUPORT HOME FARM CLOSE	* 3.04	* 3.04	* 3.04	1.82	1.75	1.76	31.97	15.38	24.19
25	6 BEAUPORT GARDENS	* 3.04	* 3.04	* 3.04	1.75	1.73	1.74	17.59	9.08	15.04
26	1 BEAUPORT GARDENS	* 3.04	* 3.04	* 3.04	1.77	1.74	1.77	24.91	13.92	12.90
27	MYWAY LODGE	3.22	* 3.04	* 3.04	1.89	1.78	1.78	31.86	15.55	14.12
28	OFFICE RAMBLER BUS GARAGE			* 3.04			1.72			10.31
29	8 LITTLE COMMON ROAD (EXISTING A259)	4.27	* 3.04	* 3.04	1.97	1.82	1.75	114.80	55.02	27.95
30	WEST VIEW	5.29	3.65	* 3.04	2.07	1.90	1.76	129.43	61.05	27.95
31	35 DE LA WARR ROAD	11.21	6.09	* 3.04	2.65	2.09	1.83	156.77	73.70	26.85

* For Nitrogen Dioxide, a value of 7.0 represents the lower threshold value of the assessment method.
For Carbon monoxide, a value of 3.04 represents the lower threshold value. An asterisk indicates that actual values fall below these thresholds.
For Hydrocarbons, a value of 1.7 has been included for background concentration.

TABLE 4
RESULTS SUMMARY

Ref No	Receptor Address	Carbon Monoxide (CO)			Hydrocarbons (HC)			Nitrogen Dioxide (NO_2)		
			Year 2013			Year 2013			Year 2013	
		1994	Without Scheme	With Scheme	1994	Without Scheme	With Scheme	1994	Without Scheme	With Scheme
32	391 BEXHILL ROAD	8.92	6.17	* 3.04	2.42	2.10	1.76	216.58	101.21	24.02
33	WEST ST. LEONARDS COUNTY PRIMARY SCHOOL	11.16	7.24	3.64	2.65	2.19	1.90	193.34	90.94	39.74
34	1 EVERSFIELD PLACE	10.32	5.66	3.95	2.57	2.06	1.92	142.99	67.78	42.91
35	BARNHORN ROAD	7.07	4.65	* 3.04	2.26	1.98	1.79	110.47	53.26	26.63
36	17 THE ROURNE	11.28	6.12	5.08	2.66	2.10	2.01	157.97	74.20	59.37
37	476 OLD LONDON ROAD	9.50	5.25	4.53	2.49	2.03	1.97	129.22	61.86	51.50

* For Nitrogen Dioxide, a value of 7.0 represents the lower threshold value of the assessment method.
For Carbon monoxide, a value of 3.04 represents the lower threshold value. An asterisk indicates that actual values fall below these thresholds.
For Hydrocarbons, a value of 1.7 has been included for background concentration.

AIR QUALITY
OVERALL IMPACT ASSESSMENT

TABLE 5

A259 BEXHILL AND HASTINGS WESTERN BYPASS

1998 SCHEME YEAR OF OPENING

	TOTAL EMISSIONS (tonnes / year)			
	Carbon Monoxide	Hydrocarbons	Oxides of Nitrogen	Carbon Dioxide
1998 Without Scheme	4553.20	767.65	1007.80	141422
1998 Published Scheme	4021.13	664.51	1063.22	140820
Difference	-532.06	-103.14	55.42	-601.83
Percentage change	-11.7	-13.4	5.5	-0.4

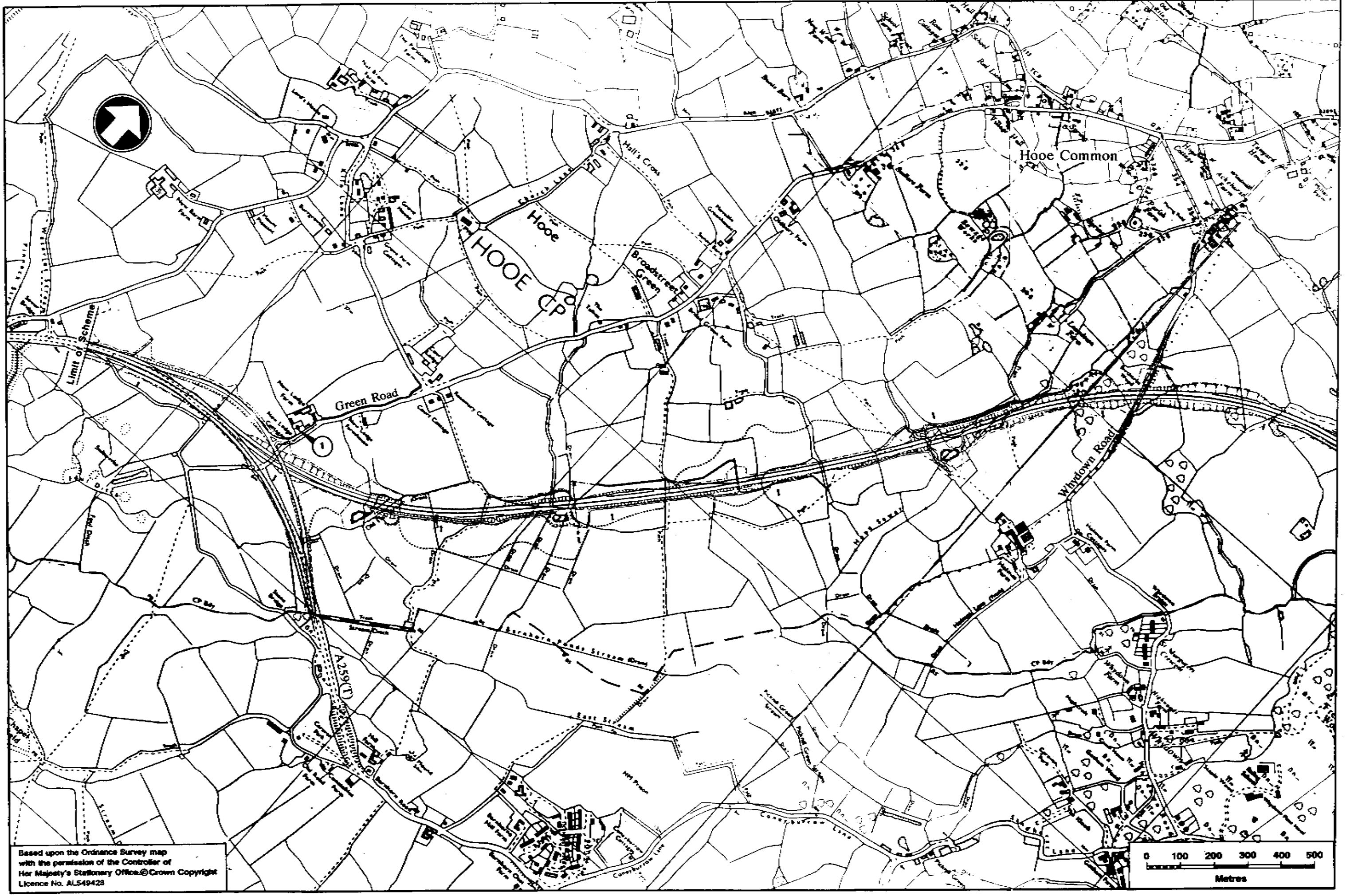
AIR QUALITY
OVERALL IMPACT ASSESSMENT

A259 BEXHILL AND HASTINGS WESTERN BYPASS

TABLE 6

2013 DESIGN YEAR

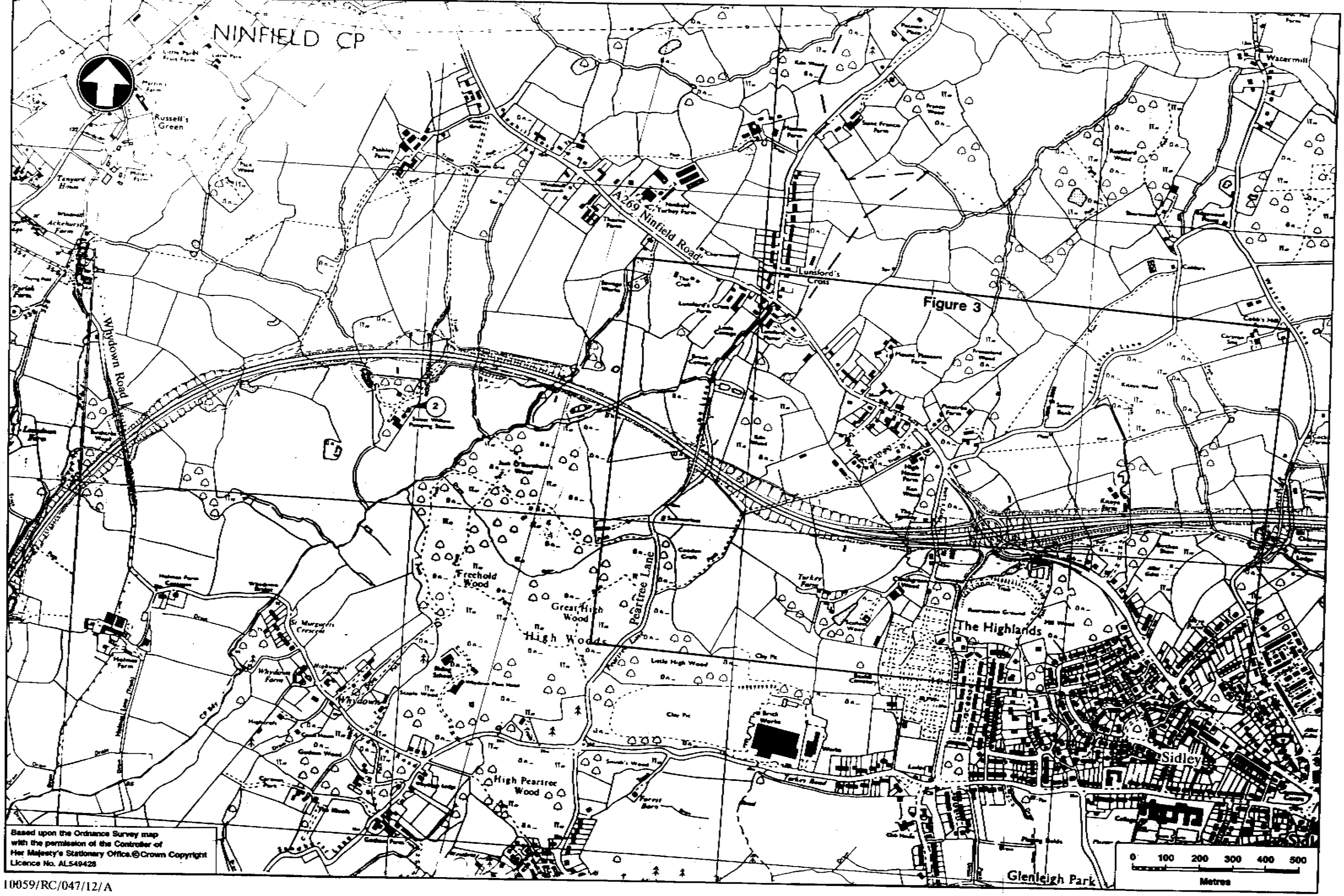
	TOTAL EMISSIONS (tonnes / year)			
	Carbon Monoxide	Hydrocarbons	Oxides of Nitrogen	Carbon Dioxide
2013 Without Scheme	3079.64	455.46	596.67	197298
2013 Published Scheme	2699.01	391.79	629.40	195239
Difference	-380.63	-63.68	32.73	-2059.34
Percentage change	-12.4	-14.0	5.5	-1.0



10059/RC/047/12/A

Location of Properties Assessed

Figure 1

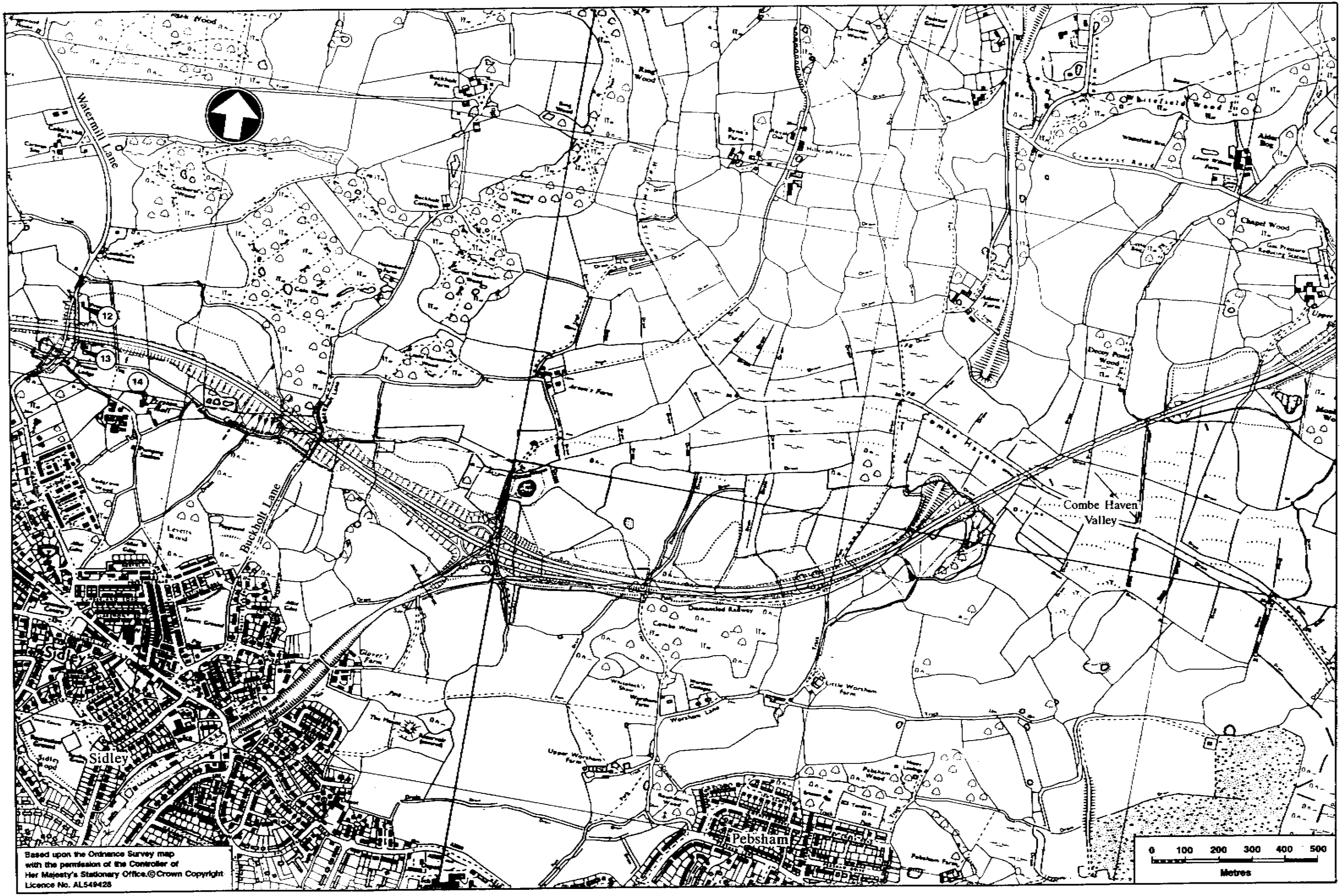


Based upon the Ordnance Survey map with the permission of the Controller of Her Majesty's Stationary Office.© Crown Copyright Licence No. AL549428

10059/RC/047/12/A

Location of Properties Assessed

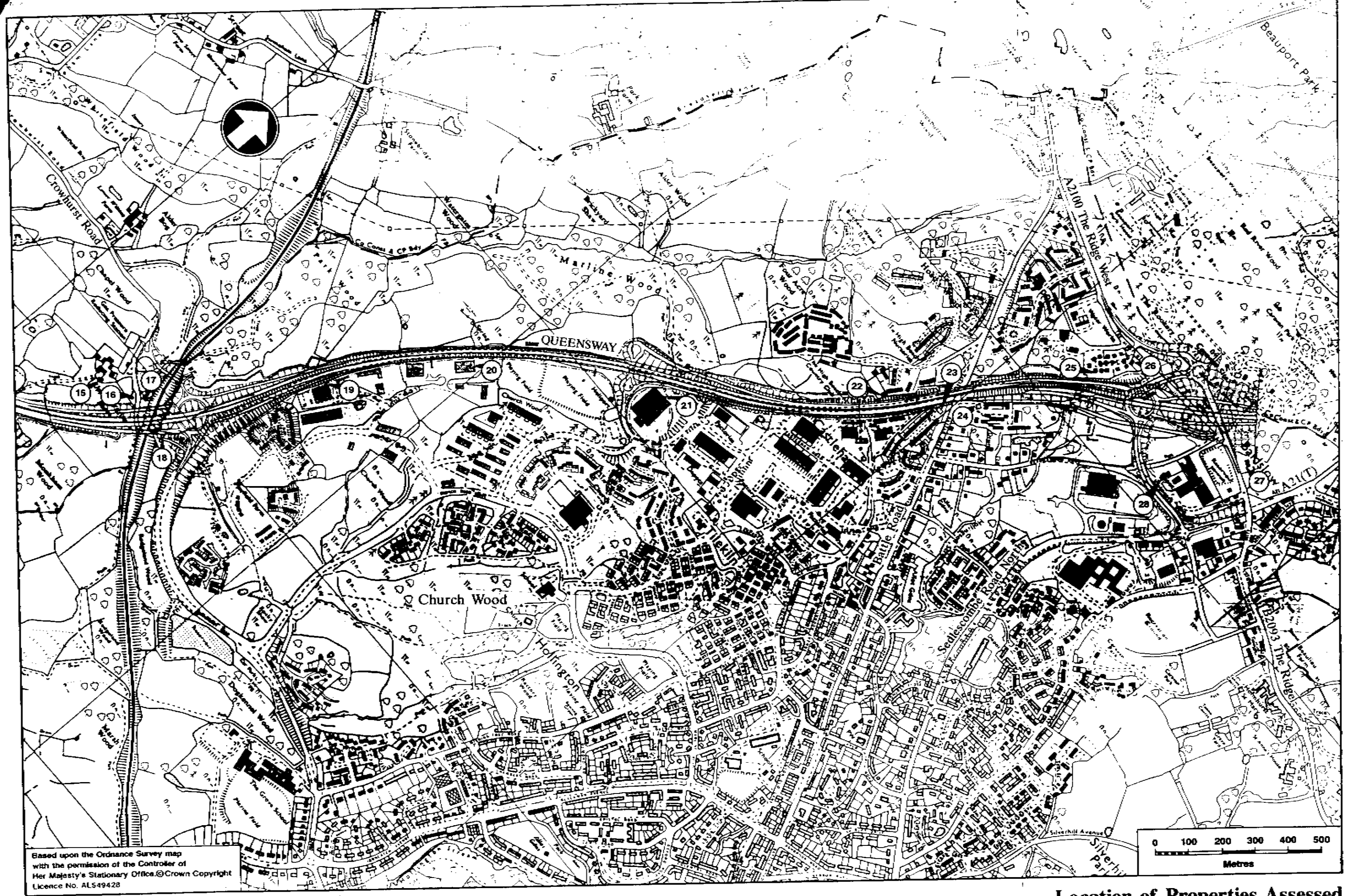
Figure 2



10059/RC/047/12/ A

Location of Properties Assessed

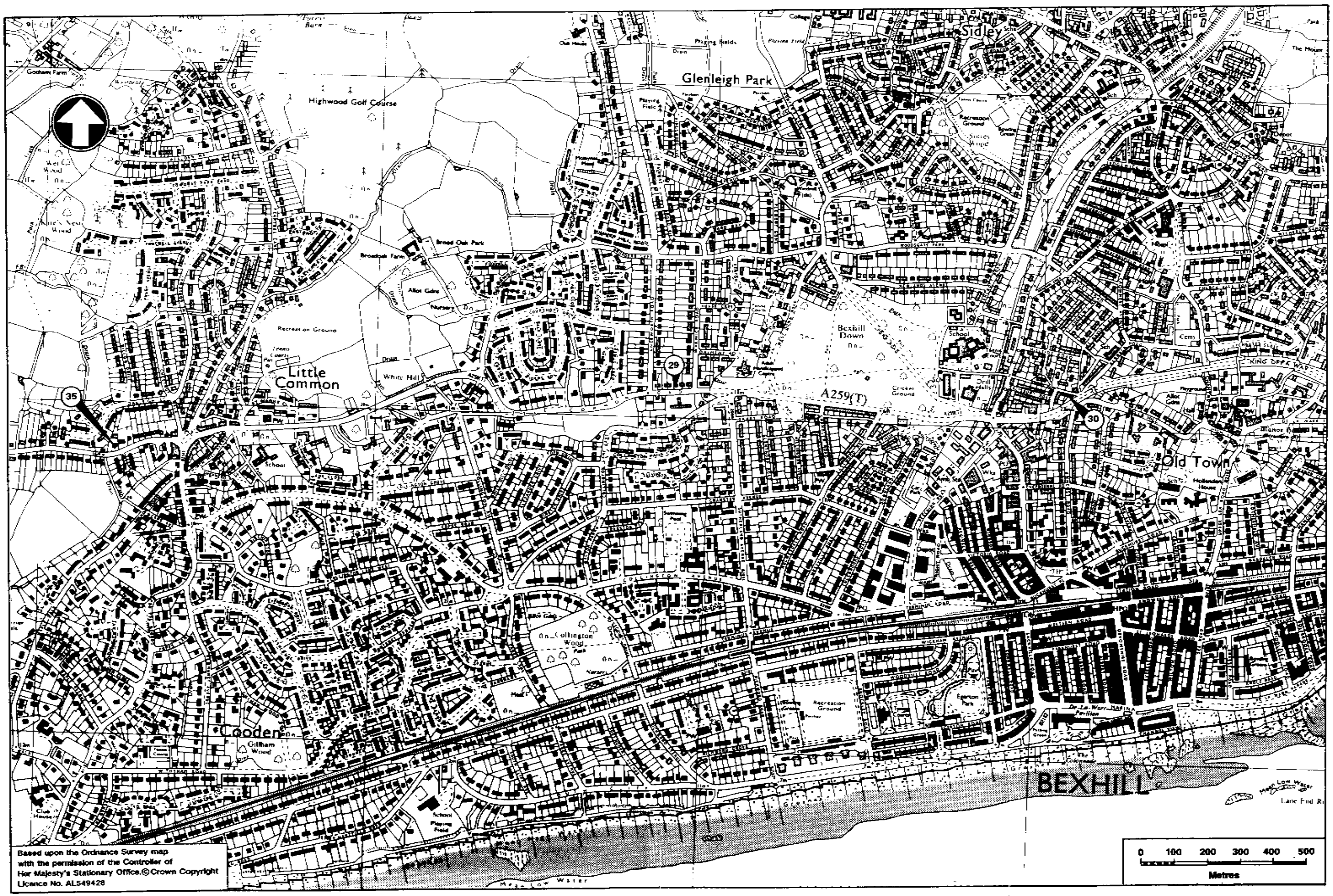
Figure 4



10059/RC/047/12/A

Location of Properties Assessed

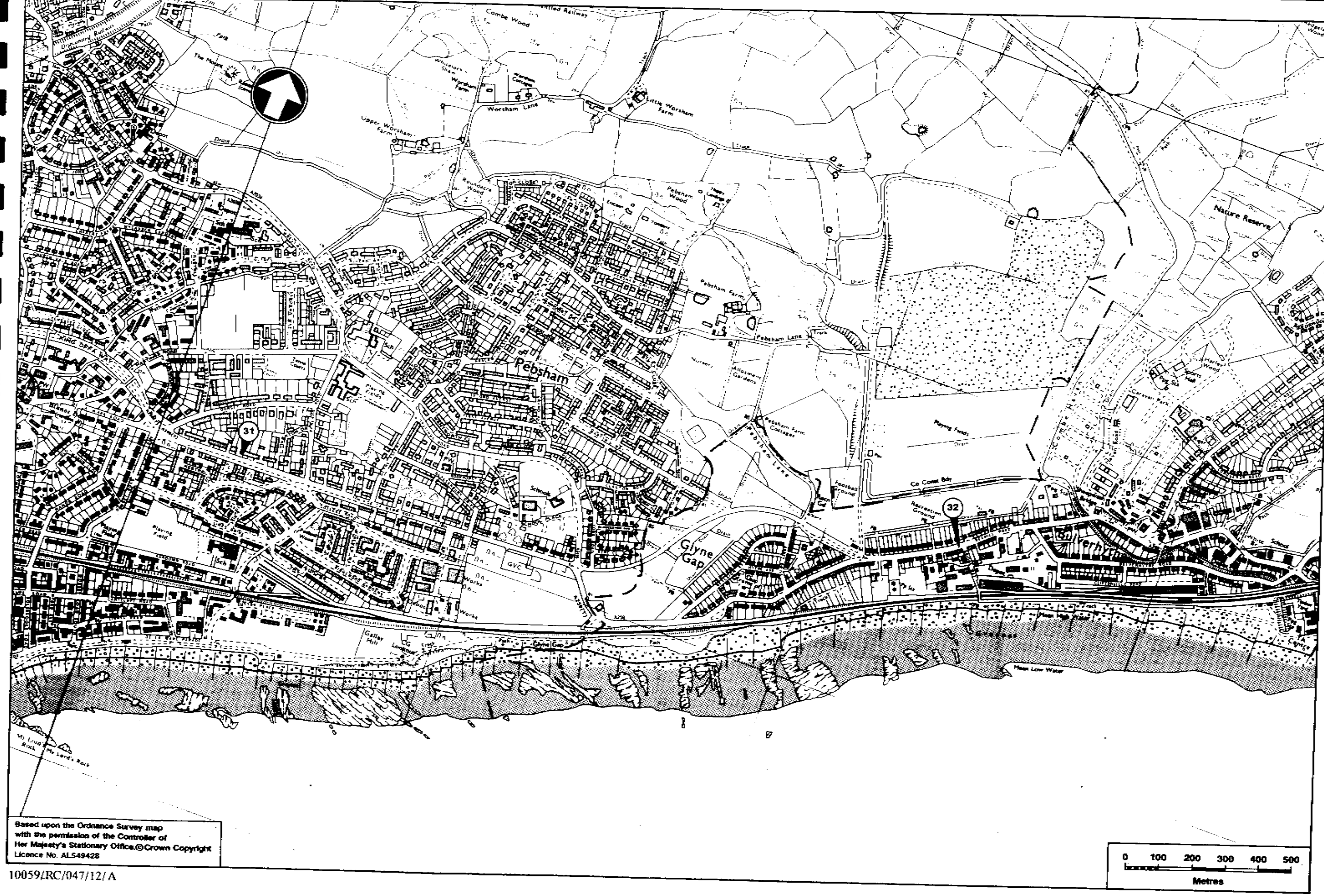
Figure 5



10059/RC/047/12/ A

Location of Properties Assessed

Figure 6



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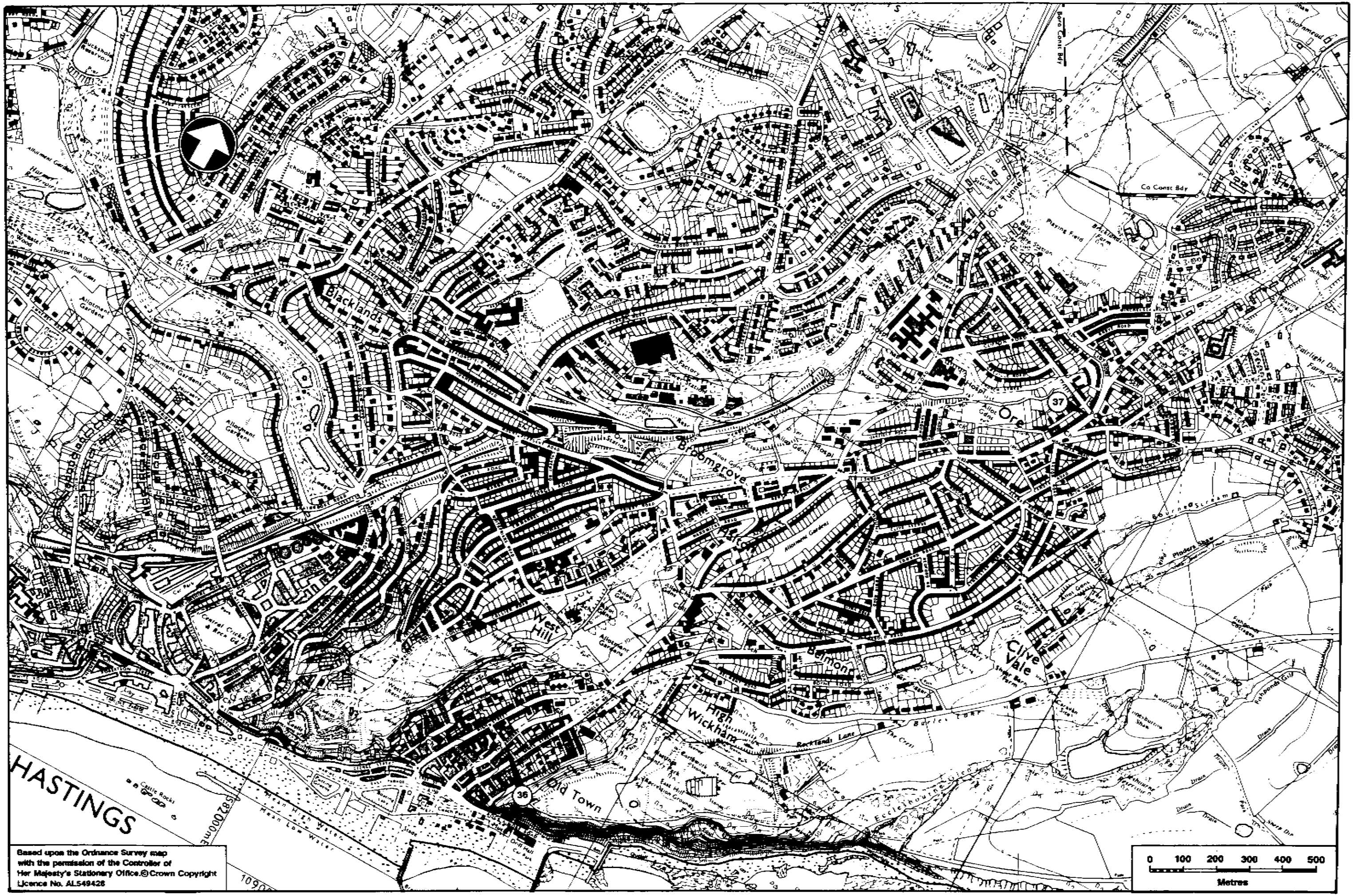
Location of Properties Assessed

Figure 7

10059/RC/047/12/ A

Location of Properties Assessed

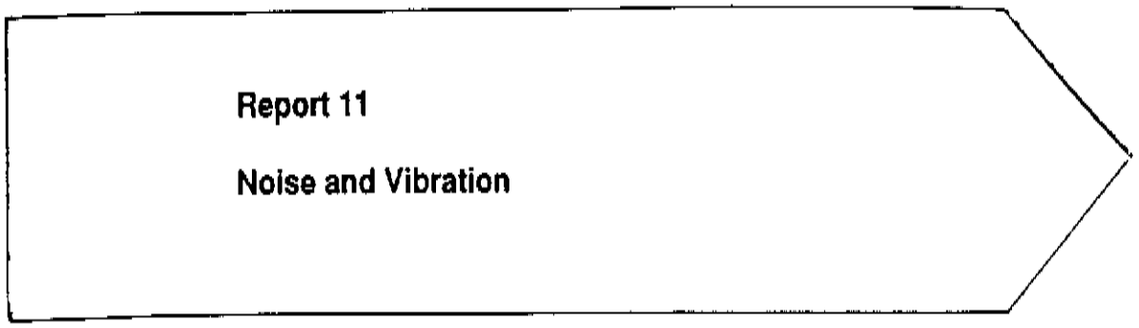
Figure 8

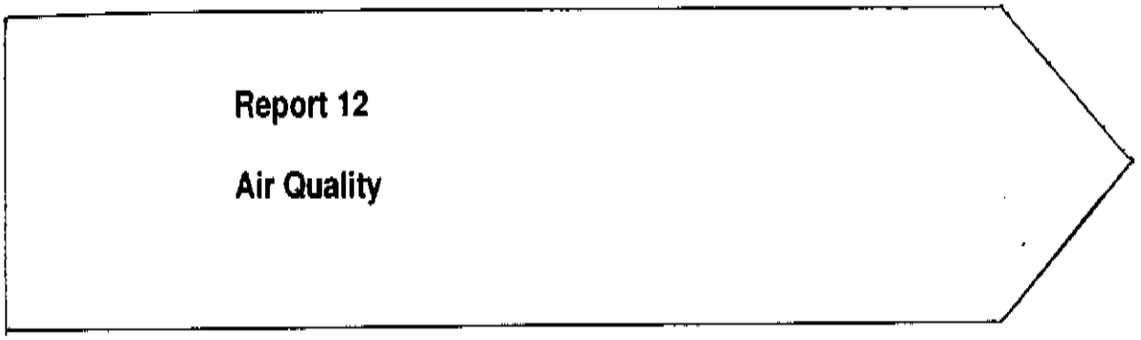


10059/RC/047/12/A

Location of Properties Assessed

Figure 9


Report 11
Noise and Vibration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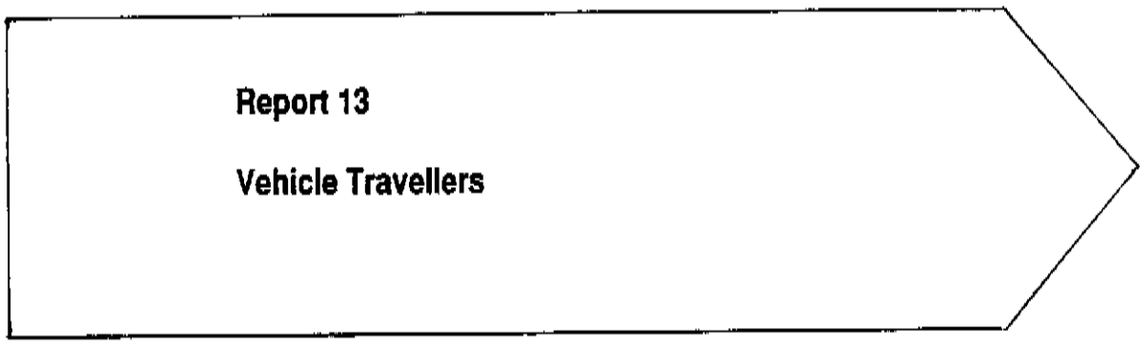
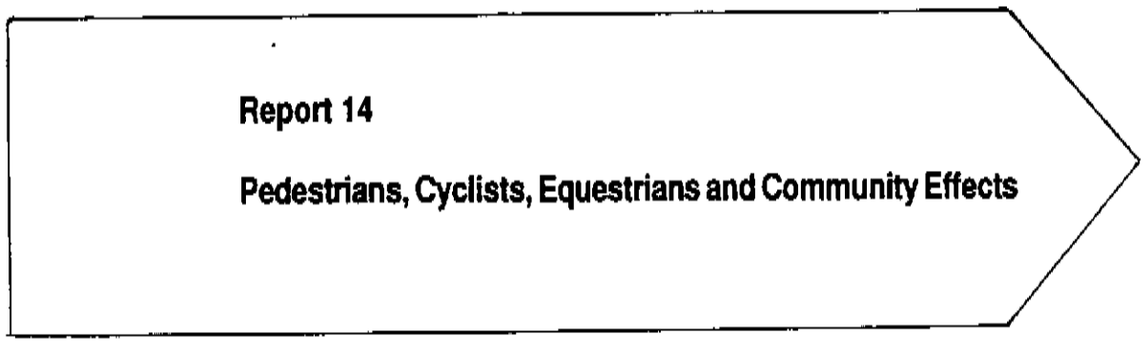
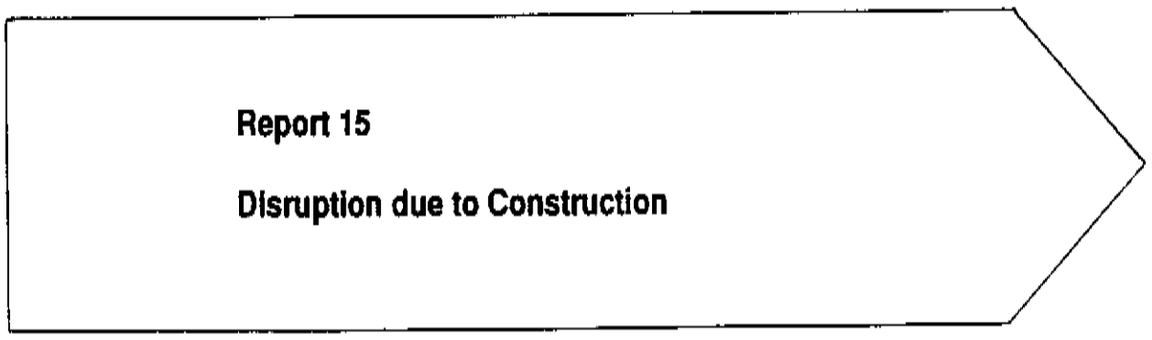
Air Quality


Report 13
Vehicle Travellers


Report 14
Pedestrians, Cyclists, Equestrians and Community Effects


Report 15
Disruption due to Construction

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September 1994

REPORT 13

VEHICLE TRAVELLERS

September 1994

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September 1994

REPORT 13

VEHICLE TRAVELLERS

September 1994

Issue and Revision Record

Rev	Date	Originator	Checked	Approved	Description
P1	May 94	CBA/AMT	SFB	SFB	First Draft
A	Sept 94	CBA/AMT	SFB	SFB	Publication Issue

REPORT 13 - VEHICLE TRAVELLERS

LIST OF TABLES

LIST OF FIGURES

1 VIEW FROM THE ROAD

1.1 Introduction

1.1.1 View from the road is defined under the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 9, as the extent to which travellers, including drivers, are exposed to the different types of scenery through which a route passes.

1.1.2 The construction of a new road through the countryside may enable more people to see the landscape than hitherto, providing interest on a journey and helping to alleviate driver stress. Such benefits have to be balanced however against the visual and landscape impact which could result if the road and traffic were left unscreened.

1.2 Method

1.2.1 When assessing the view from the road, consideration is given to the landscape's character and quality including prominent landmarks and landscape features and the extent to which the traveller is able to view the scene.

1.2.2 The extent to which a view can be obtained is dependent on the relative level of the road in comparison to the surrounding landform and vegetation. Four categories are given in Volume 11 which are as follows:

(a) No view - road in deep cutting or contained by earth bunds, environmental barriers or adjacent structures.

(b) Restricted view - frequent cuttings or structures blocking the view.

(c) Intermittent view - road generally at ground level but with shallow cuttings or barriers at intervals.

(d) Open view - view extending over many miles, or only restricted by existing landscape features.

1.2.3 Finally it is important to note that the view from the road would change, not only from season to season, but from one year to the next due especially to the establishment of highway planting.

1.3 Drivers' View (Figure 1)

Section A - Barnhorn Level

1.3.1 The landscape of Barnhorn Level has an open, rural character. There is a characteristic settlement pattern of farmsteads on the sides of the gentle ridges within a predominantly pasture landscape with low sparse

and intermittent hedges. There is contrast between the wet pasture of the level and the drier pasture and occasional arable land on the valley side. From within this area, there are extensive views south westwards across the Pevensey Levels.

1.3.2 The route alignment through this section would follow the northern edge of Barnhorn Level where it joins the Hooe ridge. At the commencement of the scheme the vertical alignment would be at or very near to existing ground level before entering a short section of deep cutting to pass beneath the proposed A259 link road. Eastwards from this point the road would run generally on embankment before entering cutting once again to pass beneath Whydown Road. In order to minimise the visual impact of the scheme in views from the south a 2m - 3m high mound is proposed along the southern side of the road over a length of almost one kilometre. Consequently views southwards across Barnhorn Level would be largely prevented or at best intermittent. Those travellers heading west, however, would glimpse an open view of Barnhorn and Pevensey Levels as they pass under Whydown Road and descend from the Weald section of the route. In addition there would be open views to the north along much of this section although these would largely be limited to short distances by the nature of the landform.

Section B - The Weald

1.3.3 This section extends from Whydown Road around the northern edge of Bexhill to the Combe Haven valley. It is a rural landscape of intricately formed ridges and moderately steep sided valleys. There is a transition from the Hooe ridge with small fields but little woodland cover to the much more heavily wooded area, with overgrown hedges in slightly larger fields to the east. Scattered farmsteads lie characteristically slightly below the ridge tops with more recent settlement along roads running on the ridge crests.

1.3.4 The undulating nature of the landform has resulted in the route crossing the grain of the landscape on low embankment and in deep cutting. The view from the road, therefore, would be restricted, but the undulating nature of the landform and extensive woodland cover would allow only short distance views.

Section C - Combe Haven

1.3.5 This section comprises the valley of the Combe Haven with attractive side valleys to the north. The wide valley bottom is dominated by rough, wet grassland drained by open ditches with standing water. There is a marked contrast between these fields and the well-drained arable land and pasture in the fields of moderate size on the valley sides. Woodland is frequent on the mid to upper slopes. Despite the proximity of Bexhill in the south west, the overall character is rural, except in views of the dense settlement of Harley Shute in the south east. A feature of the valley is the now heavily wooded line of a dismantled railway which once crossed the valley on a brick arch viaduct. The viaduct has been demolished but the approach embankments remain and are prominent landscape features.

1.3.6 Initially the route would extend along the narrow head of the Combe Haven valley. There would be intermittent views to the north foreshortened by landform and vegetation. Mounding between the A269 junction and Cole Wood would prevent views to the south. East of Cole Wood the valley broadens out to the north and the route would extend along the valley's southern side, crossing open farmland to the

junction with the Bexhill Northern Approach Road. In order to minimise the visual impact of the junction and to blend it into the landscape, extensive mounding is proposed. These measures would largely prevent views out from the road, with the exception for travellers heading east, who would glimpse an open view across the Combe Haven from the area of the junction. Once planting has established on the surrounding embankments the opportunity for these views would be largely prevented as well.

1.3.7 To the east of the junction with the Bexhill Northern Approach Road the route would cross sidelong ground immediately to the north of and parallel to the dismantled railway line before turning northwards to cross the valley floor on a 10m high, 705m long viaduct. To the north of the viaduct the route would ascend the side of the valley on embankment on its approach to the junction near Upper Wilting Farm. In the area of the dismantled railway 2m - 3m high mounding is proposed along the northern side of the road, which would largely prevent the traveller's view northwards. Intermittent views would be possible to the south, being broken up by cuttings, the dismantled railway embankment and vegetation. The main opportunity, therefore, to achieve a view from the road would be on the viaduct and the embankment immediately to the north from where open views to both the east and west would be enjoyed.

Section D - Queensway to the A2100

1.3.8 This section comprises the urban fringe area between the Combe Haven and the A2100. The route would follow the crest of a minor ridge which carries the existing Queensway. North of the B2159 (Battle Road) the road would pass locally onto high embankment before entering deep cutting to pass under the A2100, heading north-eastwards to join with the Hastings Eastern Bypass. The Hastings Town Development Area encompasses most of the southern part of Queensway, where both residential and light industrial areas exist and more are planned. Presently, the development lies mostly to the east of Queensway with residential development occurring to the west in the area north of Castleham.

1.3.9 Despite its location on top of the ridge, views from the road like those at present would at best be intermittent due to cuttings, mounds, barriers and vegetation. On entering the deep cutting to pass under the A2100, the traveller would enjoy open long distance views to the north across the High Weald Area of Outstanding Natural Beauty, although the field of vision would be restricted by the width of cutting.

1.3.10 The side roads would also provide an opportunity for the traveller to obtain a view from the road. The elevated position of the A21 link road would provide open views southwards across Hastings. The bridge carrying the A2100 over the bypass would provide open views to the south and in contrast, the traveller would have a glimpsed view to the north across the countryside of the High Weald.

1.4 Summary

1.4.1 The different landscapes through which the route would pass offer contrast and features of interest. The opportunity, however, for the traveller to have a view from the road would be reduced with the implementation and establishment of the proposed mitigation measures, designed to screen traffic in wider views and to blend the scheme into the landscape. Despite this, opportunities would still exist with

restricted or intermittent views out from the road and the traveller would also glimpse open views along the route of Barnhorn Level, the Combe Haven, Hastings and the High Weald Area of Outstanding Natural Beauty, all of which would provide contrast, considerable interest and give the traveller a sense of place.

2 DRIVER STRESS

2.1 Introduction

2.1.1 Driver stress is defined for the purposes of this environmental assessment as 'the adverse mental and physiological effects experienced by a driver traversing a road network'.

2.1.2 Factors influencing the level of driver stress include road layout, geometry, surface riding characteristics, junction frequency, speed and flow per lane. These factors can induce feelings of discomfort, annoyance, frustration and fear culminating in physical and emotional tension that detracts from the safety, comfort and value of a journey.

2.1.3 Research into driver stress indicates it leads to a decline in driving skills. As frustration annoyance and discomfort increase drivers become more aggressive and inclined to take risks. It can also induce driver fatigue leading to a slower response time to visual and other stimuli. Driver stress is likely to be a major contributor to road accidents, especially those in urban areas where flows are highest and speeds lowest.

2.1.4 The level of stress depends on skill, experience, temperament, knowledge of the route, state of health, anticipated ease of journey and age. Professional drivers or commuters therefore may feel a lower level of stress than other drivers.

2.1.5 In Bexhill and Hastings stress is a particularly important factor as during the summer months traffic is increased by holiday drivers. These holiday drivers will have little knowledge of the routes to and around the area and feel more tension as delays detract from their pleasure time.

2.1.6 This report details the change in driver stress that it is predicted would occur following the construction of the A259 Bexhill and Hastings Western Bypass. It does so by describing the stress induced on the existing A259 and the other major roads in Bexhill and Hastings and describing how this would change with the construction of a bypass. The analysis assumes that the A259 Hastings Eastern Bypass would be completed at the same time as this scheme with East Sussex County Council's local link roads, the Bexhill Northern Approach Road and Hastings Spur Road, also constructed. The route of the Published Scheme is shown in Figure 1.

2.1.7 The assessment of driver stress has been carried out on the assumption that the scheme opening and design years (15 years after opening) would be 1998 and 2013 respectively and has been based on the predicted traffic flows for those years. Traffic forecasts have recently been reassessed and the year of opening of the scheme revised to 2000 (Design year 2015). Revised traffic flows for these years are given in Volume 1 of this Statement. It is anticipated that the results of the assessment for the revised years would be broadly similar to those given in this report.

2.2 **Methodology** (Figures 2 and 3)

2.2.1 This calculation is based on the method given in the Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 9.

2.2.2 Research does not allow for a finely graded assessment of driver stress but only allows it to be broken into three categories: low, moderate and high. No reliable correlations between driver stress and physical factors have been established, therefore the tables in the DMRB have been used as guidance on the assessment of the appropriate level of driver stress for the road conditions.

2.2.3 Tables 1 to 3 on page 4/2 of the DMRB, Volume 11, Section 3, Part 9 give a relationship between the road type, driver stress, speed and flow. The levels of speed and flow with the scheme constructed have been assessed for the worst year in the first fifteen years after opening (2013), assuming the highest predicted traffic flows for that year are achieved, and are compared with the speeds and flows predicted on the existing network at the same time with no scheme.

2.2.4 The flow and speed statistics for each section of existing and new road have been obtained from information in the report from COBA9, a computer program which assesses the economic implications of the scheme, using predicted traffic flows and speeds.

2.2.6 For the purposes of this report the effect of the A259 Bexhill and Hastings Western Bypass on traffic in Hastings has been taken as the effect on that area that lies south of the B2093 'The Ridge'. Effects on the B2093 and along the A259 east of its' junction with the B2093 at Ore are considered in the assessment of the A259 Hastings Eastern Bypass, which would provide the relief for roads in this area.

2.2.7 The roads assessed in this report are those that form the existing network of major links through the towns and in addition to the A259, include the A269 and A2036 in Bexhill and the A21, A2101, A2102, B2195 and B2092 in Hastings. The A259 is considered in sections due to the variation of conditions along its length. The likely stress levels along the Published Scheme and the proposed link roads are also discussed.

2.3 **Discussion of Results**

2.3.1 The results of the assessment of driver stress levels along the A259 in the year 2013 without a bypass and with a bypass open, are given in Tables 2.1 and 2.2 respectively. Those of the other roads and the Published Scheme are given in paragraphs 2.3.5 to 2.3.6 and 2.3.7 to 2.3.10 respectively. The levels of driver stress predicted for the year 2013 without a bypass are shown on Figure 2 and with a bypass on Figure 3.

Section of existing A259	Level of Stress
Bexhill	
Start of Scheme - Little Common	High
Little Common - Old Town Bypass	High
Old Town Bypass	Moderate
Old Town Bypass - Glyne Gap	High
Glyne Gap	High
Hastings	
Glyne Gap - Junction with A21	High
Junction with A21 - B2093 'The Ridge' at Ore	High

Table 2.1 Level of stress on the existing A259 in 2013 without Bypass

Section of A259	Level of Stress
Bexhill	
Start of Scheme - Little Common	Moderate/High
Little Common - Old Town Bypass	Moderate/High
Old Town Bypass	Moderate
Old Town Bypass - Glyne Gap	High
Glyne Gap	High
Hastings	
Glyne Gap - Junction with A21	High
Junction with A21 - B2093 'The Ridge' at Ore	High

Table 2.2 Level of stress on the existing A259 in 2013 with Bypass

The Existing A259

2.3.2 This route would generally create a high level of stress for drivers in the year 2013 if the Published Scheme were not to be built. The only exception to this would be the Old Town Bypass which due to limited frontage access and being a dual carriageway would create a moderate stress level.

2.3.3 The main features of the existing A259 that would contribute to the high level of stress for drivers include proximity of housing, shops, hotels, recreational facilities, the frequency of pedestrian crossings, the poor road alignment and the high traffic flows. The predicted reduction of traffic through Bexhill as a result of construction of the bypass (in 2013 approximately 60%) would reduce the level of stress generally to moderate/high, but the lower predicted reduction through Hastings (in 2013 approximately 40%) would still maintain a high level, although this would obviously be a reduction from the level that would be experienced with no bypass.

2.3.4 In the area of Glyne Gap where traffic flows are concentrated due to the lack of route choice, driver stress levels would be high with or without a scheme, but the large reduction in flows that it is predicted a bypass would bring in this area, would reduce delays and hence driver stress substantially.

Other Roads in Bexhill

2.3.5 The A269 and A2036 in Bexhill would have substantial reductions in traffic flows, largely as a result of the provision of the Bexhill Northern Approach Road (BNAR), the link road from the bypass to the A259. The level of stress on the A269 and A2036 would be high in 2013 without a bypass, but this would reduce to a moderate/high level with the provision of the bypass and the associated link road. Flows on the new link road would be substantial and a high level of stress would be expected, but in this case the standard of alignment and signing would provide some relief, and the level of stress experienced would be less than if the same journey was taken along the existing network at the same time.

Other Roads in Hastings

2.3.6 Some of the roads in Hastings, the A21 and the A2101 are predicted to have slightly higher flows with the introduction of the scheme. These routes would create a high level of stress with or without the new bypass. The proposed link into Hastings from the bypass at the southern end of Queensway, the Hastings Spur Road, is predicted to have a substantial increase in traffic flow with the bypass. This would increase the expected level of driver stress on the section west of Harley Shute Road from moderate/high to high with the scheme, the increases in traffic flows being compensated to some degree by the improved widened link road and accompanying signing and traffic management schemes. It is predicted that Harley Shute Road, between the A259 and the new link road, would have a substantial reduction in traffic flow with the provision of a bypass, and this would reduce the driver stress level from high to moderate in the year 2013.

The Published Scheme

2.3.7 The full length of the Published Scheme, some 14.7km, would be dual carriageway mainly passing through rural areas with a short section along the urban fringe of Hastings. All junctions on the scheme would be two level with the bypass connecting to the side roads by slip or link roads. The layout would be to a high standard of design that would be familiar to all users, with free movement and limited access. Consequently the Published Scheme will have a low level of stress except on the section between the Bexhill Northern Approach Road (BNAR) and the Hastings Spur Road where heavy traffic flows between the two towns would increase the stress to moderate.

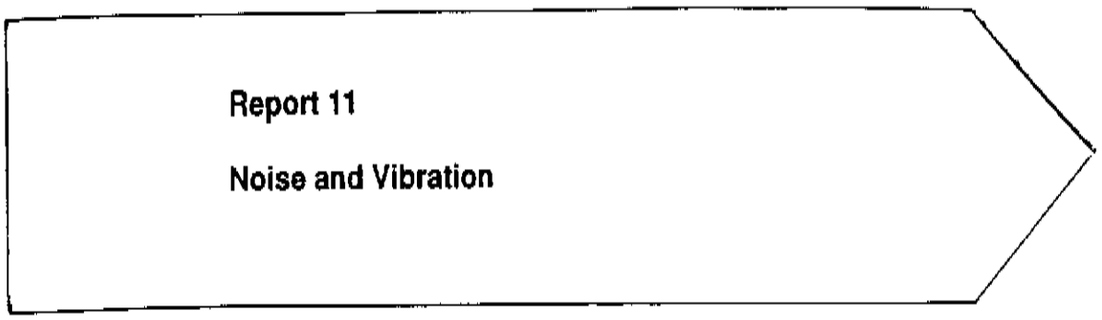
2.3.8 The high degree of transfer to the bypass from the existing A259, would benefit large numbers of drivers by the reduction in stress levels.

2.3.9 Some features of the new route, particularly the higher speeds and merging and diverging that would be required at junctions may deter some drivers, particularly the elderly or inexperienced. The reduction of flows on the existing A259 would enable them to benefit from a reduction of stress level without transferring to the new scheme if they so wished.

2.3.10 The design of the Published Scheme would be such that a high standard of direction signing would be provided to enable decisions on routes to be taken by drivers in sufficient time. The anxiety of following the signing of a route through a busy urban area would be relieved.

2.4 Summary

2.4.1 The removal of through traffic from Bexhill and Hastings would contribute to a reduction in driver stress level along the length of A259 from west of Bexhill to Ore, by transferring this traffic to the Published Scheme, where lower levels of stress would be experienced. Other major links in Bexhill would have similar relief due to the construction of the Bexhill Northern Approach Road. In Hastings apart from the A259, much of the road system would have driver stress levels at a similar level with or without a bypass, the Hastings Town Development Area being the only area where levels would increase substantially.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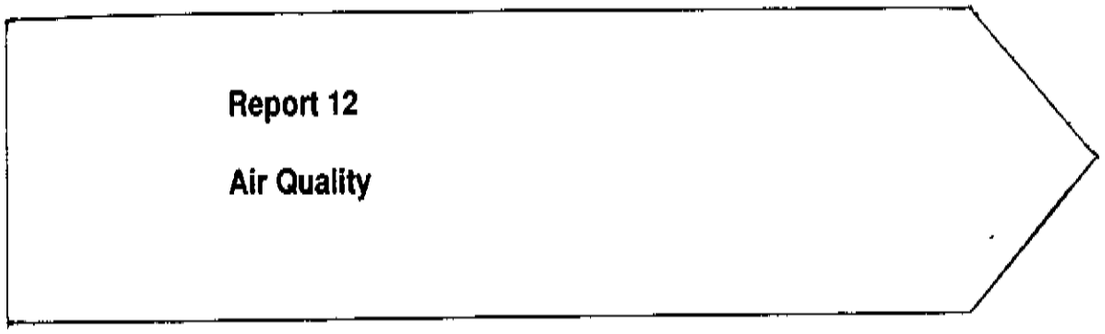
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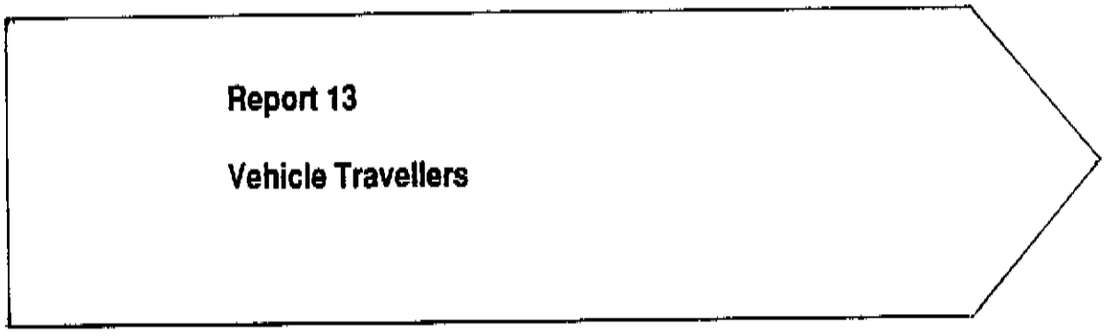
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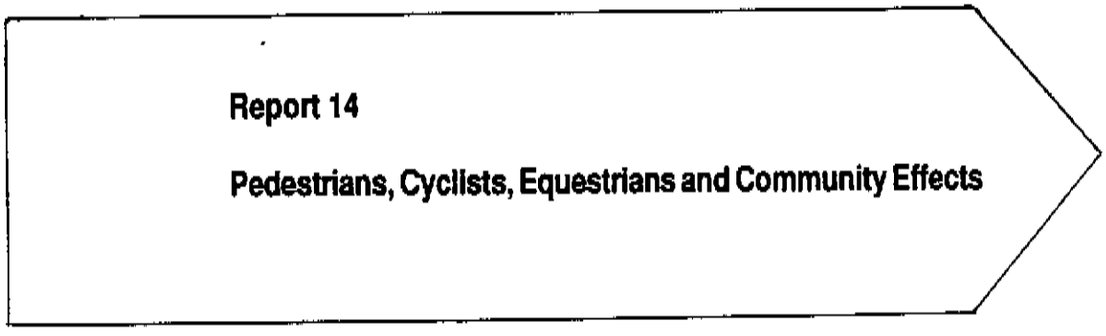
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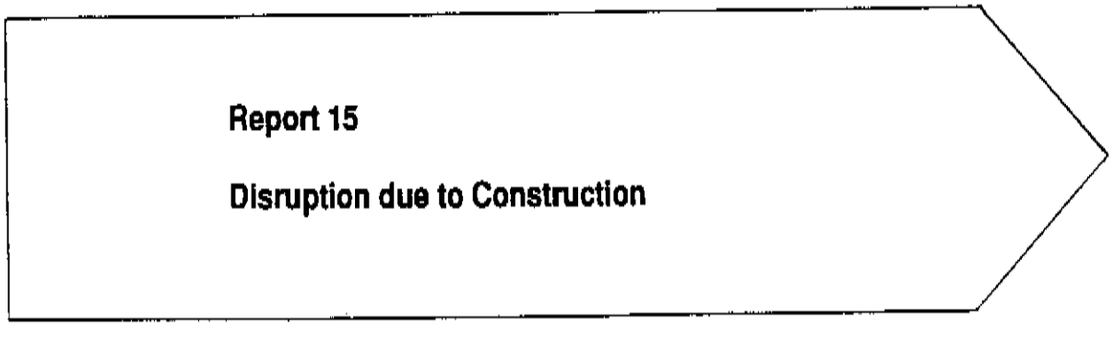
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REPORT 14

PEDESTRIANS, CYCLISTS, EQUESTRIANS AND COMMUNITY EFFECTS

September 1994

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REPORT 14

PEDESTRIANS, CYCLISTS, EQUESTRIANS AND COMMUNITY EFFECTS

September 1994

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P1	May 94	AMT	SFB	SFB	First Draft
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CONTENTS

LIST OF FIGURES

1 INTRODUCTION

1.1 This report considers the impact the construction of the Published Scheme would have on pedestrians, cyclists, equestrians and on community facilities.

1.2 The assessment has been carried out in accordance with Volume 11, Section 3, Part 8 of the Design Manual for Roads and Bridges (DMRB).

1.3 The assessment of the effects of the bypass on the above has been carried out on the assumption that the scheme opening and design years (15 years after opening) would be 1998 and 2013 respectively and has been based on the predicted traffic flows for those years. Traffic forecasts have recently been assessed and the year of opening of the scheme revised to 2000 (Design year 2015). Revised traffic flows for those years are given in Volume 1 of this Statement. It is anticipated that the results of the assessments for the revised years would be similar to those given in this report

2 METHODOLOGY (Figures 1 and 2)

2.1 In order to assess the likely impact of the Published Scheme on the pedestrians, cyclists, equestrians and other users of community facilities, consideration has been given to the effect it would have on the duration of journeys and how any local travel patterns would be affected.

2.2 The establishing of travel patterns has required that the following bodies be contacted for the purposes given:

East Sussex County Council)	-	Rights of Way, Definitive footpath plans
Hastings Borough Council)		
The Ramblers	-	Footpath usage
East Sussex County Fire Brigade	-	Station locations
Area Health Authority	-	Hospitals and Doctors
Sussex County Constabulary	-	Station locations
East Sussex County Council Education Department	-	Schools
East Sussex County Council Social Services Department	-	Aged persons retirement homes
Local Equestrian centres	-	Routes

2.3 In addition to the above, information has been gathered concerning the following:-

Routes of Bus Services
Locations of Post Offices
Locations of Railway Stations

2.4 In order to establish the usage of the Rights of Way along the scheme corridor, a footpath survey was carried out in August 1993. The footpaths were counted on a weekday and at a weekend to establish the variation in usage. The numbers of ramblers quoted in this report as being affected by the scheme are based on the results of the survey and assume similar usage on each weekday to that counted on the weekday of the survey and similarly for the weekend days. The numbers are average summer flows although it is recognised that the flows will vary through the year. The effects on pedestrian are described in Section 3. The report on the survey is Appendix A to this report.

2.5 The roads in the area are not heavily used by cyclists, but the bypass proposals make due allowance for cyclists throughout and these are described in section 4.

2.6 The equestrian centres in the area are restricted in their routes by the lack of bridleways. As a result the byways and local roads are well used, Peartree Lane and Whydown Road in particular. The effects on equestrians are described in Section 5.

3 **PEDESTRIANS** (Figures 1 and 2)

3.1 There are 21 public footpath routes and one byway open to all traffic that would be physically affected by the Published Scheme. The details of the 17 that would be diverted are given below.

Footpath/ Byway Route	Maximum No of users recorded per day	Diversion Route	Additional Length of Route	Additional Walking Time (4 kph)
8	15	Via new link road and field alongside Green Road	405m	6 mins
9a/9b	9	Via footpath along boundary of bypass and over new bridge	490m	8½ mins
13b,13c	-	Via footpath along boundary of bypass	60m	1 min
10c,10d	3	Via footpath along boundary of bypass	80m	1 min
11e	-	Via footpath along boundary of bypass and through new underpass	310m	4½ mins
30	5	"	170m	2½ mins
18b	2	Over new bridge	-	-
47	12	Via footpaths along boundaries of bypass and over Peartree Lane bridge	450m	8 mins
16b	21	Via access track to Preston Hall and over Watermill Lane bridge	100m	2½ mins
33	4	Via dismantled railway, new underpass and footpath 31a	625m	10½ mins
31a		Via new underpass	30m	½ min
1		Via existing track and under viaduct	680m	11 mins

Footpath/ Byway Route	Maximum No of users recorded per day	Diversion Route	Additional Length of Route	Additional Walking Time (4 kph)
32	23	Via footpath along boundary of bypass, under bridge at Castleham and Footpath 33	1070m	16 mins
34a	31	Via footpath along boundary of slip road and under bridge at Castleham	580m	9½ mins
34/39c	Not recorded	Within bypass boundary	-	-
131	66	Via verges of A21 link road	330m	6 mins
130/129	57	Via south verge of A21 link road	-	-

3.2 The following public footpaths would be truncated, with no diversion proposed:

Footpath	Maximum No of users recorded per day	Where truncated
18	-	St Mary's Lane diversion
56	Not recorded	Watermill Lane diversion
22	29	Westbound slip road of junction at Mayfield Farm

3.3 Footpath 131A would be extinguished but the diverted routes of footpaths 131, 130 and 129 would be available for users.

3.4 The changes in amenity for pedestrians using the above footpaths and the byway that would be physically affected are as given in the following paragraphs. Details of the visual impact of the scheme on the footpath routes are given in Volume 2, Report 10 of this Statement, with general comments only in this report.

Footpaths 8, 9a, 9b, 13a, 13b, 13c, 10c, 10d, 11e, 30 (Barnhorn Level)

With Published Scheme in opening year (1998)

3.4.1 Reduction in amenity for around 150 ramblers each week. The Annual Average Daily Traffic (AADT) flows on the bypass in this area are predicted to be 14,700 vehicles (two-way, 1998) assuming high growth for traffic in the intervening period. Some footpaths have lengthy diversions but would be carried over or under the bypass with no access thereto.

3.4.2 Views from the footpaths would be affected by the new road and a new access overbridge near Broad Green Farm.

Without Published Scheme in opening year

3.4.3 Existing good amenity would remain unchanged.

Footpaths 18b, 47 (North east Bexhill)

With Published Scheme in opening year (1998)

3.4.4 Reduction in amenity for around 35 ramblers each week. Traffic forecasts predict AADT (1998, high growth) of 14,700 vehicles (two-way) for the bypass in this area. Footpath 47 has long diversions and views would be affected by bypass. New bridges would not be highly visible. Both footpaths would be carried over the bypass with no connection thereto.

Without Published Scheme in opening year

3.4.5 Existing good amenity would remain unchanged.

Footpaths 18, 56, 16b (North Bexhill)

With Published Scheme in opening year (1998)

3.4.6 Reduction in amenity for around 100 ramblers each week. Traffic forecasts predict AADT (1998, high growth) of 20,500 vehicles (two-way) for the bypass in this area. Footpaths 18 and 56 would suffer reduction in amenity due to their proximity to the bypass which although not highly visible, would produce high noise levels. Footpath 16b would be diverted and carried over the bypass.

Without Published Scheme in opening year

3.4.7 Existing good amenity would remain unchanged.

Footpaths 33, 31a, 1 and Dismantled Railway (North west Bexhill)

With Published Scheme in opening year (1998)

3.4.8 Reduction in amenity for around 400 ramblers each week using the area of the dismantled railway for recreational walking. The loss of some of the walking area as well as the influence of the close proximity of the bypass with forecast traffic flows of 29,500 vehicles AADT (two-way, 1998, high growth) would significantly reduce the amenity value of the area. There would be substantial diversions for footpaths 33 and 1 but these would provide crossings under the bypass with no access thereto.

Without Published Scheme in opening year

3.4.9 The existing good amenity would remain unchanged.

Footpaths 22, 32, 34a, 34/39c (Queensway)

With Published Scheme in opening year (1998)

3.4.10 The 70 or so users each week of footpath 22 would suffer reduced amenity due to the proximity of the bypass and the interruptions to the extensive views currently available. There would be a reduction in amenity for the users of the Marline Woods area and its associated footpaths due to the increased traffic flows forecast for Queensway of 17,400 vehicles AADT (two-way, 1998, high growth). This would affect approximately 250 ramblers each week. Views over Queensway would remain relatively unchanged from Marline Woods, which lie on lower ground. The introduction of a new footpath along the boundary of the bypass from Crowhurst Road would improve access to the area.

Without Published Scheme in opening year

3.4.11 Existing very good amenity would remain unchanged.

Footpaths 131A, 131, 129/130 (Baldslow)

With Published Scheme in opening year (1998)

3.4.12 Footpath 131A which is used by approximately 400 walkers each week would be extinguished. Use could be made of footpath 131 and the verges of the A21 link road, a diversion of over 300 metres. The amenity of both of these footpaths and 129/130 would be substantially reduced by the bypass with a forecast flow of 23,100 vehicles AADT (two-way, 1998, high growth) and 10,150 vehicles on the A21 link road. The construction of the superstore immediately to the south and east of footpaths 129/130 and 131 has already reduced the amenity value of these footpaths to some extent. The road would dominate the local area from a visual point of view and would reduce amenity further.

Without Published Scheme in opening year

3.4.13 Existing amenity would remain unchanged.

Byway 58a

With Published Scheme in opening year (1998)

3.4.14 There would be a reduction in amenity for users of the byway, around 370 walkers each week due to the bypass with forecast flows of 20,500 vehicles AADT (two-way, 1998, high growth). The byway would be diverted to pass under the bypass with no access thereto. The views from the byway would be dominated by the new road, reducing the attraction of the facility.

Without Published Scheme

3.4.15 Existing good amenity would remain.

The Existing A259

3.5 The usage of the existing A259 by pedestrians is heavy, as throughout its length from the west of Bexhill to north of Hastings the road has footways usually on both sides of the road. There is extensive use of these footways for access to the numerous commercial, industrial and community facilities that front the road. The sea front at Hastings is also well used by pedestrians, accessing the promenade, beach, pier and other leisure activities.

3.6 The changes in amenity for pedestrians along the existing A259 are given in the following paragraphs:

A259 through Bexhill

With Published Scheme in opening year (1998)

3.6.1 Improvement in amenity for all pedestrians using footways and local facilities. Traffic flows forecast to fall by up to 68%, to 9600 vehicles AADT (two-way, 1998, high growth).

Without Published Scheme in opening year

3.6.2 Amenity for pedestrians using footways along the roads is poor and would deteriorate further without the scheme.

A259 at Glyne Gap

With Published Scheme in opening year (1998)

3.6.3 Improvement in amenity with forecast reduction in traffic flows of 64% to 14,200 vehicles AADT (two-way, 1998, high growth).

Without Published Scheme in opening year

3.6.4 Users of footways and shopping areas would suffer a further reduction in amenity with increasing traffic flows.

A259 on Seafront at Hastings

With Published Scheme in opening year (1998)

3.6.5 Improvement in amenity with forecast reduction in traffic flows of 38% to 26,800 AADT (two-way, 1998, high growth).

Without Published Scheme in opening year

3.6.6 Users of promenade, pier and tourist facilities along seafront would suffer gradual reduction in amenity with increasing traffic flows.

Other Roads in Bexhill and Hastings

3.7 With the opening of the bypass traffic flows are predicted to fall on the major routes through Bexhill, where there would be an improvement in amenity for pedestrians. In Hastings, some roads would benefit in the same way, but some roads would suffer from an increase, reducing amenity further.

Consultations with other Bodies

3.8 The proposals were discussed with the Rights of Way officer for East Sussex County Council and the local officer for the Ramblers. Their comments and requests were taken into consideration and incorporated in the proposals where possible.

4 CYCLISTS

4.1 The congestion on the existing road network and the forecasted increase in traffic flows makes the option of cycling a dangerous one. The frequency of junctions, including roundabouts, combined with the high traffic flows produces a hazardous route for cyclists using the A259 through the two towns.

4.2 The provision of a bypass would help in two ways:

(1) By providing a safer route for longer distance cycling and making junctions more 'cycle friendly' by provision of crossing points and dedicated cycle lanes.

(2) By reducing flows on the existing A259, allowing safer cycling.

4.3 The provision for cyclists along the new scheme consists of the use of the one metre hardstrip marked on the nearside of each carriageway, separate from the main running lanes for vehicles. Where two level junctions would require slip roads to leave or join the main carriageway, crossing points on the slip roads combined with cycle tracks through the dividing nosings would enable cyclists to negotiate the merge or diverge area safely. The provisions at junctions are in accordance with Traffic Advisory Unit Leaflet 1/88 'Provision for Cyclists at Grade Separated Junctions' and are shown on Figure 3.

4.4 At the junctions of side roads with the bypass, roundabouts would allow the merging of traffic. At these locations dedicated crossing points and lanes would be provided for the use of cyclists to enable them to avoid the merge, diverge and weaving areas that can be dangerous. These provisions are shown on Figure 4.

4.5 The only side road where specific facilities would be provided for cyclists would be the A21 link road where one metre hard strips would be provided for this purpose.

5 EQUESTRIANS

5.1 During the course of the footpath survey (see 2.4 above), the usage of Rights of Way by equestrians was also recorded. The results are shown in Appendix 1.

5.2 The byway open to all traffic at Buckholt Lane was the most well used, seven and six equestrians recorded on a weekday and weekend day respectively. Elsewhere, footpaths 8, 130, 131 and 131A had light usage.

5.3 The locations of local equestrian centres and livery stables were established and their routes for exercise and recreation identified. The locations of these facilities are shown on Figures 1 and 2.

5.4 There are three stables in the Whydown area which all generally use Whydown Road, Hooe Road, Ninfield Road and Peartree Lane as routes. There is conflict with traffic along all these roads but the lack of bridleways forces riders to use them. There are two stables in the Buckholt Lane area that use this byway, Watermill Lane, the road from Henley's Down to Crowhurst and private tracks and other byways for their routes.

5.5 The construction of the bypass would reduce the amenity value of the routes in the areas where they would cross the bypass but as all the crossing points used would be maintained by the provision of bridges over or under the bypass, the severance impact would be minimal. The Oaktree Riding Stables on Buckholt Lane would have some land taken by the bypass, and the amenity of the rest of the site and the stables would be reduced by the proximity of the scheme.

5.6 There are stables in Beauport Park but the routes used by the riders are contained within the park itself and although there may be a slight reduction in amenity due to increased noise levels there would be little effect overall.

6 COMMUNITY EFFECTS

6.1 It can be seen from Figures 1 and 2 that the majority of community facilities that serve the area are located within the urban areas of Bexhill and Hastings, lying to the south of the scheme. Maintaining routes to the towns from the rural areas would obviously be important in terms of access to these community facilities.

6.2 The outlying villages of Hooe and Hooe Common and Ninfield and Crowhurst to the north are served by their own post offices, the last two also having schools and churches. People living in the outlying areas would however require access to the main facilities within the towns, even though local needs could be satisfied in a few areas.

6.3 The construction of the Published Scheme would physically sever the outlying areas from the urban areas, but all side roads, with the exception of St Mary's Lane which would be diverted locally, would be maintained by the provision of bridges over or under the bypass. The provision of the bridges would reduce the severance effect to slight overall.

6.4 The areas of open space used by the public that would be affected by the scheme are shown on Figures 1 and 2. Four areas, at St Mary's Recreation Ground, the dismantled railway, Marline Woods and at Beauharrow Road would have land taken. This land would be replaced by an equivalent area of exchange land of a similar type that would be purchased under the Orders for the scheme and made available for use by the public, in areas close to the land that would be taken.

6.3 The impact of the scheme on these areas would be one of loss of amenity as well as loss of land. Similarly in the other areas of open space close to the scheme, there would be a loss of amenity due to increased noise and air pollution. These areas include High Woods, the allotments at Ninfield Road and the playing fields at Castleham on Queensway.

6.4 The provision of a bypass would reduce the traffic flows through the urban areas, most specifically along the A259. This is the area where a large number of community facilities are grouped and which would benefit most from the reduction in noise and air pollution. It would also allow easier access for all users of the facilities.

6.5 The relief from existing severance would be substantial along the A259 in Bexhill and at Glyne Gap, and moderate through Hastings.

6.6 No existing bus routes would be re-routed apart from following local diversions of existing roads. There would therefore be no effect on services. Bus services along the existing A259 would benefit from the predicted reduction in traffic flows.

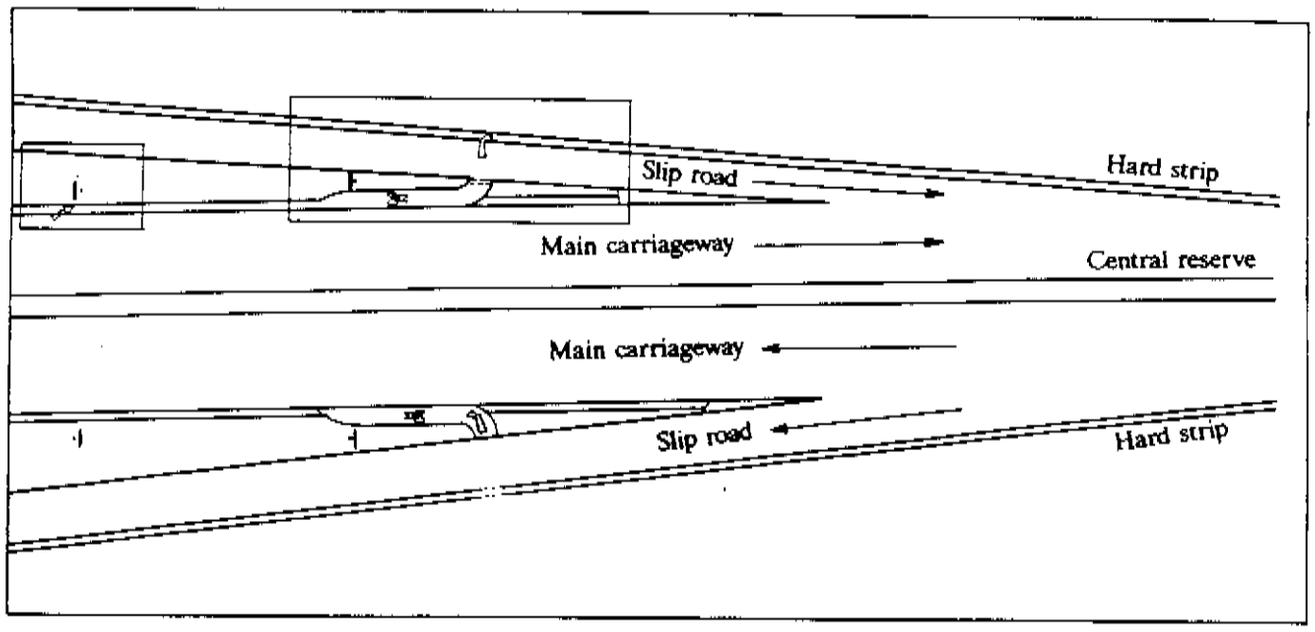
7 SUMMARY

7.1 The usage of the footpaths is relatively light, with moderate usage of footpaths 1, 130 and 131, byway 58a and the line of the dismantled railway which is not a designated footpath. As the majority of usage of footpaths is for recreational purposes rather than as a route between facilities, it is unlikely that the diversions proposed would affect the numbers using the footpaths, but the reduction in amenity caused by the presence of the new road may well do so.

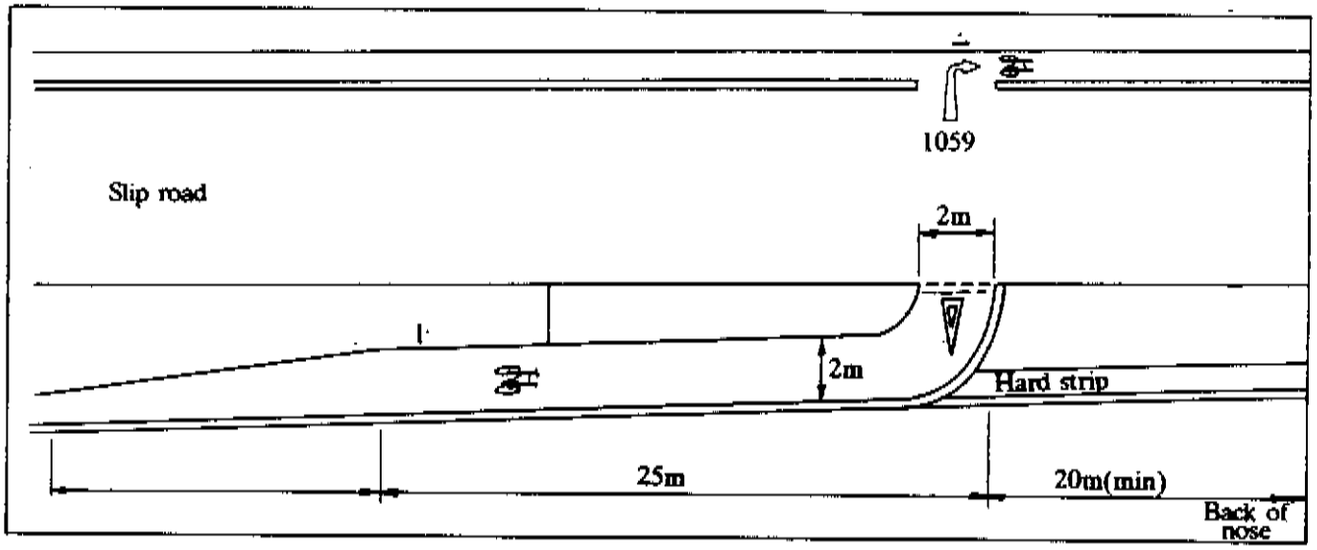
7.2 Facilities would be provided along the new scheme and at all the junctions for the use of cyclists. These would also enable cyclists using existing roads crossing the bypass to negotiate the junction safely. The reductions in traffic flows along the existing A259 would make the use of this route by cyclists safer and more enjoyable.

7.3 The scheme would affect equestrians by reducing the amenity value of those parts of their routes crossed by the bypass. The provision of bridges for side roads and byways over or under the bypass would however enable access to remain virtually unchanged.

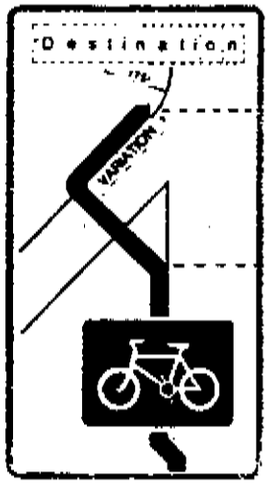
7.4 The scheme would sever the outerlying communities from the facilities in the urban areas of Bexhill and Hastings, but the provision of bridges across the bypass for all the significant roads in the area, would limit the impact of the severance to slight.



Typical Junction Detail



Slip Road Crossing Detail

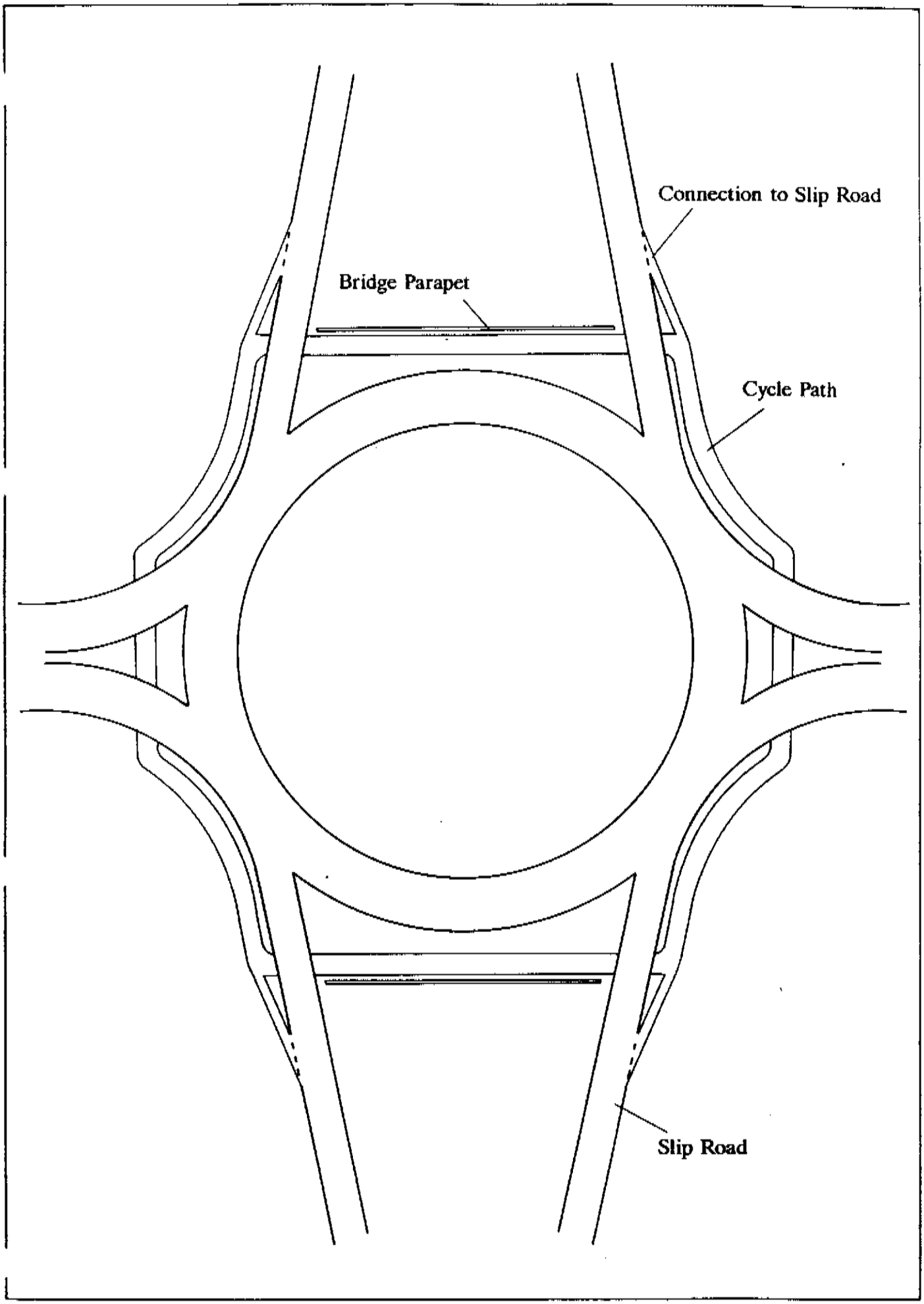


Typical warning sign

10059/RC/047/14/A

Slip Road Crossing Standard Details

Figure 3



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Typical Roundabout Detail
Figure 4

APPENDIX 1

Footpath Survey

August 1993

CONTENTS

1 INTRODUCTION

1.1 This report documents the pedestrian surveys undertaken on the fifteen public footpaths and one byway along the route of the western bypass, and their analysis.

1.2 The surveys were carried out by East Sussex County Council to a specification supplied by Mott MacDonald. The survey locations are indicated in **Figure 1.**

2 SURVEY METHOD

2.1 The surveys were carried out on Sunday 15.08.93 when the weather was dry and sunny. Intervention from the local landowner at site 9 necessitated relocating the survey site. The Sunday count for this site was then undertaken on 22.08.93 when the weather was showery. All sixteen sites were also surveyed on Wednesday 18.08.93, with dry and sunny weather prevailing.

2.2 Each count was carried out over a 12 hour period from 0700 to 1900 hours, and the following information recorded:

i) Time of observation

ii) Age range, ie 0-5, 5-18 or 18+

iii) Travel mode, ie by foot, bicycle, horse or vehicle

iv) Direction of travel.

3 SURVEY RESULTS

3.1 Summaries of the survey results are given in **Table 1**, showing the total count at each site for the 12 hour period, split by travel mode.

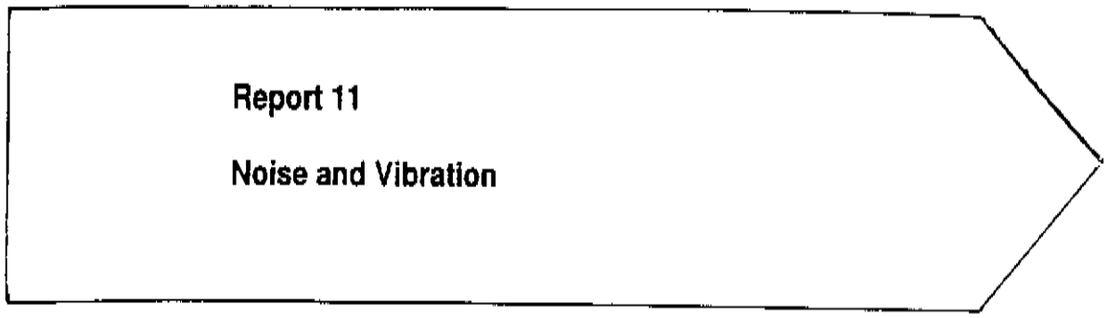
3.2 It can be seen that numbers of pedestrians observed are generally low, and even zero at several sites. The maximum number observed was at site 11 on the Sunday, with 109 pedestrians plus 5 cyclists recorded using the dismantled railway line.

Site No (1)	FP No	Sunday 15/8/93 (3)				Wednesday 18/8/93			
		P	B	E	V	P	B	E	V
1	8	15	-	-	-	12	-	5	-
2	9a	9	-	-	-	-	-	-	-
	"13a" (4)	9	-	-	-	-	-	-	-
3	10d	3	-	-	19	-	-	-	11
	30	5	-	-	19	3	-	-	11
4	18b	1	-	-	5	2	-	-	12
5	47	12	-	-	-	-	-	-	-
6	18	-	-	-	-	-	-	-	-
7	16b	21	-	-	-	13	-	-	-
8	BOAT 58a (5)	46	2	6	59	56	3	7	55
9	33	2	-	-	4	4	1	-	7
10	31a (N)	10	-	-	-	6	-	-	-
	Railway (W)	38	5	-	-	22	1	-	-
11	1(N)	94	3	-	-	16	-	-	-
	Railway (W)	44	5	-	-	18	1	-	-
12	22	29	2	-	-	2	-	-	-
13	32	23	-	-	-	19	2	-	-
14	34a	20	-	-	-	31	-	-	-
15	130	57	-	-	-	33	1	1	-
	131	66	2	-	-	60	13	1	-
16	131A	26	4	-	-	16	7	2	-

Key: P = pedestrian E = equestrian
B = bicyclist V = vehicle

Note:
1. Site locations are shown in Figure 1.
2. 12-hour two-way counts at each site are given.
3. For site 9, the Sunday count was undertaken on 22/8/93.
4. Route used is not the designated line of FP13a.
5. BOAT = Byway Open to All Traffic

SUMMARY OF PEDESTRIAN COUNTS **TABLE 1**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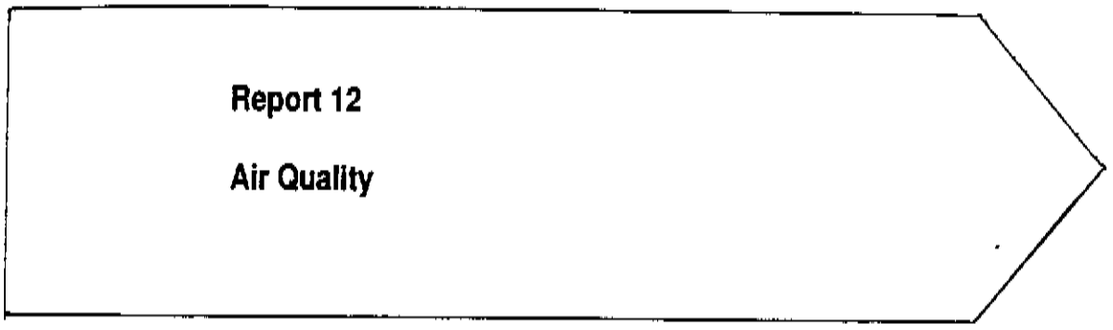
Noise and Vibration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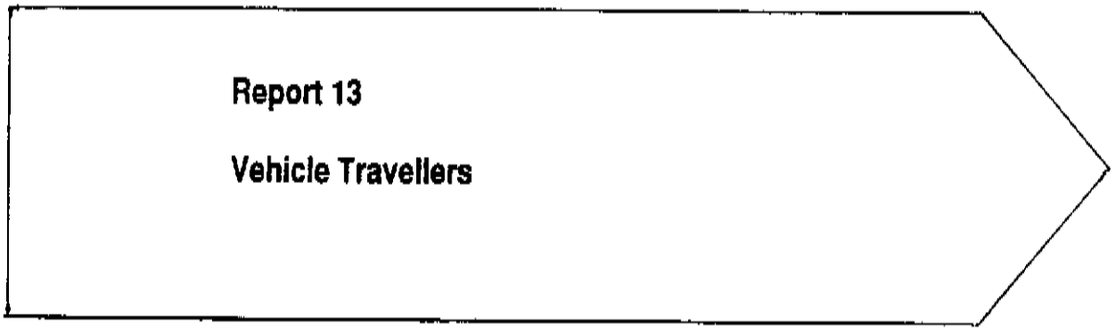
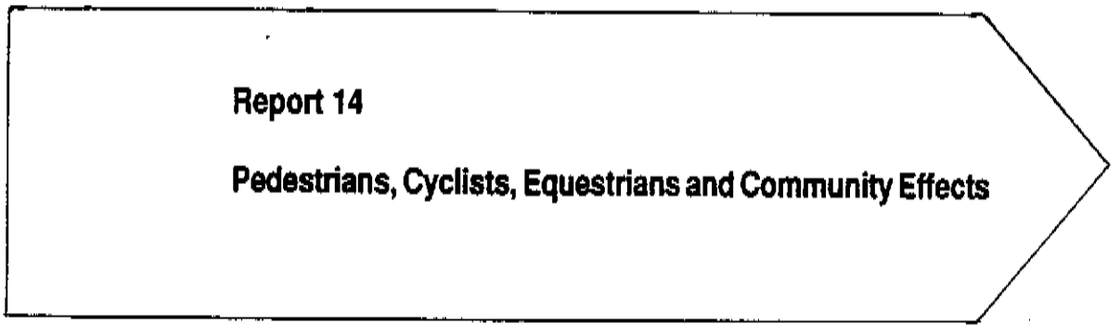
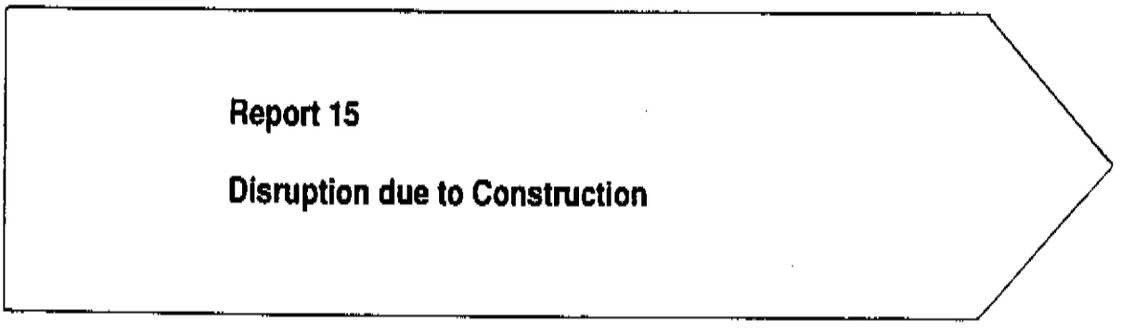
Air Quality


Report 13
Vehicle Travellers


Report 14
Pedestrians, Cyclists, Equestrians and Community Effects


Report 15
Disruption due to Construction

Report

15

Document Ref: 10059/RC/047/15/A
September 1994

REPORT 15

DISRUPTION DUE TO CONSTRUCTION

September 1994

Document Ref: 10059/RC/047/15/A
September 1994

REPORT 15

DISRUPTION DUE TO CONSTRUCTION

September 1994

Issue and Revision Record

Rev	Date	Originator	Checked	Approved	Description
P1	May 94	AMT	MP	SFB	First Draft
A	Sept 94	AMT	SFB	SFB	Publication Issue

REPORT 15 - DISRUPTION DUE TO CONSTRUCTION

CONTENTS

LIST OF FIGURES

1 INTRODUCTION

1.1 The construction of the Published Scheme would take place over a period of approximately two years. During this time, there would be disruption to those people living and working in close proximity to the site of the works and accesses thereto.

1.2 This report describes the construction processes that could affect the surrounding area and assesses the likely extent of disruption caused.

2 THE CONSTRUCTION CONTRACT

2.1 The road, its associated structures and ancillary works would be constructed by a contractor who would be awarded the contract following competitive tendering. The contractors selected to tender for the contract would be chosen by their track record in carrying out similar works.

2.2 The contractor would be supervised throughout construction to ensure compliance with the design and to ensure that the requirements of the relevant authorities and other requirements of the contract in respect of environmental protection are upheld.

2.3 The contractor would be responsible for selecting working methods, the plant used to carry out the work, the sources of materials and the order in which the work would be carried out. These have a large bearing on the disruption likely to occur during construction, and would not be finalised until after a contractor has been appointed. The practices described in this report are therefore based on those that are normally used, but there would be no obligation for any contractor to adopt them.

2.4 Prior to the contract being prepared for tender, the views and requirements of the local Environmental Health Officer would be sought. He or she would provide limiting levels of allowable disruption, usually in the form of specifying maximum noise levels and limiting working hours. These requirements would form part of the contract, and the contractor's compliance would be checked by the supervising team and the local authority.

3 METHODOLOGY OF ASSESSMENT OF DISRUPTION

3.1 Disruption due to construction is generally a localised phenomenon. A study has shown that at least half the people within 50 metres of a construction site boundary were seriously bothered by the activities but beyond 100 metres less than a fifth of the people were.

3.2 For the purposes of this report the number of residences within 100 metres of the proposed construction works have been assessed to give an indication of the number of people who would be seriously bothered by the works. This line does not extend necessarily from the final scheme boundaries, as in some cases such as where landscaping works are proposed, construction practices would take place outside these. Where these works are proposed, the 100 metres has been taken from the limit of these works.

3.3 Sites of ecological and heritage value within 100m of the scheme have also been assessed and the mitigation measures proposed are described where provided.

3.4 The effects on residents, areas used by the public and the local ecology that could be expected during construction of the Published Scheme are described in the following sections together with a review of construction impacts and how they would be mitigated.

4 PROPERTIES AFFECTED

4.1 Residences

4.1.1 During the route location studies for the bypass the major constraints were identified and these included both existing and proposed residential developments. The alignment selected, would keep impact on residences to a minimum, but inevitably some properties would still be affected due to their proximity. Mitigation measures in the form of earth mounding, landscaping and planting and the erection of noise barriers are proposed wherever possible to reduce the impact of the scheme, both in its final form and during construction.

4.1.2 The main areas where residences would lie in close proximity to the bypass are in northern Bexhill where the new road would cross St Mary's Lane, the A269 and Watermill Lane, and along parts of Queensway in western Hastings. A total of 424 residences would lie within 100 metres of the perimeter of the construction site, and these properties are shown together with the extent of the area considered on Figures 1 - 10 incl. All these residences could expect some disruption due to construction.

4.1.3 The static caravan park at Beauport Park lies in close proximity to the bypass and some of the chalets at High Beech. A total of 65 caravan plots would lie within 100 metres of the construction site and 5 chalets. All these would expect some disruption due to construction.

4.1.4 The likely main effects of the site operations are described below.

Noise

4.1.5 Noise produced during the construction process would probably be one of the largest impacts experienced at nearby residences. The plant and processes used are noisy by nature, and although advances in machine and silencing technology have allowed some aspects to become relatively quiet, noise would still be a problem.

4.1.6 Under the Control of Pollution Act, 1974, the Local Authority has the power to limit working hours and noise levels, through the Environmental Health Officer as outlined in para 2.4. The daytime working hours would be set, and night time working would be agreed to only in 'exceptional circumstances', and then only following the relevant permissions being forthcoming from the local authority and after consultations with local residents. These noise limits would not stop the noise from being intrusive but would prevent excessive levels being generated whilst permitting the contractor to construct the scheme.

4.1.7 In areas where construction noise '... seriously affects or will affect for a substantial period of time the enjoyment of an eligible building adjacent to the site ...', the Highway Authority has discretionary powers under the Noise Insulation Regulations 1975 to provide insulation in the form of secondary glazing. (An "eligible building" is a dwelling or residential building not more than 300m from the

nearest point of the carriageway of the scheme.) In areas where this is the case, installation would take place at an early stage of scheme construction to enable full benefit to be derived. The criteria previously adopted for schemes within the Department of Transport's South East Region for the provision of insulation under these conditions are:

(i) The predicted construction noise level L_{Aeq} is expected to exceed 70 dB sustained over a period of several months, and

(ii) Construction noise levels alone are at least 1 dB greater than the prevailing ambient levels.

A preliminary assessment concluded that 65 residences could benefit from secondary glazing during the construction period.

4.1.8 In addition to insulation, as part of the mitigation of the final scheme, environmental barriers in the form of noise fences and earth mounds are proposed. Where feasible, these mitigation measures could be installed at an early stage of construction to afford the residences the benefits during construction. The location of the proposed barriers and mounds for the final scheme are shown on Figures 1 - 10 inclusive.

Dust

4.1.9 Dust caused by the movement of earthworks and other construction materials could be a problem at adjacent properties, particularly during the drier summer months. Watering by spraying can be used on site to reduce this impact, and road sweeping would be enforced to minimise the spreading of dust along access roads.

Piling

4.1.10 Noise from piling at the sites of the construction of bridges and retaining walls would often be the basis for the provision of discretionary insulation (see 4.1.6). The major structures that are expected to have piled foundations are given below:

Combined Footpath and Field Access Overbridge	(Figure 2)
Combined Culvert Farm Access and Footpath Underpass at Hooe Sewer	(Figure 2)
Whydown Road Overbridge	(Figure 2)
Combined Footpath and Access Overbridge at Sweet Willow Pumping Station	(Figure 3)
Peartree Lane Overbridge	(Figure 4)
Retaining Wall at A269 Junction	(Figure 4)
Bexhill Northern Approach Road Junction Underbridges	(Figure 6)
Combe Haven Viaduct	(Figure 7)
Railway Tunnel	(Figure 8)
Retaining Walls at Junction at Mayfield Farm	(Figure 8)
Crowhurst Road Underbridge	(Figure 8)

Retaining Wall at High Beech Close	(Figure 9)
Retaining Wall at Beauport Home Farm Close	(Figure 10)
Retaining Wall at Whitworth Road	(Figure 10)

Other minor structures may also have piled foundations but the scale of the works and hence the disruption would be much less.

Deliveries of Materials

4.1.11 The deliveries of materials to the site would generally be limited to the main roads indicated on Figure 13, ie A259, A271, A269, A2100, A21, A28, B2092 (Queensway and Harley Shute Road) and B2093 (The Ridge). Construction traffic would not be permitted to use other minor roads for access or for through routes to gain access to the major roads except in agreed circumstances. This aspect is dealt with more fully under 7.2 and 7.3.

4.1.12 Although deliveries would generally be restricted to the roads given above, works to the side roads that cross the bypass would be necessary to enable the main carriageway and the associated bridges to be constructed and for approaches to these crossings on the side roads to be built. This would involve excavations for the diversion of services and the provision of drainage in addition to the roadworks. Much of this work would require traffic management, possibly with two way working at temporary traffic signals over extended periods. Access to properties would be affected by these works, but would be maintained at all times.

4.2 Commercial Properties

4.2.1 There would be 42 commercial properties within 100 metres of the perimeter of the works, all lying in the area of Queensway and the link road to the A21. Here commercial properties in the Castleham Industrial Estate and the Ridge West Industrial Estate would be affected by the same construction effects that would affect residential properties and due to their proximity to housing, would be likely to benefit from the limitations in construction working hours and noise levels described in 4.1.5.

4.2.2 Access to commercial properties would be maintained throughout construction, although as described in para 4.1.11, may be limited by temporary traffic management measures. Most commercial properties along Queensway have their main access from side roads, but the properties on Whitworth Road, which would have their access changed by the scheme, might have to use temporary access routes whilst the new link road and its supporting walls are constructed. In this case access to all the main feeder roads would be maintained.

4.3 Farms

4.3.1 The permanent effects of the scheme on agriculture and farming methods are given in detail in Report 7. The effects on farm houses, which are considered as residences, are described in section 4.1. Farms would however be affected in a number of other ways during construction, including the following:

Temporary Landtake

4.3.2 Extensive areas of land would be taken under licence to blend the scheme in with its surroundings by regrading and allowing return to agriculture. The extent of these areas are shown on Figures 1 - 10 incl. From an agricultural point of view this would result in the loss of use of the land for a period of time, before being returned. The time the land would be out of production would be kept to a minimum and landowners compensation for loss of income would be negotiated with the District Valuer. These areas would be stripped of topsoil, regraded with additional material, and the topsoil respread. Drainage to these areas would be incorporated as necessary.

Access

4.3.3 Temporary access across the site would be maintained at all times for farm vehicles and livestock where an existing access would be affected during scheme construction. All fields affected by construction would be fenced where the possibility of livestock entering the site would exist. The provision of permanent fencing would be a matter for agreement between the landowner and the District Valuer.

Services

4.3.4 All water and power supplies to farms and fields would be maintained during construction. Permanent diversions would however form part of the accommodation works.

5 COMMUNITY FACILITIES AFFECTED

5.1 Access across the construction site along existing roads would be maintained at all times, although there may be flow restrictions due to temporary traffic management for the reasons laid out in para 4.1.11. Access to community facilities would therefore be largely unaffected.

5.2 Recreational facilities that lie in close proximity to or would be affected by the scheme include areas of public open space and footpaths and byways. These facilities would be maintained during construction, although they would suffer from additional noise, dust and access disruption. Footpaths and byways that cross the site, would be clearly marked during construction, but users would in most cases be required to cross the working site prior to construction of the bridges and underpasses that would eventually carry the rights of way over or under the new road.

5.3 Some areas of public open space would suffer a reduction in amenity during the construction process, particularly those that would be directly affected. The dismantled railway embankment north of Bexhill would suffer particularly, and would be of limited amenity value until construction is complete and the replacement land is available. In the area of Queensway, the Marline Valley Woods area would suffer from construction noise and dust and access would become particularly difficult. At the present time no parking facilities are provided on Queensway specifically for this area, so maintaining pedestrian access would provide for most of the current users. The amenity value of the area would be further reduced by its increased severance from the residential areas to the south-east of Queensway. The provision of a new footpath along the north-western boundary of the new road from the area of Crowhurst Road northwards to Marline Valley Woods would however be available and would provide an alternative access.

5.4 Other facilities which would suffer a reduction in amenity during construction include High Woods, the cemetery at Bexhill, the recreation ground at St Mary's Lane, Ninfield Road allotments and the recreation ground at Castleham on Queensway. The early provision of earthmounds and noise barriers along the new road would reduce the effects on some of these facilities.

5.5 The locations of all the above facilities are shown on Figures 1 - 10 incl.

6 EFFECTS ON NATURE CONSERVATION AND HERITAGE

6.1 Nature Conservation

6.1.1 The route of the new road directly affects three Sites of Special Scientific Interest (SSSI), Pevensey Levels, Combe Haven and Marline Valley Woods, and passes close to another at High Woods. The section north-west of Hastings enters the High Weald Area of Outstanding Natural Beauty (AONB) to connect with the Hastings Eastern Bypass. Along its length the route also passes through or close to other important features of nature conservation value. The locations are shown in Figures 1 - 10 inclusive.

6.1.2 Site clearance for construction would be controlled in both timing and method to limit the effect on the ecology. Mitigation measures proposed for incorporation in the final scheme to protect the local ecology would be gradually introduced as construction of the scheme develops. Temporary measures would be necessary to protect the ecology during construction, the main concerns being:-

(1) Preservation of topsoil
(2) Protection of woodland
(3) Protection of watercourses
(4) Protection of wildlife.

Each of the above are considered in more detail below. The crossing of the Combe Haven SSSI is considered separately because of the special issues at this location.

Preservation of Topsoil

6.1.3 Topsoil removed for construction would be carefully stockpiled for re-use after completion of earthworks. Topsoil removed from ecologically sensitive areas would be segregated from other topsoil for re-use in the same area.

Protection of Woodland and Hedgerows

6.1.4 The removal of trees, shrubs and undergrowth would be carefully timed to ensure that breeding birds would not be disturbed during the nesting season. Clearance of these areas would be restricted to the period between August and January. In areas where woodland would be partly taken by the scheme, ie a stand of trees would remain, woodland management would be necessary in the form of thinning and replanting to prevent damage to the exposed edge of the woodland from wind blow. The woodland management aspects would be undertaken immediately after the initial site clearance to minimise damage to that remaining. The areas of ancient woodland affected are shown on Figures 1 - 10 incl.

6.1.5 Individually none of the hedgerows in proximity to the scheme are of other than local interest. Where they occur next to woodland or grassland of nature conservation value their value is increased.

Management of exposed edges would occur and any damage would be reinstated. Edges of hedges to remain would be protected by temporary fencing.

Protection of Water Courses

6.1.6 In the final scheme, all drainage outfalls would be protected by the installation of a balancing pond or tank that would limit the amount of water entering the ditch, stream or drain to a level acceptable to the National Rivers Authority. These balancing ponds and tanks would act as interceptors for pollutants existing either as part of normal run off from the road pavement and earthworks drainage or due to an accidental spillage.

6.1.7 Similar temporary holding tanks would be installed during construction to reduce the risk of pollutants from the site entering the watercourses nearby. Outfalls during construction would be limited to those proposed for permanent outfall. All watercourses would be monitored for water quality during construction to ensure that pollutants do not find their way to the watercourses from other sources on the site. Sixteen ponds would be within 100m of the site and may experience indirect effects during construction.

Protection of Wildlife

6.1.8 The limitations on the timing of clearance of trees outlined in 6.1.4 above, applies equally to shrubs and hedgerows. This would help reduce the impact on nesting birds. The clearance of aquatic vegetation and wetlands would be carried out wherever possible between late spring and early autumn, when invertebrate populations would be at their most mobile.

6.1.9 A confidential badger survey has shown that the badger population of the area is relatively high and that there would be a direct impact on up to 14 setts. It is most likely that badgers from some setts would require relocation. The location and design of mitigation measures such as badger tunnels and fencing and/or the construction of alternative setts would be decided in consultation with English Nature. During construction, monitoring of the movement of the local badger population would be undertaken and established paths used by the animals for their feeding would be maintained by the provision of tunnels as necessary.

Combe Haven Crossing

6.1.10 The bypass would cross the Combe Haven Valley, a wetland Site of Special Scientific Interest, on a 705 metre long viaduct. The viaduct would have a minimum of 8 metres clearance above ground and would be supported on twin circular columns generally at 42.5 metre centres across the valley (see Figure 11).

6.1.11 The valley is a mosaic of wet, neutral and acid grasslands close to sea level. Four watercourses run through the valley; the Combe Haven, Watermill Stream, Powdermill Stream and Decoy Pond Stream,

as well as numerous drainage ditches, all of which support the more important flora and fauna species of the valley.

6.1.12 The construction of the viaduct would cause a greater impact on the valley than the completed viaduct, as the latter has been designed to minimise longterm effects, principally by allowing the water regime to remain in a form similar to that which exists at present. The height of the viaduct has also been set so that light levels are such that vegetation can re-establish under the structure.

6.1.13 The construction of the viaduct would take place within a defined works corridor, that would allow access from the area lying below the deck as well as narrow strips of land that would allow access from either side. The viaduct would be 22 metres wide and access widths of 3 metres (north side) and 5 metres (south side) would be provided for the use of the contractor, providing a 30 metre wide corridor for construction.

6.1.14 The grassland areas affected by this working area would be harvested for seeds, which would be stored in appropriate conditions. The topsoil would be stripped in the period late spring to early autumn, and stored in stockpiles outside the SSSI if practicable.

6.1.15 An area of hardstanding would be provided to allow piling and construction of the foundations for the piers and to facilitate deck construction. Figure 12 shows the layout of the temporary hardstanding that would probably be adopted for construction.

6.1.16 After construction, the hardstanding would be removed apart from a 3 metre width under the centre of the viaduct which would be excavated to just below existing ground level and covered over with topsoil. This would provide a strip of ground over which access could be taken if needed for maintenance in the future.

6.1.17 During the construction, watercourses would be maintained using small diameter culverts, and as the likelihood of flooding of the valley is high, further culverts would be provided through the hardstanding to avoid the retention of flood waters. The permanent access track would have no culverts; the ditches would be temporarily bridged if necessary.

6.2 Heritage

6.2.1 There would be six listed buildings within 100 metres of the scheme as well as the archaeologically significant areas shown on Figure 1 - 10. The Beauport Park East Lodge which is listed, would be demolished by the scheme, and five others, Mayfield Farmhouse, Upper Wilting Farmhouse, Hollington Lodge, Beauport Home Farmhouse and Beauport Home Farm lie in close proximity.

6.2.2 The details of the archaeological finds and a detailed description of Beauport Park East Lodge and how its structure would be recorded, is given in Report 8. It is likely that archaeological finds would occur during excavation for construction, and a watching brief would be maintained to ensure that artefacts

found would be recorded and stored for posterity. Some exploratory trenching for this purpose has been carried out, and further work would be required prior to construction. Construction works in the areas of the listed buildings would be carefully monitored to ensure no damage is done to the fabric of the buildings.

7 OTHER EFFECTS OF CONSTRUCTION

Site Compound

7.1 The contractor would be responsible for obtaining, establishing and maintaining a compound where offices for his staff and that of the supervisors, together with laboratories, storage areas for materials and plant and temporary living accommodation for workers would be provided. This compound would be situated on land close to the route, and its location would be the subject of a planning application if not contiguous with the site.

Site Access and Delivery of Materials

7.2 As previously outlined in 4.1.10 access to the site would generally be limited to major roads, with movement of materials along the site from these access points. Figure 13 shows the routes that would be permitted for access. These would be classified as 'unrestricted access' routes, whereas some less major routes may be used for 'restricted access' to carry out specified agreed works.

7.3 Most construction materials would need to be imported to the site from elsewhere, the majority being brought by road, although the proximity of the railway line could allow delivery of some materials by this route subject to agreement between the contractor and British Rail. It would be the contractor's responsibility to locate sources for the materials for the scheme. The following approximate quantities of the main construction materials would be required:

Granular Material	330,000 m^3
Bitumen-bound Material	135,000 m^3
Concrete Aggregate and Cement	50,000 m^3

These quantities would result in approximately 50,000 deliveries by road.

Earthworks

7.4 The scheme has been designed so that the earthworks approximately balance, ie so that there is no large scale removal of soil from or importing to the site. This balance has been achieved by considering the scheme in conjunction with the neighbouring schemes, the A259 Pevensey to Bexhill Improvement to the west and the A259 Hastings Eastern Bypass to the east. These two neighbouring schemes would require approximately 700,000 m^3 of additional soil (100,000 m^3 to the west, 600,000 m^3 to the east), and these quantities form part of the balance for this scheme.

7.5 The road has been designed to blend in with its surroundings using regrading techniques. These techniques involve additional cutting in some areas to round off slopes and depositing additional soil in other areas to form earth mounding to screen the road. These earth mounds are in most cases graded into their surroundings by using gentle slopes that allow return to agricultural use. In addition, one area of land, lying on the south-east slope of the Combe Haven valley (Figure 7) would be obtained for tipping surplus soil preventing the need to remove surplus soil from site, and negating the need to carry soil across the Combe Haven valley to form earthworks on the northern side. This tipping area would be carefully landscaped and planted to fit in with the surroundings. The section of scheme north of the Combe Haven Valley would have an earthworks balance with the Hastings Eastern Bypass.

7.6 There would be substantial movement of earthworks along the scheme to move material from areas of cut to where they would be required for embankment, landscaping areas or earth mounding. In all a total of 2,850,000 m^3 of material would be excavated and redeposited. The key areas for consideration are at the Combe Haven, where no transfer of material across the valley would be required, an important mitigation measure for reducing impact on the valley floor, and at the A269 where 400,000 m^3 would have to be carried across the road in an easterly direction. This would probably involve the use of temporary traffic signals to control plant crossing. The quantities for the whole scheme (rounded to the nearest 50,000m^3) are summarised in Table 7.1 below.

Table 7.1

	Cut	Fill	Landscaping	Regrading	TOTAL
A259 Bexhill - Pevensey Improvement	-	- 100,000	-	-	- 100,000
A259(W) - A269	1,000,000	- 300,000	- 50,000	- 150,000	500,000
A269 - Combe Haven	550,000	- 300,000	0	- 650,000	400,000
Combe Haven - A21	1,300,000	- 500,000	- 200,000	0	600,000
A259 Hastings Eastern Bypass	0	0	0	- 600,000	600,000
TOTAL	2,850,000	- 1,200,000	- 250,000	- 1,400,000	0

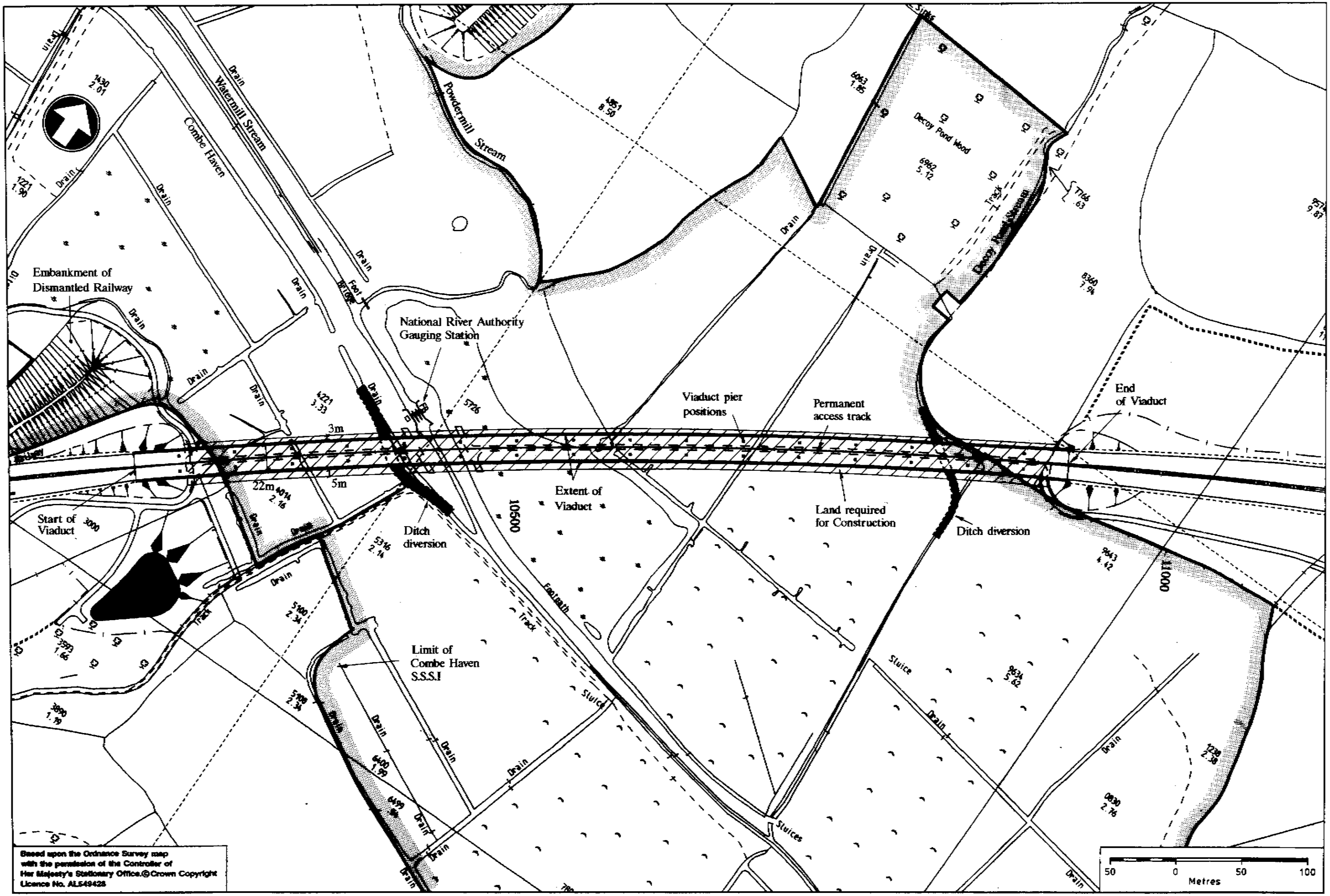
7.7 The matter of earthworks and dealing with surplus soil has been the subject of discussions with East Sussex County Council (ESCC) who are the local planning authority responsible for minerals and waste disposal, and thereby for excavation and tipping of earthworks materials in the local area. At an early stage of scheme preparation ESCC investigated the possibility of off-site tip areas in the immediate area of the scheme and confirmed that none existed of a size suitable for tipping large amounts of surplus earthworks material. The balance of the earthworks for this scheme in conjunction with the neighbouring schemes was therefore seen as essential mitigation of the environmental problems

associated in long distance haulage of materials to a suitable tipping area. East Sussex County Council have welcomed the current scheme proposals for earthworks.

Lime Stabilisation

7.8 It is possible that the movement of earthworks materials may be reduced by the use of lime stabilisation to strengthen in-situ materials rather than removing and replacing them with stronger imported materials. This method would involve scarifying the existing material and spreading lime either in the form of a powder or in the form of a slurry on the surface before mixing. The spreading and mixing of the powder would cause some of the lime to become airborne and produce a dust that could affect adjacent properties or land. The dust could be reduced by watering but windy conditions would exacerbate the problem. The slurry method would be slower and more expensive and would be unlikely to be selected by the contractor. A further difficulty would lie in protecting watercourses from contamination. This would require close monitoring on site with sediment traps.

7.9 Overall, although this method would have some environmental problems, these would probably be outweighed by the advantages of reduced importing of stronger material by road. In areas of high nature conservation value, where contamination of watercourses for instance would have a major impact, the use of this method of construction would not be permitted.



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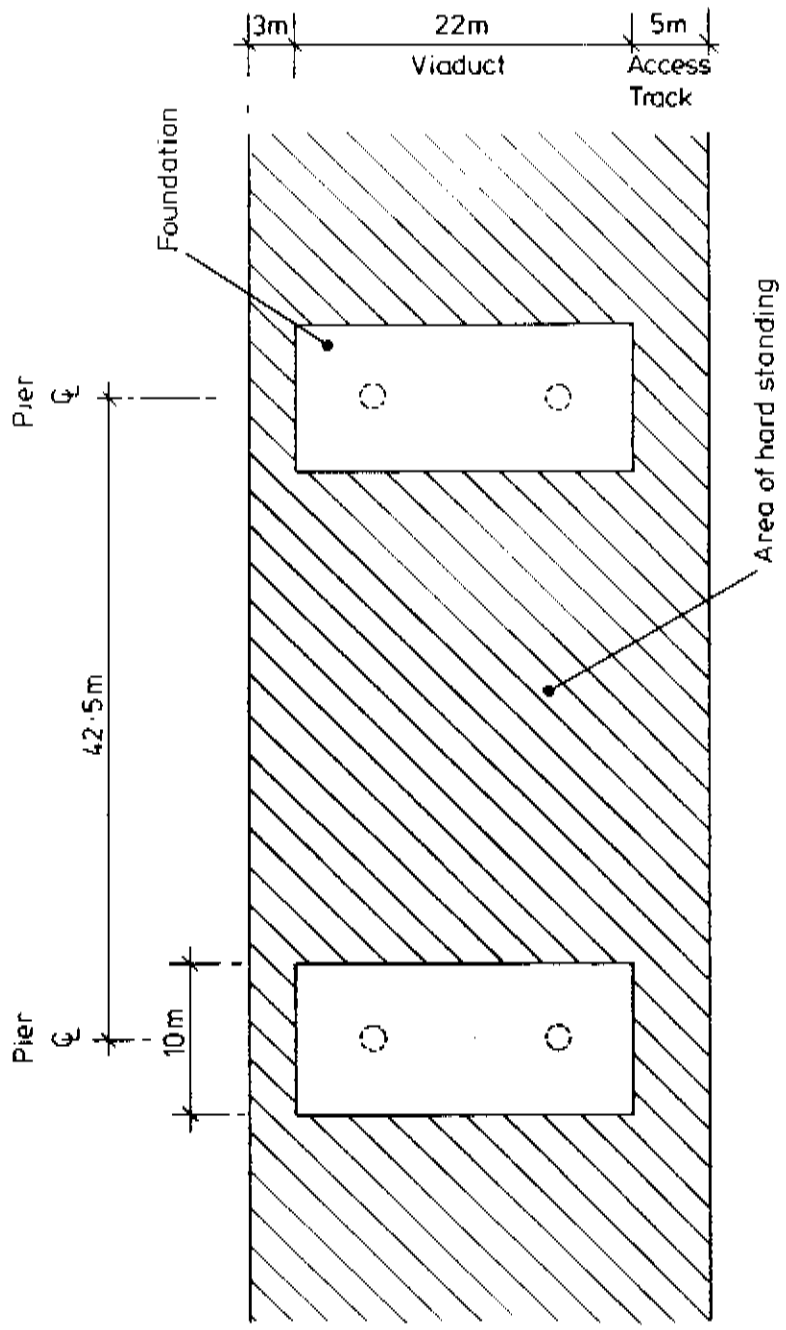
10059/RC/047/15/A

Combe Haven Viaduct Layout
Figure 11



10059/RC/047/15/A

Combe Haven Viaduct
Minimum Hard Standing for Construction

Figure 12

UNCLASSIFIED

HIGHWAYS AGENCY

TOLLGATE HOUSE

HA 044/027/000190 1

ENVIRONMENT & LANDSCAPE
Environmental Statement

18/03/2001 13:30:32

A259 BEXHILL & HASTINGS WESTERN BYPASS – ENVIRONMENTAL STATEMENT VOL 2 (REPORTS) PART 3/3 09/94

Green Road

Hooe Common

Hooe Sewer

Whydown Road

Combined Footpath and Field Access Overbridge

A259(T)

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NOTE

Noise levels are rounded to the nearest dB. Noise change banding (e.g. 3 - 5dB) may not reflect the difference between the rounded figures quoted

0 100 200 300 400 500

Metres

Key

Traffic Noise Levels. dB. L_{A10} (18 hour)

- Without Scheme in Year 1998
- Without Scheme in Year 2013
- With Scheme in Year 2013

Note: Noise levels calculated 1m from building facade (1st floor level), except where 'free field', which are 2m above ground in the open.

Changes in Traffic Noise Levels 1998 to 2013 With Scheme.

Increases

- 3 to 5 dB
- 5 to 10 dB
- 10 to 15 dB
- 15 to 20 dB

Decreases

- 3 to 5 dB
- 5 to 10 dB

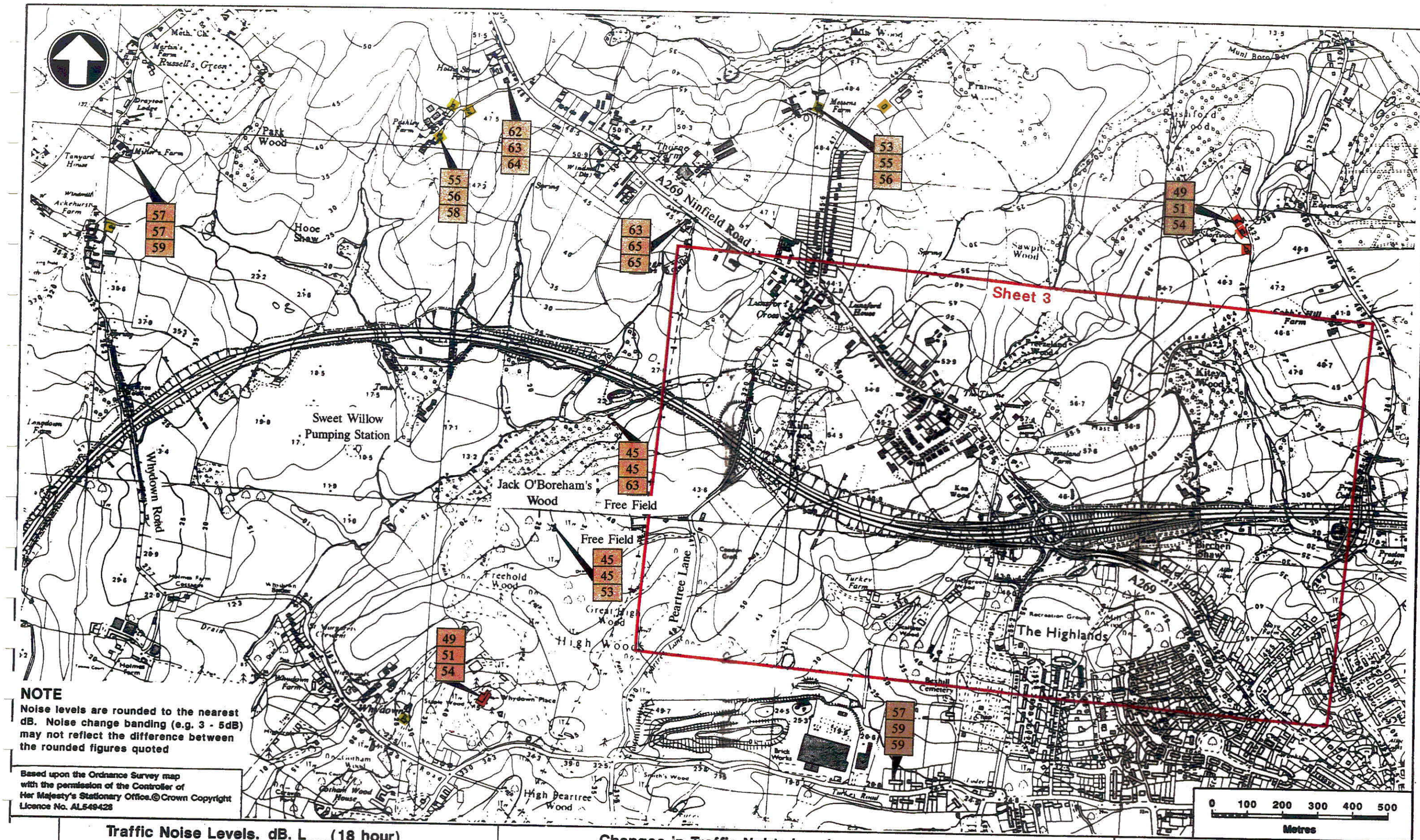
Physical Barriers

- Noise Barrier
- Earth Mound

10059/RC/047/11/A

Traffic Noise Impact - Sheet 1 (Section A)

Figure 4



62
63
64

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49
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65

45
45
63

45
45
53

49
51
54

57
59
59

NOTE

Noise levels are rounded to the nearest dB. Noise change banding (e.g. 3 - 5dB) may not reflect the difference between the rounded figures quoted

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Key

Traffic Noise Levels. dB. L_{A10} (18 hour)

- Without Scheme in Year 1998
- Without Scheme in Year 2013
- With Scheme in Year 2013

Note: Noise levels calculated 1m from building facade (1st floor level), except where 'free field', which are 2m above ground in the open.

Changes in Traffic Noise Levels 1998 to 2013 With Scheme.

Increases
- 3 to 5 dB
- 5 to 10 dB
- 10 to 15 dB
- 15 to 20 dB

Decreases
- 3 to 5 dB
- 5 to 10 dB

Physical Barriers
- Noise Barrier
- Earth Mound

0059/RC/047/11/A

Traffic Noise Impact - Sheet 2 (Section A)

Figure 5

Cobbs Hill Farm Caravans

54 56 58

Hunsford's Cross

A269

63 65 65

75 76 76

56 58 62

Warfield Road

Kiln Wood

Overbridge

C703 Pearlins Lane

54 55 60

50 52 60

57 58 62

60 61 68

The Spinney

59 60 63

A269 Ninfield Road Junction

74 74 74

60 62 67

Kiteye Wood

Kiteye Farm

Free Field

48 49 68

Allotments

62 64 66

Free Field

50 51 63

55 56 60

58 60 63

62 64 65

54 56 65

Bramble Cottage

Little Bearsden

Free Field

56 58 60

St Mary's Recreation Ground

Free Field

52 54 57

56 57 60

48 50 57

Free Field

52 53 57

Bexhill Cemetery

Free Field

48 49 54

53 55 59

62 63 63

A269

NOTE

Noise levels are rounded to the nearest dB. Noise change banding (e.g. 3 - 5dB) may not reflect the difference between the rounded figures quoted

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0 100 200 300 Metres

Key

Traffic Noise Levels. dB. L_{A10} (18 hour)

- Without Scheme in Year 1998
- Without Scheme in Year 2013
- With Scheme in Year 2013

Note: Noise levels calculated 1m from building facade (1st floor level), except where 'free field', which are 2m above ground in the open.

Changes in Traffic Noise Levels 1998 to 2013 With Scheme.

Increases: 3 to 5 dB; 5 to 10 dB; 10 to 15 dB; 15 to 20 dB

Decreases: 3 to 5 dB; 5 to 10 dB

Physical Barriers

- Noise Barrier
- Earth Mound

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Traffic Noise Impact - Sheet 3 (Section B)

Figure 6

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NOTE
Noise levels are rounded to the nearest dB. Noise change banding (e.g. 3 - 5dB) may not reflect the difference between the rounded figures quoted

0 100 200 300 400 500
Metres

Key

Traffic Noise Levels. dB. L_{A10} (18 hour)

- Without Scheme in Year 1998
- Without Scheme in Year 2013
- With Scheme in Year 2013

Note: Noise levels calculated 1m from building facade (1st floor level), except where 'free field', which are 2m above ground in the open.

Changes in Traffic Noise Levels 1998 to 2013 With Scheme.

Increases		Decreases	
3 to 5 dB	10 to 15 dB	3 to 5 dB	
5 to 10 dB	15 to 20 dB	5 to 10 dB	

Physical Barriers

- Noise Barrier
- Earth Mound

10059/RC/047/11/A

Traffic Noise Impact - Sheet 4 (Section B)
Figure 7

FOR NOISE INFORMATION IN THIS AREA SEE SHEET 4

Free Field
45
45
54
51
51
58
51
51
54
51
51
56
51
51
56
51
51
57
BNAR Junction
45
45
58
45
45
59
Combe Haven Viaduct
Dismantled Railway
45
45
60
Free Field
45
45
73
51
51
51
51
51
52
51
51
51
51
51
51
Sidley
Pebsham

NOTE
Noise levels are rounded to the nearest dB. Noise change banding (e.g. 3 - 5dB) may not reflect the difference between the rounded figures quoted

0 100 200 300 400 500
Metres

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Key

Traffic Noise Levels. dB. L_{A10} (18 hour)

- Without Scheme in Year 1998
- Without Scheme in Year 2013
- With Scheme in Year 2013

Note: Noise levels calculated 1m from building facade (1st floor level), except where 'free field', which are 2m above ground in the open.

Changes in Traffic Noise Levels 1998 to 2013 With Scheme.

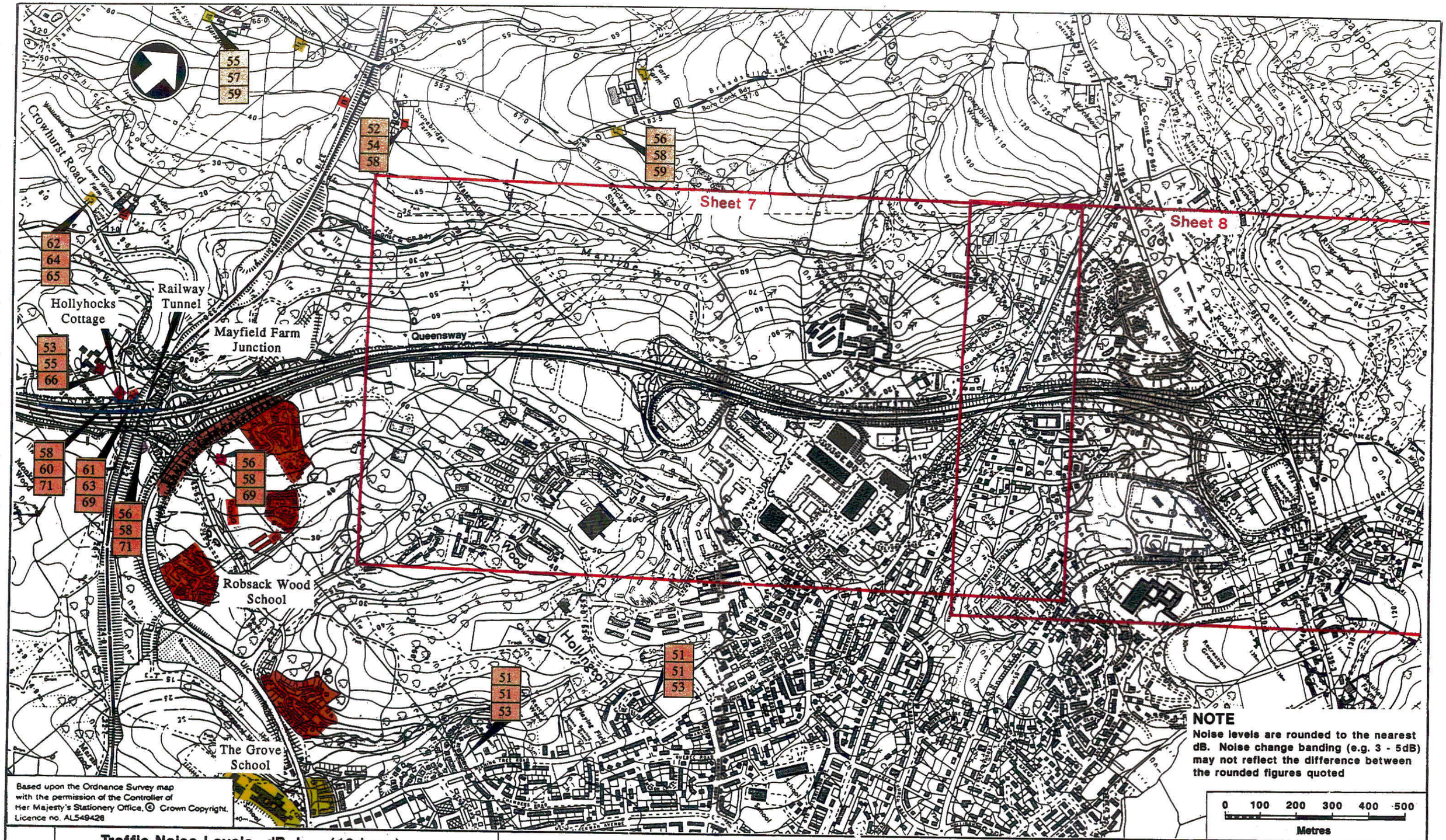
Increases
- 3 to 5 dB
- 5 to 10 dB
- 10 to 15 dB
- 15 to 20 dB

Decreases
- 3 to 5 dB
- 5 to 10 dB

Physical Barriers
- Noise Barrier
- Earth Mound

10059/RC/047/11/A

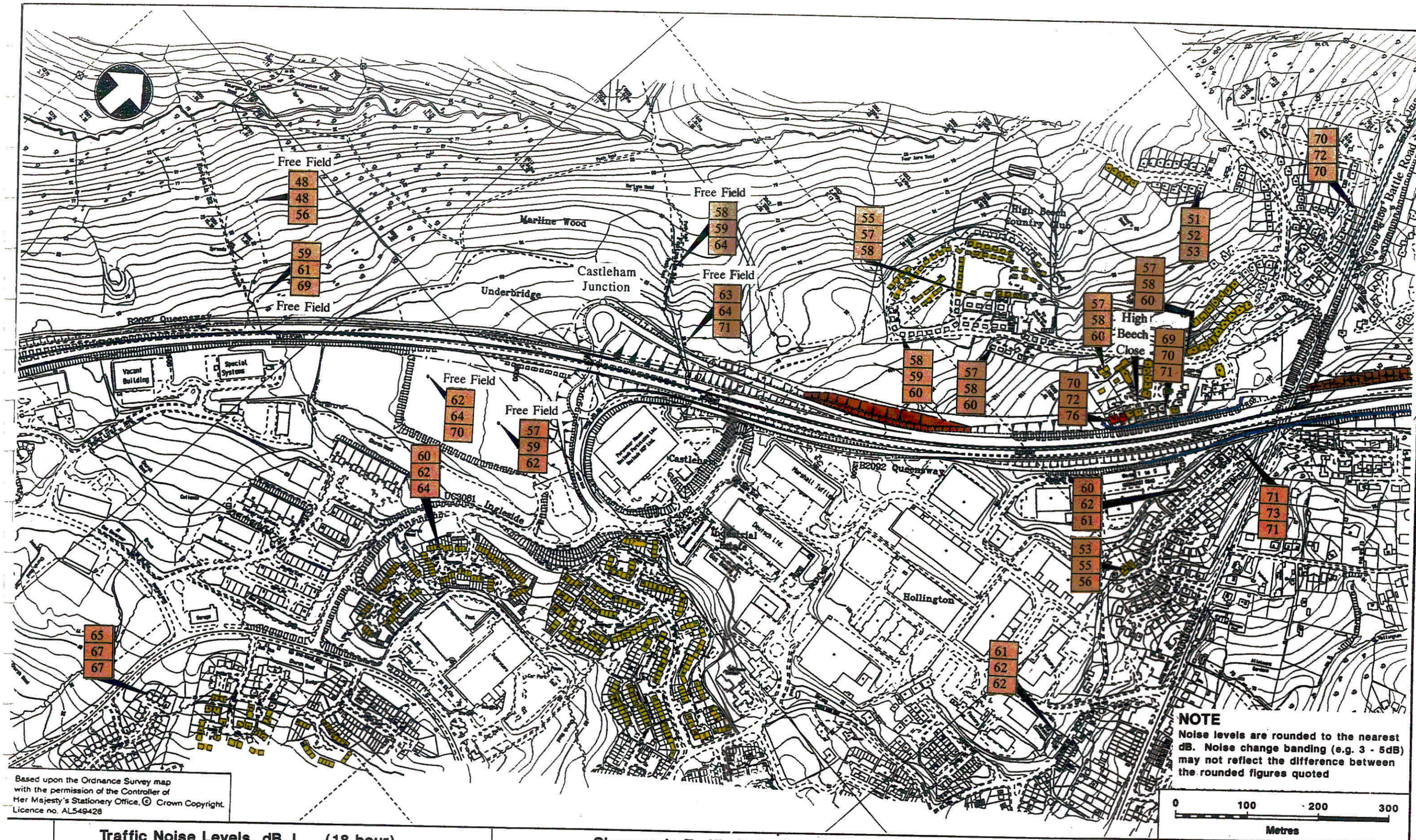
Traffic Noise Impact - Sheet 5 (Section C)
Figure 8



10059/RC/047/11/A

Traffic Noise Impact - Sheet 6 (Section D)

Figure 9



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Key

Traffic Noise Levels. dB. L_{A10} (18 hour)

- Without Scheme in Year 1998
- Without Scheme in Year 2013
- With Scheme in Year 2013

Note: Noise levels calculated 1m from building facade (1st floor level), except where 'free field', which are 2m above ground in the open.

Changes in Traffic Noise Levels 1998 to 2013 With Scheme.

Increases
- 3 to 5 dB
- 5 to 10 dB
- 10 to 15 dB
- 15 to 20 dB

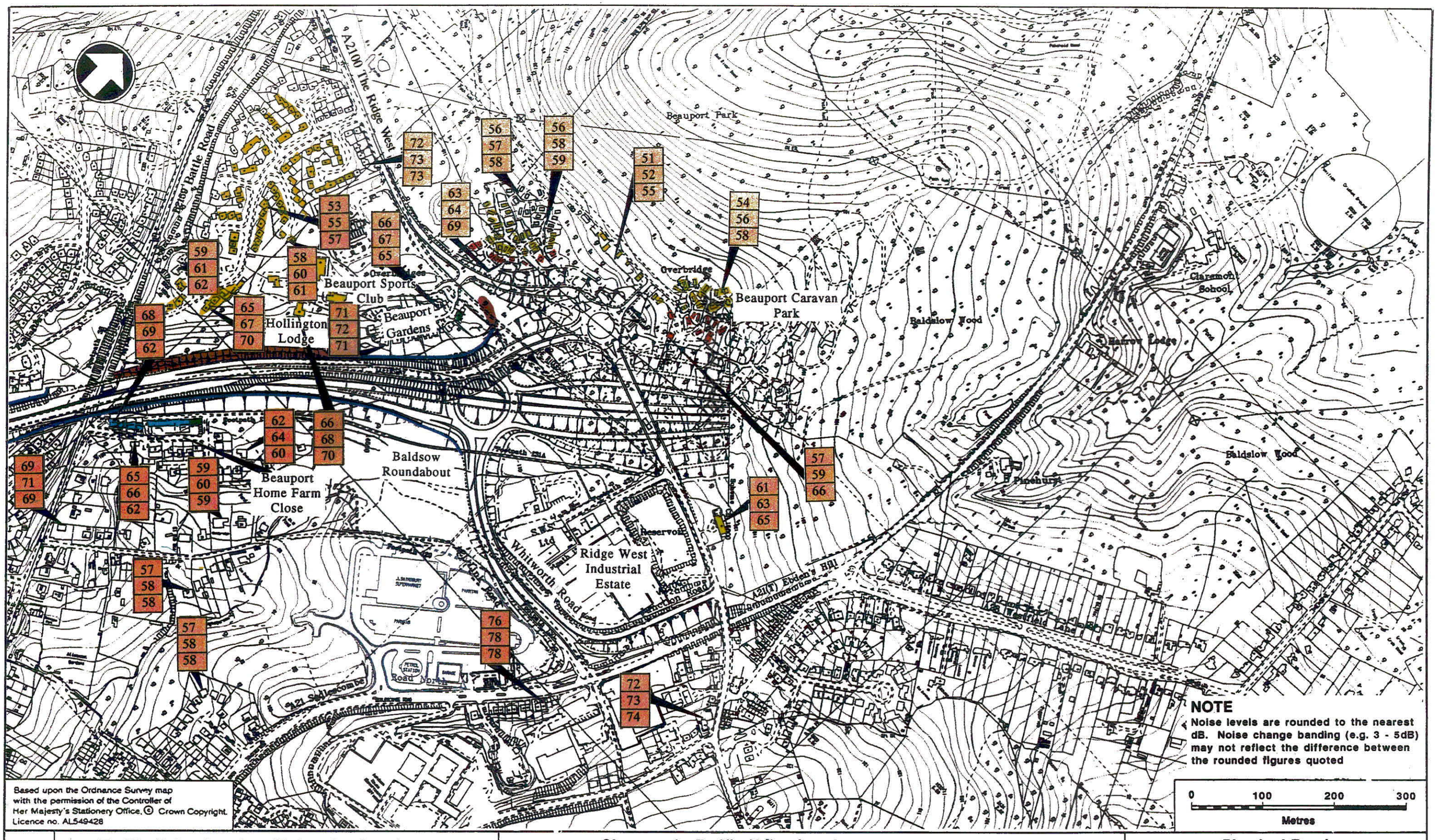
Decreases
- 3 to 5 dB
- 5 to 10 dB

Physical Barriers
- Noise Barrier
- Earth Mound

059/RC/047/11/A

Traffic Noise Impact - Sheet 7 (Section D)

Figure 10



NOTE
Noise levels are rounded to the nearest dB. Noise change banding (e.g. 3 - 5dB) may not reflect the difference between the rounded figures quoted

0 100 200 300
Metres

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Key

Traffic Noise Levels. dB. L_{A10} (18 hour)

- Without Scheme in Year 1998
- Without Scheme in Year 2013
- With Scheme in Year 2013

Note: Noise levels calculated 1m from building facade (1st floor level), except where 'free field', which are 2m above ground in the open.

Changes in Traffic Noise Levels 1998 to 2013 With Scheme.

Increases		Decreases	
3 to 5 dB	10 to 15 dB	3 to 5 dB	
5 to 10 dB	15 to 20 dB	5 to 10 dB	

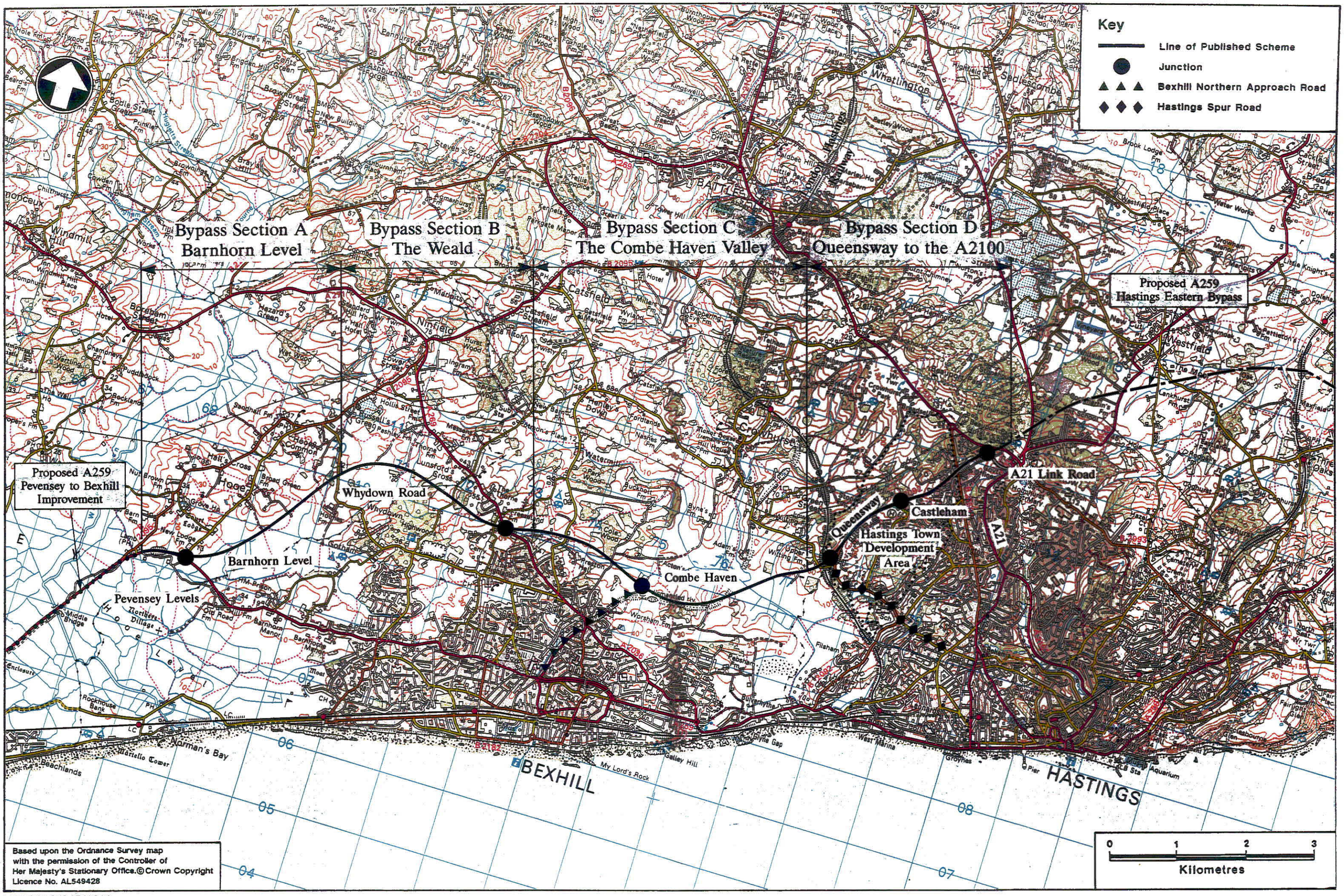
Physical Barriers

- Noise Barrier
- Earth Mound

10059/RC/047/11/A

Traffic Noise Impact - Sheet 8 (Section D)

Figure 11



10059/RC/047/13/A

The Published Scheme

Figure 1

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Driver Stress Levels in 2013 without Bypass

Figure 2

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Driver Stress Levels in 2013 with Bypass
Figure 3

KEY

- Footpath/Byway
- Footpath Diversion
- Hospitals/Clinics
- Churches
- Post Offices
- Railway Stations
- Schools
- Police, Fire and Ambulance Stations
- Open Space
- Equestrian Stables
- Published Scheme

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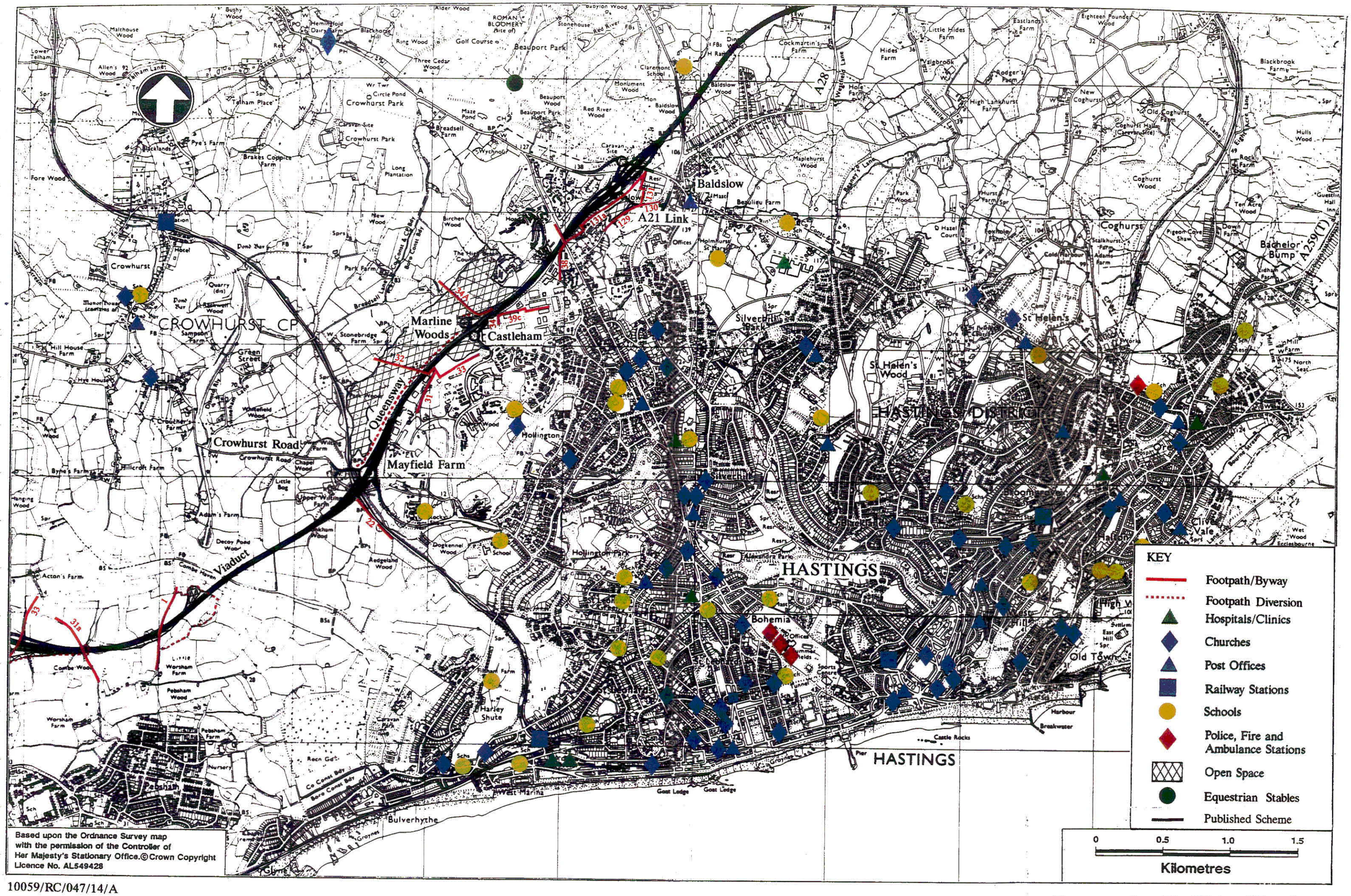
0 0.5 1.0 1.5 Kilometres

10059/RC/047/14/A

Community Facilities Bexhill

Figure 1



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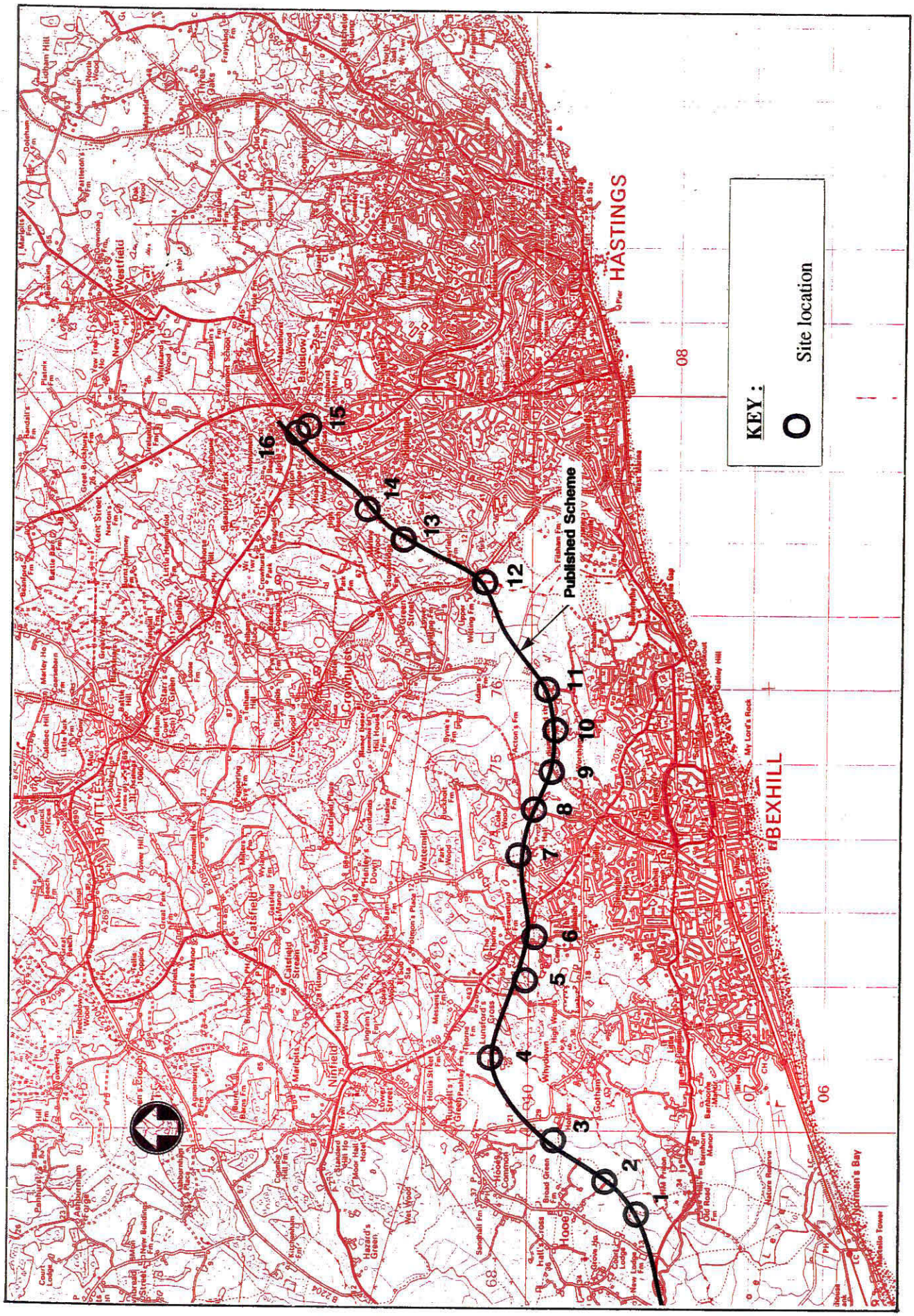
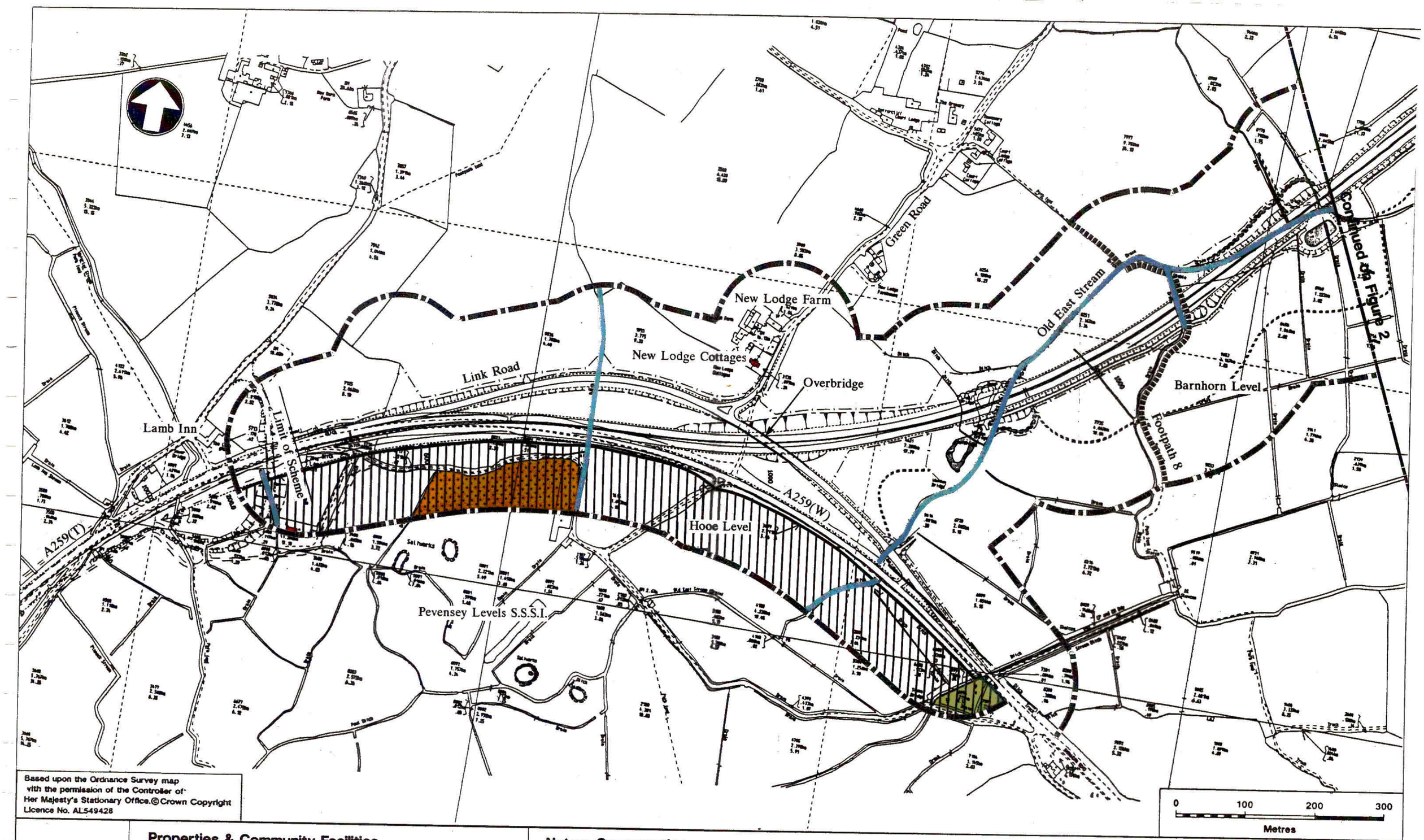
Community Facilities Hastings

Figure 2



Survey Site Locations
Figure 1



Key

Properties & Community Facilities

- Boundary of area Assumed to be Disrupted by Construction
- Residential Properties
- Commercial Properties
- Public Footpath
- Public Open Space/ Recreation Area

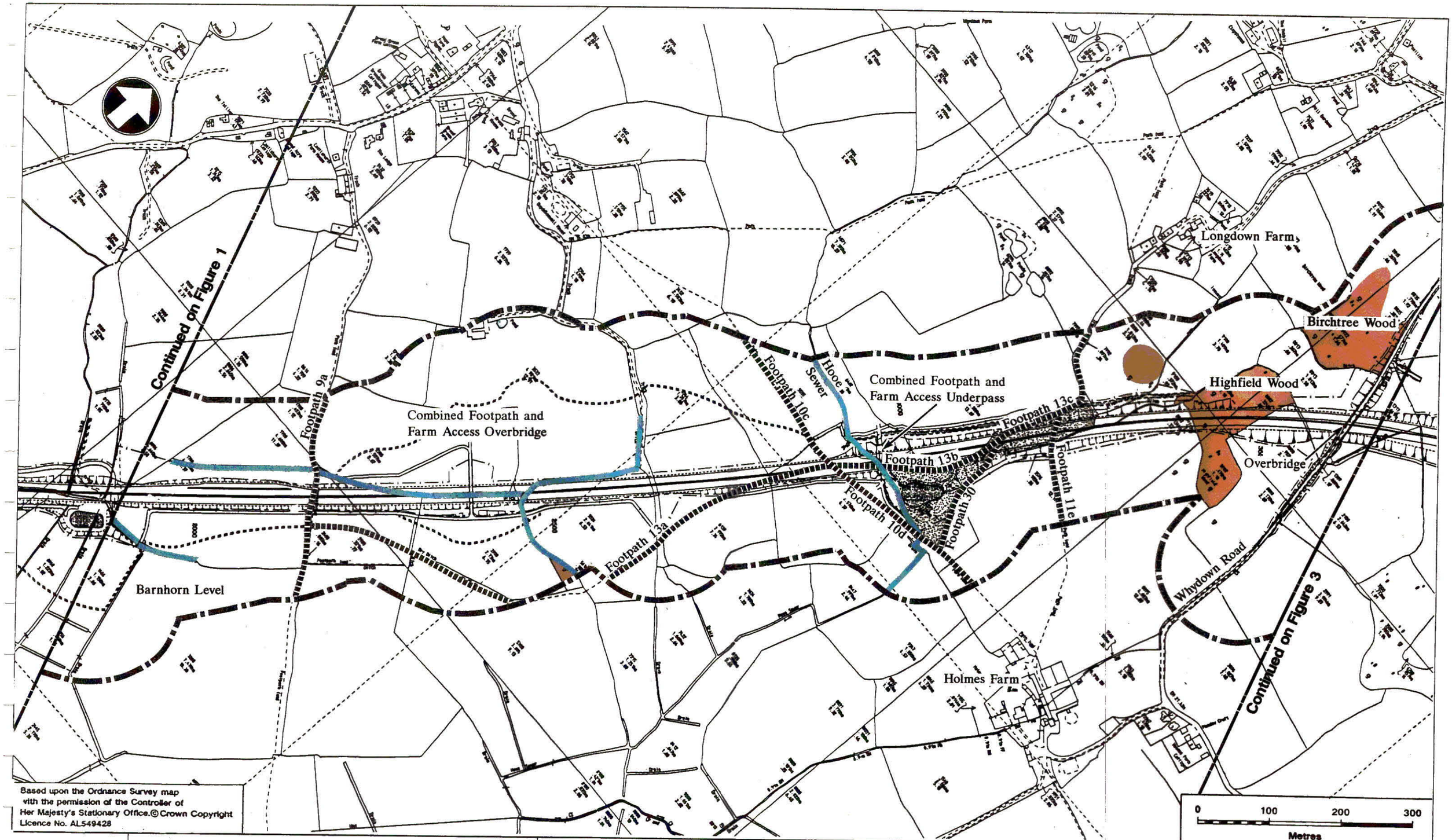
Nature Conservation

- Site of Special Scientific Interest
- Grassland of Nature Conservation Interest
- Ancient Woodland
- Watercourse /Pond
- Archaeological Feature
- Listed Building
- Recent Woodland

10059/RC/047/15/A

Disruption due to Construction - Sheet 1 (Section A)

Figure 1



Key

Properties & Community Facilities

- Boundary of area Assumed to be Disrupted by Construction
- Residential Properties
- Commercial Properties
- Public Footpath
- Public Open Space/ Recreation Area

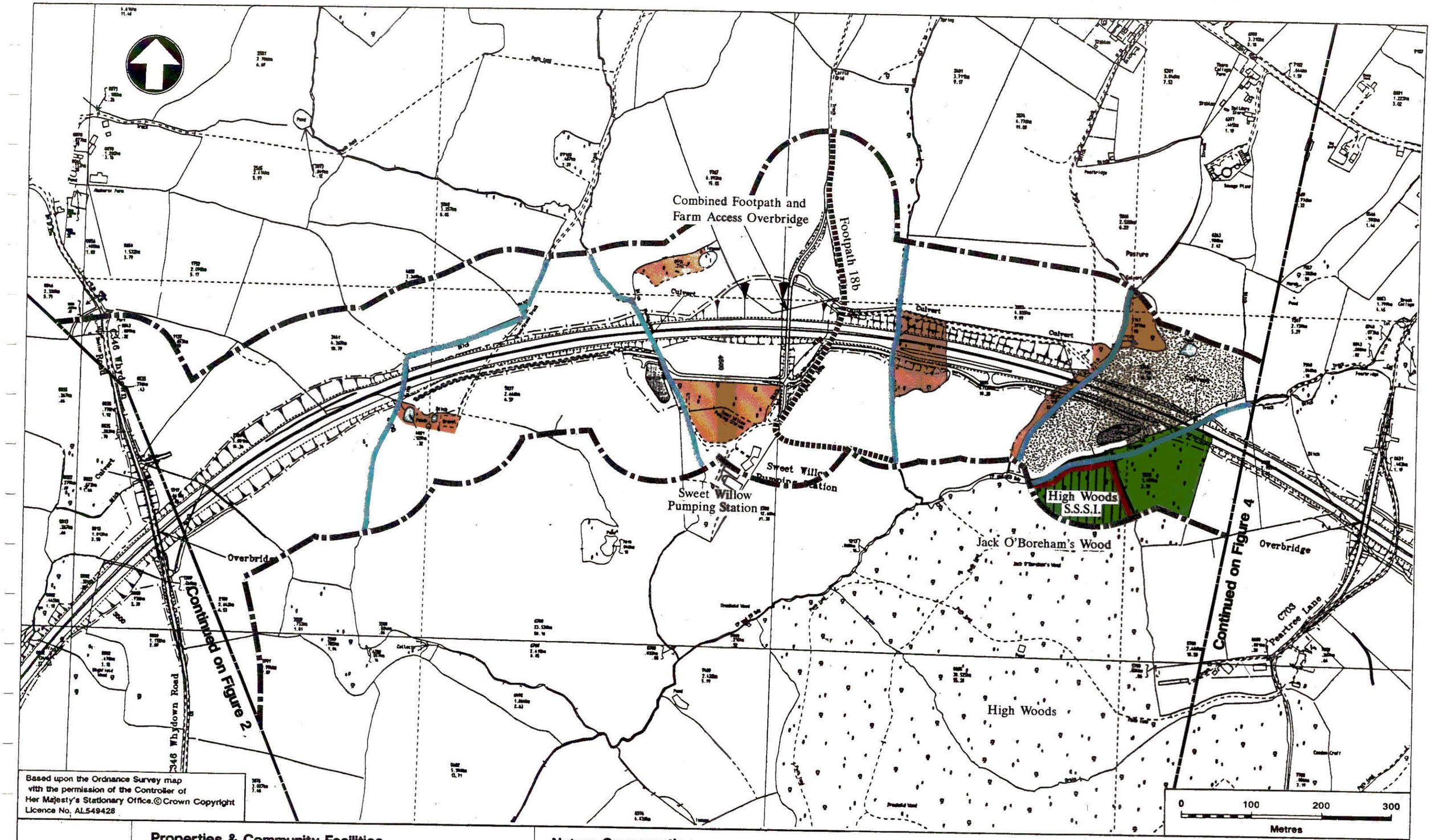
Nature Conservation

- Site of Special Scientific Interest
- Grassland of Nature Conservation Interest
- Ancient Woodland
- Watercourse /Pond
- Archaeological Feature
- Listed Building
- Small Copses and Shaws, Possible Ancient Woodland

10059/RC/047/15/A

Disruption due to Construction - Sheet 2 (Section A)

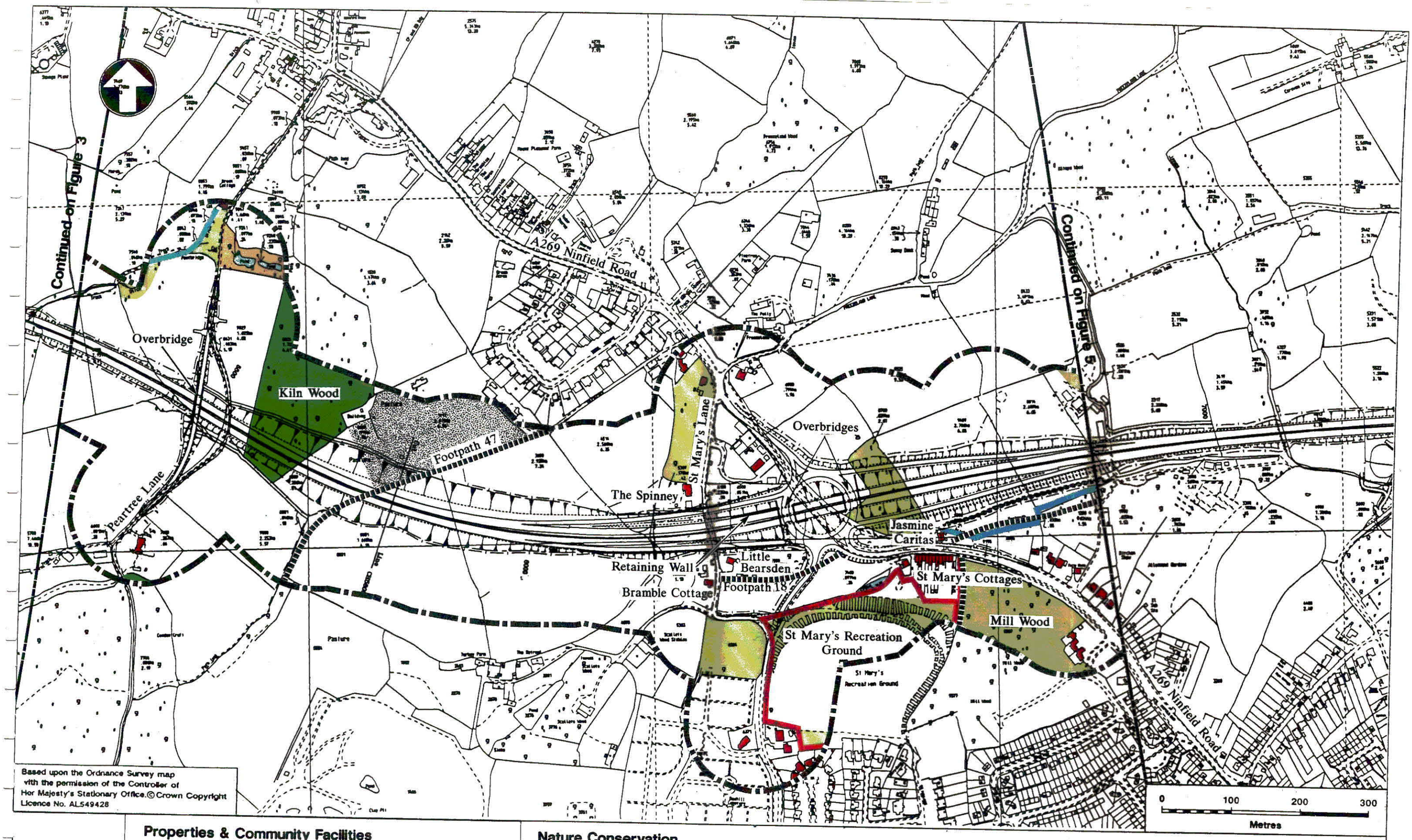
Figure 2



10059/RC/047/15/A

Disruption due to Construction - Sheet 3 (Section B)

Figure 3



Key

Properties & Community Facilities

- Boundary of area Assumed to be Disrupted by Construction
- Residential Properties
- Commercial Properties
- Public Footpath
- Public Open Space/ Recreation Area

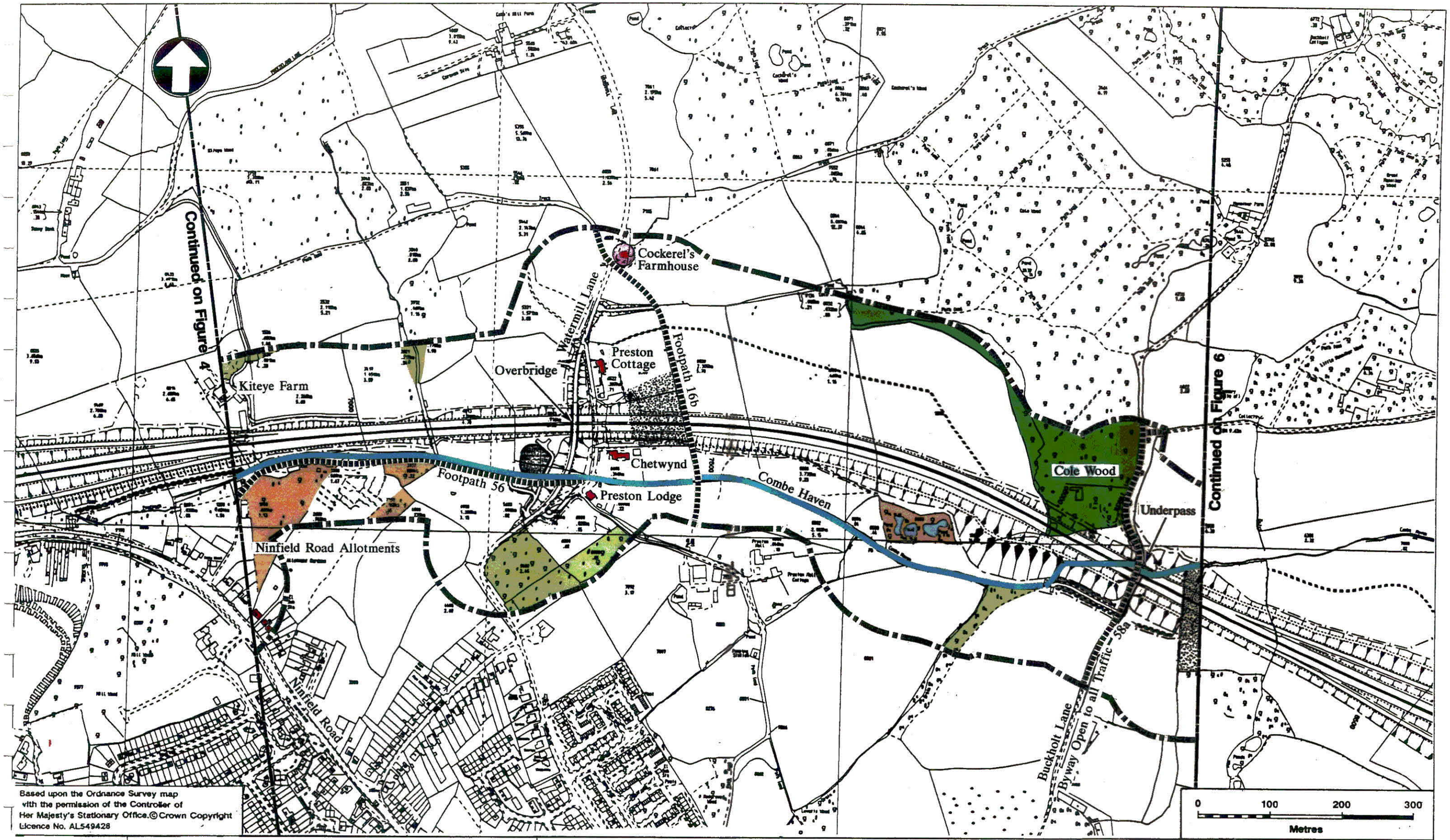
Nature Conservation

- Site of Special Scientific Interest
- Grassland of Nature Conservation Interest
- Ancient Woodland
- Watercourse /Pond
- Archaeological Feature
- Listed Building
- Recent Woodland
- Small Copses and Shaws, Possible Ancient Woodland

10059/RC/047/15/A

Disruption due to Construction - Sheet 4 (Section B)

Figure 4



Key

Properties & Community Facilities

- Boundary of area Assumed to be Disrupted by Construction
- Residential Properties
- Commercial Properties
- Public Footpath
- Public Open Space/ Recreation Area

Nature Conservation

- Site of Special Scientific Interest
- Grassland of Nature Conservation Interest
- Ancient Woodland
- Watercourse/Pond
- Archaeological Feature
- Listed Building
- Recent Woodland
- Small Copses and Shaws, Possible Ancient Woodland

10059/RC/047/15/A

Disruption due to Construction - Sheet 5 (Section C)

Figure 5

Acton's Farm

Footpath 33

Combe Haven

Underbridge

Underbridge

Footpath 31a

Combe Haven S.S.S.I.

Line of Dismantled Railway

Combe Wood

Continued on Figure 5

Continued on Figure 7

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0 100 200 300
Metres

Key

Properties & Community Facilities

- Boundary of area Assumed to be Disrupted by Construction
- Residential Properties
- Commercial Properties
- Public Footpath
- Public Open Space/ Recreation Area

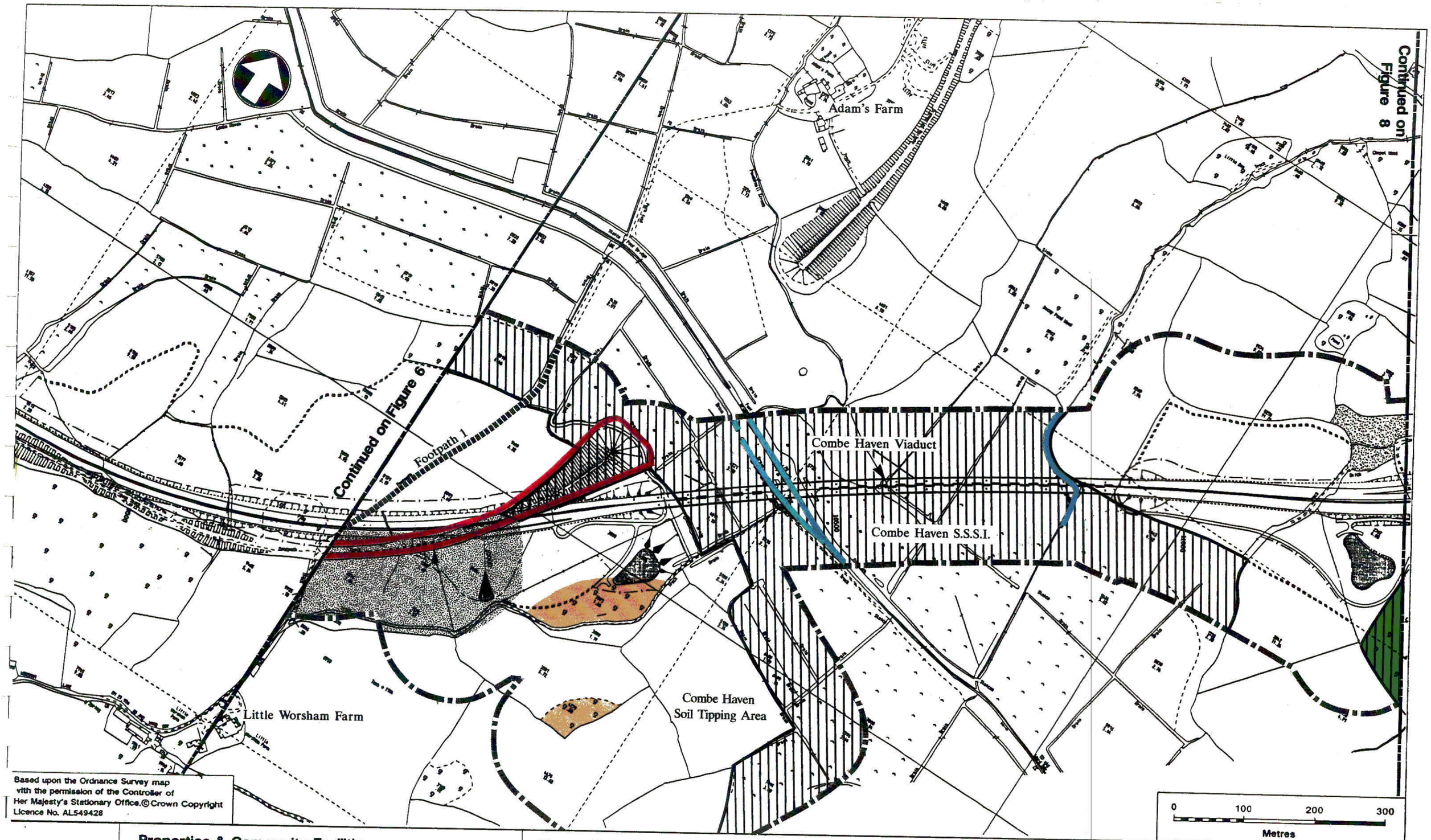
Nature Conservation

- Site of Special Scientific Interest
- Grassland of Nature Conservation Interest
- Ancient Woodland
- Watercourse/Pond
- Archaeological Feature
- Listed Building
- Recent Woodland
- Small Copses and Shaws, Possible Ancient Woodland

.0059/RC/047/15/A

Disruption due to Construction - Sheet 6 (Section C)

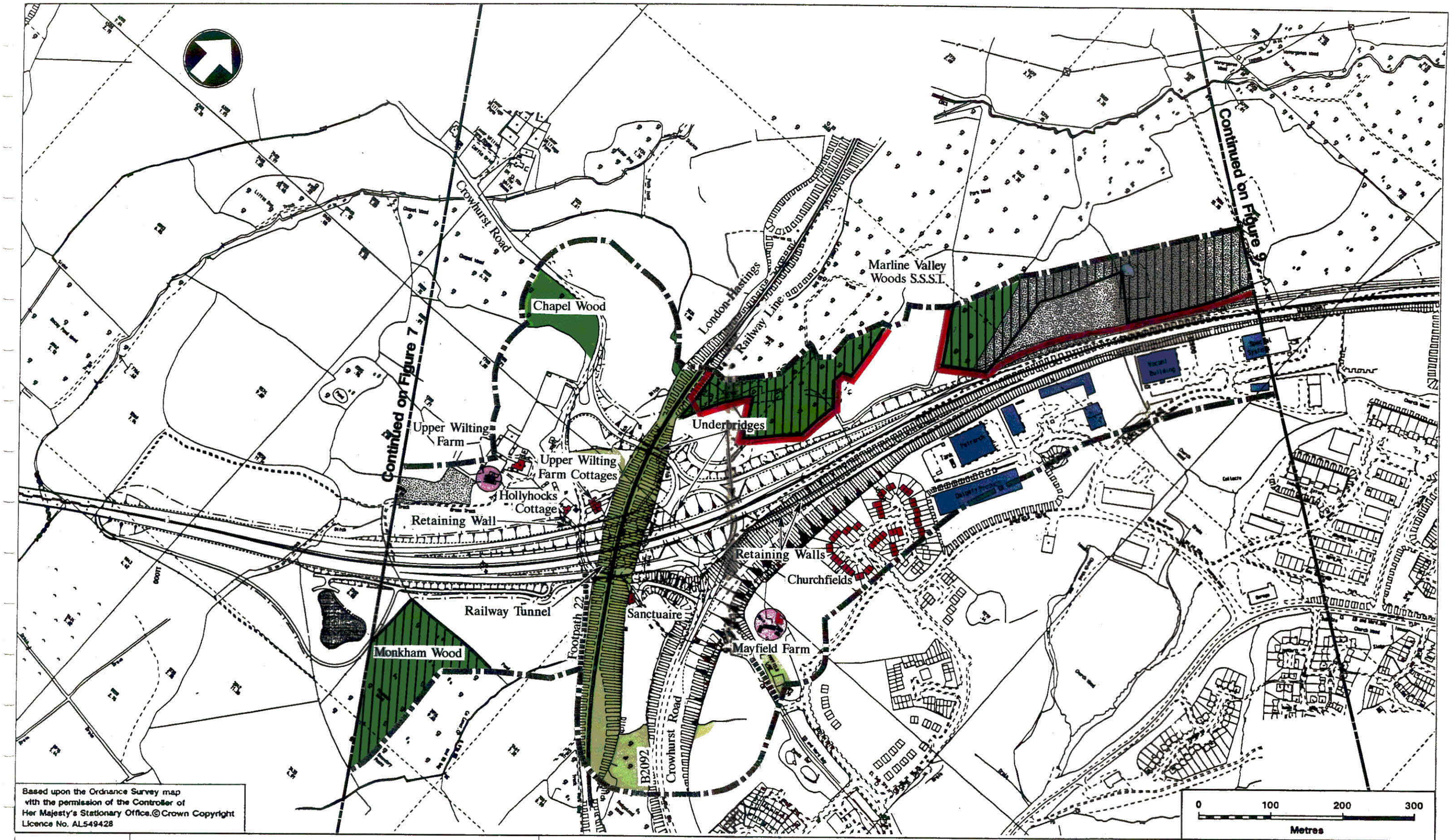
Figure 6



10059/RC/047/15/A

Disruption due to Construction - Sheet 7 (Section C)

Figure 7



Key

Properties & Community Facilities

- Boundary of area Assumed to be Disrupted by Construction
- Public Footpath
- Residential Properties
- Public Open Space/ Recreation Area
- Commercial Properties

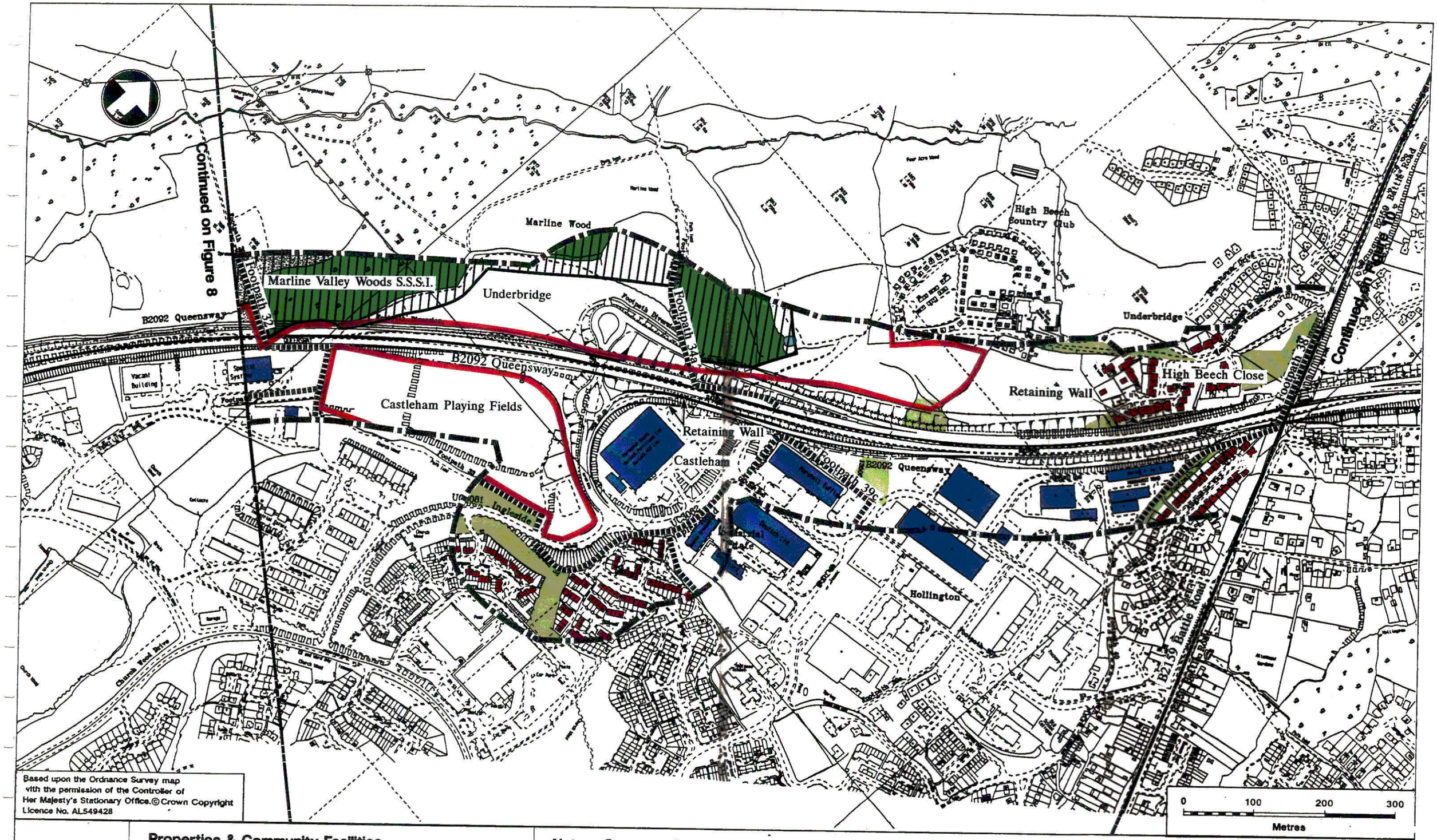
Nature Conservation

- Site of Special Scientific Interest
- Watercourse/Pond
- Recent Woodland
- Grassland of Nature Conservation Interest
- Archaeological Feature
- Ancient Woodland
- Listed Building

10059/RC/047/15/A

Disruption due to Construction - Sheet 8 (Section D)

Figure 8



Key

Properties & Community Facilities

- Boundary of area Assumed to be Disrupted by Construction
- Residential Properties
- Commercial Properties
- Public Footpath
- Public Open Space/ Recreation Area

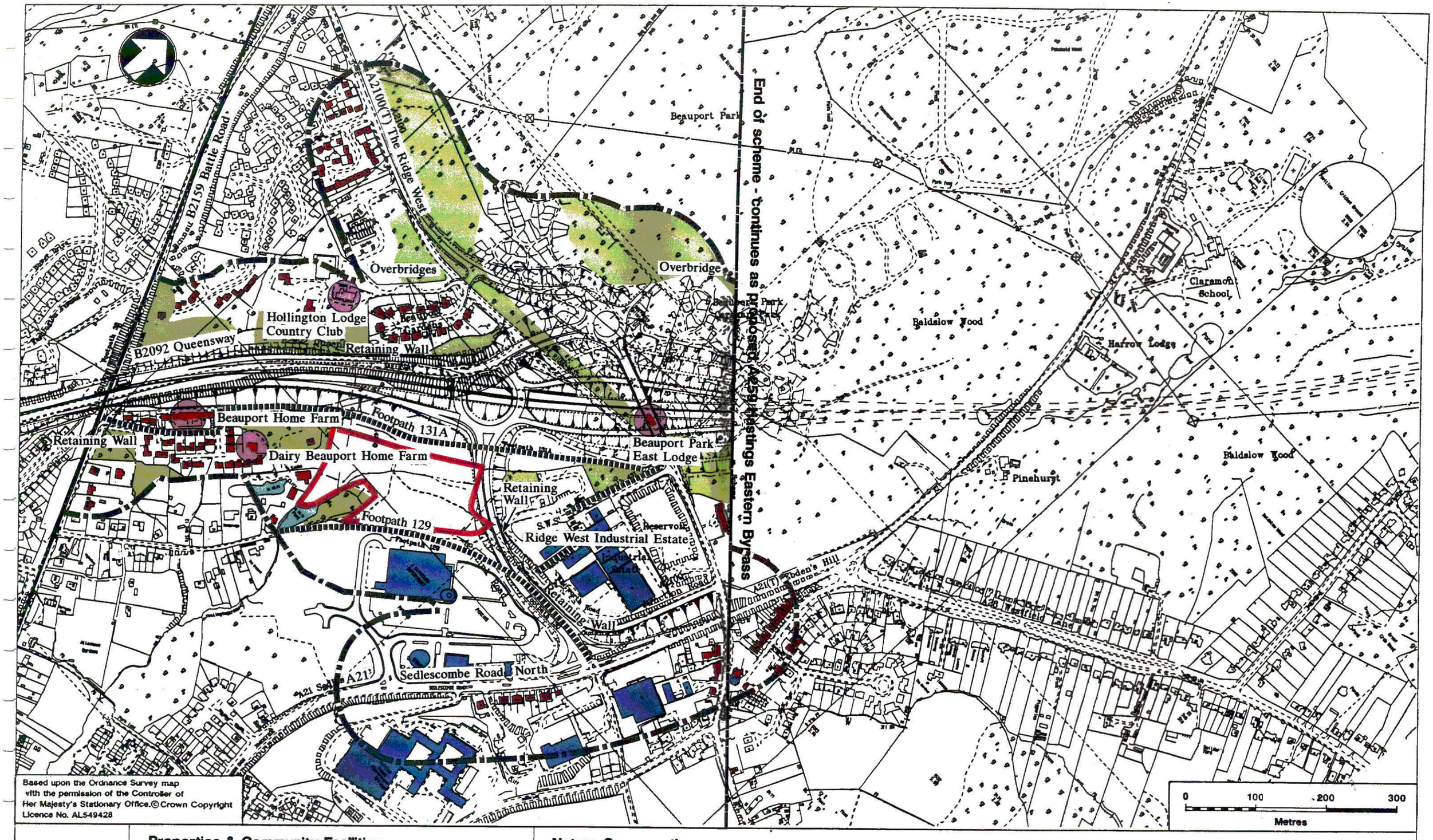
Nature Conservation

- Site of Special Scientific Interest
- Grassland of Nature Conservation Interest
- Ancient Woodland
- Watercourse/Pond
- Archaeological Feature
- Listed Building
- Recent Woodland

10059/RC/047/15/A

Disruption due to Construction - Sheet 9 (Section D)

Figure 9



Key

Properties & Community Facilities

- Boundary of area Assumed to be Disrupted by Construction
- Residential Properties
- Commercial Properties
- Public Footpath
- Public Open Space/ Recreation Area

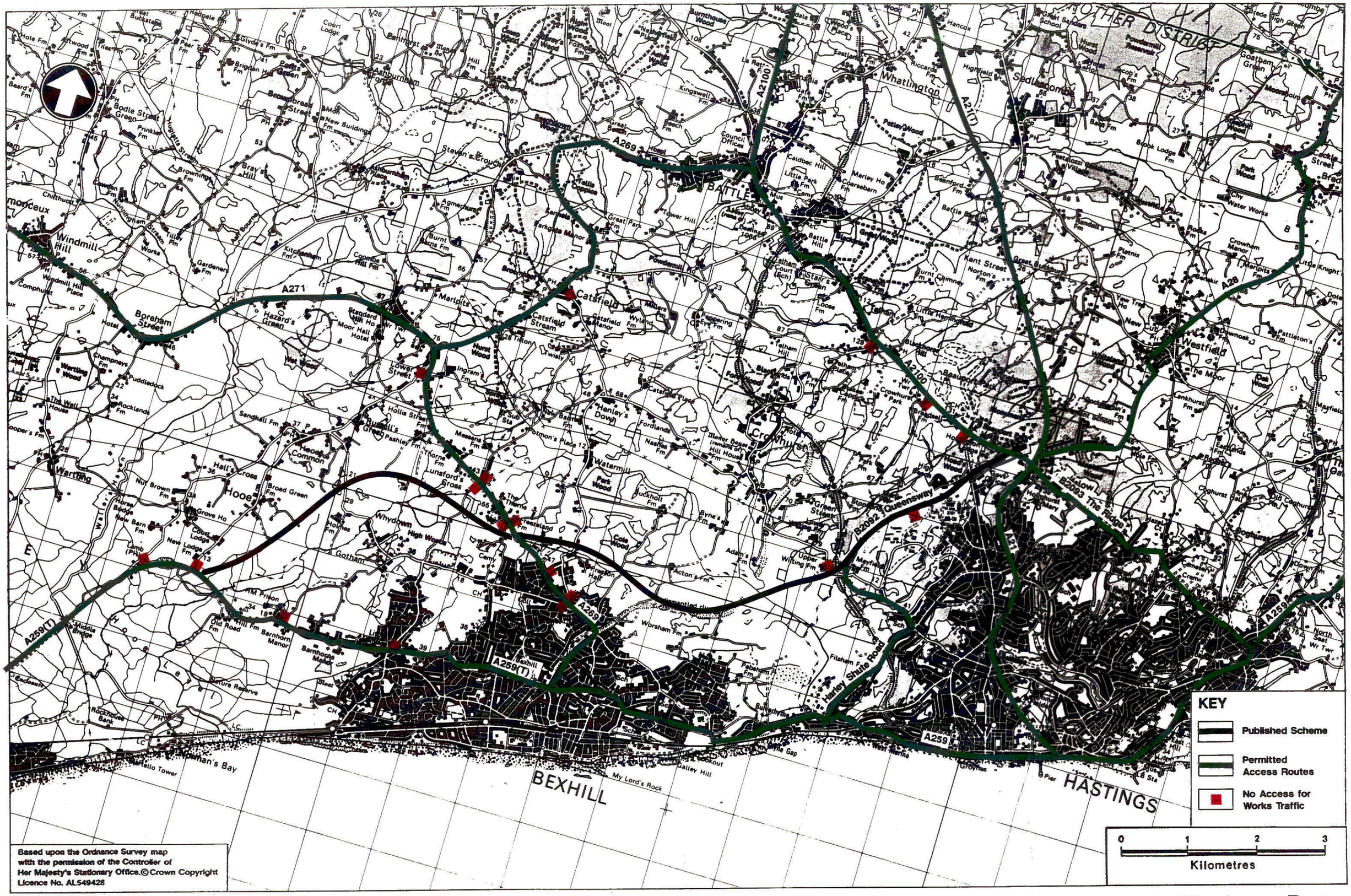
Nature Conservation

- Site of Special Scientific Interest
- Grassland of Nature Conservation Interest
- Ancient Woodland
- Watercourse/Pond
- Archaeological Feature
- Listed Building
- Recent Woodland

10059/RC/047/15/A

Disruption due to Construction - Sheet 10 (Section D)

Figure 10



10059/RC/047/15/A

Site Access Routes

Figure 13

10059/RC/047/11/A

Scale 1 : 25 000

Location of Noise Measurements **Figure 3**