

# A23/M23 Hooley Junction

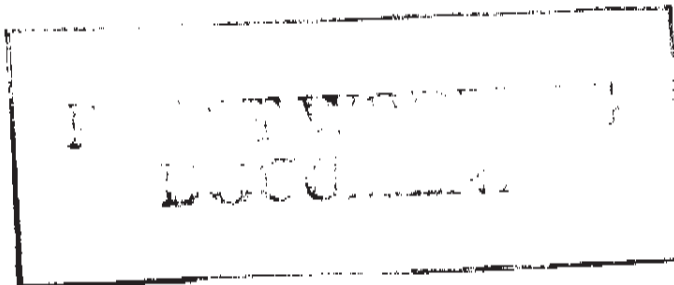
## Environmental Statement

Highways Agency Scheme ID A3/NEP/28

December 1997



*Volume 1*



**m Mott**  
**MacDonald**

In association with



Highways Agency

**A23/M23 Hooley Junction Improvement**

**Highways Agency Scheme ID A3/NEP/28**

**Environmental Statement, Volume 1**

**December 1997**

Mott MacDonald  
Easton Lane Compound  
M3 Junction 9  
Winchester  
Hampshire  
SO23 7TY

Highways Agency  
Federated House  
London Road  
Dorking  
Surrey  
RH4 1SZ

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Highways Agency



**A23/M23 Hooley Junction Improvement**

**Highways Agency Scheme ID A3/NEP/28**

**Environmental Statement, Volume 1**

**December 1997**

**Issue and Revision Record**

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P1	Oct 1997	J Fisher			Preliminary Draft
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Mott MacDonald  
Easton Lane Compound  
M3 Junction 9  
Winchester  
Hampshire  
SO23 7TY

Highways Agency  
Federated House  
London Road  
Dorking  
Surrey  
RH4 1SZ

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*The revised traffic model for the scheme is unlikely to be completed until March 1998. This report is therefore an interim and is based in part on the findings of the preliminary Stage 1 Scheme Assessment Report prepared by the Engineering Consultancy Division of Surrey County Council, April 1996, on which the draft Environmental Assessment Report was based.*

*Elements of the report which are certain to be reviewed, edited or amplified in the light of the revised traffic data are printed in italic.*



## 1 INTRODUCTION

### 1.1 General Introduction

The Highways Agency is currently developing an improvement scheme to the existing A23/M23 junction at Hooley. The M23 motorway together with parts of the A23 that are designated as Trunk Road is an important part of the road network in the south-east, providing a strategic link between London and the south coast. The context of the scheme is shown in **Figure 1.1**.

### 1.2 Purposes of the Environmental Statement

The aim of an Environmental Statement is to give the public and, in certain circumstances, statutory environmental bodies an opportunity to express an opinion before a project is initiated. The Environmental Statement also informs the final decision on whether a development should be allowed to proceed. The aim is to provide an accessible document which reflects the assessment that has been carried out and gives due weight to significant impacts.

EC Directive 85/337 on the assessment of the effects of certain public and private projects on the environment has been transposed, in respect of trunk road projects, into UK law by Section 105A of the Highways Act 1980 in England and Wales. Section 105A of the Highways Act 1980 has recently been amended by the introduction of the Highways (Assessment of Environmental Effects) Regulations 1994.

A consideration of options and a process of public consultation has taken place. A ~~decision~~ decision has been made and, a preferred route announced. Orders will now be published. Act 1980.

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### 1.3 History of the Environmental Statement

Proposals for improving the A23/M23 junction at Hooley were developed in response to the high number of accidents occurring on the A23 close to Dean Lane. A factor considered significant to the relatively high number of accidents was the number of vehicles performing "U" turn manoeuvres at the junction to join the A23 southbound carriageway.

The Engineering Consultancy Division, part of the Highways and Transportation Department of Surrey County Council was commissioned by the Highways Agency to undertake a feasibility study to investigate options for improvement. The options considered, 2 to 9, are described below. The options could be broadly classified as either:

- (i) improvements to the Dean Lane junction
- (ii) providing additional slip roads to allow drivers to perform the desired turning movements within the interchange.

Following a detailed examination of the comparative merits of each option, a most favoured scheme emerged and was put forward to public consultation. The public consultation commenced on 25 October 1995 and closed 8 January 1996. The consultation document and comment form was distributed to approximately 220 households in the vicinity of the study area at the start of the consultation period. A public exhibition was held at Hooley Community Centre on 10 and 11 November 1995.

A Stage 1 Environmental Report on options was produced by Surrey County Council in February 1996. In July 1997 Mott MacDonald was appointed by the Highways Agency to develop the scheme including preparation of a full Environmental Statement.

The Environmental Statement comprises three parts, of different levels of detail:

- (i) Volume 1 - a comprehensive and concise document drawing together all the relevant information about the scheme;

- (ii) Non-Technical Summary (NTS) - a brief report summarising the principal sections of Volume 1 of the ES in non-technical language which is readily understandable by members of the public. It should be bound in to the main volume, but also be available as a free-standing document;
- (iii) Volume 2 - a volume which contains a detailed assessment of significant environmental effects by subject area.

Comments on the Environmental Statement should be sent to

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to arrive by

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## 2 THE NEED FOR THE SCHEME

### 2.1 The Existing Road Network

The A23 trunk road links Redhill, Surrey to Coulsdon, London Borough of Croydon in the north, a distance of approximately five and a half miles. About halfway between these centres the M23 merges with the A23 just to the south of Hooley.

The study area is located at the junction of the A23 and M23 south of Hooley. At Hooley the junction was originally constructed to extend the motorway northwards towards London. The interchange was not completed and road users must perform a U-turn manoeuvre at Dean Lane junction to transfer from the A23 northbound to the M23 southbound and from the M23 northbound to the A23 southbound.

The junction with the motorway is a predominantly rural setting with some linear settlements adjacent to the trunk road. The population of the district ward of Chipstead, Hooley and Woodmansterne is approximately 6,200 and is mainly located to the west of the A23 in the area of the junction of the A23 with Star Lane. A very low standard road provides access to Netherne Hospital (now closed). The junction of the A23 with Dean Lane lies 700 m to the south of the Star Lane Junction.

A 40 mph mandatory speed limit applies to the A23 from the County Boundary, through Hooley to a point 40 m to the south of Dean Lane. This section of the A23 has development either side and can be classified as an urban road.

The London to Brighton railway runs parallel to the A23 and is situated within cutting and tunnel to the east.

To the west of Hooley is the larger settlement of Chipstead which has a railway station on the Croydon to Epsom line.

To the south of Hooley, the next significant settlement on the line of the A23 is Merstham, which lies 3 km to the south. Merstham is located immediately to the south of the M25 motorway.

### 2.2 The Existing Traffic Problem

#### 2.2.1 Traffic Flows

For September and October 1994, the average daily 24 hour traffic flow on the A23 just north of Dean Lane was in the order of 46,600 vehicles. This had increased from 43,000 vehicles per day in September 1990, and 44,000 vehicles per day in September 1993.

Examination of seasonal variations in flows in 1993 indicated that the lowest flows were in January (38,400 vehicles per day) and highest in August (45,600).

The weekday morning peak hour was between 0800 and 0900, and the evening peak hour between 1700 and 1800. AM and PM average weekday peak hour flows in September 1994 were in the order of 4000 vehicles and 3,800 vehicles respectively.

Twelve hour manual classified turning counts at the A23/Dean Lane junction in December 1994 recorded 34,700 vehicles between 0700 and 1900 hours. Of this total 78% were cars, 12% were LGVs, 8% were HGVs 1.4% were motorcycles, 0.5% were buses and 0.1 % were pedal cycles.

Over the 12 hour period 860 vehicles (2.5%) performed a north to south U-turn at the junction. Of this total 73% were cars, 17% were LGVs and 10% were HGVs.

Traffic flow on the A23 between Dean Lane and the M23 increased by approximately 6% between December 1993 and December 1994.

2.2.2 **Accidents**

64 PIAs were recorded in the study area in the period 01/01/91 to 31/07/95. Two were fatal, 10 were "seriously injured" and 52 were "slightly injured" casualties. Ten of the PIAs involved U-turning traffic on the A23.

16 PIAs occurred in darkness and 27 in wet conditions. 26 PIAs involved only one car, 3 involved HGVs, 3 involved motor-cycles and 3 involved pedal cycles.

### 3 ROUTE OPTIONS AND ALTERNATIVES

#### 3.1 Consideration of Alternatives

The consideration of Alternatives was undertaken during Stage 1 of the scheme. The preferred option was selected prior to public consultation.

As with all assessments of alternative options, the baseline case is the do minimum option. However the available space within the highway boundary is insufficient for a "designed" turning movement facility to be constructed. For this reason, a do minimum option has not been developed.

The scheme options that were considered can be broadly divided into two categories: online and offline improvements.

Those which involve mainly online improvements centre on the A23 junction with Dean Lane and propose a range of improvements which facilitate the U-turning movement. The offline improvement options would provide dedicated slip roads linking the A23 and M23 (ie A23 northbound to M23 southbound and M23 northbound to A23 southbound) so that U-turning movements are no longer necessary. The A23 northbound to the M23 southbound link road would involve the use of the unused section of the M23 and some additional landtake to the north of this section. For M23 northbound to the A23 southbound, a second slip road would be provided between the existing M23/A23 northbound link road and the A23 southbound carriageway.

#### 3.2 Online Improvement Options

The online improvement options considered were as follows:

- Roundabout at Dean Lane
- Traffic signals, segregated right turning lane
- Traffic signals, near side slip road for right turning vehicles
- Traffic signals, segregated U-turning lanes for traffic approaching the junction northbound and southbound.

The online options in general, would require little landtake with the exception of the roundabout (Option 2), and consequently have little impact on the surrounding environment. The safety levels, delays and congestion associated with the current conflicting movements at the A23/Dean Lane junction would also be improved for both local residents and travellers with the suggested junction improvements. However, unlike the offline options, U-turning movements would continue to be accommodated in close proximity to residential areas. In addition these options would not provide a long term solution to the problem.

#### 3.3 Link Road Improvement Options

Offline improvement options considered were as follows:

- Link Road, 30 m radius loop
- Link Road, to the south of the existing unused bridge structure
- Link Road, Free Flow Slip Roads

The offline options would provide considerable benefits to the area. The options would result in the removal of the U-turning traffic from the A23/Dean Lane junction with beneficial impact for residents in that area in terms of reducing the number of conflicting movements, risk of accidents, delays and congestion occurring during peak periods from this road. However the requirement for considerable landtake and earthworks would mean impacts on the environment.

In association with the offline options, the existing service road running parallel to the A23 northbound carriageway southwards from Glebe Road would be extended as far as Harps Oak Lane. This road would provide a replacement access to properties in Glebe Road and close off direct access from Harps Oak Cottage to the A23.

## 4 THE PROPOSED SCHEME

### 4.1 Principal Features

The scheme includes the construction of two new link roads, closure of the existing link road between the A23 northbound and southbound carriageways, extension of the Glebe Road service road and modification of the Harps Oak Lane/A23 junction. The A23 northbound carriageway would be re-aligned so the works would not impinge on the ancient woodland to the north of Harps Oak Lane (see **Figure 4.1**)

### 4.2 The Principal Objectives of the Scheme

Construction of the new link roads would:

- Reduce the very high number of vehicle conflicts from the Dean Lane Junction.
- Reduce the number of accidents on the A23 in the vicinity of Dean Lane.
- Reduce the distance vehicles need to travel to and from the motorway network.
- Provide opportunities for traffic management measures through the Dean Lane junction.
- Reduce the frustration caused by delays as drivers queue to make U-turns at Dean Lane.
- Reduce the amount of traffic using inappropriate routes to the motorway network.

### 4.3 Traffic Forecasts and Economic Appraisal

Traffic forecasts have been produced for the year of opening (2000) and for the year 2015, for morning peak, inter-peak and evening peak traffic flows.

Growth in traffic is expected to be lower than national forecasts, because of congestion on the highway network locally and the availability of public transport alternatives for many journeys.

Induced traffic resulting from the completion of full links to the M23 has been estimated in accordance with recent Department of Transport guidance.

The study has shown that the scheme would provide good value for money, even taking account of traffic likely to be generated by the scheme.

The present day traffic flows, forecast traffic flows for the year of opening (2000) and for the year 2015 assuming that the scheme is not constructed are shown on **Figure 4.2**.

For comparison, the present day traffic flows on the existing network and the forecast traffic flows for the year of opening (2000) and for the year 2015, in both cases assuming that the scheme is built, are shown in **Figure 4.3**.

### 4.4 A New A23 Northbound to M23 Southbound Link Road

The proposed link road would utilise the two existing motorway bridges and embankment constructed during the 1970s.

A new left turn junction would be constructed on the A23 northbound carriageway to the south of one of the existing motorway bridges where there is an existing partly constructed, diverge taper.

A short length of cycle track is proposed adjacent to this junction to enable cyclists to travel from the existing service road, cross the new link road and then rejoin the A23 northbound carriageway.

Immediately following the left turn off the A23 northbound carriageway, the proposed link would turn into a tight, right hand loop, over one of the existing motorway bridges. This loop would be partly in cutting and partly on embankment. The link would then continue southwards on the existing embankment which is presently used as a maintenance compound. An environmental mound and landscape planting are proposed on the western side of the new link to screen nearby properties. The link would then pass over the second existing bridge before merging with the M23 motorway.

#### 4.5 **A New M23 Northbound to A23 Southbound Slip Road**

The proposed new slip road rises up from the M23 to its intersection with the southbound A23 carriageway. A simple priority T-junction is proposed with the A23.

The existing two lane A23 southbound carriageway which is already reduced to one lane beyond the proposed junction would be reduced to one lane through the new junction. A cycle lane would be introduced from the existing crossing facility on the M23 southbound slip road to a point to the south of the new slip road junction.

To the north of Shepherds Hill overbridge the M23 northbound carriageway would be realigned to reduce the amount of cutting required to accommodate the construction of the diverge taper for the proposed slip road.

#### 4.6 **Closure of Existing Link within A23 Central Reserve**

In order to reduce vehicle conflict on the A23 southbound carriageway in the vicinity of the new slip road junction, the existing link road within the A23 central reserve would be closed.

#### 4.7 **Extension of Service Road (serving Glebe Road) to Harps Oak Lane and closure of local accesses onto the A23 northbound carriageway**

In order to reduce vehicle conflict on the A23 northbound the existing service road accesses onto the A23 carriageway would be closed, including the access at Glebe Road.

To gain access to the A23 the existing service road would be extended to the Harps Oak Lane junction.

The existing northbound carriageway of the A23 would be re-aligned to the east between its junction with the M23 and Harps Oak Lane. This will allow space for the service road to be constructed without impinging on the area of ancient woodland.

#### 4.8 **A23 Junction with Harps Oak Lane**

Harps Oak Lane, in the close vicinity of the junction, would be modified to accommodate the extension of the service road serving Glebe Road and other properties adjacent to the A23 northbound carriageway. A shared use footway/cycleway is proposed to the south of Harps Oak Lane to encourage cyclists to leave the A23 carriageway and use the service road.

#### 4.9 **Lighting and Signing**

#### 4.10 **Environmental Mitigation**

#### 4.11 **Construction and Maintenance**

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**KEY**

2013 d/h	50	km/h
2013 Dpt. 8	150	km/h

ALL 10% HGV

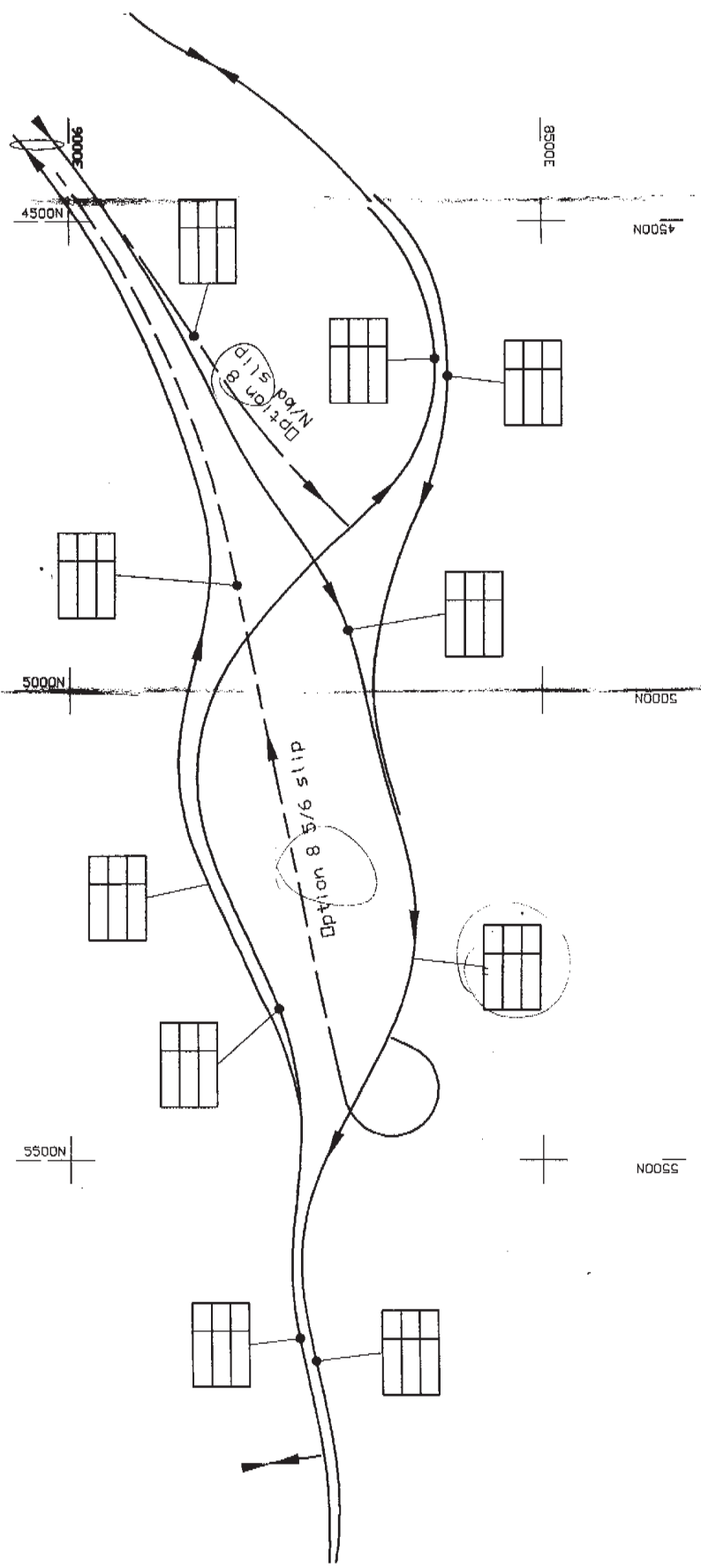
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 Mott MacDonald Limited  
 Capital House, 41-42 Andover Road  
 Waterbury, Salisbury, Wiltshire, SP4 7DZ  
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 Fax 01292 426224  
 Telex 832011 MOTTUK G

**TS24/23/M23 HOOLEY JUNCTION**  
 IMPROVEMENT  
 EXISTING 18 HOUR TRAFFIC FLOWS  
 (DATA SUPPLIED BY SCC)

Date	Drawn	Checked	Approved	Scale
DEC '97	AL/MC			1:1

Drawing No. **Figure 4.2**





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**KEY**

2013 d/n	30	Km/h
2013 Opt. 8	50	Km/h

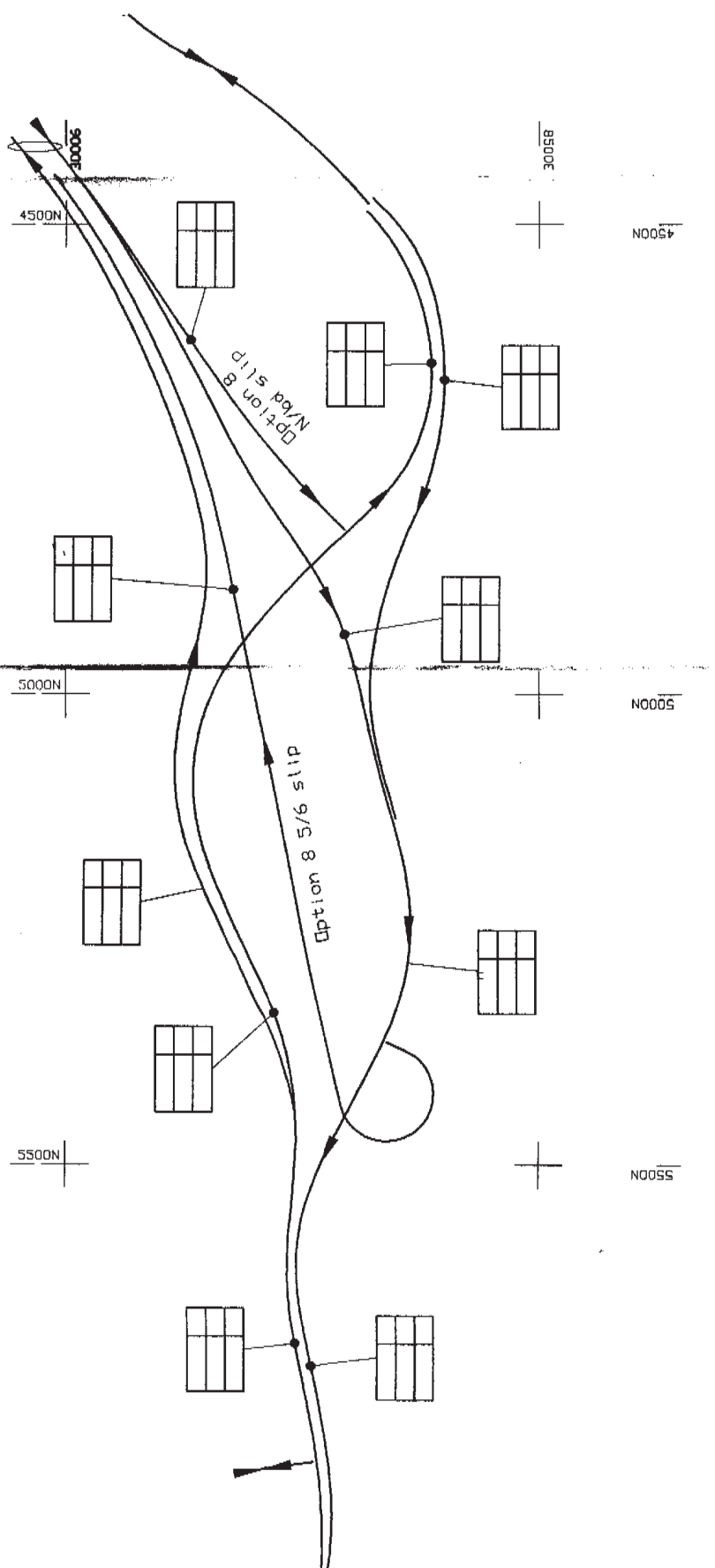
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 300, Rotherham Road, Rotherham, S60 1JH  
 Telephone: 0114 255 4600  
 Fax: 0114 255 5900  
 Email: sales@mottmac.com  
 Website: www.mottmac.com

014-423/423 HODDLEY JUNCTION  
 IMPROVEMENT  
 DESIGN YEAR 18 HOUR (4%)  
 TRAFFIC FLOWS  
 (DATA SUPPLIED BY SCC)

Date	From	Checked	Approved
DEC '97	AL/HC		

Revision No. **Figure 4.3**



5 **THE ENVIRONMENT: EXISTING CONDITIONS, MITIGATION AND PREDICTED EFFECTS  
OF THE SCHEME**

5.1 **Introduction**

5.1.1 Chapter Structure

## 5.2 Air Quality

### 5.2.1 Introduction and Methodology

Motor vehicles emit a wide range of combustion products which can have a variety of effects on both the local area and the wider, even global, area. Some of these compounds can have harmful effects on people and plants at sufficient concentrations near the road, whilst over the wider area, they disperse and may react with sunlight and other compounds to form secondary pollutants.

The Air Quality assessment has followed the methodology prescribed in the DoT Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 1 (Air Quality). The full methodology is described in detail in section 5.2.3 following.

*A number of scheme options were considered at stage 1, each of which would have a broadly similar effect on local traffic flows.. For the initial Air Quality assessment, Option 2 was selected as a surrogate for all options, but Option 8 was subsequently selected as the preferred option. The conclusions will therefore need to be reviewed following receipt of the new traffic forecasts for option 8.*

*It was concluded that since the scheme, whichever option was to be selected, would not have a significant effect on the overall traffic flows, it would not generate changes in air quality beyond the local area, thus a total or global assessment was not undertaken.*

### 5.2.2 Technical Backeround: Potential Effects

The combustion of hydrocarbon fuel in an internal combustion engine produces, ideally, carbon dioxide (CO<sub>2</sub>) and water, but due to incomplete oxidation, a small proportion of carbon monoxide (CO) is also produced. Incomplete combustion also produces a number of partially oxidised or unburnt hydrocarbons (HC) and carbon soot. The high temperatures and pressures involved also cause some of the nitrogen in the air to be oxidised (NO<sub>x</sub>). A number of compounds may be added to fuel to aid combustion and lubrication, but while these additives may increase the engine efficiency, further pollutants may be generated.

Of the many pollutant compounds generated, the effects of only those of most concern <sup>care?</sup> ~~can~~ be considered. The DMRB procedure considers four indicators for the local impacts: CO, HC, NO<sub>x</sub> and particulate matter (PM), and also CO<sub>2</sub> for the total or global impact. The effects of these are outlined below.

#### **Carbon monoxide, CO**

Approximately 90% of the total UK (1991) emission of CO arises from road transport, thus its presence in the air is a reliable indicator of pollution due to road traffic. CO is toxic, being rapidly absorbed by the blood and reducing its oxygen carrying capacity. It contributes indirectly to the greenhouse effect by slowing the destruction of the powerful greenhouse gas methane.

#### **Oxides of nitrogen, NO<sub>x</sub>**

Approximately 50% of the total UK airborne emission of NO<sub>x</sub> arises from road transport. Most is emitted as nitric oxide (NO) which is further oxidised to nitrogen dioxide (NO<sub>2</sub>) in the atmosphere. NO<sub>2</sub> is more toxic, affecting the respiratory system. NO<sub>x</sub> also reacts with other compounds in sunlight to form photochemical smog and acid deposition. High levels can be harmful to plants but generally this effect is confined to distances less than 5 m from the road. NO<sub>x</sub> contributes to the formation of ozone (O<sub>3</sub>) which can have a deleterious effect on plants, possibly over wider areas. Nitrous oxide (N<sub>2</sub>O) is a powerful greenhouse gas produced in small quantities.

#### **Hydrocarbons (HC)**

Approximately 40% of the total UK airborne emission of HC is from motor vehicles. Hydrocarbons (HC) are those organic compounds emitted as a result of incomplete combustion processes and by evaporation from the fuel system. They embrace many hundreds of different compounds of which some, such as benzene, are particularly toxic or carcinogenic and may contribute to photo-chemical smog. Hydrocarbon compounds contribute directly or indirectly to the greenhouse effect.

#### **Particulate matter (PM)**

Approximately 40% of the smoke emission in the UK is produced by motor vehicles. These emissions originate mainly from diesel engines, which produce very small carbon particles, under 10 microns in size (PM10), which are thought to cause lung irritation and possibly aggravate lung conditions such as asthma. Smoke causes staining to buildings.

#### **Lead**

For many years organic lead compounds were added to petrol to aid the combustion process, and resulted in the emission of inorganic lead compounds. These are toxic to the nervous system. Lead was known to be a serious problem but this has been addressed by the progressive reduction of lead in petrol, from 0.55 g/l in 1972 to 0.14 g/l in 1986. In 1983, the intention to make unleaded petrol widely available by 1990 was announced and all petrol engine vehicles first used after April 1991 had to be capable of using unleaded petrol. Since 1993, all new petrol vehicles have been fitted with catalytic converters which are damaged by lead and must therefore use only unleaded fuel. The net result of these measures is that lead from road traffic will not have a significant impact on health in the foreseeable future and it is therefore not included in the DMRB procedure.

#### **Carbon dioxide (CO<sub>2</sub>)**

Approximately 20% of the total airborne emission of CO<sub>2</sub> in the UK is from motor vehicles. While considered the least harmful for a given volume of the greenhouse gases, it is the largest contributor in terms of volume.

#### **Impact of legislation regarding vehicle exhaust emission**

Since the early 1970s, statutory limits have been introduced to reduce the impact of exhaust emissions by limiting the permissible levels of various pollutants in vehicle exhausts and reducing the amount of lead in petrol. Catalytic converters, which must be fitted to all new petrol vehicles since 1993, can produce a significant reduction in the various pollutants only when hot, and are not fully effective on short journeys. The overall effect, however, is that pollution from roads (both new and old) is likely to reduce as the national vehicle fleet is progressively replaced. This is reflected in the DMRB procedure.

Vehicle emissions increase at low speeds and in traffic congestion. The least pollution is produced when traffic flows freely at moderate speed, thus any road improvements which reduce congestion can be beneficial.

#### ***UK objectives for air quality***

An EC Framework Directive on Ambient Air Quality Assessment and Management was adopted in September 1996 which will lead to the extension and improvement of earlier standards and guidelines. In the UK, part IV of the Environment Act 1995 has led to the development of an air quality policy in advance of the EC Framework Directive. A duty was placed on the Secretary of State to prepare a strategy for the management and improvement of air quality and on local authorities to review and assess the quality of air in their areas and take action where defined standards are breached or at risk of being breached. In most areas, the main source giving rise to such a risk is road traffic.

The National Air Quality Strategy was published in March 1997, following consultation. It defines a set of standards based on medical and scientific evidence on the effects on health and objectives to be reached by 2005, related to these standards and a judgement on what is achievable and justifiable economically.

#### 5.2.3 **Baseline Conditions**

The DMRB specifies that for impacts which will occur only after a road is opened to traffic, the **baseline** conditions should be those which would exist **just prior to opening** (*currently assumed to be 2000 but this must be reviewed*) assuming that the road had not been built.

As the area of concern is relatively rural, the existing air quality is likely to be high except close to the M23 and A23 carriageways, there being no major industrial sources of air pollution in the area.

*As part of the Stage 1 assessment, an air quality assessment was undertaken at four locations adjacent to the various scheme options. These were considered to be representative of the locations likely to be the worst affected.*

- my local air quality strategy.

1  
15th May 97?

Calculations were made for the year 1994 at the four sites using the method described in para 5.2.3 above, using traffic data taken from the model developed for the scheme and shown on **Figure 5.1**. As the baseline will now be 2000 or later, these calculations will be an over-estimate for the reasons outlined in 5.2.2.

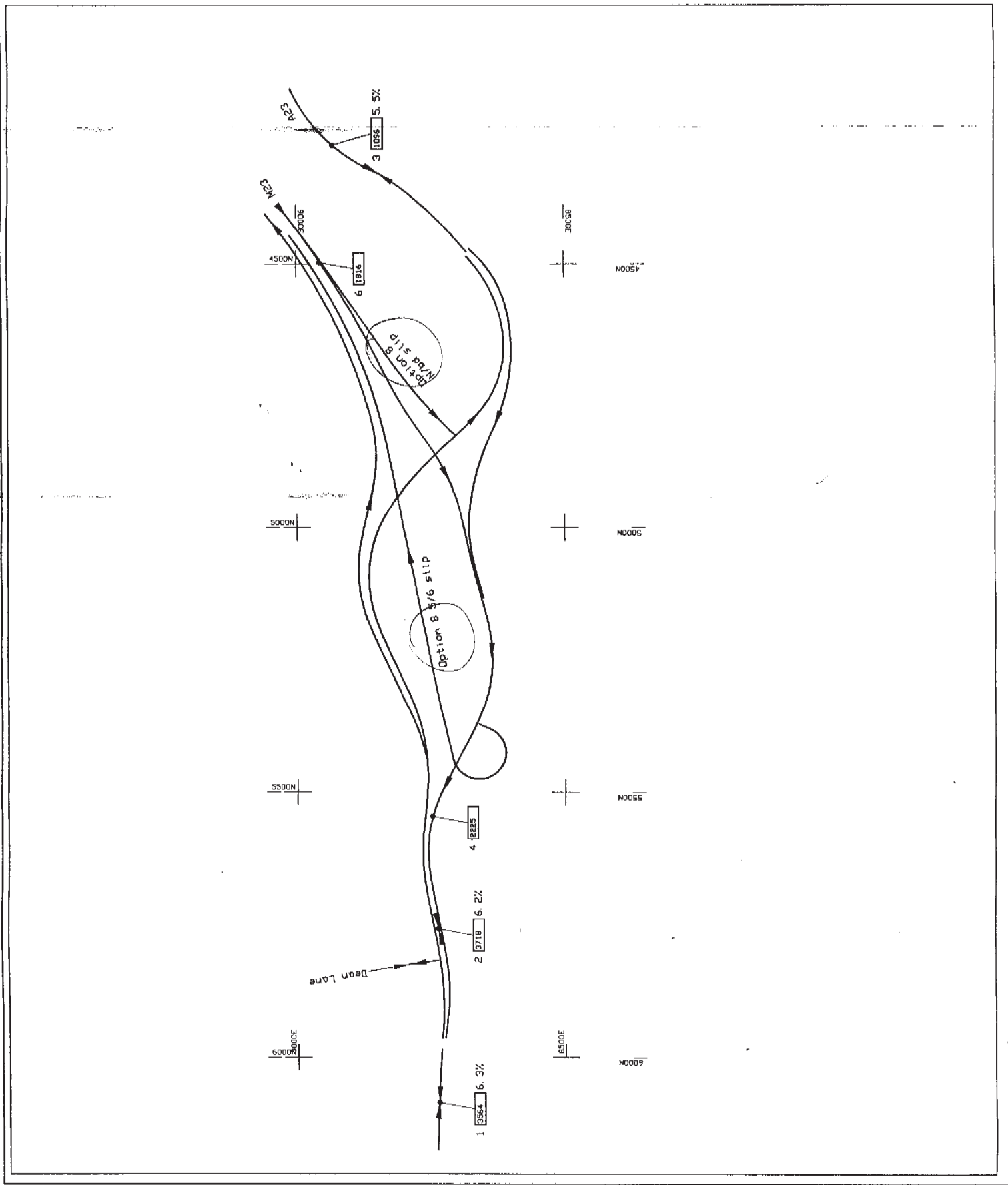
The calculated 1994 concentrations for the selected receptors are given in Tables 1 to 4.

Inspection of these results for 1994 shows that at all of four sites, the pollution concentrations were well below the current DMRB standards. The concentrations in the preferred baseline year (2000) are likely to be somewhat lower as the result of recent emission control measures. (To be re-calculated when the traffic review is received).

OK / WJH / ECC

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**KEY**  
**PEAK HOUR FLOW** %HGV



**Mott MacDonald**  
 Mott MacDonald Limited  
 Central House, 28 Abchurch Lane, London EC4N 3AB, UK  
 Telephone: 01845 255000  
 Fax: 01845 255001  
 E-mail: info@mottmac.com

**Project:** A23/M23 HOOLEY JUNCTION  
**Improvement:** PEAK HOUR FLOWS FOR AIR QUALITY CALCULATIONS.  
**Data:** (DATA SUPPLIED BY SCC)

Date	Drawn	Checked	Approved
DEC '97	ALHC		N. T. S.

Drawing No. **Figure 5.1**

#### 5.2.4 Assessment of Impacts and Effects

An air quality **impact** may be defined as a change in pollutant concentration resulting from the operation of the scheme. An **effect** may be defined as the result of the impact on people animals and resources.

In order to assess the impacts and effects of the proposed scheme on the **local** air quality, it is necessary to make a comparison of forecast pollutant concentrations in the design year (both with and without the scheme) with the existing/baseline conditions before the scheme is opened. Consideration should also be given to the immediate changes on opening. To further assess the impacts and effects, future concentrations at representative sensitive receptors are compared with defined Air Quality Standards and any local standards if appropriate. Consideration is only given to receptors within 200 m of the new or existing carriageways.

Since the air quality in the future cannot be measured directly, the DMRB assessment method requires that, for a valid and consistent comparison, the pollutant concentrations for both the future and baseline years should be determined by **calculation** from forecast traffic flows for those years.

The calculation method is defined in DMRB Vol 11, section 3, part 1, chapter 6. It is an empirical one based on a series of charts which enable the concentrations of the four indicator pollutants to be determined from forecast traffic flows and other factors. The procedure may be summarised as follows:

- (i) the network of roads within 200 m of each selected receptor is divided into a number of continuous sections.
- (ii) for each section, the effective peak hour flows of light and heavy vehicles in the appropriate year are determined.
- (iii) for each section, the emission rate for each pollutant is estimated.
- (iv) corrections are made for the effects of vehicle speed and distance to the receptor.
- (v) the contributions from all of the road sections are summed to give the peak hour concentrations for each year of interest
- (vi) finally the peak hour pollutant concentrations are converted into values appropriate for comparison with the Air Quality Standards (see below).

#### *The Air Quality Standards*

An assessment of the significance of a particular pollutant concentration can be made by reference to a standard which is based on its known effects on health. The effects of the four indicator pollutants may vary with exposure time and frequency of occurrence, thus the selected standards must reflect this accordingly. The Standards currently specified in the DMRB are as follows:

- (i) Carbon monoxide: An annual maximum 8 hour concentration of 9 ppm, based on the US National Ambient Air Quality Standard.
- (ii) Hydrocarbons (Benzene): An annual mean concentration of 5 ppb, based on the UK Expert Panel on Air Quality Standards recommendation.
- (iii) Nitrogen Dioxide: The 98th percentile of 1 hour concentrations of 105 ppb, based on the European Community Standard 85/203/EEC.
- (iv) Total particulates: The 95th percentile of the daily mean values ( $300 \mu\text{g}/\text{m}^3$ ) and an annual mean concentration ( $150 \mu\text{g}/\text{m}^3$ ) based on the EC Standard for sulphur dioxide and suspended particulate air quality 80/779/EEC.

If any of the predicted pollutant concentrations are found to exceed these standards, a more thorough assessment of the air quality implications is required to be made. Table 8 in annex I of Volume 11 section 3 part 1 of the DMRB summarises these standards and is reproduced below.

Pollutant	CO	NO <sub>2</sub>	HC	HC	PM	PM
			non-methane	benzene	total particulates	total particulates
averaging period	8 hour	1 hour	3 hour	1 year	1 day	1 year
frequency	annual maximum	98th percentile	annual maximum	mean	95th percentile	mean
limit/guide value	9 ppm	105 ppb	240 ppb	5 ppb	300 µg/m <sup>3</sup>	150 µg/m <sup>3</sup>

The standards and objectives defined in the UK Air Quality Strategy are essentially the same as those of the DMRB stated above. At the time of writing, the Local Authority do not have an action plan in place.

Using the predicted traffic flows and speeds for the relevant links of the network, the baseline and future pollutant concentrations have been calculated for the four representative locations designated A - D shown on **Figure 5.2**.



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**Key**

**D ●** Air quality receptors  
(Selected by Surrey C.C.)



**Mott MacDonald**  
Mott MacDonald Limited  
Capital House, 48-52 Jackson Road  
Wimbledon, Surrey, Surrey RM4 9HT  
Telephone 0181 835 8800  
Fax 0181 835 8804  
Telex 947943 MOTTMAC G

Scale  
**A23/A223 HOVEY JUNCTION  
IMPROVEMENT  
AIR QUALITY RECEPTORS**

Date	Drawn	Checked	Approved	Scale
Drawing No.				Fig
				7/91

5.2.5 Assessment Methodology: Total impacts

The **total** impact of a scheme is a measure of the more widespread effects such as the formation of photochemical oxidants, acid deposition and the greenhouse effect. The total impact is quantified by calculating the overall change in annual **quantity** (tonnes) of the indicator pollutants emitted as a result of the scheme. It is therefore necessary to calculate the total quantity of annual pollutant emissions after the scheme has been built and deduct the estimated emissions from the existing road network within an area where traffic patterns are affected by the scheme.

The method defined in the DMRB follows closely the graphical method for localised impacts together with an additional procedure for carbon dioxide (CO<sub>2</sub>). It requires the traffic flow on each segment to be amalgamated with the speed related data to determine the total emissions of the indicator pollutants CO, NO<sub>x</sub>, HC, PM and CO<sub>2</sub>. *As in the case of localised impacts, data was taken from the COBA traffic model for the scheme.* The results are expressed as a percentage change, but as they cannot be related to any particular standards, no guidance is given on the assessment of the resulting regional effects.

5.2.6 Local Impacts: Future conditions

*Since the various scheme options under consideration at stage 1 were considered to be broadly similar in terms of forecast traffic flows, only one was considered in detail. Option 2 was taken as a surrogate and calculations were made for the four representative sites for an assumed design year of 2013, both with and without the scheme. The results are also given in Tables 1 to 4. A recent re-calculation for site A using parallel 2013 traffic data for option 8 shows good agreement with the SCC result for option 2.*

The forecast traffic flows, speeds and proportion of heavy vehicles used in the calculations are also shown on **Figure 5.1.**

From tables 1 to 4, it may be concluded that:

- (i) *If the scheme is not built (1994 to 2013 do nothing), the concentration of all four indicator pollutants will fall significantly by 2013 as the result of improved emission control technology, despite any increase in traffic flows.*
- (ii) *If the scheme (~~option 2~~) is built (1994 to 2013 ~~option 2~~), concentrations would still be significantly lower than the 1994 levels for the same reason*
- (iii) *In 2013, concentrations with the scheme in operation would generally be similar to those which would occur if it is not built, i.e. the scheme itself would generate no significant impact on the local air quality.*

*increase at re-pnt-3?*

5.2.7 Assessment of Significance: Local Impacts and Effects

*None of the changes described in 5.2.6. above can be considered to be significant.*

5.2.8 Total impacts

*These were not considered in the SCC report and will be calculated from the revised traffic data when available. While no criteria for significance are given in the DMRB, it is not considered likely that any significant increases would occur.*

5.2.9 Conclusions

- (i) **The** calculated pollutant concentrations for 1994 were well below the standards defined in the DMRB and are likely to be lower in the assumed baseline year of 2013 as the result of improved emission controls,

*Compare with: do min.*

- (ii) *If the scheme is not built, the concentration of all four indicator pollutants will fall significantly by 2013 as the result of improved emission control technology, despite any increase in traffic flows.*
- (iii) *If the scheme is built, concentrations would still be significantly lower than the 1994 levels for the same reason.*
- (iv) *In the design year, concentrations with the scheme would generally be similar to those which would occur if it is not built, i.e. the scheme itself would generate no significant impact on the local air quality.*
- (v) *The total or global impacts are not likely to be significant.*
- (vi) *Since the predicted pollutant concentrations are all significantly below the DMRB standards, it is unlikely that any changes to the traffic forecasts will change these conclusions.*
- (vii) *As a result, there is no requirement for a specialist study or Volume 2 Report for the Environmental Statement (DMRB 11, section 4, part 3, ch 4 para 4.1).*

**AIR QUALITY IMPACT TABLES**

**1 CO annual 8 hour max, ppm DMRB guide/limit value 9 ppm**

receptor	1994 existing	2013 do min	2013 option 2
A	3.9	0.6	0.6
B	5.3	0.9	0.9
C	1.7	0.2	0.4
D	1.9	0.2	0.2

inc. ✓

**2 HC annual average benzene, ppb DMRB guide/limit value 5 ppb**

receptor	1994 existing	2013 do min	2013 option 2
A	1.6	0.2	0.2
B	2.5	0.3	0.3
C	0.7	0.1	0.1
D	0.8	0.1	0.1

✓

**3 NO<sub>2</sub> 98th percentile hourly, ppb DMRB guide/limit value 105 ppb**

receptor	1994 existing	2013 do min	2013 option 2
A	73	41	40
B	85	52	48
C	70	41	47
D	72	41	41

inc. ✓

**4 PM 95th percentile daily, µg/m<sup>3</sup> DMRB guide/limit value 300 µg/m<sup>3</sup>**

receptor	1994 existing	2013 do min	2013 option 2
A	19	13	10
B	29	20	16
C	16	11	14
D	16	10	10

inc. ✓

**5 PM Mean annual ?**

To be added

### 5.3 Cultural Heritage

#### 5.3.1 Introduction and Methodology

~~This section is taken from the assessment undertaken by Surrey County Council in April 1996.~~

The cultural heritage resources to be assessed, that contribute to the overall character of the historic environment, can be grouped into three broad categories:

- historic buildings;
- archaeological sites.

Historic buildings include statutory listed buildings (Grade I, II\* and II), locally listed buildings and other features identified by local authorities, interest groups and the Consultant as being of historical interest. This definition also encompasses structures of historic merit such as railway bridges, boundary stones, statues etc.

Archaeological sites include a variety of features dating from palaeolithic to modern times and include ruins, stone circles, standing stones, burial chambers, crop and soil marks and finds scatters etc. They may be designated statutory sites such as Scheduled Ancient Monuments (SAMs) and local authority Archaeological Priority Areas. They also include palaeo-environmental geological features contained in gravels, drift, head material, alluvium and peat deposits.

#### *Identification of Impacts and Effects*

Potential impacts have been identified through a consideration of the construction, operational and maintenance requirements of the scheme, eg extent of landtake, level of traffic movements etc. Many impacts that occur during the construction phase are temporary in nature, but others may be experienced throughout the operational phase in which case they are long term. The following list comprises a range of impacts which may occur as a result of the scheme and which could result in effects on cultural heritage:

- temporary or permanent landtake;
- temporary or permanent severance;
- excavation and ground disturbance, including compaction;
- visual disruption during both construction and operation;
- disruption to local hydrology, drainage patterns, flows and volumes of subsurface water.

These impacts could lead to a set of effects on the archaeological and historic resources. Such effects have been identified as:

- complete or partial loss of the archaeological or architectural feature, or topographical evidence due to landtake;
- loss of the physical and visual integrity of the site due to severance, such that key relationships are lost. This is particularly important where features are clustered together (ie group setting), or where the historic setting of an archaeological monument, historic building or historic landscape/townscape feature is affected by visual intrusion;
- damage to resources due to changes in water levels;
- direct damage due to excavation; and
- indirect damage due to point loading and compaction.

#### *Evaluative Criteria*

- (i) For Assessing the Importance of Historical Resource

The importance of archaeological sites, historic buildings, and landscape features varies considerably. The starting point for evaluating the sensitivity of the cultural heritage features will be to consider their legal or quasi-legal status (such as scheduled ancient monuments, conservation areas, listed buildings). The importance of cultural heritage features can be further defined by use of the non-

statutory criteria for scheduling ancient monuments and listed buildings, as set out by English Heritage:

The criteria include:

- (a) survival
- (b) period
- (c) rarity
- (d) fragility
- (e) diversity
- (f) documentation
- (g) group value
- (h) potential
- (i) amenity
- (j) conservation value

(ii) For the Significance of Impacts and Effects

There is no standard scale of comparison against which the severity of impacts on cultural heritage may be judged, because of the great variety of resources and receptors. Severity of impacts can be judged taking the following into account:

- the proportion of the feature affected and whether key characteristics would be affected, such as the setting of a listed building;
- consideration of the type, survival/condition, fragility/vulnerability, potential and amenity value of the feature affected.

**Significance Criteria**

The significance of effects is determined by integrating the importance of the historic resources with the severity of impact judged to occur there.

- Major - Effects which breach national statutory designations and policy and affect sites of national importance. The effects are likely to be of particular importance to national statutory agencies, local authorities, national and local interest groups and the general public. Examples may include demolition or significant landtake within a SAM or Grade I listed building or significant intrusion into the setting of a SAM or Grade I listed building.
- Moderate- Effects which conflict with national designations and local authority policies. They also include effects which do not technically conflict with national or local policy but which are significant in having a major impact on features which are of particular importance at a county and local level with local authorities and special interest groups. Examples could include the demolition of a Grade II listed building, extensive landtake in a poorly preserved archaeological site (ie a site of degraded archaeological value), significant visual intrusion to a Grade II\* listed building.
- Minor - Effects which, although not breaching national or local policies, may be raised by local authorities and be of concern to local interest groups and the local public. These effects could be removed by incorporation of additional mitigation in the detailed design process. Examples may include the demolition or extensive intrusion of setting of unlisted historic buildings and loss of non-critical components of an archaeological site of local or county importance.

**Methodology**

In order to assess and safeguard the archaeological interest of the area an appropriate scheme of investigation will consist of up to four stages. The character of successive stages will be dependent on the results of the previous stage. The four distinct stages of archaeological involvement may be defined as follows.

The first stage, a Stage 1 assessment as defined in Volume 11, Section 3, Part 2, Chapter 8 of the Design Manual for Roads and Bridges has already been completed, and as a result it was recommended that further

work was undertaken to provide a Stage 2 assessment as defined in the same manual. This forms the present report and has involved an examination of early cartographic sources (including, for example, the Tithe map of c.1840); a rapid review of readily available secondary historical sources (such as the Victoria County History volumes); appraisal of geological, topographic and soils information already compiled; examination of relevant aerial photographs; collation of Sites and Monuments Record information; consultation with local archaeologists as appropriate; a very careful walkover survey of the site; and the production of a report summarising the above information and identifying the nature and location of Stage 3 work in light of the development proposals and any other identified constraints (eg services or safety considerations). It may also be appropriate to rank different proposals according to their likely archaeological impact.

The third stage of work will be Survey and Evaluation of those areas which are to be the subject of significant ground disturbance. There are various options for such work depending on the archaeological potential of the site as defined by the preliminary assessment. Possible approaches include a watching brief or geophysical survey, but the most common method is the excavation of machine-cut trial trenches, followed up by excavation of the archaeological features which are revealed within them, and further assessment by geophysical survey as appropriate. This will enable the existence, extent and importance of archaeological remains (if any) in these areas to be defined in appropriate written reports.

The fourth stage of work will be Preservation Strategy, based on the findings at Stage 2. It does, of course, only become applicable if archaeological remains are discovered. The fundamental principle behind the archaeological policy of Surrey County Council is that Preservation in situ is always the most desirable approach; should that prove impossible then Preservation by Record is essential.

### 5.3.2 Baseline Conditions

#### *Recent Geology*

The proposed junction improvement covers an area of approximately 0.7 Ha. and is underlain on its southern third by Middle Chalk and on its northern two thirds by Upper Chalk. Local geology is described in greater detail in section 5.12 of this report.

#### *Sites and Monuments Record*

The Sites and Monuments Record of Surrey County Council was checked to see what sites of archaeological interest were known from the area of the proposed development. (See **Figure 5.3**)

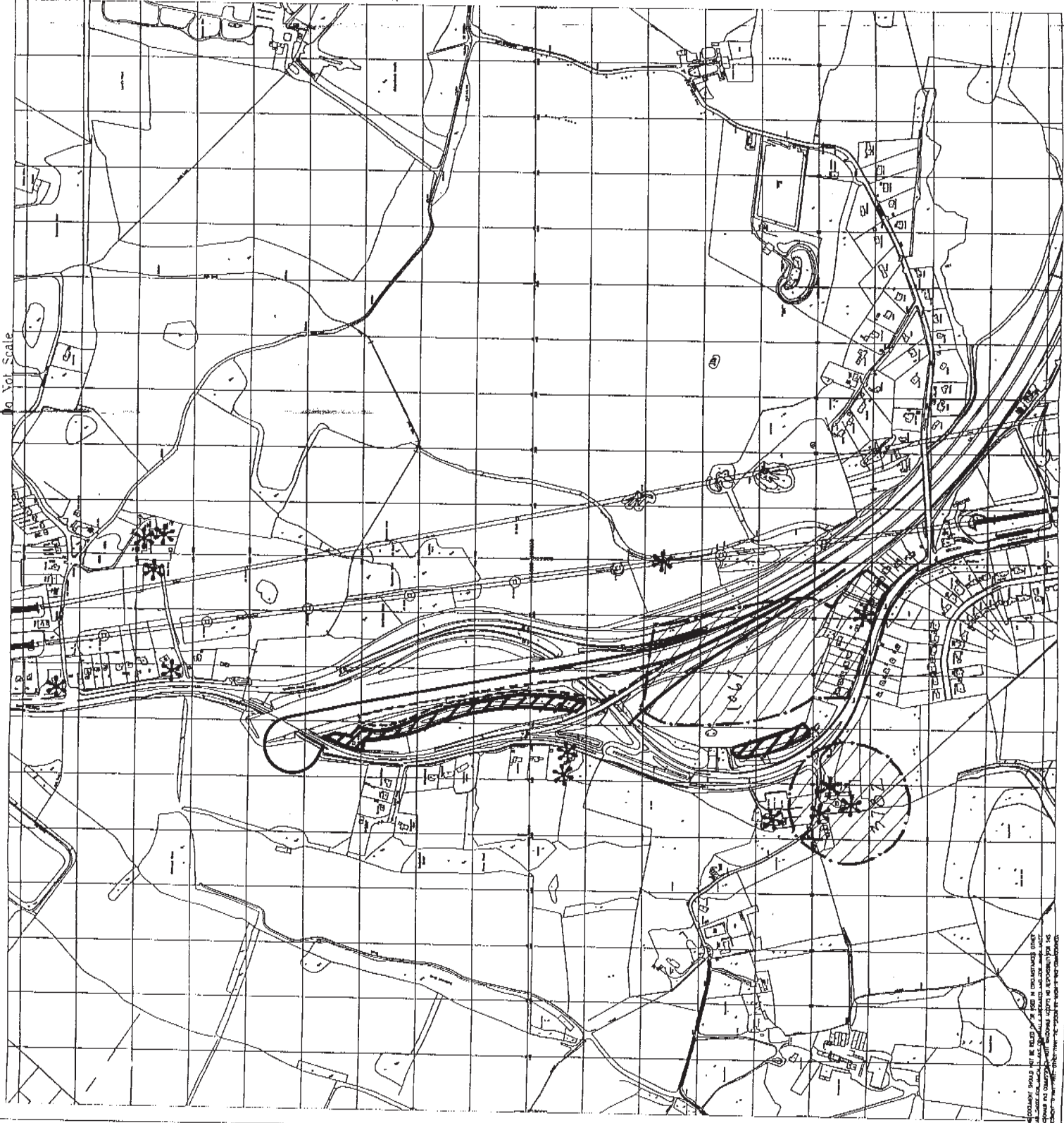
- 3745 Surrey Iron Railway Earthworks: The line served the chalk pits of the Merstham Greystone Lime works, which were developed in the 19th century by Jolliffe and Banks, promoters of the railways. The cutting runs north, from the east side of the A23 opposite Harps Oak Lane to the motorway junction and then continues as shallow depressions in front gardens. This site is also a Scheduled Ancient Monument, no 123.
- 1067 Possible Barrow Site: Field name 'Dragberry' on 1840 Tithe Award. Drakebergh, 1388 Court Roll; Dragburrough in 1522; all meaning Dragon's mound, alluding to the ancient folklore of the dragon in the barrow and, perhaps, to some ancient discovery.
- 1025 2 Hourglass Perforated Maceheads: Axe-head found in Autumn 1928 'in a black deposit' below a top layer of flints in the grounds of a house, 'North Point', Church Hill, Merstham. The implement is of reddish quartzose sandstone not found locally, and brought possibly from Wales or the west of England. It is assigned by Mr Reginald Smith to the Late Neolithic period, about 2,000 BC. The surface is partly polished; the hole is countersunk in 'hour-glass' fashion; extensive signs of wear appear at both ends, and a large flake has been broken off at the butt end leaving a scar. Close by, he found a semifinished 'mace-head' of similar appearance which was only partly bored. The second implement was subsequently lost.
- 3620 Iron Railway Rails: About 12 cast-iron rails from the Surrey Iron Railway are preserved east of the A23, south of the B2031. They are angle section c. 76 cm long, slightly higher in the centre than the ends. and are laid on stone sleepers.

- 3782 Roman Coin: As or Dupondius. A 1st or 2nd century As or Dupondius, which is in a worn condition. It was found north of Marlin Glen Wood, by Brian Lambert, using a metal detector.



LEGEND: -

- SYMBOLS
- SITES OF ANCIENT MONUMENTS
- BUILDING OF ARCHITECTURAL OR HISTORIC INTEREST
- 9999 SITES AND MONUMENT RECORD INFORMATION.
- SITE UNSUITABLE FOR FURTHER ARCHAEOLOGICAL WORK.



**Mott MacDonald**

Mott MacDonald Limited  
Denmeter House  
Station Road  
Cambridge CB1 2PS

Telephone 01223 456660  
Fax 01223 491007  
Telex 817260 MXP G

Title  
A23 / M23 HOOLEY JUNCTION IMPROVEMENTS  
ARCHAEOLOGY

Date	Drawn	Checked	Approved	Status
Drawing				Scale
				Rev

Figure 5.3

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### **Maps**

Maps can be a very useful source of information when looking for archaeological features as it is possible to trace the development of a landscape over several hundred years or more, and features recorded on early maps, which often disappear on later ones, can be identified.

#### ***The Rocque Map of 1768***

This later 18th century map is one of the earliest maps to show the village of Hooley and the landscape underlying the route of the proposed junction improvement. The route follows a similar line to the road leading from Merstham to a village called 'Woolley' (this is, in fact, Hooley) northwards, starting from the end of a field, north of Merstham church (written as Meestham on the map), leading up to, and just beyond, Deane Farm. At the southern end of the route there is a marked difference in the line of the Merstham - Hooley road to that of the modern road in that the High Street runs off the west side of the Church rather than the east side, as today, and it leads directly up to Harps Oak via Marting Pit, rather than curving to the east as it does at present. There are two small settlements marked along what will be the line of the road but neither of them would appear to be directly affected by the proposed route. The general character of the landscape that the route will cross is one of fields with occasional plots of woodland.

#### ***The Tithe Map of 1840***

The Tithe map and award for Merstham was consulted for information similar to that above and for any interesting field - or place-names that might provide evidence for the existence of former archaeological features. The area of the present junction covers fields (see figure 2):

- 84 - Part of Great Home Field
- 96 - Part of Foxfield
- 97 - Shaw in front Home Field
- 102 - Part of Rowen's Field
- 103 - Part of Old Ham
- 104 - Shaw Pit
- 105 - Dragberry
- 108 - Part of Dragberry

Fields 102, 103, 104 and 105 are situated in the area of the proposed junction alterations and none of them have names of any particular significance except 105 - Dragberry, which, as referred to in section 3 (SMR no 1067), may possibly have connections with a barrow site though of unknown date.

Another interesting point is that a railway track is clearly shown parallel with the old Hooley Lane (north-south road) and this must represent the industrial railway (SMR nos 3745 and 3620) which still exists today in a fragmentary nature. The fields affected by the proposed junction alterations are nearly all arable with some woodland (104).

#### ***The Ordnance Survey 1st Edition 6 inch Map of 1871***

The OS first edition 6 inch map represents the first attempt at a systematic, large scale, 'objective' cartographic survey of the whole country. The extract shows Hooley Lane (the modern London Road North) leaving Merstham to go north to Hooley; the line of this road has been altered from the 1840 Tithe Map and now leads not into the north of Merstham but comes in from the east side. The area of the proposed junction alteration is covered by a large field with the remains of field boundaries at the north and south ends, which were originally shown on the Tithe map. Running down the centre of the field is a faint division which may represent a former field boundary not shown on the tithe map.

### **Printed Sources**

Various written sources were checked for information regarding the history of the general area and the site itself. These included the local records of the Surrey Record Office, the Victoria County History of Surrey, and the English Place-Names Society volumes for Surrey; of these only the last two sources produced any information of direct relevance.

***The Place-Names of Surrey (English Place-Names Society, vol XI, 1 934)24***

The EPNS volume gives the meaning and origin of local place-names of interest, and there are several names of interest for this survey:

**Alderstead Farm**

This is first recorded as Aldested(e) in 1225, Alstede in 1327, and Aldersted in 1522. The meaning is probably 'alder place'.

**Dean Farm**

This is first recorded as la Dene in 1225, atte Dene in 1390, and lez Deane in 1522. The meaning probably comes from denu meaning 'valley'.

**Harpsok Cottage**

This is recorded as 'the Harp, two crofts called Harps' in 1522. No meaning is given.

**Hooley**

This is first recorded as Holog(h) in 1235, Holce in 1301, and Hooley in 1789. This is probably a compound of Old English holh and leah, hence 'woodland or clearing in the hollow'.

**Merstham**

This is first recorded as Mestham in 947, Merstan in 1086, Mesthan in 1202, and Merysham in 1505. The suggested meaning of the name Merstham is 'homestead by the horse enclosure', or, as Rumble (Rumble A R, 1976 Place-names and their context with special regard to the Croydon survey region, Proc Croydon Nature Hist Sci Soc, 15.8, 161-84) put it, 'the horse enclosure'; Mearsaet means 'horse paddock'. Rumble noted the existence of specialist units such as this, and others such as Gatton - 'the goat farm', in the immediate vicinity, and suggested that they formed an important part of a multiple estate (essentially self-sufficient), a type of landholding which developed probably due to the absence of money and a greater emphasis on self-sufficiency in the early Saxon years. Whitehall Farm was earlier recorded as White Hill but no date is given in the EPNS for this.

***The Victoria County History of Surrey vol 3, 191 1***

'In 1807 the high road to Croydon was improved so it avoided the steep hill into Reigate and the steeper portion of Merstham Hill, passing by the depression near the west end of the church. Before this road was made, a rail road, worked by horse traction and following the same depression in the chalk, had been laid down, connecting Merstham with Croydon.

Though the Merstham stone and lime works were intended primarily to benefit by the line, it took goods of any ownership or description.

The line was taken over by the London and Brighton and South Eastern companies, whose joint line runs upon part of it. The railway is still visible in an inclined cutting'.

***A Walkover Survey on the 17th February 1995***

The whole of the area outlined on plan 92114/003 in Appendix 4 was carefully walked over on 17th February 1995. This work did not reveal any new information of direct archaeological interest, but it did provide valuable information on recent land use and the suitability of different areas for any further archaeological fieldwork. The distinct areas are marked by letter codes on **Figure 5.4**: some residual pieces of land of narrow extent and/or obviously badly disturbed by recent landscaping are separately indicated as unsuitable for any further archaeological investigation by reason of these facts. The lettered parcels of land as shown in **Figure 5.4** are as follows, the title of each site is given in paragraph 4.6:

- A Site of SMR no 3745 - As described above, a well defined cutting but note that there are many small (c 3-7 m high) trees growing within it. On the eastern side, spoil from the motorway construction spills over the sides of the cutting.
- B This is scrub land, with occasional small trees, open and accessible for further fieldwork.
- C Area covered with closely spaced, small (c1.5 m high) fruit trees. Fieldwork would be impossible with this ground cover, but the trees would be easily removed by machine if archaeological investigation was required.

- D A small grass-covered, area, sloping steeply to the south. It seems probable that this has been heavily landscaped, and is useless for further archaeological investigation.
- E This is a grass field, but it has evidently been much disturbed in the recent past. It was a compound during motorway construction and a gas pipeline was diverted into the field for the construction of the M23. Topsoil has been removed and piled in low mounds, and there is much surface standing water, and evidence of the passage of heavy vehicles. At F, rubbish tipping has been taking place. Despite all this, it would be unwise to assume that archaeological remains (if such exist) have been damaged or destroyed beyond recovery of useful information. This is especially so on the higher ground towards the south (on fin 1), which seems the most likely location for a barrow (SMR 1067) and is also apparently less disturbed than elsewhere.
- F See above under F.
- G This is a sizeable area of fairly level ground. It is covered with small (c 5 m high) trees at 7-10 m intervals, and there is evidence of many similar trees in between having been cut at ground level in the past 1-2 years. Removal of the trees and stumps would almost certainly destroy any archaeological evidence present. Fieldwork (trial trenching) would just about be practical in its present condition, but the stumps may be a problem.
- H Large quantities of dumped soil here would render fieldwork impossible. Even if removed it seems likely that the area below has been badly disturbed.
- I Grassland with a few trees, not apparently previously disturbed, suitable for fieldwork.
- J,K These are pasture fields, both of which slope gently to the south-east or east. Suitable for fieldwork. The northern part of the field has been disturbed by the laying, of a gas pipeline. It was diverted into this area during the construction of the M23.

**Figure 5.4: Cultural Heritage - Archaeology**

### 5.3.3 The Methodology of Further Archaeological Work

### 5.3.4 Built Heritage

The following includes a list of nationally and locally listed buildings, located within the Study Area (to be used with plans 92114/99 to 104, Appendix 3). Of those in the Study Area, buildings in close proximity to the alignment of the scheme proposals are marked with an asterisk

Description and Location    **Grade**

#### *Dean Lane*

1	Surrey Iron Railway Bridge (partly buried) 1803	Locally
2	Dean Farm (17c.)	11
3	Barn 60-yards N.E. of Dean Farm (e.19c.)	11
4	Stable S. of barn and 100 yds east from Dean Farm (e. 19c.)	11

#### *Harps Oak Lane*

5	Hoath Farm House (17c.)	11
6	Barn to N.E. of Hoath Farm House (17c.)	11
7	Granary to N.E. of Hoath Farm House (18c.)	11

#### *A23 London Road*

8	Harp's Oak (18c.)	11
9	Weighbridge Cottage (1803 Surrey Iron Railway)	11
10	Surrey Iron Railway Bridge	Locally
11	Railway Alignment Tower E. of M23 (1823)	Locally
12	No. 170 (Foxshaw) (17c.)	11
13	Barn at rear of Foxshaw (18c. Merstham stone)	11
14	Surrey Iron Railway Bridge (1803) north of 'Downlands'	Locally

Only one listed structure would be in close proximity to any of the scheme proposals. The brick arched bridge that was originally part of the old Surrey Iron Railway is situated in the vicinity of the Dean Lane junction, approximately 50 m to the east of the A23 southbound carriageway on Dean Lane. The railway at this point was situated in a cutting at this location but is now backfilled. The structure would not be materially affected by the 'on line' Dean Lane junction improvement proposals (options 2, 3, 4, and 9).

### 5.3.3 Assessment of Impacts and Effects

The further background research undertaken for this stage 2 assessment has not in fact significantly added to or altered the conclusion in this regard arrived at, following the Stage I assessment. These are, therefore, quoted unchanged from that report.

A number of archaeological sites have been identified within or in the immediate area of the proposed A23/M23 improvements at Hooley. The Neolithic maceheads (SMR no 1025) were found about 250 m distant from the area. One of them was unfinished which suggests that they derive from a nearby settlement: there is, presently, no reason to suppose that this lay north, in the direction of the study area, but the possibility needs further assessment. A Neolithic settlement would be of very high importance.

The possible barrow (SMR no 1067) lies in an area that may be affected by the proposals. Such a monument might, in principle, be of Bronze Age or Anglo Saxon date, and would in either case be a significant discovery in local and national terms.

The Roman coin (SMR no 3782) is an isolated find and, it would seem most probable, represents a casual loss rather than being an indicator of nearby settlement.

The remains of the Surrey Iron Railway (SMR nos 3620 and 3745) are earthworks upon which a very high value must be placed because of their significance to industrial history.

It may be suggested that there are, essentially three archaeological issues which arise with regard to these proposals. These are discussed in turn below, but it is important to note, at this stage, that there are a number of possible options (not all of them seen by us) for the improvement, and they are expressed in terms of principles which can be applied to each of the options.

- 1 SMR no 3745 is a Scheduled Ancient Monument. There is a strong presumption against any works which will directly affect its integrity. Such work would require Scheduled Monument Consent. In principle SMC may also be required for work affecting the setting of an Ancient Monument, as will be the case here. Because of its present location, adjacent to the M23 embankment, it seems unlikely that the proposed works could be regarded as having a significantly adverse effect on the setting. SMC is issued by the Department of National Heritage, having regard to the advice of English Heritage. Whether or not the monument is to be directly affected by works, it is recommended that the issue is discussed on site with English Heritage at the earliest opportunity in order to obtain their point of view.
- 2 SMR no 1067 refers to a sizeable field, most of which falls within the improvement area, but which has already been damaged or disturbed to some degree. Nevertheless, the field should be subject to field evaluation, preferably before a final decision on options is taken. This is to allow the possibility of preservation in situ in the (perhaps unlikely) event that suitable archaeological features are identified. Such evaluation should consist of geophysical survey followed by trial trenching.
- 3 The remaining areas affected by the improvements, excluding those identified in section 6 as useless for further archaeological work, have some, although not a high, archaeological potential for the reasons indicated in section 7. In essence this means areas I, J and K (Figure 5.4) and these should be subject to trial trench evaluation where affected by the proposals. Areas B, C and G are marginal for this purpose (because of their limited extent and/or current condition) and may be appropriately covered by a watching brief.

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In the case of 2 and 3 the evaluation could be limited, in the first instance to areas affected by the preferred option. If these show little or no archaeological evidence, or only material that can be dealt with by Preservation by Record, then further evaluation will be unnecessary. If, however, material requiring Preservation in situ is identified then clearly the areas of alternative route options will need to be evaluated.

There is little or no further archaeological work that will need to be done with regard to 1. The issue is simply one of establishing, in consultation with English Heritage, what works, and under what conditions, are likely to gain Scheduled Monument Consent.

**Cultural Heritage**

Several other buildings, although not located very near to any of the scheme proposals, may be affected by some visual intrusion, although the wider visual setting of most of them would have been changed by the construction of the M23 embankment and A23 link roads. These include:

- 5 Hoath Farm House (17c.) on Harps Oak Lane
- 6 Barn to N.E. of Hoath Farm House (17c.) as above
- 9 Weighbridge Cottage (1803 Surrey Iron Railway) on A23 London Road
- 10 Surrey Iron Railway Bridge (1803) on A23 between 131 and 133 Brighton Road
- 12 No. 170 (Foxshaw) (17c.) on A23 London Road
- 14 Surrey Iron Railway Bridge on A23 London Road north of 'Downlands'

SOURCE DOCUMENTS: Reigate and Banstead Borough Council - Listed. of Buildings of Architectural and Historic Interest, Second Edition May 1994.

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## 5.4 Disruption due to Construction

### 5.4.1 Introduction and Methodology

Disruption due to construction, would be of limited duration. The baseline condition is one of no construction and no disruption. However, it should be borne in mind that, in the absence of the proposed link roads, the process of responding to accidents at the Dean Lane junction results in disruption to local traffic.

#### *Environmental Disruption*

This is a temporary impact, but one which may be significant, for example, a survey by TRRL showed that 58% of people living within 50 m of construction works had either complained or felt like complaining (TRRL SU 562, 1980). This means that it is essential that measures are taken to minimise any disruption associated with the construction of the link roads.

Localised increases in noise, dust and vibration can be experienced by the community, as well as a loss of amenity caused by the presence of construction traffic. The environment can also be affected, for example, due to excavation works resulting in an increase in air borne dust.

Levels of nuisance relating to dust, noise and vibration are related to the proximity of construction works (TRRL, 1980 and DMRB Vol 11), with residences further than 100 m away from construction work not experiencing significant disturbance.

### 5.4.2 Baseline Conditions

The table below shows the number of dwellings and their proximity to construction work.

Site	up to 50 m from site	From 50 m to 100 m from site	Total up to 100 m
	16	18	34

**TABLE 5.4.1** Number of dwellings within 100 m of proposed works

This shows residential areas near the A23 northbound to be potentially sensitive.

### 5.4.3 Assessment of Impacts and Effects

Measures can be taken to minimise potential construction disruption - for example, by careful scheduling of the construction work, bunding to ensure contaminants do not reach groundwater, water spraying in dry weather to minimise dust.

The balance between cut and fill is also important. Most of the works involve forming new cutting slopes. Removal of this material will increase traffic on the A23. Fill material is also to be removed. Haulage vehicles would use the A23 and M23 to cart to tip.

#### *Health and Safety*

It is not believed that any of the fill deposited within the area poses particular problems in terms of construction. The landfill material is mainly inert building waste, however tests are proposed to determine whether any chemical waste is present. Any such waste will be removed to licensed tips.

#### *Construction and Maintenance/Management*

It is expected that the civil engineering works for the new link roads would be constructed as a single contract.



It is considered that a construction period of approximately 14 weeks would be needed for completion of the Works.

Until additional testing has been completed it will not become clear whether it would be possible to incorporate excavated fill material into the construction of landscaped fill areas. For the time being it has been assumed that this would be the case.

All completed embankment and cutting slopes and other soil surfaces would be covered with a layer of topsoil to ensure rapid establishment of trees, shrubs or grass as proposed.

It would be necessary for the Contractor to make arrangements for the temporary acquisition of land on which to site temporary offices, works compounds and storage areas. These areas would be occupied for the duration of the contract and for an additional period of probably up to one year following completion.

### ***Construction Noise Impact***

Noise from construction operations, while of only a temporary nature, would adversely affect nearby dwellings. It is however likely that construction noise would be masked by traffic noise.

Reigate and Banstead Borough Council has obligations under:

- (i) The Noise Insulation Regulations, which provide for insulation against construction noise. Regulation 5 gives discretionary power to the Authority to provide insulation where certain criteria are met (see Section 4.4).
- (ii) Part III of the Control of Pollution Act 1974, which empowers the Local Authority to impose restrictions limiting construction noise to reasonable levels during various periods of the day and night (see Section 4.4).

The likely noise levels arising from the construction of the earthworks and carriageways are shown in the Noise Impact Plans (Figures ??? and ???) for representative locations.

#### **5.4.4 Mitigation Measures for Construction Noise**

The Local Authority has power under the Control of Pollution Act 1974 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.

These requirements are usually agreed with the Local Authority and specified in the Contract. Site monitoring of noise levels and control of working hours would normally be undertaken by the Resident Engineer, although ultimate control remains with the Borough Council's Environmental Health Officer.

The Contractor is required to use equipment silenced in accordance with BS 5228 Code of Practice for "Noise Control on Construction and Open Sites".

The Authority has discretionary powers under Noise Insulation Regulation 5 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 Regs 3 or 4 for traffic noise.

The criteria previously adopted for schemes within the south east 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 consideration of the representative calculated noise levels shown on the Noise Impact Plans (**Figures ????** and **????**) indicates that few properties are likely to experience construction noise levels exceeding the above criteria.

*OMISSIONS*

## 5.5 Ecology and Nature Conservation

### 5.5.1 Introduction and Methodology

This section assesses the impacts on ecology and nature conservation based on surveys that have been completed to date. Further ecological survey has not been possible because of the timing of the project in relation to the best time to undertake certain surveys. However the information presented has enabled a preliminary mitigation package to be designed which will be reviewed following further survey as detailed below.

The stage one environmental study included a desk study of ecological and nature conservation interest. In general it was limited to an examination of Phase 1 Habitat Survey information. This encompassed the eight options being considered.

An ecological survey has been commissioned by Mott MacDonald Ltd along the line of the preferred route to provide more detailed information and to confirm the findings of the Stage 1 survey this was undertaken by Andrews Ward Associates. Consultation with English Nature will be carried out with regard to the mitigation measures proposed.

The survey <sup>which have</sup> undertaken concluded that further survey will be justified only if there is a probability of finding:-

- species of such importance that the layout of the scheme must be modified,
- species that are legally protected and will require special measures to be taken,
- species for which translocation may be justified (eg orchids).

#### *Plants*

To establish the full range of interest of the area of calcareous plant cover which lies on the proposed line of the road, in order to consider the desirability of translocation to a new location within the complex, further survey would be required in May-June.

If it is envisaged that the scheme design could be influenced by the status and composition of the plant community in the ancient semi-natural woodland, this should be surveyed for the presence of uncommon species in April-May: at the same time, the NVC community type(s) affected and its extent in the wood should be determined so that the loss can be quantified.

#### *Invertebrates*

Although the calcareous area and the adjacent areas (B, C, D) may have invertebrate importance, it is probable that all the species present have good powers of mobility and colonisation and may also be present in areas within the complex which need not be affected or on adjacent land such as the chalk cutting which lies to the east. Therefore, survey is not required if similar habitat to that being removed is created elsewhere on the site. This should be done as soon as possible before works commence, allowing at least one full summer season, and ideally more, to elapse before the existing habitat is removed.

#### *Mammals*

Survey to confirm the absence of badgers is required. March may be the ideal month as vegetation cover is minimal and badgers are active.

Survey for bats will not be necessary unless mature trees are to be removed.

#### *Other species*

No other survey is required.

The environmental assessment studies follow the Design Manual for Roads and Bridges Volume 11, published in 1993. The procedures described in Volume 11, for a Stage 3 assessment have been adopted.

#### *Evaluative Criteria for Assessing the Significance of Effects*

The severity of impacts would be judged on a number of characteristics that would include magnitude, spatial extent, duration and the nature/location of the impact. The significance of effects would be determined by

combining the importance and sensitivity of the ecological resources (as defined in 2.3) with the severity of impact.

Categories of significance of effect are proposed as follows:

- Major - Permanent loss affecting the ability of the site to support internationally important habitats and the related species.
  - Permanent loss of any protected or nationally rare species
  - Permanent loss to those resources within a site of national importance where the presence of those resources were the reasons for the site's designation.
- Moderate- Permanent loss of nationally scarce species through loss of habitat, severance or disturbance.
  - Where an international or national site suffers some damage that compromises the ability of that site to support the habitat or species for which it was notified; but partial or total recovery is likely soon after the cessation of the impact.
  - Where it only affects a small part of the site of national importance and to such a limited extent that the key elements of the ecosystem can continue to function.
  - Permanent loss of high quality SNCI
- Minor - Where a locally designated site suffers some damage that compromises the essential functioning of the habitat or species, but partial or total recovery is likely soon after the cessation of the impact.
  - Where it only affects a small part of the site of local importance and to such a limited extent that the key elements of the ecosystem can continue to function.

#### 5.5.2 Baseline Conditions

There are no nationally or locally designated ecological sites in the area affected by the scheme options or in the wider area. However, there are two areas of woodland designated as Ancient Semi Natural woodland. In addition the trees located in the Surrey Iron Railway cutting are protected by a Tree Preservation Order (TPO).

##### *Plants*

The site as a whole contains a wide range of species, reflecting the varying conditions of substrate, drainage, aspect and time elapsed since the last ground disturbance. No scarce species were found. However, survey in spring would be necessary to establish the full range of species present on the calcareous substrate Area C and in the woodland Area J.

##### *Invertebrates*

The site lacks those features commonly associated with an important invertebrate fauna. There are no scarce habitat types on the site. There are few mature trees, no ancient trees and little standing or fallen decaying or dead timber. Wetland areas are small and probably ephemeral. There were a few small exposed faces of consolidated sandy or chalky soil possibly suitable for solitary bees and wasps; these were searched but no evidence of occupancy was found. Only the area of ancient semi-natural woodland has long historic continuity in the landscape.

However, it is not possible to say with certainty that scarce species are not present. For instance, some of those which require early successional stages are ready colonists of new sites with sparse plant cover and the probability of their occurrence increases in the southern counties including Surrey.

Overall, the Areas B, C and D, with varied and abundant flower production, wind-shelter provided by banks of scrub and bramble and patches of short sward or bare ground are likely to hold a varied invertebrate community which could include some uncommon species.

### **Reptiles**

Habitat conditions are not suitable for rare reptile species but grass snake was noted on a roadside verge in Area H and adder, slow worm and common lizard could be present.

### **Birds**

The area as a whole will hold a range of the common breeding species normally found in woodland canopy and in open scrub. However, breeding occupancy may be constrained by effects of traffic noise and mortality may also be high.

The extensive stands of seed-bearing plants such as docks, thistles, teasel will attract flocks of finches and buntings in late summer and autumn.

### **Mammals**

Rabbits are present throughout the survey area. A range of common small mammal species will be present. Deer (unknown species) are said to occur.

It was not possible to establish with certainty that badgers do not occur. Similarly, there may be bat roosts in the ivy-clad trees on the embankments of the old railway or in the woodland.

### **Habitats**

The boundaries of the distinct habitat areas within the site are shown on **Figure 5.5**. A full list of all plant species noted is given in Volume 2.

#### **Area A – mainly improved grassland**

This was mostly improved grassland with clovers *Trifolium* spp and a small range of common pasture weeds, principally dandelion *Taraxacum officinale*. A small patch of ground adjacent to the road boundary fence was unimproved and unmanaged grassland, reflecting a different ownership, but not separately fenced and therefore subject to some degree of grazing pressure from animals turned out on the improved field.

There were few nectar-producing plants, no areas of bare ground or other features likely to be of importance for invertebrates.

Given the lack of standing water, free-draining landform and the level of grazing pressure, it is highly improbable that any ground-nesting bird species attempt to breed and that the area it will be used for feeding by small numbers of common species only.

The margins are rabbit-grazed and it is possible that the field may be used by foraging badgers but no confirmatory evidence of this was noted.

#### **Area B – ungrazed grassland and scrub**

This consists of the boundary between Area A and London Road and includes an area of rough grassland at the extremity of the overpass line. It held a mixture of planted and self-sown trees including ash *Fraxinus excelsior*, oak *Quercus robur*, hawthorn *Crataegus monogyna*, sycamore *Acer pseudoplatanus*, field maple *Acer campestre*, elm *Ulmus* sp., hybrid poplar *Populus* sp., whitebeam *Sorbus aria*, wild cherry *Prunus avium*, an ornamental cherry variety, hazel *Corylus avellana*, buckthorn *Rhamnus cathartica*, dogwood *Cornus sanguinea* and blackthorn *Prunus spinosa*. There were no mature trees.

Parts of the area were covered by dense thickets of bramble *Rubus fruticosus* agg. and the plant assemblage along the boundary fence and in the rough grassland contained a typical range of species exploiting disturbed ground. No uncommon species were present. However, there were a small number of dry spikes of an unidentified orchid.

The range of nectar-bearing plants, combined with the rough, ungrazed ground layer vegetation, potentially provide good conditions for a range of invertebrates including bumblebees and some common butterflies.

The habitat is suitable for feeding and breeding by a range of commoner songbird species and the rough grassland will provide a small patch of hunting habitat for kestrel and possibly for owls.

The trees are too small to provide roost sites for bats and there was no evidence of recent use by badgers, though a possible former sett was located. A range of common small mammals will be present.

*Area C – calcareous grassland*

This is a small area on the north side of the London Road overpass bridge, holding a calcareous grassland flora on compacted chalk substrate. Plants included yellow-wort *Blackstonia perfoliata*, blue fleabane *Erigeron acer*, wild thyme *Thymus polytricus*, marjoram *Oreganum vulgare*, spotted cat's-ear *Hypochaeris maculata*, pale St John's-wort *Hypericum montanum* and wild parsnip *Pastinaca sativa*, as well as dried spikes of unidentified orchids.

The area held nest mounds of meadow ants (*Lasius* sp.) which may attract feeding green woodpeckers but it is unlikely to have other ornithological interest. It probably has low value for mammals, due to the absence of cover and limited food resources.

*Area D – main section of unused highway and margins*

This embraced the margins of the unused road section, including mounds of tipped spoil, south of the London Road overpass bridge and outside the fences delimiting the tops of the embankments of the adjoining roads

Much of the area was overgrown by scrub and bramble thickets with abundant goat's-rue *Galega officinalis* and garden escapes including *Buddleia davidii* and evening-primrose *Oenothera* sp. Small pockets of impeded drainage held bulrush *Typha latifolia*, giant horsetail *Equisetum telmateia*, soft rush *Juncus effusus*, hard rush *J. inflexus* and jointed rush *J. articulatus*. A pool formed by rainfall on a concrete surface held a small patch of stonewort *Chara* sp.

The varied and abundant flower production, wind-shelter provided by banks of scrub and bramble and patches of short sward or bare ground make this area likely to hold a varied invertebrate community which could include some uncommon species but there are no features that might indicate the probable occurrence of rare species.

The scrub and bramble patches will hold an assemblage of common songbird and small mammal species.

*Area E – ironstone railway cutting*

The old Surrey ironstone railway cutting carries mature timber on the cutting sides and is mostly shaded by the over-arching tree canopy. Stretches have recently been cleared of fallen timber and here the ground layer has been temporarily obliterated. Elsewhere, the vegetation was dominated by dense, tall stands of stinging nettles *Urtica dioica* with occasional clumps of elder *Sambucus niger*. Male fern *Dryopteris filix-mas* and dog's-mercury *Mercurialis perennis* were present but the ground layer plant community appeared to be very restricted. It is possible that survey in spring would detect a wider range of woodland flora.

The recent clearance of fallen timber will have destroyed the habitat element most likely to have been of importance for mosses, fungi and saproxylic invertebrates.

The bird assemblage will comprise those common and widespread species which are found in all small woodlands. The limited shrub and ground layers will tend to exclude most of those species which nest and/or feed at this level and the bulk of the assemblage is likely to consist of cavity and canopy-nesters such as titmice and corvids.

The mature trees could hold bat roosts but many were heavily ivied, making survey for signs of occupied holes or cavities impossible. However, there are no mature trees suitable for bats at the point where it is proposed to cross the embankment with a new road.

An attempt was made to survey for evidence of badgers but it was not possible to make an exhaustive search due to the dense nettle cover and the steep and slippery conditions of the embankments. All excavations found could be attributed to rabbits.

*Area F - vineyard*

This is a vineyard, its botanical interest being restricted to a limited range of common plants of disturbed ground, all of which were also present elsewhere in the survey area.

*Area G – neglected pasture*

Possibly ground worked at the time of road construction and then reseeded but now unmanaged with extensive stands of ragwort *Senecio jacobea*, spear thistle *Cirsium vulgare* and docks *Rumex* spp. interspersed with patches of low-growing ruderals including scarlet pimpernel *Anagallis arvensis* and field forget-me-not *Myosotis arvensis*. This suggests severe overgrazing by horses and rabbits.

The botanical interest of this area was low and it is probably also of limited value for invertebrates but it will have value as a late-summer and autumn feeding area for finches and buntings as well as providing hunting habitat for kestrel and owls. It could be used for foraging by badgers but rabbits were the only mammals noted.

*Area H – highway verges and embankment*

The existing roadside verges and embankments carried a typical assemblage of planted and self-sown trees and shrubs also present elsewhere on the site, with a grassy understorey. Where ground had been disturbed or not top-soiled, there was a more varied flora with species including purple toadflax *Linaria purpurea*, barren strawberry *Potentilla sterilis*, sorrel *Rumex acetosa*, prickly sow-thistle *Sonchus asper* and perennial sow-thistle *S. arvensis*.

Use by birds will be restricted to the common songbird species plus road-margin scavengers. There were some open patches that may be used by kestrel.

There was no evidence of occupancy or use by badgers. None of the trees was of a size to provide roosts sites for bats.

*Area J – ancient semi-natural woodland*

This was the margin of the ancient semi-natural woodland block. Predominantly ash, with some oak, hawthorn, hazel and spindle *Euonymus europaeus*, sycamore and elm. There were also some larch *Larix* sp. which will have been planted. Ivy *Hedera helix* formed much of the ground cover. An effective plant survey was not possible due to the time of year at which this survey was carried out.

LEGEND:-

- A IMPROVED GRASSLAND
- B UNGRAZED GRASSLAND + SCHEM
- C CALCAREOUS GRASSLAND
- D UNUSED HIGHWAY + MARGINS
- E BRANSTONE RAILWAY CUTTING
- F VINEYARD
- G NEGLECTED PASTURE
- H HIGHWAY VERGES + EMBANKMENTS
- I ANCIENT SEMI NATURAL WOODLAND
- BOUNDARY OF SURVEY



**Mott MacDonald**

Mott MacDonald Limited  
 Dermeter House  
 Station Road  
 Cambridge CB1 2PS  
 Telephone 01223 460660  
 Fax 01223 461017  
 Telex 617260 MMP G

Title  
**A23/M23 HOOLEY JUNCTION  
 IMPROVEMENTS  
 ECOLOGY**

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5.5.3 Analysis of Impacts and Effects

This section analyses each habitat and species group in the light of the impacts and effects defined in the previous sections, highlighting where appropriate the mitigation measures which have been applied, in order to define the final level of impact and magnitude of effect. These effects take into account the mitigation measures, and the level of their significance is given in the text.

**Habitats and Plants**

The range of potential impacts and effects on habitats and plants is summarised at Table 5.5.1 as a basis for identifying likely temporary and permanent effects and evaluating their significance.

**TABLE 5.5.1: Check-list of Potential Impacts and Effects on Habitats and Plants**

Potential impacts	None	Temporary	Permanent
Damage to or loss of habitats	-	*	*
Severance/fragmentation of habitat	*	-	-
Dust and air pollution	-	*	-
Noise and vibration	*	-	-
Visual disturbance	*	-	-
Nitrogen deposition	-	*	*
Disruption to local hydrology	-	-	*
Pollution of watercourses by spillage	-	*	-
Pollution of watercourses by de-icing and particulates	-	-	*
Lighting	*	-	-
Mortality due to vehicles	*	-	-
Spoil disposal	*	-	-

During the construction phase, land in the construction corridor would be subject to impacts including soil compaction by vehicles, loss of vegetation cover due to the passage of vehicles or humans and to shading by temporary structures or deposit of materials. Measures would be taken to minimise the physical extent of impacts on adjacent plant communities. The construction corridor width adjacent to the semi-natural ancient woodland would be restricted to the width of the final road corridor.

Accidental spillages of pollutants during construction may affect vegetation in the corridor or possibly in watercourses outside it. However, construction would be carried out under a strict code of practice, agreed in advance with the Environment Agency, to minimise the likelihood of this happening.

Dust deposition on land during construction is predicted to be minor, as contract conditions would include wetting down of haul roads and other areas during periods of dry weather, and speed limit controls.

Adverse effects resulting from the construction phase are therefore predicted to be minor. The principal direct effect is loss of land taken for the new road. The extent of loss of calcareous grassland is .....ha. However an area of approximately 2500 m<sup>2</sup> will be created as part of the mitigation. In addition .....ha of ancient semi-natural woodland would be lost. This would be at the edge of the woods and the effect would be minor.

After mitigation, it is predicted that there will be no adverse effects on ecological resources resulting from landtake.

**Invertebrates**

The site lacks the features typically indicative of an important invertebrate fauna including nationally rare species. However, those parts of the site with varied and abundant flower production, wind-shelter provided by banks of scrub and bramble and patches of short sward or bare ground are likely to hold a varied invertebrate community which could include some uncommon species.

Construction activity would be confined to the corridor and there would be no significant impacts outside it. Dust from the works would be controlled by specific measures, so any deposition would be a short-lived impact and its effect would not be significant. Within the corridor, a small amount of habitat would be disrupted and destroyed and this would effect dependent species. The measures proposed for adjacent habitat creation would aim to re-create the pre-existing conditions so that there is no permanent effect.

The effects on invertebrates are therefore predicted to be minor.

#### ***Reptiles***

From the survey information, no important species are present in the road corridor, and there is no evidence that any migration or dispersal corridors would be severed by the new road.

#### ***Birds***

During the construction of the road, there would be a short-term impact due to the use of land within the construction corridor. In addition, disturbance due to human presence and noise may extend beyond the construction corridor. The extent of disturbance cannot be precisely defined for several reasons. Different species have different tolerances: tolerance can increase with habituation and may do so under changing conditions, eg food scarcity. The nature and intensity of disturbance may vary through the construction period. However, though there may be short-term impacts on breeding within and near the construction corridor, resulting in reduced breeding production, any such losses would be minor and the impacts associated with the construction phase are predicted to have no long-term effect on overall population sizes.

#### ***Mammals***

No important species were found to be present in the road corridor or in the vicinity of the road.

It was not possible to establish with certainty that badgers do not occur. However the site is essentially an enormous traffic island and the scheme will not really alter the likelihood of mortality. Similarly, there may be bat roosts in the ivy-clad trees on the embankments of the old railway or in the woodland. However no mature trees are to be felled.

### 5.5.4 Mitigation Measures

The mitigation measures have been designed to limit as far as possible any adverse effects of the scheme in terms of habitat loss and disturbance to flora and fauna and indirect damage to valuable habitats outside the highway boundary. Mitigations have been based on current information and assume that

- survey of the calcareous grassland reveals an interesting assemblage of plants and it is considered desirable to transplant
- no badgers are found on the site
- that the habitat lost from the ancient semi-natural woodland will be slight.

#### ***Enhancement and Creation of Verge Habitats***

The verges, embankments and cutting slopes would be sown with a non invasive low maintenance seed mix, the composition and density of which would be agreed with English Nature as part of the detailed design. The objective would be to create a non-competitive environment whereby indigenous species could colonise. The existing topsoil within the landtake would be stripped, stored and respread in the locations from where it came.

The calcareous flora located on the unused motorway just north of the A23 northbound carriageway would be transferred to the new cutting of the proposed loop. If this itself is in a chalk substrate, then minimal ground preparation will be required. But if it is composed of a non-chalky medium, then it will be necessary to cut back the cutting slope and create a layer of consolidated chalk about 0.3 m deep over the top third of the slope (ie where it will not receive run off). Surface material will be stripped from the best plant area, moved and spread on the receptor site. This will be done outside the growing season, ideally in early March to minimise the tendency for soil and plant propagules to be washed down the slope by precipitation before germination and rooting takes place. The shallower the cutting slope, the less this will be a problem.

The volumes of material to be moved (I think) will be approximately 500 cu.m. which spread about 0.2 m deep would cover 2500 m<sup>2</sup>. The new area would therefore be a strip along the top of one side of the cutting.

***Protection of the Semi-natural Ancient Woodland***

Where trees and the woodland edge is lost adjacent to the road a dense hedge or belt of shrubs or coppice cover would be planted. This would reduce the effect traffic noise on breeding songbirds.

***Protection Against Damage During Construction***

Stringent contract requirements would be applied in relation to safeguarding areas of ecological significance, in particular pollution to watercourses, controlling dust and limitation to work areas to minimise potential adverse impacts on existing adjacent habitats. Additional measures would also include temporary protective fencing in advance of the construction works, preventing accidental damage from construction plant. A detailed Schedule of Understanding would be prepared with the Environment Agency, defining a code of practice for the Contractor (eg provision of bunding around fuel storage areas, provision of silt traps on drainage from wheel washing facilities etc), and providing for regular monitoring of water quality throughout the contract period. Further discussion of Disruption due to Construction is included in the chapter in Volume 1 of the Environmental Statement.

***Creation of areas for invertebrates***

Area G currently has limited value for wildlife. The area will be developed into good invertebrate habitat by the creation of a series of south facing earth banks about 1 m high constructed from low fertility material. Limited scrub and tree planting around the margins will increase wind shelter.

## 5.6 Landscape Effects

### 5.6.1 Introduction and Methodology

This section assesses the existing landscape and the predicted impact and effect of the proposed scheme on it. It is divided into two parts:

- Part 1 assesses the landscape character and quality of the landscape generally; identifies the scheme proposals; examines mitigation proposals and assesses the overall impact of the proposals.
- Part 2 assesses the level of visual impact of the route experienced from properties, footpaths and sensitive land uses within the study area.

### 5.6.2 PART 1 - Landscape Character and Quality: Methodology

Initial survey work was undertaken by Surrey County Council in 1995 as part of the Stage 1 assessment. These were used as baseline conditions which were further refined and developed with additional survey work undertaken in November 1997 by Mott MacDonald. The assessment was undertaken in accordance with guidelines laid down in the Highways Agency's Design Manual for Roads and Bridges, Volume 11, Part 5, Section 3 Environmental Assessment.

The assessment involved site survey to ascertain any changes to the baseline conditions identified in Stage 1, including physical, man-made and biological features which add to or detract from the landscape. This information, along with additional information obtained from Surrey County Council was evaluated to ascertain the importance of the features within the landscape. The area was then assessed for quality using a five point scale as follows:

Value class	Quality of the landscape
1	Highest quality landscape
2	Very attractive landscape
3	Good landscape
4	Ordinary landscape
5	Poor landscape

Most of the study area is deemed to be Highest Quality Landscape and is designated accordingly although the road corridor itself is less attractive.

The study area for the landscape assessment and for the visual impact assessment was broadly defined by the extent of the visual envelope.

### 5.6.3 Landscape Character and Quality

Landscape designations are shown on **Figure 5.6**. The area is designated as part of the Surrey Hills Area of Outstanding Natural Beauty (AONB). Part of the area is also designated as an Area of Great Landscape Value in the local authority plan. The un-used section of the M23 motorway is designated as a damaged landscape?

Two tree groups located between the A23 and the M23 along the line of the former Surrey Iron Railway are covered by Tree Preservation Orders. There are also two areas of Ancient Woodland at Fox Shaw and Cold Roast.

A detailed assessment of the major components of the immediate landscape adjoining the scheme is shown on **Figure 5.7** with photographic illustrations on **Figures 5.8 and 5.9**.

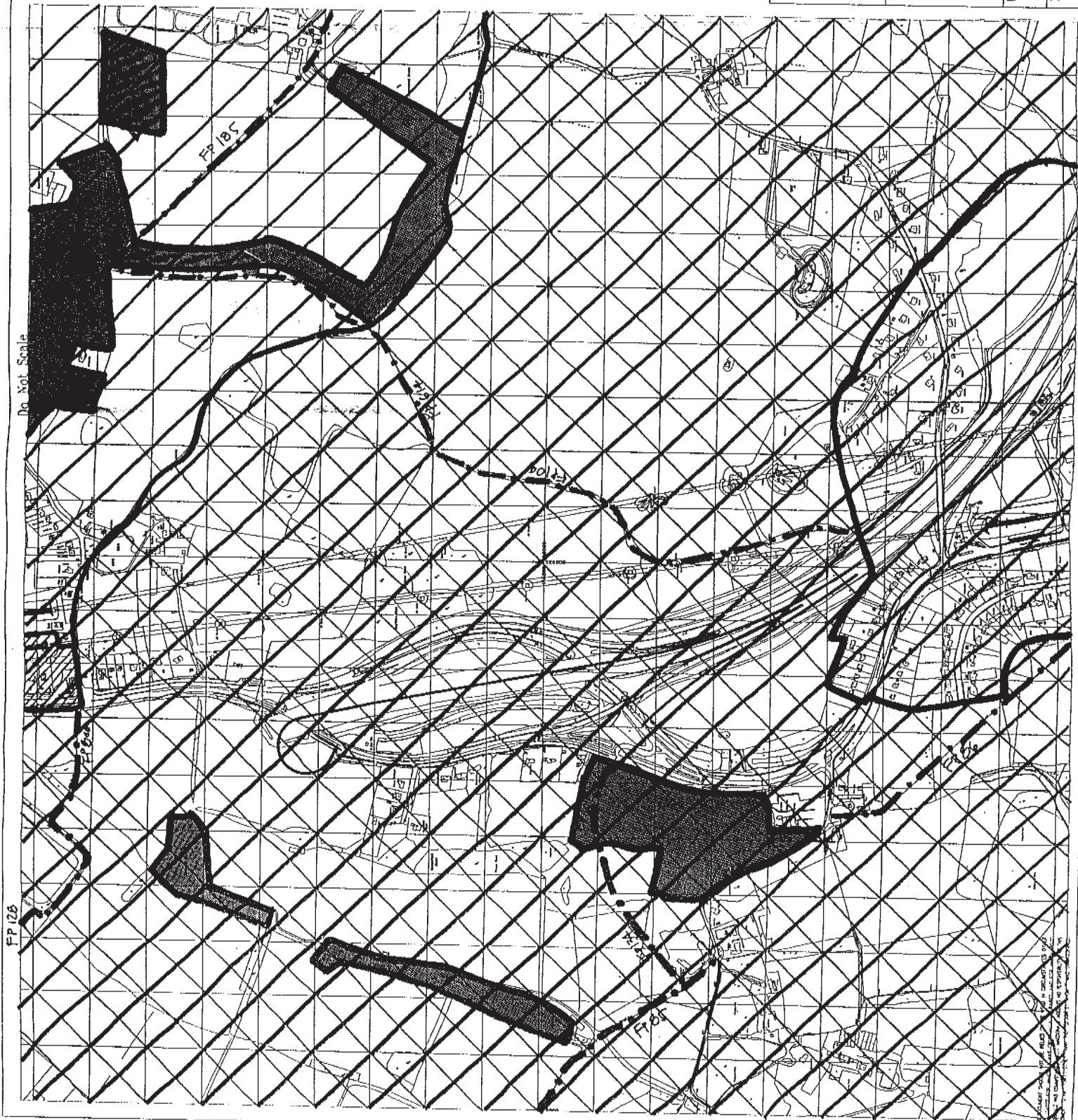
The landscape as a whole is very attractive. Undulating topography, small to medium sized fields and thick hedgerows, woodlands and copses contribute to the sense of enclosure. However there are also good views across the valley. The area is sub-urban with a mix of well established properties with mature gardens set in predominantly pastoral countryside. Features of note include the brick air-vents located along the eastern side of the valley that define the line of the London to Brighton railway line which is in a tunnel through this area.

The Surrey Iron Railway cutting is located along the bottom of the valley. Both the air-vents and the railway cutting are framed with mature trees.

The valley bottom in particular supports the transportation corridor. Close to Hooley the valley appears to be narrow and the busy A23 dual carriageway is very dominant. The service roads and parking area parallel to the road increase the width of the road contributing to the character which is further degraded by the road noise and general business. However once above the floor of the valley on Dean Lane or the public footpath the road, all but the noise, is left behind.

At the A23/M23 junction the road landscape is large scale particularly in plan. However the banks of the unused motorway section which are well vegetated give some relief on the ground. This landscape was not designed for the pedestrian and the lack of pavements and wide bridge under the motorway emphasise this. The few mature trees are particularly important.






The unused section of the M23 motorway is a degraded landscape created when the M23 was constructed. Whilst trees have vegetated the slopes of the embankment, the top of the bank is derelict with mounding, accumulated water owing to poor drainage and general rubbish.



Do Not Scale

FP 126

LEGEND :-

-  AREA OF OUTSTANDING NATURAL BEAUTY (AONB)
-  AREA OF GREAT LANDSCAPE VALUE (AGLV)
-  ANCIENT WOODLAND
-  PUBLIC FOOTPATH
-  URBAN AREA

GREEN BELT COVERS EXTENT OF MAP EXCEPT FOR URBAN AREA.



**M** Mott MacDonald

Mott MacDonald Limited  
 Bemeter House  
 Station Road  
 Cambridge CB1 2TS  
 Telephone 01223 460350  
 Fax 01223 461007  
 Telex 817260 MNP G

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Date	Drawn	Checked	Approved	Status
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**Figure 5.7: Landscape Effects - Landscape Components**

**Figure 5.8: Landscape Effects - Photographic Illustrations**



**Figure 5.9: Landscape Effects - Photographic Illustrations.**

#### 5.6.4 Landscape Character and Quality: Assessment of Impacts and Effects

The proposed scheme has been assessed in terms of impacts on existing features and landscape character and quality as described in Section 5.6.2. The mitigation measures described in Section 6.5.4 have been designed to reduce the impacts described below.

The following significance criteria were applied to assess the effects that the scheme would have on landscape character and quality, taking into consideration the various mitigation measures proposed.

- (i) Slight Adverse/Benefit: Effects would be small and localised.
- (ii) Moderate Adverse/Benefit: Effects would be distinct and generally noticeable.
- (iii) Substantial Adverse/Benefit: Effects would be very conspicuous and dominant over a large area
- (iv) No Change: No change to the present condition.

#### *Outline of Scheme Proposals and Mitigation Measures*

##### *Impacts during Construction*

There would be short term localised impacts on landscape character during the construction process, which are likely to last for approximately years. The location of construction compounds and storage areas outside the road corridor are not yet defined and would be subject to planning procedures with the local authority. However, the presence of such compounds would have a slight adverse effect on landscape character in localised areas. The presence of active construction plant and operations such as earthmoving and bridge construction would also have a slight adverse effect on landscape quality in the short term. Overall, construction effects are not considered significant owing to the temporary nature of the effects which are short term only.

##### *Assessment of Effects on the Area*

The topography of the area and the fact that existing structures are to be utilised means that effects are generally restricted to the existing corridor and effects on the wider landscape are avoided.

Given that the new road infrastructure will be located adjacent to the existing A23 and M23, and that on the whole little existing vegetation will be lost, the presence of this road with its tree and shrub planting will in the long term have a neutral effect.

The unused section of the M23 motorway is currently a degraded landscape. The proposals would retain the best aspects of this structure (ie the vegetated slopes) and would restore the other areas with planting and grass verges. The effects of the scheme would therefore initially be moderately beneficial in the long term when the new planting has matured.

The extension of the Glebe road service road would result in the loss of some trees from the edge of Fox Shaw wood but also from the central reservation. Here the road is narrow and enclosed and the loss of these trees would open up the view in the general direction of the A23/M23 junction, and increase the width of the road visually. The area is little used by pedestrians other than residents of the adjacent houses, and the trees would be replaced. The short term impacts would therefore be moderate reducing to slight in the long term as the new planting matures.

### *Comparison of Year 1 and Year 15 Effects*

Extensive planting is proposed around the new slip roads and the interchange link. By year 15 this will have matured and the new road structures will blend into already well wooded landscape.

### *Night-time Effects*

Although the new slip roads and interchange links will be fully lit, much of the existing road infrastructure at the A23/M23 junction is already lit. This extends to the east and west of the newly lit sections and also to the north (ie Hooley) and to the south (ie Merstham). The addition of the new proposals will therefore not be significant.

### *Summary*

#### 5.6.5 Part 2 Visual Impact: Methodology

The Visual Impact Assessment was undertaken according to the procedures laid down in the Department of Transport's 'Design Manual for Roads and Bridges, Volume 11 Environmental Assessment'. The assessment methodology concentrates on the effects on views from residential properties but affected footpaths and amenities have also been included. The results of the visual impact are provided in detail in the visual impact schedules (VIS) in Volume 2 supported by drawings and photographs (Figures ? to ?).

The terms used to describe the differing degrees of visual impact are:

Substantial:	Significant deterioration (or improvement) to the existing view
Moderate:	Noticeable deterioration (or improvement) to the existing view
Slight:	Barely perceptible deterioration (or improvement) to the existing view
No change:	No discernible deterioration (or improvement) to the existing view.

The assessment was undertaken in clear weather during December 1997. It was carried out on site by walking roads and footpaths to gain vantage points of the study area.

An assessment of the visual impact of the proposals during the winter following opening undertaken as a worst case scenario. In addition the impact of the road alignment 15 years after opening in summer with all mitigation measures in place and screen vegetation established.

Each building, footpath and public amenity has been identified and the impact assessed. The information contained within the schedule consists of:

- reference number of property;
- location address of property;
- type of building;
- context - urban/rural etc;
- measurement of distance from centre line of the road and/or bridge;
- Visual impact assessment for the winter year 1 scenario and summer year 15. The visual impact is defined for each location with the letter 'a' for adverse impacts, 'b' for beneficial, 'Nc' for no discernible change in conditions. These are located in columns of level of impact: Nc for no change; Sl for slight; M for moderate or Sb for substantial. (Nc is inserted in the 'slight' column in the schedules for simplicity.)
- Finally a brief description of key features relating to the location which affect the level of impact is included in the last column of the schedule.

5.6.6 Assessment of Impacts and Effects

In total ?? properties and 3 footpaths were assessed. These experienced a range of impacts which are detailed in the visual impact schedules in Volume 2. An approximate visual envelope for the proposed development has been prepared and this is shown on **Figure ???**.

**Impact of Road Alignment**

The main areas visually affected by the road are:

- properties at the edge of Merstham
- properties along London Road North
- properties on the edge of Hooley

The cutting that would accommodate the interchange loop would initially be visible as would the new cutting for the M23 northbound slip road. In particular these scars would be visible from the eastern side of the valley, and in particular the latter would be visible from footpath 100. Short term impacts would be moderate owing to the cutting being in a chalk substrate. Long term impacts, however would be slight owing to partial screening from tree and shrub planting which would blend the infrastructure into the existing wooded landscape, and given that many existing views already look onto the major A23/M23 junction.

In general the impact on properties will be slight as many already look out onto a major road network.

Properties along London Road North between Dean Lane and the new loop road will have views of the traffic using the currently unused section of the M23. Many of these views will be distant (greater than 100 m) whilst existing views are about 40 m away. The situation will be similar for properties along the London Road North between Glebe Road and the current A23/M23 merge.

Properties on the edge of Merstham may experience slight adverse effects from the proposals in particular the new slip road cutting. Properties on the edge of Hooley will also have distant views particularly those properties on the eastern side of the valley.

**TABLE 5.6.1: Summary of Visual Impact of Road Alignment**

	Impact in winter year of opening						Impact in summer year 15							
	Nc	Slight		Moderate		Substantial		Nc	Slight		Moderate		Substantial	
		a	b	a	b	a	b		a	b	a	b		
<b>PROPERTIES</b>														
House														
Commercial			1											
<b>OTHERS</b>														
Footpaths	1													
<b>TOTAL</b>														

**Night-time Effects**

The new slip roads and interchange links will be fully lit, however much of the existing road infrastructure at the A23/M23 junction and associated roads are already lit and therefore there will be no additional impacts associated with lighting.

**Visual Impact Summary**

LEGEND :-



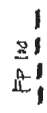
AREAS OF SIGNIFICANT WOODLAND



BOUNDARY OF VISUAL ENVELOPE



EDGE LINES



FOOTPATHS



**M** Mott MacDonald

Mott MacDonald Limited  
Demeter House  
Station Road  
Cambridge CB1 2ES



Telephone 01223 460660  
Fax 01223 461007  
Telex 817290 MAMP C

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**A23/M23 HOLLEY JUNCTION IMPROVEMENTS**

**LANDSCAPE VISUAL ENVELOPE**

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Drawing	Scale	Rev.

Figure 5.10

5.6.7 Conclusion

## 5.7 Land Use and Agriculture

### 5.7.1 Introduction and Methodology

The assessment was conducted in accordance with the Design Manual for Roads and Bridges Volume 11 'Environmental Assessment' Section C3, part 6. The four main topics covered in the assessment of the effects on land use are as follows:

- demolition of private property and associated land use
- loss of land used by the community
- effects on development land;
- effects on agricultural land.

An assessment of the effects of the scheme has been carried out, and where possible, effects are quantified and assessed in the wider context to evaluate the degree to which they may be deemed 'significant'.

Data was collected from published data and route plans as follows:

- Route proposals
- Published data: including land quality maps, Ordnance Survey maps and other relevant data
- Consultation: with local authority

The methods of assessment for the four main topics can be summarised as follows:

### 5.7.2 Land Ownership and Tenure

### 5.7.3 Baseline Conditions

The land uses have been categorised into the following groups (see **Figure 5.12**):

- highway land
- open/agricultural land
- woodland areas
- residential
- industrial/commercial

A substantial proportion of the land is in highway use. These areas include cuttings, embankments and other features such as verges. There are large areas of this type of land use particularly in the vicinity of the motorway junction and the unused section of the M23.

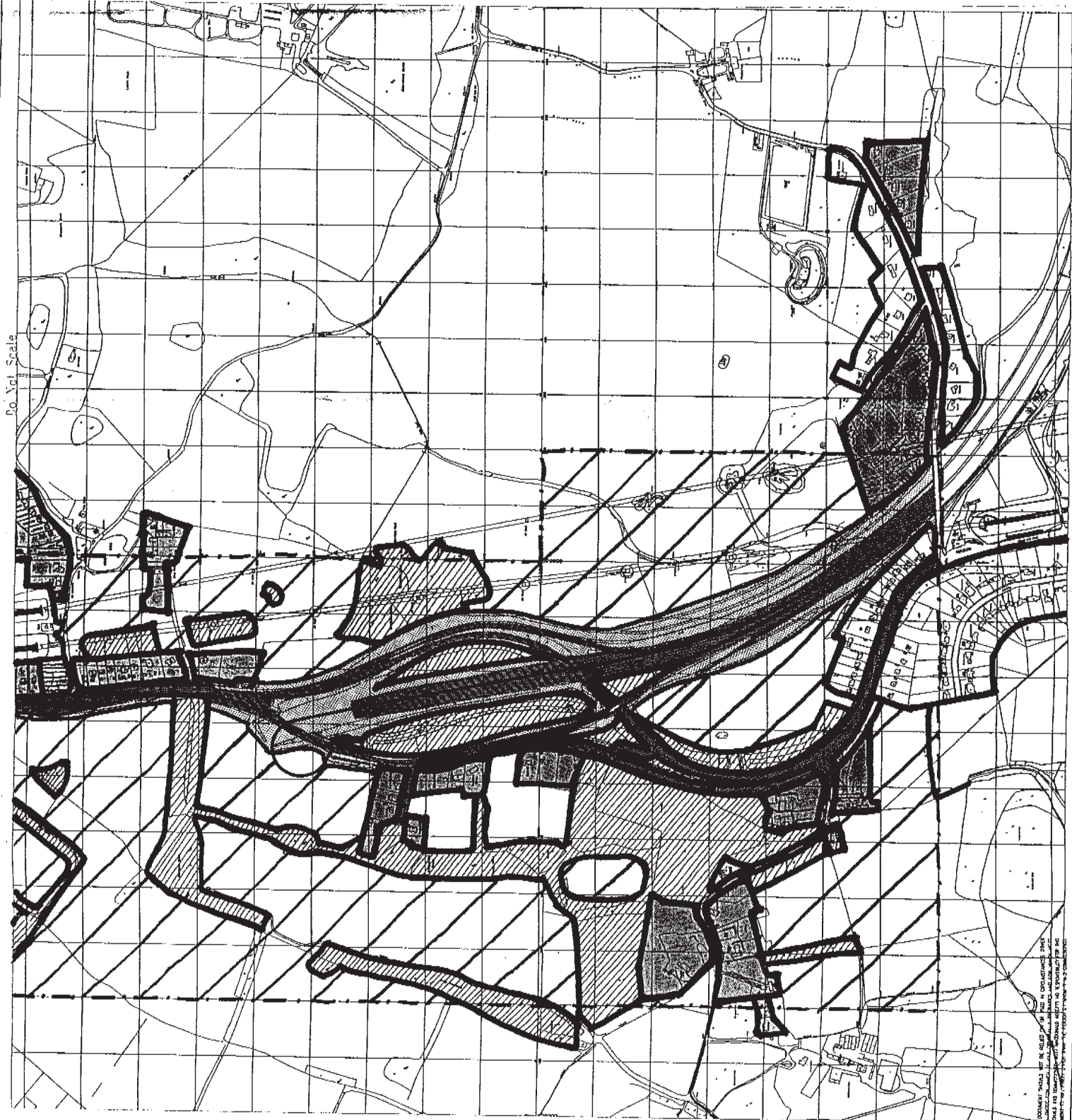
Much of the land adjacent to the A23/M23 junction is agricultural land used as pasture. The agricultural land in the area has been classified by MAFF as Grades 3 and 4. Other land is classified as either 'other land primarily in non-agricultural use' or 'land predominantly in urban use'.

Field boundaries are often demarcated by hedgerows and by the areas of woodland. Two areas have been identified as ancient woodland (at Coldroast Shaw and Harps Wood). Two narrow bands of woodland in the cutting of the Surrey Iron Railway are protected by Tree Preservation Orders (TPO).

There are residential properties along the route of the A23 to the north and south of the Dean Lane junction, and south of the Harps Oak Lane junction. There are more residential properties to the north of Dean Lane and along the route of the northbound carriageway from Glebe Road south to the existing A23 link road. A number of farmsteads are located off Dean Lane and Harps Oak Lane. Properties are generally substantial detached houses, often with large gardens some of which are densely wooded.







The only industrial or commercial property is the Happy Eater Restaurant on the A23, at the junction with Dean Lane.

### 5.7.4 Assessment of Impacts and Effects



Do Not Scale

LEGEND :-

-  SIGNIFICANT AREAS OF WOODLAND OR SCRUB
-  INDUSTRIAL / COMMERCIAL
-  RESIDENTIAL
-  OPEN / AGRICULTURAL LAND
-  EARTHWORKS
-  HIGHWAY

EXTENT OF INFORMATION - - - - -



**M** Mott MacDonald

Mott MacDonald Limited  
Demeter House  
Station Road  
Cambridge CB1 2BS

Telephone 01223 466660  
Fax 01223 461007  
Telex 917260 MMD G

Title

A23/M23 HOOLEY JUNCTION  
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Figure 5.12		

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LEGEND: —



LAND TAKE



LAND OWNERSHIP BOUNDARY

EXTENT OF INFORMATION



**M** Mott MacDonald

Mott MacDonald Limited  
Demeter House  
Station Road  
Cambridge CB1 2ES



Telephone 01223 460660  
Fax 01223 461007  
Telex 617260 MDP G

Title

A23/M23 HOOLEY JUNCTION  
IMPROVEMENTS  
LAND OWNERSHIP AND LAND TAKE PLAN.

Date

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Figure 5.13

Scale

Rev.



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5.7.3 Landtake

Landtake was calculated and assessed in terms of quantity and quality, and the losses evaluated against national and local criteria (see **Figure 5.13**).

5.7.4 Demolition of Private Property and Associated Landtake

No residential, commercial (including farming), industrial or other properties will need to be demolished as a result of the proposed junction improvements.

Extension of the Glebe Road service road to Harps Oak Lane will require landtake from the eastern edge of Cranston House garden between the driveway and the corner of Harps Oak Lane. In the long term, access to this property will be from the new service road.

5.7.5 Loss of Land used by the Community

There would be no direct loss of land used by the community. Impacts would be limited to the temporary disruption to the Public Right of Way (footpath 602) which connects with the Glebe Road Service Road and with footpath 134 during the construction period (see also section 7).

5.7.6 Effects on Development Land

There are no areas defined in Reigate and Banstead Local Plan as development land in the vicinity of the scheme and there are no current planning applications relating to this area.

Changes to the A23/Dean Lane junction, such as a reduction in congestion resulting from reduced numbers of cars doing U-turn manoeuvres would, however, enhance accessibility to the Netherne Hospital site, whose first phase of redevelopment would involve a net gain of 200 housing units. The unused section of the M23 motorway was originally intended for the extension of this road.

5.7.7 Effects on Agricultural Land

Construction of the northern slip road will require landtake from an agricultural field which is currently rough pasture. However the southeast corner of this field, which is mostly scrub, is owned by others.

The southern link road, is for the main part constructed on the unused M23 structure, however the new loop will involve landtake from two additional fields currently in agricultural use, as pasture.

**TABLE 5.7.1: Summary of Effects**

Plot Title	Ref	MAFF grade	Land Owner	Size of Holding (Hectares)	Landtake
SY 443 283	9	other	The Secretary of State for the Environment 2 Marsham Street London	2.80	<del>0.66</del>
SY 425 539	13	other	The Secretary of State for the Environment 2 Marsham Street London	0.09	0.05
SY 626 376	14	other	Ralph Sam Haecms Colley Corner Clifton Lane Reigate, Surrey	5.46	-

SY 582 204	16	3	Leeds Permanent Building Society Permanent House 1 Lovell Park Road Leeds LS1 1NS	0.10	0.02
SY 436 551	18	3	The Secretary of State for the Environment 2 Marsham Street London	0.06	
	30	3/4	Unregistered		Agricultural land 0.98
SY 32 239	31	other	Reigate and Banstead Borough Council Town Hall Reigate Surrey		0.35
Total Landtake					

*no*

5.7.8 Mitigation

Mitigation measures can be summarised as follows:

- New access points would be provided for Cranston House onto the Glebe Road service road.
- Footpath 602 would be diverted during the construction period.

5.7.9 Conclusions

The impact on land use would be slight in overall terms

No properties will be demolished, there will be no loss of land used by the community and there will be no effects on development land.

The total area of farmland taken would be 1.99 hectares, of which half is classified as grade 3/4, but is currently rough pasture and half is classified as "other land primarily in non-agricultural use". The majority of the scheme would be confined to the existing highway landtake utilising the unused section of the M23 motorway.

Other landtake is limited to very small areas ..... (look at usage on site).

## 5.8 Traffic Noise and Vibration

### 5.8.1 Introduction and Methodology

The construction and use of a road scheme may generate noise and vibration impacts and effects on dwellings and properties adjacent to it.

The noise and vibration assessment has followed the procedure prescribed in the DoT Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 7 (Traffic Noise and Vibration). The methodology is described in detail in section 5.8.3 following.

### 5.8.2 Technical background

The description of a noise assessment inevitably requires the use of a number of technical terms. The essentials are outlined below, while more formal definitions are given in the Appendix.

Noise is generally defined as unwanted sound. Sound is the transmission of energy through the air by a series of small amplitude pressure waves. The ear responds to these in a non-linear way, thus a logarithmic scale, the decibel (dB), has been adopted to accommodate this feature.

The ear also responds in a non-linear way to sound frequency (cycles per second or Hertz, Hz). It is less sensitive to low and high frequencies hence a filter is applied to the output of measuring instruments to simulate this response. The characteristic generally used for environmental noise is known as the A-weighting.

Noise from road traffic fluctuates considerably on both a short and long term basis. It is therefore treated in a statistical manner and in the UK is conventionally described using the  $L_{A10}$  index, i.e. the A weighted sound pressure level exceeded for 10% of the period of concern. This is a measure of the higher noise levels as vehicles pass and has been found to give the best correlation with subjective effects.

When measured in front of a building, the sound level is increased by sound reflected from the facade. The calculated values are corrected for this effect and are known as facade levels.

All **traffic noise** levels quoted in this report are facade levels described in terms of the  $L_{A10}$  averaged over the 18-hour period 0600 to 2400 during an annual average weekday.

### 5.8.3 Baseline Conditions

The DMRB specifies that for impacts which will occur only after a road is opened to traffic, the baseline conditions should be those which would exist **just prior to opening** (currently assumed to be 2000) assuming that the road had not been built.

*Since the noise in the area is determined almost entirely by road traffic, which can be determined by calculation, a baseline measurement survey was not undertaken.*

Although the area of concern is relatively rural, the presence of the M23/A23 corridor imposes a relatively high traffic noise level on properties adjacent to it. The calculated 1995 traffic noise levels at nearby dwellings are indicated on the noise impact plans, **Figures 5.15 to 5.17**, and may be summarised as follows:

At the south end of the scheme, properties on the northeast side of the A23 London Road North currently experience high levels of noise (up to 70 dB) from the M23 at their rear facades and from the A23 at their front facades, there being no mitigation measures in place.

Properties to the east of the M23 in Shepherd's Hill experience similar levels from the M23

Properties on the west side of the A23 adjacent to the M23 northbound junction currently experience high levels (over 70 dB) at their front facades.

At the north end of the scheme, properties on the east side of the A23 adjacent to the Dean Lane junction currently experience high levels (over 70 dB) at their front facades.

#### 5.8.4 Assessment of traffic noise impacts and effects

A **noise impact** can be defined as the change in noise level resulting from the operation of the scheme. A **noise effect** may be defined as the result of the noise impact on people, animals and use of various buildings or resources. It may be described in terms of subjective reaction or nuisance.

In order to assess the impacts of the proposed scheme on local noise levels, the DMRB procedure compares the levels which would exist in the design year (both with and without the scheme) with the levels existing before the scheme is opened (the baseline). To facilitate the assessment, these impacts are quantified in terms of the numbers of properties affected by differing degrees of noise change and presented in the form of a noise impact table.

The resulting noise effects may be quantified with respect to the following:

Subjective reaction to noise changes is broadly as follows

- |              |   |
|--------------|---|
| 1 to 3 dB:   | a change of 1 dB is generally considered to be noticeable only under laboratory conditions. A change of less than 3 dB would be perceptible in the short term but is generally considered to be not significant over a long period of time. |
| 3 to 5 dB:   | a change of 3 dB would be generated by a doubling or halving of traffic flow. A change of 3 to 5 dB would be clearly perceptible in both the short and long term, and might be described as slight.   |
| 5 to 10 dB:  | a change of 10 dB would cause a doubling or halving of subjective loudness. A change of 5 to 10 dB is therefore significant and might be described as moderate.   |
| 10 to 15 dB: | a more significant change which might be described as substantial.  |
| 15 to 20 dB: | a 20 dB change would cause a quadrupling or quartering of subjective loudness. An increase of 15 to 20 dB might therefore be described as severe  |

*A procedure for estimating subjective nuisance effects is given in the DMRB, but given the provisional nature of the traffic data, it is not appropriate to consider it at this stage.*

Since the future noise levels cannot be measured directly, the DMRB procedure requires that, for a valid and consistent comparison, the traffic noise levels for both future and baseline years should be determined by calculation from forecast average traffic flows.

The procedure specifies that these levels should be calculated using the method defined in the DoT technical memorandum Calculation of Road Traffic Noise (CRTN) 1988, which was originally developed for use with the Noise Insulation Regulations. This is empirically based and may be summarised as follows:

- (i) The road is divided into convenient segments depending, for example, on curvature, gradient and screening.
- (ii) For each segment, a "basic" noise level for the appropriate traffic flow is determined from an empirically based chart for a reference distance of 10 m from the carriageway edge. Corrections are made for average speed, proportion of heavy vehicles, gradient, surface type and texture.
- (iii) Further corrections are made to the basic level for propagation losses due to distance, ground absorption, intervening obstructions and angle of view.
- (iv) Finally, the results for each segment are summed and corrected for the effects of reflection from opposite and adjacent facades.

For this study, the baseline and future traffic noise levels were calculated using the computer program ROADNOISE, produced by W S Atkins Ltd., which calculates noise levels in accordance with the specified CRTN method. The programme creates a three dimensional digital model of the area of interest, including the new and existing roads and receptors. The earthworks associated with the road construction are also included in the model, as are any other features that will affect sound propagation.

The model assumed that the intervening ground between source and receptor was acoustically soft, e.g. short grass. Small numbers of trees or other vegetation do not reduce noise significantly but where wider areas of vegetation exist, the calculated noise levels may well be several dB(A) above the actual levels.

The appropriate flow of light and heavy vehicles and speed information was assigned to each road section in the model and the locations of those points at which the noise level is to be calculated was defined (normally at the facade of a property at bedroom window level).

*For this study, calculations were undertaken for the existing (1995) conditions, do-minimum (i.e. retention of the existing road alignment, 2013) and option 8 (2013). The input traffic data are shown in Figure 5.14.*

The existing traffic model indicates that there would be little proportional difference in flow on the existing main carriageways between the do minimum and option 8 cases. That option provides two new slip roads, each of which would carry some 2-3000 vehicles per 18 hour day. The southbound on-slip would be relatively distant from local dwellings and the northbound off-slip would be largely screened from adjacent dwellings by the retaining wall and cut.

The calculations therefore indicate that only small changes, generally less than 0.5 dB, are likely to occur at nearby dwellings. The results for a comparison of the do-nothing situation and option 8 **both in 2013** are indicated on Figures 5.16 and 5.17. Such a comparison removes the effect of any regional increase in traffic which would occur between the baseline year and the design year in any case.

The noise impacts, expressed as the difference between option 8 and do-nothing in the design year 2013, are summarised in the customary format in Table 5.8.1 following:

**TABLE 5.8.1: Noise Assessment Summary Table: Differences between Option 8 and do minimum, 2013**

Sub-group	Impacts	option 8	comments
dwellings	increase 1 to 3 dB	0	-
	increase 3 to 5 dB	0	-
	increase 5 to 10 dB	0	-
	increase > 10 dB	0	-
dwellings	decrease 1 to 3 dB	0	-
	decrease 3 to 5 dB	0	-
	decrease 5 to 10 dB	0	-
	decrease > 10 dB	0	-

A consideration of the noise impacts with reference to the subjective effect categories described in 3.8.3 indicates that the small increases in noise are likely to be barely noticeable and not significant.

#### 5.8.5 Mitigation

Since no property will experience an increase of more than 1 dB, none will qualify for sound insulation measures under the provisions of the Noise Insulation Regulations 1975/1988.

Although there will not be a significant noise increase resulting from the proposed scheme, the area is affected by high levels of traffic noise mainly in the region of 65 to 70 dB<sub>L<sub>A10</sub></sub> and consideration has been given to any reduction that could be achieved in the design of the works.

Porous asphalt (PA) as a noise reducing running surface is gaining wider acceptance and might be a possible way of providing an overall noise reduction in this area. Because the effects of PA are primarily on the tyre noise element of the noise produced, it is only fully effective at higher traffic speeds above about 80 km/h when the residual noise benefit after some years of use is 3.5 dB<sub>L<sub>A10</sub></sub>.

At the lower speeds within this study area, the beneficial effects of the use of PA will be much more limited although at present the speed relationship of PA noise reduction is not published.

The provision of noise fences or bunds has been considered but there is little scope for any practical or effective locations.

In the north of the study area south of Dean Lane on the east side of the road, there is a narrow strip of land between the service road and the main carriageway which might be wide enough to accommodate a noise barrier fence. This would, however, affect the bus stop and pedestrian crossing point. It is believed that services exist beneath the verge which may make construction difficult or even impossible. The provision of a noise fence at this location is therefore not recommended.

To the south of the north-bound A23 underbridge, there is a similar service road on the west side of the road serving a few properties in the vicinity of Glebe Road. These properties are located higher than the road and a barrier of acceptable height would have little beneficial effect.

#### 5.8.6 Traffic induced vibration

Vibration due to road traffic can affect nearby properties in two ways:

- (i) vibration from wheel-road interaction can be transmitted through the ground (ground borne vibration) and
- (ii) low frequency noise from vehicle exhausts can induce vibration in lighter structural elements, eg. windows, doors and floors (airborne vibration)

Ground borne vibration is very difficult to predict, but since it is generated primarily by surface irregularities, it is highly unlikely to be significant when considering the impact of new roads and therefore has not been considered any further in this assessment.

Low frequency airborne induced vibration can occur to some extent on any type of road, old or new, but not at levels which are likely to cause structural effects. *Surveys have indicated that the relationship between such vibration and resulting nuisance follows that for noise nuisance except that the percentage bothered by a given noise level is some 10% lower.* These surveys were restricted to properties within 40 m of the carriageways where there were no noise barriers.

#### 5.8.7 Noise due to Construction Operations

Noise and vibration from construction operations, while of only a temporary nature, could affect a small number of properties close to the scheme. These impacts and provisions for its control are considered in the Disruption Due to Construction section *n.n.*

#### 5.8.8 Conclusions

Properties adjacent to the existing M23 and A23 carriageways currently experience high levels of traffic noise.

*Traffic noise levels would not change by more than about 0.5 dB if option 8 is constructed. Such changes would not be noticeable at nearby dwellings and there would therefore be no significant effects.* <sup>- change</sup>

*It is unlikely that there would be any traffic vibration impacts and effects.*

*It is not therefore necessary to produce a Volume 2 Specialist Report (DMRB Vol 11 section 4 part 3 ch 4 para 4.1)*

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KEY

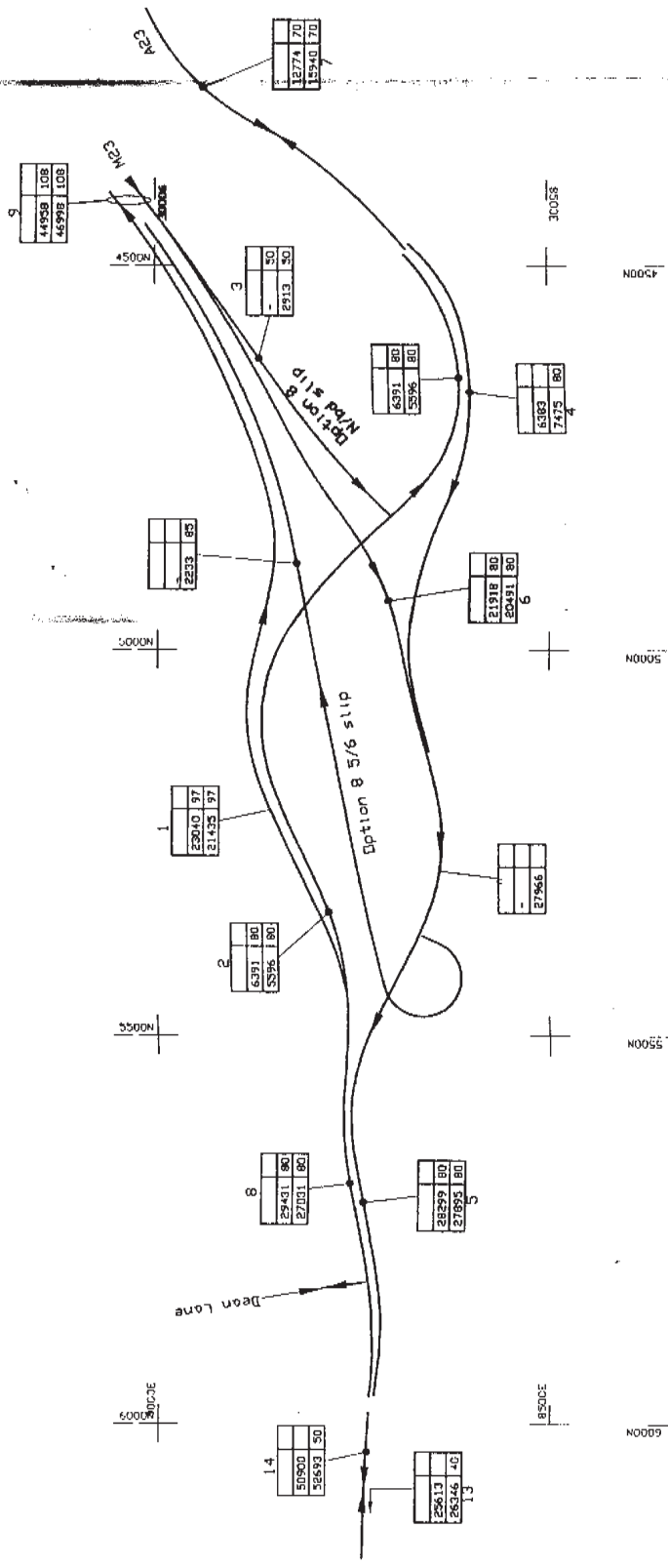
2013	d/n	50	Km/h
2013	Opt. B	50	Km/h
ALL 10% HGV			

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Project: A23/M23 HOOLEY JUNCTION  
 Title: IMPROVEMENT 18 HOUR TRAFFIC FLOWS FOR NOISE CALCULATIONS.  
 (DATA SUPPLIED BY SCC)

Date	Drawn	Checked	Approved
DEC '97	ALMC		N. T. S.

Project No. **Figure 5.14**





## 5.9 Pedestrians, Cyclists, Equestrians and Community Effects

### 5.9.1 Introduction and Methodology

The following section makes an assessment of the impact of the A23/M23 junction improvements in terms of changes in local travel patterns, vehicular and non-vehicular journeys, general amenity, new road severance and more generally, severance of residents from community facilities.

The effect of the junction improvements on the amenity of the area, and journeys through that area, is potentially a positive impact of the scheme. Amenity, which may be defined as the relative pleasantness of an area or journey, is concerned with changes in the degree of duration of exposure of people to various factors. These factors have been assessed in detail in Volume 2 of the Environmental Statement, particularly the Air Quality Report, Landscape Effects Report and Traffic Noise and Vibration Report.

The environmental effects of an improvement scheme are either local or widespread. They may be adverse or beneficial, direct, indirect, permanent or temporary. Effects may occur immediately upon commencement of construction or at some time in the future.

The magnitude of the predicted effect is likely to be a combined measure of the total extent of the area affected, and the volume or scale of the effects. Where possible the magnitude of the effect is quantified.

The evaluation of the significance of the effect is a matter of judgement. The criteria for the assessment of significance for the assessment of effects is stated below, it is measured against:

- the length of footpath or size of the community facility affected;
- the length of diversion, or degree of severance to a facility;
- number of people affected;
- the level of importance of the footpath or facility in terms of environmental and planning policy/legislation;
- sensitivity, uniqueness of and rarity of location;
- if the effect is permanent or reversible through mitigation.

#### ***Substantial:***

The impacts may affect sensitive sites of high conservation interest, large areas or large numbers of people. It would be of a high magnitude (permanent loss of several footpaths or major disruption to the use of a community facility). The effect may be difficult to mitigate and would be of regional or national importance.

#### ***Moderate:***

The impacts may affect sites of moderate conservation interest, large areas or large numbers of people. The effect would be of moderate magnitude and may be difficult to mitigate and would be of local or regional importance.

#### ***Slight:***

The impacts would be localised, of low magnitude (eg small sections of footpath diverted) and would be easy to mitigate.

#### ***No Change:***

No discernible effect.

The impacts of the proposed scheme are considered during construction, year one of opening and 15 years after opening.

### 5.9.2 Baseline Conditions

The study area is characterised by:

- a mixture of open agricultural land with farmsteads and areas of woodland;
- residential development is centred on the A23 route and associated access roads such as Dean Lane and Harps oak Lane;
- and highway land accommodating the M23, link roads and the 'dead' section of the M23.

Most of the long established residential properties are detached, on substantial plots of land. The Happy Eater Restaurant is the only community facility in the area other than off road footpaths. The lack of facilities such as schools and shops in the immediate area would suggest a high level of car dependency in this urban fringe area.

#### ***Pedestrians***

There is a pavement on the nearside of the A23 northbound carriageway, commencing 225 m south of Harps Oak Lane opposite a crossing point within the central reserve. The footway continues northwards running adjacent to either Glebe road or the A23. At 230 m south of the Dean Lane junction, the footway terminates. A crossing point within the central reserve is provided to allow pedestrians to cross over to the other side of the road.

There is also a pavement adjacent to the southbound A23 in the vicinity of the Dean Lane junction. This pavement is located next to the service road. Crossing Points in the central reserve provide access to the west side of the A23 and are situated at 80 m north and 230 m south of Dean Lane. To the west of the A23, almost opposite Dean Lane, footpath 600 runs westwards towards Garden Walk. The footpath rises steeply in elevation between the A23 and Garden Walk.

The London & Country bus company operates the main bus service through the Study Area. A 'request' bus stop is located 130 m to the south of the Dean Lane junction adjacent to the northbound A23. A 'request' bus stop is also located 230 m to the south of Dean Lane on the A23 southbound carriageway opposite the footway crossing point in the central reserve. The No.405 Crawley to Croydon bus service is routed along the A23 in the northbound and southbound directions. Bus stops are located as follows:

- A23 northbound - 130 m south of Dean Lane
- A23 southbound - 230 m south of Dean Lane

#### ***Public Rights of Way***

There are a few rights of way which cross or pass close to the existing A23/M23 roads. A total of 4 definitive footpaths cross the study area. The current routes of footpaths are illustrated in Figure 2

*Footpath 100* leads from Netherne Hospital south to join the B2031 close to Shepherds Hill over-bridge.

*Footpath 128* commences at Noke Farm (grid ref 278 561) and joins with footpath 600 (grid ref 284 558)

*Footpath 134* leads from Harps Oak Lane to join footpath 602.

*Footpath 600* leads from Garden Walk to join the pavement of the A23 northbound, opposite Dean Lane Junction.

*Footpath 602* connects with footpath 134 to Harps Oak Lane and commences at the A23/Glebe Road service road at grid ref 286 548.

#### ***Equestrian***

There are no bridleways within the area affected by the A23/M23 junction improvements.

#### ***Cyclists***

500 m south of Dean Lane, on the A23 southbound carriageway by the diverge for M23 southbound traffic, is a crossing facility for cyclists. Further to the south, but still some 250 m to the north of Harps Oak Lane junction, there is a crossing point within the central reserve for pedestrians. At this location a footway is provided on the nearside of the A23 southbound carriageway which runs towards Shepherds Hill. Immediately to the south of the crossing point there is a lay-by with a bus stop.

#### ***Existing Vehicular Accessibility to Local Residential Areas***

On the A23 northbound carriageway, 400 m to the north of the Harps Oak Lane junction, there is a left turning into Glebe Road and a minor service road, which gives access to eleven residential properties. There is also

a link road within the central reservation opposite the left turn into Glebe Road for vehicles wishing to access the A23 carriageway from Glebe Road. The right turn from the A23 northbound carriageway into the link road is prohibited. About 150 m to the north of the Dean Lane junction, is the Church Lane access on to the A23 northbound carriageway. Church Lane is a one-way road at this location and the left turn from the A23 is prohibited.

In the vicinity of the Dean Lane junction, there is no access to residential properties directly from the A23 northbound and southbound carriageways. Service roads to the north and south of the junction provide access to thirteen residential properties, situated close to the A23 southbound carriageway. The service road to the south of the junction is signed as "No Entry Except For Access".

#### *Other community facilities*

One access to the Netherne Hospital is via Dean Lane junction and Netherne Lane.

#### 5.9.3 Assessment of Impacts and Effects

The main effects of the scheme would be to significantly improve pedestrian safety at Dean Lane. U-turning vehicles would be rerouted away from this junction with a reduction in congestion.

#### *Public Rights of Way*

There would be some temporary disruption to footpath 602 during the construction period.

#### *Cyclists*

A cycle route would be provided to enable cyclists to travel from the existing service road, cross the new link road and then rejoin the A23 northbound carriageway.

#### *Community and Recreation Facilities*

The existing bus lay-by on the northbound carriageway to the south of Dean Lane would be maintained although some modifications would be necessary.

#### *Comparison of Year 1 and Year 15 Effects*

#### 5.9.4 Mitigation

#### 5.9.5 Conclusion

LEGEND: —

PUBLIC RIGHTS OF WAY :

FOOTPATHS

BRIDLEWAY

CYCLE PATHS

LITTLE CHEF RESTAURANT

BUS STOPS

FP 614

BW 97

●●●●

⊙

\*

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Mott MacDonald Limited  
Demeter House  
Station Road  
Cambridge CB2 2BS

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Title  
A23/M23 HOOLEY JUNCTION  
IMPROVEMENTS

PUBLIC FOOTPATHS AND COMMUNITY FACILITIES

Date	Drawn	Checked	Approved	Status
Drawing				Scale
				Rev.

Figure 5.18



Do Not Scale

FP 729

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## 5.10 **Vehicle Travellers**

### 5.10.1 Introduction and Methodology

This section is based on information provided in the Environmental Report on Options 1996 produced by Surrey County Council.

DMRB defines two topics under this heading which includes vehicle users views from the road and driver stress. Depending on the location of the route and the design standards adopted impact on the vehicle users would vary accordingly.

View from the road is a largely subjective assessment based on whether or not views are open or restricted, and whether or not the landscape through which the route passes is of high scenic quality. Assessment of driver stress is more objective, and is based on traffic speeds and movements. A three point scale is used based on the existing situation against that which would exist if the scheme were built.

### 5.10.2 Baseline Conditions

#### *View from the Road*

The existing A23 trunk road and the M23 motorway pass through countryside designated because of its attractiveness. Views from the road are varied. The M23 is constructed on embankment and in cutting. The A23 passes through several built up areas such as Hooley and Merstham.

#### *Driver Stress*

Driver stress has three main components: frustration, fear of potential accidents, and uncertainty relating to the route being followed. Frustration is caused by a driver's inability to drive at a speed consistent with his or her own wishes in relation to the general standard of the road. Fear of potential accidents is produced mainly as a result of the presence of other vehicles, poor road standards, and the possibility of pedestrians stepping into the road. Route uncertainty is caused primarily by signing that is inadequate for the driver's purposes.

Fine assessment of driver stress is not possible, and the usual method of assessment is on a three point descriptive scale of low, moderate or high supplemented by a comment as to the section of road to which the description is applicable. The Highway Agency's Design Manual for Roads and Bridges gives guidance relating levels of driver stress to the numbers of vehicles in each lane of road for various categories of road.

Proposals for the A23/M23 junction improvement at Hooley have been developed as a result of the high number of traffic accidents occurring on the A23, close to the existing junction with Dean Lane, which has to accommodate both the local access turning movements and U-turning movements between the A23 and M23.

#### *Personal Injury Accident Data (PIA)*

Within the Study area, there had been 52 PIAs in the period 1/1/91 to the 31/7/94. 10 occurred in 1991, 14 in 1992, 17 in 1993 and 11 in the first 7 months of 1994. 1 PIA involved a fatal casualty, 10, a seriously injured casualty and 41, a slightly injured casualty.

The 52 PIAs produced 70 casualties, 1 fatal, 12 serious and 57 slightly injured casualties. 13 PIAs occurred in darkness and 19 in wet conditions. 20 PIAs involved only one car, 2 involved HGVs, 3 involved motor-cycles and 3 involved pedal cycles.

10 of the PIAs involved vehicles performing a U-turn on the A23, 2 of which occurred at the junction of Dean Lane. 9 of the U-turning PIAs involved vehicles which were travelling from and then towards the south. 6 PIAs occurred within 20 metres of Dean Lane.

### ***Existing Traffic in the Scheme Area***

#### ***Automatic Traffic Count***

An Automatic Traffic Count (ATC) site is located on the A23, situated between Dean Lane and the junction of the A23 / M23. For the period September to December 1994, the monthly average 24 hour daily traffic flow was in the order of 44,000 to 48,000 vehicles.

Average weekday AM (0800 to 0900) and PM (1700 to 1800) peak hour flows were in the order of 4020 and 3830 vehicles respectively. Average weekday inter-peak (0900 to 1700) flows ranged from 2410 to 3220 vehicles per hour, with an averaged of 2650 vehicles per hour. The peak hour for Saturday was 1300 to 1400 hours with a flow of 3130 vehicles, and for Sunday 1700 to 1800 hours with a flow of 3340 vehicles. The AM period has a pronounced north bound tidality whilst the PM period has an approximately equal northbound and southbound distribution.

#### ***Manual Classified Count***

A Manual Classified Count (MCC) on the A23 was undertaken between Dean Lane and Church Lane, on Thursday 1 April 1993. The count was for a 12 hour period (0700 to 1900) and was taken for each direction. Out of the total 12 hour two-way flow of 31,710 vehicles, 78% were cars, 11% were Light Goods Vehicles (LGVs), 9% were Heavy Goods Vehicles (HGVs), 1% were motorcycles and 0.6% were buses or coaches. In addition, 13 pedal cycles were counted. The flow of HGVs ranged from 200 to 340 vehicles per hour over the survey period, and LGV flows ranged from 250 to 380 vehicles per hour.

#### ***Manual Classified Turning Count***

The junction of Dean Lane and A23 Brighton Road was surveyed on Thursday 27 April 1989 for a 12 hour period (0700 to 1900), showing 34,860 vehicles. 690 vehicles travelling from the Merstham direction made a U-turn manoeuvre at the Dean Lane junction. These can be sub-divided into those making the U-turn in one movement around the central reservation (380 vehicles) and those using the junction mouth of Dean Lane (310 vehicles). An additional 590 vehicles made the right turn into Dean Lane. U-turns by traffic from the London direction amounted to 20 vehicles. Travelling from the Merstham direction, 80 vehicles made the U-turn in each AM and PM peak hour. Of these 5 (6%) were HGVs.

### 5.10.3 Assessment of Impacts and Effects

#### ***View from the Road***

The proposed junction improvements would not effect the existing situation.

#### ***Driver Stress***

The proposed improvements will provide a link between the A23 south and the M23 at Hooley. Currently these two roads merge into the A23 north, with no provision for traffic movements between the two roads from the south. Traffic wishing to perform this U turn manoeuvre currently has to either undertake a dangerous U-turn at the Dean Lane junction or use unsuitable roads to the south.

Overall the level of driver stress in the existing situation is confirmed as high. Without the proposed improvements to the junction, traffic flows would increase. Driver stress, which is already high, would only get worse.

When assessed by the flow/lane method given in the Highways Agency's guidance, the proposed junction improvements would reduce not reduce the level of driver stress, as traffic flows would not be reduced. However, there would be an improvement in many of the factors that contribute to driver stress as follows:

- Driver frustration would be reduced. The proposals provide separate link roads for U-turning movements between the A23 and M23, away from the existing Dean Lane junction. The northern link roads (A23 northbound to M23 southbound) would be more or less free flowing. Some delays might occur where the southern link (M23 northbound to A23 southbound) joins the A23 in heavy traffic.
- Driver uncertainty would be reduced by signage provided to a standard compliant with Trunk Road or Motorway status. Detail on signage has not been provided at this stage for a full comparative assessment to be carried out.

- Driver fear would be reduced by...  
Sight distances .....  
Speed.....?  
The potential segregation of pedestrians and cyclists away from the carriageways except for particular crossing points.....The extension of the Glebe Road Service Road will segregate local traffic.  
In addition the free flowing nature of the link may result in a lower level of driver fear.

5.10.4 Mitigation

As the road results in generally beneficial effects, no mitigation is required

5.10.5 Conclusion

The scheme would result in beneficial effects for vehicle travellers, reducing driver stress, throughout the design life of the scheme.

## 5.11 **Water Quality and Drainage**

### 5.11.1 Introduction and Methodology

Water is a vital necessity for all living plants and animals. For human beings it is not only essential to life, but also important for industry and agriculture, waste disposal and for informal recreation.

The DMRB states that there are a number of possible ways in which, in certain circumstances, a road scheme may affect the water environment. Surface watercourses, groundwater and soil and vegetation in close proximity to the road may be affected by:

- (i) pollution from surface water run-off, or surface water spray
- (ii) pollution from accidental spillages.

The same sources can also have an impact which is geographically more widespread:

- (iii) pollution of groundwater.

In addition, regardless of the quality of water run-off or spray, a road scheme could produce physical changes, eg creation of embankments, change in gradients, bridges, channel diversions, coffer dams, channel profile etc. These may result in changes to water flows or levels which can increase the risk of flooding, affect groundwater supplies or affect the ecology and natural hydrological systems of surrounding areas.

### 5.11.2 Baseline Conditions

There are no well defined watercourses within the study area, (See **Figure 5.19**). Some surface flow is inevitable during periods of intense rainfall but at other times rainfall will infiltrate the drift deposits overlying the chalk and move downwards to the standing ground water level (water table).

The study area is within the Groundwater Protection Zone for the Woodmansterne (Water Abstraction) Pumping Station owned by Sutton and East Surrey Water. The water table is believed to be at substantial depth within the chalk

Existing highway drainage is by means of kerbs and gullies which are believed to drain to soakaways.

### 5.11.3 Assessment of Impacts and Effects

#### *Pollution from Surface Water Run-off and Spray and Accidental Spillages*

The DMRB points out that the amounts of pollutants passing into receiving waters depend on two main factors. First, the proportions and types of pollutant in the run-off itself and, second, the effect of any drainage systems in removing pollutants.

An accidental spillage is potentially the most damaging form of road surface run-off pollution for receiving waters. Although the occurrence of major spills is relatively rare it is proposed to provide bypass interceptors to control light liquid spillages, eg hydrocarbons as well as emergency shut-off valves to contain other spillages. Such measures are designed to minimise the risk of polluted run-off entering receiving waters.

#### *Pollution of Groundwater*

The DMRB explains that groundwater is the term used to refer to water collected and retained underground in aquifers. It is an important contributor to the public water supply, providing nationally around a third of present demand and in many areas constituting the only practicable future source. It is important to ensure that groundwater quality is maintained as far as possible because contaminants may be difficult and expensive, or even impossible, to remove.

A road scheme has the potential to affect groundwater quality either through soakaways, which discharge water directly into groundwater, or via surface waters which find their way into aquifers. Pollution of groundwater can also occur when highway construction disturbs contaminated ground. The proposed works will involve



excavation in and removal of fill material of varying quality. Further tests will be required to more fully establish the quality and quantity of materials to be removed.

The existing highway drainage discharges to soakaways and it is proposed to use the existing drainage network where possible. Some additional soakaways will be required and these will be provided with bypass interceptors to control hydrocarbon pollution.

#### *Changes to Water Flows or Levels*

The DMRB points out that in some circumstances, a road scheme has the potential to change water flows or levels. This can have three possible effects: increase in the risk of flooding; interference with aquifers; and effects on the ecology of surrounding areas.

Changes to the risk of flooding would depend mainly on whether a scheme is built in a flood plain or not and whether any flood capacity is lost. The efficacy of the local drainage system, as well as on the additional demands which the road would place on it. The proposed works do lie within a valley but occupy sloping ground or embankment. Flooding caused by obstructed surface flow is unlikely.

In some circumstances, highway construction work can cause problems by draining groundwater from an aquifer or by diverting groundwater due to interception of the water table, or by interconnecting different aquifers. An example is a road in deep cutting through an aquifer, where water would tend to drain to the road and may be lost to the aquifer on both sides, or be unable to move from one side of the aquifer to the other. The proposed works do involve the creation of new cutting slopes. However the water table is believed to be at significant depth and therefore it is unlikely to be intercepted by the new works. Surface run-off during periods of intense rain will flow towards some of the cutting slopes. Intercepting ditches will be provided to deal with this.

Ecological effects would depending on changes in both water levels and flows. These effects can be both positive and negative. For example, an area of wetland might be created by a road scheme, which could develop into a valuable wildlife habitat. On the other hand, some species may be unable to survive in wetter conditions or faster-flowing streams. Ecological effects are unlikely to be significant for this scheme.

#### 5.11.4 Mitigation

Various possible mitigation measures, such as oil interceptors, can be used to reduce the impact of a road on Water Quality and Drainage. The suggested measures available for mitigating against reduction in water quality are listed below.

- (i) Grit/silt traps
- (ii) French drains
- (iii) Sedimentation tanks/lagoons
- (iv) Grass swales
- (v) Aquatic/vegetative systems
- (vii) Pollution traps.

#### *Proposed Drainage Provision*

Rainwater running off the surface of the new road would be collected at the road edge by kerbs and gullies and piped to soakaways. The new roads will be within three separate drainage catchments. The extents of these are shown on **Figure 5.20**.

In order to reduce the impact of road surface run-off on the water quality of the receiving waters it is proposed to incorporate suitable measures to remove suspended solids and hydrocarbons prior to discharge to soakaways.

The proposed loop cutting to the north of Glebe Road would intercept surface flow from the adjacent field which will be collected and discharged to the highway drainage system.

The section of the road between the loop and M23 southbound carriageway will follow the line of the motorway carriageway already constructed. It is proposed to utilise the existing highway drainage subject to inspection and remedial works as necessary.

It is proposed that the M23 off slip to the A23 southbound carriageway will drain to the existing motorway drainage system to the south.

The re-aligned A23 northbound road would be drained to the existing highway drainage system. The extended service road would be drained to new soakaways in the vicinity of Harps Oak Lane.

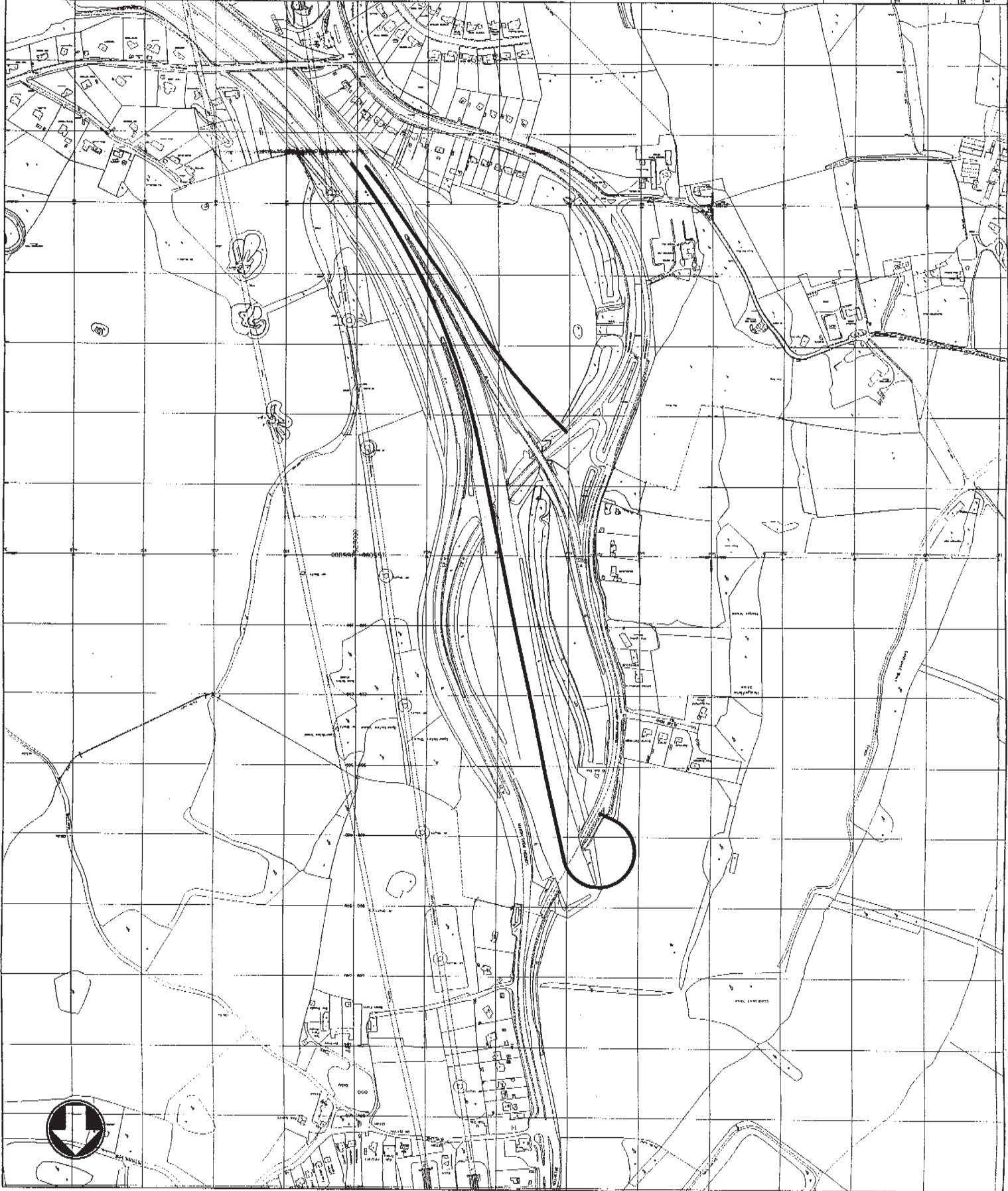
#### *Possible Pollution from Made Ground*

The proposals involve excavating within made ground. It is possible that ground water in this area may be polluted. Further site investigation will be carried out and results of ground water testing will determine appropriate measures necessary.

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**KEY**

**AQUIFER PROTECTION ZONE**  
**— CENTRE LINES OF PROPOSED WORKS**



**Mott MacDonald**  
 Mott MacDonald Limited  
 One, Riverside, 100, Riverside Road  
 Manchester, M20 2BN  
 Telephone: 0161 275 2200  
 Fax: 0161 275 2201

**Title**  
 A23/M23 HOOLEY JUNCTION  
 IMPROVEMENT  
 WATER QUALITY AND DRAINAGE -  
 EXISTING

Date	Drawn	Checked	Approved	Scale
11/12/97				1:5000

Drawing No. **Figure 5.19** P1

## 5.12 **Geology and Soils**

### 5.12.1 Introduction and Methodology

### 5.12.2 Baseline Conditions

The site is located on the chalk of the North Downs. The chalk is generally covered by deposits of clay which are generally fairly thin on the valley sides but up to several metres thick in the valley bottom.

The unused section of the M23 motorway has been used as a storage area and contains extensive stockpiles of spoil, some of it contaminated.

### 5.12.3 Assessment of Impacts and Effects

The scheme will require the excavation of approximately 70,000 cubic metres of chalk and clay from the line of the northbound slip road and 12,000 cubic metres of chalk and clay and a similar volume of stockpiled spoil from the line of the southbound link road.

The majority of this material will be surplus to requirements. Where appropriate, some of it will be used for essential landscaping. Material in excess of this requirements will be removed from the site. Care will be taken to identify and safely excavate and remove from the site any contaminated material.

### 5.12.4 Mitigation

## 5.13 Policies and Plans

### 5.13.1 Introduction and Methodology

In this section the proposed road improvements are assessed in relation to their effects on the international, national, county and local planning policy objectives. The effects on development of adjacent areas are also assessed. The greatest weight will be given to the Reigate and Banstead Local Plan.

The assessment has primarily been undertaken as a desk-study, but has also included consultations with local planning authorities.

The policies and legislation which were considered, relevant to the proposed scheme, were as follows:

- The Wildlife and Countryside Act 1981 (Amended 1985)
- PPG2 - Green Belts
- PPG9 - Nature Conservation (October 1994)
- PPG13 - Transport (March 1994)
- PPG16 - Archaeology and Planning (November 1990)
- Regional Planning Guidance for the South East (RPG9) (March 1994)
- Surrey County Council Structure Plan - Replacement Plan (1994)
- Reigate and Banstead Local Plan - Adopted (July 1994)

### 5.13.2 Baseline Conditions

#### *International Legislation*

The European Union's 'Habitats Directive' requires member states to endeavour to encourage the management of features of the landscape which are of major importance for wild flora and fauna. Examples given include traditional field boundary systems, (such as hedgerows) and small woods.

#### *National Legislation and Guidance*

The Wildlife and Countryside Act 1981 gives special protection to certain listed wild plants in the UK.

PPG2 confirms that Green Belts must be protected for the foreseeable future and provides advice on defining boundaries and on safeguarding land for longer term development needs. Safeguarded land comprises areas and sites which may be required to serve development needs in the longer term. Any development proposed needs to take into account the existing landscape quality and the visual impact of development.

PPG9 gives guidance on how the Government's policies for the conservation of our natural heritage are to be reflected in land use planning. It embodies the Government's commitment to sustainable development and to conserving the diversity of wildlife. The guidance emphasises the importance of designated sites but also states that our natural heritage is also found throughout the countryside (this would include areas of ancient woodland).

However, it also states that 'Local Planning Authorities should not refuse permission if development can be subjected to conditions that will prevent damaging impacts on wildlife, habitats or other features, or if other material factors are sufficient to override nature conservation considerations.'

The main aim of PPG13 is to ensure that local authorities carry out their land use policies and transport programmes in ways which help to reduce growth in the length and number of motorised journeys; encourage alternative means of travel which have less environmental impact; and reduce the reliance on the private car.

Trunk roads have an important strategic role to play in carrying long distance traffic between major centres. However, great care must be taken to minimise the impact of any new transport infrastructure, or improvements to existing infrastructure, on both the natural and built environment. The guidance states that 'wherever possible, new routes must be kept away from protected areas, such as AONBs and SSSIs.

New routes should also make the best use of existing landscape contours and features to reduce noise, visual effects and intrusion, having regard to safety and economic considerations. New road routes and infrastructures should be designed to have the minimum effect on the best and most versatile agricultural land,

avoiding farm severance and disruption to field drainage systems. Care should also be taken to minimise the impact during construction, including the need to transport materials to and from the site and the disposal of spoil.

The guidance also states that 'Local plans should include policies that encourage the implementation of specific measures to assist people to use bicycles.'

PPG16 provides guidance on archaeological remains on land and how they should be preserved or recorded both in an urban setting and in the countryside.

It states that 'Archaeological remains should be seen as finite, and non-renewable resources, in many cases highly fragile and vulnerable to damage and destruction. Appropriate management is therefore essential to ensure that they survive in good condition. In particular, care must be taken to ensure that archaeological remains are not needlessly or thoughtlessly destroyed. They can contain irreplaceable information about our past and the potential for an increase in future knowledge. They are part of our sense of national identity and are valuable both for their own sake and for their role in education, leisure and tourism'. 'Where planning authorities decide that the physical preservation in situ of archaeological remains is not justified in the circumstances of the case and that development resulting in the destruction of the archaeological remains should proceed, it would be entirely reasonable for the planning authority to satisfy itself before granting planning permission, that the developer has made appropriate and satisfactory provision for the excavation and recording of the remains'.

#### **Regional Planning Policies**

The South East Regional Planning Conference (SERPLAN) provides regional advice to government. Based on this, the Secretary of State for the Environment issued regional planning guidance for the South East in March 1994, which covers the period between 1991 and 2011, and is a replacement for RPG9 (February 1989). The objectives of the guidance are to promote 'enhanced economic performance, sustainable development and environmental improvement opportunity, and choice' (RPG 9, para 1.6).

The principles of the planning guidance reflect those set out in the Government White Paper 'This Common Inheritance' (September 1990) and 'Sustainable Development: The UK Strategy' (January 1994).

'A key objective is to provide a framework for economic growth to maintain and develop the South East's competitive position in Europe and to give employment to its people.' RPG9 also stresses that the Regional transport system must provide for the economic and social needs for access. Efficient movement of goods and people is a prerequisite of a strong economy, and is therefore regarded as an important aim. It also states that planning and transport policies should be coordinated to maintain and improve communication with continental Europe and inter-regional movement through the south east.

Its objectives of particular relevance to the scheme are: *to provide for safe and efficient movement and to facilitate accessibility in order to serve the existing and future pattern of development in the Region, -to take into account fully the high and rising economic and environmental costs of transport in the South East.*

The transport investment programme reflects the need for: *good quality inter urban and strategic links from the South East and other regions to the Channel Tunnel -the major sea ports and air ports; a good strategic route around London for through traffic combined with a judicious programme of road improvements within the capital to aid orbital movement, and to alleviate congestion blackspots.*

#### **Surrey County Structure Plan - Replacement Plan (1994)**

#### **Reigate and Banstead Local Plan - Adopted Plan (July 1994)**

5.13.3 Analysis of Impacts and Effects

The assessment revealed that all the Structure and Local Plan policies outlined reflect the national Planning Policy Guidance Notes and other planning guidance and legislation relevant to the scheme. For this reason other policies have not been separately analysed in the Policy Assessment Schedules.

The majority of policies in the local planning documents would either be facilitated or not adversely affected by the proposals. However the proposals would affect the objectives of archaeological designations.

5.13.4 Mitigation

5.13.5 Conclusions



UNCLASSIFIED

TOLLGATE HOUSE

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ENVIRONMENT & LANDSCAPE  
Environmental Statement

11/03/2001 16:08:44

# A23/M23 HOOLEY JUNCTION - ENVIRONMENTAL STATEMENT 12/97



HA 44/27/150 1





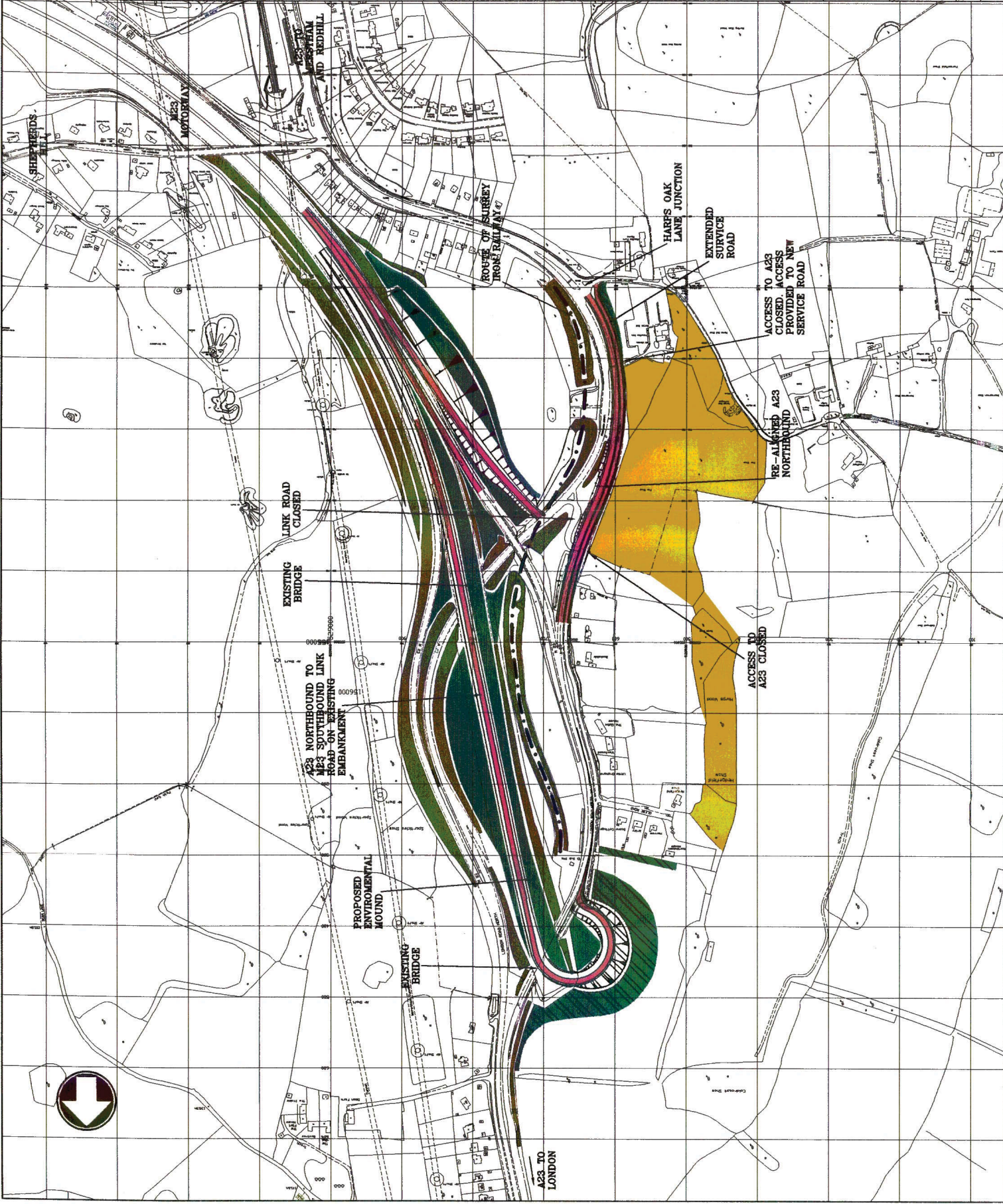
A23 / M23 Hooley Junction Improvement
Regional Context
Fig 1.1

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**LEGEND :-**

-  EXISTING PLANTING
-  PROPOSED PLANTING
-  PROPOSED OFFSITE PLANTING
-  NEW CARRIAGEWAY
-  ANCIENT WOODLAND

?  
 15m  
 10m  
 5m






**Mott MacDonald**  
 Mott MacDonald Limited  
 Capital House, 45-52 Andover Road,  
 Winchester SO50 7BE  
 Telephone 01963 883300  
 Fax 01963 883304  
 Telex M1764 MOTTAT G  
 Title

**A23/A25 HOYLES JUNCTION  
 GENERAL FEATURES  
 OF THE PROPOSED SCHEME**

Date	Drawn	Checked	Approved	Scale
16.12.97	CAD	CRW	CRW	1:50000
Drawing No.	Figure 4.1			Rev
				P1

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**LEGEND: -**

-  EXISTING PLANTING
-  PROPOSED PLANTING
-  PROPOSED OFF SITE PLANTING

*Screening (L.F.A)*

These plots would comprise dense native trees and shrubs to screen the new road from properties and other facilities.

*Integration with Surrounding Landscape (L.F.B)*

These measures are intended to blend the new road into the landscape and include new planting or the removal of redundant canopy or other unsightly features.

*Townscape Conservation (L.F.C)*

These plots are intended to link the new route into the urban area and would consist of more ornamental species to provide an attractive high quality edge to the road.

*Nature Conservation (L.F.D)*

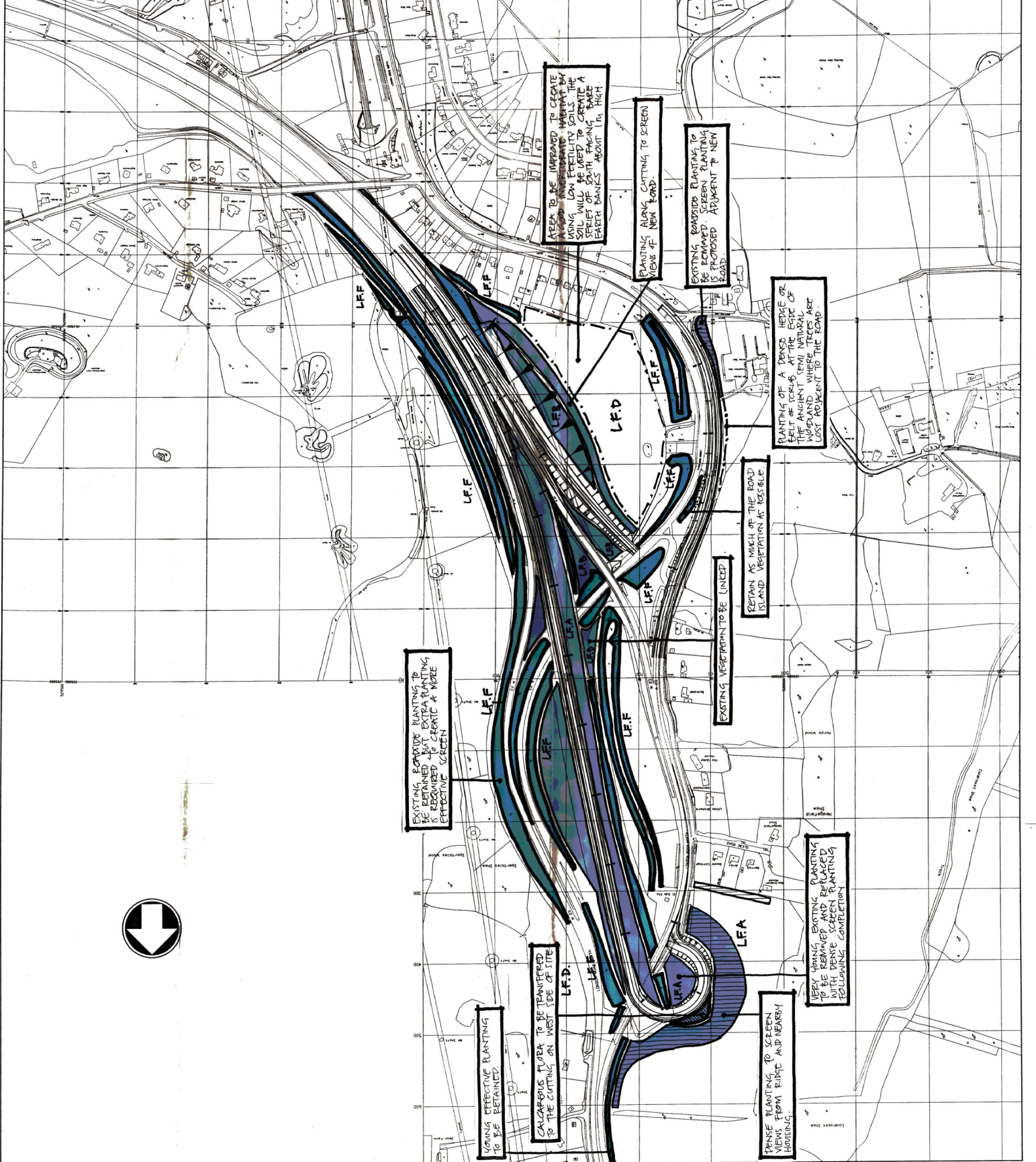
Detailed ecological mitigation is described in the ecology section of the Environmental Statement, but where appropriate measures outlined on the drawings, including the planting of native species, will be implemented to offset any damage resulting from the scheme.

*Providing Interest for the Road User (L.F.E)*

These areas are intended to provide an interesting visual experience for the road user, such as wildflower seeding or ornamental planting in urban areas.

*Conservation of Existing Landscape (L.F.F)*

This function is intended to conserve features that make an important contribution to the local landscape such as mature blocks of existing vegetation or other local landmarks.



EXISTING BORDERSIDE PLANTING TO BE RETAINED BUT EXTRA PLANTING TO BE REQUIRED TO CREATE A WIDE EFFECTIVE SCREEN

YOUNG BEECHING PLANTING TO BE RETAINED

CALCAREOUS FLORA TO BE TRANSFERRED TO THE CUTTING ON WEST SIDE OF SITE

AREAS TO BE IMPROVED TO CREATE A MORE LONG FERTILITY PLANTING SOIL WILL BE LAYED TO CREATE A SERIES OF SOUTH FACING BAKE EARTH BANKS ABOUT 1.5m HIGH

PLANTING ALONG CUTTING TO SCREEN VIEWS OF NEW ROAD

EXISTING BORDERSIDE PLANTING TO BE REMOVED. SCREEN PLANTING IS PROPOSED ADJACENT TO NEW ROAD

PLANTING OF A DENSE HEDGE OR BELT OF SCRUBS AT THE EDGE OF THE ANCIENT SEMI NATURAL WOODLAND WHERE TREES ARE MOST PROMINENT TO THE ROAD

RETAIN AS MUCH OF THE ROAD ISLAND VEGETATION AS FEASIBLE

EXISTING VEGETATION TO BE UNICED

VERY YOUNG EXISTING PLANTING TO BE REMOVED AND REPLACED WITH DENSE SCREEN PLANTING FOLLOWING COMPLETION

DENSE PLANTING TO SCREEN VIEWS FROM FINE AND NEARBY HOUSING

Rev.	Date	Drawn	Description	Check	App'd

**Mott MacDonald**  
 Mott MacDonald Limited  
 One St. Andrew's Road  
 Hampshire SO8 7YH  
 Telephone 01800 80000  
 Fax 01800 80004  
 Email [info@mottmac.com](mailto:info@mottmac.com)

Client: **12500**  
 Drawing No. **Figure 3.2**

Title: **A23/M23 HOOLEY JUNCTION IMPROVEMENTS LANDSCAPE PROPOSALS**

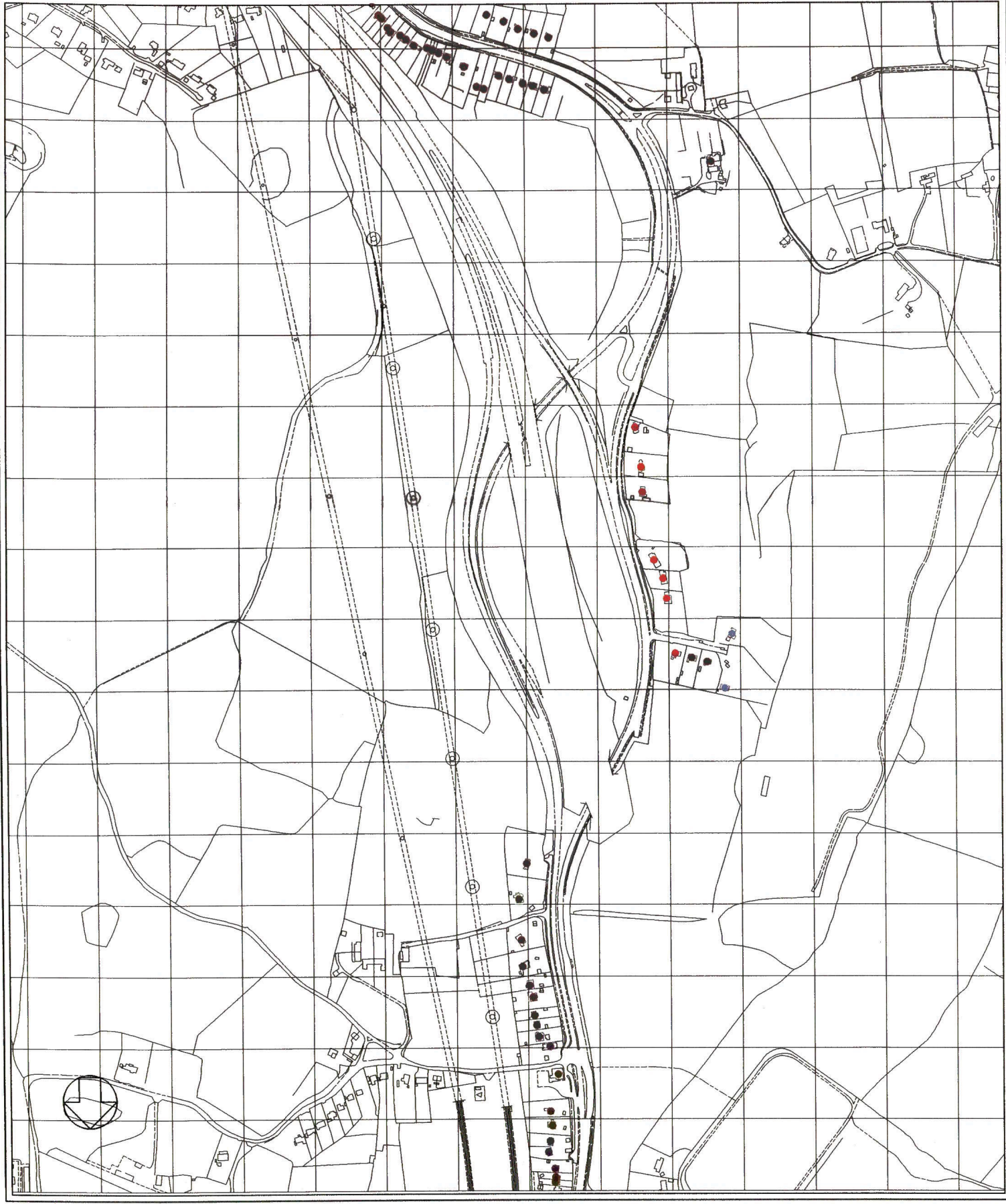
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**Key**

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- 60 - 70 dB
- > 70 dB



**m Mott MacDonald**  
 Mott MacDonald Limited  
 Capital House, 40-42 Andover Road  
 Winchester, Hampshire SO8 9TE

Telephone 01963 888000  
 Fax 01963 888005  
 Telex 81544 MOTTAL G

**A25/A263 HOLEY JUNCTION  
 IMPROVEMENT  
 DO NOTHING 1996 PREDICTED NOISE  
 LEVELS(NO SCHEME)**

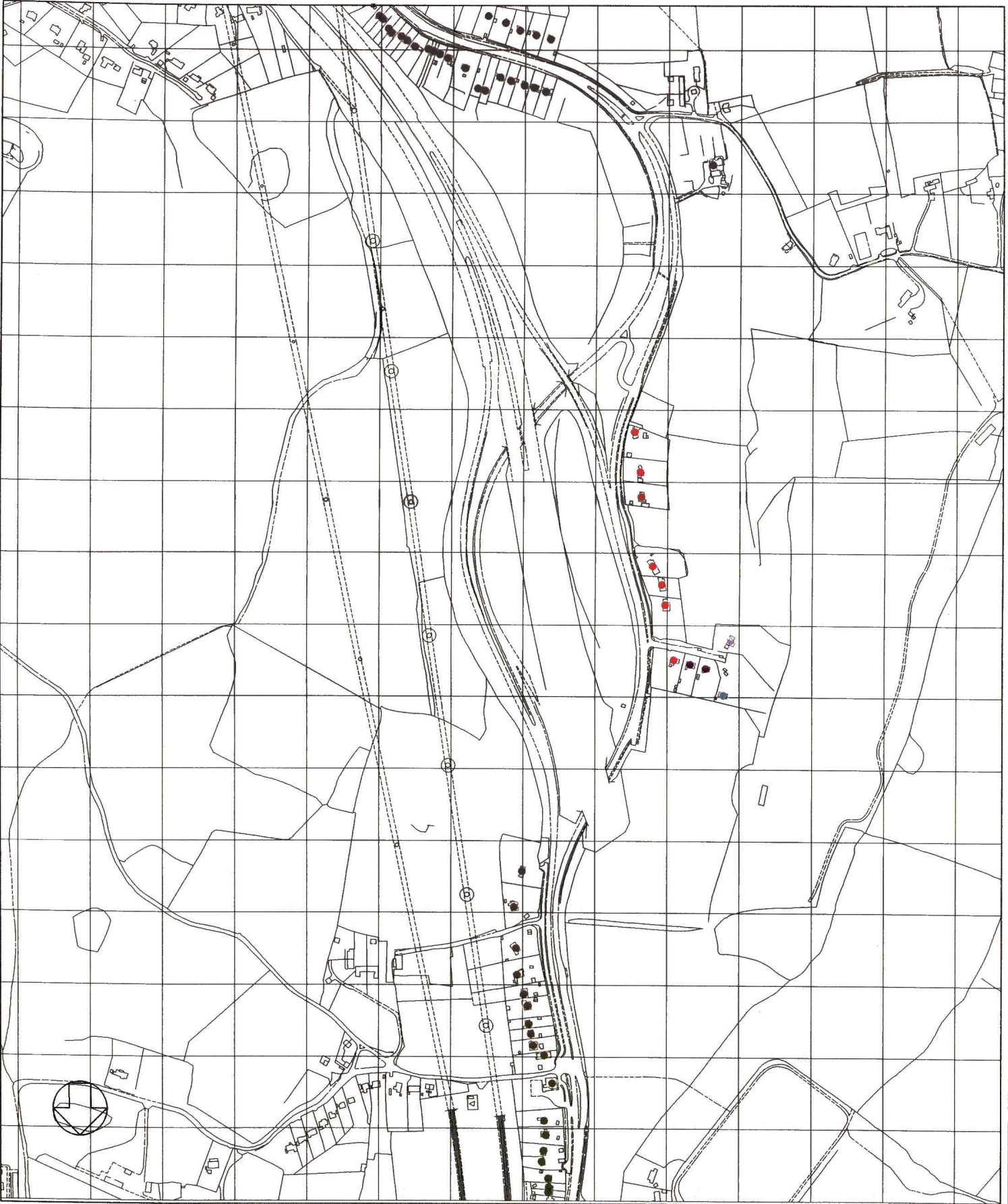
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**Mott MacDonald**  
 Mott MacDonald Limited  
 Capital House-4th Floor, Broad Street  
 Wincoburton  
 Nottingham NG10 7TH  
 Telephone 01930 888200  
 Fax 01930 862264  
 Telex 817041 MOTTAL G

**TITLE**  
 A59/A66 HOCKLEY JUNCTION  
 IMPROVEMENT  
 DO MINIMUM 2013 PREDICTED NOISE  
 LEVELS(NO SCHEME)

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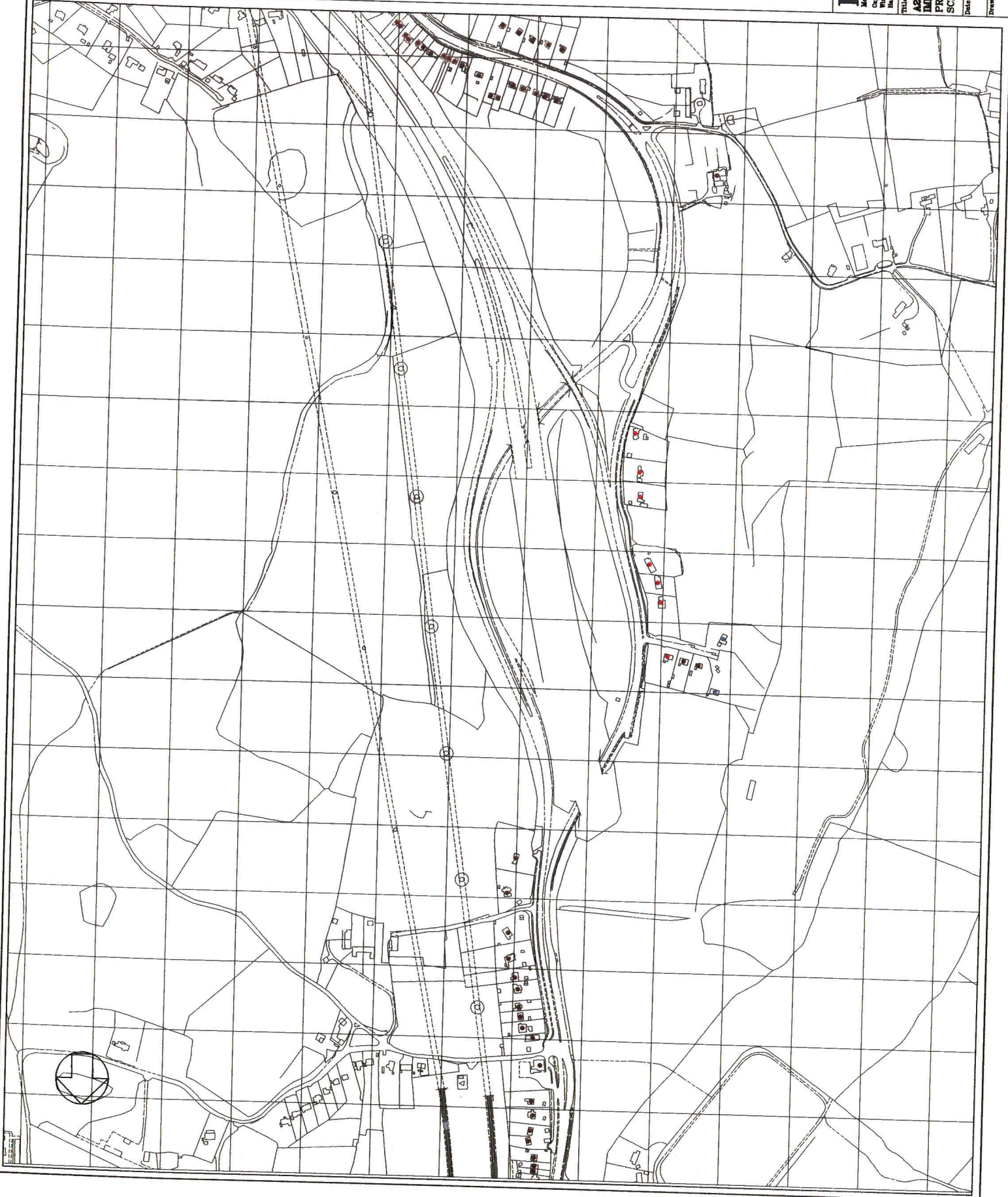
- 50 - 60 dB
- 60 - 70 dB
- > 70 dB

**Mott MacDonald**  
 Capital House, 48-50 Alderley Road  
 Wilmslow, Cheshire SK9 7BE  
 Telephone 01625 080000  
 Fax 01625 080001  
 Telex 817241 MOTTVAL G

**APR/M25 HOOLEY JUNCTION IMPROVEMENT PREDICTED 2013 NOISE LEVELS (WITH SCHEME)**





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**KEY**

-  PROPOSED NEW DRAINAGE CATCHMENTS
-  PROPOSED CARRIAGEWAY AREAS TO DRAIN TO EXISTING HIGHWAY DRAINAGE SYSTEM
-  APPROXIMATE POSITION OF EXISTING OR PROPOSED SOAKAWAYS
-  CUT OFF DRAIN

**Mott MacDonald**  
 Telephone 01858 888000  
 Capital House, 42-48, Audley Road  
 Winchester  
 Hampshire SO8 7YE

**A23/M23 HOOLEY JUNCTION  
 IMPROVEMENT  
 WATER QUALITY AND  
 DRAINAGE - PROPOSED**

Date	Drawn	Checked	Approved
16.12.97	CAD	CBF	CBF

Scale 1:50000  
 Sheet P1

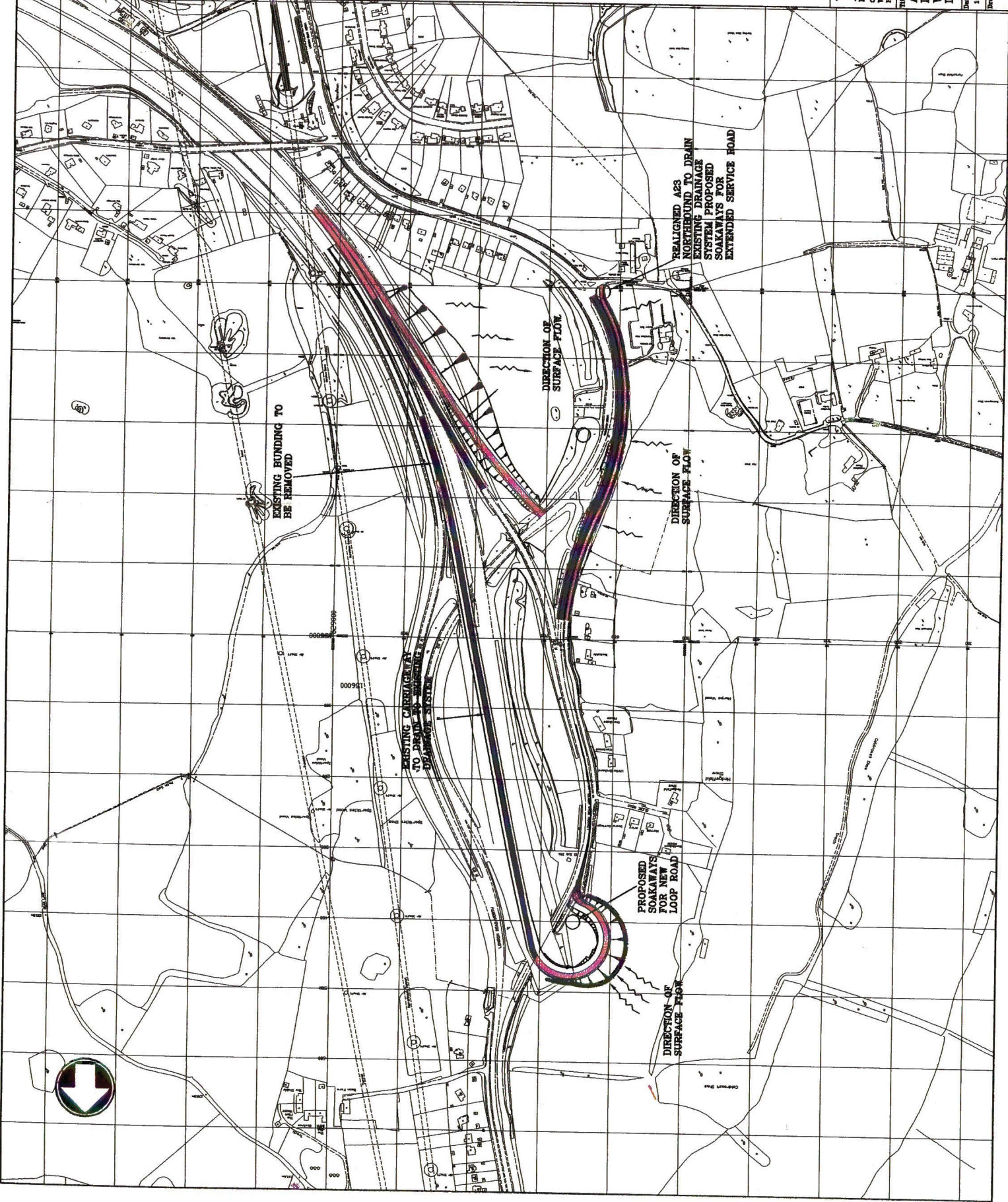


Figure 5.20

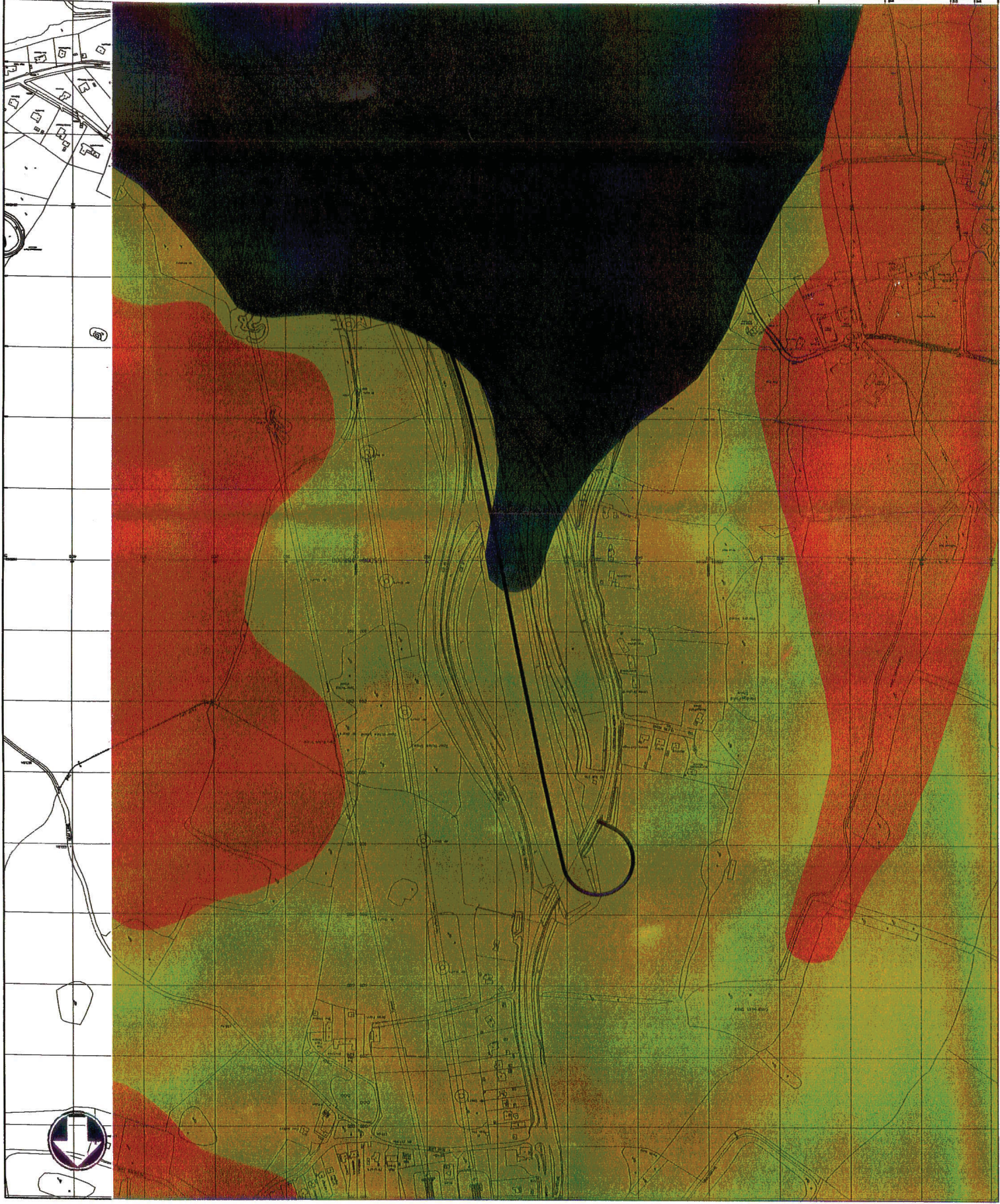
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**KEY**

- CLAY WITH FLINTS
- UPPER CHALK
- MIDDLE CHALK

**NOTE**

THE CHALK IS FREQUENTLY COVERED BY A WASH OF CLAY WITH FLINTS WHICH MAY BE OVER 3m THICK IN THE VALLEY BOTTOM.



**m** Mott MacDonald  
 Mott MacDonald Limited  
 Capital House, 40-42 Andover Road  
 Basingstoke, Hampshire RG24 0NY  
 Telephone 01256 888000  
 Fax 01256 333999  
 Email: [enquiries@mottmac.com](mailto:enquiries@mottmac.com)

Title  
**A23/M23 HODLEY JUNCTION IMPROVEMENT**  
**GEOLOGY**

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CUD	CRF	CRF	1:50000
Drawing No.			Rev.
Figure 5.21			P1