

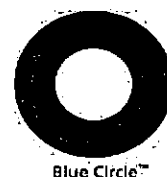
# **WESTBURY CHALK QUARRY EXTENSION** **PLANNING APPLICATION**

## ***ENVIRONMENTAL STATEMENT***



VOLUME 1  
Chapters 1 - 7

SEPTEMBER 2004



**WESTBURY CHALK QUARRY**  
**Proposed Chalk Quarry Extension, Planning Application**

**Environmental Statement**

**Contents**

NON-TECHNICAL SUMMARY

---

**Volume 1**

---

**1.0 INTRODUCTION**

- 1.1 Mineral Working at Westbury
- 1.2 The Planning Background to this Application
- 1.3 The Environmental Statement
- 1.4 Scoping
- 1.5 The Cement Works, Clay Quarry and Pipelines
- 1.6 Relationship to Other Documents
- 1.7 The Assessment Team

**2.0 PROJECT DESCRIPTION**

- 2.1 Chalk Quarry Extension
- 2.2 Other Development

**3.0 ALTERNATIVES CONSIDERED**

- 3.1 Introduction
- 3.2 Alternative Quarry Extensions
- 3.3 Alternative Quarry Sites
- 3.4 Conclusions

**4.0 GEOLOGY, QUARRY DESIGN & RESTORATION**

- 4.1 Geological Description
- 4.2 Reserves
- 4.3 Geotechnical Considerations
- 4.4 Quarry Restoration
- 4.5 Quarry Operation and Phasing

Appendix 4.1      Borehole logs

## **5.0 LANDSCAPE & VISUAL ASSESSMENT**

- 5.1 Introduction
- 5.2 Methodology
- 5.3 Baseline Survey
- 5.4 Proposed Development
- 5.5 Predicted Landscape Impacts
- 5.6 Predicted Visual Impacts
- 5.7 Policy Considerations
- 5.8 Conclusions

- Appendix 5.1 Glossary of terms
- Appendix 5.2 Assessment Methodology
- Appendix 5.3 Published Landscape Assessment Extracts
- Appendix 5.4 Bibliography

## **6.0 HYDROLOGY, HYDROGEOLOGY and WATER QUALITY**

- 6.1 Introduction
- 6.2 Water interests
- 6.3 Hydrological conceptual model
- 6.4 Environmental impact
- 6.5 Conclusion
- 6.6 References

- Appendix 6.1 Borehole logs

## **7.0 ECOLOGY**

- 7.1 Introduction
- 7.2 Methods
- 7.3 Background Information
- 7.4 Survey Results
- 7.5 Evaluation
- 7.6 Future under the Status Quo
- 7.7 Impacts before Mitigation
- 7.8 Mitigation
- 7.9 Residual Impacts

- Appendix 7.1 Flora of the Study Area
- Appendix 7.2 Invertebrates Recorded from the Study Area

---

## **Volume 2**

---

### **8.0        ARCHAEOLOGY**

- 8.1        Desk Based Archaeological Assessment
- 8.2        Area A Fieldwalking
- 8.3        Area B Fieldwalking
- 8.4        Stage 3 Archaeological Evaluation
- 8.5        Overall Conclusions
- 8.6        References

- Appendix 8.1    Gazetteer of Archaeological Sites
- Appendix 8.2    Field Walking Area A Phase 1 finds
- Appendix 8.3    Field Walking Area A Phase 2 finds
- Appendix 8.4    Worked Flint
- Appendix 8.5    Field Walking Area B finds
- Appendix 8.6    Transect Co-ordinates
- Appendix 8.7    Evaluation Trenching Tables
- Appendix 8.8    Letter from County Archaeologist

### **9.0        RIGHTS-OF-WAY**

### **10.0       SOILS AND AGRICULTURE**

- 10.1       Introduction
- 10.2       Site and climatic characteristics
- 10.3       Agricultural land quality and main soil characteristics
- 10.4       Soil resource
- 10.5       Alternative site search
- 10.6       Farm structure and land use
- 10.7       Conclusions

### **11.0       NOISE**

- 11.1       Introduction
- 11.2       Noise Measurement Procedure
- 11.3       Discussion of Results
- 11.4       Total "Worst Case" Calculated Community Noise Levels from Quarry Extensions
- 11.5       Risk of Noise Complaints
- 11.6       Other Considerations
- 11.7       Conclusions



## **12.0 OTHER ISSUES**

- 12.1 Air quality
- 12.2 Listed Buildings
- 12.3 Scheduled Ancient Monuments
- 12.4 Transport
- 12.5 Lighting
- 12.6 Socio economic
- 12.7 Vedette post

Appendix 12.1 Listed Buildings

Appendix 12.2 Scheduled Ancient Monuments

## **13.0 CUMULATIVE IMPACTS**

- 13.1 Introduction

## **14.0 DEVELOPMENT PLAN POLICIES**

- 14.1 Introduction
- 14.2 Commentary Upon Proposed Development in Relation to the MLP
- 14.3 Conclusions

Appendix 14.1 Extracts from Minerals Local Plan

## **ILLUSTRATIONS**

- Figure 1.1 Location plan – regional
- Figure 1.2 Location plan – local
- Figure 4.1 Aerial photographs current vv restored quarry
- Figure 12.1 Listed Buildings and Scheduled Ancient Monuments

## **DRAWINGS**

- TD-WQ030 Planning application
- TD-WQ031 Planning constraints
- TD-WQ032 Proposed restoration
- TD-WQ033 Quarry geological cross-sections
- TD-WQ033a Northern area, detailed cross-sections
- TD-WQ034 Phased working scheme leading to final restoration
- TD-WQ035 Alternative site search
- TD-WQ036 Rights-of-way closures and diversions



## **1.0 Introduction**

### **1.1 MINERAL WORKING AT WESTBURY**

- 1.1.1 This Environmental Statement (ES) is submitted in connection with a planning application to extend the area of mineral working at Westbury Chalk Quarry.
- 1.1.2 Lafarge Cement UK ('Lafarge'), formerly Blue Circle Cement<sup>1</sup>, operates Westbury Cement Works, which is located near Westbury, roughly equidistant from Trowbridge and Warminster in Wiltshire. The works was opened in 1962 and, with extensive modernisation over the years, manufactures around 5% of the UK's cement and is the only remaining cement production unit in the South West Region.
- 1.1.3 The cement-making process employs chalk and clay and these two primary raw materials have always been supplied from quarries nearby. The clay quarry is located almost adjoining the cement works and does not form part of these proposal. The chalk quarry is located on the northwest edge of Salisbury Plain, southwest of the chalk scarp and 2km south of the cement works, the two being connected by underground chalk slurry pipelines.
- 1.1.4 Over the years the works has increased production. From an initial figure of about 200,000 tonnes of cement per annum (tpa), the figure today is approaching 700,000 tpa and is anticipated to increase to 745,000 tpa. The consumption of raw materials has increased similarly.
- 1.1.5 This level of production requires the quarrying of around 100,000 tonnes per annum (tpa) of clay, and 1.17 million tpa of chalk. These tonnages are "as dug", i.e. including moisture.
- 1.1.6 The regional location of the development is given in Figure 1.1 and its local context in Figure 1.2.

### **1.2 THE PLANNING BACKGROUND TO THIS APPLICATION**

- 1.2.1 The existing chalk quarry was originally permitted in 1947. Commencement of development was deferred until 1961-62, when the quarry opened. In 1980 permission was granted for a southeastwards extension of the 1947 quarry, these two permissions comprising the surface extent of the quarry today. In 1989 these permissions were amended by the grant of approval for deepening the quarry within their existing permitted surface areas.
- 1.2.2 The 1947 permission was registered under the Planning & Compensation Act 1992, and new planning conditions agreed in August 1994.
- 1.2.3 Under the Environment Act 1995, Westbury is classed as a Periodic Review site, and the clay and chalk quarries together form a 'single site' for the

---

<sup>1</sup> For simplicity the name Lafarge is used throughout even though Blue Circle might be historically appropriate in places.

purposes of the Act. Because the site is "mixed" – that is, it includes permissions subject to both the 1992 and 1995 acts – its prescribed date for review under the 1995 Act is 15 years from 1994, namely 2009.

1.2.4 It is envisaged that, if granted, this current planning application will supersede the existing chalk planning permissions with a single modern permission, with a review date under the 1995 Act of 15 years from the date of such new permission.

1.2.5 The planning application requires environmental assessment, the basis of which is given below.

### 1.3 THE ENVIRONMENTAL STATEMENT

1.3.1 This Environmental Statement (ES) has been prepared by Lafarge in support of the application to extend the existing chalk quarry.

1.3.2 The requirement to produce a formal ES is contained within the Town & Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999. These regulations identify certain types of development for which an ES is mandatory ("Schedule 1" development) and other types of development ("Schedule 2" development) where the requirement for an ES depends upon whether they would be likely to have significant effects upon the environment by reason of their nature, size and location. The scale of these proposals means that an ES is required.

1.3.3 Schedule 4 to the 1999 Regulations specifies the information that shall be contained within an ES. This consists as follows:

- Description of the development, including its physical characteristics and land-use requirements during construction and operation
- The main characteristics of the production processes, such as the nature and quantity of materials used
- An estimate by type and quantity of residues and emissions
- An outline of the main alternatives studied and the reason for the choice, taking into account environmental effects
- A description of the environment likely to be significantly affected, including flora, fauna, soil, water, air, climate, material assets including architectural and archaeological heritage, landscape, and the inter-relationships between these factors
- A description of the likely significant effects of the development, direct and indirect, secondary, cumulative, short, medium and long term, positive and negative
- Details of mitigation measures

- A non-technical summary.

1.3.4 The 1999 Regulations have been amended by the Town & Country Planning (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2000. These amendments are largely procedural and intended to reconcile the provisions of the Environment Act 1995 with European Directive 85/337/EEC as amended by Directive 97/11/EC. Consequently, the 2000 Regulations do not affect the preparation of this ES, but do affect the procedures under which it is considered.

## 1.4 SCOPING

1.4.1 Although not specifically required by the 1999 Regulations, it is common to agree the scope of environmental impact assessment (EIA) in conjunction with the relevant statutory authorities. In this instance, and in discussion with Wiltshire County Council (WCC), who are the Mineral Planning Authority (MPA), a scoping report was submitted on 1 September 2003 and responses from WCC and various consultees have been received up to 24 October 2003. The information so received has been taken into account during preparation of the relevant chapters.

1.4.2 That process has not, however, been the only consultation on the scope of studies and the assessment of possible impacts. The statutory process of preparing the Wiltshire Minerals Local Plan (MLP) has also informed the scope of the environmental studies.

1.4.3 The MLP was first issued as a Consultation Draft in September 1994. Proposals Map Inset 3 identified an Area of Search extending predominant northeast and southeast of the existing quarry. Lafarge considered that a better outcome would be a Preferred Area that extended only a small distance northeast, and then concentrated upon southeast and southwestwards extensions.

1.4.4 Following extensive environmental investigations in 1994-95 and subsequent years, the latter proposal appeared in the Wiltshire & Swindon MLP Deposit Draft, January 1999. Following a Public Inquiry in 2000, the Preferred Area was included in the Adopted MLP in November 2001. It is this Preferred Area that is now applied for. Further information on the MLP is given in Chapter 14.

1.4.5 The relevance of this somewhat drawn-out timetable is that environmental assessment has been carried on since 1994-95, up to the date of this application. This has included extensive consultation with WCC and key statutory bodies in particular English Nature and the Environment Agency.

1.4.6 In addition, much of the land involved in the application is leased by Lafarge from the Ministry of Defence (MoD), who have also been involved throughout.

1.4.7 The development that is being assessed is in summary as follows. The

existing quarry is often compared to a "shoe box". It originated in a 1940s philosophy whereby the maximum chalk would be extracted from the minimum area. While limiting surface occupancy, that philosophy gives rise to potentially inadequate restoration, as little of value can be achieved on many of the steep quarry faces that are a necessary consequence of the philosophy. The proposal therefore includes reducing the slope of most of the faces to allow worthwhile restoration to be undertaken. That reduction would be achieved by developing flatter slopes northwards from the existing quarry and then continuing clockwise around the eastern and southern margins, until a bowl-like form replaces most of the current steep sides.

## 1.5 THE CEMENT WORKS, CLAY QUARRY and PIPELINES

- 1.5.1 It should be noted that the cement works itself, the clay quarry, and the pipelines connecting the quarry to the works, are not part of this ES or of any proposal being assessed. This is because the applications being made do not encompass or affect them and they remain unchanged. In particular, the proposals do not result in any increase in raw material consumption or cement production, and the clay quarry has more than adequate permitted reserves to support this chalk extension.

## 1.6 RELATIONSHIP TO OTHER DOCUMENTS

- 1.6.1 The planning application is accompanied by this ES and the statutory Non-Technical Summary.
- 1.6.1 Cement manufacture is a process controlled under the Integrated Pollution Control (IPC) procedures in the Environmental Protection Act 1990. Under the Pollution Prevention and Control (England and Wales) Regulations 2000 (SI 2000/1973), the existing IPC authorisation has been upgraded to an Integrated Pollution Prevention and Control (IPPC) authorisation which was approved by the Environment Agency on 14 March 2003. The IPPC process, including future improvements and matters of cement works' fuels, is governed by other, non-planning, legislation.

## 1.7 THE ASSESSMENT TEAM

- 1.7.1 The ES has been prepared by Lafarge's in-house specialists and a team of experienced consultants, as under:

|                              |                                      |
|------------------------------|--------------------------------------|
| • Landscape and Visual       | David Jarvis Associates              |
| • Geotechnical Appraisal     | Edge & Pritchard Ltd                 |
| • Hydrology and Hydrogeology | Marcus Hodges Environment            |
| • Ecology                    | Bioscan Environmental<br>Consultancy |
| • Soils                      | Reading Agricultural Consultants     |

- |                              |                                       |
|------------------------------|---------------------------------------|
| • Archaeology                | Oxford Archaeological Unit <i>and</i> |
| • Noise                      | A.C.Archaeology                       |
| • Other Topics and Editorial | A.R.Coppen & Partners                 |
|                              | Dr Chris Down                         |



Key:

● Westbury chalk quarry

Reproduced with the kind permission of HarperCollins Publishers.  
© HarperCollins Publishers Ltd 2003



United Kingdom

Title: Location plan - regional  
Works: Westbury chalk quarry  
Project: Planning Application & EIS  
Figure: 1.1

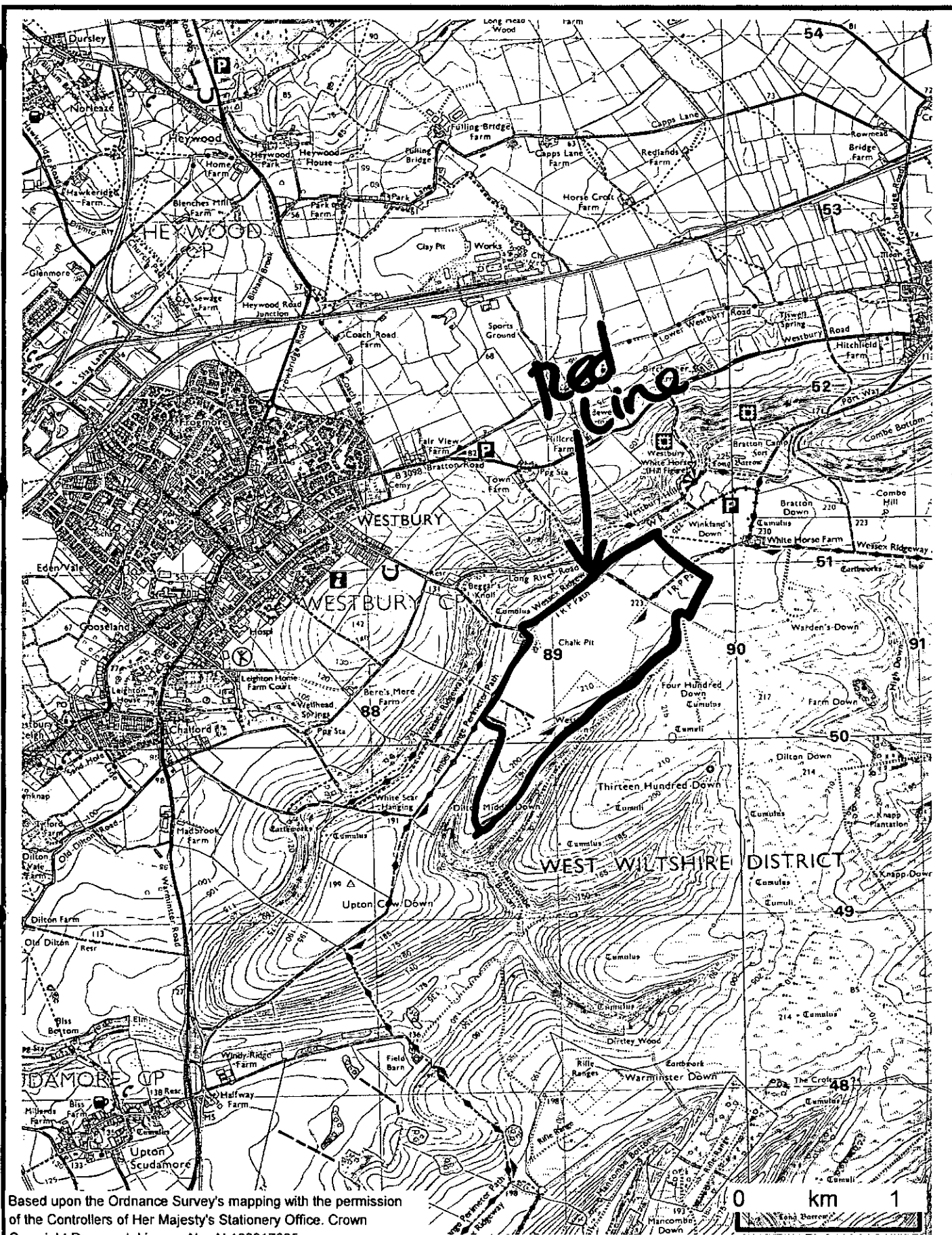
Scale: N.T.S.

Date: February 2004



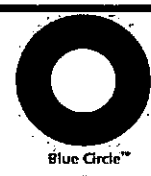
Blue Circle™





Title: Location plan - local  
 Works: Westbury Chalk Quarry  
 Project: Planning Application & EIS  
 Figure: 1.2

Scale: N.T.S.  
 Date: September 2004





## 2.0 Project Description

### 2.1 CHALK QUARRY EXTENSION

- 2.1.1 The project that has been assessed in this ES is the extension of the existing Westbury chalk quarry to secure an additional 20.17 million tonnes of mineral reserves, equivalent to an extra 19.4 years of life. These would be added to the remaining existing permitted reserves of 9.4 million tonnes (9 years) to give a total of about 28-29 years life (as at December 2003). These figures are calculated assuming maximum rated production.
- 2.1.2 The land area of the existing quarry is about 44.8ha and this will be increased to 85.7ha (including the existing quarry), the majority with much flatter, restorable, slopes than at present. Within that larger area, 69.2ha will be quarried, the remainder being used for landscaping, rights-of-way diversions and similar ancillary requirements.
- 2.1.3 The planning application area is shown on Drawing UKTD-WH030, which also locates the 1947 and 1980 permissions and their 1989 deepening permissions.
- 2.1.4 It is acknowledged that the location has always been environmentally sensitive. Drawing UKTD-WH031 summarises the main planning and environment constraints.
- 2.1.5 Quarry operation is envisaged to be substantially unchanged compared to today, with no increase in production and only incremental improvements in machinery. Drawing UKTD-WH033 illustrates the site geology and how the current and ultimate quarry landforms appear in cross section.
- 2.1.6 Production of chalk from the quarry will therefore continue to be about 1.17Mtpa as dug (1.03Mtpa dry basis), with only minor amounts of waste mineral.
- 2.1.7 Drawing UKTD-WH034 illustrates the progression of the development. It shows how in Phase 1 the quarry is first developed eastwards in order to create a ramp running up northwards into the northeast area of the extension. In Phases 1 and 2, this area is extended progressively northwest, and deeper, to its limits, with restoration of final surfaces following closely behind.
- 2.1.8 At this stage, development turns southwest, with only minor development eastwards to flatten the existing quarry faces along this side. By Phase 3, this southwards extension is well established, and is completed in Phase 4.
- 2.1.9 Restoration is completed progressively with quarrying. A more detailed final restoration plan is given in Drawing UKTD-WH032, its basis being to facilitate the natural regeneration of chalk flora by providing appropriate gradients and physical properties of the final surfaces.

- 2.1.10 Various landscaping features will be installed, primarily bunding and tree planting at necessary locations. Drawing UKTD-WH033A illustrates the detail of bunding at the northern end of the extended quarry, showing how provision is made for both visual screening, and a diverted bridleway.
- 2.1.11 There will be a need to close and divert certain public rights of way, and these are shown on Drawing UKTD-WH036.
- 2.1.12 Drawing UKTD-WH035 supports a description (given in Chapter 3) of a search for alternative sites for the development.

## 2.2 OTHER DEVELOPMENT

- 2.2.1 No other development, of the pipelines, cement works, or clay quarry, is required as a result of the chalk quarry extension, and none is therefore assessed.



## 3.0 Alternatives Considered

### 3.1 INTRODUCTION

- 3.1.1 The 1999 Regulations require (Schedule 4) that an ES includes "*An outline of the main alternatives studied by the applicant .... and an indication of the main reasons for his choice, taking into account the environmental effects.*"
- 3.1.2 In the present case, various alternative sites for quarry development have been considered, over several years. The work done and the conclusions reached are given below.
- 3.1.3 To preface that information, it should be appreciated that the overall intention is to secure the supply of chalk to Westbury cement works. To do so, either the existing quarry must be extended, or some new separate quarry must be developed. A precondition of any development must be that it is economically and technically feasible. If not, it would fail to be an alternative.
- 3.1.4 By the same reasoning, an alternative to the present proposals would not be to construct a new cement works somewhere else, as that would not be a project that secured the future of the existing works.

### 3.2 ALTERNATIVE QUARRY EXTENSIONS

- 3.2.1 Alternative extensions to the existing quarry have been considered a number of times at Westbury, and are indicated as area number 2 on Drawing UKTD-WH035. The most recent was the area originally identified by Wiltshire County Council in 1994, when the first draft of the Wiltshire Minerals Local Plan (MLP) indicated generally northeast and southeast extensions towards and behind Bratton Camp / White Horse.
- 3.2.2 Some years previously, Lafarge had considered an extension to the southeast into Salisbury Plain. This would have involved an extension into Four Hundred Down, an ecologically important part of Salisbury Plain (designated as a Site of Special Scientific Interest [SSSI]) and into the military training area. It did not achieve planning permission.
- 3.2.3 One further extension of the existing quarry that could be considered would be to extend towards the northwest. This would involve removal of the Imber footpath and a major breach in the chalk escarpment, and would certainly be regarded as unacceptable.
- 3.2.4 Lastly the option of further deepening the existing quarry has been considered but rejected, on a number of grounds:

- it would involve working chalk with a much lower grade that could only be balanced with additional high grade chalk which would have to come from somewhere else; such as a lateral extension
- it would result in sub-water table quarrying which would be likely to have an adverse impact on the public water supply wells in the area
- the final restored landform would be a large lake which would not be a feature that would be consistent with rolling chalk downland
- the pyritic sulphur levels in the chalk marl would require significant capital investment in scrubbing equipment to remove sulphur dioxide (SO<sub>2</sub>) from the cement works exhaust gases.

3.2.5 The overall conclusion of these considerations was that there was no lateral or in-depth development that would be preferable to the one now proposed. Either the raw materials would not be of the quality required; or the environmental impact of quarrying would be excessive; or restoration would be incongruous or unsatisfactory. On that basis, representations were made on the 1994 MLP with the eventual result that, following recommendations made by the Inspector at a Public Inquiry in 2001, the Adopted MLP contains the allocation for which permission is now sought. The fact of having passed a lengthy and thorough public examination is, in itself, an indication that no alternative expansion of the existing quarry was seen as preferable.

### 3.3 ALTERNATIVE QUARRY SITES

3.3.1 A second possibility is that there might be alternative, entirely new, stand-alone quarry sites available within a reasonable radius. A desk study was therefore made of possible alternative sites within an 8km (5 mile) radius of the cement works.

3.3.2 The geological basis of this study was to identify all areas with a thickness of at least 21 metres of the higher-grade Upper/Middle chalk units. This is required to ensure that the chalk slurry has both acceptable chemistry/grade and handling characteristics.

3.3.3 It will be noted from Drawing UKTD-WH035 that, overwhelmingly, the chalk within an 8km radius of the cement works is designated as SSSI, and it is entirely within the Special Landscape Area (SLA). Two potential areas were identified (numbered 1 and 3 on Drawing UKTD-WH035):

Area 1 (Tinhead Hill) - public right of way crosses the area of interest. Constrained by the woodland (Tottenham Wood), which is visible from the valley and the public area adjacent to the White Horse and the skyline.

Area 3 (Warminster) - The area between Arn Hill Down and Warminster Down – the field barn with a prominent screen of mature trees is a feature on the skyline viewed from the northwest and south. A public footpath crosses the area and it is overlooked by the golf course, which stands on higher ground.

- 3.3.4 No reserve calculations were undertaken as the objective was only to establish the principle of suitability or otherwise.
- 3.3.5 Neither of these areas was considered acceptable. They would involve either the very high capital cost of constructing a brand new chalk washing plant at the new site, or else the substantial environmental impact and cost of transporting chalk by road to the existing washing plant or a new one built at the cement works. Although nominally they might avoid proposals within the SSSI, the fact that the preferred solution occupies only agricultural land within the SSSI diminishes the force of any apparent benefit, while the landscape constraints are similar in policy terms. So, too, are soils and agricultural issues.
- 3.3.6 Additionally, the existing quarry was not designed at a time when restoration was such a high priority. If it were to close without the extension envisaged in the MLP, meaningful restoration would be difficult. These options involve similar or worse policy and environmental issues to that proposed in the MLP.
- 3.3.7 Another option that has been considered was supplying chalk from an existing consented chalk reserve in the southeast of England. Lafarge Cement has no such reserves that are not already committed.

### 3.4 CONCLUSIONS

- 3.4.1 There has been no need to investigate in more detail the stand-alone alternatives, because the capital and operating costs involved would not be acceptable. Neither of the locations considered appear to have any clear advantage over the proposed site and indeed have certain clear disadvantages. Nor do the existing proposals have unacceptable environmental impacts that, to avoid them, would justify incurring such costs.
- 3.4.2 On the other hand, the alternative extensions of the exiting quarry have been considered in some detail and the fact that the current proposals have already passed through a public inquiry indicates that there is no environmentally preferable alternative.





## 4.0 Geology, Quarry Design & Restoration

### 4.1 GEOLOGICAL DESCRIPTION

- 4.1.1 The geological succession within the existing and proposed quarry area consists of Middle Chalk and Lower Chalk, with the basal 10 metres or so of the overlying Upper Chalk present in the northwestern part of the site; the Upper Greensand underlies the Lower Chalk over the whole site. Traditionally it was conventional to divide the Lower Chalk, which the borehole results show attains a thickness of about 90 metres across the site, into an upper part approximately 30m thick and termed the Grey and Blue Chalk, and a lower part, approximately 60m thick and termed the Chalk Marl. Although this sub-division has been revised by the British Geological Survey, the old nomenclature is more widely understood and has been retained throughout this ES. Drawing UK TD-WH033 shows the sequence of these strata.

*Table 4.1 : Chalk Quarry Stratigraphy*

|                              | Unit                 | Thickness (m) |
|------------------------------|----------------------|---------------|
| Upper High-grade Chalk Units | Upper Chalk          | 0 - 11        |
|                              | Chalk Rock           | 2.5           |
|                              | Middle Chalk         | 34            |
|                              | Melbourn Rock        | 2.0           |
| Lower Low-grade Chalk Units  | Plenus Marl          | 1.2           |
|                              | Grey Chalk           | 13            |
|                              | Blue Chalk           | 13            |
| Units not utilised           | Chalk Marl           | 58            |
|                              | Calcareous Limestone | -             |
|                              | Upper Greensand      | -             |

- 4.1.2 Geological investigations/assessments have been carried out at the Chalk quarry since the 1940's. However, prior to the investigation carried out in late 1983, exploration drilling had been restricted to the Upper and Middle part of the Chalk succession. In 1983 drilling established that part of the Lower Chalk sequence, the Grey Chalk, was suitable for cement manufacture and planning permission to develop these reserves was granted in 1989. The 1997 drilling programme was designed to evaluate the potential resources within the potential extension area at Westbury and further prove the level of the water table beneath the quarry. Borehole logs are given in Appendix 4.1.

- 4.1.3 The chalk strata are very consistent laterally and dip gently towards the south-south east at an angle of approximately 3 degrees (1 in 70). Minor faulting is visible within the quarry. This does not impact on chalk quality or quarry development. The Upper and Middle Chalk are typically thinly bedded and the Lower Chalk (Grey Chalk) typically thinly to medium bedded.

## 4.2 RESERVES

- 4.2.1 The life of the chalk quarry reserves has been assessed based on a clinker capacity of 721,000 tonnes/annum<sup>1</sup>. This capacity is a lower figure than previously quoted and is based on the standard statistical methodology employed on all Lafarge cement operations.
- 4.2.2 The reserves have been assessed as at the date of the topographic survey update of October 2003 and updated to the end of the year based on production.
- 4.2.3 The usable chalk reserve remaining within the existing consents is calculated to be 9.4 million tonnes as at 31 December 2003, which is equivalent to just over 9 years life. Indications of the life expectancy of the reserves can only be based on best estimates of the rate of cement production and raw material qualities. Increases or decreases in the rate of production of cement clinker will proportionally decrease or increase the reserve life.
- 4.2.4 Within the limits of the proposed extension the total reserves (excluding consented reserves quoted above) of chalk that the proposed quarry development scheme releases are estimated to be 20.17 million tonnes dry-basis, sufficient for a further 19.4 years.
- 4.2.5 In addition to the geology and chemistry of the chalk beds the final design of the chalk quarry has taken into account a large number of factors including:
- Ecology
  - Visual impact
  - Geotechnical
  - Restoration
- 4.2.6 The reserves have been calculated based on density determinations, which were carried out on rock cores from the 1987 series of boreholes. This information has given a weighted average for the high and low-grade chalks. High-grade chalk units have a dry density of 1.85 tonnes/m<sup>3</sup> and the low-grade a dry density of 1.98 tonnes/m<sup>3</sup>.

---

<sup>1</sup> The product of a cement kiln is called cement clinker, and the clinker capacity of Westbury Works is 721,000 tpa. To make cement, the clinker is ground up with various additives, including gypsum (to control the setting time of the cement) and sometimes other products to tailor the cement to specific markets. Therefore, the cement production capacity of a cement works is a little more than its clinker capacity, in this case 745,000 tpa.

- 4.2.7 A small allowance has been made in the figures for the anticipated tonnage of associated ‘flint’ nodules in the chalk, which are rejected from the wash mills. Flint and occasional bands of very hard chalk are used as a sub-base material for internal quarry haulage roads. Occasionally, flint is sold off site to avoid tipping it as waste.
- 4.2.6 The most notable feature of the proposed extension is that the percentage of higher-grade chalk reserves increases. The Middle Chalk is higher grade than the upper 30m of the Lower Chalk, (the Grey Chalk) and, as indicated in Table 4.2, the two different qualities are blended in different proportions to ensure consistent kiln feed and maximum use of the reserves available.

*Table 4.2 : Generalised mix designs*

|                            | Historic % | Current % | Future % |
|----------------------------|------------|-----------|----------|
| Chalk                      | 83.2       | 87.5**    | 86.8***  |
| Clay                       | 15.0       | 3.6       | 7.2      |
| Silica Sand*               | 1.0        | 3.7       | 2.7      |
| Pulverised Fuel Ash (PFA)* | -          | 4.1       | 2.2      |
| Iron Oxide*                | 0.8        | 1.1       | 1.1      |

\* These products are imported from elsewhere and blended into the quarried chalk and clay at the cement works

\*\* Comprising 35% higher grade (Middle) chalk and 65% lower grade (Lower) chalk

\*\*\* Comprising 51% higher grade (Middle) chalk and 49% lower grade (Lower) chalk

- 4.2.7 The potential use of the unconsented low-grade Chalk Marl resources below the floor of the existing quarry has also been evaluated. Using this material would reduce the need for clay and other secondary materials. However problems of handling the material, plus hydrogeological and restoration implications, mean that significant use of Chalk Marl is not proposed.

### 4.3 GEOTECHNICAL CONSIDERATIONS

- 4.3.1 In order to comply with the latest Mines & Quarries legislation, geotechnical assessments have been undertaken to identify the geotechnical stability and safety risk of quarry faces within the quarry. The proposed design has also been fully assessed to ensure that the geotechnical stability and safety risks have been taken into account.
- 4.3.2 The existing quarry has generally been excavated in accordance with the basic criteria set out in the original approved development plan. However, the terminal slope angles employed are very much at the upper limit for chalk slopes. Chalk slopes at an angle of 63° will always suffer continuous spalling. This limit is also compromised somewhat by the total depth of the quarry and the location of the various ramp systems.

4.3.3 In overall stability terms it is considered that it would be more appropriate in future to cut final slopes with an angle of  $45^{\circ}$  or less, with intermediate “catch” benches to intercept any spalled material. The proposed design incorporates these criteria and, in many areas, still lower face angles have been incorporated.

4.3.4 Three sets of very widely spaced, persistent primary joints are evident throughout the excavated chalk sequence. Their orientations are as follows :

- Set 1 : striking *c.* NNE-SSW and dipping *c.*  $50-75^{\circ}$  towards the WNW and ESE;
- Set 2 : striking *c.* ENE-WSW and dipping *c.*  $50-75^{\circ}$  towards the SSE and NNW;
- Set 3 : dipping *c.*  $45-70^{\circ}$  towards the NNE.

Persistent smooth curviplanar joints are evident in the Lower Chalk (Grey/Blue Chalk) and dip at about  $45-70^{\circ}$  principally towards the SSW. Impersistent, close to medium spaced, sub-vertical secondary joints are generally evident in weathered faces.

4.3.5 The following principal modes of excavated face instability are active, or may potentially occur, at the quarry:

- Wedge: high angle wedge failures are locally evident in excavated faces and are associated with the intersection of the persistent joints;
- Sliding: sliding on the smooth curviplanar joints in the Lower Chalk (Grey/Blue Chalk) is evident;
- Spalling: general degradation of rock mass, particularly during the winter (associated with freeze thaw action).

4.3.6 The most significant types of instabilities listed above, wedge and sliding types, are the principal modes that are active, or may potentially occur, in the existing quarry. The potential for such failures to occur in the proposed final restoration slopes is precluded given that:

- the proposed restored slope gradients are shallower than the angle of potential failure surfaces associated with wedge or sliding type failures;
- potential failure surfaces will therefore not daylight in the restored slopes;
- wedge and sliding type failures are therefore not kinematically possible.

4.3.7 The existing northwestern faces will be retained. These faces currently represent a hazard, due principally to face height and steepness and an associated risk of rockfall. Land ownership and environmental constraints generally preclude regrading these faces to shallower gradients.

4.3.8 The majority of the faces have gradients which range from about 1 vertical :1 horizontal ( $c.45^\circ$ ) to about 2v:1h ( $c.63^\circ$ ). Based on the performance of these faces to date, the rock mass quality of the chalk represented in the faces and the empirical design and performance criteria for excavated chalk slopes set out in Table 4.3, it is considered that:

- there will not be significant regression of the north-west faces;
- spalling and general face degradation will continue in the long term;
- the potential exists for further wedge and sliding type failures to occur;
- a rockfall hazard will be associated with the faces in the long term.

*Table 4.3 : Maximum Slope stability criteria considered (Williams 1989)<sup>2</sup>*

| Slope      | Angle      | Stability                                                                               |
|------------|------------|-----------------------------------------------------------------------------------------|
| 4v in 1h   | $75^\circ$ | Short term stable angle, long term stable angle in massive chalk but with some spalling |
| 2v in 1h   | $63^\circ$ | Actively eroding chalk cliffs                                                           |
| 1.5v in 1h | $53^\circ$ | Stable cut angle but some spalling and loss of vegetation                               |
| 1v in 1h   | $45^\circ$ | Stable cut angle for long term retention of vegetation                                  |
| 1v in 1.5h | $33^\circ$ | Geological stable angle for chalk escarpment, stable cut angle in weathered chalk.      |

## 4.4 QUARRY RESTORATION

4.4.1 The amendments to the 1947 and 1980 consents approved on 20 November 1989 allowed deeper digging. The application to amend the consent stated that the after-use of the quarry would be for MOD purposes. No detailed requirements for reclamation were therefore contained within the consents.

4.4.2 Although after restoration, the chalk quarry will still revert to the MOD, the restoration scheme now proposed aims to improve on the existing permitted restoration scheme and achieve a number of benefits: it mitigates the visual impact of the south western extension, provides a workable final restored landform, and secures significant improvements in the safety of operations.

4.4.3 The proposed restoration scheme for the quarry is illustrated in plan and section on Drawings UKTD-WH032 and UKTD-WH033. The expected progress towards that end result is shown in Drawing UKTD-WH034. This plan concentrates on the development work to the northeast of the existing quarry, which must be undertaken before work can commence on developing the quarry to the southwest.

<sup>2</sup> Williams, R.E. 1989. Performance of highway cuttings in Chalk. International Chalk Symposium, Thomas Telford, London.

- 4.4.4 In order to leave slopes with acceptable gradients for suitable restoration / habitat creation it is considered that generally no new final slopes will be created with face angles in excess of 45°. As it is not intended to restore the quarry side slopes to agriculture or forestry low gradient slope angles such as those described in MPG 7 (November 1996) have not been considered.
- 4.4.5 The proposed restoration slopes/gradients are consistent with:
- long term slope stability requirements;
  - the avoidance of significant progressive slope degradation and regression due to spalling;
  - the establishment and long term maintenance of vegetation cover;
  - the proposed after use.
- 4.4.6 The quarry development and restorations proposals offer significant geotechnical benefits given that they will result in the removal of many of the identified hazards to employees associated with the current final quarry faces.
- 4.4.7 All of the hazards associated with the existing northeastern, southeastern and southwestern perimeter faces will be removed as these faces are advanced to the proposed final positions and graded to the shallow restoration gradients.
- 4.4.8 The rockfall hazard associated with the existing northwestern faces will remain following the proposed restoration. This hazard will be managed by ensuring that pedestrian and vehicular access within the vicinity of the faces is restricted by means of bunds, fences and signs as appropriate. The risk to public safety associated with these faces will be low given that the quarry after-use proposals do not provide for public access into the restored site.
- 4.4.9 The low angle restoration slopes are considered stable for the long-term retention of the calcareous grassland proposed.

#### 4.5 QUARRY OPERATION AND PHASING

- 4.5.1 The quarry is worked in a series of shallow benches (~3m in height). Blending to achieve a constant grade of chalk slurry feed to the works is controlled by the selection of working benches.
- 4.5.2 The quarry is operated by contractors using an hydraulic backhoe excavator to win the chalk from the face. The stone is hauled to the crusher using a fleet of dump trucks. Crushed stone is stockpiled and fed through the wash mills in fixed proportions based on the type and chemistry of the chalk.
- 4.5.3 The product of the wash mills is a blended chalk slurry with a moisture content of approximately 35%. The slurry is gravity fed to the works via an underground pipeline.

4.5.4 With the exception of the use of smaller articulated dump trucks during development work (soil stripping and restoration) it is not proposed to change the type of equipment used for chalk quarrying or processing at the chalk quarry.

4.5.5 Phasing of the quarry working has been developed in conjunction with the landscape architects. The phasing is driven by the need to avoid the visual impact of quarry development into the southeast extension area. Because the ground levels fall towards the southeast, more of the back face of the chalk quarry would become visible from long distance views from the Warminster area as quarrying proceeds southwestwards. Avoidance of adverse impact requires the working and restoration of the back face of the quarry in the northeast before development proceeds too far towards the southwest. The phasing is illustrated on drawing UKTD-WH034.

4.5.6 It should be noted that the major changes from the current situation occur in the earlier years of the development, and the phase intervals are chosen to reflect this.

#### *Phase 1*

4.5.7 The first phase of extraction towards the east and northeast is estimated to release approximately 4.6 million tonnes (dry basis) of chalk reserves sufficient for approximately 4.4 years of extraction. The eastern limit of extraction would remain within the agricultural fields and stand off 10m from the areas of ecological interest.

4.5.8 Phase 1 involves the construction of a haul road into the northeast area and the development of faces orientated northeast to southwest, which would progress towards the northwest.

4.5.9 Restoration of the worked out slopes would be concurrent with extraction. Progressive soiling and seeding of the final worked out slopes (Type 1 restoration) would be undertaken to mitigate the visual impact on views from the southwest. Development of the quarry within the current permitted area would continue lowering the quarry floor both northeast and southwest of the causeway.

#### *Phase 2*

4.5.10 The second phase of extraction would be a continuation of phase 1 with the visual impact mitigation measures in the northeast area largely completed by the end of the phase. Development of the quarry within the current permitted area would also continue lowering the quarry floor predominantly southwest of the causeway.

4.5.11 The second phase of extraction is estimated to release a further 4.5 million tonnes (dry basis) of chalk reserves sufficient for approximately 4.3 years of extraction.

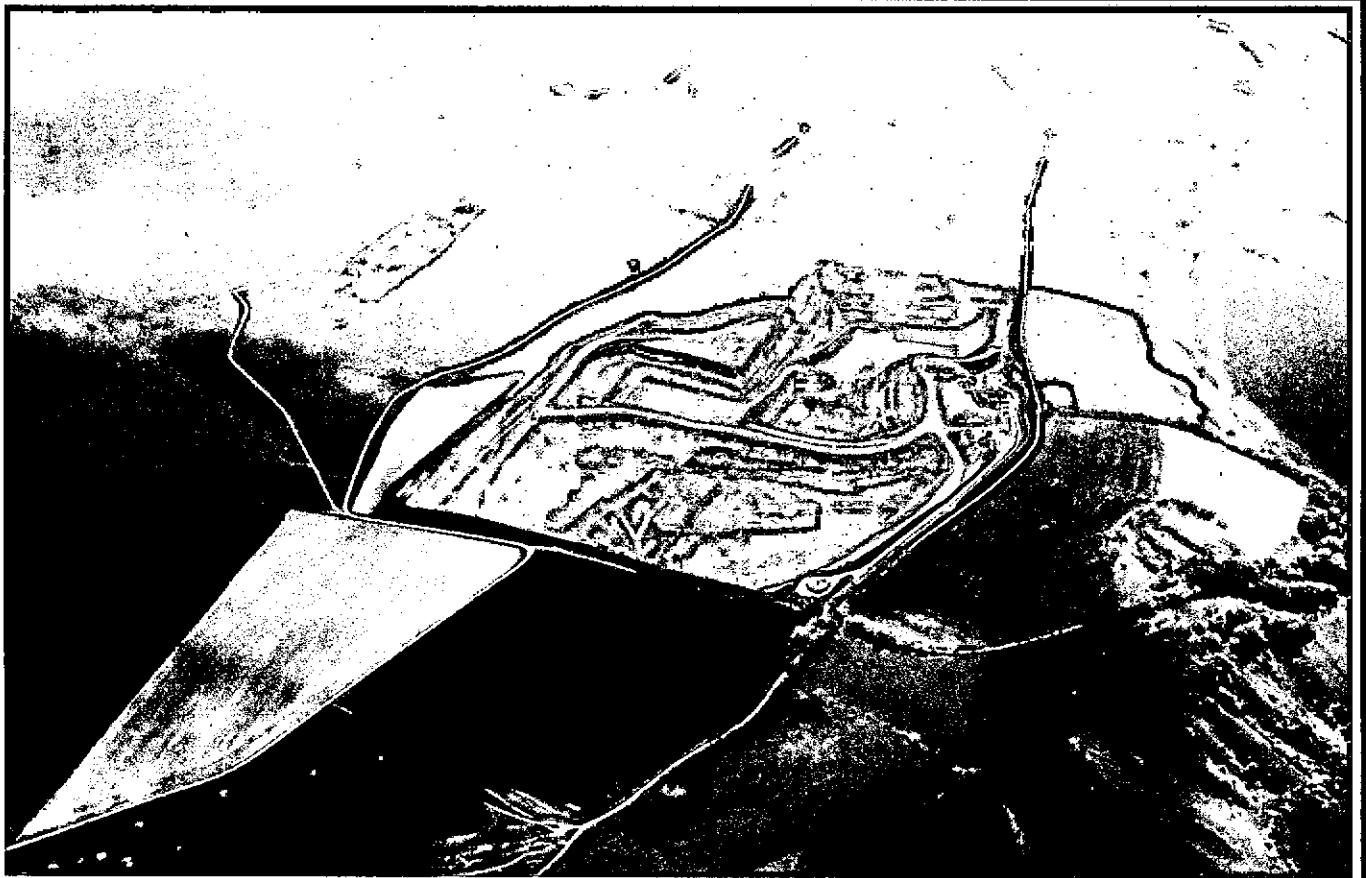


*Phase 3*

- 4.5.12 This phase would see the quarry developed into the southeast and southwest areas which would be worked as a multi-bench operation advancing towards the south-west. The limit of extraction would remain within the agricultural cultivation area of the SSSI and stand off 10m from the areas of ecological interest. The causeway would be progressively removed once it was no longer required for cross-pit haulage.
- 4.5.13 The third phase of extraction is estimated to release a further 4.3 million tonnes (dry basis) of chalk reserves sufficient for approximately 4.1 years of extraction.

*Phase 4*

- 4.5.14 The final phase of extraction releases the balance of the reserves in the southwest area. This phase releases reserves of 16.4 million tonnes (dry-basis) sufficient for 15.6 years of extraction. Completion of extraction is anticipated in 28.4 years (at full clinker capacity). Restoration of the site would be progressive and would be expected to be completed in the Phase 4 areas within five years of the completion of chalk extraction.



Existing Quarry (aerial photograph)



Proposed Restoration (aerial photomontage)



United Kingdom

Title: Existing Quarry & Proposed Restoration (Photomontage)  
 Works: Westbury Chalk Quarry  
 Project: Planning Application & EIS  
 Figure: 4.1

Date: September 2004



Blue Circle™

**Appendix 4.1**  
Borehole Logs

## Appendix 4.1

### Summary Chalk Quarry borehole logs

#### WCH 1/47

|               |                |
|---------------|----------------|
| 0.00 - 3.81   | UPPER CHALK    |
| 3.81 - 35.66  | MIDDLE CHALK   |
| 35.66 - 38.40 | MELBOURNE ROCK |
| 38.40 - 52.73 | LOWER CHALK    |

#### WCH 2/54

|               |                |
|---------------|----------------|
| 0.00 - 0.38   | TOP SOIL       |
| 0.38 - 2.24   | CHALK ROCK     |
| 2.24 - 33.53  | MIDDLE CHALK   |
| 33.53 - 37.19 | MELBOURNE ROCK |
| 37.19 - 42.98 | GREY CHALK     |

#### WCH 3/54

|               |                |
|---------------|----------------|
| 0.00 - 0.30   | TOP SOIL       |
| 0.30 - 4.65   | UPPER CHALK    |
| 4.65 - 7.14   | CHALK ROCK     |
| 7.14 - 39.55  | MIDDLE CHALK   |
| 39.55 - 43.43 | MELBOURNE ROCK |
| 43.43 - 45.57 | GREY CHALK     |

#### WCH 4/54

|               |                |
|---------------|----------------|
| 0.00 - 0.25   | TOP SOIL       |
| 0.25 - 2.41   | CHALK ROCK     |
| 2.41 - 33.53  | MIDDLE CHALK   |
| 33.53 - 37.29 | MELBOURNE ROCK |
| 37.29 - 37.64 | PLENUS MARL    |

#### WCH 5/54

|               |                 |
|---------------|-----------------|
| 0.00 - 7.32   | TOP SOIL / CLAY |
| 7.32 - 14.94  | CHALK ROCK      |
| 14.94 - 45.19 | MIDDLE CHALK    |
| 45.19 - 47.55 | MELBOURNE ROCK  |

#### WCH 6/54

|               |                |
|---------------|----------------|
| 0.00 - 1.09   | TOP SOIL       |
| 1.09 - 2.34   | CHALK ROCK     |
| 2.34 - 34.01  | MIDDLE CHALK   |
| 34.01 - 37.08 | MELBOURNE ROCK |
| 37.08 - 41.00 | GREY CHALK     |

#### WCH 7/54

|               |                |
|---------------|----------------|
| 0.00 - 0.46   | TOP SOIL       |
| 0.46 - 24.54  | MIDDLE CHALK   |
| 24.54 - 27.28 | MELBOURNE ROCK |
| 27.28 - 33.76 | GREY CHALK     |

WCH 8/54

|               |                |
|---------------|----------------|
| 0.00 - 0.46   | TOP SOIL       |
| 0.46 - 6.78   | UPPER CHALK    |
| 6.78 - 9.98   | CHALK ROCK     |
| 9.98 - 41.68  | MIDDLE CHALK   |
| 41.68 - 44.20 | MELBOURNE ROCK |

WCH 1/83

|                |               |
|----------------|---------------|
| 0.00 - 0.60    | TOPSOIL.      |
| 0.60 - 9.95    | UPPER CHALK   |
| 9.95 - 10.16   | FLINT         |
| 10.16 - 12.61  | CHALK ROCK    |
| 12.61 - 46.30  | MIDDLE CHALK  |
| 46.30 - 48.02  | MELBOURN ROCK |
| 48.02 - 49.22  | PLENUS MARL   |
| 49.22 - 76.00  | GREY CHALK    |
| 76.00 - 106.20 | CHALK MARL    |

WCH 2/83

|                 |                 |
|-----------------|-----------------|
| 0.00 - 0.30     | TOPSOIL         |
| 0.30 - 2.00     | CHALK ROCK      |
| 2.00 - 33.65    | MIDDLE CHALK.   |
| 33.65 - 36.75   | MELBOURN ROCK.  |
| 36.75 - 37.92   | PLENUS MARL     |
| 37.92 - 64.00   | GREY CHALK      |
| 64.00 - 123.10  | CHALK MARL      |
| 123.10 - 124.35 | CHALK/SANDSTONE |
| 124.35 - 127.70 | GREENSAND       |

WCH 3/83

|               |                          |
|---------------|--------------------------|
| 0.00 - 6.25   | MADE GROUND (open holed) |
| 6.25 - 12.35  | MIDDLE CHALK             |
| 12.35 - 14.05 | MELBOURN ROCK            |
| 14.05 - 15.35 | PLENUS MARL              |
| 15.35 - 42.00 | GREY CHALK               |
| 42.00 - 80.37 | CHALK MARL               |

WCH 4/83

|                |               |
|----------------|---------------|
| 0.00 - 27.60   | MIDDLE CHALK  |
| 27.60 - 29.62  | MELBOURN ROCK |
| 29.62 - 30.45  | PLENUS MARL   |
| 30.45 - 57.00  | GREY CHALK    |
| 57.00 - 103.21 | CHALK MARL.   |

WCH 5/83

|               |               |
|---------------|---------------|
| 0.00 - 1.35   | MELBOURN ROCK |
| 1.35 - 2.58   | PLENUS MARL   |
| 2.58 - 29.00  | GREY CHALK    |
| 29.00 - 70.00 | CHALK MARL    |

WCH 6/97

|                 |               |
|-----------------|---------------|
| 0.00 - 12.20    | MIDDLE CHALK  |
| 12.20 - 15.15   | MELBOURN ROCK |
| 15.15 - 16.35   | PLENUS MARL   |
| 16.35 - 42.95   | GREY CHALK    |
| 42.95 - 100.08  | CHALK MARL    |
| 100.08 - 103.80 | SANDSTONE     |
| 103.80 - 116.00 | GREENSAND     |

WCH 7/97

|               |               |
|---------------|---------------|
| 0.00 - 12.20  | MIDDLE CHALK  |
| 12.20 - 15.15 | MELBOURN ROCK |
| 15.15 - 16.35 | PLENUS MARL   |
| 16.35 - 42.95 | GREY CHALK    |
| 42.95 - 95.75 | CHALK MARL    |

WCH 8/97

|                 |               |
|-----------------|---------------|
| 0.0 - 2.0       | TOPSOIL       |
| 2.0 - 28.0      | MIDDLE CHALK  |
| 28.0 - 29.37    | MELBOURN ROCK |
| 29.37 - 55.88   | GREY CHALK    |
| 55.88 - 114.40  | CHALK MARL    |
| 114.40 - 132.50 | SANDSTONE     |

WCH 9/97

|              |            |
|--------------|------------|
| 0.0 - 62.60  | CHALK MARL |
| 62.60 - 78.0 | GREENSAND  |



## 5.0 Landscape and Visual Assessment

### 5.1 INTRODUCTION

- 5.1.1 This assessment concerns predicted landscape and visual effects of a proposed extension to the Westbury chalk quarry.

### 5.2 METHODOLOGY

#### *Published Guidance*

- 5.2.1 This assessment has been prepared in accordance with published guidance<sup>1</sup>. It reflects recent changes in recommended approach and incorporates a revised glossary of terms (Appendix 5.1).
- 5.2.2 As with the 1<sup>st</sup> Edition the guidance emphasis the responsibility of the landscape professional carrying out the assessment to ensure that the approach and methodology adopted is appropriate for the particular development to be assessed. The specific methodology adopted for the assessment is provided at Appendix 5.2.

### 5.3 BASELINE SURVEY

#### *Site Location*

- 5.3.1 Westbury Chalk Quarry is located in the vicinity of National Grid Reference ST890505 approximately 1km south east of Westbury, Wiltshire, shown on Figure 5.1.

#### *Site Description*

- 5.3.2 The consented quarry and the proposed extension area are shown on Figure 5.2. Current quarry operations are confined to a broadly rectangular 46ha pit orientated southwest - northeast. The western boundary runs parallel with the adjoining escarpment ridge and a public right of way (the Imber Range Perimeter Path), which also adjoins the northern boundary for about half its length. The southern boundary is bordered by a bridleway.
- 5.3.3 The quarry contains fixed plant, offices and stockpiles on a retained chalk terrace set against the northwestern boundary, shown on Figure 5.3. The terrace platform is set at approximately 200m AOD some 10.0m below the adjoining ridge. An access road leads northeast from the plant site to the site

---

<sup>1</sup>Institute of Environment Management and Assessment and the Landscape Institute - "Guidance for the Assessment of Landscape and Visual Impacts" Second Edition 2002. Scottish Natural Heritage and the Countryside Agency - "Landscape Character Assessment" 2002.



entrance in the northwestern corner.

- 5.3.4 The remainder of the site comprises the main quarry working areas. These are split broadly northeast and southwest of the main haul road, which is set some 40m above quarry floor levels. The northeastern half of the quarry is largely worked out at approximately 70m below original ground levels. Final consented faces are being formed, typically at 2:1 grade below simple grassed rollover slopes at 1:1-1:3 grade. The consented final quarry landform is shown on Figure 5.4.
- 5.3.5 Proposed extension areas lie northeast, southwest and southeast of the current working. The northeastern extension covers some 14.3ha and forms part of the gently southwest-sloping dome of Winklands Down, currently under arable agriculture. Its border with the existing quarry is broadly defined by a tree-lined track which leads eastwards to an MoD vedette post and which coincides with the Imber Range Perimeter Path/bridleway 48 for some of its length. The western boundary is bordered by a byway open to all traffic.
- 5.3.6 The southwestern extension comprises approximately 32ha of farmland set largely on the broad ridge of Westbury Down and Dilton Middle Down. The site limits are defined by the extent of farmed (ploughed) land, the existing quarry and the Imber Range Perimeter Path. Ridge levels fall southwest from approximately 205m to 180m. Adjoining upper valley side slopes are quite consistent at approximately 1:5 grade, steepening to 1:2 grade.
- 5.3.7 The southeastern extension forms an irregular narrow strip covering some 6ha of farmed (ploughed) land on the steep valley slopes facing Four Hundred Down.

#### *Landscape Context*

- 5.3.8 The landscape context of the chalk quarry is shown on Figure 5.5. The site lies at the northern edge of the Salisbury Plain and West Wiltshire Downs National Character Area<sup>2</sup>, and the Salisbury Plain Regional Character Area<sup>3</sup>. Summary descriptions of these areas are made below (full descriptions at Appendix 5.3).

---

<sup>2</sup>The Countryside Agency - "Countryside Character - Volume 8 : South West" 1999.

<sup>3</sup>Wiltshire County Council - "Landscape Local Plan - Adopted Written Statement" 1986 and "Landscape Assessment for the Wiltshire and Swindon Local Plan to 2006" 2000 (Prepared for Wiltshire County Council by The Landscape and Countryside Section, Swindon Borough Council).

*Table 5.1 : Summary of Published Landscape Character Assessment*

| Key Characteristics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Identified Landscape Improvements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><i>National Character Area 132 - Salisbury Plain and West Wiltshire Downs.</i></p> <ul style="list-style-type: none"> <li>• Extensive open, rolling Chalk plateau dominated by large arable fields.</li> <li>• Scattered copses and shelterbelts.</li> <li>• Woodland confined mainly to valleys and steep slopes.</li> <li>• Unimproved chalk grassland of high nature-conservation value.</li> <li>• River valleys with common settlements and narrow floodplains, dominated by former flooded flood meadows and meandering rivers.</li> <li>• Steep scarps with unimproved grassland and woodland.</li> <li>• Abundant older buildings of cob, thatch, brick, Chilmark Stone, flint and clunch.</li> <li>• Outstanding prehistoric ritual landscape with widespread earthworks and monuments prominent in an open landscape, especially Stonehenge.</li> <li>• Military structures, airfields, tracks and signs.</li> </ul> | <ul style="list-style-type: none"> <li>• Creation of grassland of more nature conservation interest.</li> <li>• Local design initiatives to maintain historic village character.</li> <li>• Management of prehistoric monuments better linked to landscape, nature conservation and education based objectives.</li> <li>• Retention/creation of unimproved/chalk grasslands and valley bottom wetlands.</li> <li>• Removal/avoidance of tree planting on the plateau affecting the open character.</li> <li>• Retention/creation of hedgerows on the scarp slopes.</li> </ul> |
| <p><i>Regional Character Area - Salisbury Plain</i></p> <ul style="list-style-type: none"> <li>• Area of high landscape quality.</li> <li>• Rolling very open plateau landscape characterised by large fields and tracts of rough grassland with isolated tree clumps.</li> <li>• Dramatic escarpments supporting mixed farming with pasture/rough grazing on steeper slopes and occasional scrub.</li> <li>• The spectacular Iron Age hillfort of Bratton Castle combined with the Westbury White Horse dominate the locality.</li> <li>• Other historic features i.e. tumuli and ancient trackways strengthen the ancient character.</li> <li>• Traditional building materials of brick, stone, flint and thatch.</li> <li>• New plantations on Salisbury Plain increasingly noticeable.</li> <li>• Redundant military buildings and structures.</li> </ul>                                                                     | <ul style="list-style-type: none"> <li>• Encouragement of a positive approach to the conservation and management of the landscape including features of nature conservation and historic value.</li> <li>• Conservation and management of recreation facilities and public access.</li> <li>• Maintain diversity of the landscape.</li> <li>• Conserve the character of military land.</li> </ul>                                                                                                                                                                              |

### *Local Character Assessment*

5.3.9 Based on the above a Level 3 character assessment carried out by this practice has identified 10 local character areas within the Salisbury Plain Regional Character Area. These are described on Figures 5.6 and 5.7. The assessment also identified prominent eye catching elements (features) and

included considerations of landscape value. Proposed development would directly affect two local character areas, Bratton Farmlands and Dilton Middle Down Farmlands, described below.

### **1. Bratton Farmlands**

An open landscape of gently sloping domed ridges supporting mixed farming. The western extents include public open space and border the Bratton Camp hillfort complex, contributing to its setting. Public Rights of Way cross the area and link the hillfort and near car park to open downland beyond. The buildings and structures of White Horse Farm combine with mature trees to form a local landmark and focal point.

### **2. Dilton Middle Down Farmlands**

A simple open rolling domed ridge and valley landform currently used for pasture/hay. The adjoining steep sided valleys of Ranscombe Bottom Valley define much of the character area boundary and offer a sharp contrast in vegetative cover. The farmlands abut the south and eastern limits of the chalk quarry, defined by a mix of fencing, hedges and screen bunds. Footpaths and a bridleway enter the area from the west, providing a small circular route leading to and from the Imber Range Perimeter Path from which this character area is clearly visible.

#### *Other Character Areas*

5.3.10 The proposals are indirectly associated with eight other local landscape character areas.

- BC - Bratton Camp and White Horse.
- CBV - Combe Bottom Valley.
- DWV - Dirlley Wood Valley.
- DG - Down Grasslands.
- UCDF - Upton Cow Down Farmlands.
- WE - Westbury Escarpment.
- WRF - Westbury Ridge Farmlands.
- WSF - Westbury Scarp Farmlands.

5.3.11 A summary description of these areas is provided on Figure 5.7.

#### *Landscape Features*

5.3.12 Prominent eye-catching elements were identified during field survey. These are classified as attractors or detractors. The results are shown on Figure 5.8 and described below.

#### *Attractors*

5.3.13 The distinctive and prominent mix of chalk scarp, woodland and farmland

rising above Westbury forms a backdrop and dramatic contrast to the gently undulating clay vales to the west. Westbury White Horse and the distinctive earthwork profiles of Bratton Camp Fort are particularly prominent emphasising the historic and cultural value of this part of the Downs.

- 5.3.14 Other local features include isolated tree groups on high ground which also define the skyline.

#### *Detractors*

- 5.3.15 Prominent detracting features, seen to be in conflict with the broader landscape setting for reasons of form, colour and association were identified as the upper faces and stockpiles of Westbury Chalk Quarry.

#### *Landscape Elements*

- 5.3.16 Proposed development of the Chalk quarry would affect other landscape elements that contribute to local character.
- 5.3.17 Within the proposed extension area these relate to the remaining extent of open ridge farmland on Westbury Down and Dilton Middle Down.

#### *Landscape Value*

- 5.3.18 Landscape value relates to the value or importance society attaches to a landscape or view, which expresses national or local consensus and because its quality, special qualities, cultural associations or ecological status.
- 5.3.19 Assessment of landscape value has been based on consideration of:

- published landscape character assessment and landscape designation;
- nature conservation designation and baseline studies;
- published literature relating to local cultural heritage, recreation and tourism;
- field study observations; and
- the inter-relationship of the above.

#### *Landscape and Nature Conservation Designation*

- 5.3.20 The broad extent of designated and published representation of landscape value is shown on Figure 5.9. The site and study area fall within an area of high landscape sensitivity corresponding with a Special Landscape Area<sup>4</sup> designation.
- 5.3.21 Overlain on this are further designations relating to Sites of Special Scientific Interest (SSSI), candidate Special Areas of Conservation (cSAC), proposed Special Protection Areas (pSPA) and Ancient Woodland.

---

<sup>4</sup>West Wiltshire District Local Plan.

### *Cultural Heritage*

- 5.3.22 The site and study area form part of the Salisbury Plain Training Area of Archaeological Significance<sup>5</sup>. The area as a whole is of major archaeological importance forming part of the remaining prehistoric and Romano-British landscapes in England.
- 5.3.23 The area was extensively settled by the Neolithic period and it is likely that the landscape was cleared of much of its woodland at this time. It is likely that this open character has remained more or less intact to the present day.
- 5.3.24 Closer to the site lies Bratton Camp Fort, one of a series of major Iron Age hill forts that were developed from about 600 BC. What remains are extensive earthworks of steep ditches and banks, which surround a Neolithic barrow. Westbury White Horse is a famous local landmark closely associated with the fort in physical terms though of uncertain age, the current version having being cut in 1778 though possibly on the site of a more historic version.
- 5.3.25 Archaeological Evaluation of the extension site<sup>6</sup> has identified evidence of Neolithic or Bronze Age activity in the form of worked/unworked flint and a sherd of prehistoric pot. No Iron Age, Romano-British, Saxon or Medieval material was identified. The bulk of remaining finds consisted of post-medieval building materials, possibly associated with farm buildings.
- 5.3.26 Based on this the importance of the extension site lies more with its contribution to the setting of the local focus of Neolithic activity at Bratton Camp Fort rather than its intrinsic interest.

### *Tourism and Leisure*

- 5.3.27 Leisure and tourism value is associated with the concentration of public rights of way, cultural heritage interests, scenic quality and nature conservation interest of the study area.
- 5.3.28 Bratton Camp Fort and the Westbury White Horse are well-known tourist attractions and offer extensive views from the scarp over the clay vales below. The complex is well served by an adjoining car park, public open space, minor road, bridleway and footpaths.
- 5.3.29 The Imber Range Perimeter Path passes along the local ridgelines and is linked to the hill fort and car park. The path is an important (48km) long distance circular route around the MoD Imber Live Firing Range with extensive views across Salisbury Plain and the surrounding countryside.

---

<sup>5</sup>West Wiltshire District Local Plan - Area 26.

<sup>6</sup>Oxford Archaeological Unit: Westbury Cement Works, Westbury Chalk Pit Extension. Report on the Archaeological Evaluation : Area A - Surface Collection of Artifacts, Area B - Surface Collection of Artifacts. (1995 and 1997)

### *Landscape Value - Sensitivity*

- 5.3.30 In view of the high level and importance of landscape, nature conservation, cultural heritage and leisure related interests in the locality, the study area as a whole is considered to rate as highly valued landscape in most aspects.

### *Visual Receptors*

- 5.3.31 LI/IEMA guidelines currently provide examples of broad categories of inherently high, medium and low sensitivity. The guidelines stress that these are only examples and that every project will require its own set of criteria and thresholds. The examples provided relate to High, Medium and Low Sensitivity dependent upon the expectations of the viewer and broadly typified by occupiers of Residential Properties and users of Public Rights of Way (High), people engaged in certain Sporting and Recreational activities (Medium) and those occupied at their place of work (Low).
- 5.3.32 The degree by which a visual receptor is judged to be sensitive however depends not only upon the inherent nature, but also the actual quality, context, proximity and extent of view available as well as the expectations of the receptor.
- 5.3.33 An example could be provided by two identical residential properties. The occupier of property A could have open views across a National Park while B may overlook heavy industrial areas on the urban fringe. Whilst both parties could be regarded as inherently highly sensitive to visual change the actual situation would be that the occupier of property A would be regarded as highly sensitive to change relative to built development in the context of the view whilst the party at property B as of medium sensitivity.

### *Categories*

- 5.3.34 Three categories of Visual Receptor have been identified within the predicted zone of visual influence of the proposed development. The inherent and actual range of sensitivity is indicated for each category with an explanation.
- 5.3.35 People occupied at their place of work are excluded as potential receptors.

*Table 5.2 : Categories of Visual Receptor*

| Category                                                                              | Sensitivity |                       | Rationale                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------|-------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                       | Inherent    | Actual Range          |                                                                                                                                                                                                     |
| A. Users of Public Rights of Way and Public Open Space used for its scenic attributes | High        | Very High to Medium   | Views range from open extensive vistas over vale or downland to close restricted views of the Westbury Chalk Quarry.                                                                                |
| B. Users of Public Highways                                                           | Medium      | Medium to Medium High | Views vary markedly but tend to be enclosed by steep banks or hedging. Occasional stretches occur which offer panoramic views from high ground (particularly in the vicinity of Bratton Camp Fort). |
| C. Users of Recreational Activities (West Wiltshire Golf Club)                        | Medium      | Medium to Medium High | A hilltop golf course providing open panoramic views over Salisbury Plain and the surrounding countryside.                                                                                          |

### *Zones of Visual Influence (ZVI) Studies*

- 5.3.36 Zones of Visual Influence studies have been carried out to compare the broad extents of existing, consented and proposed quarry faces and identify potential receptor viewpoints.
- 5.3.37 The studies are based on an Ordnance Survey derived digital landform model of the locality covering 168 square kilometres and extending up to 10 kilometres from the site. This represents the maximum extents to which existing and proposed operations are considered to be significantly visible i.e. likely to draw the eye based on field assessment.
- 5.3.38 Detailed digital quarry models were inserted into the broader model and each version tested using LSS software. The model excludes the screening effects of any vegetation or structures but does include existing or proposed screen bunds in order to provide a sound basis for assessment close to the worst case scenario.
- 5.3.39 Potential visibility of the upper chalk faces of the existing quarry is shown on Figure 5.10. Field assessment combined with computer based visualisation has demonstrated that the actual extents of significant visibility are considerably more restricted and this is indicated on the plan both by the low values produced by the test and the scale, nature and context of the views in the field.
- 5.3.40 The broad ZVIs of the existing, consented and proposed chalk quarries are shown on Figures 5.10, 5.11 and 5.12 respectively.

5.3.41 By comparison the same features associated with the final consented quarry would be significantly visible over a larger area, shown on Figure 5.11. This is a result of the quarrying of remaining land, which currently screens views into the quarry.

5.3.42 The proposed development would have all new final restoration slopes based on replication of the convex/concave rectilinear profiles of local natural chalk slopes. These would be vegetated and are therefore excluded from the test. The retained western faces, remaining substantially unvegetated, together with the quarry stockpiles would be significantly visible over an area comparable to the consented quarry, shown on Figure 5.12. The extent of face exposed would be greater, indicated by the higher values, however this effect is mostly restricted to a small area of near military land with no public access. Further afield the effect would be mitigated by distance.

#### *Representative Visual Receptors*

5.3.43 For the purposes of assessment selected representative receptor viewpoints have been chosen to monitor the predicted performance of the proposals. These are identified in Table 5.3 and shown on Figure 5.13. The viewpoints have been selected on the basis that they represent the most sensitive receptors and/or were likely to demonstrate the greatest magnitude of effect.

*Table 5.3 : Representative Visual Receptors*

| Viewpoint Reference | Receptor Location                              | Distance from Extension Site | Eye Level (metres AOD) |
|---------------------|------------------------------------------------|------------------------------|------------------------|
| 1A                  | Footpath 44, Imber Range Perimeter Path        | 5m                           | 217.8                  |
| 1B                  | Footpath 44, Imber Range Perimeter Path        | 5m                           | 215.3                  |
| 1C                  | Footpath 44, Imber Range Perimeter             | 0.1km                        | 198.8                  |
| 2.                  | Footpath 8, Imber Range Perimeter Path         | 0.65km                       | 201.0                  |
| 3.                  | Footpaths 44 and 50                            | 5m                           | 222.5                  |
| 4.                  | Bratton Camp Hill Fort                         | 0.5km                        | 229.5                  |
| 5.                  | Footpath 59                                    | 0.3km                        | 231.8                  |
| 6.                  | West Wiltshire Golf Club, Elm Hill, Warminster | 3.2km                        | 204.5                  |
| 7.                  | Cley Hill Hill Fort                            | 6.5km                        | 245.5                  |

5.3.44 Public access on MOD land south east of the quarry is not envisaged for the foreseeable future; were it to occur then views into the quarry would be



available from the locations indicated on Figure 5.12.

- 5.3.45 Significant visibility would be restricted to the near local landscape on Thirteen Hundred Down. The retained western faces and northern and southern restored slopes would all feature prominently in the view. Compared to the baseline of existing or consented visibility the effect would be of moderate to substantial magnitude as more of the retained quarry faces would be revealed as well as the restored extents. The overall nature of the effect would be slightly adverse.

## 5.4 PROPOSED DEVELOPMENT

- 5.4.1 A detailed description of proposed development is provided in Chapter 2. Key aspects relevant to the assessment of landscape and visual effects are described below.

### *Quarry Development*

- 5.4.2 The existing quarry is shown on Figure 5.3. The phased sequence of proposed development is shown on Figures 5.14-5.16. Proposed restoration is shown on Figure 5.17.
- 5.4.3 The quarry design has evolved over a period of eight years during which it has been the subject of an extensive process of consultation, environmental survey, assessment and research including a minerals local plan inquiry.
- 5.4.4 Landform replication techniques relating to chalk scarp slopes have been tested at the quarry and incorporated into the design.
- 5.4.5 The main landscape-related criteria governing proposed development are:
- as far as practicable, achieve final restoration slopes and vegetation cover which reflect local landscape character;
  - reduce extent of working and exposed face in view during and after operations;
  - realise the potential for the creation of valuable semi-natural vegetation and habitats in the restoration.
- 5.4.6 Current and consented working results in near vertical face development which relates poorly to the landscape context and which provides few opportunities for habitat creation.
- 5.4.7 Extension of the quarry to the northeast and southeast is aimed primarily at achieving a more sympathetic restoration in these respects and is quite restricted in extent as a consequence. The main balance of the reserve would be derived from continued working to the southwest within land relatively

free from actual environmental constraints, particularly those related to the cultural heritage and nature conservation.

- 5.4.8 The resulting restoration landform is shown on Figure 5.17. A wide, even sloping valley floor enclosed by convexo-concave chalk slopes would be formed within the domed ridge of Dilton Middle Down. Ecological constraints on lateral development into the adjoining remnant steep sided valleys prevent a more naturalistic landform insertion.
- 5.4.9 Natural representations of this type of landscape can be found in the vicinity of Combe Bottom and Longcombe Bottom located approximately 2km northeast and 2.5km north east of the site respectively and illustrated on Figure 5.18.
- 5.4.10 Analysis of local landforms indicates that the slope of the rectilinear element of the natural chalk slopes is not normally greater than 30° (1:1.7) though slopes up to 34° (1:1.5) do occur naturally in the area, especially on scarp slopes. Steep and high chalk slopes tend to be convexo-concave with a rectilinear portion in the centre. Typically the rectilinear portion represents approximately 25%-40% of the slope length.
- 5.4.11 On the basis of the above final restoration slopes at Westbury have been designed to replicate natural chalk landforms within mineral recovery objectives. Figure 5.19 shows the range of slopes proposed.
- 5.4.12 The upper (convex) 'rollover' portion of these slopes would be formed in the top 15-20m of the slope. It would typically comprise a 1:5 slope to 3 metres below ground level leading to a 1:3 slope to 5m below ground level. The rectilinear portion would extend from the rollover at gradients between 1:1 and 1:3 to a bench retained at the Melbourne Rock/Plenus Marl strata level for geotechnical reasons.
- 5.4.13 The rectilinear slope would continue below the retained bench for a depth of up to 15m. The lower (convex) slopes would extend to a further depth of 15m at 1:3 grade leading to 1:6 grade to reach the quarry floor. The gradient on the floor is defined by the geological contact between the chalk marl and the grey chalk.
- 5.4.14 The proposed vegetative cover is chalk grassland over the quarry floor and chalk grassland or grassland/scrub on the restored slopes as described in Chapter 7 of the ES. This would be achieved in three ways, each reflecting priorities attached to visual amenity and nature conservation.
- 5.4.14 The quarry floor would be left as rubbly chalk and allowed to vegetate naturally. The floor would be almost entirely screened from public view and hence issues of visual amenity are of less concern than achieving a high level of diverse flora.
- 5.4.15 The lower quarry slopes would be partially visible. These would be formed

using rubbly chalk dressed with minimal subsoils and left to regenerate naturally. This would achieve a more rapid 'greening' effect whilst still providing basis for the development of a diverse flora.

5.4.16 The most visible remaining areas of the quarry slopes would be dressed with subsoil or, in the case of the upper convex 'rollover' slopes, topsoil. These topsoiled slopes would be seeded with appropriate chalk grassland species as would steeper rectilinear slopes at gradients exceeding 1:2. The latter would reduce incidence of soil erosion as much as address visual amenity issues.

5.4.17 Chalk grassland would become established on slopes with gradients up to and including 1:1.5. In order for the grassland to develop and keep its ecological value to a maximum it would help if it were to be grazed by domestic stock. Limited scrub would be allowed to establish on slopes adjoining existing areas of this type of habitat and on steeper slopes not suitable for grazing.

5.4.18 Existing quarry faces retained on the western margins would be left to revegetate though such cover will likely be substantially limited to placed soils and eroded material at the base of each face. The faces would however be amongst the least visible aspects of the quarry and would also be capable of providing valuable habitat for predatory birds.

5.4.19 To add further value an area of geological interest would be retained on the western benches.

5.4.20 Existing public rights of way would be permanently diverted around the quarry margins. Footpath 48 (Imber Range Perimeter Path), which currently runs close to the existing northern extraction limit, would be relocated around the proposed northern boundary to rejoin Footpath 59 at a point some 300m further north. There would be no significant change in the length of the route.

5.4.21 At the southern margins the circular route comprising footpath Nos 46, 56 and 45 would be re-routed in part to run alongside part of the proposed south western boundary. The route would be shorter by approximately 310m.

5.4.22 At the request of Wiltshire County Council, all proposed operational perimeter screen bunding would be left behind following restoration, to avoid disturbing what will be by that stage mature visual screens.

#### *Quarry Phasing and Mitigation Design*

5.4.23 The proposed phasing sequence is largely the result of initial visual assessment which identified the following mitigation:

- operate a phased sequence of progressive working and restoration within three distinct areas of the quarry;

- use a combination of existing intervening landform as well as grassed and planted bunding to screen views into the works;
- as far as practicable restore worked areas before removing screening elements.
- practical development phasing having regard to health and safety issues;

5.4.24 Proposed planting relates to scrub and hedge planting on retained screening bunds:

### 1. Scrub Planting

| Species                   | English Name | %  | Size (cm) | Age |
|---------------------------|--------------|----|-----------|-----|
| <i>Crataegus monogyna</i> | Hawthorn     | 75 | 45-60     | 1+1 |
| <i>Euonymus europaeus</i> | Spindle      | 15 | 45-60     | 1+1 |
| <i>Sambucus nigra</i>     | Elder        | 10 | 45-60     | 1+1 |

These would be planted in groups of 3-5 of the same species on a 1m x 1m grid. All transplants to be provided with 75cm staked tree shelters and mulch mats.

### 2. Hedge Planting

Species, sizes and percentages as above. Planted at random in two lines, plants staggered. 7m plants per linear metre, 300mm spacings and 500mm between lines. All transplants provided with 75cm staked tree shelters and mulch matting.

#### Phase 1

5.4.35 The phasing sequence is shown on Figures 5.14 - 5.16.

5.4.36 Prior to Phase 1 works commencing Footpath 48 would be diverted to its permanent route following construction of the MoD access track and fencing. Screen bunding would then be constructed between the diversion and the quarry extension using soils stripped from the northern extension area. Bunding would be to 2.0 metres height with outer slopes graded to 1:5 and grassed and planted with a mix of hawthorn, spindle and elder. Visibility tests indicate that this bund will screen views of the quarry and proposed main extraction works from adjacent areas. Currently views into the quarry are available from Footpath No 48. Hedgerow trees would then be removed (leaving the hedgerow) along the existing northern boundary.

5.4.37 If footpath closure were to be delayed, almost all the soil stripping, bund construction and landscaping can continue around it until closure is secured, subject to appropriate safeguards during earthworks.

5.4.38 Additional screen bunding would be located along the western perimeter adjacent to Footpath No 44 to replace existing gappy planting and complement other existing bunding. The soil bund would also provide a better base for new hedgerow development as has been demonstrated by existing bunding on this boundary to the south. The result would be a more comprehensive screen along the route. However it is recognised that despite the level of intrusion that large quarries can cause in the landscape they can also be impressive and interesting developments in their own right, particularly at close quarters. Consequently it is also proposed to retain two gaps in the screen bunding sufficient to allow views into the complex together with an information board.

5.4.39 Phase 1 extraction would commence following the formation of a haul route cut into the northeastern side of the quarry. The working faces will be angled so that from major viewpoints the working areas will remain largely behind retained sections of the existing northern face, rollover slopes and hedging as well as the new perimeter bunding. This measure creates an opportunity to work and restore the upper slopes of Phase 1 progressively whilst retaining as much of the existing northern face as practicable to screen the active quarry working. Views from the south would be directed towards the proposed landform replication slopes, the upper portions of which should be developing a grassland cover on soils sourced from previously stored material.

#### *Phase 2*

5.4.40 Phase 2 works reflect continued working in the northern area at a time when the upper rollover slopes have been formed, restored and revealed by the removal of the existing northern face.

5.4.41 Working to this sequence would retain the screening effects of intervening landform and much of the bunding and vegetation south of the existing quarry during the works.

#### *Phase 3*

5.4.42 Phase 3 works relate to the remaining south and eastern extraction areas. The latter portion would be worked to a scheme of progressive 'top down' restoration.

5.4.43 Prior to completion of Phase 2 Footpath/Bridleway Nos 46, 56 and 45 would be permanently diverted, fenced as necessary and a new screen bund constructed around the southern margins. The bund would be 2.0m high with external batters at a 1:5 gradient and grassed. It is designed to reduce the extent of proposed Phase 3 works in view from the south and screen the quarry floor. Complete screening of the quarry would require a bund in excess of 20m high and construction of such a feature would be both impracticable and itself an intrusive element. More suitable mitigation has been devised:

- extraction of Phase 3 in sub-phases leading southwards and keeping behind existing landforms;
- progressive restoration of the worked-out faces and areas of quarry as quickly as possible, before they become visible.

5.4.44 By the end of Phase 3 working, restoration within the visible extents of Phases 1 and 2 would be approximately 10 years old by which time a chalk grassland cover would be established including areas of unsoiled substrate.

#### *Final Restoration*

5.4.45 The final restoration is shown on Figure 5.17.

## 5.5 PREDICTED LANDSCAPE IMPACTS

5.5.1 Predicted landscape impacts are assessed in relation to landscape characteristics, features and value. Assessment is based on proposed development inclusive of mitigation.

#### *Effects on Landscape Characteristics*

5.5.2 Continued extraction of chalk within the Preferred Area would result in the permanent loss of a small tract of chalk downland. There would be a substantial change in landform over the affected area during the operational period and, to a lesser extent, landcover and landuse characteristics.

5.5.3 At a local level the extension site forms the larger remaining component of the Dilton Middle Down Character Area and a minor component of the Bratton Farmlands Area. At the regional level it forms a very minor component of the Salisbury Plain Character Area.

5.5.4 This is assessed as a moderate-substantial level of effect at a local scale and slight-negligible magnitude of effect at a regional scale. It would take place in the context of a landscape of high sensitivity to change of the type proposed.

5.5.5 This would equate to an impact of substantial significance on landscape characteristics at a local scale and of moderate significance at a regional scale.

5.5.6 The nature of the effect is assessed as slight-moderately beneficial in the longer term as the existing baseline and consented restoration is replaced by a more sympathetic naturalistic landform and landcover.

### *Effects on Landscape Value*

- 5.5.7 The extension site constitutes highly valued landscape. Scenic quality would be affected during operations principally as a result of the construction of grassed and planted screen bunds, the gradual revealing of restored areas of the quarry and the loss of a local feature (a line of trees adjoining the northern boundary access track). The effects are described in detail in Section 5.6 of this report but overall the effect would likely be perceived as slight-moderately adverse for the reason that areas of attractive landscape are being lost, changed or excluded from view during the works.
- 5.5.8 The final restoration would result in a quarried landscape more appropriate to context. Most of the current/consented detracting elements would be removed or restored. On balance it is considered that scenic quality would be maintained overall as a result despite the loss of attractive landscape.
- 5.5.9 The loss of part of a designated SSSI/cSAC/SPA has been assessed in the ecological assessment in Chapter 7. The area of designated land affected by the works has low ecological value as it relates to improved/ploughed grassland. Where the MLP allocation boundary incorrectly included areas of high ecological value, these have been excluded from the present proposals. An affected badger sett is expected to have been relocated in connection with the existing quarry. By contrast the proposed restoration holds much greater potential for diverse habitat creation than either presently exists or would occur with the consented scheme. In particular the progressive establishment of chalk grassland and scrub appropriate to the wider context of the adjoining designated land. The resulting enhancement of local biodiversity would prove of substantial benefit at a local level in the long term.
- 5.5.10 Working the extension site would not have a significant effect on the setting of Bratton Camp Fort or the remaining archaeological interest of the locality.
- 5.5.11 The amenity value of the local public rights of way and facilities at Bratton Camp Fort/Westbury White Horse would be affected by proposed mitigation and footpath diversions. The effects on users of public rights of way would vary markedly depending upon location, described in section 5.6. Overall effects would be slightly adverse during operations but improved following restoration. Visitors to the hill fort complex would be slightly affected due to the presence of screen bunds during and after operations. These features have been carefully designed and would appear at what is considered to be a 'safe distance' so that any sense of encroachment should be minimal.
- 5.5.12 Overall this is assessed as a moderate magnitude of effect on a highly sensitive receptor, representing an effect of moderate to substantial significance on landscape value at a local level. The nature of the effect would change during the lifespan of the development ranging from slight to moderately adverse during the operational stages to slightly beneficial upon reaching final restoration.

## 5.6 PREDICTED VISUAL IMPACTS

5.6.1 Predicted visual impacts are described with mitigation measures in effect during the following stages of development:

1. Initial Works.
2. Phases 1 and 2.
3. Phase 3.
4. Final Restoration at Completion.
5. Final Restoration 5 years after Completion.
6. Final Restoration 20 years after Completion and beyond.

5.6.2 Prediction of effects is based on the following assumptions:

- That all quarry operations would detract (including vehicular movements).
- That all areas proposed for natural regeneration would establish a comprehensive vegetative cover over variable periods of time according to the substrate used, ie:
  - Rubbly chalk - 15 years.
  - Subsoil/overburden - 3 years.
- That scrub would likely take between 15-20 years to establish sufficiently to become visually significant.

### *Artificial Lighting*

5.6.3 Existing security lighting would be maintained in the vicinity of the plant site and the chalk slurry tank during proposed works. The lighting is currently under review with the intention of improving shielding and directionality. There are no significant adverse impacts anticipated resulting from continued use in the context of proposed works.

### *Effects on Visual Amenity*

5.6.4 A detail assessment of visual effects in relation to each of the representative sensitive receptor viewpoints is provided below. For ease of reference the effects are tabulated and cross referenced where appropriate to the computer generated visual analysis model and photo-real photomontages.

5.6.5 The methodology used for the analysis and creation of photomontages is described at Appendix 5.2.



Table 5.4 : Predicted Effects on Visual Amenity

| VP Ref | Receptor Location                | Description of Effects                                                                                                                                                                                                                                                                                                                                                                                                           | Nature of Effect    | Receptor Sensitivity | Magnitude            | Significance            |
|--------|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------|----------------------|-------------------------|
| 1A     | Footpath 44                      | <u>Initial Works</u> Construction of a 2.0m high bund screening views into the existing quarry.                                                                                                                                                                                                                                                                                                                                  | Slight Beneficial   | High                 | Moderate             | Moderate to Substantial |
|        |                                  | <u>Phases 1 and 2</u> Views screened by grassed bund. (Ref. Figure 5.20)                                                                                                                                                                                                                                                                                                                                                         | Slight Beneficial   | High                 | Moderate             | Moderate to Substantial |
|        |                                  | <u>Phase 3</u> Views of bund becoming screened by hedge planting establishment.                                                                                                                                                                                                                                                                                                                                                  | Slight Beneficial   | High                 | Moderate             | Moderate to Substantial |
|        |                                  | <u>Final Restoration at Completion</u> Views of bund becoming screened by hedge planting establishment.                                                                                                                                                                                                                                                                                                                          | Slight Beneficial   | High                 | Moderate             | Moderate to Substantial |
|        |                                  | <u>5 Years After Completion</u> Views of trackside hedgerow. (Ref. Figure 5.20)                                                                                                                                                                                                                                                                                                                                                  | Slight Beneficial   | High                 | Moderate             | Moderate to Substantial |
|        |                                  | <u>20 Years+ after Completion</u> Views of trackside hedgerow.                                                                                                                                                                                                                                                                                                                                                                   | Slight Beneficial   | High                 | Moderate             | Moderate to Substantial |
| 1B     | Footpath 44 (Proposed viewpoint) | <u>Initial Works</u> Construction of a 2.0m high bund nearby. Continued views into the quarry.                                                                                                                                                                                                                                                                                                                                   | Neutral             | High                 | Slight               | Moderate                |
|        |                                  | <u>Phases 1 and 2</u> Continued views into the quarry. Haul road access into Phase 1. Removal of existing back face, rollovers and trees revealing Phase 1 restoration.                                                                                                                                                                                                                                                          | Neutral             | High                 | Moderate             | Moderate                |
|        |                                  | <u>Phase 3</u> Excavation of eastern side resulting in a gradual reduction in the extent of face in view as it travels downslope. Progressive restoration of upper rollover slopes. Removal of southern boundary hedgerow. Continued excavation at southern end. Extent of face visible would gradually reduce as it recedes and travels down slope. Progressive restoration of Phase 2 slopes. Established Phase 1 restoration. | Moderate Beneficial | High                 | Moderate-Substantial | Substantial             |
|        |                                  | <u>Final Restoration at Completion</u> Established vegetative cover over Phases 1 and 2 restoration and parts of the quarry floor. Phase 3 establishing grassland in upper slopes, chalk still visible on lower slopes and near floor.                                                                                                                                                                                           | Moderate Beneficial | High                 | Moderate-Substantial | Substantial             |

| VP Ref | Receptor Location                          | Description of Effects                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Nature of Effect          | Receptor Sensitivity | Magnitude            | Significance    |
|--------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------|----------------------|-----------------|
| 1B     | Footpath 44 (Proposed viewpoint) Continued | <u>5 Years After Completion</u> As above but with increased grass cover over Phase 3 slopes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Moderate Beneficial       | High                 | Moderate-Substantial | Substantial     |
|        |                                            | <u>20 Years+ after Completion</u> Established grassland over the majority of the site. Scrub development well established with some scrub/tree growth on western boundary benches. (Ref. Figure 5.21)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Moderate Beneficial       | High                 | Substantial          | Substantial     |
| 1C     | Footpath 44                                | <u>Initial Works</u> No significant effects. Planted scrub developing in the foreground.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Nil                       | High                 | Nil                  | Not significant |
|        |                                            | <u>Phases 1 and 2</u> No significant effects. Planted scrub developing in the foreground.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Nil                       | High                 | Nil                  | Not significant |
|        |                                            | <u>Phase 3</u> Construction of a 2.0m high grassed screen bund around southern extension margins partly screened by planted scrub developing in the foreground. Removal of southern boundary hedgerow revealing slightly more of the chalk stockpiles. Soil stripping works in sub phases. Chalk extraction in sub phases progressing southwards behind intervening landform/developing scrub and gradually lowering the foreground skyline to reveal Phase 3 upper southernmost and eastern slope extraction and progressive restoration works. Occasional vehicle and plant movements on or close to surface level in Phase 3 where not screened by developing scrub. (Ref. Figure 5.22) | Moderately Adverse        | High                 | Moderate-Substantial | Substantial     |
|        |                                            | <u>Final Restoration at Completion</u> Views of the restored Phase 3 upper slopes where not screened by established scrub. These would be beginning to develop grassland. Stockpiles screened by established scrub.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Slight Adverse            | High                 | Substantial          | Substantial     |
|        |                                            | <u>5 Years After Completion</u> As above but with increased grass cover over Phase 3 slopes. (Ref. Figure 5.22)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Neutral                   | High                 | Substantial          | Substantial     |
|        |                                            | <u>20 Years+ After Completion</u> Established grassland over the majority of the site. Scrub development well established.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Neutral-Slight Beneficial | High                 | Substantial          | Substantial     |

| VP Ref | Receptor Location   | Description of Effects                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Nature of Effect | Receptor Sensitivity | Magnitude | Significance            |
|--------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------|-----------|-------------------------|
| 2.     | Footpath 8          | <u>Initial Works</u> No significant effects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Nil              | High                 | Nil       | Not significant         |
|        |                     | <u>Phases 1 and 2</u> Removal of existing back face, rollovers and trees revealing uppermost slope of Phase 1 restoration. Phase 2 works screened from view.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Neutral          | High                 | Slight    | Moderate                |
|        |                     | <u>Phase 3</u> Excavation of eastern side uppermost levels. Construction of a 2.0m high grassed screen bund around the southern extension margins. Removal of southern boundary hedgerows revealing more of the restored upper slopes of Phase 1 and the Chalk stockpiles. Soil stripping works in sub phases. Chalk extraction in sub phases progressing southwards (mostly behind intervening landform) gradually revealing more of the Phase 1/Phase 2 restoration and the upper faces on the western boundary. Occasional vehicle and plant movements on or close to surface level in Phase 3. Removal of southern margin screen bund and final restoration works.<br>(Ref. Figure 5.23) | Moderate Adverse | High                 | Moderate  | Moderate-Substantial    |
|        |                     | <u>Final Restoration at Completion</u> Views of the restored Phase ½ restored slopes, western faces and stockpiles.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Slight Adverse   | High                 | Moderate  | Moderate to Substantial |
|        |                     | <u>5 Years After Completion</u> As described above but with stockpiles removed.<br>(Ref. Figure 5.23)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Slight Adverse   | High                 | Moderate  | Moderate to Substantial |
|        |                     | <u>20 Years+ After Completion</u> As described above with significant levels of scrub development and tree establishment on western benches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Slight Adverse   | High                 | Moderate  | Moderate to Substantial |
| 3.     | Footpaths 44 and 50 | <u>Initial Works</u> Construction of a 2.0m high bund screening views over a field.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Slight Adverse   | High                 | Moderate  | Moderate to Substantial |

| VP Ref | Receptor Location      | Description of Effects                                                                                                                                                                                                                                                                                                                        | Nature of Effect  | Receptor Sensitivity | Magnitude       | Significance            |
|--------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----------------------|-----------------|-------------------------|
| 3.     | Footpaths 44 and 50    | <u>Phases 1 and 2</u> Occasional initial views of vehicle/plant movements above screen bund. Removal of most of existing northern boundary trees where visible above screen bund. Brief vehicle plant movements associated with soil storage operations behind screen bund. Remaining Phase 1/2 works screened from view. (Ref. Figure 5.24)  | Slight Adverse    | High                 | Moderate        | Moderate to Substantial |
|        |                        | <u>Phase 3</u> Continued views of 2.0m high grassed and planted screen bund.                                                                                                                                                                                                                                                                  | Slight Adverse    | High                 | Moderate        | Moderate to Substantial |
|        |                        | <u>Final Restoration at Completion</u> Continued views of 2.0m high grassed and planted screen bund above perimeter hedging. (Ref. Figure 5.24)                                                                                                                                                                                               | Neutral           | High                 | Moderate        | Moderate to Substantial |
|        |                        | <u>5 Years After Completion</u> As described above.                                                                                                                                                                                                                                                                                           | Neutral           | High                 | Moderate        | Moderate to Substantial |
|        |                        | <u>20 Years+ After Completion</u> As described above.                                                                                                                                                                                                                                                                                         | Neutral           | High                 | Moderate        | Moderate to Substantial |
| 4.     | Bratton Camp Hill Fort | <u>Initial Works</u> Construction of a 2.0m high bund screening slight views over a field.                                                                                                                                                                                                                                                    | Slight Adverse    | High                 | Slight          | Moderate                |
|        |                        | <u>Phase 1</u> Occasional initial views of vehicle/plant movements above screen bund. Removal of most of the existing northern boundary trees opening up views to the far horizon. Brief vehicle/plant movements associated with soil storage operations behind screen bund. Remaining Phase 1/2 works screened from view. (Ref. Figure 5.25) | Slight Adverse    | High                 | Slight          | Moderate                |
|        |                        | <u>Phase 3</u> Continued views of 2.0m high grassed and planted screen bund and far horizon beyond.                                                                                                                                                                                                                                           | Neutral           | High                 | Slight-Moderate | Moderate to Substantial |
|        |                        | <u>Final Restoration at Completion</u> Continued views of 2.0m high grassed and planted screen bund, perimeter hedging and far horizon beyond. (Ref. Figure 5.25)                                                                                                                                                                             | Slight Beneficial | High                 | Slight-Moderate | Moderate to Substantial |
|        |                        | <u>5 Years After Completion</u> As described above.                                                                                                                                                                                                                                                                                           | Slight Beneficial | High                 | Slight-Moderate | Moderate to Substantial |
|        |                        | <u>20 Years+ After Completion</u> As described above.                                                                                                                                                                                                                                                                                         | Slight Beneficial | High                 | Slight-Moderate | Moderate to Substantial |

| VP Ref | Receptor Location        | Description of Effects                                                                                                                                                                                                                                                                                                                                                                                                                                           | Nature of Effect        | Receptor Sensitivity | Magnitude       | Significance            |
|--------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------|-----------------|-------------------------|
| 5.     | Footpath 59              | <u>Initial Works</u> Construction of a 2.0m high bund screening slight views over a field.                                                                                                                                                                                                                                                                                                                                                                       | Slight Adverse          | High                 | Slight          | Moderate                |
|        |                          | <u>Phase 1</u> Occasional initial views of vehicle/plant movements above screen bund. Removal of most of the existing northern boundary trees opening up views to the far horizon above screen bund. Brief vehicle/plant movements associated with soil storage operations behind screen bund. Remaining Phase 1/2 works screened from view.<br>(Ref. Figure 5.26)                                                                                               | Slight Adverse          | High                 | Slight          | Moderate                |
|        |                          | <u>Phase 3</u> Continued views of 2.0m high grassed screen bund and far horizon beyond.                                                                                                                                                                                                                                                                                                                                                                          | Neutral                 | High                 | Slight-Moderate | Moderate to Substantial |
|        |                          | <u>Final Restoration at Completion</u> As described above.<br>(Ref. Figure 5.26)                                                                                                                                                                                                                                                                                                                                                                                 | Neutral                 | High                 | Slight-Moderate | Moderate to Substantial |
|        |                          | <u>5 Years After Completion</u> As described above.                                                                                                                                                                                                                                                                                                                                                                                                              | Neutral                 | High                 | Slight-Moderate | Moderate to Substantial |
|        |                          | <u>20 Years+ After Completion</u> As described above.                                                                                                                                                                                                                                                                                                                                                                                                            | Neutral                 | High                 | Slight-Moderate | Moderate to Substantial |
| 6.     | West Wiltshire Golf Club | <u>Initial Works</u> No significant effects.                                                                                                                                                                                                                                                                                                                                                                                                                     | Nil                     | Medium High          | Nil             | Not significant         |
|        |                          | <u>Phases 1 and 2</u> Distant view of the removal of the upper levels of existing back face and associated tree line revealing upper slopes of Phase 1 restoration. Gradual lowering of quarry eastern edge to reveal more of the mid-upper faces of the western quarry boundary.                                                                                                                                                                                | Slight Adverse          | Medium High          | Slight          | Moderate                |
|        |                          | <u>Phase 3</u> Distant view of the construction of a 2.0m high grassed screen bund around the southern extension margins. Removal of southern boundary hedgerow revealing marginally more of the stockpile site. Soil stripping works in sub phases. Chalk extraction in sub phases (mostly behind intervening landform) gradually revealing slightly more of the existing upper western faces. Removal of the southern margin bund and final restoration works. | Slight-Moderate Adverse | Medium High          | Slight          | Moderate                |

| VP Ref | Receptor Location                    | Description of Effects                                                                                                                                                  | Nature of Effect        | Receptor Sensitivity | Magnitude            | Significance |
|--------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------|----------------------|--------------|
| 6.     | West Wiltshire Golf Club - Continued | <u>Final Restoration at Completion</u><br>Distant view of the restored Phase 1/2 upper slopes and mid-upper faces of the western quarry boundary.<br>(Ref. Figure 5.27) | Slight-Moderate Adverse | Medium High          | Slight               | Moderate     |
|        |                                      | <u>5 Years After Completion</u> As described above.                                                                                                                     | Slight-Moderate Adverse | Medium High          | Slight               | Moderate     |
|        |                                      | <u>20 Years+ After Completion</u> As described above but including tree/scrub development on western benches.                                                           | Slight Adverse          | Medium High          | Slight               | Moderate     |
| 7.     | Cley Hill Hill Fort                  | <u>Initial Works</u> Distant view of the removal of the upper back face and restored slopes.                                                                            | Neutral                 | High                 | Slight-Imperceptible | Moderate     |
|        |                                      | <u>Phase 1 and 2</u> Distant view of Phase 1 upper restoration slopes replace view of existing back face, rollover and tree line.                                       | Slight-Beneficial       | High                 | Slight-Imperceptible | Moderate     |
|        |                                      | <u>Phase 3</u> Distant views of Phases 1 and 2 upper restoration slopes revealed slightly more as Phase 3 extraction progresses southwards.                             | Slight Beneficial       | High                 | Slight-Imperceptible | Moderate     |
|        |                                      | <u>Final Restoration at Completion</u><br>Distant view of Phases 1 and 2 upper restoration slopes.<br>(Ref. Figure 5.28)                                                | Slight Beneficial       | High                 | Slight-Imperceptible | Moderate     |
|        |                                      | <u>5 Years After Completion</u> As described above.                                                                                                                     | Slight Beneficial       | High                 | Slight-Imperceptible | Moderate     |
|        |                                      | <u>20 Years+ After Completion</u> No significant difference to previous description.                                                                                    | Slight Beneficial       | High                 | Slight-Imperceptible | Moderate     |

## 5.7 POLICY CONSIDERATIONS

5.7.1 The effects of the proposal are considered in line with landscape related planning policy in respect of:

1. Wiltshire Structure Plan 2011.
2. Wiltshire and Swindon Minerals Local Plan (Adopted Version November 2001).
3. West Wiltshire District Plan (Adopted Version March 1996).

5.7.2 In order to avoid repetition, policies relating to a particular topic (i.e. nature conservation) are grouped under that heading as defined in the following table:

| Topic                       | Structure Plan Policy Ref: | Wiltshire & Swindon Minerals Local Plan | West Wiltshire District Plan | Description                                                                                   |
|-----------------------------|----------------------------|-----------------------------------------|------------------------------|-----------------------------------------------------------------------------------------------|
| Landscape                   | C9                         | 23                                      | C3                           | Special Landscape Areas.                                                                      |
| Nature Conservation         | C1-C2                      | 19                                      | C5                           | Maintenance and Management. Sites of International, National, Regional and County Importance. |
|                             | C3                         |                                         |                              | High Ecological Value                                                                         |
| Historic Environment        | HE2                        | 78                                      | C10                          | Protection of features and settings of Archaeological/Historic Importance.                    |
| Restoration                 | -                          | 31                                      | -                            | Satisfactory restoration of Mineral Workings.                                                 |
| Public Rights of Way (PROW) | -                          | 30                                      | -                            | Safeguarding Rights of Way.                                                                   |

### *Landscape*

5.7.3 Proposed development lies within a Special Landscape Area (SLA), which includes the majority of Salisbury Plain, shown on Figure 5.9. The broad requirement of policy, stated in Structure Plan Policy C9, is for development *'to have regard to the need to protect landscape character and scenic quality'*.

5.7.4 Consented working would result in near vertical face development which would relate poorly to the landscape context and which detracts from the broader scenic quality of the SLA.

- 5.7.5 The Proposed extension of the quarry would achieve a more sympathetic restoration. Landcover would establish relatively rapidly compared to the consented working and would reflect local grassland and scrub habitat.

#### *Nature Conservation*

- 5.7.6 Policies refer to the maintenance, management and preservation of nature conservation resources at international, national, regional, County and local levels. The southern and easternmost parts of proposed development fall within the Salisbury Plain SSSI/SPA/cSAC shown on Figure 5.9.
- 5.7.7 Ecological survey of areas that would be affected by proposed works has however identified that these areas have relatively low ecological value. The land is ploughed arable fields, not chalk grassland.
- 5.7.8 Proposed restoration would provide excellent conditions for the establishment of high quality species rich chalk grassland with scrub and other habitats. The overall nature conservation value of the new scheme would be far greater than the existing or consented quarries and complementary with the Salisbury Plain SSSI/cSAC/SPA.

#### *Historic Environment*

- 5.7.9 Policy affords protection to features of archaeological or historic interest and their settings.
- 5.7.10 Based on archaeological evaluation of the extension site the importance of the extension site lies more with its contribution to the setting of the local focus of Neolithic activity at Bratton Camp Fort rather than its intrinsic interest. The setting would however remain largely unchanged in the closer vicinity of the Fort. The slightly more open landscape resulting from the removal of a line of trees and remnant hedging would likely be no less appropriate to the setting than the current situation.

#### *Restoration*

- 5.7.11 Minerals Local Plan Policy 31 requires development proposals to . . . *'provide for the satisfactory restoration of the site at the earliest practicable opportunity to an appropriate landform and landscape character, which is capable of supporting a beneficial after-use, in accordance with an approved scheme'*.
- 5.7.12 Proposed phased working and restoration represents the best practicable means of achieving a sympathetic restoration in accordance with policy requirements.



*Public Rights of Way*

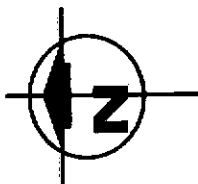
- 5.7.13 Minerals Local Plan Policy 31 seeks minimum practicable interference of PROW or the diversion and reinstatement of original routes.
- 5.7.14 The proposed development would result in the permanent diversion of two footpaths, a bridleway and a byway. The diversions represent a minimum level of change to the routes and would not significantly change their overall length.

5.8 CONCLUSIONS

- 5.8.1 Proposed extension working has evolved during an iterative design process to accommodate, amongst many other criteria, primary and secondary landscape mitigation measures.
- 5.8.2 This assessment of the resulting scheme of working concludes:
1. The overall long-term impact on landscape characteristics and value would be substantial and broadly beneficial at a local scale.
  2. Overall, visual impacts would be slightly adverse during the operational life of the quarry becoming neutral or slightly beneficial in the long term.
  3. That development substantially accords with Structure, Mineral Local Plan and District Plan policies.
  4. That there are no unacceptable levels of adverse landscape and visual impacts arising from the development.

KEY

BOUNDARY:  
CONSENTED SITE



DAVID JARVIS ASSOCIATES

PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT  
David Jarvis Associates Ltd.  
1 Tennyson Street  
SWINDON Wiltshire SN1 5DT  
Tel: 01793 612173 Fax: 01793 613825  
Email (text): mail@dvj.co.uk  
Email (drawings): drawings@dvj.co.uk

Client

LCUK

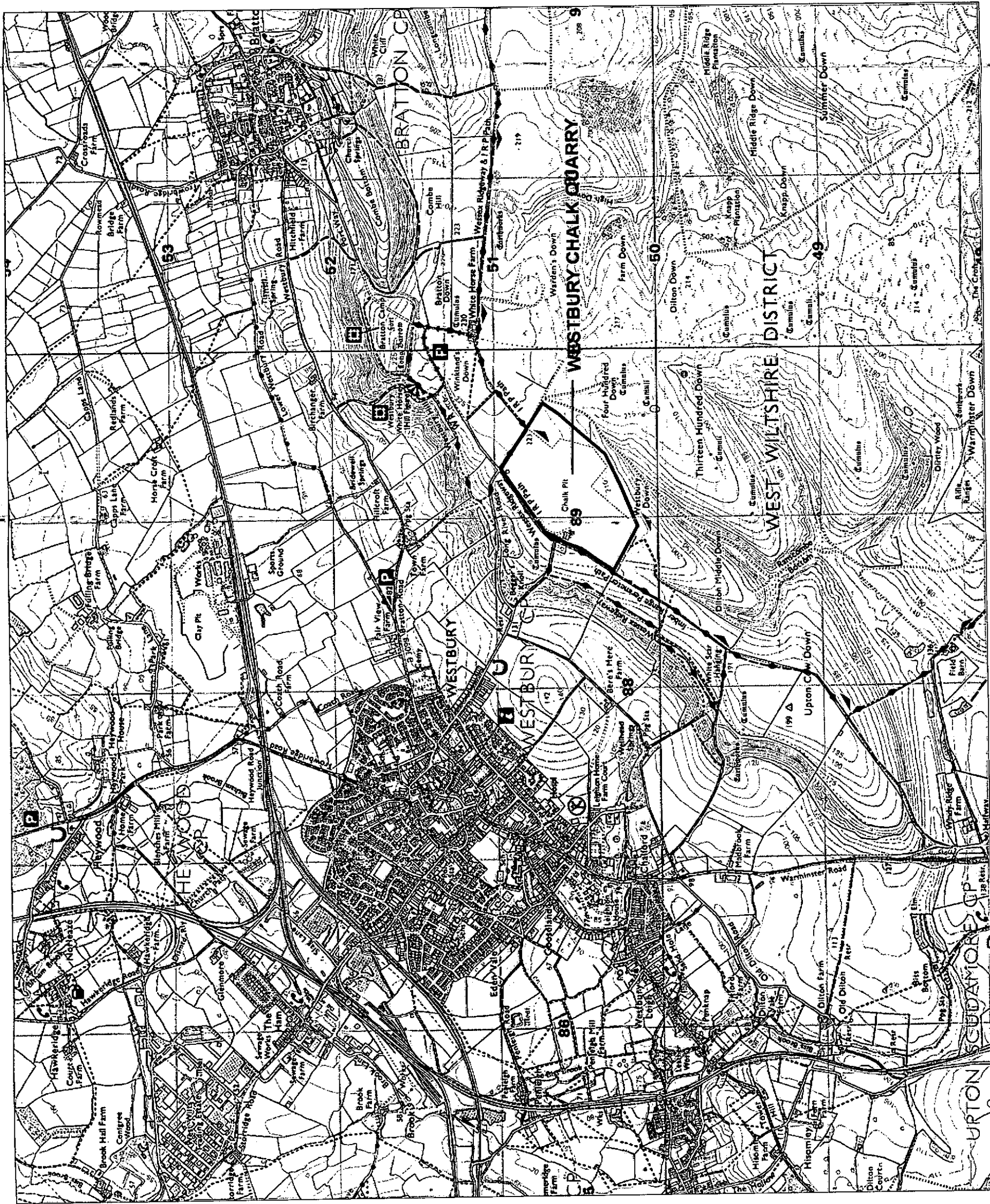
Project

WESTBURY CHALK QUARRY

Drawing Title

LOCATION PLAN

Scale 1:25,000 Date NOVEMBER 2003  
Drawing No. 5.1



SCALE



Reproduced with the permission  
of the controller of HMSO.  
Licence No. AR 189685

KEY

BOUNDARY: APPLICATION SITE

BOUNDARY: EXISTING PLANNING PERMISSION

BOUNDARY: LAND WITHIN COMPANY CONTROL

PUBLIC RIGHTS OF WAY:

BYWAY OPEN TO ALL TRAFFIC

BRIDLEWAY

FOOTPATH

DAVID JARVIS ASSOCIATES

PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT

David Jarvis Associates Ltd.

Tennyson Street

SWINDON Wiltshire SN1 5DT

Tel: 01793 612173

Fax: 01793 613625

Email (Text): mail@ davidjarvis.biz

Email (Drawings): drawings@davidjarvis.biz

Client

LCUK

Project

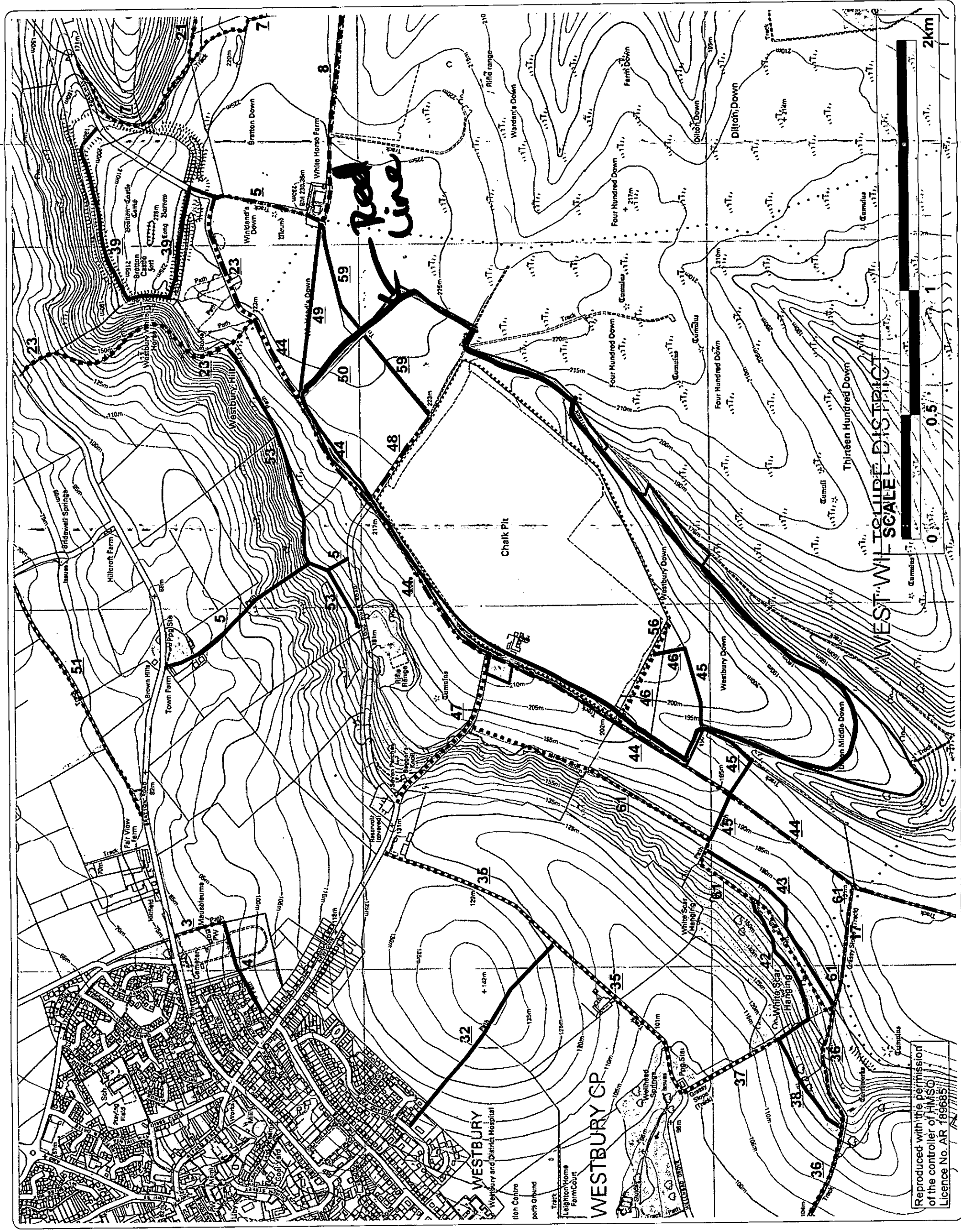
WESTBURY CHALK QUARRY

Application Site

Scale 1:10,000

Date NOVEMBER 2003

Drawing No. 5.2



Reproduced with the permission of the controller of HMSO Licence No. AR 189685



A topographic map of a military installation, likely a base, with various handwritten annotations in black ink. The map shows contour lines, roads, and buildings. Key features include:

- Winkland's Down**: A label in the upper left corner.
- MOD VEDETTE POST**: A label near the top center.
- Four Hundred Down**: A label in the upper right corner.
- Blue Outline**: A thick blue line tracing a path around the perimeter of the installation, with an arrow pointing to it from the label.
- Red Line**: A dashed red line tracing a path through the installation, with an arrow pointing to it from the label.
- Red**: Three arrows pointing to specific locations along the red line, with the word "Red" written above each arrow.
- Stockpiles**: A label near the bottom center.
- Offices, Car Park and Processing Plant**: A label at the bottom center.
- TANK**: A label near the bottom left.
- Blue Outline**: A label in the lower left corner, with an arrow pointing to the blue line.





KEY *red line*

BOUNDARY:  
APPLICATION SITE

LANDSCAPE CHARACTER  
TYPES:

BOUNDARY: NATIONAL  
CHARACTER AREAS  
(COUNTRYSIDE AGENCY)

AV AVON VALES

SPWWD SALISBURY PLAIN  
AND WEST  
WILTSHIRE DOWNS

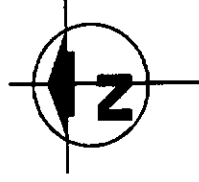
BOUNDARY: REGIONAL  
CHARACTER AREA  
(WILTSHIRE COUNTY COUNCIL)

BOUNDARY: EXTENTS  
OF WILTSHIRE C.C.  
STUDY AREA

DH DUNGE HILL

HV HEYWOOD VALE

SP SALISBURY PLAIN



DAVID JARVIS ASSOCIATES  
PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT

David Jarvis Associates Ltd.  
The Old Rectory  
Swindon Wiltshire SN1 5DT  
Tel: 01793 612173 Fax: 01793 613625  
Email (Text): mail@davidjarvis.biz  
Email (Drawings): drawings@davidjarvis.biz

Client  
LCUK

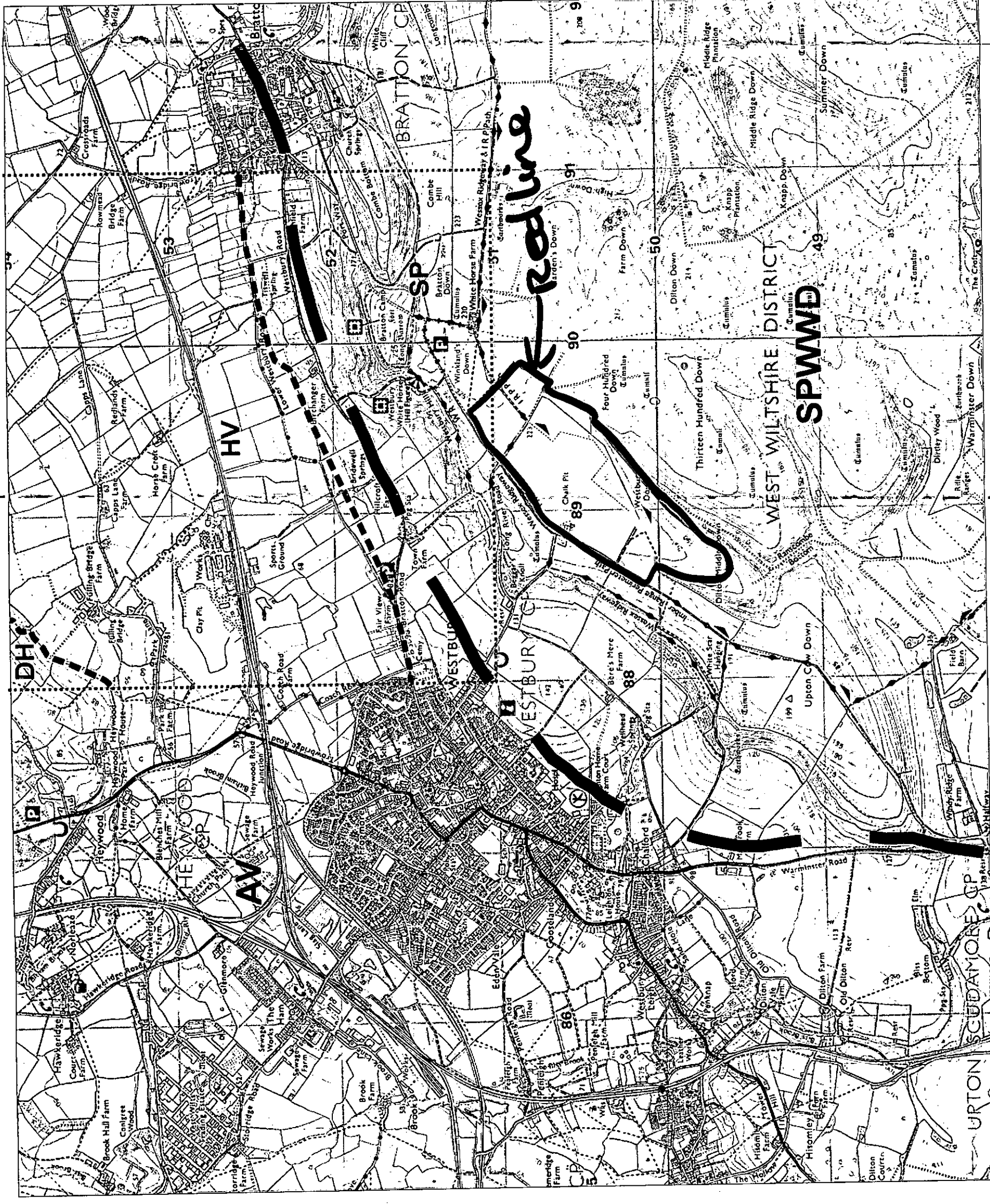
Project  
WESTBURY CHALK QUARRY

Drawing title

LANDSCAPE CONTEXT

Scale 1:25,000 Date NOV 2003

Drawing No. 5.5



SCALE

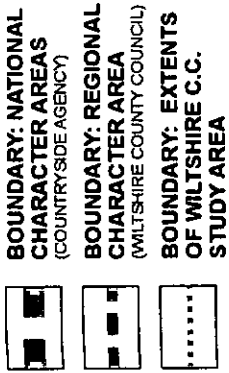


Reproduced with the permission  
of the controller of HMSO.  
Licence No. AR 189685

# KEY



## LANDSCAPE CHARACTER TYPES:



BC BRATTON CAMP AND WHITE HORSE

BF BRATTON FARMLANDS

CBV COMBE BOTTOM VALLEY

DMDF DILTON MIDDLE DOWN FARMLANDS

DWV DIRTLEY WOOD VALLEY

DG DOWN GRASSLANDS

RBV RANSCOMBE BOTTOM VALLEY

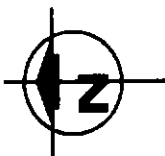
UCDF UPTON COW DOWN FARMLANDS

WCQ WESTBURY CHALK QUARRY

WE WESTBURY ESCARPMENT

WRF WESTBURY RIDGE FARMLANDS

WSF WESTBURY SCARP FARMLANDS



## DAVID JARVIS ASSOCIATES

PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT  
David Jarvis Associates Ltd.  
1 Tennyson Street  
SWINDON Wiltshire SN1 5DT  
Tel: 01793 612173 Fax: 01793 843825  
Email (Text): mail@darvidjavis.biz  
Email (Drawings): drawings@darvidjavis.biz

Client

LCUK

Project

WESTBURY CHALK QUARRY

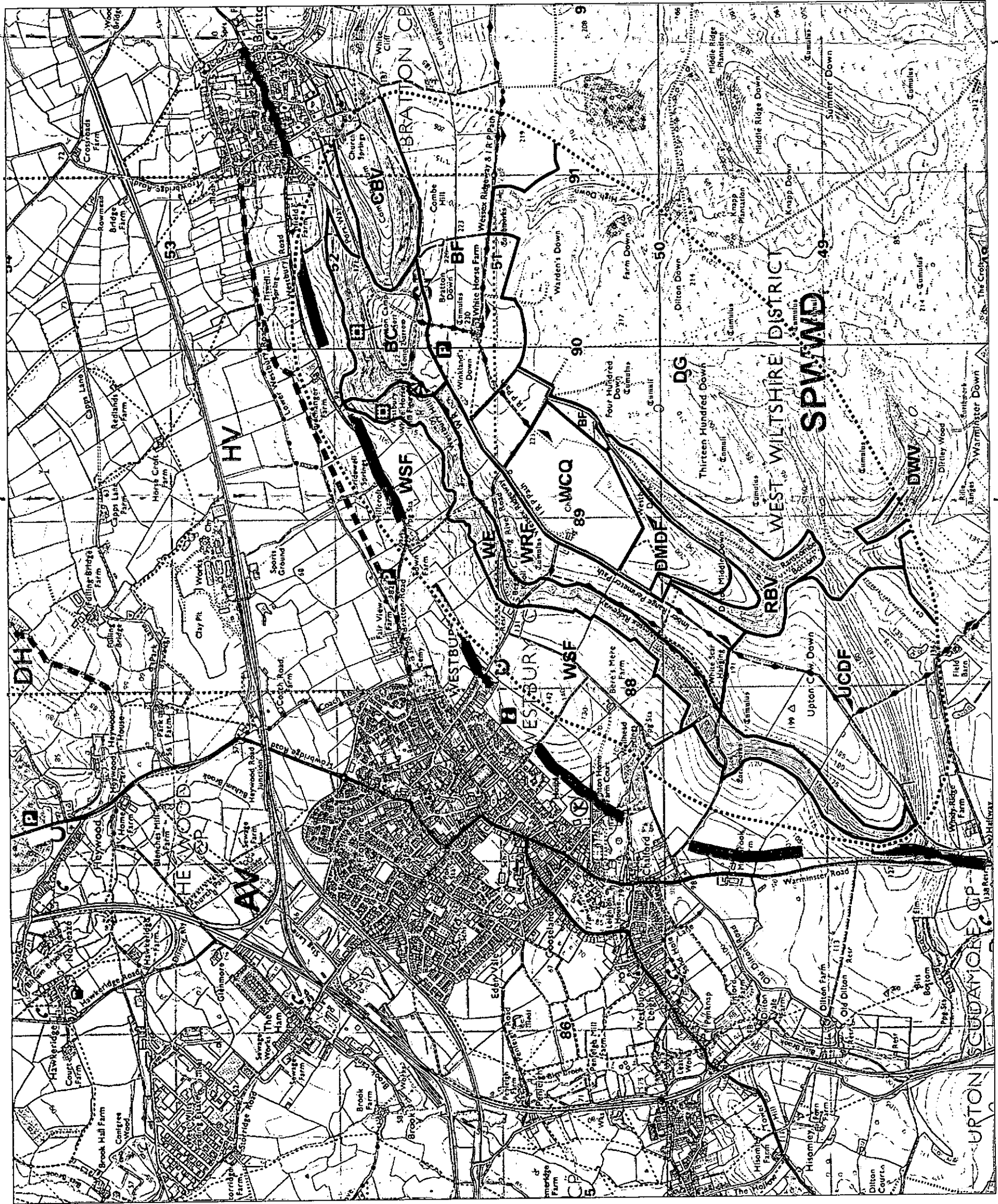
Drawing Title

LOCAL LANDSCAPE CHARACTER AREAS

Scale 1:25,000 Date NOV 2003

Drawing No.

5.6



## SCALE



Reproduced with the permission of the controller of HMSO.  
Licence No. AR 189685

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BRATTON CAMP AND WHITE HORSE</b><br><br>This character area is defined by the site and immediate setting of the historic hillfort and White Horse complex which offers panoramic views, particularly over the clay vales to the north, east and west. Located at the top of the highest local scarp face Bratton Camp retains a strong individual sense of place distinct from adjoining areas. The scarp slopes provide pasture whilst the hillfort is given over to rough grass. | <b>COMBE BOTTOM VALLEY</b><br><br>A distinctive dry valley with steep sides set into, and forming part of the local scarp. The valley is deep and provides strong enclosure leading up towards Bratton Camp. Pasture farming predominates. Views are generally channelled eastwards in a narrow corridor over Bratton village in the foreground.                                | <b>DIRTLEY WOOD VALE</b><br><br>A small, steep sided dry downland valley partly wooded with rough grass and scrub. This combination of landform, landcover and strong enclosure distinguishes the valley from the open downs adjoining.                                       |
| <b>DOWN GRASSLANDS</b><br><br>Typifying the broad expanse of Salisbury Plain the Down Grasslands comprise part of a extensive larger area characterised by open, exposed rolling chalk plateau downland. Chalk grassland and pasture predominate with occasional scrub, scattered plantations, beech hangers and woodland. In common with the broader area the grasslands contain earthworks and monuments evidence of a prehistoric landscape.                                       | <b>UPTON COW DOWN FARMLANDS</b><br><br>Mixed farming with large open arable fields distinguishes this local character area from the adjoining Down Grasslands which it otherwise forms a part. The landform is defined by a broad hill with relatively gentle slopes and very little tree or hedge cover.                                                                       | <b>WESTBURY ESCARPMENT</b><br><br>A dramatic chalk scarp rising above undulating farmland and the clay vales beyond. This character area provides a distinct boundary and edge to the open chalk plateau above and is further distinguished by a mix of pasture and woodland. |
| <b>WESTBURY RIDGE FARMLANDS</b><br><br>This narrow tract of gently sloping mixed farmland represents the remaining component of the adjoining Upton Cow Down Farmlands to the south west. It differs in so much as it is predominantly set on the gentle north-west facing ridge slopes above Westbury Escarpment, linear in character and with marginally greater tree and hedge cover.                                                                                              | <b>WESTBURY SCARP FARMLANDS</b><br><br>The Scarp Farmlands comprise an area of predominantly arable farming on gently undulating chalk ground between the Clay Vales and the Westbury Escarpment. Field sizes are smaller and more regular than that found on the farmed plateau with greater woodland, tree and hedge cover. The result is a more enclosed, gentler landscape. |                                                                                                                                                                                                                                                                               |

**DAVID JARVIS ASSOCIATES**  
PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT  
David Jarvis Associates Ltd.  
1 Tenbyson Street  
SWINDON Wiltshire SN1 5DT  
Tel: 01793 612173 Fax: 01793 613625  
Email (Text): mail@davidjarvis.biz  
Email (Drawings): drawings@davidjarvis.biz

Client  
**LCUK**

Project  
**WESTBURY CHALK QUARRY**

Drawing Title  
**LOCAL LANDSCAPE CHARACTER AREAS DESCRIPTION**

Scale  
**N/A**

Date  
**JAN 2004**

Drawing No.  
**5.7**



# KEY

BOUNDARY:  
APPLICATION SITE

## LANDSCAPE CHARACTER TYPES:

BOUNDARY: NATIONAL  
CHARACTER AREAS  
(COUNTRY/IDEAGENCY)

BOUNDARY: REGIONAL  
CHARACTER AREA  
(WILTSHIRE COUNTY COUNCIL)

BOUNDARY: EXTENTS  
OF WILTSHIRE C.C.  
STUDY AREA

BOUNDARY: LOCAL  
CHARACTER AREA OF  
STUDY

BOUNDARY: LOCAL  
CHARACTER AREA

## PROMINENT LANDSCAPE FEATURES:

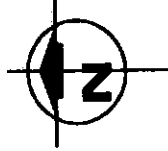
ATTRACTORS:

SCARPS AND  
RIDGES

ISOLATED TREE  
GROUPS

DETRACTORS:

UPPER QUARRY  
FACES AND  
STOCKPILES



## DAVID JARVIS ASSOCIATES

PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT  
David Jarvis Associates Ltd.  
The Old Rectory  
Swindon Wiltshire SN1 5DT  
Tel: 01793 612173 Fax: 01793 613925  
Email (Text): mail@djavidjars.biz  
Email (Drawings): drawings@djavidjars.biz

Client

LCUK

Project

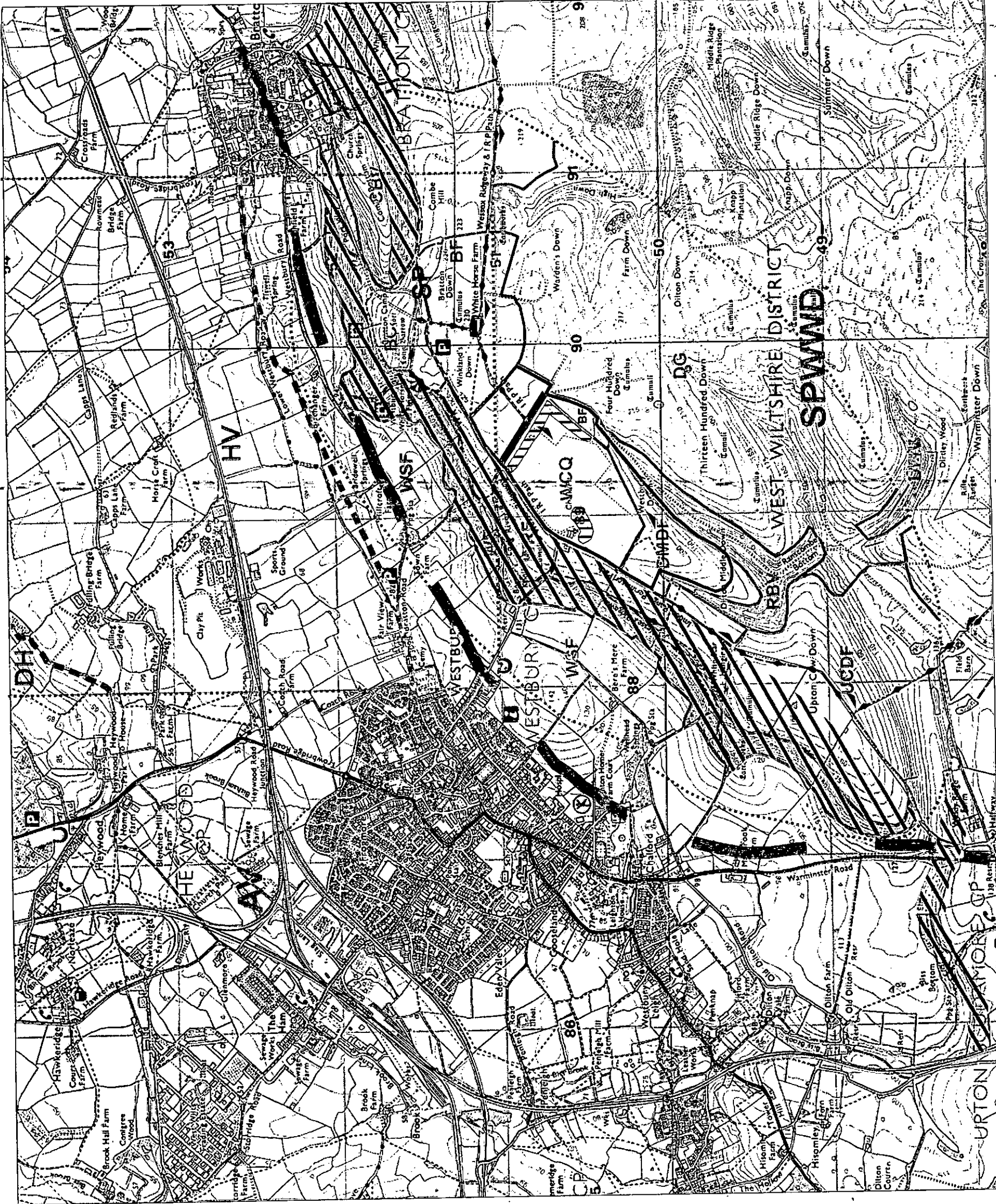
WESTBURY CHALK QUARRY

Drawing Title

## LANDSCAPE FEATURES

Scale 1:25,000 Date NOV 2003

Drawing No. 5.8



## SCALE



Reproduced with the permission  
of the controller of HMSO.  
Licence No. AR 189685

KEY

BOUNDARY:

APPLICATION SITE

SCHEDULED ANCIENT MONUMENT (SAM)

S.S.S.I. AND OTHER EUROPEAN DESIGNATION

SPECIAL LANDSCAPE AREA (SLA) / CHARACTER AREA

ANCIENT WOODLAND (ENGLISH NATURE INVENTORY)

SPECIAL AREA OF CONSERVATION (CSAC) / SPECIAL PROTECTION AREA (PSPA)

DAVID JARVIS ASSOCIATES

PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT

David Jarvis Associates Ltd.

100, The Old Rectory

SWINDON Wiltshire SN1 5DT

Tel: 01793 612173

Fax: 01793 613925

Email (Text): mail@davidjarvis.biz

Email (Drawings): drawings@davidjarvis.biz

Client

LCUK

Project

WESTBURY CHALK QUARRY

Drawing Title

LANDSCAPE PLANNING CONTEXT

Scale

1:25,000

Date

NOVEMBER 2003

Drawing No.

5.9



Reproduced with the permission of the controller of HMSO.

Licence No. AR 189685

SCALE

0 0.5 1 2km



KEY

BOUNDARY:  
ZVI TEST AREA

NUMBER OF TEST POINTS  
VISIBLE FROM EACH TEST  
VIEWPOINT

APPROX EXTENT OF  
SIGNIFICANT VISIBILITY  
BASED ON FIELD  
ASSESSMENT AND  
COMPUTER BASED  
VISUALISATION

APPROXIMATE AREA OF SIGNIFICANT  
VISIBILITY: 711,489 m<sup>2</sup>

NOTE:

ZVI TEST AREA IS COVERED IN A 15 X 15m  
GRID OF TEST POINTS (TOTAL NUMBER 1422).  
THE SURROUNDING LANDSCAPE IS COVERED  
IN A SERIES OF TEST VIEWPOINTS AT 200 X  
200m INTERVALS. EACH TEST VIEWPOINT  
WITHIN THE SURROUNDING LANDSCAPE IS  
TESTED TO DETERMINE THE NUMBER OF  
TEST POINTS VISIBLE. THIS IS RECORDED AS  
A NUMERICAL VALUE AND GIVES A BROAD  
INDICATION OF VISIBILITY.  
HIGHER VALUES = HIGHER VISIBILITY

Reproduced with the permission  
of the controller of HMSO.  
Licence No. AR 18285



DAVID JARVIS ASSOCIATES

PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT

David Jarvis Associates Limited

1 Tennyson Street

SWINDON Wiltshire SN1 5DT

Tel: 01793 612173 Fax: 01793 613625

Email (Text): mail@davidjarvis.co.uk

Email (Drawings): drawings@davidjarvis.co.uk

Client

LCUK

Project

WESTBURY CHALK QUARRY

Drawing Title

ZVI STUDY EXISTING  
CHALK QUARRY

Scale

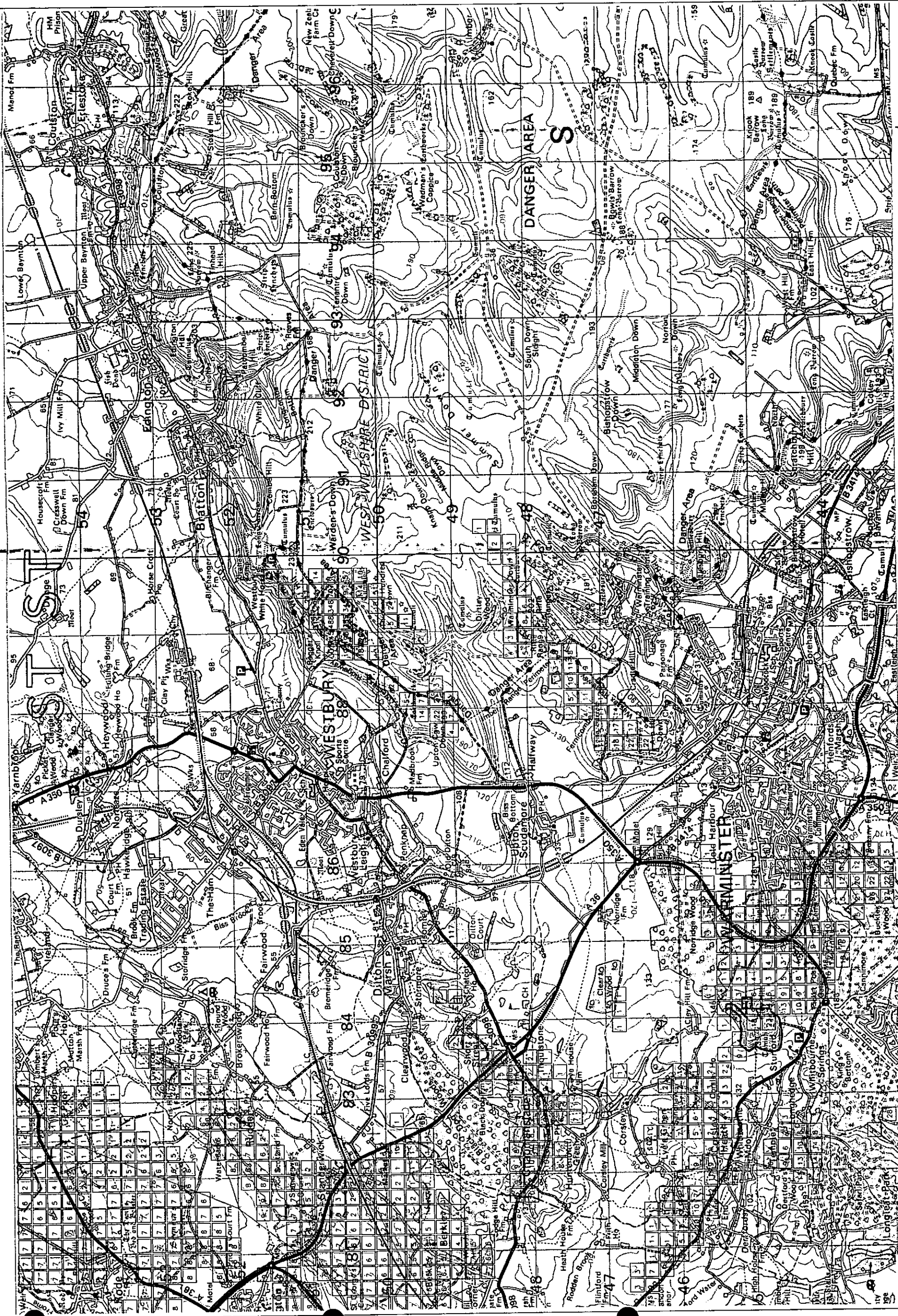
1:50,000

Date

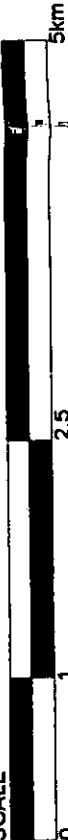
NOV 2003

Drawing No.

5.10



SCALE





KEY

BOUNDARY:  
ZVI TEST AREA

NUMBER OF TEST POINTS  
VISIBLE FROM EACH TEST  
VIEWPOINT

APPROX EXTENT OF  
SIGNIFICANT VISIBILITY  
BASED ON FIELD  
ASSESSMENT AND  
COMPUTER BASED  
VISUALISATION

APPROXIMATE AREA OF SIGNIFICANT  
VISIBILITY: 1,119,984 m<sup>2</sup>

NOTE:

ZVI TEST AREA IS COVERED IN A 15 X 15m  
GRID OF TEST POINTS (TOTAL NUMBER 705)  
THE SURROUNDING LANDSCAPE IS COVERED  
IN A SERIES OF TEST VIEWPOINTS AT 200 X  
200m INTERVALS. EACH TEST VIEWPOINT  
WITHIN THE SURROUNDING LANDSCAPE IS  
TESTED TO DETERMINE THE NUMBER OF  
TEST POINTS VISIBLE. THIS IS RECORDED AS  
A NUMERICAL VALUE AND GIVES A BROAD  
INDICATION OF VISIBILITY.  
HIGHER VALUES = HIGHER VISIBILITY

Reproduced with the permission  
of the controller of HMSO.  
Licence No. AR 1986/5



DAVID JARVIS ASSOCIATES

PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT

David Jarvis Associates Limited  
1 Tennyson Street  
SWINDON Wiltshire SN1 3DT  
Tel: 01793 612173 Fax: 01793 613625  
Email (Text): mail@davidjavis.biz  
Email (Drawings): drawing@davidjavis.biz

Client

LCUK

Project

WESTBURY

Drawing Title

ZVI STUDY CONSENTED  
CHALK QUARRY

Scale

1:50,000

Drawing No.

5.11

Date

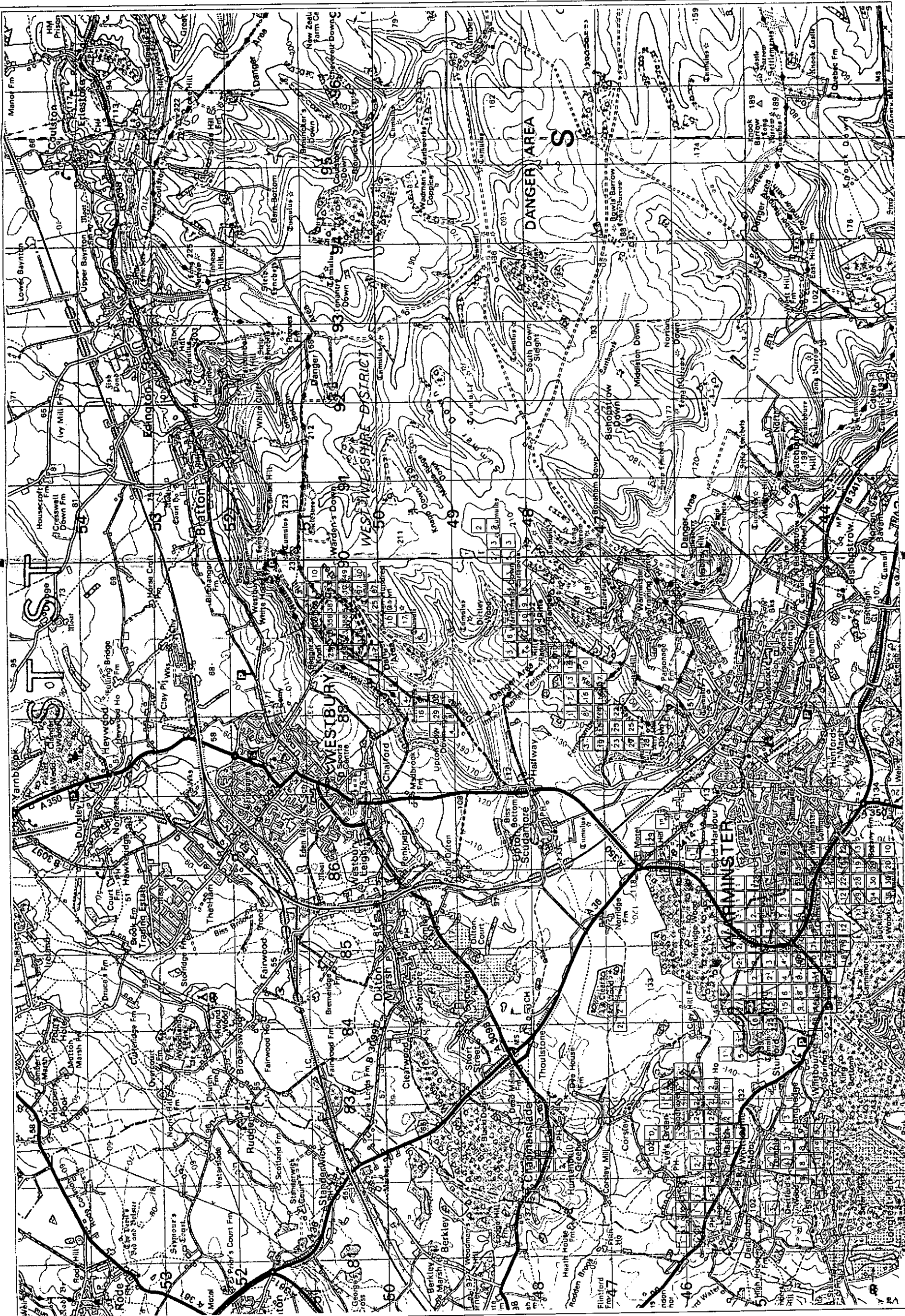
NOV 2003

Scale

1:50,000

Drawing No.

5.11



SCALE

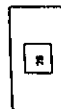


# KEY

BOUNDARY:  
ZVI TEST AREA



NUMBER OF TEST POINTS  
VISIBLE FROM EACH TEST  
VIEWPOINT



APPROX EXTENT OF  
SIGNIFICANT VISIBILITY  
BASED ON FIELD  
ASSESSMENT AND  
COMPUTER BASED  
VISUALISATION



APPROXIMATE AREA OF SIGNIFICANT  
VISIBILITY: 1,192,800 m<sup>2</sup>

## NOTE:

ZVI TEST AREA IS COVERED IN A 15 X 15m  
GRID OF TEST POINTS (TOTAL NUMBER 197).  
THE SURROUNDING LANDSCAPE IS COVERED  
IN A SERIES OF TEST VIEWPOINTS AT 200 X  
200m INTERVALS. EACH TEST VIEWPOINT  
WITHIN THE SURROUNDING LANDSCAPE IS  
TESTED TO DETERMINE THE NUMBER OF  
TEST POINTS VISIBLE. THIS IS RECORDED AS  
A NUMERICAL VALUE AND GIVES A BROAD  
INDICATION OF VISIBILITY.  
HIGHER VALUES = HIGHER VISIBILITY



Reproduced with the permission  
of the controller of HMSO.  
Licence No. A4 189855

## DAVID JARVIS ASSOCIATES

PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT

David Jarvis Associates Limited  
1 Tennyson Street  
SWINDON Wiltshire SN1 5DT  
Tel: 01793 612173 Fax: 01793 613625  
Email (Text): mail@davidjarvis.biz  
Email (Drawings): drawings@davidjarvis.biz

Client

LCUK

Project

WESTBURY CHALK QUARRY

Drawing Title

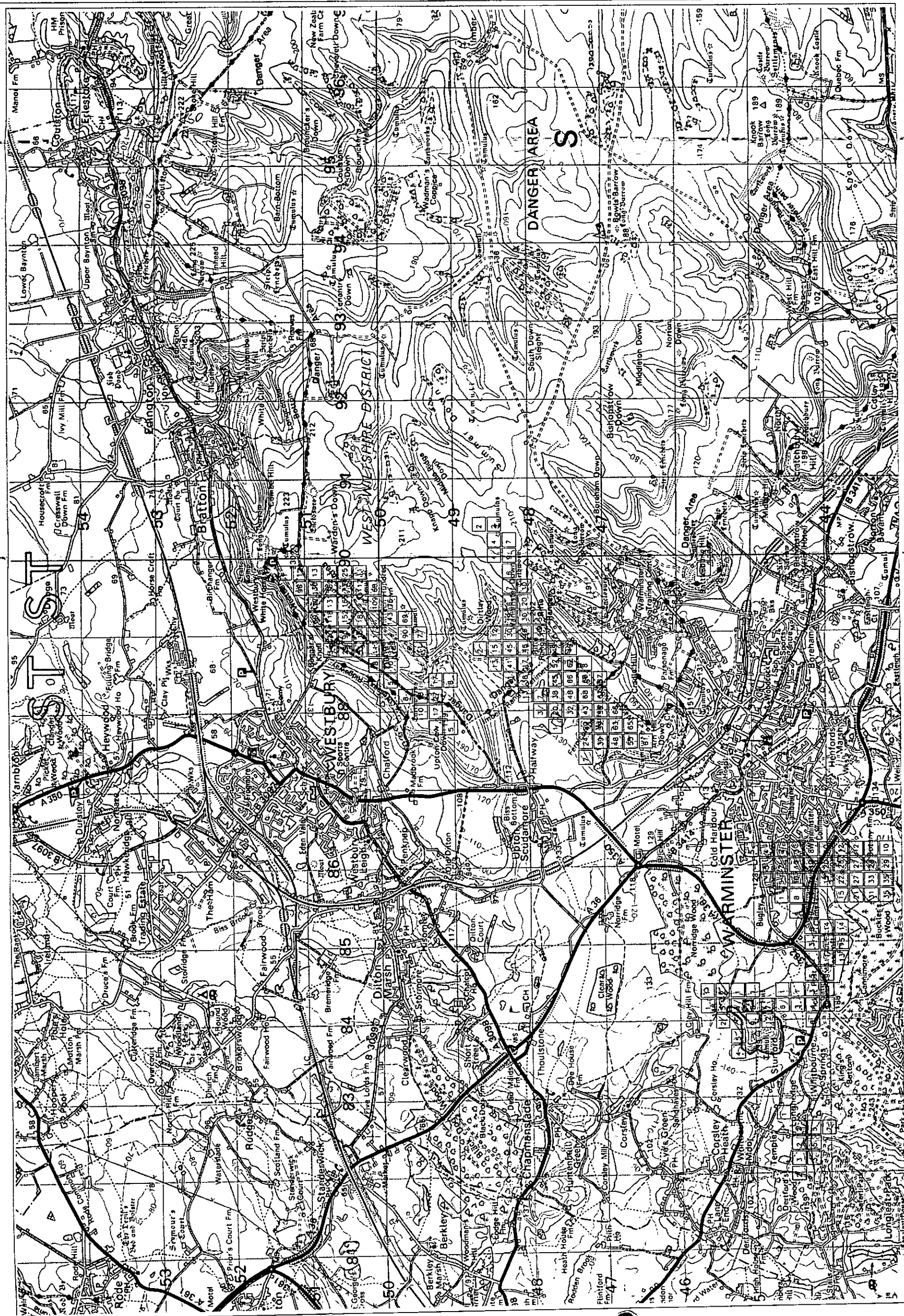
ZVI STUDY PROPOSED  
CHALK QUARRY

Scale  
1:50,000

Date  
NOV 2003

Drawing No.

5.12

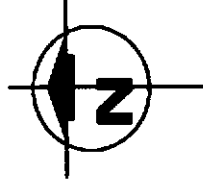
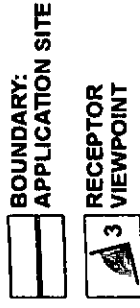


SCALE





KEY



Reproduced with the permission  
of the controller of HMSO.  
Licence No. AR 189685

DAVID JARVIS ASSOCIATES

PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT  
David Jarvis Associates Ltd.  
1 Tennyson Street  
SWINDON Wiltshire SN1 5DT  
Tel: 01793 612173 Fax: 01793 613625  
Email (Text): mail@davidjarvis.biz  
Email (Drawings): drawings@davidjarvis.biz

Client

LCUK

Project

WESTBURY CHALK QUARRY

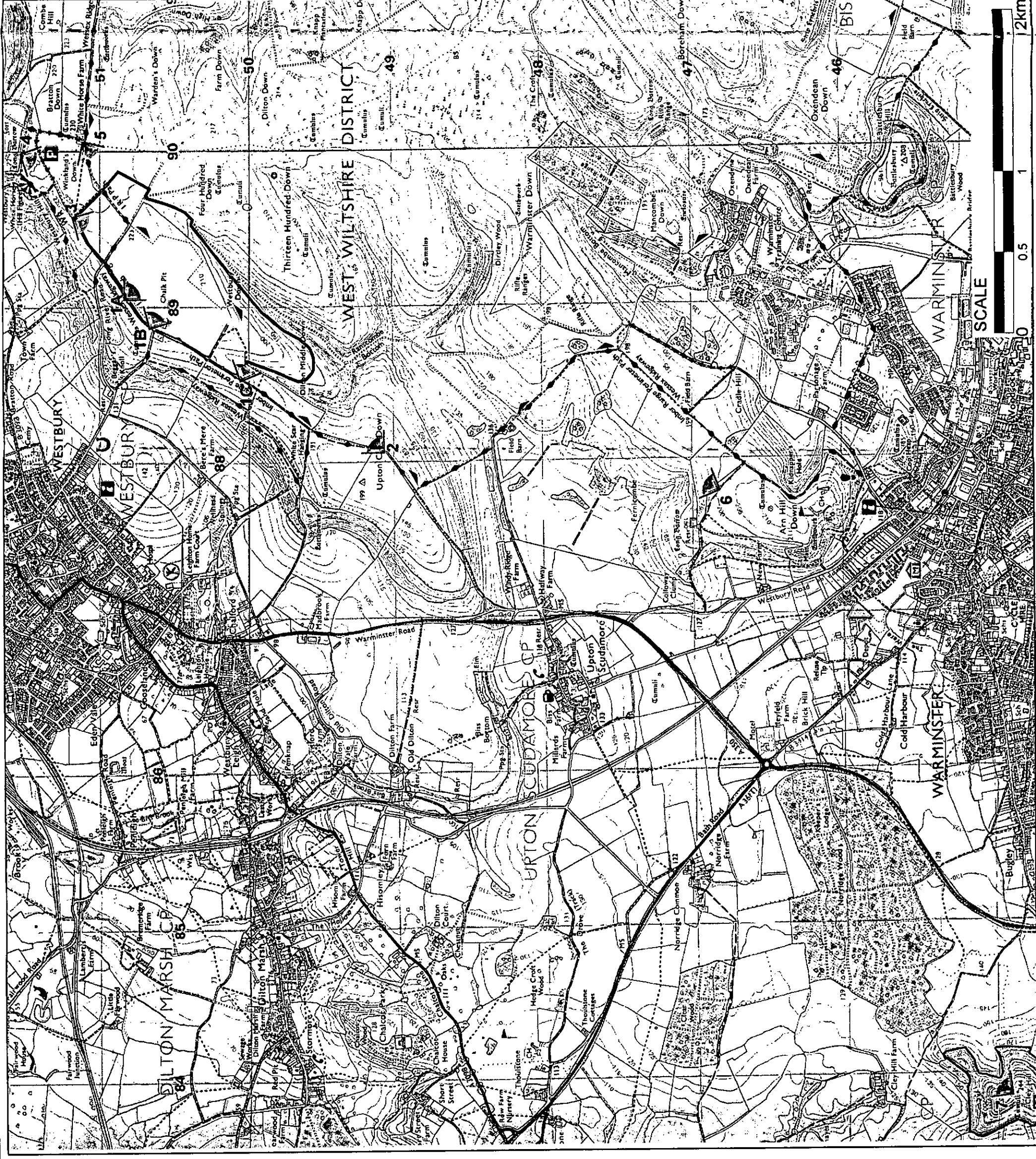
Drawing Title

REPRESENTATIVE VISUAL  
RECEPTOR VIEWPOINT  
LOCATIONS

Scale 1:25,000 Date NOVEMBER 2003

Drawing No.

5.13













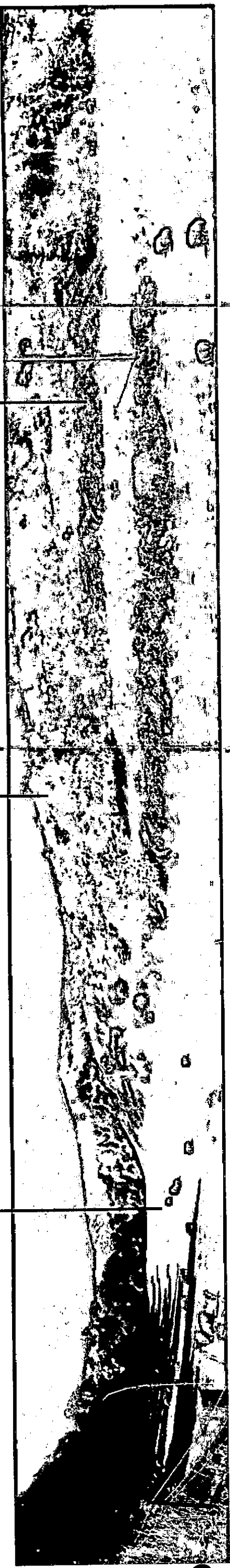




WIDE EVEN SLOPING  
VALLEY FLOOR

CHALK GRASSLAND  
WITH SCRUB ON SLOPES

EXPOSED CHALK TERRACES  
(LIKELY MAN MADE)

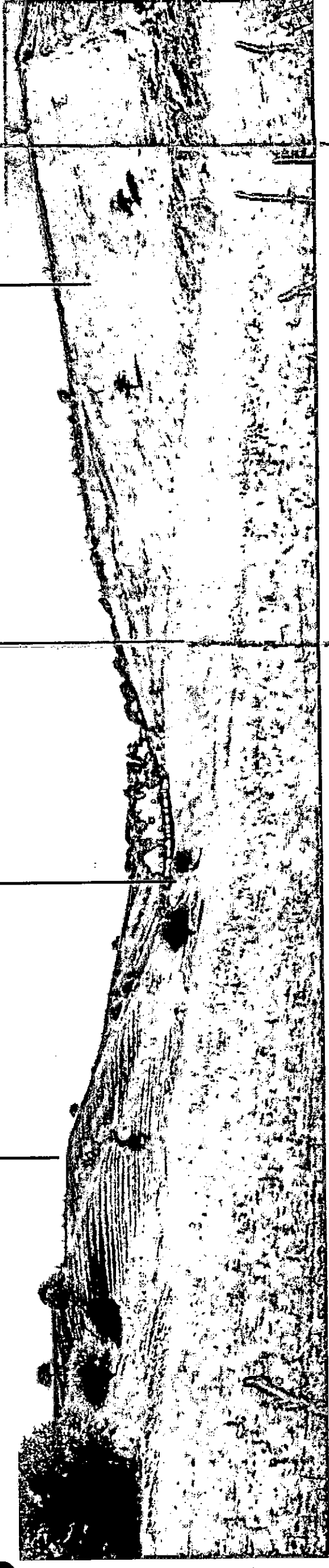


CONVEX UPPER  
SLOPES

CONCAVE LOWER  
SLOPES

WIDE EVEN SLOPING  
VALLEY FLOOR WITH  
CHALK GRASSLAND

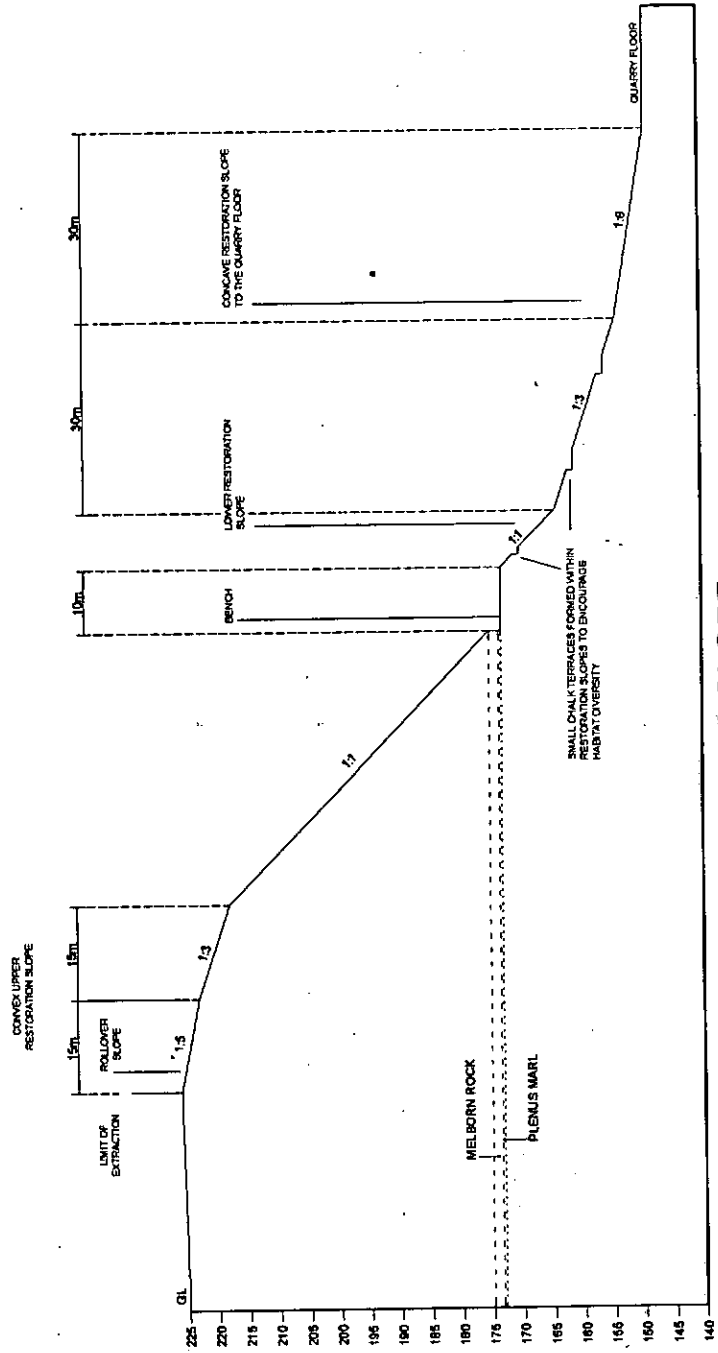
CHALK GRASSLAND  
ON SLOPES



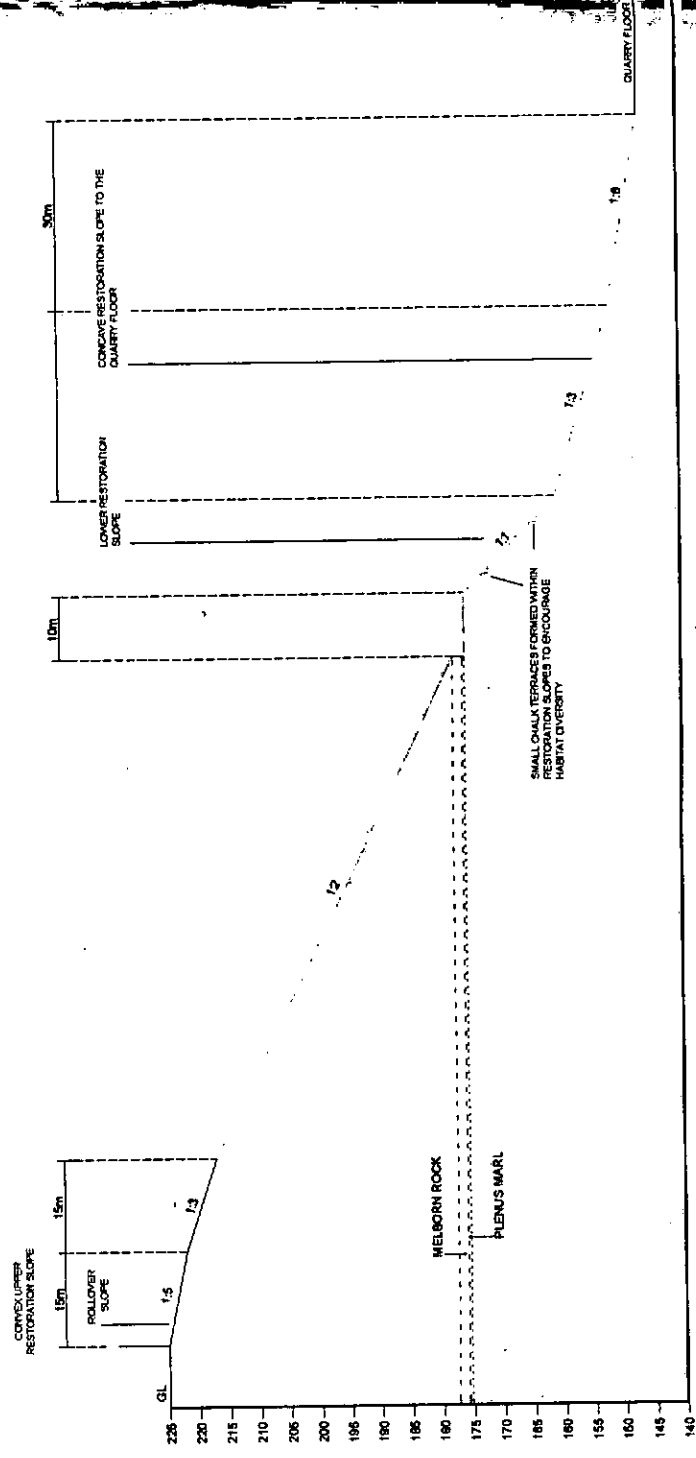
**DAVID JARVIS ASSOCIATES**  
PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT  
David Jarvis Associates Ltd.  
1 Tennyson Street  
SWINDON Wiltshire SN1 5DT  
Tel: 01793 612173 Fax: 01793 613025  
Email (Text): mail@davidjarvis.biz  
Email (Drawings): drawings@davidjarvis.biz

Client  
**LCUK**  
Project  
**WESTBURY CHALK QUARRY**

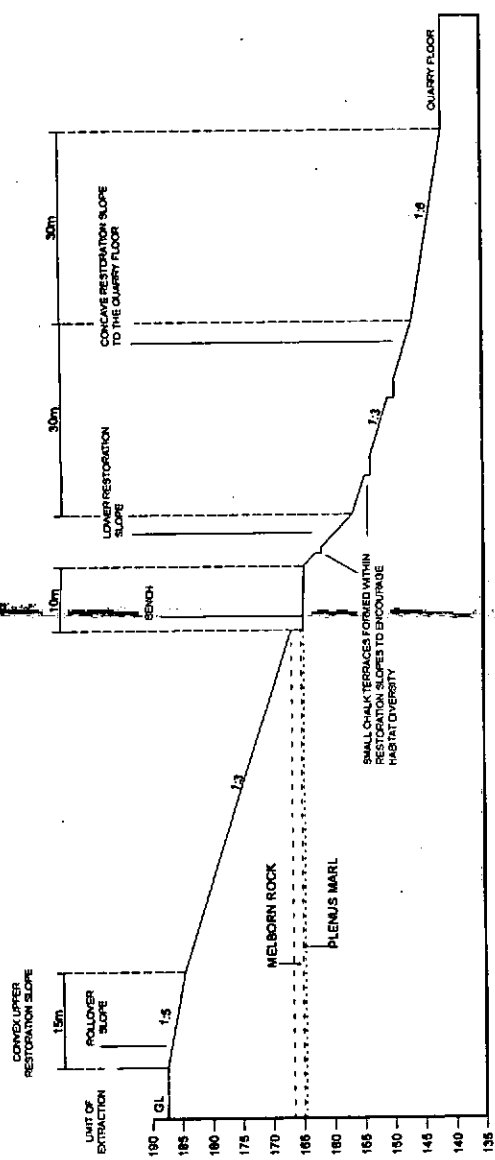
Drawing Title  
**LOCAL CHALK  
LANDSCAPE REFERENCES**  
Scale  
**NTS**  
Date  
**NOVEMBER 2003**  
Drawing No.  
**5.18**



SECTION 1:1 GRADE RECTILINEAR SLOPE



SECTION 1:2 GRADE RECTILINEAR SLOPE



SECTION 1:3 GRADE RECTILINEAR SLOPE

**DAVID JARVIS ASSOCIATES**  
PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT

David Jarvis Associates Limited  
1 Tenmyson Street  
SWINDON Wiltshire SN1 5DT  
Tel: 01793 612173 Fax: 01793 613825  
Email (Text): mail@davidjarvis.biz  
Email (Drawings): drawings@davidjarvis.biz

Client  
**LCUK**

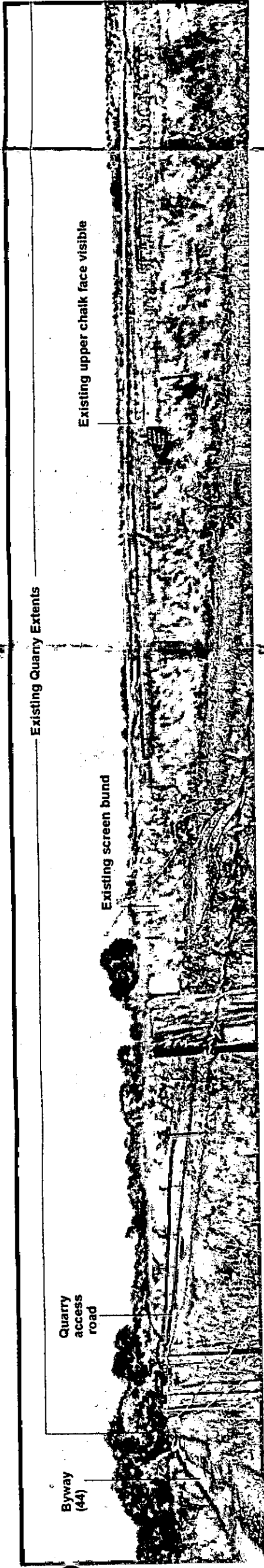
Project  
**WESTBURY CHALK QUARRY**

Drawing Title  
**TYPICAL PROPOSED LANDFORM REPLICATION SLOPES**

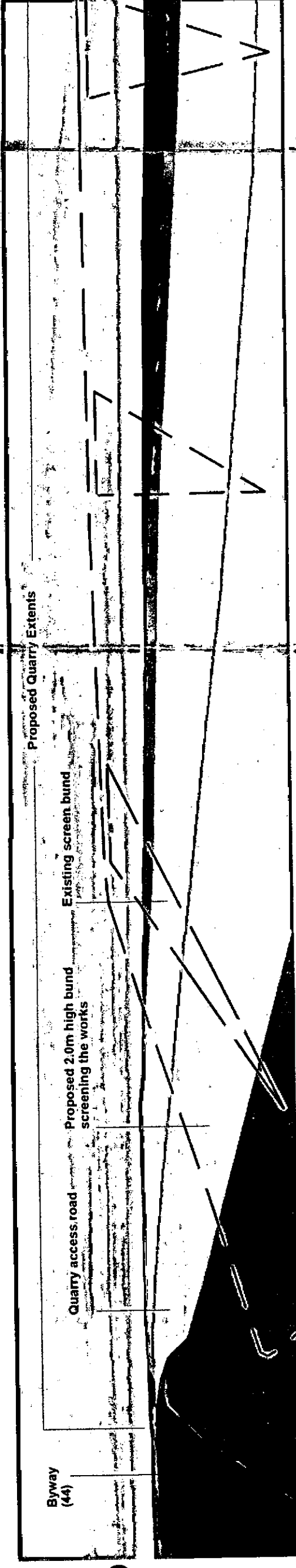
Scale  
**1:1250 @ A3**

Date  
**NOV 2003**

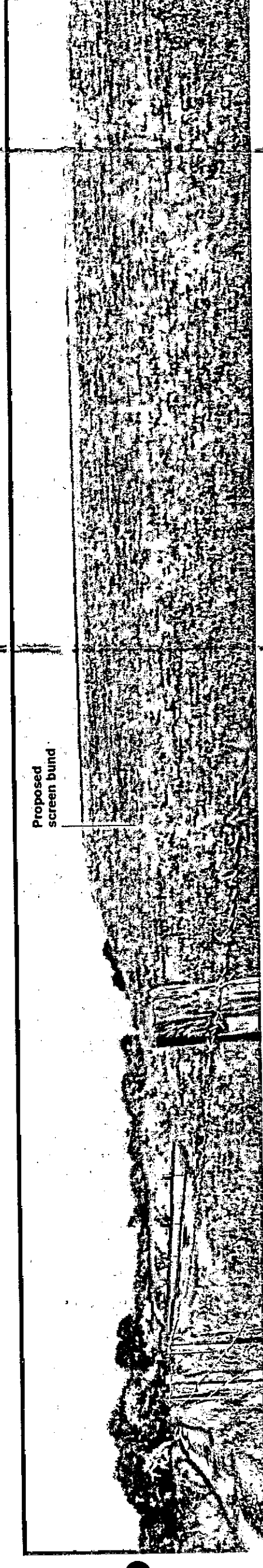
Drawing No.  
**5.19**



VIEWPOINT 1A (1 OF 2) - EXISTING CONDITIONS



VIEWPOINT 1A (1 OF 2) - COMPUTER MODEL OF PROPOSED PHASE 1

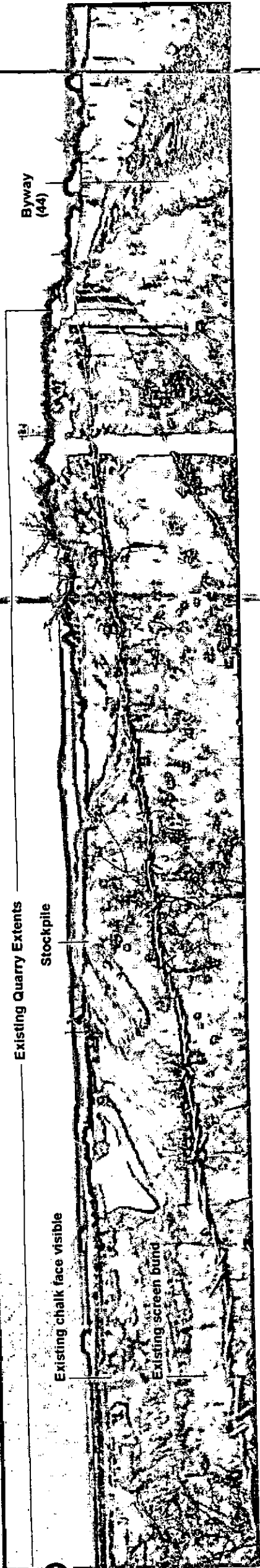


PHOTOMONTAGE - PHASE 1

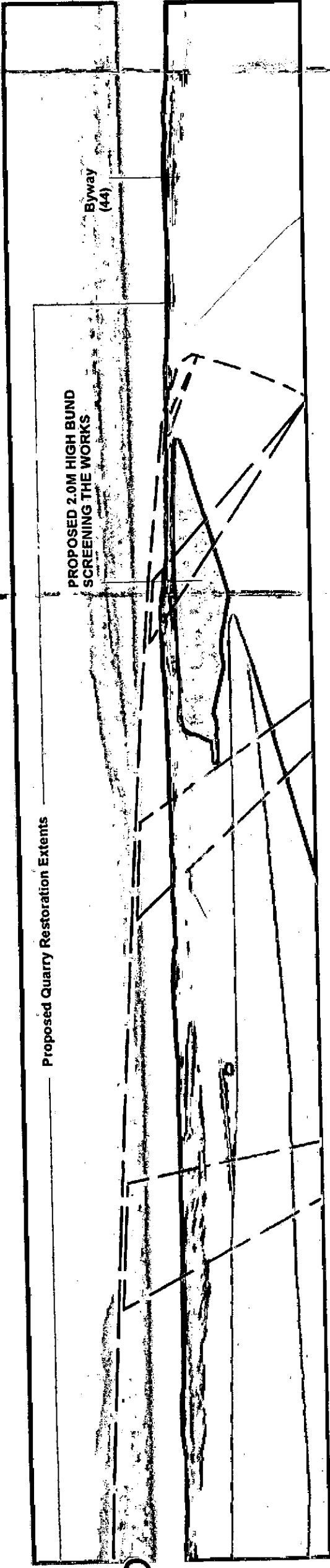


PHOTOMONTAGE - 5 YEARS AFTER COMPLETION

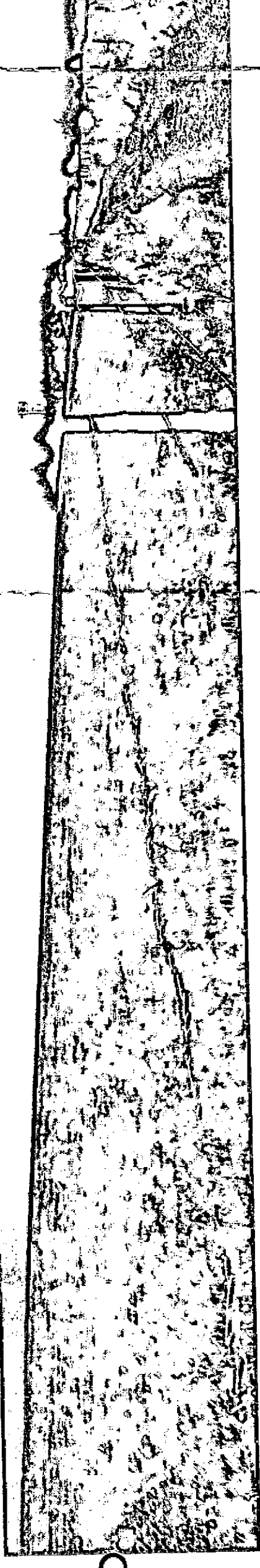
|                                                                                                                                                                                                                                      |                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| <b>DAVID JARVIS ASSOCIATES</b><br>PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT<br>David Jarvis Associates Ltd.<br>1 Tennyson Street<br>SWINDON Wiltshire SN1 5DT<br>Tel: 01793 612173 Fax: 01793 613825<br>Email: mail@davidjarvis.biz |                             |
| Client                                                                                                                                                                                                                               | LCUK                        |
| Project                                                                                                                                                                                                                              | WESTBURY                    |
| Drawing Title                                                                                                                                                                                                                        | VIEWPOINT 1A - PHOTOMONTAGE |
| Scale                                                                                                                                                                                                                                | N/A                         |
| Date                                                                                                                                                                                                                                 | DEC 2003                    |
| Drawing No.                                                                                                                                                                                                                          | 20 (1 of 2)                 |



VIEWPOINT 1A (2 OF 2) - EXISTING CONDITIONS



VIEWPOINT 1A (2 OF 2) - COMPUTER MODEL OF PROPOSED PHASE 1



PHOTOMONTAGE - PHASE 1



**DAVID JARVIS ASSOCIATES**  
PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT

David Jarvis Associates Ltd.  
1 Tennyson Street  
SWINDON Wiltshire SN1 5DT  
Tel: 01793 812173 Fax: 01793 813825  
Email: mail@davidjarvis.biz

Client  
**LCUK**

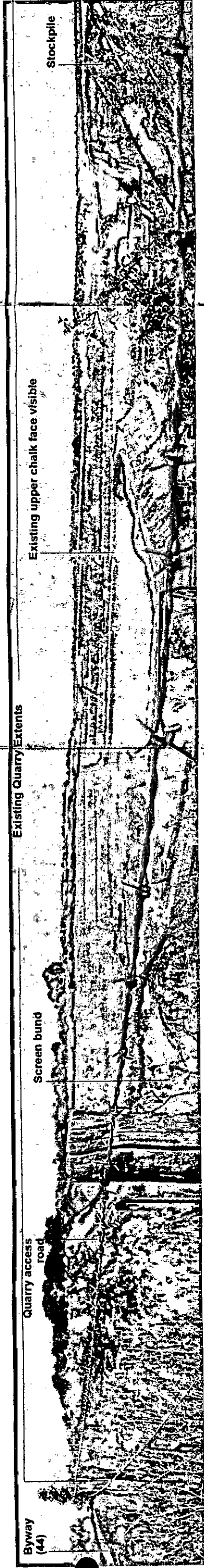
Project  
**WESTBURY**

Drawing Title  
**VIEWPOINT 1A -  
PHOTOMONTAGE**

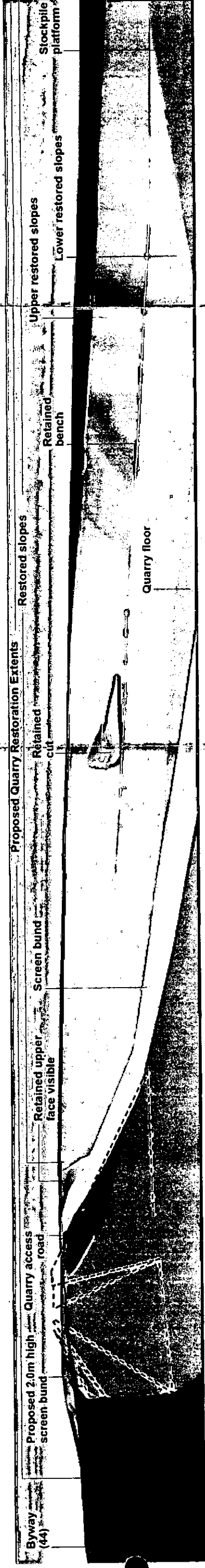
Scale N/A

Date DEC 2003  
Drawing No. 20 ( 2 of 2 )

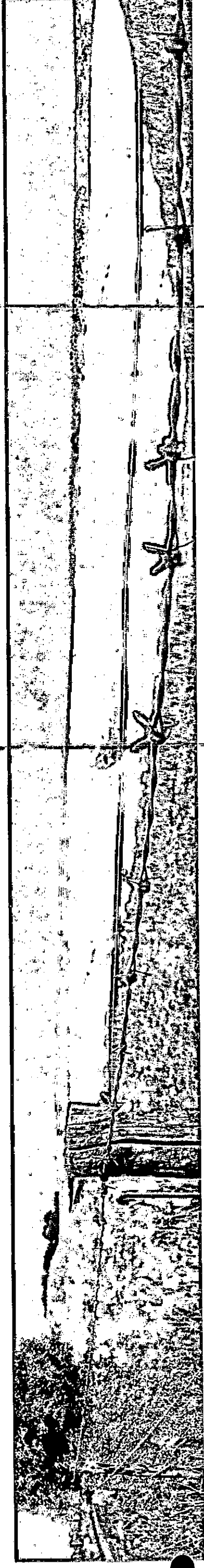




VIEWPOINT 1B (1 OF 2) - EXISTING CONDITIONS



VIEWPOINT 1B (1 OF 2) - COMPUTER MODEL OF PROPOSED RESTORATION



PHOTOMONTAGE - RESTORATION 20 YEARS AFTER COMPLETION

DAVID JARVIS ASSOCIATES

PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT

David Jarvis Associates Ltd.  
100, The Old Rectory  
100, The Old Rectory  
SWINDON Wiltshire SN1 5DT  
Tel: 01793 612173 Fax: 01793 613025  
Email: mail@davidjarvis.biz

Client

LCUK

Project

WESTBURY

Drawing Title

VIEWPOINT 1B -  
PHOTOMONTAGE

Scale

N/A

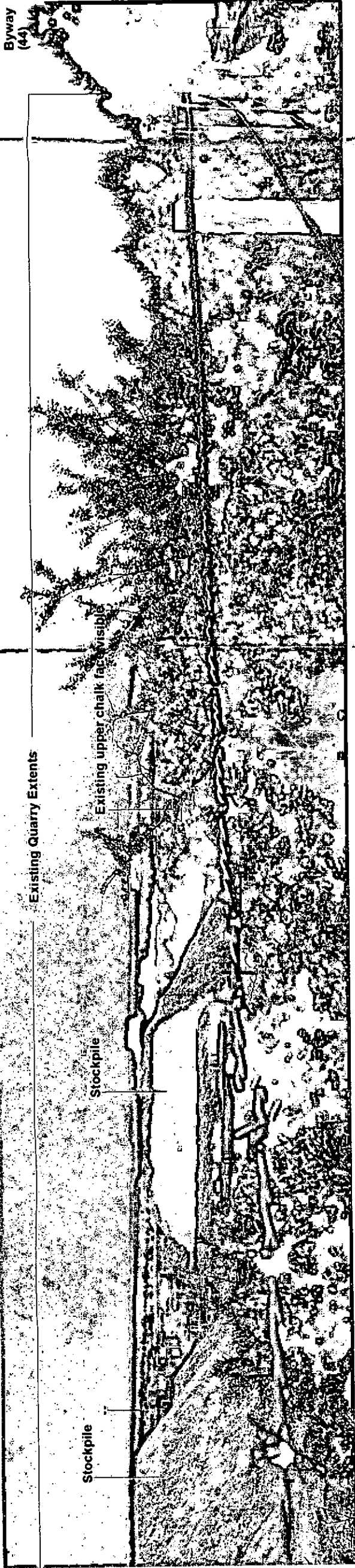
Date

DEC 2003

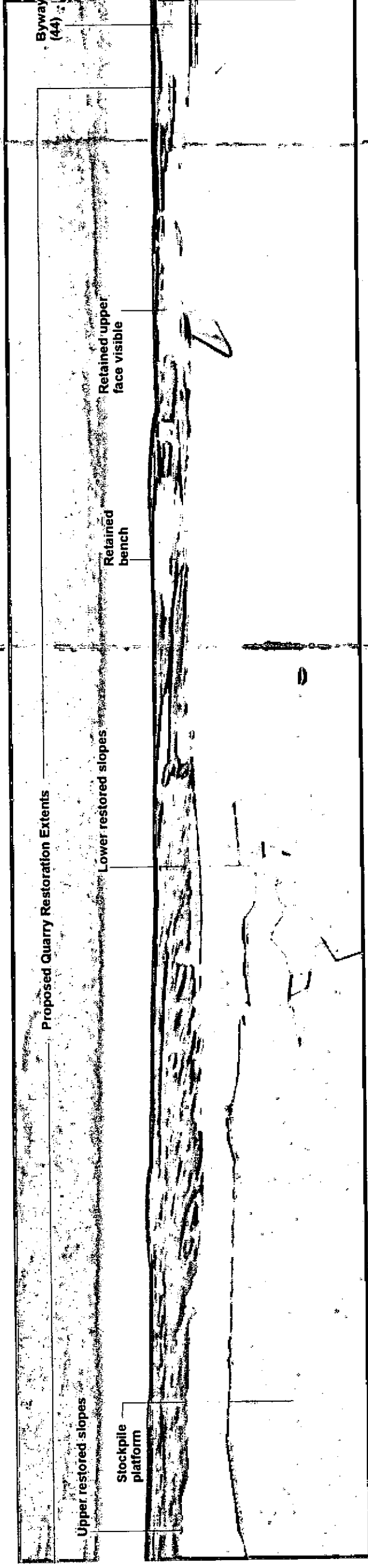
Drawing No.

21 (1 of 2)





VIEWPOINT 1B ( 2 OF 2) EXISTING CONDITIONS

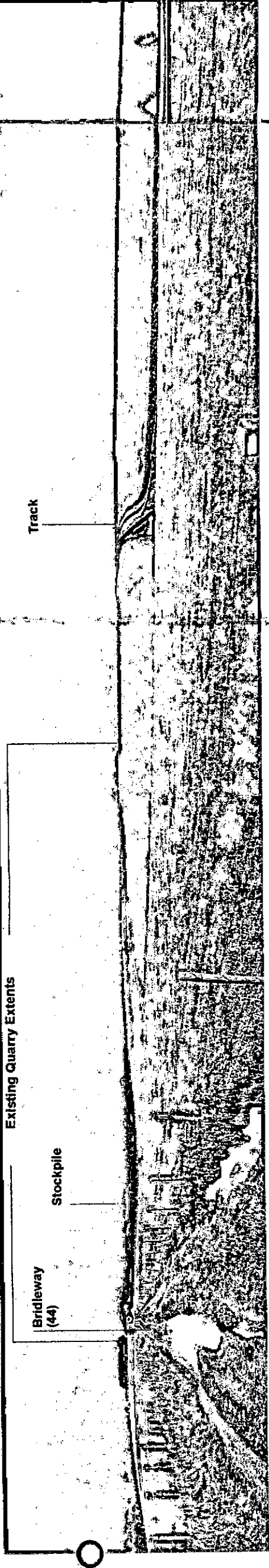


VIEWPOINT 1B ( 2 OF 2) COMPUTER MODEL OF PROPOSED RESTORATION

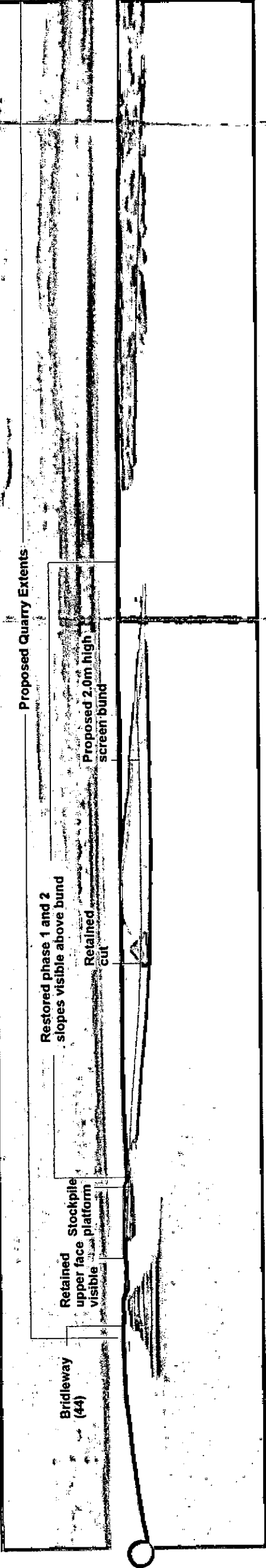


PHOTOMONTAGE - RESTORATION 20 YEARS AFTER COMPLETION

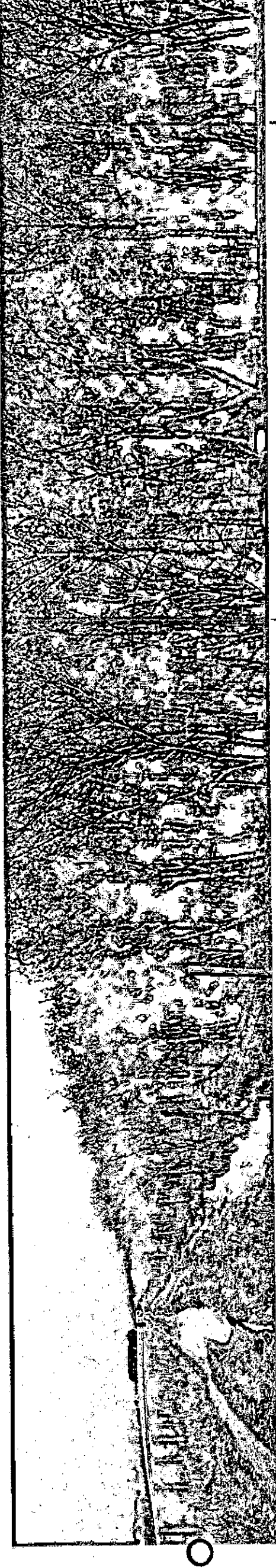
|                                                                                                                                                                                                                                                     |                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| <b>DAVID JARVIS ASSOCIATES</b><br><small>PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT</small><br>David Jarvis Associates Ltd.<br>1 Tennyson Street<br>SWINDON Wiltshire SN1 5DT<br>Tel: 01793 612173 Fax: 01793 613625<br>Email: mail@davidjarvis.biz |                                |
| Client                                                                                                                                                                                                                                              | LCUK                           |
| Project                                                                                                                                                                                                                                             | WESTBURY                       |
| Drawing Title                                                                                                                                                                                                                                       | VIEWPOINT 1B -<br>PHOTOMONTAGE |
| Scale                                                                                                                                                                                                                                               | N/A                            |
| Date                                                                                                                                                                                                                                                | DEC 2003                       |
| Drawing No.                                                                                                                                                                                                                                         | 21 (2 OF 2)                    |



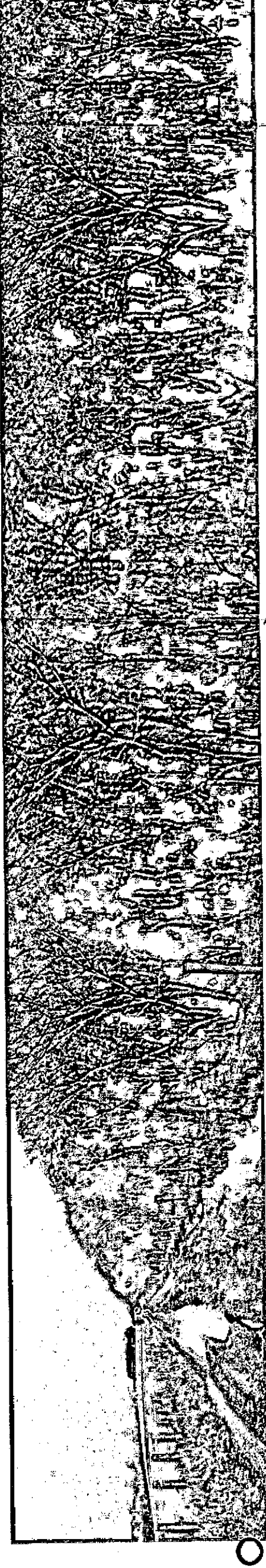
VIEWPOINT 1C ( 1 of 2 ) EXISTING CONDITIONS



VIEWPOINT 1C ( 1 of 2 ) COMPUTER MODEL OF PHASE 3



PHOTOMONTAGE - PHASE 3



PHOTOMONTAGE - RESTORATION- 5 YEARS AFTER COMPLETION

DAVID JARVIS ASSOCIATES

PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT

David Jarvis Associates Ltd.

Tennyson Street

SWINDON Wiltshire SN1 5DT

Tel: 01793 612173 Fax: 01793 613925

Email: mail@davidjarvis.biz

Client

LCUK

Project

WESTBURY

Drawing Title

VIEWPOINT 1C -  
PHOTOMONTAGE

Scale

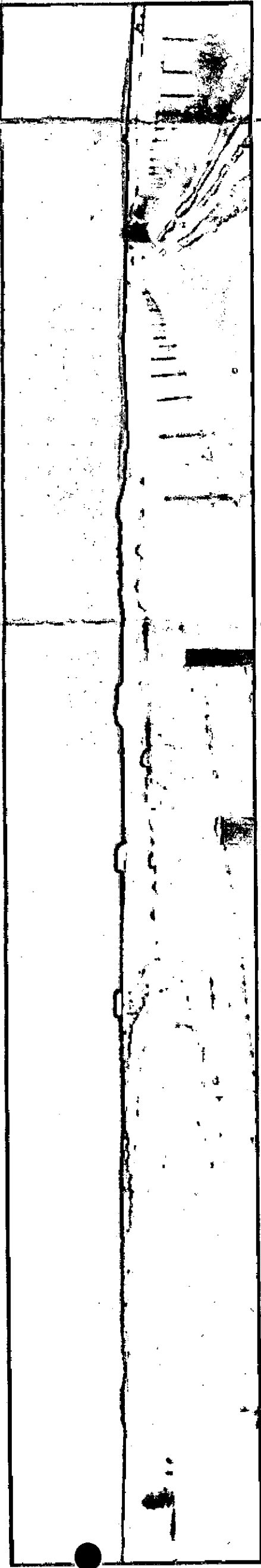
N/A

Date

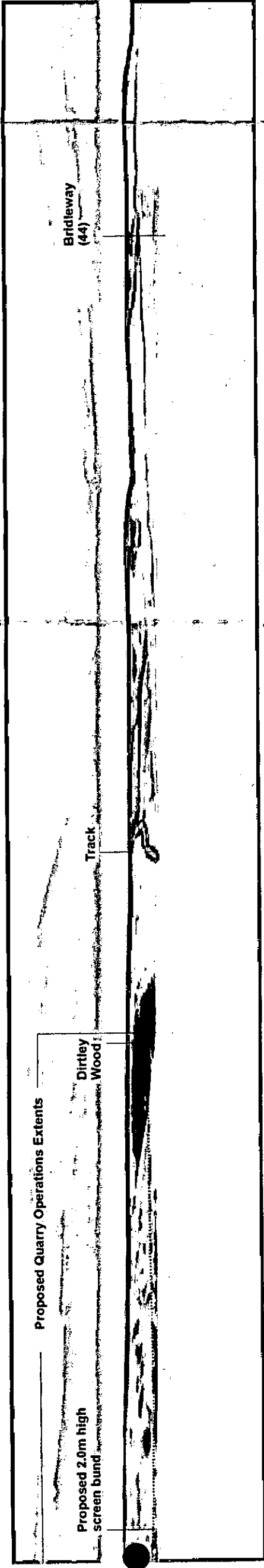
DEC 2003

Drawing No.

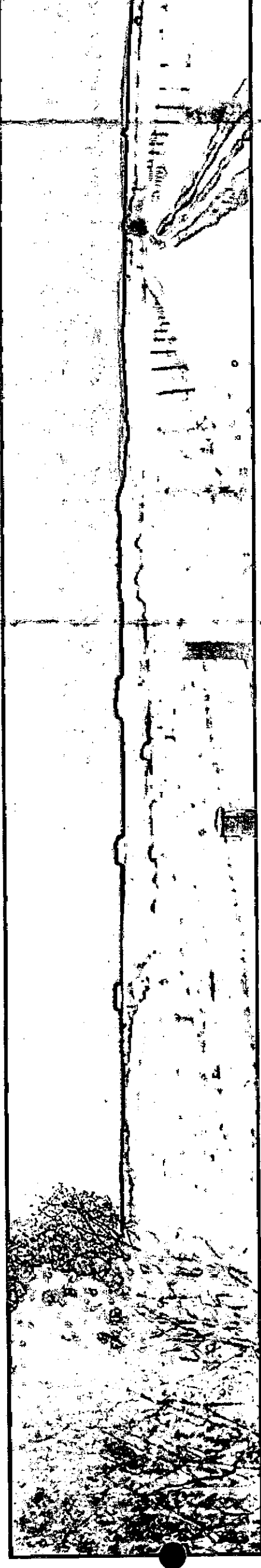
5.22 (1 of 2)



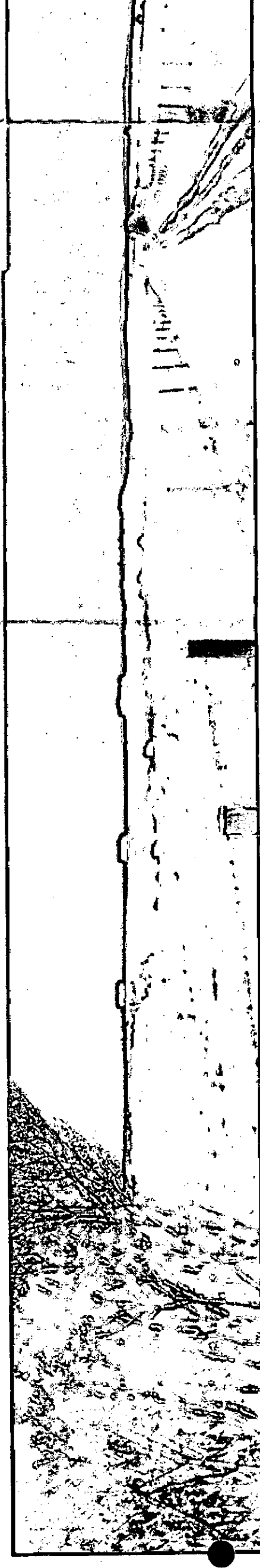
VIEWPOINT 1C ( 2 of 2 ) EXISTING CONDITIONS



VIEWPOINT 1C ( 2 of 2 ) COMPUTER MODEL OF PHASE 3



PHOTOMONTAGE - PHASE 3



PHOTOMONTAGE - RESTORATION 5 YEARS AFTER COMPLETION

**DAVID JARVIS ASSOCIATES**  
PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT

David Jarvis Associates Ltd.  
1 Tennyson Street  
SWINDON Wiltshire SN1 5DT  
Tel: 01793 612173 Fax: 01793 613825  
Email: mail@davidjarvis.biz

Client  
**LCUK**

Project  
**WESTBURY**

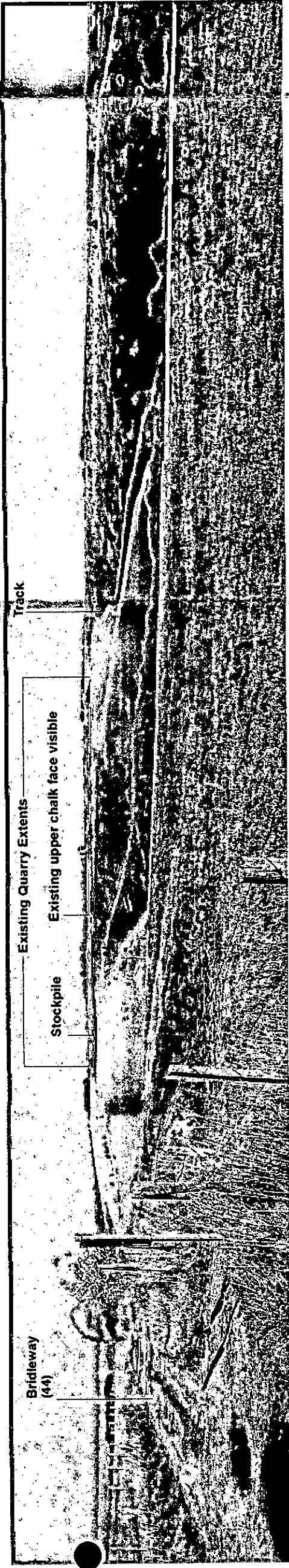
Drawing File  
**VIEWPOINT 1C -  
PHOTOMONTAGE**

Scale  
**N/A**

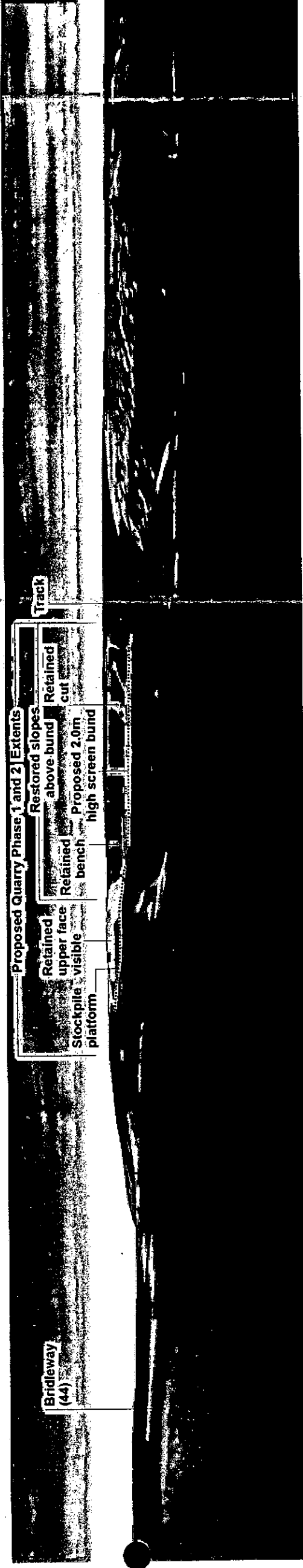
Date  
**DEC 2003**

Drawing No.  
**5.22 (2 of 2)**

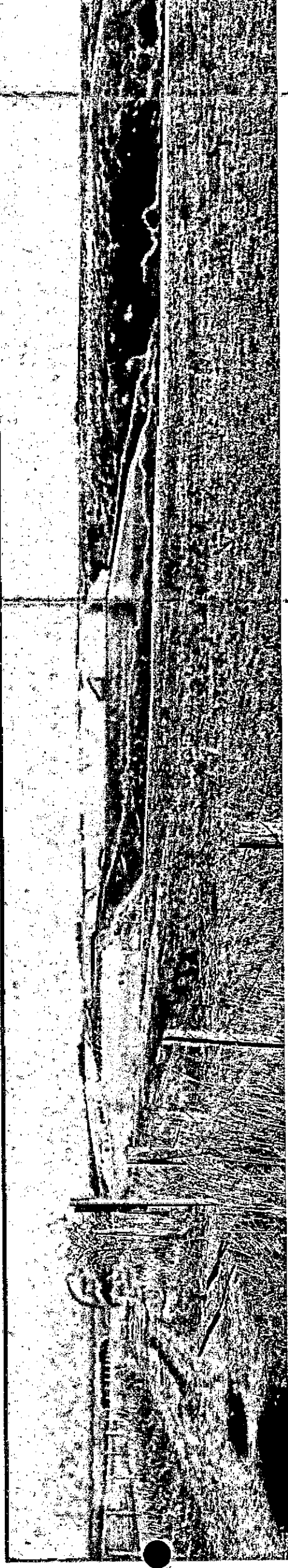




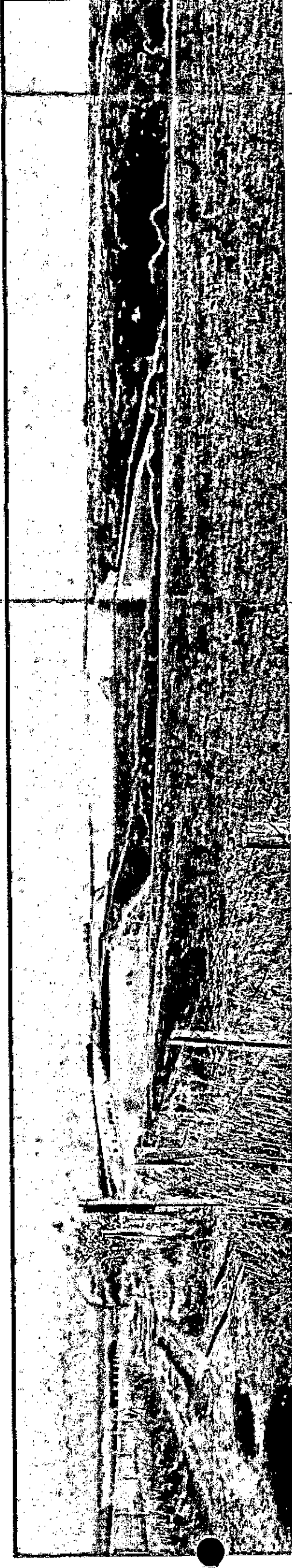
VIEWPOINT 2 - EXISTING CONDITIONS



VIEWPOINT 2 - COMPUTER MODEL OF PHASE 3



PHOTOMONTAGE - PHASE 3



PHOTOMONTAGE - RESTORATION- 5 YEARS AFTER COMPLETION

DAVID JARVIS ASSOCIATES

PLANNING

DEVELOPMENT

LANDSCAPE

ENVIRONMENT

David Jarvis Associates Ltd.

1 Tennyson Street

SWINDON Wiltshire SN1 5DT

Tel: 01793 612173

Fax: 01793 613625

Email: mail@davidjarvis.biz

Client

LCUK

Project

WESTBURY

Drawing Title

VIEWPOINT 2 - PHOTOMONTAGE

Scale

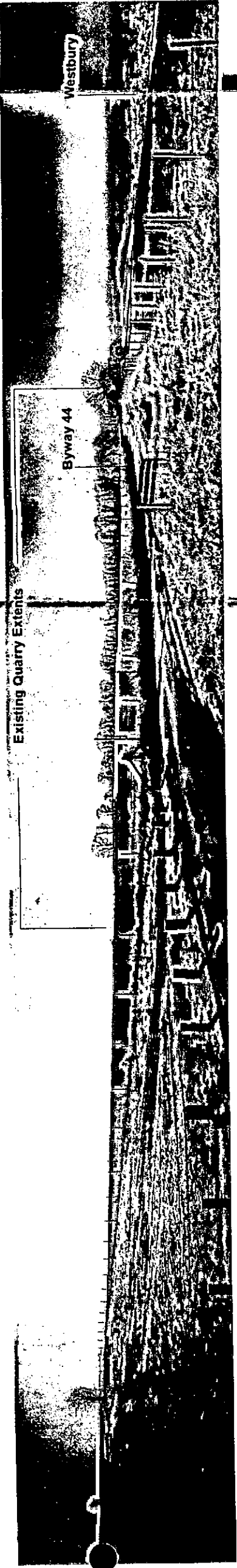
N/A

Date

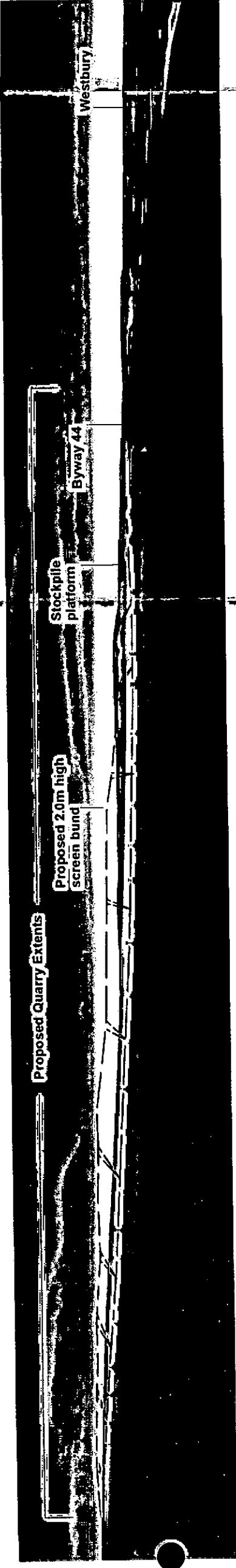
DEC 2003

Drawing No.

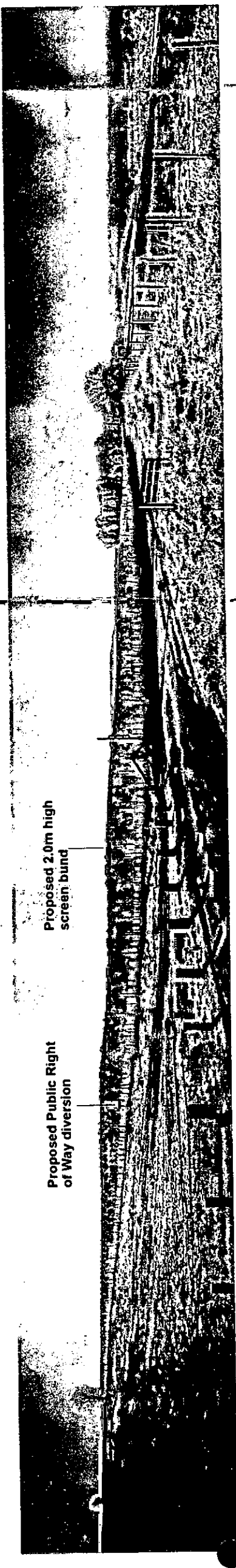
5.23



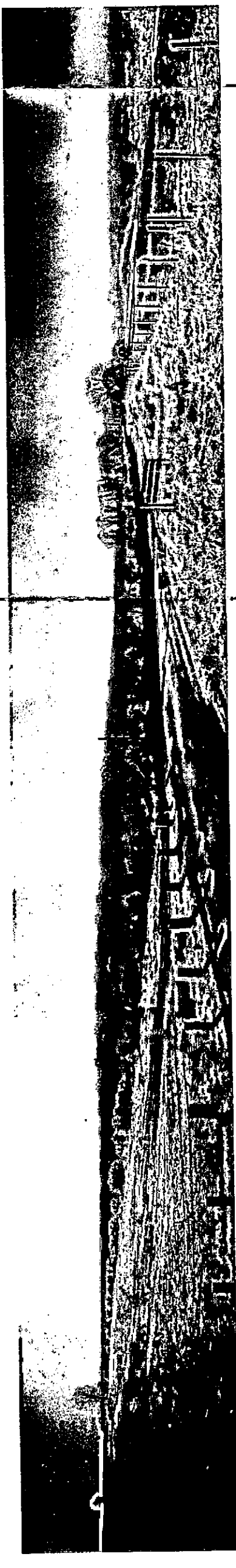
VIEWPOINT 3 - EXISTING CONDITIONS



VIEWPOINT 3 - COMPUTER MODEL OF PHASE 1



PHOTOMONTAGE - PHASE 1



PHOTOMONTAGE - RESTORATION AT COMPLETION

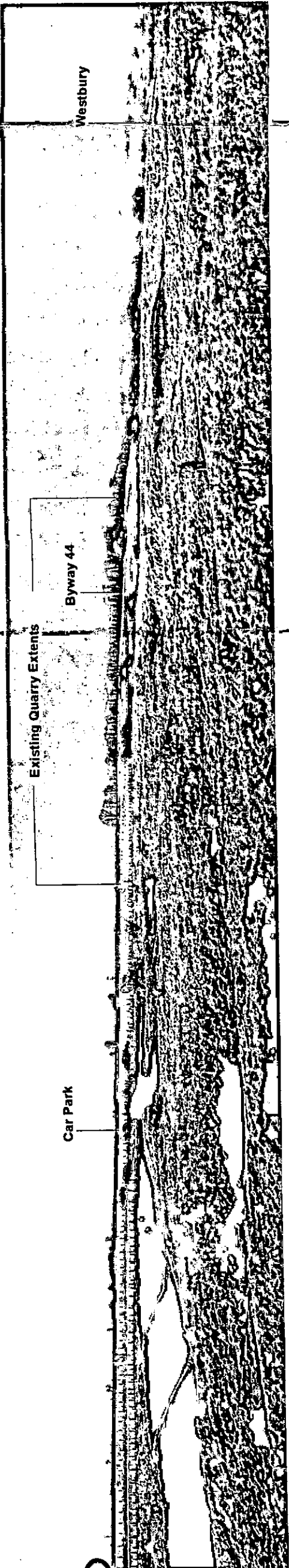
**DAVID JARVIS ASSOCIATES**  
PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT

David Jarvis Associates Ltd.  
100 Westbury Street  
SWINDON Wiltshire SN1 5DT  
Tel: 01793 612173 Fax: 01793 613825  
Email: mail@davidjarvis.biz

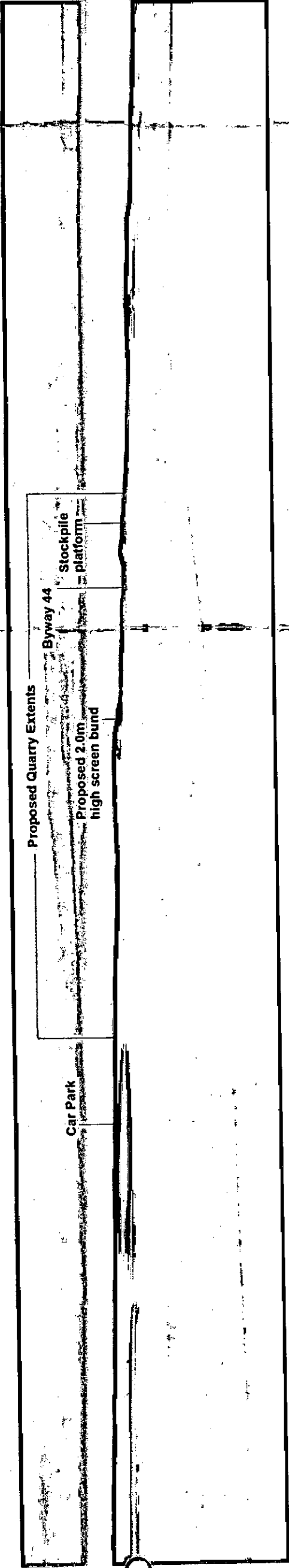
|         |          |
|---------|----------|
| Client  | LCUK     |
| Project | WESTBURY |

|               |                               |      |          |
|---------------|-------------------------------|------|----------|
| Drawing Title | VIEWPOINT 3 -<br>PHOTOMONTAGE |      |          |
| Scale         | N/A                           | Date | DEC 2003 |
| Drawing No.   | 5.24                          |      |          |

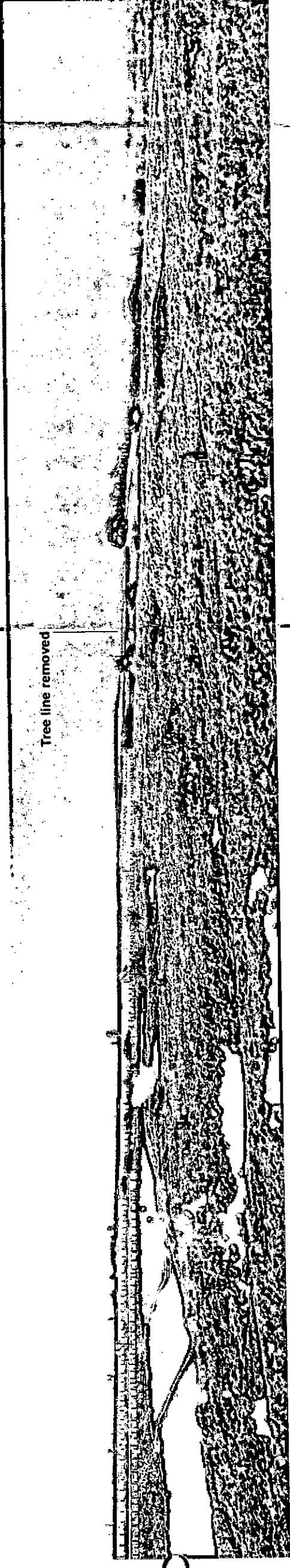




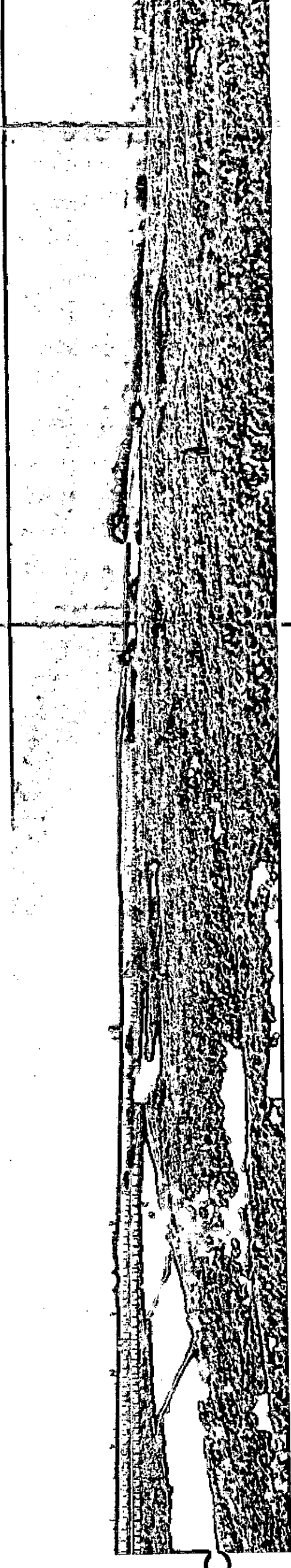
VIEWPOINT 4 - EXISTING CONDITIONS



VIEWPOINT 4 - COMPUTER MODEL OF PHASE 1



PHOTOMONTAGE - PHASE 1



PHOTOMONTAGE - RESTORATION AT COMPLETION (No Significant Change)

DAVID JARVIS ASSOCIATES  
PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT

David Jarvis Associates Ltd.  
100 Westbury Road  
SWINDON Wiltshire SN1 5DT  
Tel: 01793 812173 Fax: 01793 813625  
Email: mail@davidjarvis.biz

Client  
LCUK

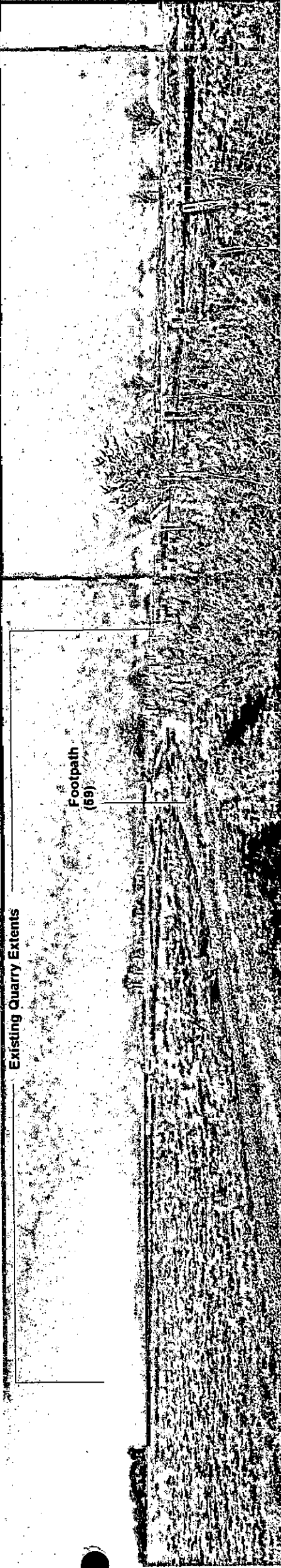
Project  
WESTBURY

Drawing Title  
VIEWPOINT 4 -  
PHOTOMONTAGE

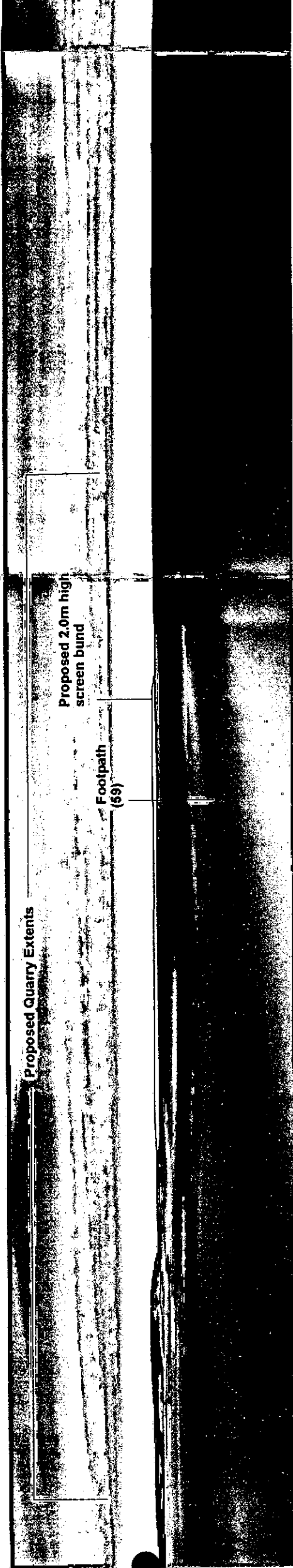
Scale  
N/A

Date  
DEC 2003

Drawing No.  
5.25



VIEWPOINT 5 - EXISTING CONDITIONS



VIEWPOINT 5 - COMPUTER MODEL OF PHASE 1



PHOTOMONTAGE - PHASE 1



PHOTOMONTAGE - RESTORATION AT COMPLETION (No Significant Change)

**DAVID JARVIS ASSOCIATES**  
PLANNING DEVELOPMENT LANDSCAPE ENVIRONMENT  
David Jarvis Associates Ltd.  
100, The Old Mill, The Mill Lane  
SWINDON Wiltshire SN1 5DT  
Tel: 01793 612173 Fax: 01793 613625  
Email: mail@davidjarvis.biz

Client  
**LCUK**  
Project  
**WESTBURY**

Drawing Title  
**VIEWPOINT 5 -  
PHOTOMONTAGE**  
Scale  
**N/A**  
Date  
**DEC 2003**  
Drawing No.  
**5.26**



**Appendix 5.1**  
Glossary of Terms

## **APPENDIX 5.1**

### **Glossary of Terms**

**(Derived from current IEMA/LI Guidelines with additional glossary)**

|                                |                                                                                                                                                                      |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Analysis, (landscape)</b>   | The process of breaking the landscape into its component parts to understand how it is made up.                                                                      |
| <b>AONB</b>                    | Area of Outstanding Natural Beauty                                                                                                                                   |
| <b>ASLV</b>                    | Area of Special Landscape Value                                                                                                                                      |
| <b>Assessment (Landscape)</b>  | An umbrella term for description, classification and analysis of landscape.                                                                                          |
| <b>Baseline</b>                | Record and analysis of existing landscape and visual conditions.                                                                                                     |
| <b>Biodiversity</b>            | The concept of variety in all species of plants and animals through which nature finds its balance.                                                                  |
| <b>Classification</b>          | A process of sorting the landscape into different types using selected criteria but without attaching relative values to different sorts of landscape.               |
| <b>Compensation</b>            | The measures taken to offset or compensate for residual adverse effects which cannot be mitigated or for which mitigation cannot entirely eliminate adverse effects. |
| <b>Constraints Map</b>         | Map showing the location of important resources and receptors that may form constraints to development.                                                              |
| <b>Countryside</b>             | The rural environment and its associated communities (includes the coast).                                                                                           |
| <b>Cumulative effects</b>      | The summation of effects that result from changes caused by a development in conjunction with other past, present or reasonably foreseeable actions.                 |
| <b>Diversity</b>               | Where a variety of qualities or characteristics occurs.                                                                                                              |
| <b>Do nothing situation</b>    | Continued change/evolution of landscape or of the environment in the absence of the proposed development.                                                            |
| <b>Element</b>                 | A component part of the landscape, e.g. roads, hedges and woods.                                                                                                     |
| <b>Enhancement</b>             | Landscape improvement through restoration, reconstruction or creation.                                                                                               |
| <b>Environment</b>             | Our physical surroundings including air, water and land.                                                                                                             |
| <b>Environmental Appraisal</b> | A generic term for the evaluation of the environmental implications of proposals.                                                                                    |
| <b>Environmental fit</b>       | The relationship of a development to identified environmental opportunities and constraints in its setting.                                                          |
| <b>Environmental Impact</b>    |                                                                                                                                                                      |

|                                        |                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Assessment</b>                      | The evaluation of the effects of particular development proposals on the environment of particular development proposals.                                                                                                                                                                                                                     |
| <b>Field Pattern</b>                   | The pattern of hedges and walls that define fields in farmed landscapes.                                                                                                                                                                                                                                                                      |
| <b>Geographical information System</b> | Computerised database of geographical information.                                                                                                                                                                                                                                                                                            |
| <b>Heritage</b>                        | Historic or cultural associations.                                                                                                                                                                                                                                                                                                            |
| <b>Indirect Impacts</b>                | Impacts on the environment, which are not a direct result of the development but are often produced away from it or as a result of a complex pathway. Sometimes referred to as secondary impacts.                                                                                                                                             |
| <b>Iterative (design process)</b>      | A design approach which enables the site planning and detailed design of the development project to be informed by and respond to the ongoing Environmental Impact Assessment.                                                                                                                                                                |
| <b>Land Use</b>                        | The primary use of the land, including both rural and urban activities.                                                                                                                                                                                                                                                                       |
| <b>Landcover</b>                       | Combinations of land use and vegetation, that cover the land surface.                                                                                                                                                                                                                                                                         |
| <b>Landform</b>                        | Combinations of slope and elevation, that produce the shape and form of the land.                                                                                                                                                                                                                                                             |
| <b>Landscape</b>                       | Human perception of the land conditioned by knowledge and identity with a place.                                                                                                                                                                                                                                                              |
| <b>Landscape Capacity</b>              | The degree to which a particular landscape character type or area is able to accommodate change without unacceptable adverse effects on its character. Capacity is likely to vary according to the type and nature of change being proposed.                                                                                                  |
| <b>Landscape Character</b>             | The distinct and recognisable pattern of elements that occurs consistently in a particular type and landscape, and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement. It creates the particular sense of place of different areas of the landscape. |
| <b>Landscape Characteristics</b>       | Landscape Characteristics refer to the combinations of landscape elements and features which make a particular contribution to the character of an area including experiential characteristics such as tranquillity and wilderness.                                                                                                           |
| <b>Landscape Character Type</b>        | A landscape type will have broadly similar patterns of geology, landform, soils, vegetation, land use, settlement and field pattern discernible in maps and field survey records.                                                                                                                                                             |
| <b>Landscape Effects</b>               | Change in the elements, characteristics, character and qualities of the landscape as a result of development. These effects can be positive or negative.                                                                                                                                                                                      |
| <b>Landscape evaluation</b>            | The process of attaching value (non-monetary) to a particular landscape, usually by the application of previously agreed criteria, including consultation and third party documents, for a particular purpose (e.g. designation or in the context of the assessment).                                                                         |
| <b>Landscape Factor</b>                | A circumstance or influence contributing to the impression of a landscape (e.g. scale, enclosure, elevation).                                                                                                                                                                                                                                 |

|                                               |                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Landscape feature</b>                      | A prominent eye-catching element, e.g. wooded hill top and church spire.                                                                                                                                                                                                                                                               |
| <b>Landscape Quality (or condition)</b>       | Is based on judgements about the physical state of the landscape, and about its intactness, from visual, functional, and ecological perspectives. It also reflects the state of repair of individual features and elements which make up the character in any one place.                                                               |
| <b>Landscape Resource</b>                     | The combination of elements that contribute to landscape context, character and value.                                                                                                                                                                                                                                                 |
| <b>Landscape Sensitivity</b>                  | The extent to which a landscape can accept change of a particular type and scale, without unacceptable adverse effects.                                                                                                                                                                                                                |
| <b>Landscape Value</b>                        | The relative value or importance attached to a landscape (often as a basis for designation or recognition), which expresses national or local consensus, because of its quality, special qualities including perceptual aspects such as scenic beauty, tranquillity or wilderness, cultural associations or other conservation issues. |
| <b>Magnitude</b>                              | A combination of the scale, extent and duration of an effect.                                                                                                                                                                                                                                                                          |
| <b>Methodology</b>                            | The specific approach and techniques used for a given study.                                                                                                                                                                                                                                                                           |
| <b>Mitigation</b>                             | Measures, including any process, activity or design to avoid, reduce, remedy or compensate for adverse landscape and visual effects of a development project.                                                                                                                                                                          |
| <b>Perception (of landscape)</b>              | The psychology of seeing and possibly attaching value and/or meaning (to landscape).                                                                                                                                                                                                                                                   |
| <b>Precautionary Principle</b>                | Principle applied to err on the side of caution where significant environmental damage may occur, but knowledge on the matter is incomplete, or when the prediction of environmental impacts is uncertain.                                                                                                                             |
| <b>Preference</b>                             | The liking by people for one particular landscape element, characteristic or feature over another.                                                                                                                                                                                                                                     |
| <b>Quality</b>                                | (See landscape quality).                                                                                                                                                                                                                                                                                                               |
| <b>Receptor (landscape and visual)</b>        | Physical landscape resource, special interest or viewer group that will experience an effect.                                                                                                                                                                                                                                          |
| <b>Regulatory Authority</b>                   | The planning or other authority responsible for planning consents or project authorisation. (Synonymous with Determining or competent Authority).                                                                                                                                                                                      |
| <b>Scenario</b>                               | A picture of a possible future.                                                                                                                                                                                                                                                                                                        |
| <b>Scoping</b>                                | The process of identifying the potentially significant effects of a development on the environment.                                                                                                                                                                                                                                    |
| <b>Sense of place (or <i>genius loci</i>)</b> | The essential character and spirit of an area. <i>Genius Loci</i> literally 'spirit of the place'.                                                                                                                                                                                                                                     |

|                                 |                                                                                                                                                                                                                                             |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sensitive/sensitivity</b>    | (See landscape sensitivity).                                                                                                                                                                                                                |
| <b>Sieve Mapping</b>            | Technique for mapping environmental constraints, working from a series of overlays, sieving out less important factors.                                                                                                                     |
| <b>Sustainability</b>           | The principle that the environment should be protected in such a condition and to such a degree that ensures new development meets the needs of the present without compromising the ability of future generations to meet their own needs. |
| <b>Technique</b>                | Specific working process.                                                                                                                                                                                                                   |
| <b>Threshold (significance)</b> | A specified level in grading effects e.g. of magnitude, sensitivity or significance.                                                                                                                                                        |
| <b>Visual Amenity</b>           | The value of a particular area or view in terms of what is seen.                                                                                                                                                                            |
| <b>Visual Impact</b>            | Change in the appearance of the landscape as a result of development. This can be positive (i.e. beneficial or an improvement) or negative (i.e. adverse or a detraction).                                                                  |
| <b>Visual Envelope</b>          | Extent of potential visibility to or from a specific area or feature.                                                                                                                                                                       |
| <b>Visualisation</b>            | Computer simulation, photomontage or other technique to illustrate the appearance of a development.                                                                                                                                         |
| <b>Worst Case Situation</b>     | Principle applied where the environmental impacts may vary e.g. seasonally, to ensure the most severe potential effects is assessed.                                                                                                        |
| <b>Zone of Visual Influence</b> | Area within which a proposed development may have an influence or effect on visual amenity.                                                                                                                                                 |

## **Appendix 5.2**

### **Assessment Methodology**



## APPENDIX 5.2

### Assessment Methodology

#### Generally

Preparation of this assessment involved the following key stages:

- \$ baseline survey;
- \$ identification of potential effects;
- \$ identification of sensitive landscape and visual receptors;
- \$ description and quantification of the changes to the baseline;
- \$ identification of mitigating measures;
- \$ evaluation of the predicted effects.

#### Baseline Survey

Baseline surveys were carried out to record and analyse the existing landscape characteristics and the value of the landscape and visual resources in the vicinity of the proposed development. The research, classification and analysis process included:

- \$ Desk and computer based studies to identify the likely Zone of Visual Influence (ZVI) and local landscape character.
- \$ Research to establish the landscape planning context, nature conservation interest and aspects of cultural heritage.
- \$ Field survey to identify the likely Zone of Visual Significance (ZVS), record landscape character and value, record sensitive receptor viewpoints and identify potential mitigation measures.
- \$ Analysis of local landscape characteristics in order to understand how they are made up and experienced as well as ascertaining their relative value.

#### Identification of potential effects

Identification of potential effects has formed part of the design process.

The broad design parameters of the project were established at the time of commission in terms of the nature of the development. This provided sufficient information to identify the likely:

- \$ scale and nature of changes to landscape characteristics and landscape value; and
- \$ changes affecting visual amenity.

#### Identification of sensitive landscape and visual receptors

Identification of the sensitivity of the landscape resource is based on its ability to accommodate changes in character and value which would be caused by the development.

Landscape characteristics and value are separately identified. This is done in order to distinguish between the ability of a landscape to accommodate a development in physical and cultural terms, as opposed to its effects on elements which are more subjective in nature.

Identification of sensitive visual receptors is based on the proximity, context, expectations and occupation or activity of the receptor. Consideration is also given to the importance of the view.

Degrees of sensitivity are identified as appropriate for all categories of landscape and visual receptors. This enables a systematic and consistent evaluation of the levels of predicted effects once assessed against their magnitude.

#### Description and quantification of the changes to the baseline

Predicted changes to the baseline take into account existing trends for change as well as those anticipated as a result of the development.

Change in landscape characteristics, including elements of landform, landcover and landuse as well as significant features are described and broadly quantified. The effect of these changes on aspects of landscape value are also described in terms of scenic quality, designated landscape, heritage interests, tranquillity, sense of place, rarity or uniqueness and nature conservation interests.

Predicted changes to the visual baseline are described for each sensitive receptor type and location. Consideration is given to change during operations, at completion and at key stages after completion of the restoration. Computer generated imaging assists the description.

#### Creation of Photomontages

Photomontages are based on detailed computer modelling of proposed development. The quarry models, each representing key stages of development, are inserted into a landform model of the local context, based on data supplied by the Ordnance Survey. To assist with visualisation and analysis a digital aerial photograph is draped over the landform model.

The model essentially represents a bald landscape, effectively the 'worst case scenario', which excludes the screening effects of i.e. trees, hedging, woodland and housing but includes key mitigation elements such as screen bunding and restoration vegetative growth.

The view from each selected representative viewpoint is then taken from the model to provide a full analysis of the development effects. This is presented in direct comparison to photographs of the real situation so that the actual effect can be accurately portrayed and compared.

#### Evaluation of Predicted Effects

Predicted landscape and visual effects are assessed in terms of their scale, duration, magnitude, level and nature on identified sensitive receptors.

Methods used for evaluation follow published guidance and include a combination of objective and subjective judgements.

To aid consistency and allow easier inspection and review of results checklists, tables and matrices have been employed. These include the use of matrices for the determination of significance thresholds, whereby the predicted magnitude of an effect is assessed against the sensitivity of a given receptor. This provides an indication of the level or significance of an effect (see table below).

The nature of an effect, whether adverse or beneficial, is a subjective consideration based on professional judgement and identified separately.

#### Identification of Mitigating Measures

Mitigation measures have been considered in relation to:

- \$ primary measures which form part of the iterative design process; and
- \$ secondary measures designed to address any residual adverse effects of the development.

Table : Landscape and Visual Impact Assessment : Significance Thresholds

| SIGNIFICANCE |    |             |     |     |     |     |     |     |     |
|--------------|----|-------------|-----|-----|-----|-----|-----|-----|-----|
|              |    |             |     |     |     |     |     |     |     |
| MAGNITUDE    | VS | .VS         | .VS | .SB | .SB | .SM | .SM | .M  | .NS |
|              | SB | .VS         | .SB | .SB | .SM | .SM | .M  | .M  | .NS |
|              | SM | .SB         | .SB | .SM | .SM | .M  | .M  | .MS | .NS |
|              | M  | .SB         | .SM | .SM | .M  | .M  | .MS | .MS | .NS |
|              | MS | .SM         | .SM | .M  | .M  | .MS | .MS | .S  | .NS |
|              | S  | .SM         | .M  | .M  | .MS | .MS | .S  | .S  | .NS |
|              | SI | .M          | .M  | .MS | .MS | .S  | .S  | .SI | .NS |
|              | I  | .NS         | .NS | .NS | .NS | .NS | .NS | .NS | .NS |
|              |    | VH          | H   | MH  | M   | ML  | L   | VL  | N   |
|              |    | SENSITIVITY |     |     |     |     |     |     |     |

Magnitude/Significance Thresholds

KEY VS: Very Substantial, SB: Substantial, SM: Substantial-Moderate, M: Moderate, MS: Moderate-Slight, S: Slight, SI: Slight-Imperceptible, I: Imperceptible, NS: Not

Significant

Sensitivity

KEY VH: Very High, H: High, MH: Medium-High, M: Medium, ML: Medium-Low, L: Low, VL: Very Low, N: Negligible

Note: The above matrix is only used as a guide and never used to replace professional judgement, particularly in instances when assessing the nature of an effect (i.e. adverse, neutral or beneficial). It's purpose is solely to ensure consistency of approach and results.

**Appendix 5.3**  
Published Landscape Assessment Extracts

## **APPENDIX 5.3**

### **Published Landscape Assessment Extracts:**

**National Character Area 132 - Salisbury Plain and West Wiltshire Downs**

**Regional Character Area - Salisbury Plain**



**Extract "Landscape Assessment for the Wiltshire  
and Swindon Local Plan to 2006" 2000**

**Prepared for Wiltshire County Council  
by The Landscape and Countryside Section,  
Swindon Borough Council**

**6.2 1. Salisbury Plain**

The north western boundary of this character area is formed by the junction of the clays on the relatively level vale floor with the toe of the steep chalk and greensand escarpment. The chalk forms a high ridge running south west to north east on the north western edge of Salisbury Plain. The other boundaries have not been identified.

This is a dramatic, rolling, open landscape which because of its height, up to 230 metres AOD in the Westbury area, can be very bleak. The view from the top of the escarpment looks down onto the Avon Vales character area and across to the Cotswolds further west. To the south west the views extend to the woodlands at Longleat and the high downland at Brimsdown Hill and Cold Kitchen Hill near Kingston Deverill. To the north east Tan Hill and Roundway Down north of Devizes can be clearly seen. The Mendips can be seen in the south west. Westbury cement works is a dominant foreground feature in the landscape.

The fields on the escarpment are moderate to large in size with arable on the more level areas and pasture and rough grazing on the very steep areas. Immediately to the south east of the crest of the ridge, there are a few large fields and then the very open landscape of the Ministry of Defence's Imber Ranges on Salisbury Plain.

Scrub is developing on parts of the steep escarpment at Westbury Hill, otherwise the only other woodland is at Beggar's Knoll and on the west side of Westbury chalk pit.

The spectacular Iron Age hillfort at Bratton Castle together with the Westbury White Horse at its western end dominate this character area. Other earthworks and tumuli give further visual support to this historic landscape.

## **Appendix 5.4**

### **Bibliography**

## **APPENDIX 5.4**

### **Bibliography**

MOD: Defence Estate - "Access and Recreation - Walks on MOD Land, Salisbury Plain, Wiltshire" November 2003.

A History of Wiltshire - The Hundred of Westbury

The Countryside Agency - "Countryside Character - Volume 8: South West" 1999.

Wiltshire County Council - "Landscape Local Plan - Adopted Written Statement" 1986.

Wiltshire County Council - "Landscape Assessment for the Wiltshire and Swindon Local Plan to 2006" 2000.

Oxford Archaeological Unit: "Westbury Cement Works, Westbury Chalk Pit Extension. Report on the Archaeological Evaluation: Area A - Surface Collection of Artifacts, Area B - Surface Collection of Artifacts" 1995 and 1997.

Penny Anderson Associates - "Ecological Survey and Assessment" 1995.

Bioscan UK Ltd - "Environmental Assessment, Ecology and Biodiversity" 2004.



## **6.0 Hydrology, Hydrogeology and Water Quality**

### **6.1 INTRODUCTION**

#### *Background*

- 6.1.1 The location of the quarry is shown on Figure 6.1.
- 6.1.2 The chalk excavation is a 'dry' operation i.e. the excavated chalk is taken from above the water table. The current permission sets the working base of the quarry as the base of the grey chalk or 15m above the maximum winter water table (leaving a 15m unsaturated zone). The extension will also work down to the base of the grey chalk. However, the unsaturated zone thickness is reduced as monitoring has shown that the maximum winter water is actually higher than was predicted at the time of the original permission. The extension plans for the quarry will reduce the unsaturated zone to a minimum thickness of 8m under a small area of the quarry floor.
- 6.1.3 Following the completion of a desk study and discussions with the Environment Agency (EA) a series of four boreholes (three with multiple screened sections) were drilled within the quarry and around the proposed extension area in early 1997 to allow long term groundwater level monitoring. Continuous data logging equipment was installed in each borehole to monitor water level fluctuations. A five-year record of groundwater behaviour is available. Regular meetings have been held with the Environment Agency to discuss the findings and to agree the work that needs to be undertaken to support a planning application.
- 6.1.4 This report documents the hydrological setting of the quarry. Potential impacts on the water environment are detailed and where appropriate measures are detailed to mitigate significant negative environmental impact.

#### *Objective*

- 6.1.5 The objectives were to:
- Identify water interests in the vicinity of the quarry extension.
  - Establish the hydrogeological regime in the aquifer beneath the quarry and extension area and hydrology of the surrounding area.
  - Establish the impact (if any) that the removal of some of the Chalk unsaturated zone has on the hydrogeological regime.
  - Establish whether any changes to the hydrogeological regime, due to quarrying, will impact the identified water interests – quantity and quality.
  - If adverse impacts are predicted, detail mitigation measures.
  - Identify residual impacts.

### *Scope and Approach*

6.1.6 The following approach has been taken to fulfil the objectives detailed above:

- Desk study to identify water interests potentially at risk from any changes to the hydrogeological regime due to quarrying.
- Using an empirical approach to identify whether the removal of some of the unsaturated zone causes a change in the aquifer hydrographs.
- Identify water interests at risk and propose mitigation measures.

## 6.2 WATER INTERESTS

### *Site Location*

6.2.1 The quarry is located approximate 1.5km south east of Westbury in Wiltshire, on the edge of Salisbury Plain. The chalk is excavated from the ridge area of the Salisbury scarp slope. The NGR for the centre of the quarry is ST 893 505. The elevation of the quarry (prior to excavation) varies from 180m to 220m AOD. The boundaries of the existing and proposed quarry excavation are shown on Figure 6.1, within the local geographical setting.

6.2.2 The existing planning permission permits chalk excavation from an area of 44.8ha. The proposed extension will increase the quarry workings to 69.2ha.

### *Chalk Aquifer*

6.2.3 As detailed in Section 6.3 the quarry is excavated principally into the Middle Chalk, with some Upper Chalk and part of the upper horizons of the Lower Chalk. The outcrop geology in the Westbury area is shown on Figure 6.2. The Upper, Middle and Lower Chalk are classified as Major Aquifer Units (Ref 1). The Chalk aquifer is also hydraulically linked to the underlying Upper Greensand; which is also a Major Aquifer. These aquifers provide baseflow to streams draining the aquifers. In addition the aquifers are used for public and private water supply.

### *Licensed Water Interests*

6.2.4 Licensed sources of supply within a 3km radius of the centre of the site are shown on Figure 6.3. A summary of the licence details is presented in Table 6.1.

*Table 6.1 - Licensed Abstraction Rates*

| Ref No. (Figure 6.3) | Name                  | Annual Quantity (m <sup>3</sup> /a) |
|----------------------|-----------------------|-------------------------------------|
| 1                    | Wellhead Wells        | 660,000                             |
| 2                    | Upton Scudamore       | 5,230,000                           |
| 3                    | Westbury Chalk Quarry | 33,190                              |
| 4                    | Bridewell Springs     | 2,270                               |
| 5                    | Madbrook Farm         | 1,500                               |
| 6                    | Ditton Farm           | 4,400                               |

- 6.2.5 Excluding the source operated by Lafarge at the quarry, the nearest licensed source to the quarry is the Wessex Water Supply Source at Wellhead Drove (known as Wellhead). This source abstracts water from the Upper Greensand via two wells. The source protection zone (SPZ) for the Wellhead source is shown on Figure 6.4. The SPZ information has been obtained from the Environment Agency's (EA) Web site. Figure 6.4 shows that the proposed quarry excavation area does not lie in the SPZ for Wellhead.
- 6.2.6 The preferred bypass route for the A350 around Westbury passes very close to the Wellhead Source. It is understood that the source may be relocated as a measure to ensure water quality. The relocation area is approximately 100 to 200m higher up the scarp slope, closer to the quarry.

#### *Private Water Supplies*

- 6.2.7 Information on the presence of private water sources has been obtained from West Wiltshire District Council. The locations of registered water sources are shown on Figure 6.3.

#### *Springs and Watercourses*

- 6.2.8 Spring and streams draining the Chalk/Upper Greensand scarp slope are shown on Figure 6.3: Mill spring, Wellhead Springs and the River Biss. An ephemeral pond is present during winter months in Ranscombe Bottom.

#### *Conservation Sites*

- 6.2.9 Beyond the south east boundary of the existing quarry area lies the Salisbury Plain Site of Special Scientific Interest and to the north the Bratton Downs SSSI. Salisbury Plain is also designated as a candidate Special Area of Conservation (cSAC) and a proposed Special Protection Area (pSPA). The surrounding vegetation is predominately dense hawthorn-elder scrub, blurring into ash - field maple - dog's mercury, plus certain area of chalk grassland.



## 6.3 HYDROLOGICAL CONCEPTUAL MODEL

### *Introduction*

6.3.1 The hydrology and hydrogeology of the Westbury Quarry area has been investigated by:

- Walk over surveys in the winter and summer.
- Constructing groundwater monitoring boreholes.
- Monitoring groundwater levels using continuous monitoring devices.
- Spot gauging spring and stream flows.

6.3.2 This section describes the geological setting and hydrological setting and presents a conceptual model for water movement from the site.

### *Investigation Drilling*

6.3.3 Boreholes were constructed in 1996 to investigate the hydrogeology of the Chalk and Upper Greensand.

6.3.4 Two dual completion boreholes were constructed, with test-sections monitoring the Lower Chalk and Upper Greensand. In addition, two single completion boreholes monitor the Lower Chalk and Upper Greensand. Borehole locations are marked on Figure 6.5. The borehole logs are contained in Appendix 6.1 (Ref. 2) and the borehole reference numbering and geological units monitored are given in Table 6.2.

*Table 6.2 - Monitoring Boreholes*

| Borehole Reference | Geological Unit Monitored |
|--------------------|---------------------------|
| WCH6/96            | Greensand                 |
| WCH7/96            | Lower Chalk               |
| WCH8A/96           | Lower Chalk               |
| WCH8B/96           | Greensand                 |
| WCH9A/96           | Lower Chalk               |
| WCH9B/96           | Greensand                 |

6.3.5 Previous investigation boreholes have been lost as the quarry has developed, though some hydrographs are available. These earlier data has been used to allow groundwater flow contours to be constructed.

### *Geology*

6.3.6 The regional geological setting of the Quarry is shown on Figure 6.3. Chalk is extracted from the Upper, Middle and Lower Chalk (Upper Grey chalk) of Cretaceous Age. The lower chalk is underlain by Upper Greensand, which is

underlain by Gault Clay. The sequence and approximate thicknesses of the units within the Quarry and extension area are presented in Table 4.1.

- 6.3.7 The data show that there is up to 135m of Chalk overlying the Upper Greensand strata. The Quarry works the Chalk formations: Upper, Middle and part of the Lower Chalk (upper Grey Chalk).

### Hydrogeology and Hydrology- Groundwater Level Fluctuation

- 6.3.8 Monitoring boreholes hydrographs are shown on Figure 6.6. Following agreement with the Environment Agency water levels are now continuously monitored in two boreholes (WCH8a and 9a). Maximum and minimum water levels recorded in each borehole are shown in Table 6.3. The water level fluctuations are large (21m - 31m), indicating low storage in the lower chalk

### Chalk and Greensand Aquifer Head Differences

- 6.3.9 The Greensand and Chalk have been monitored separately to allow the hydraulic connection between the aquifer units to be investigated.
- 6.3.10 Hydrographs for WCH9A and WCH9B (existing quarried area), Figure 6.6, shows a vertical gradient from the Chalk to the Greensand is present through the year, with the head difference ranging from 0.21m to 5.97m.
- 6.3.11 WCH8a and 8b (within the proposed extension area) show a smaller head difference (average 0.27m). The head difference is minimal during the summer, increasing to 0.91m in the winter.

Table 6.3 - Water Level Ranges and Permeability

| Borehole<br><br>Ref No | Geology   | Water Level Range<br>(m AOD) |        | Range |
|------------------------|-----------|------------------------------|--------|-------|
|                        |           | min                          | max    | (m)   |
| WCH6/96                | Greensand | 95.18                        | 119.54 | 24.36 |
| WCH7/96*               | Chalk     | -                            | 134.86 | -     |
| WCH8A/96               | Chalk     | 91.83                        | 116.28 | 22.61 |
| WCH8B/96               | Greensand | 91.79                        | 113.74 | 21.79 |
| WCH9A/96               | Chalk     | 97.36                        | 131.00 | 31.11 |
| WCH9B/96               | Greensand | 97.18                        | 125.16 | 27.99 |

\* a possible blockage meant the minimum water could not be recorded

- 6.3.12 These data indicate that groundwater in the chalk is moving down into the Greensand, with the Greensand acting as a higher (than the Lower Chalk) permeability pathway conveying water to spring discharge points.

### *Response to Rainfall*

- 6.3.13 The hydrographs have been examined to investigate how quickly rainfall events cause a rise in groundwater level. Data from the summer of 1997 has been examined in detail. Rainfall data has been obtained from a gauge at Upton Scudamore (~3km south-west of the quarry). The hydrographs from March 1997 to March 1998 are shown on Figure 6.7.
- 6.3.14 Figure 6.73 shows marked groundwater level rises in late June, early August, early September and early October, which slow the rate of recession in all boreholes. The magnitude of the water level rise in each borehole, due to these four events, is presented in Table 6.4.
- 6.3.15 Daily rainfall figures leading up to and during the groundwater level rises are displayed together with the hydrographs for WHCH6, 8b and 9b, for the four events, on Figure 6.8a, b and c. The rainfall totals that occurred before a rise in water level range between 31mm and 62mm.

*Table 6.4 - Water Level Rises*

| Borehole | Water Level Rise (m) |              |                 |               |
|----------|----------------------|--------------|-----------------|---------------|
|          | Late June            | Early August | Early September | Early October |
| WCH6     | 0.82                 | 0.33         | 1.17            | 0.62          |
| WCH8a    | 0.48                 | 0.18         | -               | 0.32          |
| WCH8b    | 0.45                 | 0.17         | 0.81            | 0.31          |
| WCH9a    | 5.2                  | 3.1          | 7.91            | 4.07          |
| WCH9b    | *                    | *            | *               | 2.38          |

\* Change cannot be calculated due to incomplete hydrograph

- 6.3.16 The greatest rise in water level occurs in the borehole constructed beneath the floor of the existing quarry.

### *Groundwater Contours*

- 6.3.17 Winter water levels from the winter of 2002/03 and summer levels from 1997 have been used to construct maximum and minimum groundwater contours; these are shown on Figure 6.9 and 6.10 respectively. These data are also shown on cross-sections through the quarry (Drawing UKTD-WH033). Comparison of the contours and quarry design shown that the chalk unsaturated zone is reduced to a minimum of 8m beneath a small portion of the quarry.
- 6.3.18 The contours shows that groundwater beneath the quarry is moving a westerly direction.
- 6.3.19 The ephemeral pond at Ranscombe Bottom is groundwater fed and only existing at time of high groundwater levels.

#### *Groundwater discharge points*

- 6.3.20 Groundwater flow contours indicate that groundwater beneath the quarry is discharging via springs at Wellhead and Mill Spring in Westbury.
- 6.3.21 These data therefore indicate that the south-west portion of the Quarry extension lies within zone I/II the SPZ for the Wellhead PWS source. This finding is contrary to the EA's SPZ for Wellhead (Figure 6.4), which has the quarry outside the SPZ. However, the findings presented in this report post date the EA's SPZ work. Therefore, if this information was incorporated into the EA's SPZ model it is considered very likely that part of the quarry extension will lie within Zone I and II.

#### *Moisture Content*

- 6.3.22 A potential impact of a quarry excavation is that the surrounding rock may be 'dried out'. If this occurred it could have a detrimental impact on surrounding vegetation. To assess whether this is a pertinent issue at Westbury samples from a quarry face excavated in 1975 were taken in 1997. Samples were taken at the face surface and 1m, 2m and 3m into the face. The respective moisture contents of the samples were 19.5%, 18.6%, 18.8% and 19.5% by weight.
- 6.3.23 Similar sampling was undertaken from Middle Chalk in Kent, from a "spine" of chalk left between two quarries. Moisture contents of samples ranged from 24 to 33%. No obvious relationship between moisture content and depth and distance from the quarry face was found.
- 6.3.24 The implications of these results are discussed in Section 6.4.

#### *Hydrology*

- 6.3.25 Spot gauging of spring and stream flow were undertaken at three locations during 1997. The gauging points were: Wellhead spring, 380m downstream of Wellhead Spring and the outflow from the Mill Spring/Pond in Westbury. The Gauging data is presented on Figure 6.11.

#### *Conceptual Flow Model*

- 6.3.26 The topographic contours of the quarry mean that rainfall into the quarry will runoff into the base of quarry and soak into the ground (except for the quantity of water that is lost due to evaporation). Evapotranspiration losses from the quarry will be low until restoration works increase the soil and vegetation cover. Therefore, the quarry promotes greater recharge to the chalk aquifer.
- 6.3.27 Hydrograph monitoring shows groundwater levels rise only a few days after rainfall events, this indicates that fracture flow is a important mechanism for the movement of water from the ground surface to the water table.

- 6.3.28 The large groundwater fluctuations indicate that the chalk aquifer has low storage. The Greensand is considered to act as the main groundwater flow horizon, 'collecting' and transferring water from the Lower Chalk. Groundwater beneath the quarry flows westward discharging via Chalk/Greensand springs. These spring issues provide important baseflow to the resultant streams.

## 6.4 ENVIRONMENTAL IMPACT

### *Potential Risk*

- 6.4.1 A review of the quarry activities has identified at the proposed extension could potentially impact:

- Water resources: Recharge volume and recharge timing (delayed recharge).
- Water quality.
- Adjacent vegetation.

- 6.4.2 The potential impacts are examined below, mitigation measures are detailed as appropriate.

### *Water Resources - Water Interests*

- 6.4.3 Triangulation of water level data indicates that groundwater flow beneath the extension area is towards the Wellhead Spring and Boreholes and Mill Spring. Therefore, any changes to the hydrogeological regime due to quarrying may impact these features. No other water interests are considered to be at risk. It is considered that the southwest portion of the quarry extension is located within Zone I/II of the Wellhead PWS source protection zone.

### *Volume of recharge*

- 6.4.4 Comparison of hydrographs detailed in Section 6.3 shows that groundwater recharge during the winter and summer causes a much greater rise in water level in the Westbury boreholes compared to Tilshead borehole. The greatest rise in water level at Westbury is recorded in boreholes located in the existing quarry. It is considered that the removal of the soil zone results in greater recharge as losses due to evapotranspiration are reduced to a minimum. In addition runoff collects in the quarry floor and soaks into the ground. The observed water level rise in boreholes outside the quarry is due to the recharge mound that develops beneath the existing quarry. Therefore, the quarrying activities result in greater recharge of the aquifer and consequently an increased flow from the Wellhead Spring during winter and summer.
- 6.4.5 The Wellhead Public supply borehole, located immediately up-gradient of the Spring abstracted on average 11.6 l/s (1997). It is noted that gauging of the spring

shows that the top end of the stream dries out (3/10/97). During this period the flow at the Mill Spring was ~20 l/s. It is considered, that the Wessex Water abstraction at Wellhead impacts the spring and upper reach of the resultant stream. It is considered that the increased recharge due to quarrying will help maintain flow at the spring and stream, therefore, providing a benefit to the water environment.

#### *Delayed Recharge*

- 6.4.6 There are usually considered to be two mechanisms for recharge flow in fractured aquifers such as the Chalk; rapid flow via fractures and fissures and slow flow via the matrix of the rock.
- 6.4.7 The hydrographs from the monitoring boreholes at Westbury show that recharge events cause a rise in water level only a few days after rainfall. This shows the rapid recharge of the chalk via fracture flow, once the soil moisture deficit is satisfied.
- 6.4.8 In certain hydrogeological circumstances the removal of the unsaturated zone can result in an increase in the rate of groundwater recession. This theory is based on the assumption that the slow flow in the matrix of the unsaturated zone introduces a delay into the groundwater system so that the rate of recession during dry periods (the summer months) is less than would theoretically be expected.
- 6.4.9 Thus in theory, if the unsaturated zone is removed, water levels and therefore spring discharges are less than would have been the case if the unsaturated zone had remained in place. At Westbury the unsaturated zone is only beginning reduced, though the reduction is marked; up to 70m. Whether this marked reduction has altered groundwater recession has been examined.
- 6.4.10 A method of assessing if delayed recharge is having a significant effect on the rate of recession is to compare rates of recession in an area with part of the unsaturated zone removed with an area where it is intact. The rates of recessions at the different boreholes must be compared at the same hydraulic head as the recession is proportional to the hydraulic head. This procedure also assumes that the boreholes are situated in similar groundwater environments.
- 6.4.11 The hydrograph recessions have been compared to see if the rate of recession in boreholes within the quarry is greater than for boreholes just outside and remote from the quarry (Tilshead). The rates of recession have been visually compared (Figure 6.6) and very little difference between the curves is observed. It is concluded that the reduction in unsaturated zone does not affect the rate of recession.
- 6.4.12 As noted above quarry design does not fully remove the unsaturated zone. During the summer an unsaturated zone of over 20m is still present to 'slowly' release water. Therefore, the timing of aquifer recharge is not affected by the proposed extension.

### *Water Quality*

- 6.4.13 Before considering the activities at the site that could impact groundwater quality the role of the unsaturated zone in protecting groundwater quality is examined.

### *Unsaturated Zone*

- 6.4.14 The unsaturated zone plays an important role in water quality protection as it introduces a delay (attenuation) in the movement of water from the ground surface to the water table. During this attenuation chemical and biological processes can reduce the level of a contaminants in the water as it flows through the unsaturated zone.
- 6.4.15 At Westbury, the existing planning permission restricts the working base of the quarry to ensure a 15m unsaturated zone is retained. The proposed quarry design will reduce the minimum unsaturated zone to ~8m, however this will only occur under a small area of the quarry for a very limited period. This minimum thickness will only occur for a 2-3 weeks in a very wet winter, typically through the year an unsaturated zone of greater than 15m will exist. Also it is proposed to work the chalk in this '8m zone' during the summer months when that actual unsaturated zone thickness will be greater than 15m.
- 6.4.16 It is considered the presence of a unsaturated zone, though partly reduced will still afford a great deal of protection to the aquifer.

### *Site Activities*

- 6.4.17 A review of site activities has identified the following site operations that involve potentially polluting materials/activities:
- Fuel storage and filling.
  - Vehicle accidents.
  - Slurry process water.
- 6.4.18 Losses of fluid from these activities could potentially contaminate the aquifer. Mitigation measure and site procedures to protect the water environment are detailed below.

### *Fuel Storage and Filling*

- 6.4.19 Fuel storage at the site comprises:
- 35,700 l sealed, bunded diesel tank
  - 2,700 l bunded engine oil tank
  - 200 l bunded waste oil tank



- 6.4.20 Upgrading of tanks has taken place recently to comply with the Oil Storage Regulations and they are located at an elevation of 202m AOD near the site office. Tanks are situated on a concrete hard standing with an impermeable plastic membrane.
- 6.4.21 Refuelling activities take place on the concrete hard standing approximately once per day for:
- 2 No - 65 tonne capacity dump trucks
  - 1 No. - 50 tonne capacity dump truck
  - 1 No. – 5,750 l capacity sealed, bunded mobile fuel bowser
- 6.4.22 The mobile fuel bowser is utilised for refuelling of the 80 tonne hydraulic excavator used for digging the chalk. Refuelling also occurs approximately once per day and as previously stated, quarrying or associated refuelling in the lower elevations of the quarry, where the thickness of the unsaturated chalk zone is reduced, will not be scheduled during the winter months.
- 6.4.23 The fuel storage tanks were identified within the IPPC application document for the Westbury site and as such are covered in the IPPC permit which was issued on 14 March 2003. The IPPC process requires the site to operate under appropriate management systems and controls which includes procedures for maintenance of tanks and response to accidental releases. There are no improvements relating to any site fuel/lubricant storage or use identified within the IPPC permit.
- 6.4.24 The site operates an environmental management system (EMS) which is certified to ISO 14001 and to the Eco-Management and Audit Scheme (EMAS). The system includes procedures for:
- fuel/lubricant tank and bund inspections which also meet the requirements of 1999 Quarry Regulations.
  - emergency response for dealing with accidental releases.
- 6.4.25 All relevant spillage protection kits, absorbent booms and absorbent granular materials for removal of pollutants are held on site. Absorbent material, if used, is bagged, sealed and placed in the appropriate bin for removal by an authorised waste carrier.

#### *Vehicle Accident*

- 6.4.26 A vehicle accident could result in a spill of diesel outside the filling area. An EMS site procedure is in place to mitigate this risk, this involves containment and removal of contaminants as soon as possible. Such spills are unlikely given the small number of vehicles in the quarry. However, if a spill did occur the residual unsaturated zone will allow the bulk of the diesel to be 'absorbed' into the chalk matrix. This allows the spill material to be rapidly excavated and removed to protect the aquifer. In the unlikely event of a fuel tank rupture, the contaminated

chalk can quickly be excavated and returned to the cement making process to dispose of the contaminants in the kiln

#### *Slurry Process Water*

- 6.4.27 At Westbury Quarry the 'as dug' chalk is mixed with process water to produce a chalk slurry; with a target moisture content of 36%. The process water is chlorinated to meet the requirements of The Control and Prevention of Legionella Regulations, by use of an automated dosing system prior to entering the chalk rough mills. The final slurry product from the mixer tanks is gravity fed to the cement works, via a 150mm diameter 3km long underground pipeline. This is a sealed system, and is regularly inspected for any evidence of leakage.
- 6.4.28 Periodically the slurry mills are drained to allow hard flint nodules to be removed from the mills. Excess flint recovered by this activity is used for stabilisation of haul roads in the winter months. Surplus water is contained and recirculated back into the slurry preparation process via an automated recirculation pump. Periodically, accumulated sediments in the containment tank are extracted and returned to the slurry mill. There is no discharge of process water associated with this process.
- 6.4.29 The process water used on site consists of treated final effluent water from the Westbury Water Treatment Works plus water abstracted from the quarry's own well. This water is used at the quarry and at the associated cement works. Use of this water was detailed within the IPPC application and is covered by the subsequent IPPC permit. By using this water source the abstraction of groundwater and use of mains water supply is reduced.
- 6.4.30 The process water is screened as part of the site Legionella prevention. Control systems on site and monitoring for contaminants at both the chalk quarry and cement works has indicated no issue with the presence of bacteria.

#### *Adjacent Vegetation*

- 6.4.31 This issue relates to potential drying effect the quarry excavation has on the surrounding rock and the associated impact (increased drought effects) on surrounding vegetation.
- 6.4.32 As detailed, in Section 6.3, site data indicates that unsaturated chalk holds appreciable quantities of water (~19%), even at the quarry face. These observations comply with chalk hydrogeological model whereby water is held tightly in the pore space in the chalk matrix in the unsaturated zone. Although this water cannot 'freely drain' to the water table (pore pressure is greater than gravity) the water can be extracted by plants.
- 6.4.33 It is concluded that the quarry development will not 'dry out' the surrounding rock and hence will not impact the surrounding vegetation. This conclusion is

supported by site observations, with no observable stress in the vegetation surrounding the existing quarry.

#### *Residual Issues*

6.4.34 The assessment has identified the following residual issues:

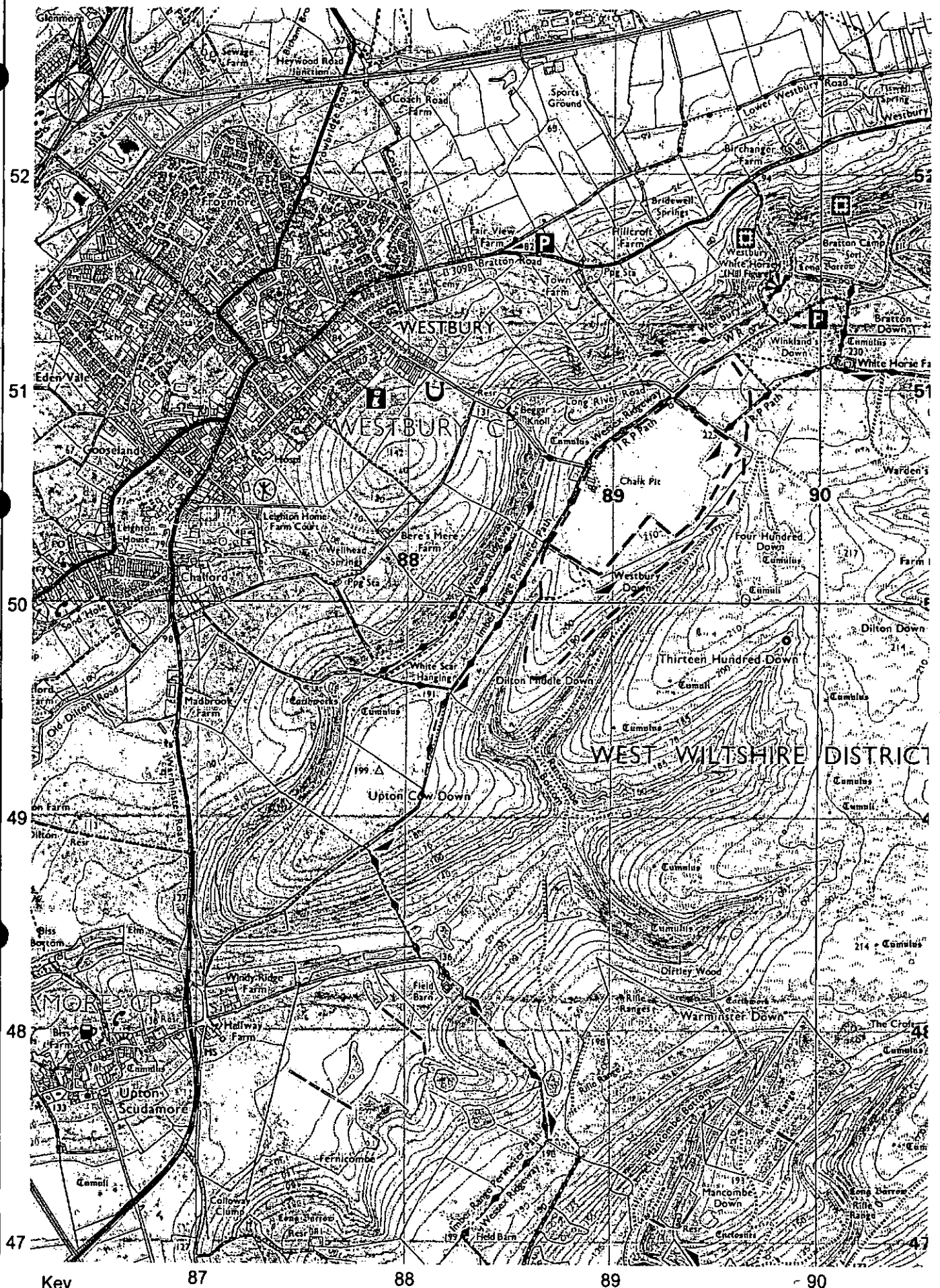
- The quarry extension will cause an increase in aquifer recharge. This is considered to be a positive benefit to the local water environment, increasing summer baseflow.
- A small residual risk exist from fuel spills, however, the likelihood of an accident occurring is low and the water receptors are unlikely to be impacted given the spill recovery procedure that would be implemented.
- A part of the quarry extension area lies within the SPZ for Wellhead public Water Supply source. However, due to the environmental protection measures detailed above the quarry activities are unlikely to impact the source.

## 6.5 CONCLUSION

6.5.1 The assessment concludes that the quarry extension poses an acceptable risk to the water environment. The quarry will result in additional recharge to the chalk aquifer occurring, which is viewed as an environmental benefit.

## 6.6 REFERENCES

1. National Rivers Authority (1992), Policy and Practice for the Protection of Groundwater – Regional Appendix, Wessex Region.
2. Marcus Hodges Environment (1998): Westbury Quarry – Interim Hydrogeological Assessment. Prepared for Blue Circle Industries PLC, Ref 50447/R1



Reproduced from the Ordnance Survey 1:25,000 Explorer Sheet 143 dated 1998 with the permission of Her Majesty's Stationery Office. (c) Crown Copyright. Licence No AL 100005552

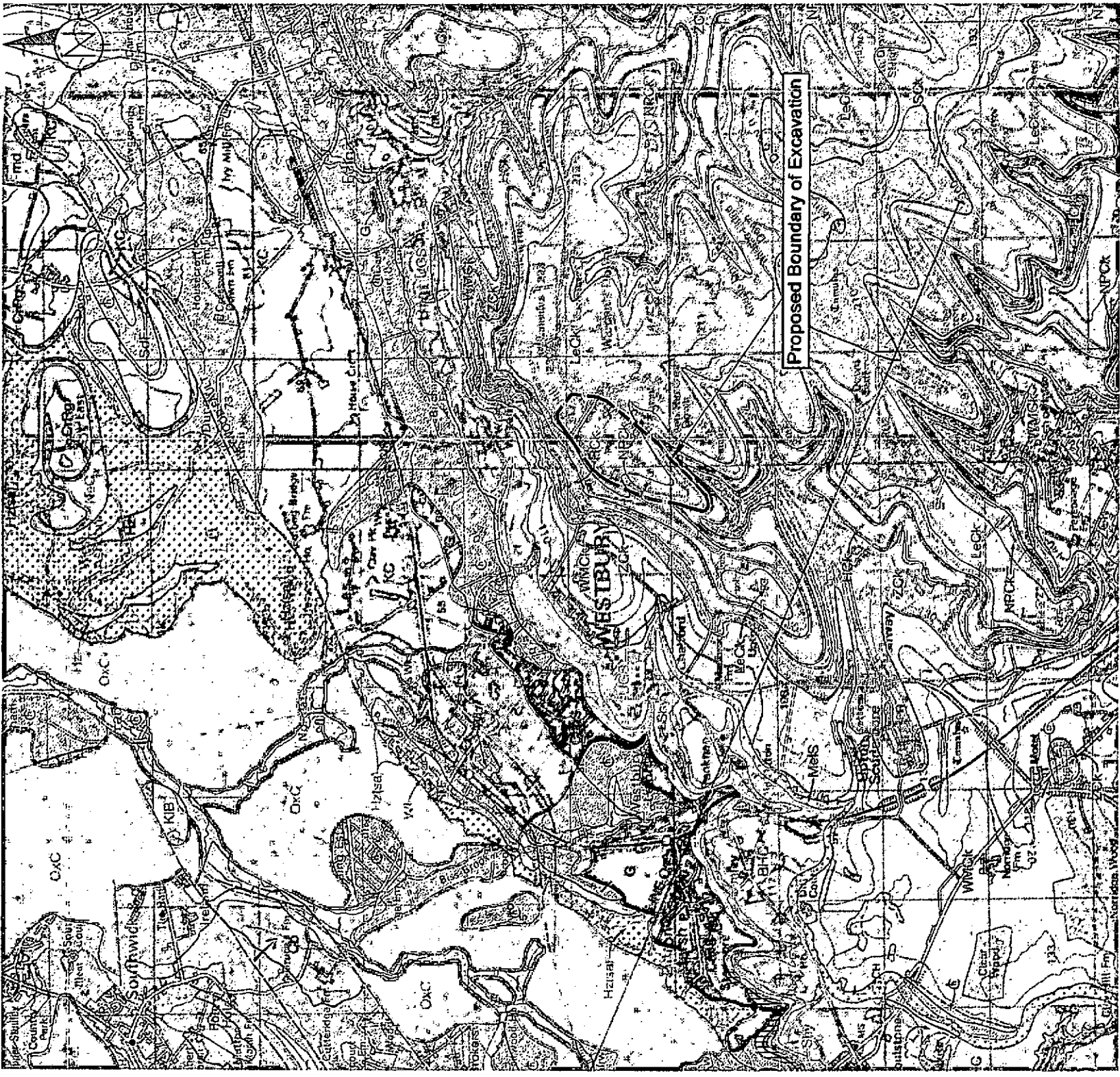


**Marcus Hodges Environment Limited**  
Consulting Hydrogeologists and Environmental Engineers  
www.mhe.co.uk

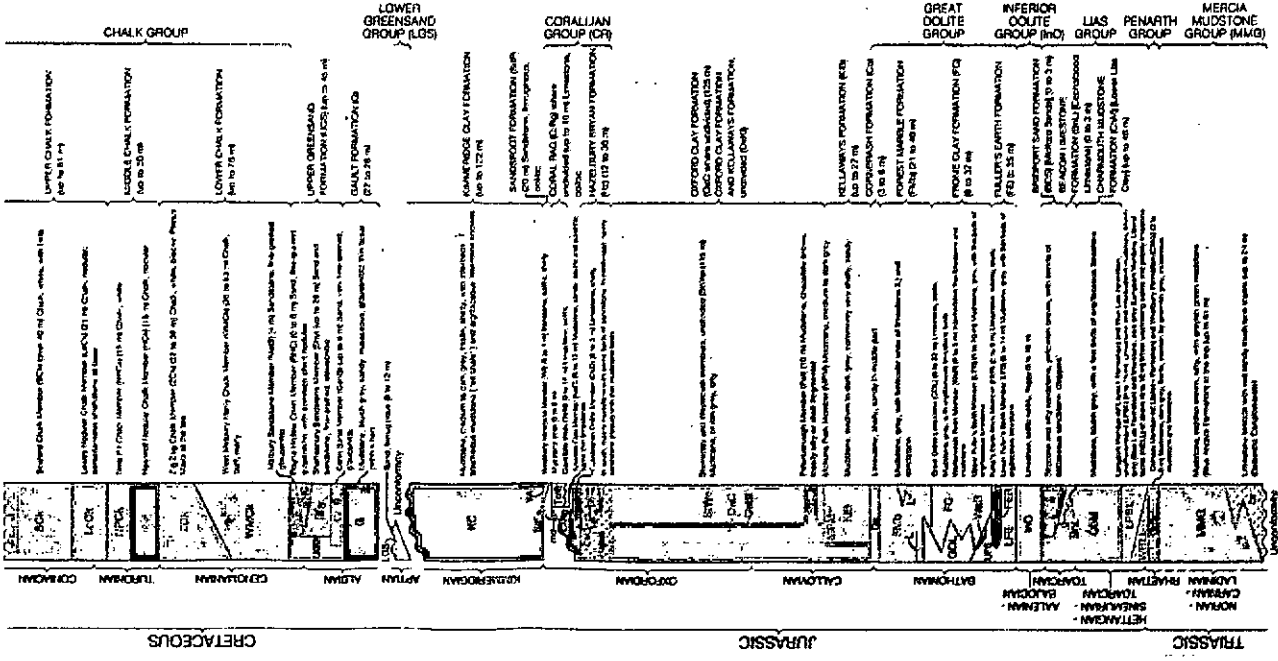
Drawn: IC  
Drafted: AC  
Checked By: IC  
Date: 16/01/04

Scale: 1:25,000  
Ref.: 50447/Fig1.1

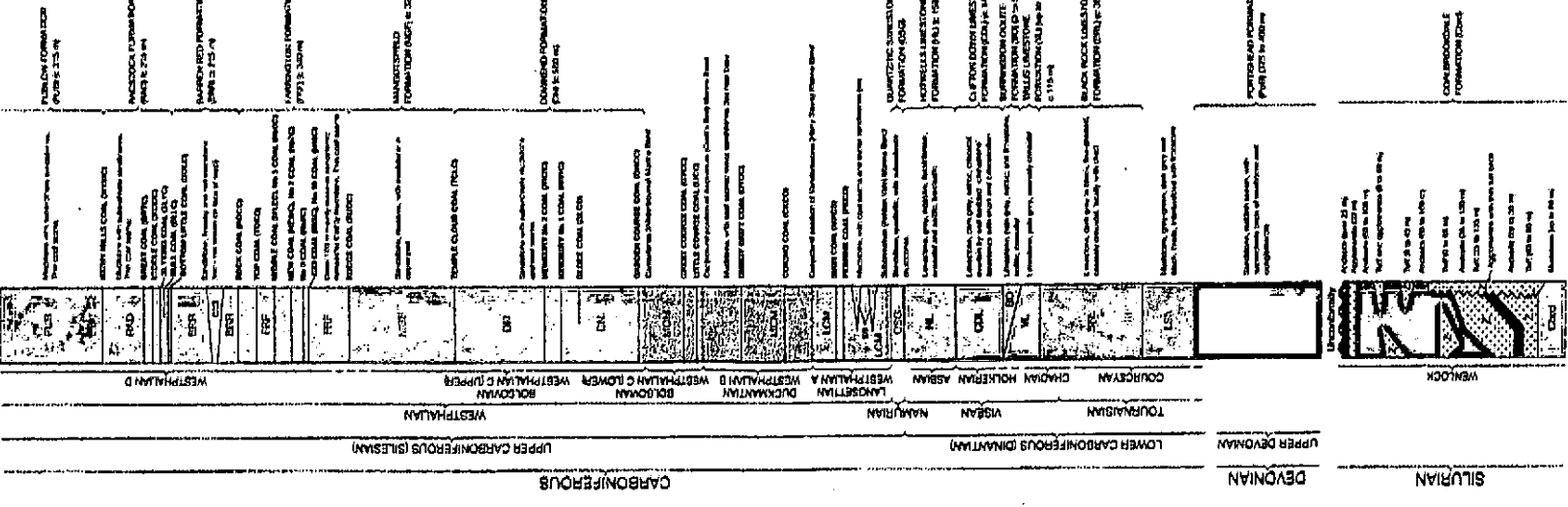
Job Title:  
**Westbury Quarry**  
Drawing Title:  
**Figure 6.1**  
**Site Location Plan**



GENERALIZED VERTICAL SECTION  
Scale 1:2400 (1 cm to 24 m)



GENERALIZED VERTICAL SECTION  
Scale 1:12 000 (1 cm to 120 m)



Reproduced from the BGS Ordnance Survey 1:50,000 Sheet 281 dated 2000 with the permission of Her Majesty's Stationery Office. (c) Crown Copyright. Licence No AL 10000552



**Marcus Hodges Environment Limited**  
Consulting Hydrogeologists and Environmental Engineers  
www.mhe.co.uk

Drawn: IC  
Drafted: GG  
Checked By: GK  
Date: 19-01-03  
Scale: 1:50,000  
Ref: 50447/Fig 2.1

**Job Title:**  
Westbury Quarry

**Drawing Title:**  
Figure 6.2  
Outcrop Solid and Drift Geology Extension





**Key**

--- Extent of Proposed Excavation

● Licensed Abstractions

1 Well Head Boreholes

2 Upton Scudamore Borehole

3 Westbury Chalk Quarry Borehole

4 Bridewell Springs System

5 Madbrook Farm (Storage Pond)

6 Dilton Farm (Borehole and Well)

▲ Private Sources

1 Chalcot Park Farm, Pilton Marsh (Spring)

2 Park Farm, Heywood (Well)

● Other Water Features

1 Mill Spring

2 Wellhead Spring

3 Spring near Madbrook Farm (Spring/Stream)

4 Pond in Runcombe Bottom (Pond)



**Marcus Hodges Environment Limited**  
Consulting Hydrogeologists and Environmental Engineers  
[www.mhe.co.uk](http://www.mhe.co.uk)

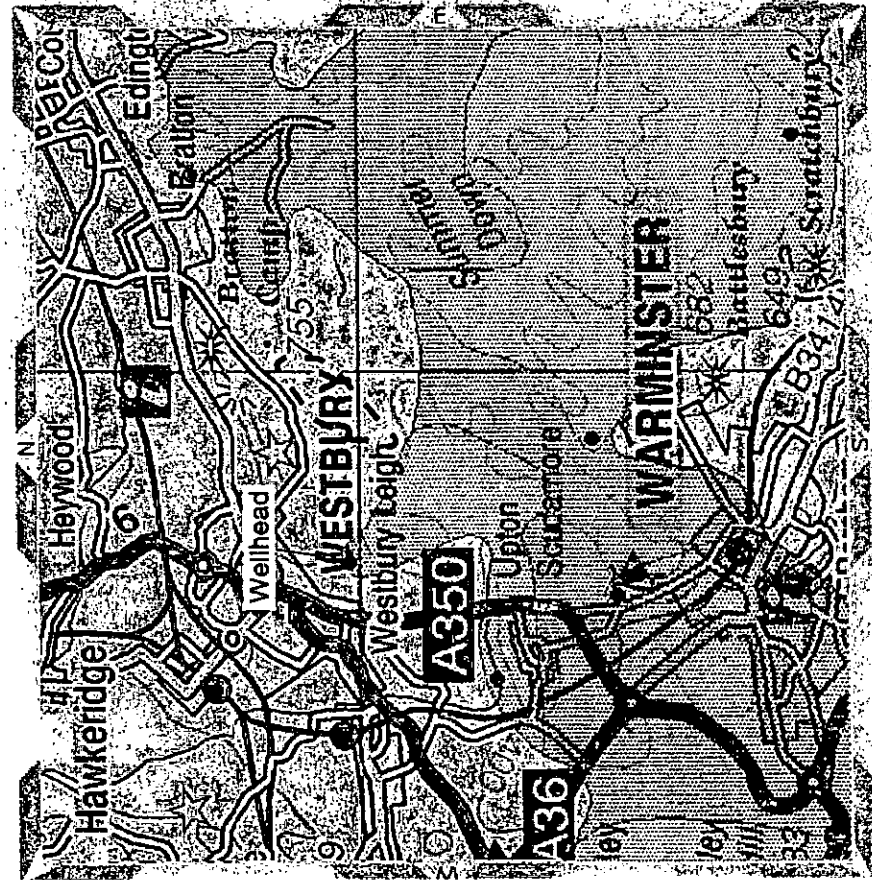
Drawn: IC  
Drafted: AC  
Checked By: IC  
Date: 16/01/04

Scale: 1:25,000  
Ref: 50447/Fig2.2

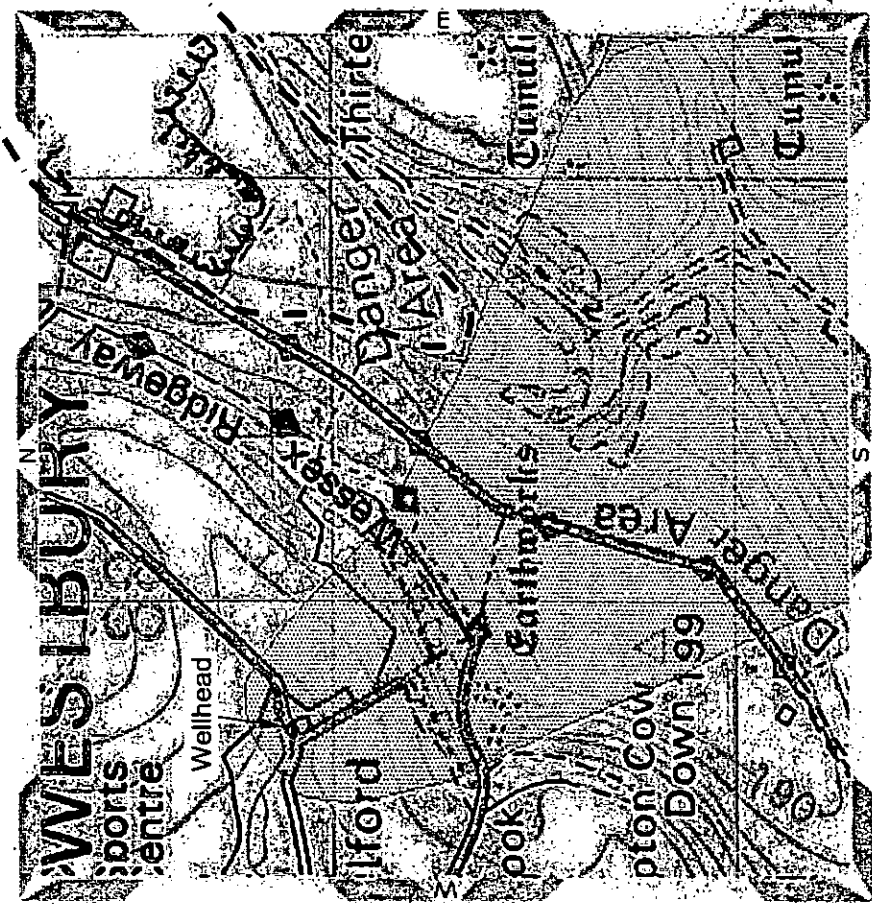
Reproduced from the Ordnance Survey 1:25,000  
Explorer Sheet 143 dated 1998 with the permission of  
Her Majesty's Stationery Office. (c) Crown Copyright  
Licence No AL 100005552

**Job Title:**  
Westbury Quarry

**Drawing Title:**  
Figure 6.3  
Water Interests



- Key:
- Source Protection
  - Inner Zone
  - Outer Zone
  - Total Catchment
  - Special Interest



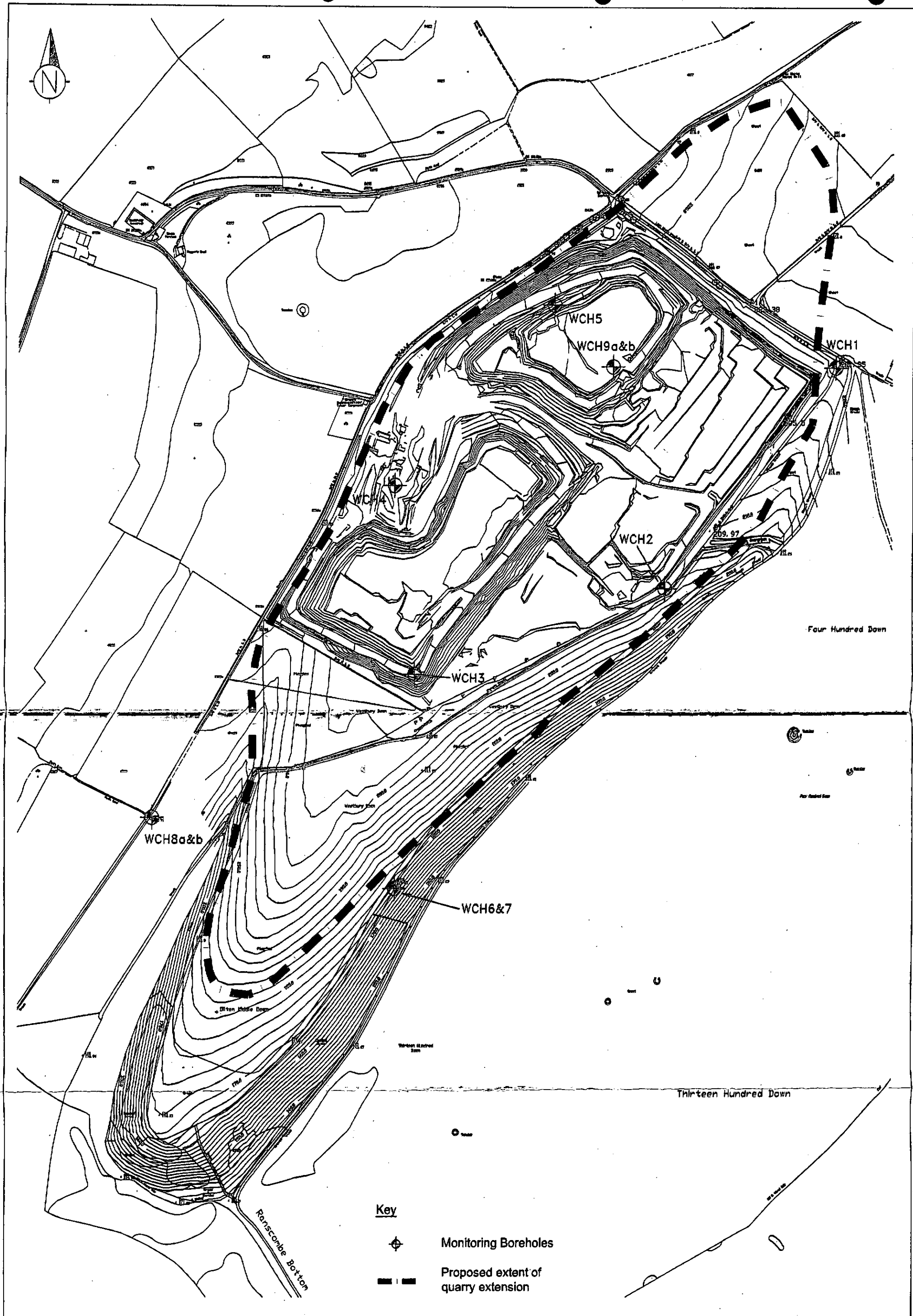
What's in Your Backyard - Data: Maps - Data: Search - Tell Me More - Download  
 © Crown copyright. All rights reserved. Environment Agency 100026380, 2002

Key

--- Proposed Extent of Quarry Extension

|                                                                                                                                                                                                                                                          |                                                                                    |                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
|  <p>Marcus Hodges Environment Limited<br/>         Consulting Hydrogeologists and Environmental Engineers<br/> <a href="http://www.mhe.co.uk">www.mhe.co.uk</a></p> | <p>Job Title:<br/>         Westbury Quarry</p>                                     | <p>Scale:<br/>         Not to Scale</p> <p>Ref:<br/>         50447/fig2.3</p> |
| <p>Drawn: IC<br/>         Drafted: AC<br/>         Checked By: IC<br/>         Date: 16/01/04</p>                                                                                                                                                        | <p>Drawing Title:<br/>         Figure 6.4<br/>         Source Protection Zones</p> |                                                                               |





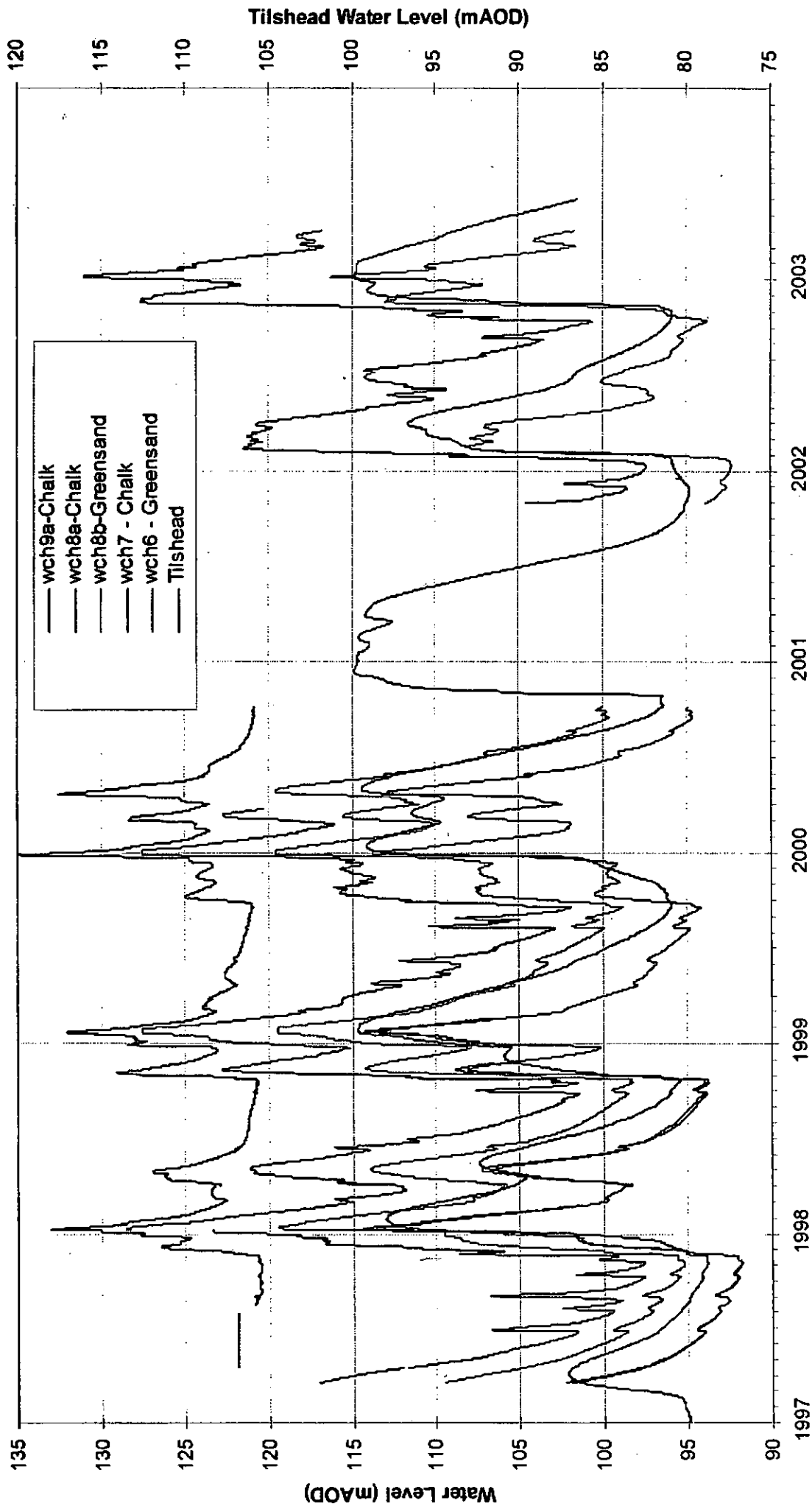
Marcus Hodges Environment Limited  
Consulting Hydrogeologists and Environmental Engineers  
www.mhe.co.uk

Drawn: IC  
Drafted: AC  
Checked By: IC  
Date: 16/01/04

Scale: 1:6,000  
Ref.: 50447/Fig3.1

Job Title:  
Westbury Quarry

Drawing Title:  
Figure 6.5  
Borehole Locations



**Drawing Title:**  
Figure 6.6  
Groundwater Hydrographs

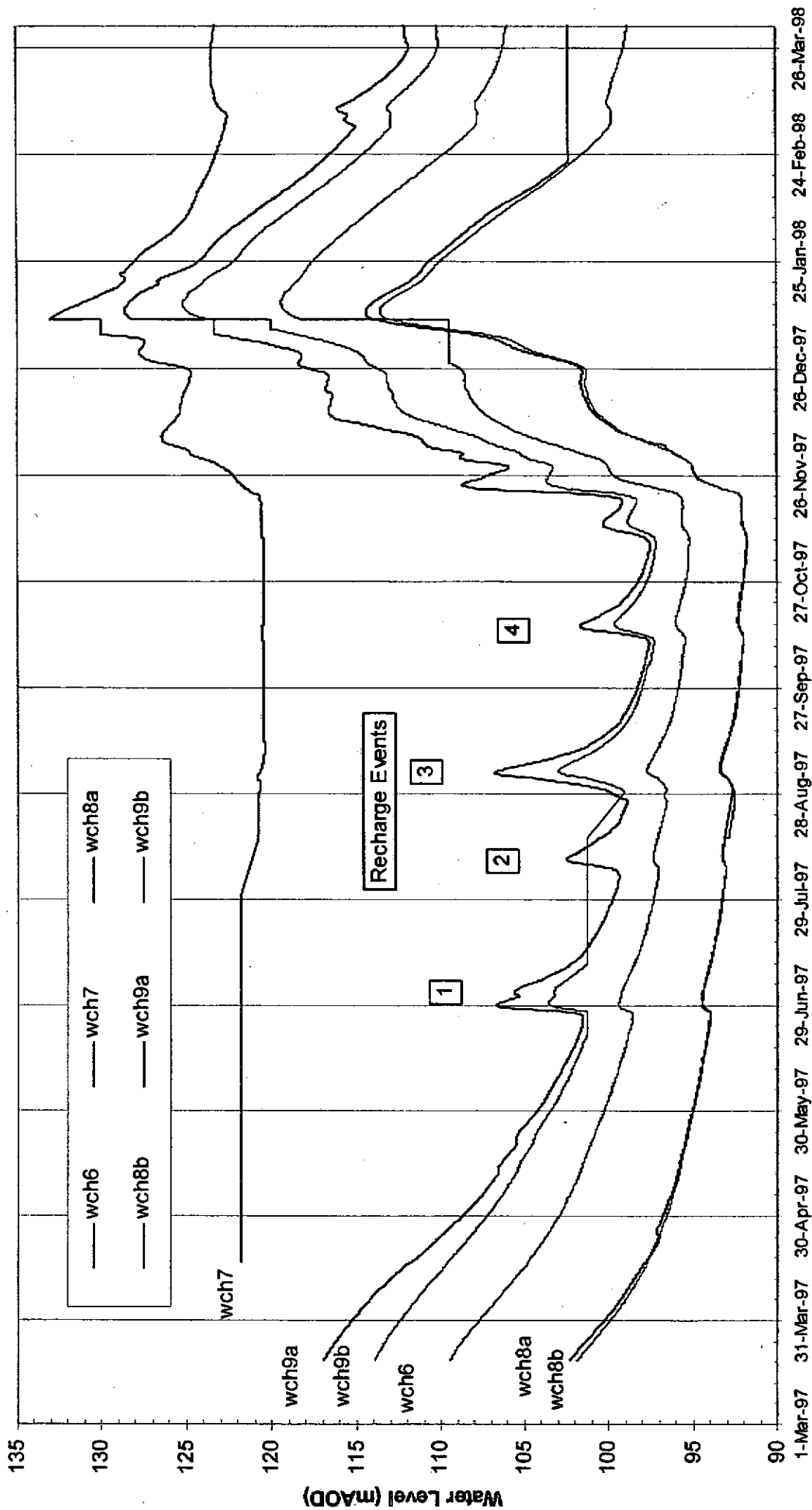
**Job Title:**  
Westbury Quarry

**Scale:**  
Not to Scale  
**Ref.:**  
50447/Fig3.2

**Drawn:** IC  
**Drafted:** AC  
**Checked By:** IC  
**Date:** 16/01/04

**Marcus Hodges Environment Limited**  
Consulting Hydrogeologists and Environmental Engineers  
www.mhe.co.uk





**Drawing Title:**  
Figure 6.7  
Borehole Hydrographs -  
Summer Recharge Events

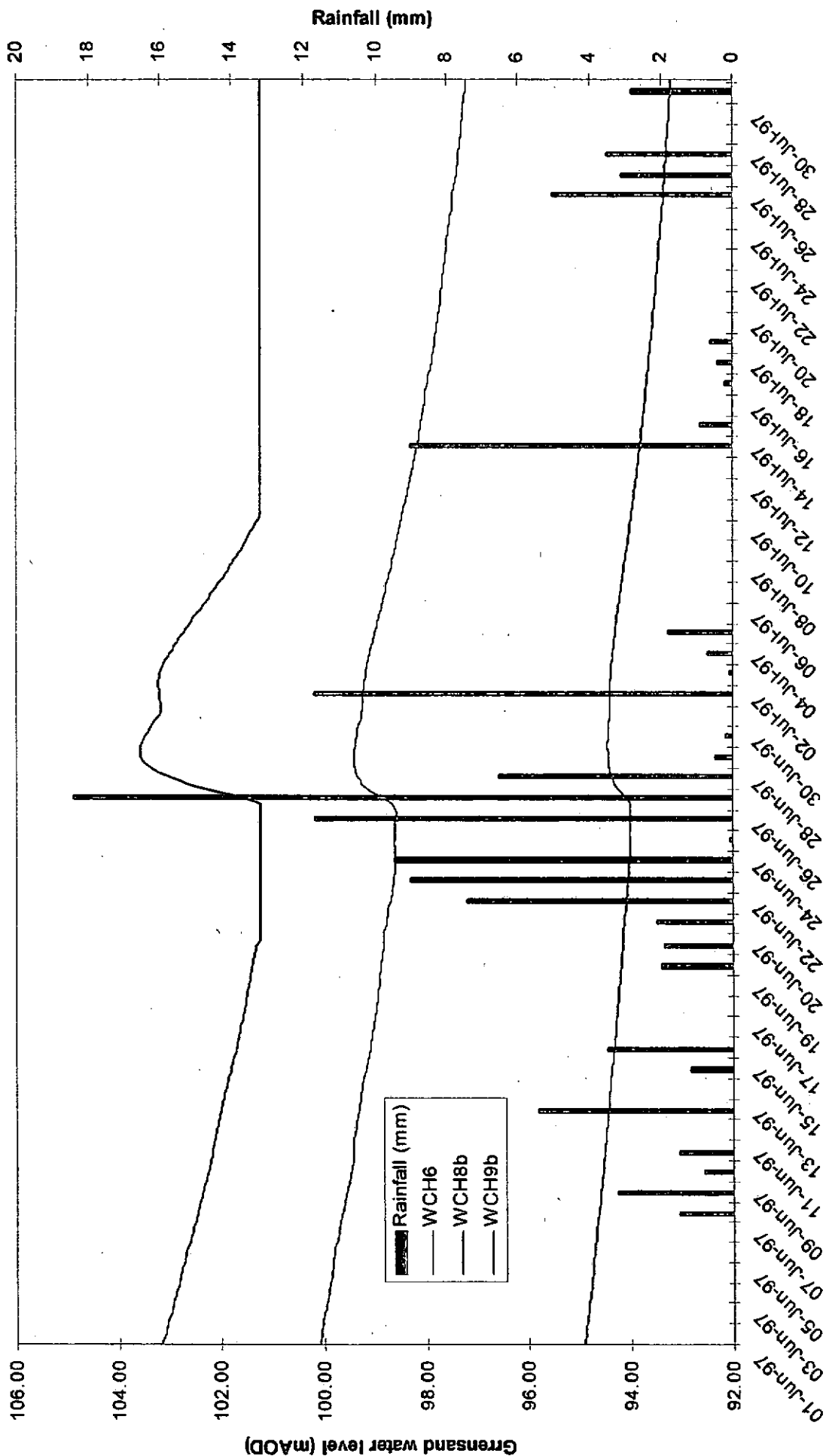
**Job Title:**  
Westbury Quarry

**Scale:**  
Not to Scale  
**Ref:**  
50447/Fig3.3

**Drawn:** IC  
**Drafted:** AC  
**Checked By:** IC  
**Date:** 16/04/01

**Marcus Hodges Environment Limited**  
Consulting Hydrogeologists and Environmental Engineers  
[www.mhe.co.uk](http://www.mhe.co.uk)





**Drawing Title:**

Figure 6.8a  
Rainfall and Water Level  
Response to Event 1

**Job Title:**

Westbury Quarry

**Scale:**

Not to Scale

**Ref:**

50447/Fig3.4a

**Drawn:**

IC

**Drafted:**

AC

**Checked By:**

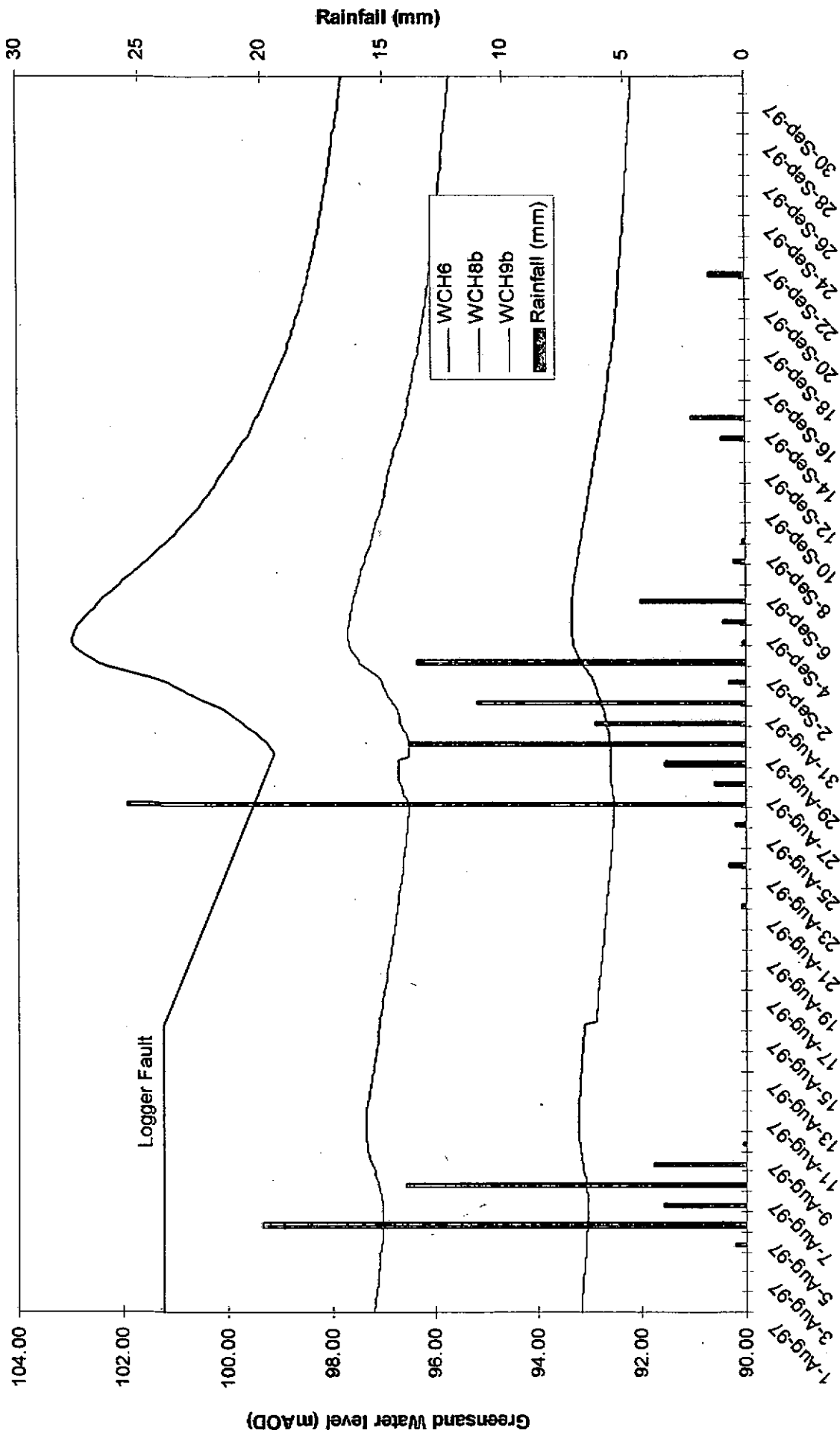
IC

**Date:**

16/04/01

Marcus Hodges Environment Limited  
Consulting Hydrogeologists and Environmental Engineers  
www.mhe.co.uk





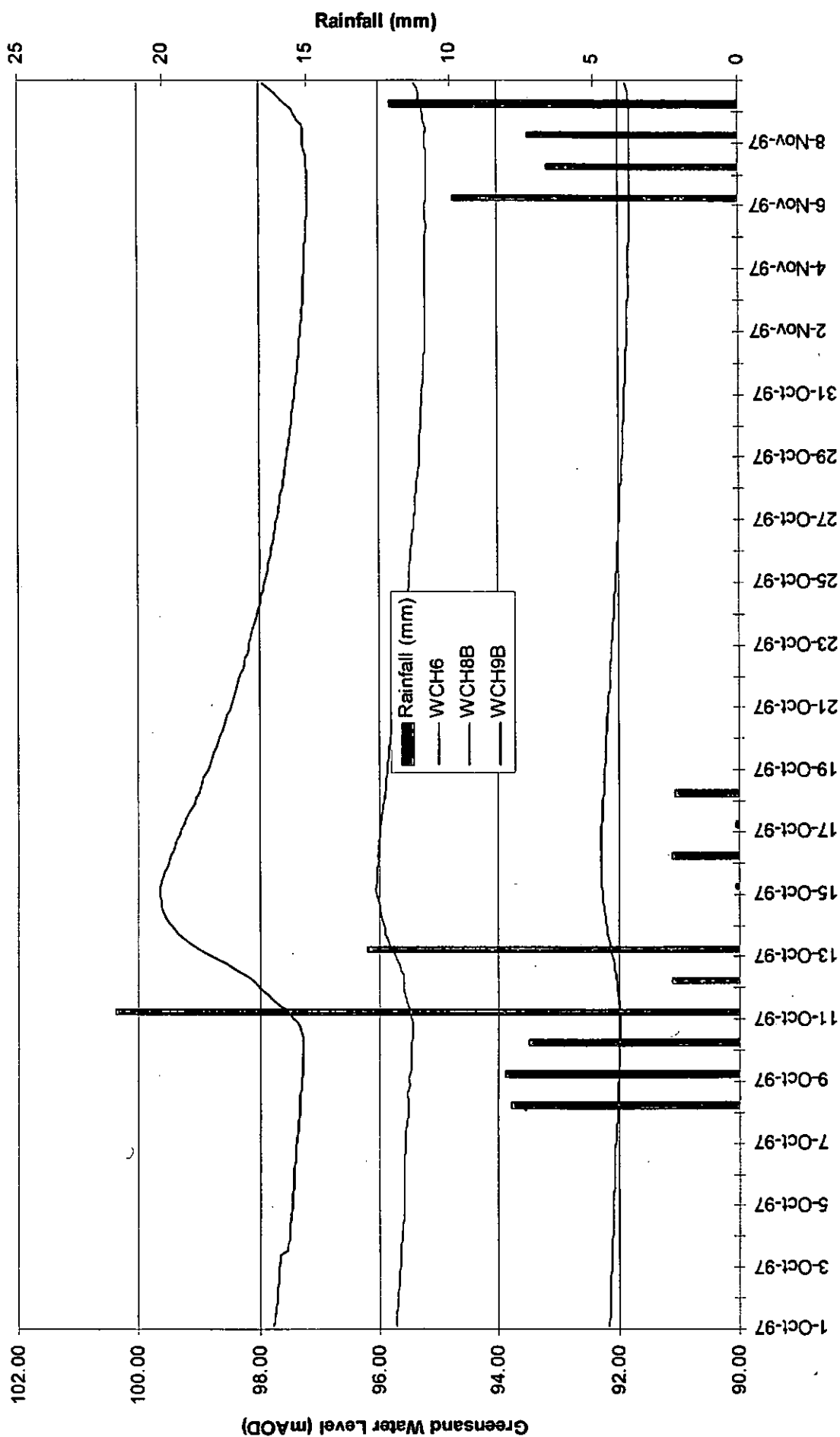


**Marcus Hodges Environment Limited**  
Consulting Hydrogeologists and Environmental Engineers  
www.mhe.co.uk

|                     |             |                     |                |
|---------------------|-------------|---------------------|----------------|
| Drawn: IC           | Drafted: AC | Checked By: IC      | Date: 16/04/01 |
| Scale: Not to Scale |             | Ref.: 50447/Fig3.4b |                |

**Job Title:**  
Westbury Quarry

**Drawing Title:**  
Figure 6.8b  
Rainfall and Water Level  
Response to Events 2 and 3



**Drawing Title:**  
Figure 6.8c  
Rainfall and Water Level  
Response to Event 4

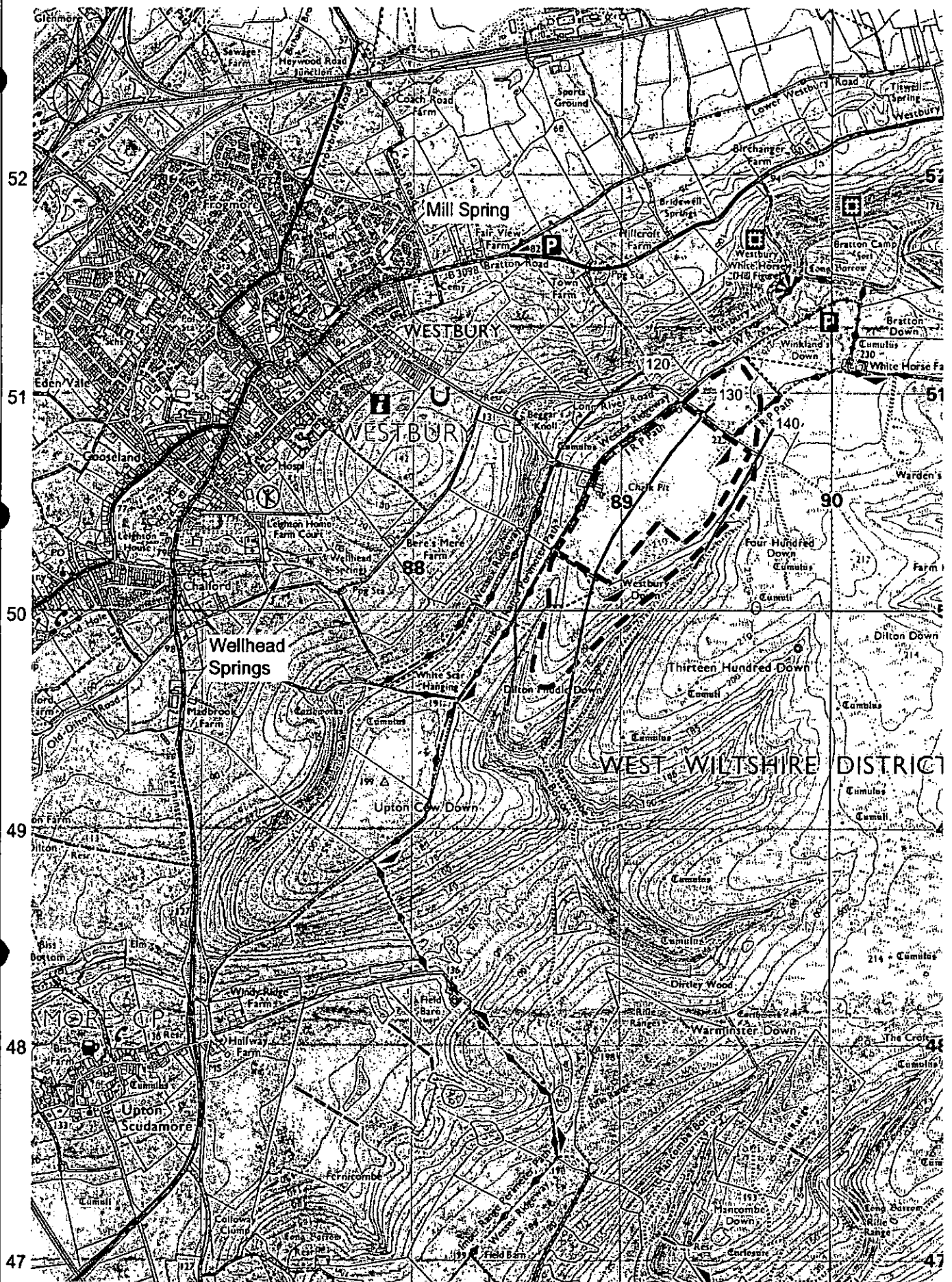
**Job Title:**  
Westbury Quarry

**Scale:** Not to Scale  
**Ref.:** 50447/Fig3.4c

**Drawn:** IC  
**Drafted:** AC  
**Checked By:** IC  
**Date:** 16/04/01

**Marcus Hodges Environment Limited**  
Consulting Hydrogeologists and Environmental Engineers  
www.mhe.co.uk





# **Key**

- Existing Excavation Boundary
- - - Extension Excavation Boundary

— Groundwater Level Contours (mAOD)

Reproduced from the Ordnance Survey 1:25,000 Explorer Sheet 143 dated 1998 with the permission of Her Majesty's Stationery Office. (c) Crown Copyright. Licence No AL 100005552



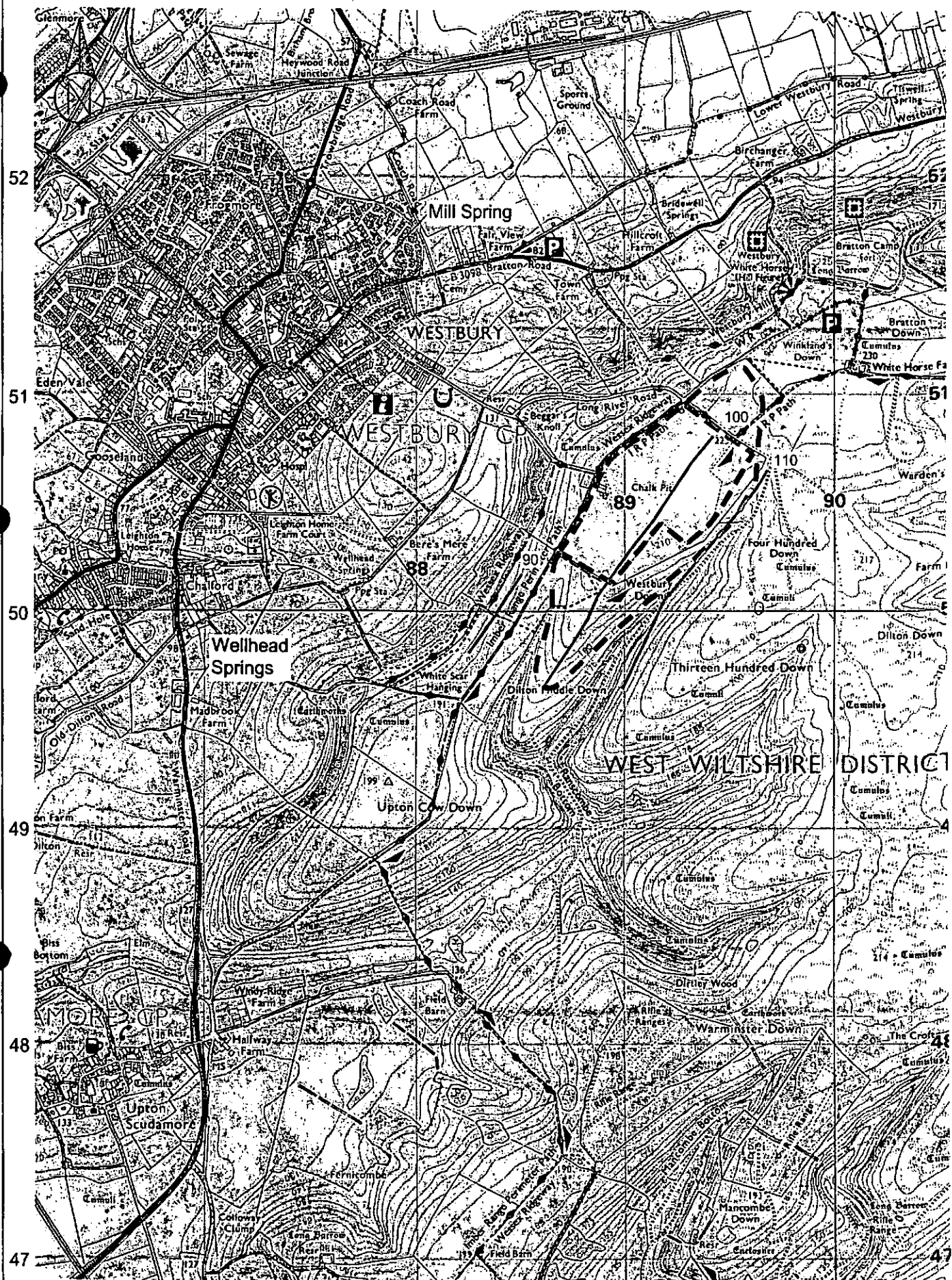
**Marcus Hodges Environment Limited**  
Consulting Hydrogeologists and Environmental Engineers  
www.mhe.co.uk

Drawn: IC  
Drafted: AC  
Checked By: IC  
Date: 16/01/04

Scale: 1:25,000  
Ref.: 50447/Fig3.5

Job Title:  
**Westbury Quarry**  
Drawing Title:  
**Figure 6.9**  
**Maximum Groundwater Levels (mAOD)**





# **Key**

- Existing Excavation Boundary
- - - Extension Excavation Boundary

Groundwater Level  
Contours (mAOD)

Reproduced from the Ordnance Survey 1:25,000  
Explorer Sheet 143 dated 1998 with the permission of  
Her Majesty's Stationery Office. (c) Crown Copyright.  
Licence No AL 100005552

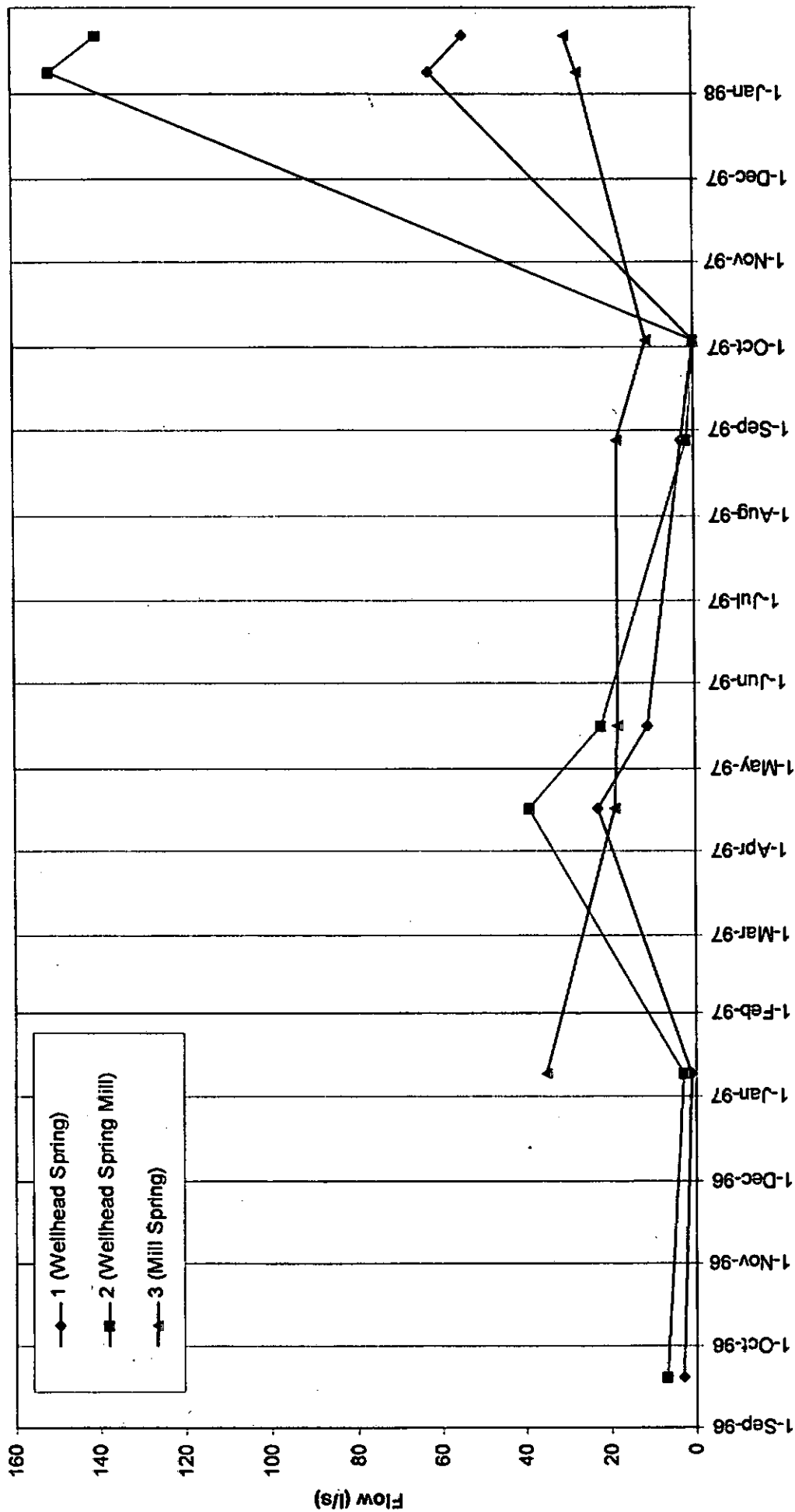


**Marcus Hodges Environment Limited**  
Consulting Hydrogeologists and Environmental Engineers  
www.mhe.co.uk

Drawn: IC  
Drafted: AC  
Checked By: IC  
Date: 16/01/04

Scale:  
1:25,000  
Ref.:  
50447/Fig3.6

Job Title:  
**Westbury Quarry**  
Drawing Title:  
**Figure 6.10**  
**Minimum Groundwater Levels (mAOD)**



Drawing Title:

Figure 6.11

Flow Gauging Data

Job Title:

Westbury Quarry

Scale:

Not to Scale

Ref:

50447/Fig3.9

Drawn:

IC

Drafted:

AC

Checked By:

IC

Date:

16/04/01

Marcus Hodges Environment Limited  
Consulting Hydrologists and Environmental Engineers  
www.mhe.co.uk



## **Appendix 6.1**

### **Borehole Logs**

# Borehole Record

Sheet 1 of 8



Marcus Hodges Environment Limited  
Consulting Hydrogeologists and  
Environmental Engineers

Project: Westbury Quarry Extension

Engineer: MHE

Borehole WCH 6/96  
Coordinates: 10356E, 10047N  
Elevation: 179.01m AOD  
Project No.: 50447

Client: BCI

| Sampling  |                | Properties |     |    | Strata                                                                                                                                                                                               |        |             |       |
|-----------|----------------|------------|-----|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------|-------|
| Depth (m) | Depth to Water | Recovery   | RQD | FI | Description                                                                                                                                                                                          | Legend | Level m AOD | Comp. |
| 0.30      |                | 46%        | 75% | —  | MIDDLE CHALK Off-white, creamy white, very fine grained, soft, broken, occasional hard bands with shell fragments, occasional wispy argillaceous bands, occasional limonite staining along fractures | 1      |             |       |
| 1.55      |                |            |     |    |                                                                                                                                                                                                      | 1      |             |       |
| 2.0       |                | 97%        | 86% | 1  |                                                                                                                                                                                                      | 1      |             |       |
| 3.05      |                |            |     |    | MIDDLE CHALK As above but increasing frequency of hard bands with depth                                                                                                                              | 1      | 175.96      |       |
| 4.0       |                | 95%        | 87% | 1  |                                                                                                                                                                                                      | 1      |             |       |
| 4.55      |                | 100%       | 52% | —  |                                                                                                                                                                                                      | 1      |             |       |
| 5.15      |                |            |     |    |                                                                                                                                                                                                      | 1      |             |       |
| 6.0       |                | 64%        | 50% | —  |                                                                                                                                                                                                      | 1      |             |       |
| 6.65      |                |            |     |    |                                                                                                                                                                                                      | 1      |             |       |
|           |                | 93%        | 48% | —  |                                                                                                                                                                                                      | 1      |             |       |
| 8.0       |                |            |     |    |                                                                                                                                                                                                      | 1      |             |       |
| 8.15      |                | 93%        | 59% | —  |                                                                                                                                                                                                      | 1      |             |       |
| 9.65      |                |            |     |    |                                                                                                                                                                                                      | 1      |             |       |
| 10.0      |                | 90%        | 30% | —  |                                                                                                                                                                                                      | 1      |             |       |
| 11.15     |                |            |     |    |                                                                                                                                                                                                      | 1      |             |       |
| 12.0      |                | 100%       | 87% | —  |                                                                                                                                                                                                      | 1      |             |       |
| 12.20     |                |            |     |    | MELBOURN ROCK White, off-white, very fine grained, broken, nodular white hard CHALK together with bands of soft off-white chalk. Top of unit gradational. Base of unit sharp, well defined.          | 2      | 166.81      |       |
| 12.65     |                | 77%        | 49% | —  |                                                                                                                                                                                                      | 2      |             |       |
| 13.95     |                |            |     |    |                                                                                                                                                                                                      | 2      |             |       |
| 14.0      |                | 100%       | 40% | —  |                                                                                                                                                                                                      | 2      |             |       |
| 15.15     |                |            |     |    |                                                                                                                                                                                                      | 3      | 163.86      |       |
| 15.45     |                |            |     |    |                                                                                                                                                                                                      | 3      |             |       |
| 16.0      |                |            |     |    |                                                                                                                                                                                                      | 3      |             |       |

| Boring        |           |                 |      | Progress      |             |                |            | Groundwater  |             |                     |              |                        |
|---------------|-----------|-----------------|------|---------------|-------------|----------------|------------|--------------|-------------|---------------------|--------------|------------------------|
| Depth         | Dia. (mm) | Technique       | Crew | Depth of Hole | Depth Cased | Depth to Water | am(A) Date | Depth Struck | Depth Cased | Depth after 20 mins | Depth Sealed | Remarks on Groundwater |
| 0.3-97.95     | 150       | Core Type 'S'   | EA   |               |             |                |            |              |             | 82.57               |              | 5/11/96                |
| 97.95-103.80  | 150       | Core Type 'SWF' | EA   |               |             |                |            |              |             | 82.67               |              | 7/11/96                |
| 103.80-116.00 | 150       | O/H Rotary      | EA   |               |             |                |            |              |             |                     |              |                        |

Remarks  
RQD = Rock Quality Designation  
FI = Fracture Index  
Comp. = Borehole Completion  
Elevation details relative to ground level

## Borehole Record

Sheet 2 of 8



Marcus Hodges Environment Limited  
Consulting Hydrogeologists and  
Environmental Engineers

Project: Westbury Quarry Extension

Engineer: MHE

Borehole WCH 6/96  
Coordinates: 10356E, 10047N  
Elevation: 179.01m AOD  
Project No.: 50447

Client: BCI

| Sampling  |                | Properties |      |    | Strata                                                                                                                                                                                                                                                                                                                                                                                                                                                          |        |             |       |  |
|-----------|----------------|------------|------|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------|-------|--|
| Depth (m) | Depth to Water | Recovery   | RQD  | FI | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Legend | Level m AOD | Comp. |  |
| 16.35     |                | 98%        | 100% | -  | <p>PLENUS MARL Mid-grey, grading to a creamy-grey with depth, very fine grained, firm, trace of fossils and shell fragments, grading to GREY CHALK with depth.</p> <p>GREY CHALK Cream generally massive very fine grained, with occasional thin pale grey banding, mod hard, occasional fossil fragments and pyrite nodules. Fracture planes spaced approximately at 2-3m intervals at 60° to core axis, and characterised by 0.5m zones of broken strata.</p> | 3      | 162.66      |       |  |
| 16.95     |                |            |      |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 4      |             |       |  |
| 18.0      |                | 93%        | 96%  | 2  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |       |  |
| 18.45     |                |            |      |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |       |  |
|           |                | 100%       | 61%  | 3  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |       |  |
| 19.95     |                |            |      |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 4      |             |       |  |
| 20.0      |                | 98%        | 78%  | 4  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |       |  |
| 21.45     |                |            |      |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |       |  |
| 22.0      |                | 100%       | 100% | 5  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 4      |             |       |  |
| 22.95     |                |            |      |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |       |  |
| 24.0      |                | 95%        | 77%  | 4  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |       |  |
| 24.45     |                |            |      |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |       |  |
|           |                | 100%       | 97%  | 2  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 4      |             |       |  |
| 25.95     |                |            |      |    | <p>GREY CHALK Cream, as above but becoming softer and broken</p>                                                                                                                                                                                                                                                                                                                                                                                                |        | 153.06      |       |  |
| 26.0      |                | 100%       | 77%  | 6  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 4      |             |       |  |
| 27.45     |                |            |      |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |       |  |
| 28.0      |                | 100%       | 35%  | 8  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |       |  |
| 28.95     |                |            |      |    | <p>GREY CHALK Cream, generally massive, mod hard with occasional fracture planes.</p>                                                                                                                                                                                                                                                                                                                                                                           |        | 150.06      |       |  |
| 30.0      |                | 99%        | 95%  | 2  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 4      |             |       |  |
| 30.45     |                |            |      |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |       |  |
|           |                | 100%       | 87%  | 1  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |       |  |
| 32.0      | 31.95          |            |      |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |       |  |

| Boring        |           |                 |      | Progress      |             |                |                     | Groundwater  |             |                     |              |                        |
|---------------|-----------|-----------------|------|---------------|-------------|----------------|---------------------|--------------|-------------|---------------------|--------------|------------------------|
| Depth         | Dia. (mm) | Technique       | Crew | Depth of Hole | Depth Cased | Depth to Water | am(A) Date<br>pm(P) | Depth Struck | Depth Cased | Depth after 20 mins | Depth Sealed | Remarks on Groundwater |
| 0.3-97.95     | 150       | Core Type 'S'   | EA   |               |             |                |                     |              |             | 82.57               |              | 5/11/96                |
| 97.95-103.80  | 150       | Core Type 'SWF' | EA   |               |             |                |                     |              |             | 82.67               |              | 7/11/96                |
| 103.80-116.00 | 150       | O/H Rotary      | EA   |               |             |                |                     |              |             |                     |              |                        |

## Remarks

RQD = Rock Quality Designation  
FI = Fracture Index  
Comp. = Borehole Completion  
Elevation details relative to ground level

Logged by: JMH

Scale: 1:100

Symbols and abbreviations are explained on the accompanying key. All linear dimensions are in metres.

# Borehole Record

Sheet 3 of 8



Marcus Hodges Environment Limited  
Consulting Hydrogeologists and  
Environmental Engineers

Project: Westbury Quarry Extension

Engineer: MHE

Borehole WCH 6/96  
Coordinates: 10356E, 10047N  
Elevation: 179.01m AOD  
Project No.: 50447

Client: BCI

| Sampling  |                | Properties |      |    | Strata                                                                                                                                                                                                                                                                         |        |             |       |  |
|-----------|----------------|------------|------|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------|-------|--|
| Depth (m) | Depth to Water | Recovery   | RQD  | FI | Description                                                                                                                                                                                                                                                                    | Legend | Level m AOD | Comp. |  |
| 33.45     |                | 100%       | 100% | —  | GREY CHALK Predominantly cream but with increasing pale grey bands. Cream chalk mod hard, pale grey bands generally softer                                                                                                                                                     | 4      | 144.06      |       |  |
| 34.0      |                | 100%       | 86%  | —  |                                                                                                                                                                                                                                                                                | 4      |             |       |  |
| 34.95     |                |            |      |    |                                                                                                                                                                                                                                                                                | 4      |             |       |  |
| 36.0      |                | 100%       | 93%  | —  |                                                                                                                                                                                                                                                                                | 4      |             |       |  |
| 36.45     |                |            |      |    |                                                                                                                                                                                                                                                                                | 4      |             |       |  |
| 37.95     |                | 100%       | 93%  | 1  |                                                                                                                                                                                                                                                                                | 4      |             |       |  |
| 38.0      |                |            |      |    |                                                                                                                                                                                                                                                                                | 4      |             |       |  |
| 39.45     |                | 100%       | 92%  | —  |                                                                                                                                                                                                                                                                                | 4      |             |       |  |
| 40.0      |                | 100%       | 92%  | 1  |                                                                                                                                                                                                                                                                                | 4      |             |       |  |
| 40.95     |                |            |      |    |                                                                                                                                                                                                                                                                                | 4      |             |       |  |
| 42.0      |                | 100%       | 83%  | 1  | CHALK MARL Mid grey-blueish grey with occasional cream banding (transition zone with GREY CHALK above) decreasing with depth, very fine grained, massive with occasional fracturing at $\approx 45^\circ$ to vertical and occasional sub horizontal discontinuities (bedding?) | 5      | 136.06      |       |  |
| 42.45     |                |            |      |    |                                                                                                                                                                                                                                                                                | 5      |             |       |  |
| 42.95     |                | 100%       | 100% | 3  |                                                                                                                                                                                                                                                                                | 5      |             |       |  |
| 43.95     |                |            |      |    |                                                                                                                                                                                                                                                                                | 5      |             |       |  |
| 44.0      |                | 100%       | 100% | 2  |                                                                                                                                                                                                                                                                                | 5      |             |       |  |
| 45.45     |                |            |      |    |                                                                                                                                                                                                                                                                                | 5      |             |       |  |
| 46.0      |                | 100%       | 87%  | 2  |                                                                                                                                                                                                                                                                                |        |             |       |  |
| 46.95     |                |            |      |    |                                                                                                                                                                                                                                                                                |        |             |       |  |
| 48.0      |                |            |      |    |                                                                                                                                                                                                                                                                                |        |             |       |  |

| Boring            |              |                 |      | Progress            |                |                      |                        | Groundwater     |                |                           |                 |                           |
|-------------------|--------------|-----------------|------|---------------------|----------------|----------------------|------------------------|-----------------|----------------|---------------------------|-----------------|---------------------------|
| Depth             | Dia.<br>(mm) | Technique       | Crew | Depth<br>of<br>Hole | Depth<br>Cased | Depth<br>to<br>Water | am(A)<br>Date<br>pm(P) | Depth<br>Struck | Depth<br>Cased | Depth<br>after<br>20 mins | Depth<br>Sealed | Remarks on<br>Groundwater |
| 0.3—<br>97.95     | 150          | Core Type 'S'   | EA   |                     |                |                      |                        |                 |                | 82.57                     |                 | 5/11/96                   |
| 97.95—<br>103.80  | 150          | Core Type 'SWF' | EA   |                     |                |                      |                        |                 |                | 82.67                     |                 | 7/11/96                   |
| 103.80—<br>116.00 | 150          | O/H Rotary      | EA   |                     |                |                      |                        |                 |                |                           |                 |                           |

## Remarks

RQD = Rock Quality Designation  
FI = Fracture Index  
Comp. = Borehole Completion  
Elevation details relative to ground level

## Borehole Record

Sheet 4 of 8



Marcus Hodges Environment Limited  
Consulting Hydrogeologists and  
Environmental Engineers

Project: Westbury Quarry Extension

Engineer: MHE

Borehole WCH 6/96  
Coordinates: 10358E, 10047N  
Elevation: 179.01m AOD  
Project No.: 50447

Client: BCI

| Sampling  |                | Properties |      |    | Strata                                                                                                                                                                          |        |             |       |  |
|-----------|----------------|------------|------|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------|-------|--|
| Depth (m) | Depth to Water | Recovery   | RQD  | FI | Description                                                                                                                                                                     | Legend | Level m AOD | Comp. |  |
| 48.45     |                | 97%        | 72%  | 3  |                                                                                                                                                                                 | [5]    |             |       |  |
|           |                | 100%       | 97%  | 1  |                                                                                                                                                                                 |        |             |       |  |
| 49.95     |                |            |      |    |                                                                                                                                                                                 |        | 129.06      |       |  |
| 50.0      |                | 100%       | 87%  | 6  | CHALK MARL Blueish grey-cream as above but with increased frequency of sub-horizontal to steeply dipping discontinuities (bedding and fracture planes)                          | [5]    | 127.56      |       |  |
| 51.45     |                |            |      |    | CHALK MARL Cream to blueish grey, banded, mostly firm with harder bands represented by the cream chalk. Frequent fossil fragments, occasional pyrite nodules generally massive. | [5]    |             |       |  |
| 52.0      |                | 97%        | 97%  | 1  |                                                                                                                                                                                 |        |             |       |  |
| 52.95     |                |            |      |    |                                                                                                                                                                                 |        |             |       |  |
| 54.0      |                | 100%       | 90%  | 3  |                                                                                                                                                                                 |        |             |       |  |
| 54.45     |                |            |      |    |                                                                                                                                                                                 |        |             |       |  |
|           |                | 100%       | 93%  | 2  |                                                                                                                                                                                 |        |             |       |  |
| 55.95     |                |            |      |    |                                                                                                                                                                                 |        |             |       |  |
| 56.0      |                | 100%       | 95%  | 3  |                                                                                                                                                                                 |        |             |       |  |
| 57.45     |                |            |      |    | CHALK MARL Blue grey-greenish grey, with some banding, fine grained mod hard-hard, some weathered horizons with increased shell fragments, banding disappearing with depth.     | [5]    |             |       |  |
| 58.0      |                | 100%       | 100% | 3  |                                                                                                                                                                                 |        |             |       |  |
| 58.95     |                |            |      |    |                                                                                                                                                                                 |        |             |       |  |
| 60.0      |                | 100%       | 93%  | 3  |                                                                                                                                                                                 |        |             |       |  |
| 60.45     |                |            |      |    |                                                                                                                                                                                 |        |             |       |  |
|           |                | 100%       | 93%  | 3  |                                                                                                                                                                                 |        |             |       |  |
| 61.95     |                |            |      |    |                                                                                                                                                                                 |        |             |       |  |
| 62.0      |                | 100%       | 89%  | 5  |                                                                                                                                                                                 |        |             |       |  |
| 63.25     |                |            |      |    |                                                                                                                                                                                 | [5]    |             |       |  |
| 64.0      |                |            |      |    |                                                                                                                                                                                 |        |             |       |  |

| Boring        |           |                 |      | Progress      |             |                |                     | Groundwater  |             |                     |              |                        |
|---------------|-----------|-----------------|------|---------------|-------------|----------------|---------------------|--------------|-------------|---------------------|--------------|------------------------|
| Depth         | Dia. (mm) | Technique       | Crew | Depth of Hole | Depth Cased | Depth to Water | am(A) Date<br>pm(P) | Depth Struck | Depth Cased | Depth after 20 mins | Depth Sealed | Remarks on Groundwater |
| 0.3-97.95     | 150       | Core Type 'S'   | EA   |               |             |                |                     |              |             | 82.57               |              | 5/11/96                |
| 97.95-103.80  | 150       | Core Type 'SWF' | EA   |               |             |                |                     |              |             | 82.67               |              | 7/11/96                |
| 103.80-116.00 | 150       | O/H Rotary      | EA   |               |             |                |                     |              |             |                     |              |                        |

## Remarks

RQD = Rock Quality Designation  
FI = Fracture Index  
Comp. = Borehole Completion  
Elevation details relative to ground level

Logged by: JMH

Scale: 1:100

Symbols and abbreviations are explained on the accompanying key. All linear dimensions are in metres.



# Borehole Record

Sheet 5 of 8



Marcus Hodges Environment Limited  
Consulting Hydrogeologists and  
Environmental Engineers

Project: Westbury Quarry Extension

Engineer: MHE

Borehole WCH 6/96  
Coordinates: 10356E, 10047N  
Elevation: 179.01m AOD  
Project No.: 50447

Client: BCI

| Sampling  |                | Properties |      |    | Strata      |                 |             |       |  |
|-----------|----------------|------------|------|----|-------------|-----------------|-------------|-------|--|
| Depth (m) | Depth to Water | Recovery   | RQD  | FI | Description | Legend          | Level m AOD | Comp. |  |
| 64.25     |                | 100%       | 71%  | 5  |             | [Brick Pattern] |             |       |  |
|           |                | 100%       | 95%  | 1  |             |                 |             |       |  |
| 66.0      |                | 100%       | 60%  | 2  |             |                 |             |       |  |
| 66.45     |                | 98%        | 92%  | 2  |             |                 |             |       |  |
| 67.95     |                | 100%       | 93%  | 1  |             |                 |             |       |  |
| 68.0      |                |            |      |    |             |                 |             |       |  |
| 69.45     |                | 95%        | 100% | -  |             |                 |             |       |  |
| 70.0      |                |            |      |    |             |                 |             |       |  |
| 70.95     |                | 78%        | 100% | 1  |             |                 |             |       |  |
| 72.0      |                | 100%       | 79%  | 3  |             |                 |             |       |  |
| 72.15     |                |            |      |    |             |                 |             |       |  |
| 73.57     |                | 100%       | 100% | 1  |             |                 |             |       |  |
| 74.0      |                |            |      |    |             |                 |             |       |  |
| 74.72     |                | 100%       | 90%  | 2  |             |                 |             |       |  |
| 76.0      |                | 100%       | 80%  | 3  |             |                 |             |       |  |
| 76.05     |                |            |      |    |             |                 |             |       |  |
| 76.95     |                | 100%       | 78%  | 5  |             |                 |             |       |  |
| 78.0      |                |            |      |    |             |                 |             |       |  |
| 78.45     |                | 97%        | 93%  | 3  |             |                 |             |       |  |
| 79.76     |                |            |      |    |             |                 |             |       |  |
| 80.0      |                |            |      |    |             |                 |             |       |  |

| Boring        |           |                 |      | Progress      |             |                |                  | Groundwater  |             |                     |              |                        |
|---------------|-----------|-----------------|------|---------------|-------------|----------------|------------------|--------------|-------------|---------------------|--------------|------------------------|
| Depth         | Dia. (mm) | Technique       | Crew | Depth of Hole | Depth Cased | Depth to Water | am(A) Date pm(P) | Depth Struck | Depth Cased | Depth after 20 mins | Depth Sealed | Remarks on Groundwater |
| 0.3-97.95     | 150       | Core Type 'S'   | EA   |               |             |                |                  |              |             | 82.57               |              | 5/11/96                |
| 97.95-103.80  | 150       | Core Type 'SWF' | EA   |               |             |                |                  |              |             | 82.67               |              | 7/11/96                |
| 103.80-116.00 | 150       | O/H Rotary      | EA   |               |             |                |                  |              |             |                     |              |                        |

## Remarks

RQD = Rock Quality Designation  
FI = Fracture Index  
Comp. = Borehole Completion  
Elevation details relative to ground level

# Borehole Record

Sheet 6 of 8



Marcus Hodges Environment Limited  
Consulting Hydrogeologists and  
Environmental Engineers

Project: Westbury Quarry Extension

Engineer: MHE

Borehole WCH 6/96  
Coordinates: 10356E, 10047N  
Elevation: 179.01m AOD  
Project No.: 50447

Client: BCI

Project No.: 50447

| Sampling  |                | Properties |      |    | Strata           |        |             |       |       |
|-----------|----------------|------------|------|----|------------------|--------|-------------|-------|-------|
| Depth (m) | Depth to Water | Recovery   | RQD  | FI | Description      | Legend | Level m AOD | Comp. |       |
| 81.05     |                | 98%        | 94%  | 3  | WL 08:30 5/11/96 | 5      |             |       |       |
| 81.45     |                | 70%        | 100% | —  |                  |        |             |       |       |
| 82.0      | ▼              | 105%       | 97%  | 2  |                  |        |             |       |       |
| 82.57     |                |            |      |    |                  |        |             |       |       |
| 82.95     |                |            |      |    |                  |        |             |       |       |
| 84.0      |                | 100%       | 76%  | 5  |                  | 5      |             |       |       |
| 84.45     |                | 95%        | 100% | 1  |                  |        |             |       |       |
| 85.95     |                |            |      |    |                  |        |             |       |       |
| 86.0      |                | 88%        | 100% | 1  |                  |        |             |       |       |
| 87.25     |                | 99%        | 86%  | 2  |                  | 5      |             |       |       |
| 87.90     |                |            |      |    |                  |        |             |       |       |
| 88.0      |                | 113%       | 94%  | 2  |                  |        |             |       |       |
| 89.45     |                |            |      |    |                  |        |             |       |       |
| 90.0      |                | 90%        | 100% | 1  |                  |        |             |       |       |
| 90.45     |                | 98%        | 97%  | 2  |                  | 5      |             |       |       |
| 92.0      |                |            |      |    |                  |        |             |       |       |
| 92.05     |                | 102%       | 98%  | 2  |                  |        |             |       |       |
| 92.56     |                | 90%        | 34%  | 8  |                  |        |             |       | 86.45 |
| 93.45     |                | 93%        | 36%  | 9  | 5                |        |             |       |       |
| 94.0      |                |            |      |    |                  |        |             |       |       |
| 94.95     |                |            |      |    |                  |        | 94.5        |       |       |
| 96.0      |                |            |      |    |                  |        |             |       |       |

| Boring        |           |                 |      | Progress      |             |                |                     | Groundwater  |             |                     |              |                        |
|---------------|-----------|-----------------|------|---------------|-------------|----------------|---------------------|--------------|-------------|---------------------|--------------|------------------------|
| Depth         | Dia. (mm) | Technique       | Crew | Depth of Hole | Depth Cased | Depth to Water | am(A) Date<br>pm(P) | Depth Struck | Depth Cased | Depth after 20 mins | Depth Sealed | Remarks on Groundwater |
| 0.3-97.95     | 150       | Core Type 'S'   | EA   |               |             |                |                     |              |             | 82.57               |              | 5/11/96                |
| 97.95-103.80  | 150       | Core Type 'SWF' | EA   |               |             |                |                     |              |             | 82.67               |              | 7/11/96                |
| 103.80-116.00 | 150       | O/H Rotary      | EA   |               |             |                |                     |              |             |                     |              |                        |

## Remarks

RQD = Rock Quality Designation  
FI = Fracture Index  
Comp. = Borehole Completion  
Elevation details relative to ground level

Logged by: JMH

Scale: 1:100

Symbols and abbreviations are explained on the accompanying key. All linear dimensions are in metres.

# Borehole Record

Sheet 7 of 8



Marcus Hodges Environment Limited  
Consulting Hydrogeologists and  
Environmental Engineers

Project: Westbury Quarry Extension

Engineer: MHE

Borehole WCH 6/96  
Coordinates: 10356E, 10047N  
Elevation: 179.01m AOD  
Project No.: 50447

Client: BCI

| Sampling  |                | Properties |     |     | Strata                                                                                                                                                                                                     |        |             |       |
|-----------|----------------|------------|-----|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------|-------|
| Depth (m) | Depth to Water | Recovery   | RQD | FI  | Description                                                                                                                                                                                                | Legend | Level m AOD | Comp. |
| 96.45     |                | 102%       | 81% | 5   |                                                                                                                                                                                                            |        | 82.56       |       |
|           |                | 96%        | 81% | 6   | CHALK MARL Dark grey green, mod firm, broken, wet, fine grained                                                                                                                                            | 5      | 81.06       |       |
| 97.95     |                |            |     |     |                                                                                                                                                                                                            |        |             |       |
| 98.0      |                | 97%        | 98% | 1   | CHALK MARL Dark grey green, generally massive, hard, fine grained but becoming coarser towards base, glauconitic with some shell fragments                                                                 | 5      | 78.91       |       |
| 100.0     |                |            |     |     |                                                                                                                                                                                                            |        |             |       |
| 100.08    |                |            |     |     |                                                                                                                                                                                                            |        |             |       |
| 100.10    |                |            |     |     | SANDSTONE Dark grey green to yellow, siliceous chalk grading rapidly to calcareous SANDSTONE. Hard and massive at top but quickly becomes broken and interbanded with soft sand (not recovered) with depth |        |             |       |
| 102.0     |                | 11%        | 22% | N/A |                                                                                                                                                                                                            |        |             |       |
| 103.8     |                |            |     |     |                                                                                                                                                                                                            |        | 75.21       |       |
| 104.0     |                |            |     |     | GREENSAND Grey green, variable sequence of loose SAND, medium grain size and occasional harder bands of sandstone (not cored).                                                                             |        | 105.0       |       |
| 106.0     |                |            |     |     |                                                                                                                                                                                                            |        | 106.2       |       |
| 108.0     |                |            |     |     |                                                                                                                                                                                                            |        |             |       |
| 110.0     |                |            |     |     |                                                                                                                                                                                                            |        | 110.6       |       |
| 112.0     |                |            |     |     |                                                                                                                                                                                                            |        |             |       |

| Boring       |           |                 |      | Progress      |             |                |            | Groundwater  |             |                     |              |
|--------------|-----------|-----------------|------|---------------|-------------|----------------|------------|--------------|-------------|---------------------|--------------|
| Depth        | Dia. (mm) | Technique       | Crew | Depth of Hole | Depth Cased | Depth to Water | am(A) Date | Depth Struck | Depth Cased | Depth after 20 mins | Depth Sealed |
| 97.95-103.80 | 150       | Core Type 'SWF' | EA   |               |             |                |            |              |             | 82.57               |              |
| 103.80-116.0 | 150       | O/H Roary       | EA   |               |             |                |            |              |             | 82.67               |              |
|              |           |                 |      |               |             |                |            |              |             |                     |              |

## Remarks

RQD = Rock Quality Designation  
FI = Fracture Index  
Comp. = Borehole Completion  
Elevation details relative to ground level

## Borehole Record

Sheet 8 of 8



Marcus Hodges Environment Limited  
Consulting Hydrogeologists and  
Environmental Engineers

Project: Westbury Quarry Extension

Engineer: MHE

Borehole WCH 6/96  
Coordinates: 10356E, 10047N  
Elevation: 179.01m AOD  
Project No.: 50447

Client: BCI

| Sampling  |                | Properties |     |    | Strata          |        |             |       |
|-----------|----------------|------------|-----|----|-----------------|--------|-------------|-------|
| Depth (m) | Depth to Water | Recovery   | RQD | FI | Description     | Legend | Level m AOD | Comp. |
| 114.0     |                |            |     |    |                 |        |             |       |
| 116.0     |                |            |     |    | End of Borehole |        | 115.5       |       |
| 118.0     |                |            |     |    |                 |        |             |       |
| 120.0     |                |            |     |    |                 |        |             |       |
| 122.0     |                |            |     |    |                 |        |             |       |
| 124.0     |                |            |     |    |                 |        |             |       |
| 126.0     |                |            |     |    |                 |        |             |       |
| 128.0     |                |            |     |    |                 |        |             |       |

| Boring            |              |                 |      | Progress            |                |                      |                        |                 | Groundwater    |                           |                 |                           |  |
|-------------------|--------------|-----------------|------|---------------------|----------------|----------------------|------------------------|-----------------|----------------|---------------------------|-----------------|---------------------------|--|
| Depth             | Dia.<br>(mm) | Technique       | Crew | Depth<br>of<br>Hole | Depth<br>Cased | Depth<br>to<br>Water | am(A)<br>pm(P)<br>Date | Depth<br>Struck | Depth<br>Cased | Depth<br>after<br>20 mins | Depth<br>Sealed | Remarks on<br>Groundwater |  |
| 0.3-<br>97.95     | 150          | Core Type 'S'   | EA   |                     |                |                      |                        |                 |                | 82.57                     |                 | 5/11/96                   |  |
| 97.95-<br>103.80  | 150          | Core Type 'SWF' | EA   |                     |                |                      |                        |                 |                | 82.67                     |                 | 7/11/96                   |  |
| 103.80-<br>116.00 | 150          | O/H Rotary      | EA   |                     |                |                      |                        |                 |                |                           |                 |                           |  |

## Remarks

RQD = Rock Quality Designation  
FI = Fracture Index  
Comp. = Borehole Completion  
Elevation details relative to ground level

Logged by: JMH

Scale: 1:100

Symbols and abbreviations are explained on the accompanying key. All linear dimensions are in metres.

## Borehole Record

Sheet 1 of 2

Marcus Hodges Environment Limited  
Consulting Hydrogeologists and  
Environmental Engineers

Project: Westbury Quarry Extension

Engineer: MHE

Borehole WCH 7/96  
Coordinates: 10362E, 10056N  
Elevation: 170.02m AOD  
Project No.: 50447

Client: BCI

| Sampling  |                | Properties |     |    | Strata                                   |        |             |       |
|-----------|----------------|------------|-----|----|------------------------------------------|--------|-------------|-------|
| Depth (m) | Depth to Water | Recovery   | RQD | FI | Description                              | Legend | Level m AOD | Comp. |
| 10.0      |                |            |     |    | See BH1 core log for strata descriptions |        |             |       |
| 20.0      |                |            |     |    |                                          |        |             |       |
| 30.0      |                |            |     |    |                                          |        |             |       |
| 40.0      |                |            |     |    |                                          |        |             |       |
| 50.0      |                |            |     |    |                                          |        |             |       |
| 60.0      |                |            |     |    |                                          |        |             |       |
| 70.0      |                |            |     |    |                                          |        |             |       |
| 80.0      |                |            |     |    |                                          |        |             |       |

| Boring    |           |            |      | Progress      |             |                |                  | Groundwater  |             |                     |              |                        |
|-----------|-----------|------------|------|---------------|-------------|----------------|------------------|--------------|-------------|---------------------|--------------|------------------------|
| Depth     | Dia. (mm) | Technique  | Crew | Depth of Hole | Depth Cased | Depth to Water | am(A) Date am(P) | Depth Struck | Depth Cased | Depth after 20 mins | Depth Sealed | Remarks on Groundwater |
| 0.0-95.75 | 150       | O/H Rotary | EA   |               |             |                |                  | 85.83        |             |                     |              | 7/11/96                |

## Remarks

Damp at 68.75m  
Elevation details relative to ground level

# Borehole Record

Sheet 2 of 2



Marcus Hodges Environment Limited  
Consulting Hydrogeologists and  
Environmental Engineers

Project: Westbury Quarry Extension

Engineer: MHE

Borehole WCH 7/96  
Coordinates: 10362E, 10056N  
Elevation: 170.02m AOD  
Project No.: 50447

Client: BCI

| Sampling  |                | Properties |     |    | Strata          |        |             |       |  |
|-----------|----------------|------------|-----|----|-----------------|--------|-------------|-------|--|
| Depth (m) | Depth to Water | Recovery   | RQD | FI | Description     | Legend | Level m AOD | Comp. |  |
| 90.0      | ▽              |            |     |    | WL 7/11/96      |        | 84.0        |       |  |
| 95.75     |                |            |     |    |                 |        | 85.0        |       |  |
|           |                |            |     |    |                 |        | 90.84       |       |  |
|           |                |            |     |    | End of Borehole |        |             |       |  |
| 100.0     |                |            |     |    |                 |        |             |       |  |
| 110.0     |                |            |     |    |                 |        |             |       |  |
| 120.0     |                |            |     |    |                 |        |             |       |  |
| 130.0     |                |            |     |    |                 |        |             |       |  |
| 140.0     |                |            |     |    |                 |        |             |       |  |
| 150.0     |                |            |     |    |                 |        |             |       |  |
| 160.0     |                |            |     |    |                 |        |             |       |  |

| Boring        |              |            |      | Progress            |                |                      |                        | Groundwater     |                |                           |                 |                           |
|---------------|--------------|------------|------|---------------------|----------------|----------------------|------------------------|-----------------|----------------|---------------------------|-----------------|---------------------------|
| Depth         | Dia.<br>(mm) | Technique  | Crew | Depth<br>of<br>Hole | Depth<br>Cased | Depth<br>to<br>Water | am(A)<br>Date<br>pm(P) | Depth<br>Struck | Depth<br>Cased | Depth<br>after<br>20 mins | Depth<br>Sealed | Remarks on<br>Groundwater |
| 0.0-<br>95.75 | 150          | O/H Rotary | EA   |                     |                |                      |                        | 85.83           |                |                           |                 | 7/11/96                   |

## Remarks

Damp at 68.75m  
Elevation details relative to ground level

# Borehole Record

Sheet 1 of 2



Marcus Hodges Environment Limited  
Consulting Hydrogeologists and  
Environmental Engineers

Coordinates:

Project: Westbury Quarry Extension

Engineer: MHE

Borehole WCH 8/96

Coordinates: 9937E, 10166N

Client: BCI

Elevation: 193.06 mAOD

Project No.: 50447

| Sampling  |                | Properties |     |    | Strata                                                                           |     | Legend | Level (mAOD)     | Comp. |
|-----------|----------------|------------|-----|----|----------------------------------------------------------------------------------|-----|--------|------------------|-------|
| Depth (m) | Depth to Water | Recovery   | RQD | FI | Description                                                                      |     |        |                  |       |
| 0.2       |                |            |     |    | TOPSOIL                                                                          |     |        | 191.06           |       |
| 2.0       |                |            |     |    | MIDDLE CHALK Dry (driller's description)                                         | 1   |        |                  |       |
| 8.7       |                |            |     |    | MIDDLE CHALK Damp chalk (driller's description) with hard band of flint at 8.70m |     |        | 184.36           |       |
| 10.0      |                |            |     |    | MIDDLE CHALK Soft chalk with small hard bands (driller's description)            | 1   |        |                  |       |
| 20.0      |                |            |     |    |                                                                                  |     |        |                  |       |
| 28.0      |                |            |     |    |                                                                                  |     |        |                  |       |
| 30.0      |                |            |     |    | MELBOURN ROCK CHALK Getting harder (driller's description)                       | 2/3 |        | 165.06<br>163.71 |       |
| 34.5      |                |            |     |    |                                                                                  | 4   |        | 158.56           |       |
| 40.0      |                |            |     |    | GREY CHALK With small hard bands (driller's description)                         | 4   |        |                  |       |
| 50.0      |                |            |     |    |                                                                                  | 4   |        |                  |       |
| 51.0      |                |            |     |    | CHALK MARL White chalk (driller's description)                                   | 4   |        | 142.06           |       |
| 60.0      |                |            |     |    |                                                                                  |     |        |                  |       |
| 70.0      |                |            |     |    |                                                                                  | 5   |        |                  |       |
| 80.0      | 78.54          |            |     |    | CHALK MARL Grey chalk (driller's description)                                    | 5   |        |                  |       |

| Boring    |           |            |      | Progress      |             |                |                  | Groundwater  |             |                     |              | Remarks on Groundwater |
|-----------|-----------|------------|------|---------------|-------------|----------------|------------------|--------------|-------------|---------------------|--------------|------------------------|
| Depth     | Dia. (mm) | Technique  | Crew | Depth of Hole | Depth Cased | Depth to Water | am(A) Date pm(P) | Depth Struck | Depth Cased | Depth after 20 mins | Depth Sealed |                        |
| 0.0-130.0 | 200       | Rotary O/H | EA   |               |             |                |                  |              | 130.1       | 105.2               |              | 4/10/96                |

## Remarks

Drilled w/ air and foam  
RWL CHALK 100.61mbgl 15/10/96  
RWL SAND 100.65mbgl 15/10/96  
Elevation details relative to ground level

----- Boundary from Interpretation of Gamma Log



# Borehole Record

Sheet 2 of 2



Marcus Hodges Environment Limited  
Consulting Hydrogeologists and  
Environmental Engineers

Project: Westbury Quarry Extension

Engineer: MHE

Borehole WCH 8/96  
Coordinates: 9937E, 10166N  
Elevation: 193.06 mAOD  
Project No.: 50447

Client: BCI

| Sampling  |                | Properties |     |    | Strata                                             |        |              |       |
|-----------|----------------|------------|-----|----|----------------------------------------------------|--------|--------------|-------|
| Depth (m) | Depth to Water | Recovery   | RQD | FI | Description                                        | Legend | Level (mAOD) | Comp. |
| 87.5      |                |            |     |    |                                                    | 5      |              |       |
| 90.0      |                |            |     |    | CHALK MARL Dark grey chalk (driller's description) |        |              |       |
| 100.0     |                |            |     |    |                                                    | 5      | 101.5        |       |
| 110.0     |                |            |     |    |                                                    |        | 102.5        |       |
| 114.4     |                |            |     |    | CHALK MARL with hard bands (driller's description) |        | 108.5        |       |
| 120.0     | ▽              |            |     |    | SAND very soft greensand (driller's description)   |        | 112.41       |       |
| 122.0     |                |            |     |    |                                                    |        | 120.83       |       |
| 130.0     |                |            |     |    | SAND Greensand with small hard bands               |        | 123.75       |       |
| 132.5     |                |            |     |    | End of Borehole                                    |        |              |       |
| 140.0     |                |            |     |    |                                                    |        |              |       |
| 150.0     |                |            |     |    |                                                    |        |              |       |
| 160.0     |                |            |     |    |                                                    |        |              |       |

| Boring    |           |            |      | Progress      |             |                |                  | Groundwater  |             |                     |              |                        |
|-----------|-----------|------------|------|---------------|-------------|----------------|------------------|--------------|-------------|---------------------|--------------|------------------------|
| Depth     | Dia. (mm) | Technique  | Crew | Depth of Hole | Depth Cased | Depth to Water | am(A) Date pm(P) | Depth Struck | Depth Cased | Depth after 20 mins | Depth Sealed | Remarks on Groundwater |
| 0.0-130.0 | 200       | Rotary O/H | EA   |               |             |                |                  |              | 130.1       | 105.2               |              | 4/10/96                |

## Remarks

Drilled w/ air and foam  
RWL CHALK 100.61mbgl 15/10/96  
RWL SAND 100.65mbgl 15/10/96  
Elevation details relative to ground level

Logged by: JMH

Scale: 1:500

Symbols and abbreviations are explained on the accompanying key. All linear dimensions are in metres.

# Borehole Record

Sheet 1 of 1



Marcus Hodges Environment Limited  
Consulting Hydrogeologists and  
Environmental Engineers

Project: Westbury Quarry Extension

Engineer: MHE

Borehole WCH 9/96  
Coordinates: 10740E, 10882N  
Elevation: 146.62 mAOD  
Project No.: 50447

Client: BCI

| Sampling  |                      | Properties |     |    | Strata                                                              |  | Legend | Level<br>(mAOD) | Comp. |
|-----------|----------------------|------------|-----|----|---------------------------------------------------------------------|--|--------|-----------------|-------|
| Depth (m) | Depth<br>to<br>Water | Recovery   | RQD | FI | Description                                                         |  |        |                 |       |
| 10.0      |                      |            |     |    | GREY CHALK White to grey with hard bands<br>(driller's description) |  | 4      |                 |       |
| 20.0      |                      |            |     |    |                                                                     |  |        |                 |       |
| 30.0      |                      |            |     |    |                                                                     |  | 5      |                 |       |
| 33.0      |                      |            |     |    | CHALK MARL Grey chalk with hard bands (driller's<br>description)    |  |        | 113.62          |       |
| 40.0      |                      |            |     |    |                                                                     |  | 5      |                 |       |
| 49.0      |                      |            |     |    |                                                                     |  |        | 47.35           |       |
| 50.0      | ▼                    |            |     |    | CHALK MARL Darker grey chalk (driller's description)                |  |        | 48.35           |       |
| 53.0      |                      |            |     |    |                                                                     |  |        | 93.62           |       |
| 60.0      |                      |            |     |    |                                                                     |  | 5      | 54.25           |       |
| 61.2      |                      |            |     |    | CHALK MARL Grey chalk, hard (driller's description)                 |  |        | 55.3            |       |
| 62.6      |                      |            |     |    |                                                                     |  |        | 85.42           |       |
| 69.5      |                      |            |     |    | SAND Greensand, very soft (driller's description)                   |  |        | 84.02           |       |
| 70.0      |                      |            |     |    |                                                                     |  |        |                 |       |
| 71.2      |                      |            |     |    | SANDSTONE Green sandstone, hard (driller's<br>description)          |  |        | 77.12           |       |
| 78.0      |                      |            |     |    | SAND Greensand, soft (driller's description)<br>End of Borehole     |  |        | 71.25           |       |
| 80.0      |                      |            |     |    |                                                                     |  |        | 73.0            |       |

| Boring        |              |            |      | Progress            |                |                      |                        | Groundwater     |                |                           |                 | Remarks on<br>Groundwater |
|---------------|--------------|------------|------|---------------------|----------------|----------------------|------------------------|-----------------|----------------|---------------------------|-----------------|---------------------------|
| Depth         | Dia.<br>(mm) | Technique  | Crew | Depth<br>of<br>Hole | Depth<br>Cased | Depth<br>to<br>Water | am(A)<br>Date<br>pm(P) | Depth<br>Struck | Depth<br>Cased | Depth<br>after<br>20 mins | Depth<br>Sealed |                           |
| 0.0-<br>78.00 | 200          | Rotary O/H | EA   |                     |                |                      |                        | 31.0            | -              | -                         | -               | Seepage                   |
|               |              |            |      |                     |                |                      |                        | 49.0            | -              | 49.0                      | -               | Main groundwater strike   |

marks

RWL CHALK 48.45mbgl (17/10/96)  
RWL SAND 48.78mbgl (17/10/96)  
Driller w/ air and foam  
Elevation details relative to ground level

----- Boundary from interpretation  
of Gamma Log



## 7.0 Ecology and Biodiversity

### 7.1 INTRODUCTION

- 7.1.1 This chapter reports on the impacts upon ecology and biodiversity, the appropriate mitigation and compensation measures and assessment of residual impacts, taking into account the likely effectiveness of such measures. These assessments are carried out on the basis of the proposals as described in Chapters 2 and 4 of the ES.
- 7.1.2 Data included in this assessment take into account desk information, historic and new field studies. Desk information was sought after initial enquiries as to who might hold relevant material from English Nature (EN) and Defence Estates, the latter of whom hold any information pertinent to their landholding. Additional records of Lepidoptera from areas of Salisbury Plain in the neighbourhood of the site were also supplied by a local moth recorder. New field study took place from autumn 2003 to May 2004, with historic information dating from surveys carried out on behalf of the then Blue Circle by Penny Anderson Associates in 1995.
- 7.1.3 The scope of studies carried out in order to assess the potential main effects on ecology has been agreed in advance of carrying out the new field studies in consultation with English Nature and the Wiltshire County ecologist.
- 7.1.4 Specifically, the areas studied take into account the range of possible indirect impacts as well as direct impacts, and also include a wider area for the purposes of putting the results into context (Figure 7.1) and informing restoration proposals for the quarry (Chapters 4 and 5).
- 7.1.5 The core study area comprises the application site, i.e. land that would be disturbed during the quarry extension. Within this area, full studies have been carried out to cover breeding and wintering birds, flora, reptiles, badgers and invertebrate studies.
- 7.1.6 Breeding and wintering bird studies also extended up to 500m from the survey area to check if any Special Protection Area Interest or otherwise sensitive species might be affected. Historic surveys were also checked on the habitat level and for key invertebrate species in this wider area.
- 7.1.7 Finally information obtained from English Nature and Defence Estates was used to place the findings in the context of Salisbury Plain and other designated sites.
- 7.1.8 For the purpose of impact assessment, it is assumed that the extension area would be worked from within the existing quarried site, i.e. that there would be no additional land take outside the study areas for access, ancillary or other off-site works. Likewise, usage of the pipeline carrying material from

the quarry to the cement works would remain unchanged. The assessment relies on the results of work in other environmental disciplines (particularly Chapters 6 and 12) where a judgement is required on whether or not emissions such as dust or noise, or possibly hydrological changes, would have significant impacts on ecology.

- 7.1.9 The future without the current proposals, i.e. the status quo, is taken to be that the existing consent for quarrying would continue to be implemented in full.

## 7.2 METHODS

- 7.2.1 Desk and historical field information on the ecological resource of the site comprised the following:

- a) Information on the Bratton Downs Site of Special Scientific Interest (SSSI) and the Salisbury Plain SSSI from English Nature.
- b) Additional information on the European designations (SPA and cSAC) of Salisbury Plain from Joint Nature Conservation Committee (JNCC) and Defence Estates.
- c) Report produced by Penny Anderson Associates in 1995 on the ecology of the then proposed extension area to Westbury Quarry and its environs in Salisbury Plain.
- d) Additional information on the moth fauna of the local area from a local recorder.
- e) Information available in Lafarge and Bioscan archives.

- 7.2.2 Field survey comprised:

- a) Check at Phase 1 habitat survey level of the 1995 habitat and vegetation information for any changes that had taken place in the intervening period. This was initiated in the autumn of 2003 and completed in April and May 2004.
- b) Wintering bird surveys involved regular counts of all birds within the study area (Figure 7.1) at approximately twice weekly intervals from the beginning of November through to the end of March. The location of each bird or flock was mapped together with an estimation of their movement. In total 10 visits were made to the study area, during which predetermined circuits were walked starting at first light and continuing at regular intervals throughout the day until dusk. Due to the variation in day length it was often only possible to complete three circuits in December, increasing to six in March.
- c) Breeding bird surveys involving the same study area in which all registrations were recorded and standard Common Bird Census (CBC) methods used to judge evidence of breeding. At the time of writing, four out of six visits scheduled to cover the breeding season have been completed.

- d) Checks for any flora of note including potential arable weeds carried out in May 2004.
- e) Reptile survey of any potentially suitable habitat within the application area, i.e. rough grassland within the existing planning consent, using standard refugia surveys in April and May 2004.
- f) Invertebrate surveys during April and May 2004 concentrating on the application area but also including checks for species of note in the wider 1995 study area.
- g) Specialist studies of badgers.

### 7.3 BACKGROUND INFORMATION

- 7.3.1 The context of the site in relation to surrounding areas designated for their ecological interest is shown in Figure 7.2.
- 7.3.2 There are parts of two designated areas within 1km of the site. The application area impinges marginally on one of these.
- 7.3.3 The south-western edge of Bratton Downs SSSI lies just across the minor road immediately to the north of the existing quarry. The biological SSSI is designated primarily for its chalk grassland vegetation, in particular communities characterised by tor grass and / or erect brome (communities CG3 to CG5 in the National Vegetation Classification<sup>1</sup>) with a species-rich associated community including specialist invertebrates and other animals as well as the flora. There is also some CG2 chalk grassland, neutral (mesotrophic) MG5 grassland, and woodland of community W8. English Nature's condition assessment of the nearest portions to the quarry found them to be in favourable condition with the exception of local over-abundance of ragwort. This is a relatively minor management issue not connected with the quarry.
- 7.3.4 The extensive Salisbury Plain SSSI lies to the south and south-east of the site and the application area impinges slightly upon the designated site. Like Bratton Downs, the Salisbury Plain SSSI is noted for its chalk grassland flora, but there are also specific SSSI interests in a wide range of fauna many of which also contribute to the same area's European site designations (below). The SSSI unit closest to the quarry (unit 1) has been assessed by English Nature as in unfavourable but recovering condition. The unfavourable condition is due to scrub encroachment, and the recovery underway is connected with recent agreements and implementation of scrub control and the re-imposition of grazing. These factors are not connected with the quarry.
- 7.3.5 Unit 7 of the SSSI also approaches to within a few hundred metres of the north-east corner of the quarry. This is listed as in favourable condition, managed for invertebrates and also containing a stone curlew plot.

---

<sup>1</sup> Rodwell J (1992 ed) British Plant Communities, volume 2: grasslands and montane communities Cambridge University Press.

- 7.3.6 The Salisbury Plain SSSI adjacent to the site is also contiguous with the European site designations of Special Protection Area (SPA) and candidate Special Area of Conservation (cSAC).
- 7.3.7 The SPA designation is for nationally important numbers of the Annex 1 breeding species stone curlew and for wintering Annex 1 hen harrier, as well as for nationally important breeding numbers of hobby and quail, which qualify as migratory species although not on Annex 1 of the Birds Directive.
- 7.3.8 The cSAC designation in the neighbourhood of the quarry is for the qualifying interests of chalk grassland<sup>2</sup>, the marsh fritillary butterfly (*Hypodryas aurinia*) and elsewhere in the cSAC juniper scrub. Semi-natural broadleaved woodland is also present, but this feature is not extensive enough on the Plain to count as a qualifying cSAC interest.
- 7.3.9 Within the quarry itself, another species specially protected on Schedule 1 of the Wildlife and Countryside Act 1981 and Annex 1 of the Birds Directive has also bred regularly for many years.
- 7.3.10 Results of the 1995 habitat and other surveys are integrated with those of the new surveys and discussed in the next section below.

## 7.4 SURVEY RESULTS

### *Habitats and vegetation*

- 7.4.2 Figure 7.3 shows the habitats found in the study areas, with full updated results for flora species found contained in Appendix 7.1.

### Application area

- 7.4.3 The application site contains the quarry itself, arable land to the north and north-east, species-poor semi-improved pastures to the south and south-east and an area of secondary calcareous grassland (formed on topsoil heaps) within the curtilage of the current quarry consent but that has not yet been extracted.
- 7.4.4 Since the 1995 surveys, the area of calcareous grassland within the current quarry has diminished as extraction within the existing consent proceeded. The areas in arable cultivation in 1995 have remained unchanged, but additional species-poor pastures to the southeast of the existing quarry have been brought under arable cultivation. The remaining species-poor pastures remain the same, although a strip of coarse false-oat grassland with nettles<sup>3</sup> is no longer present.

<sup>2</sup> Semi-natural dry grassland facies: on calcareous substrates (*Festuco-Brometalia*)

<sup>3</sup> Community MG1b in the National Vegetation Classification.



- 7.4.5 The arable fields were and remain dominated by crop species, with only a species-poor weed flora typical of intensively farmed land. This is characterised by species such as barren brome grass (*Anisantha sterilis*), soft brome (*Bromus hordeaceus*), spear thistle (*Cirsium vulgare*), sun spurge (*Euphorbia helioscopia*), common fumitory (*Fumaria officinalis*) and field poppy (*Papaver rhoeas*). Near the edges of the crop, the flora also contains a perennial component, with plants such as creeping buttercup (*Ranunculus repens*) and occasional encroaching false oat grass (*Arrhenatherum elatius*). Where the fields are near established grassland, a small component of calcareous flora is also present at the edges, such as birdsfoot trefoil (*Lotus corniculatus*), wild carrot (*Daucus carota*) and greater knapweed (*Centaurea scabiosa*). No scarce or declining arable weed species could be found either in 1995 or in 2004.
- 7.4.6 The species-poor pastures were and remain dominated by ryegrass (*Lolium perenne*) and white clover (*Trifolium repens*) locally with rough-stalked meadow grass (*Poa trivialis*) and a variety of other grasses including cocksfoot (*Dactylis glomerata*) and Yorkshire fog (*Holcus lanatus*). The commonest herbaceous species is creeping buttercup (*Ranunculus repens*).
- 7.4.7 In 1995 a widespread scatter of other species was also present in these swards, particularly on Westbury Down. These included a strong annual component with sterile and soft bromes and lesser yellow trefoil (*Trifolium dubium*). There was also a scatter of species (mainly rare in the sward) associated with unimproved grassland, including even relatively strong indicators such as horseshoe vetch (*Hippocrepis comosa*). While the scatter of perennial species remains, the annual component is much less in evidence in those areas that have remained as pasture. This may reflect continued establishment and management of a sward that could have been relatively recent in 1995. Conversion to arable on the other hand merely reflects a typical cycle between ley grassland and arable crops.
- 7.4.8 The area of grassland awaiting existing quarry extraction was identified in the 1995 surveys as a species poor erect brome grassland<sup>4</sup>. Only ten of the 53 species indicating unimproved grasslands found in all study areas were recorded, with two of these indicating neutral (mesotrophic) grassland only, three indicating calcareous grassland and five indicating unimproved grassland in both types.
- 7.4.9 Re-survey in 2004 however revealed a mosaic of small patches of short turf within this otherwise coarse sward, perhaps generated by an increase in rabbit grazing pressure in the intervening period. These shorter patches more resemble sheep's fescue-meadow oat grass grassland<sup>5</sup>, with a characteristic richer mix of herb species bringing the indicator total to 20 in the 2004 data, with three species indicating neutral conditions, five species indicating

<sup>4</sup> Community CG3d *Bromus erectus* grassland - *Festuca rubra* - *Festuca arundinacea* subcommunity in the NVC.

<sup>5</sup> Community CG2 *Festuca ovina* - *Avenula pratensis* grassland in the NVC.

calcareous conditions and 12 of the common neutral and calcareous indicators.

- 7.4.10 The grassland is highly varied in structure and topography, with small scale hummocks and pits and locally enriched patches. This is consistent with small scale extraction and / or activities carried out by the Ministry of Defence and its predecessors some decades ago before the quarry was opened.
- 7.4.11 The foodplant of the marsh fritillary butterfly, devil's-bit scabious (*Succisa pratensis*), is however absent from this and other parts of the application site.
- 7.4.12 The quarry itself is overwhelmingly dominated by bare rock, with the buildings and plant connected with extraction and initial processing before chalk slurry is passed via the underground pipeline to the works. A few areas on the edges and where faces have not been worked for some time show the beginning of the process of colonisation, typically very rapid by chalk grassland plants. Inspection of the few areas safely accessible revealed one calcareous grassland indicator and three common indicators. There are also naturalised populations of the alien wall germander (*Teucrium chamaedrys*) on the quarry faces where these have remained unworked for a time.

#### *Wider study area*

- 7.4.13 Aside from further areas of arable land and improved pastures, land within the wider study area falling within the Salisbury Plain SSSI contains both unimproved calcareous grasslands, woodlands and scrub and mosaics of scrub and grassland.
- 7.4.14 The majority of the grasslands are species rich variants of erect brome grassland, with 22 neutral grassland, 14 calcareous grassland and 19 common indicators recorded. No nationally scarce species are recorded, but the marsh fritillary foodplant is widespread in these areas. The grassland is entirely characteristic of the special interest of the SSSI and cSAC in its composition.
- 7.4.15 Within the wider study area as opposed to other parts of Three Hundred Down nearby, there appears to have been only partial scrub clearance between 1995 and 2004. Indeed the south facing slope below Dilton Middle Down between the two wooded areas appears to be more overgrown than in 1995, with only small patches of open grassland between the scrub patches.

- 7.4.16 The woodlands are characteristic of ancient semi-natural woodland, mainly of the ash-field maple-dogs mercury woodland community<sup>6</sup>, but with a restricted woody flora in which canopy trees are few and restricted to ash (*Fraxinus excelsior*), whitebeam (*Sorbus aria*) is common although few of tall stature, and the shrub layer is dominated by hazel (*Corylus avellana*). The ground flora is rich, with a total of fourteen species regarded as indicators of ancient semi-natural woodland in southern England.

#### *Species considerations*

##### Flora

- 7.4.17 The application area, including that part which falls within the coterminous designated area, contains none of the flora or vegetation features for which the designations of SSSI and cSAC were made. The best area for species is the grassland within the current consent, but its interest is limited to 20 indicator species of unimproved conditions, none of which are nationally scarce or rare. Many are however of local distribution – the fringe of Salisbury Plain remaining exceptionally rich in such species. The most unusual single feature is the local large population of knapweed broomrape (*Orobanche elatior*).
- 7.4.18 The wider area takes the total to 55 indicator species, although none of the special rarities of Salisbury Plain appear to be present. This demonstrates a typical local contribution of the grasslands to the SSSI and cSAC interest.

##### Invertebrates

- 7.4.19 Appendix 2 lists invertebrate species recorded from both the application area and wider study areas. Of 195 species recorded from all areas, 12 are nationally scarce or rare and eleven more are of local distribution in England or locally scarce. As expected in an area that is dominated by chalk grassland, these species of interest come from a wide spectrum of invertebrate groups.
- 7.4.20 Of the 23 species of interest, only four: three local leaf beetles (*Phyllotreta atra*, *Timarcha goettingensis* and *T. tenebrosa*), and the glowworm *Lampyris noctiluca* have been recorded from the application site, all from the area of grassland within the existing quarry consent.
- 7.4.21 In particular, the marsh fritillary butterfly, which forms part of the European site interest of the cSAC, is absent from the application area. Survey in April 2004 confirmed that it is still present within the wider study area, with late-instar larvae feeding on the southeast facing slopes west of Dilton Middle Down. Although the foodplant is still present in the south-facing area south of the down, it is sparse and recent badger diggings and latrines had badly

---

<sup>6</sup> Community W8 of the NVC, with most areas referable to subcommunity W8a – *Primula vulgaris* – *Glechoma hederacea*.

damaged the remaining plants. No larvae could be found in this area, where the adult was observed in 1995.

7.4.22 In the same area where marsh fritillary larvae were found there were abundant larval feedings characteristic of the local and habitat specialist dark green fritillary (*Argynnis aglaia*) on hairy violet (*Viola hirta*).

7.4.23 The candidate SAC in this area is also of note in supporting all three species of British forester moth (*Adscita*: Zygaenidae), all of which are nationally scarce, although this is not a formal cSAC interest and only one of the species is a formal SSSI interest.

#### Reptiles and amphibians

7.4.24 There are no suitable breeding areas for amphibians on the application site or within the normal land range of amphibians from it.

7.4.25 The great majority of the application area is in active and intensive use, either in quarrying, in intensive arable use, or as close grazed pasture. Such areas are not suitable for reptile habitat and may represent partial barriers to dispersal.

7.4.26 The only exception to this is the area of unmanaged grassland within the current quarry consent, and here 50 refugia with paired corrugated metal and black material were placed on 23 March 2004 and subsequently inspected on eight occasions until late May. Initial visits revealed no animals, but from late April small numbers of both common lizard and slowworm were found beneath refuges. Maxima were three common lizards and four slowworms. However animals were present in different parts of this survey area on different occasions, indicating that the populations although likely to be small are widespread through the area.

7.4.27 Both species are also likely to be present in the wider study area, in grasslands and scrub edges within the cSAC.

#### Wintering birds

7.4.28 Results from the ten study visits are summarised in Table 7.1 below, where the study area refers to the whole bird study area.

7.4.29 The key wintering species of interest is hen harrier, being a named SPA qualifying interest. Usage of the study area was however found to be very low, with only one bird flying over on a single visit. A single additional observation was made by the quarry manager.

7.4.30 Two further species on Annex 1 of the Birds Directive were observed. Of these, single merlins were seen on two occasions only, once hunting over grassland within the SPA outside the application site. Another species was regularly present, breeding within the quarry itself.

7.4.31 The remaining species of interest are those that are on the Red and Amber lists for breeding birds in the UK<sup>7</sup>. These especially include species that might be making significant use of farmland or chalk grassland in the vicinity of the application site.

*Table 7.1 Summary of winter bird survey results*

| Species                  | Status                            | Average number seen per visit | Notes                                                                                                 |
|--------------------------|-----------------------------------|-------------------------------|-------------------------------------------------------------------------------------------------------|
| Bullfinch                | Red list, UKBAP                   | 3-5                           | Normally seen in the coppice and woodland to the south of the study area                              |
| Common gull              | Amber list                        | 1-2                           | Occasionally seen, often flying over the site                                                         |
| Corn bunting             | Red list, UKBAP                   | 1-3                           | Recorded in small numbers throughout the study area                                                   |
| Dunnoch                  | Amber list                        | +20                           | Found throughout the study area                                                                       |
| Fieldfare                | Amber list, Schedule 1            | 10-20                         | Numbers generally increased as winter progressed                                                      |
| Great spotted woodpecker | Amber                             | 3-5                           | Recorded on several visits in woodland in the southwest of the study area                             |
| Green woodpecker         | Amber                             | 3-5                           | All records were from the southern end of the study area                                              |
| Hen harrier              | Red list, Schedule 1, SPA Annex 1 | 1                             | Only recorded during one visit                                                                        |
| Kestrel                  | Amber list                        | 1                             | Occasional registrations throughout the study area                                                    |
| Linnet                   | Red list, UKBAP                   | +100                          | Large flocks generally located in scrub and rough grassland to the east of the study area.            |
| Marsh tit                | Red list                          | 5-10                          | Predominately recorded from woodland to the south of the study area                                   |
| Meadow pipit             | Amber list                        | 5-10                          | Predominately located in the north-eastern corner of the study area                                   |
| Merlin                   | Amber list, Schedule 1, Annex 1   | 1                             | Recorded on two separate visits, during one of which was seen to be hunting                           |
| Mistle thrush            | Amber list                        | 1                             | A single registration, in February of 2004, but suitable habitat occurs across much of the study area |
| Raven                    |                                   | 2                             | Regularly seen during visits but never in large numbers                                               |
| Reed bunting             | Red list, UKBAP                   | 5                             | Predominately located in the grassland in the north of the study area                                 |
| Skylark                  | Red list, UKBAP                   | +50                           | Recorded from across the study area in small flocks or individuals, noted to be                       |

<sup>7</sup> Gregory RD, Wilkinson NI, Noble DG, Robinson JA, Brown AF, Hughes J, Procter DA, Gibbons DW and Galbraith CA (2002) *The population status of birds in the United Kingdom, Channel Islands and Isle of Man: an analysis of conservation concern 2002 – 2007*. British Birds 95: 410-450.

| Species      | Status     | Average number seen per visit | Notes                                                              |
|--------------|------------|-------------------------------|--------------------------------------------------------------------|
|              |            |                               | singing towards to the end of the survey above grasslands          |
| Song thrush  | Red list   | 5-10                          | Recorded across the study area                                     |
| Starling     | Red list   | +25                           | Found in moderate flocks on rough grassland                        |
| Stonechat    | Amber list | 2                             | Occasionally recorded from the site, but would appear to be a pair |
| Yellowhammer | Red list   | +20                           | Recorded from throughout the study area                            |

- 7.4.32 The majority of such species listed within Table 7.1 are passerines (small perching birds) of scrub habitats or gulls, which collectively are unlikely to be affected by the quarry. However species using the farmland habitats within the application site in winter include good numbers of linnet, skylark and yellowhammer and small numbers of corn bunting and reed bunting.

#### Breeding birds

- 7.4.33 Table 7.2 summarises the results of breeding bird species over the whole study area. The survey area is split into 6 sections as follows, with Quarry, North End and Open Hill being in effect the existing quarry and application site and the other areas being the wider study area.

- 'Quarry' refers to the quarry itself but not the boundaries of the quarry.
- 'North End' refers to the area to the north of the quarry adjacent to the military checkpoint, i.e. the arable fields to the north.
- 'Quarry South Boundary' refers to the planted landscape screen at the south-west boundary of the quarry and the rough grassland within the existing consented area,
- 'West Boundary' includes the hedgerows and track running the length of the west boundary and the fields immediately to the east leading up to but not including the southern (wooded) valley.
- 'Valley' refers to the woodland, grassland and scrub mosaic within the coombes of the cSAC and SPA.
- 'Open Hill' refers to the main area of species-poor grassland southwest of the quarry.

- 7.4.34 The table is arranged in descending order with the status of the species concerned, starting with species on Annex 1 of the Birds Directive (A1) and / or Schedule 1 of the Wildlife and Countryside Act, followed by species that are Red List birds of conservation concern (r).

Table 7.2: Summary of breeding bird results

| Status | Species                  | Quarry | North End | Quarry South Boundary | West Boundary | Valley | Open Hill |
|--------|--------------------------|--------|-----------|-----------------------|---------------|--------|-----------|
| l      | Barn Owl                 |        |           |                       |               | 1*     |           |
| r      | Bullfinch                |        |           | ?                     |               |        |           |
| r      | Grasshopper Warbler      |        |           | 1                     |               | 1      |           |
| r      | House Sparrow            |        |           |                       | ?             |        |           |
| r      | Linnet                   |        | 4         |                       |               | 1+     |           |
| r      | Marsh Tit                |        |           |                       |               | 3+     |           |
| r      | Reed Bunting             |        | ?         |                       |               |        |           |
| r      | Skylark                  |        | 6         |                       |               |        |           |
| r      | Song Thrush              |        |           |                       | 1             | 3      |           |
| r      | Starling                 |        | ?         |                       | ?             |        |           |
| r      | Yellowhammer             |        | 2         |                       | 1             | 3      |           |
| -      | Blackbird                |        | 4         | 2                     | 4             | 4      |           |
| -      | Blackcap                 |        |           |                       |               | 3      |           |
| -      | Blue Tit                 |        |           |                       |               | 6+     |           |
| -      | Buzzard                  |        |           |                       |               | 1      |           |
| -      | Carrion Crow             |        |           |                       | 1             | 1      |           |
| -      | Chaffinch                |        | 3         | 1                     | 5             | 6+     |           |
| -      | Chiffchaff               |        |           |                       |               | 1      |           |
| -      | Coal Tit                 |        |           |                       |               | 2      |           |
| -      | Cuckoo                   |        |           |                       |               | 1      |           |
| -      | Duncock                  |        | 1+        |                       |               | 2+     |           |
| -      | Garden Warbler           |        |           |                       | 1             | 1      |           |
| -      | Goldcrest                |        |           |                       |               | 3+     |           |
| -      | Goldfinch                |        |           | 1                     | 3             | 2      |           |
| -      | Great Spotted Woodpecker |        |           |                       |               | 1      |           |
| -      | Great tit                |        | 2         |                       |               | 10+    |           |
| -      | Green Woodpecker         |        |           |                       |               | 1      |           |
| -      | Greenfinch               |        | 2         |                       | 5             | 2+     |           |
| -      | Herring Gull             |        |           |                       | 10*           |        |           |
| -      | Jackdaw                  |        | 10*       |                       |               | 20*    |           |
| -      | Jay                      |        |           |                       |               | 1+     |           |
| -      | Kestrel                  |        | 1         |                       |               |        |           |
| -      | Lesser Black-backed Gull |        |           |                       | 20            |        |           |
| -      | Long-tailed Tit          |        |           |                       |               | 2+     |           |
| -      | Magpie                   |        |           | 1                     |               | 2      |           |
| -      | Meadow Pipit             |        | 1         |                       | 2             | 5      | 2         |
| -      | Nuthatch                 |        |           |                       |               | 1      |           |
| -      | Pheasant                 |        |           |                       |               | 2+     |           |
| -      | Pied Wagtail             |        |           |                       | 1             |        |           |
| -      | Raven                    | 1      |           |                       |               |        |           |
| -      | Robin                    |        | 2+        |                       | 4             | 7      |           |
| -      | Rook                     |        | 20*       |                       |               | 50*    |           |
| -      | Stonechat                |        |           |                       |               | 3      |           |
| -      | Swallow                  | 1+     |           |                       |               |        |           |
| -      | Swift                    | 4*     |           |                       |               |        |           |



| Status | Species        | Quarry | North<br>End | Quarry<br>South<br>Boundary | West<br>Boundary | Valley | Open<br>Hill |
|--------|----------------|--------|--------------|-----------------------------|------------------|--------|--------------|
| -      | Treecreeper    |        |              |                             |                  | 1      |              |
| -      | Wheatear       |        | 1            |                             |                  |        |              |
| -      | Whinchat       |        |              |                             |                  | 1      |              |
| -      | Whitethroat    |        | 7            | 3                           | 4                | 7      |              |
| -      | Willow Warbler |        | 1            |                             |                  | 6+     |              |
| -      | Woodpigeon     |        | 2            | 2                           | 2                | 6+     |              |
| -      | Wren           |        | 5            |                             | 3                | 6      |              |

Note: Counts refer to numbers of pairs, except: marked with an '\*' refer to non-breeding birds recorded and not pairs. '?' refers to species thought to be possibly breeding but for which no evidence (using standard CBC methods) that they actually were breeding could be found.

7.4.35 Barn owls breed within the SPA just outside the survey area, but use the chalk grasslands for foraging.

7.4.36 Within the application area, the only other species of special interest breeding are farmland birds of conservation concern: linnet, skylark and yellowhammer with one pair of grasshopper warbler within the rough grassland of the existing consent area.

7.4.37 There was no evidence of nearby breeding of birds that form the SPA breeding interest, i.e. stone curlew, hobby and quail, the last two as migratory species. This confirms the 1995 results and also anecdotal reports via Defence Estates.

### Mammals

7.4.38 The only specially protected mammal species recorded from the site or for which suitable habitat exists within the application area is badger. These animals have been subject to specialist studies for some years. Activities appear to have increased since 1995, indeed in one area to the likely detriment of marsh fritillary butterfly habitat ("Invertebrates" above).

7.4.39 As of spring 2004, badgers move throughout the site. Precise locations are not given to avoid knowledge coming into the hands of those inimical to the animals. However one complex of active setts including an extensive main sett lies within the existing consented area for the quarry.

## 7.5 EVALUATION

### *Evaluation methodology*

7.5.1 The basis for the evaluation of the ecological interest of the site is the application of Ratcliffe's criteria<sup>8</sup>. Primarily these are size, diversity,

<sup>8</sup> Ratcliffe (1977) 'A Nature Conservation Review'. Current SSSI selection procedure is based partly on the application of Ratcliffe's criteria and many non-statutory designation systems follow the same framework.

naturalness, rarity, fragility and typicalness although additional secondary criteria of potential value, intrinsic appeal and position within the ecological or geographical unit may be taken into account if they make a special contribution to the site's interest.

- 7.5.2 Supplementary to the application of Ratcliffe's criteria is the consideration of the conservation status and/or legal protection afforded to individual species or habitats, or of the collective significance of species assemblages. Such factors are material to the assessment of whether a site has 'substantive value' to nature conservation, in accordance with the guidance set out in paragraph 18 of PPG9<sup>9</sup>.
- 7.5.3 Legal protection is defined primarily by reference to the Wildlife and Countryside Act 1981 and its various amendments; the Conservation (Natural Habitats &c) Regulations 1994 and as amended in 2000, which implement the European Habitats Directive and where relevant the Protection of Badgers Act 1992.
- 7.5.4 Conservation status for most species is defined by reference to the Red Data Book system<sup>10</sup> or for birds by reference to the Red and Amber lists of species as updated to BTO consortium (2001)<sup>11</sup> which take additional account of long term population trends. Species or habitats identified as priorities for conservation action may also be subject to national or local Biodiversity Action Plans<sup>12</sup>. These received a statutory basis with the passing of the Countryside and Rights of Way Act 2000. Government departments and agencies are now required to have regard to the conservation of biodiversity in the exercise of their functions.

#### *Site evaluations*

- 7.5.5 The land with the contiguous designations of SSSI, cSAC and SPA in Salisbury Plain is of acknowledged international importance for nature conservation. Habitats that make a full contribution to the special interests of the SSSI and cSAC also lie within the wider study area examined in this section of the ES. However the small areas of designated land that lie within the application site contain none of the features for which the SSSI, cSAC or SPA were designated and do not make a significant contribution to the designated sites. Likewise the use of even the wider study area by the birds that form the SPA qualifying interest is minimal, being restricted to occasional passes by a wintering hen harrier.

<sup>9</sup> Department of the Environment: 'Planning Policy Guidance Note 9 - Nature Conservation' HMSO 1994

<sup>10</sup> Following the British Red Data Books published by the JNCC/RSNC and the Nationally Notable (Nationally Scarce) categorisations recognised by the JNCC

<sup>11</sup> 'The population status of birds in the UK: birds of conservation concern 2002-2007.

<sup>12</sup> The UK Biodiversity Action Plan (UKBAP) was published by the Government in 1994 as a response to its commitments as a signatory to the 1992 International Treaty on the Conservation of Biological Diversity. Local BAPs have been produced by organisations such as The Wildlife Trusts and Local Authorities to define local priorities and mechanisms for the conservation of target species and habitats.

- 7.5.6 Accordingly the value of the designated portion of the application site to all Salisbury Plain designated areas, and that of the wider study area to the SPA interest, is limited to any potential for future use. In the case of European sites, this potential has a higher profile than under the Ratcliffe system because of the requirements of the Habitats Directive to restore value where it is not there. Nevertheless the contribution of these areas to their respective designations is strictly limited.
- 7.5.7 Remaining features within the application area that do not have minimal value are limited to issues of local biodiversity and to relatively common but protected species. These are an area of disturbed grassland supporting a moderate range of plant and invertebrate species characteristic of chalk grassland, with common reptiles and a badger sett, support in the quarry for a nesting pair of a specially protected bird, and usage of parts of the intensive farmland by birds that are of conservation concern but do not form part of the qualifying interest of the SPA.
- 7.5.8 The grassland with its associated fauna is commonplace in the immediate local context, but this is unusual given the proximity of much larger and better areas of this habitat in the Bratton Downs and Salisbury Plain SSSIs. In a wider but still local context chalk grassland, even when partly disturbed and lacking its full diversity, is a scarce resource supporting a good range of native species. Accordingly it is judged to be of moderate value on the immediately local scale. Partly protected reptiles, and badgers, impose legal obligations that must be met but given that the species are not scarce do not increase the level of nature conservation value over this.
- 7.5.9 The farmland within the application site supports a relatively good range of declining and therefore Red / Amber List farmland birds, with relatively good numbers of skylark and yellowhammer. Use by components of this fauna occurs in both the breeding season and in winter. Salisbury Plain with its network of less intensive farmland as well as unimproved downland areas typically supports high densities of many of these birds, so the site is of small value in this context. More importantly, these bird species are capable of rapid response to changes in farming practice that favour them, just as they responded by rapid declines to changes that were inimical. Overall the assembly is judged to be of minor local value.
- 7.5.10 The presence of a regularly breeding pair of a Schedule 1 bird species in the quarry that also remain during the winter is however considered to be of high local value.

## 7.6 FUTURE UNDER THE STATUS QUO

- 7.6.1 If the consent being sought was not granted, then the current consent for extraction would continue to be implemented until completion. This would

mean that a similar level of operations in the quarry would continue, until the reserves were worked out.

- 7.6.2 Of the features identified as of substantive ecological value in section 7.6 above, the Schedule 1 bird species would remain as at present as ample areas of habitat would remain. Farmland birds would, as at present, continue to be subject to the vagaries of cropping and land use dictated by farm economics: the future of those species that use land outside the SPA would remain uncertain. The grassland within the current consent area of moderate local value would be removed, with protection afforded only to the legal requirement for translocation of badgers and common reptiles: it is understood that plans are in progress and will be agreed with English Nature for the movement of the badger setts by virtue of the current planning permission.
- 7.6.3 Due to the requirements of the Habitats Directive, it must be assumed that efforts would be made to restore features of value in designated land where they were absent. This is unlikely to cause any increase in use by the SPA interest bird species because the main habitat areas in the vicinity of the site are not particularly suitable especially for stone curlew and instead support chalk grassland habitats and marsh fritillary butterflies that are cSAC interests. It is more likely that the restoration of the small areas of designated land at present in intensive farmland would focus on extending the local grassland habitats rather than on providing habitat for the SPA interest birds.
- 7.6.4 There is no requirement for restoration of the quarry under the current consent to provide any particular benefit for biodiversity. Instead, it is required to be returned to the control of Defence Estates for whatever purpose they may see fit at the time.

## 7.7 IMPACTS BEFORE MITIGATION

- 7.7.2 Quarrying within the application area would remove the grassland with its reptiles and badgers. However in practice this, and the legal requirements for the protected species concerned, is likely to be implemented under the current consent before the new consent came into play. Removal of the grassland itself would however cause a moderate impact significant at the local scale, and mitigation for this is recommended, for which there is no provision under the current consent.
- 7.7.3 The extension application would also remove approximately half of the local area used by declining farmland birds, an assembly of minor local value. Mitigation by reduction of this impact is not feasible in principle, and the loss might happen in any case if local farming practices changed, but compensation by management of alternative habitat is nevertheless recommended if possible.

- 7.7.4 The extension and its restoration have been designed to retain cliffs as well as restored slopes in order to cater for the full variety of habitats needed.
- 7.7.5 No other direct impacts would occur on features of substantive value for ecology or biodiversity.
- 7.7.6 A small strip of land currently in intensive farming would however be disturbed within the SSSI and European sites' boundary. This would replace intensively farmed land by initially bare cliff face and then restored slope. Given the restoration proposals, the greatest impact this would cause would be a possible delay in restoration of what might be chalk grassland restoration. However it is noted that the skeletal soils produced by quarry restoration would be a better substrate for grassland restoration than is farmland that has had the full range of intensive agricultural inputs. Overall, the impact of land take is not likely to have a significant effect on the European designations or the SSSI interests.
- 7.7.7 The restoration proposals have become, through an iterative process of negotiation with the planning authority, English Nature and other interested parties, an integral part of the scheme design. They are however described from an ecological viewpoint under "Mitigation" below, as they are the main means by which any impacts of development on ecology will be mitigated and / or compensated for.
- 7.7.8 With respect to indirect or off-site impacts, the proposals have been designed to avoid any impacts on hydrology that might give rise to effects remote from the operation. Likewise, emissions of dust, noise and other atmospheric emissions will be controlled at least as well as at present (Chapters 6 and 12), so significant impacts will not occur. There is also no requirement from the proposals for changes to the pipeline or its operation that might affect the Bratton Downs SSSI.
- 7.7.9 Birds forming the SPA interest do not make significant use of habitats within the wider study area that was chosen to encompass land that might suffer any indirect disturbance from the extended operations. This lack of usage is consistent with the habitat requirements of the species, so needs no explanation from current quarry operations. Indeed, the presence of one Schedule 1 species breeding and the occasional use (at the low level that might be expected on habitat grounds) by hen harrier and merlin, suggests that potentially sensitive species do not avoid the quarry.

## 7.8 MITIGATION

- 7.8.1 The mitigation proposals include means of ensuring that badgers and common reptiles are not harmed (as with the current consent), making the best use of grassland with typical chalk grassland species affected by the current consent, and ensuring that quarry restoration provides a

comprehensive package directed at conserving and enhancing local biodiversity.

- 7.8.2 Badgers will be accommodated as under the present plans by translocation to an appropriate new sett as determined in consultation with English Nature and any other interested parties.
- 7.8.3 Prior to disturbance of the grassland area within the existing consent, it will be enclosed within a reptile-proof fence and animals caught and rescued according to HGBI guidelines. They will be placed in areas of the quarry perimeter and elsewhere that are the same in current and extension proposals, to avoid double handling. Given the low density population present, an extensive special new area is not considered necessary, but habitat enhancement will be carried out as necessary using turf covered chalk rubble banks to assist basking and hibernation. Eventually reptiles would be allowed to spread into the restored quarry area.
- 7.8.4 Turf from the same grassland area would likewise be best used to kick-start restoration after storage in temporary use as turf banks around the perimeter. The vegetation is not an ancient semi-natural community and currently would have no special treatment, but it contains a useful reservoir of species for recolonisation.
- 7.8.5 Restoration proposals (Drawing TD-WH032 and Chapter 4) are designed to produce chalk grassland areas in a mosaic with retained banks and cliffs, at a variety of aspects. Bottom topography is designed to provide flat areas and hollows likely to hold water temporarily, although the design to avoid the water table is not compatible with permanent water bodies (none occur at present). Management, likely to involve grazing by domestic stock, will be designed to allow a small amount of sheltering scrub pockets to develop naturally, although the best mixture for chalk grassland development would be limited to 10-15% of scrub. In detail, management would be the subject of a full management plan drawn up in agreement with interested parties, secured by an appropriate planning obligation.
- 7.8.6 In order to take advantage of the rapid natural regeneration of chalk grassland species on the skeletal soils produced after quarrying, inputs of for example fertiliser and reseedling other than with a low vigour nurse mixture have been carefully limited to the few areas where rapid development of landscape and visual screening is essential (Chapter 5).
- 7.8.7 Public access to the restored land will not be encouraged.

## 7.9 RESIDUAL IMPACTS

- 7.9.2 Badger and reptile translocation will be required to be carried out in a manner that does not harm the animals. In both cases, proper procedure has a good track record of success. Employment of suitably experienced personnel

would be required and in the case of badgers, secured under the licensing process with English Nature. The long-term impact on badgers is likely to be neutral and on reptiles highly positive, with significant new areas of reptile habitat being made available in the restoration scheme.

- 7.9.3 Grassland of moderate local value would be removed as in the current consent. This would be an impact of medium significance on the local scale. However it would be outweighed in the long term by new grassland formation in the restoration area.
- 7.9.4 No residual impact on Schedule 1 breeding birds is anticipated, as suitable habitat will be present throughout and secured during restoration.
- 7.9.5 There remains a risk of a minor local impact on farmland birds of conservation concern. However these species' future is uncertain in any case outside the SPA. Also, some species will be able to take advantage of developing grassland in the restoration area, which provide some compensation in the long term. The impact is at most of minor local significance and there may even be a net benefit in the medium to long term.
- 7.9.6 No significant impact will occur on birds that form the special interest of the SPA. It is possible that some species, even stone curlew in early successional stages in the restoration floor, may be able to take advantage of the restoration scheme. In principle, management of the floor could even be directed at this species. However the potential benefit of extending cSAC habitats through restoration is judged to be greater and accordingly the restoration is targeted at a more mature grassland habitat than these birds require.
- 7.9.7 Development of a flora and fauna characteristic of chalk grasslands on the skeletal soils of former quarries is typically rapid, especially with good sources for colonisation nearby. It typically takes only decades for a substantial community to develop rather than the century or more needed on ex-arable soils. It is limited only by the need to manage the natural process of succession to scrub, which is catered for in the restoration scheme. The prognosis for success is very good and will in the long term produce a substantial area of extension contiguous with the SSSI and cSAC of Salisbury Plain, also providing an additional habitat link between this area and the Bratton Downs SSSI. This is likely to produce a substantial benefit to the local part of the internationally important site.

Blue  
outline

Green  
line

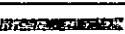
Red  
line

Blue  
outline

GREEN  
LINE

GREEN  
LINE

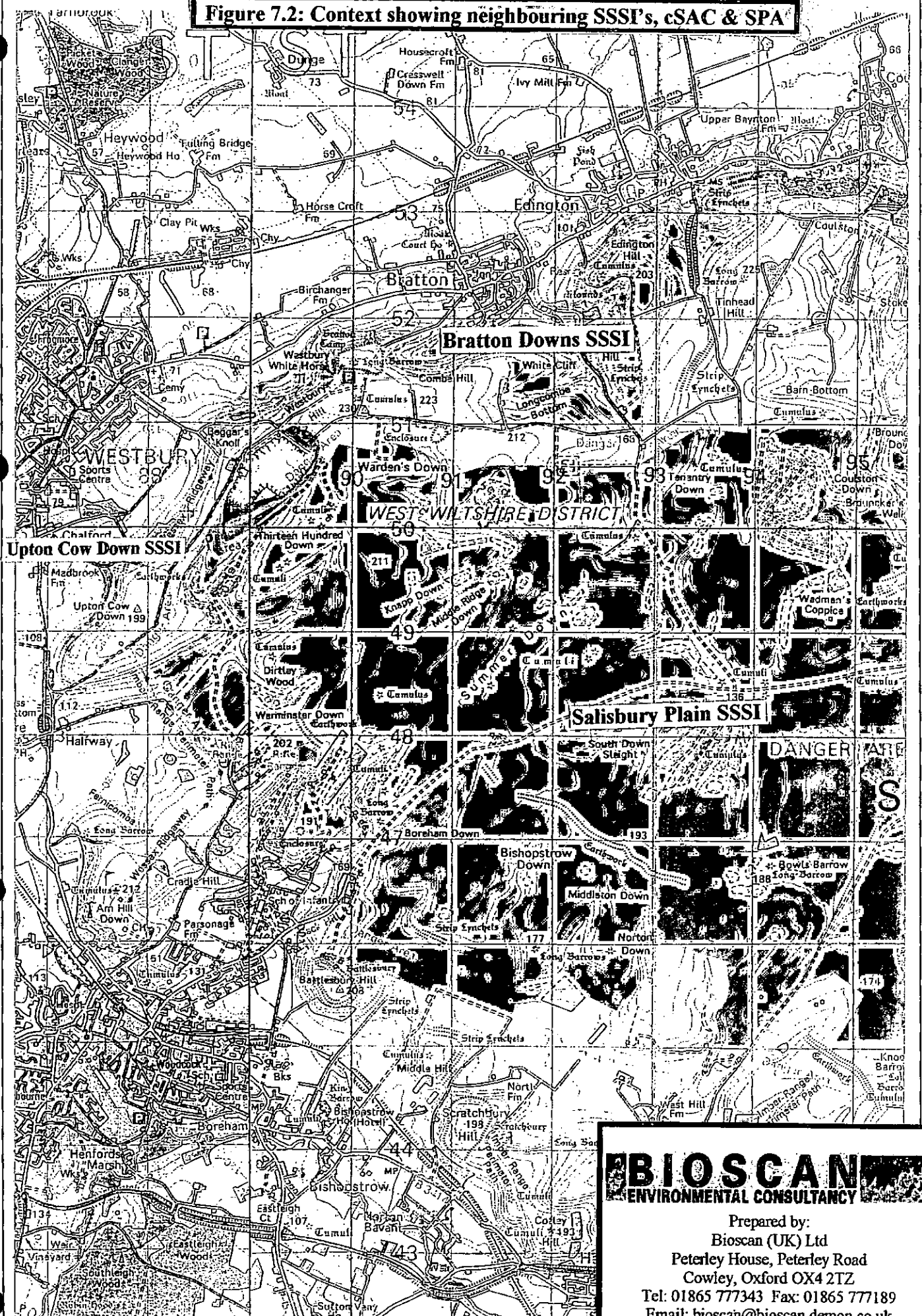
RED  
LINE

|                                                                                                                                                                          |                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Westbury Quarry                                                                                                                                                          |                     |
| Figure 7.1: Study areas                                                                                                                                                  |                     |
|                                                                                     |                     |
| Prepared by:<br>Bioscan (UK) Ltd<br>Peterley House, Peterley Road<br>Cowley, Oxford OX4 2TZ<br>Tel: 01865 777343 Fax: 01865 777189<br>Email: bioscan@bioscan.demon.co.uk |                     |
| Key                                                                                                                                                                      | E1247F7.1           |
|                                                                                     | Application area    |
|                                                                                     | Habitats study area |
|                                                                                     | Bird study area     |



# Westbury Quarry

Figure 7.2: Context showing neighbouring SSSI's, cSAC & SPA

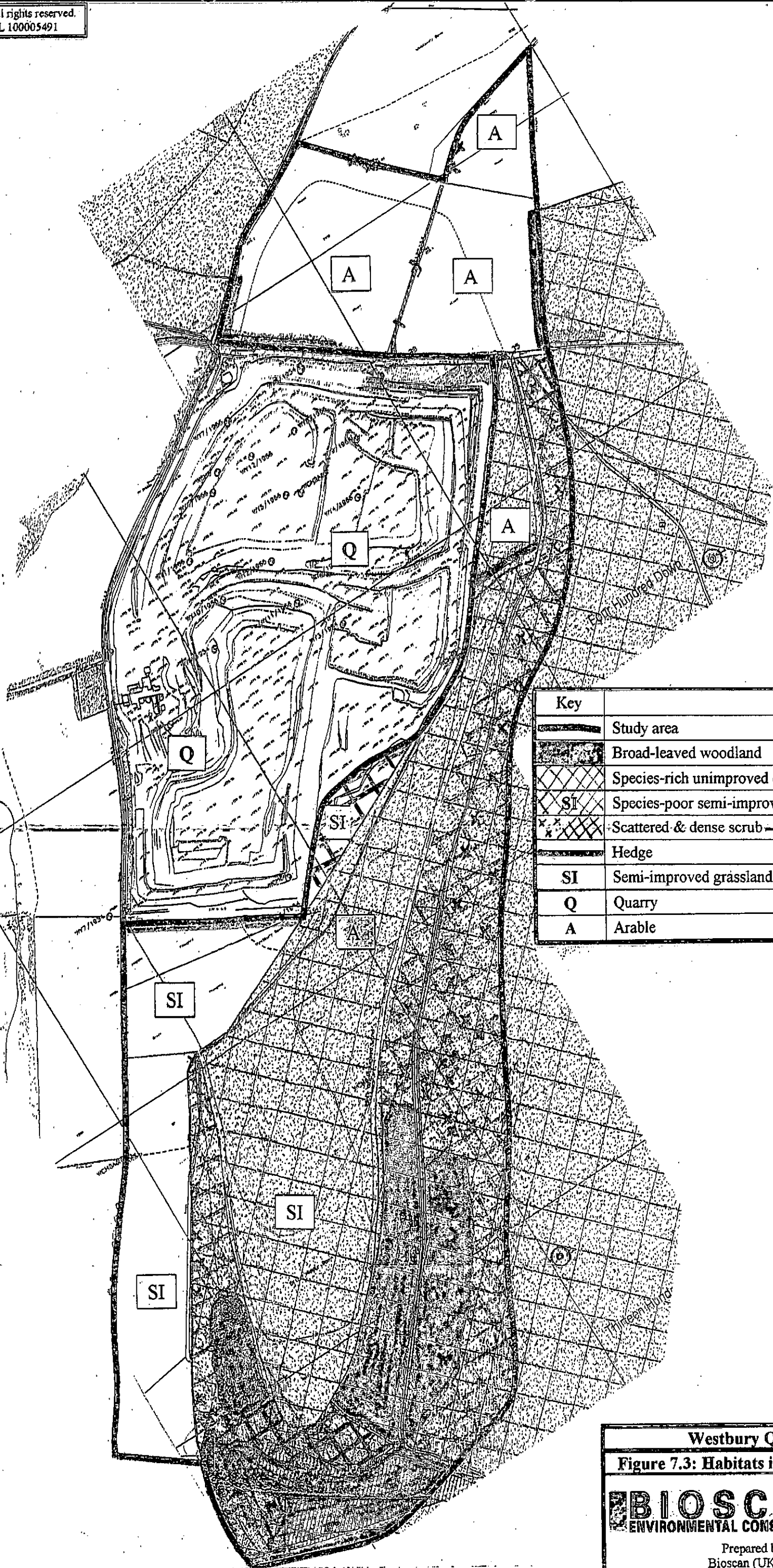


**BIOSCAN**  
ENVIRONMENTAL CONSULTANCY

Prepared by:  
Bioscan (UK) Ltd  
Peterley House, Peterley Road  
Cowley, Oxford OX4 2TZ  
Tel: 01865 777343 Fax: 01865 777189  
Email: bioscan@bioscan.demon.co.uk

|                  |           |
|------------------|-----------|
| Key              | E1247F7.2 |
| Application site |           |
| SSSI's           |           |

© Crown Copyright. All rights reserved.  
Licence number AL 100005491



| Key |                                                 |
|-----|-------------------------------------------------|
|     | Study area                                      |
|     | Broad-leaved woodland                           |
|     | Species-rich unimproved calcareous grassland    |
| SI  | Species-poor semi-improved calcareous grassland |
|     | Scattered & dense scrub                         |
|     | Hedge                                           |
| SI  | Semi-improved grassland                         |
| Q   | Quarry                                          |
| A   | Arable                                          |

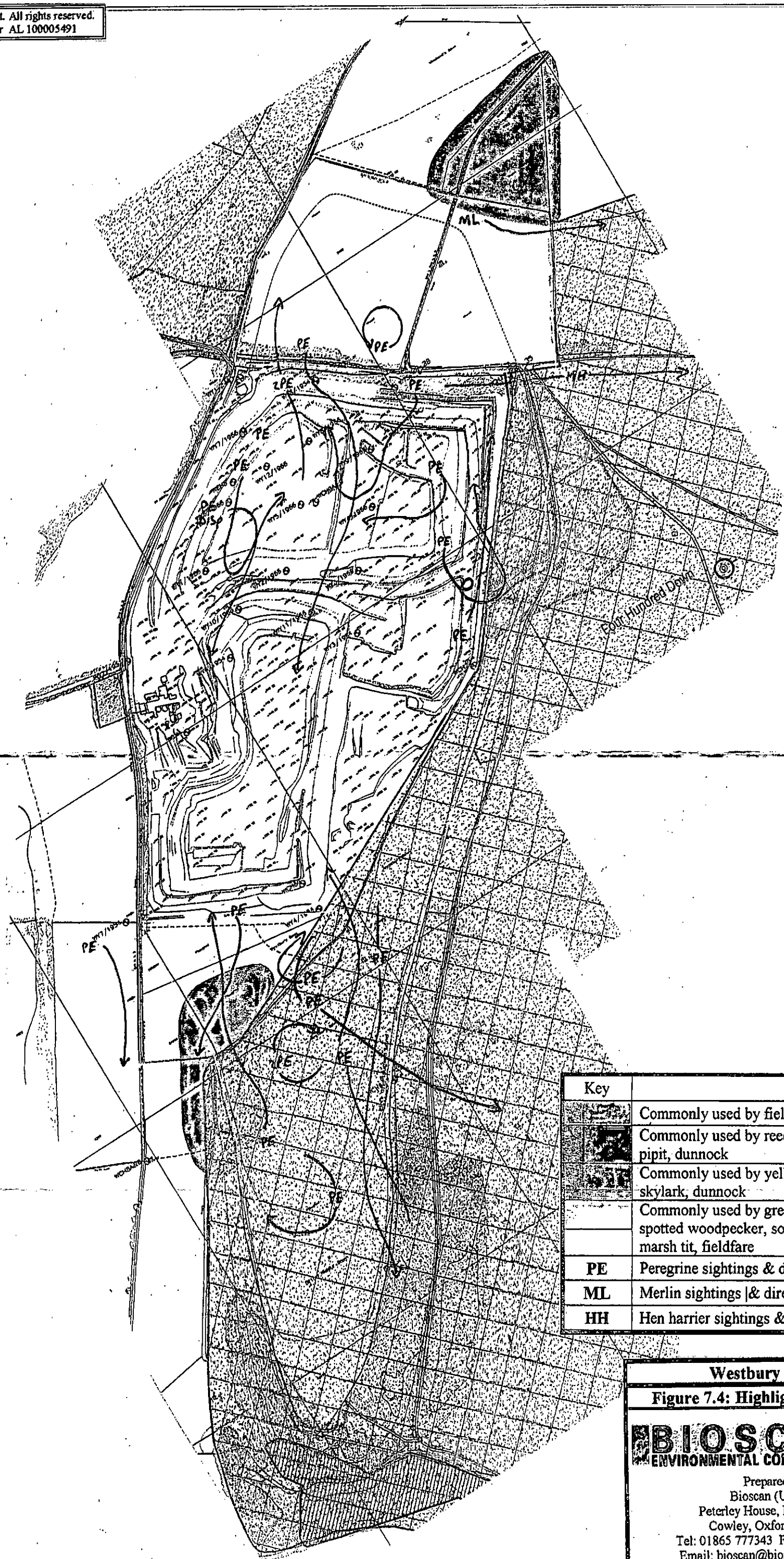
Westbury Quarry

Figure 7.3: Habitats in the study area

**BIOSCAN**  
ENVIRONMENTAL CONSULTANCY

Prepared by:  
Bioscan (UK) Ltd  
Peterley House, Peterley Road  
Cowley, Oxford OX4 2TZ  
Tel: 01865 777343 Fax: 01865 777189  
Email: bioscan@bioscan.demon.co.uk

E1247F7.3



| Key |                                                                                                           |
|-----|-----------------------------------------------------------------------------------------------------------|
|     | Commonly used by fieldfare, song thrush                                                                   |
|     | Commonly used by reed bunting, meadow pipit, dunnock                                                      |
|     | Commonly used by yellowhammer, linnet, skylark, dunnock                                                   |
|     | Commonly used by green woodpecker, great spotted woodpecker, song thrush, bullfinch, marsh tit, fieldfare |
| PE  | Peregrine sightings & direction of flight                                                                 |
| ML  | Merlin sightings & direction of flight                                                                    |
| HH  | Hen harrier sightings & direction of flight                                                               |

Westbury Quarry

Figure 7.4: Highlighted bird areas

**BIOSCAN**  
ENVIRONMENTAL CONSULTANCY

Prepared by:  
Bioscan (UK) Ltd  
Peterley House, Peterley Road  
Cowley, Oxford OX4 2TZ  
Tel: 01865 777343 Fax: 01865 777189  
Email: bioscan@bioscan.demon.co.uk

E1247F7.4

**Appendix 7.1**  
Flora of the Study Area





[illegible]

| Latin name                   | English name          | Trees | G1   | G2   | G3 | G4 | G5   | G6 | G6 2004 | A | Arable 04 | Quarry | W1  | W2  | H  | G7   | MESO | CALC | AWVI(S) | Alien |
|------------------------------|-----------------------|-------|------|------|----|----|------|----|---------|---|-----------|--------|-----|-----|----|------|------|------|---------|-------|
| <i>Cirsium arvense</i>       | Creeping thistle      | 7     | o-lf |      | f  |    | o    |    | y       | o | y         |        |     |     |    | o-lf |      |      |         |       |
| <i>Cirsium eriophorum</i>    | Woolly thistle        | 6     | o-lf | r    | r  | r  | o    |    |         | r |           |        |     |     |    |      |      |      |         |       |
| <i>Cirsium vulgare</i>       | Spear thistle         | 7     | o-lf |      | r  | lf |      |    |         | o | y         | y      |     |     | o  |      |      |      |         |       |
| <i>Clematis vitalba</i>      | Old man's beard       | 1     |      |      |    |    |      |    |         |   |           |        |     |     | o  |      |      |      |         |       |
| <i>Clinopodium vulgare</i>   | Wild basil            | 3     |      | o-lf |    | f  | o    |    |         |   |           |        |     |     |    |      |      | 2    |         |       |
| <i>Conopodium majus</i>      | Pignut                | 1     |      |      |    |    |      |    |         |   |           |        | o   |     |    |      | 1    |      | 1       |       |
| <i>Cornus sanguinea</i>      | Dogwood               | 1     |      |      |    |    |      |    |         |   |           |        |     | r   |    |      |      |      |         |       |
| <i>Corylus avellana</i>      | Hazel                 | 4     |      | o    |    | f  |      |    |         |   |           |        | a-d | a-d |    |      |      |      |         |       |
| <i>Crataegus monogyna</i>    | Hawthorn              | 8     | r-lo | o    | f  | f  | o    | y  |         |   |           |        |     | o   | f  |      |      |      |         |       |
| <i>Crepis capillaris</i>     | Smooth hawksbeard     | 1     | r    |      |    |    |      |    |         |   |           |        |     |     |    |      |      |      |         |       |
| <i>Crepis vesicaria</i>      | Beaked hawksbeard     | 5     | lf   |      |    |    | r    |    |         | r | y         |        |     |     |    | o    |      |      |         |       |
| <i>Cynosurus cristatus</i>   | Crested dogtail       | 1     | o    |      |    |    |      |    |         |   |           |        |     |     |    |      |      |      |         |       |
| <i>Dactylis glomerata</i>    | Cocksfoot             | 9     | f    | o-lf | lf | lf | la   | y  | lf      |   |           | y      |     |     | lf |      |      |      |         |       |
| <i>Dactylorhiza fuchsii</i>  | Common spotted orchid | 2     |      | r    |    |    |      | y  |         |   |           |        |     |     |    |      | 1    | 2    |         |       |
| <i>Daucus carota</i>         | Wild carrot           | 7     | f    | o    | o  | o  | y    |    |         |   | y         |        |     |     |    | o    |      | 2    |         |       |
| <i>Elytrigia repens</i>      | Couch grass           | 4     | o    | r    |    |    |      | y  |         |   |           |        |     |     |    | lf   |      |      |         |       |
| <i>Erigeron acer</i>         | Blue fleabane         | 1     |      |      |    |    |      |    |         |   |           | y      |     |     |    |      |      |      |         |       |
| <i>Erophila verna</i>        | Common Whitlowgrass   | 1     | r    |      |    |    |      |    |         |   |           |        |     |     |    |      |      |      |         |       |
| <i>Euphorbia helioscopia</i> | Sun spurge            | 2     |      |      |    |    |      |    | r       | y |           |        |     |     |    |      |      |      |         |       |
| <i>Eurynchium praelongum</i> | A moss                | 3     | o    |      |    | f  |      |    |         |   |           |        |     | f   |    |      |      |      |         |       |
| <i>Fagus sylvatica</i>       | Beech                 | 1     |      |      | r  |    |      |    |         |   |           |        |     |     |    |      |      |      |         |       |
| <i>Festuca arundinacea</i>   | Tall fescue           | 1     |      | r    |    |    |      |    |         |   |           |        |     |     |    |      |      |      |         |       |
| <i>Festuca ovina</i>         | Sheeps fescue         | 6     | r    | f    | f  | o  |      | y  |         |   |           | y      |     |     |    |      |      |      |         |       |
| <i>Festuca pratensis</i>     | Meadow fescue         | 1     |      | r    |    |    |      |    |         |   |           |        |     |     |    |      |      |      |         |       |
| <i>Festuca rubra</i>         | Red fescue            | 6     | lf   |      | f  | f  | a-lf | y  |         |   |           | y      |     |     |    | lf   |      |      |         |       |
| <i>Filipendula vulgaris</i>  | Dropwort              | 2     | o    |      | lf |    |      |    |         |   |           |        |     |     |    |      | 2    |      |         |       |

[illegible]



[illegible]

| Latin name                      | English name        | Trees | G1   | G2   | G3 | G4   | G5 | G6 | G6 2004 | A  | Arable 04 | Quarry | W1   | W2   | H  | G7 | MESO | CALC | AWVI(S) | Alien |
|---------------------------------|---------------------|-------|------|------|----|------|----|----|---------|----|-----------|--------|------|------|----|----|------|------|---------|-------|
| <i>Poa trivialis</i>            | Rough meadow grass  | 7     | la   |      | f  |      |    |    |         | lf | y         | o      | f    | lf   |    |    |      |      |         |       |
| <i>Polygala calcarea</i>        | Chalk milkwort      | 2     |      | r    |    |      |    | r  |         |    |           |        |      |      |    |    |      |      |         |       |
| <i>Polygala vulgaris</i>        | Common milkwort     | 4     |      | r    |    | o    | o  |    | y       |    |           |        |      |      |    |    | 2    | 2    |         |       |
| <i>Potentilla anserina</i>      | Silverweed          | 5     |      |      | lf |      | lo | o  | y       | o  |           |        |      |      |    |    |      |      |         |       |
| <i>Potentilla reptans</i>       | Creeping cinquefoil | 1     |      | r    |    |      |    |    |         |    |           |        |      |      |    |    |      |      |         |       |
| <i>Potentilla sterilis</i>      | Barren strawberry   | 2     |      |      |    |      |    |    |         |    |           |        |      | o    | o  |    |      |      | 1       |       |
| <i>Primula veris</i>            | Cowslip             | 10    | o-lf | f    |    | f    | o  | lf | y       | r  | y         | f      | lo   | lo   |    |    | 2    |      |         |       |
| <i>Primula vulgaris</i>         | Primrose            | 2     |      |      |    |      |    |    |         |    |           | f      | lo   | lo   |    |    | 2    |      | 1       |       |
| <i>Primula x polyantha</i>      | False oxlip         | 2     |      |      |    |      |    |    |         |    |           | f      | lo   | lo   |    |    |      |      |         |       |
| <i>Prunella vulgaris</i>        | Self heal           | 2     | r    |      |    |      |    |    |         |    |           | y      |      |      |    |    |      |      |         |       |
| <i>Prunus spinosa</i>           | Blackthorn          | 4     |      | r    |    | o    | lf |    |         |    |           |        |      | o    |    |    |      |      |         |       |
| <i>Pseudoscleropodium purum</i> | A moss              | 2     |      | f    |    | o    |    |    |         |    |           |        |      |      |    |    |      |      |         |       |
| <i>Quercus robur</i>            | Pedunculate oak     | 1     |      |      |    | o    |    |    |         |    |           |        |      |      |    |    |      |      |         |       |
| <i>Ranunculus acris</i>         | Meadow buttercup    | 2     |      |      | r  |      |    |    | y       |    |           |        |      |      |    |    |      |      |         |       |
| <i>Ranunculus bulbosus</i>      | Bulbous buttercup   | 4     | o-lf | o    |    |      |    |    | y       |    |           | y      |      |      |    |    | 1    |      |         |       |
| <i>Ranunculus ficaria</i>       | Lesser celandine    | 1     |      |      |    |      |    |    |         |    |           |        | o-lf |      |    |    | 1    |      |         |       |
| <i>Ranunculus repens</i>        | Creeping buttercup  | 7     | o    |      | o  | r    |    |    | y       | lf | y         |        |      |      | o  |    |      |      |         |       |
| <i>Reseda lutea</i>             | Mignonette          | 4     | r    |      |    |      | o  |    | y       | r  |           |        |      |      |    |    |      |      |         |       |
| <i>Rhamnus catharticus</i>      | Buckthorn           | 1     |      | r    |    |      |    |    |         |    |           |        |      |      |    |    |      |      |         |       |
| <i>Rhinanthus minor</i>         | Yellow rattle       | 1     | r    |      |    |      |    |    |         |    |           |        |      |      |    |    | 1    |      |         |       |
| <i>Rosa canina</i>              | Dog rose            | 1     |      |      |    |      |    |    |         |    |           |        |      |      | lo |    |      |      |         |       |
| <i>Rubus fruticosus</i> agg.    | Bramble             | 5     |      | o    |    | lf   | lf |    |         |    |           |        |      | o-lf | la |    |      |      |         |       |
| <i>Rumex acetosa</i>            | Sorrel              | 1     |      | o    |    |      |    |    |         |    |           |        |      |      |    |    |      |      |         |       |
| <i>Rumex obtusifolius</i>       | Broad-leaved dock   | 5     | o    |      |    |      |    | o  |         | r  | y         |        |      |      |    | o  |      |      |         |       |
| <i>Sambucus nigra</i>           | Elder               | 4     |      |      |    |      |    | o  |         |    |           |        | o    | o    | lf |    |      |      |         |       |
| <i>Sanguisorba minor</i>        | Salad burnet        | 4     |      | f-la |    | f-la | lf |    | y       |    |           |        |      |      |    |    | 1    | 2    |         |       |



| Latin name                                          | English name           | Trees | G1 | G2 | G3 | G4 | G5 | G6 | A  | Arable 04 | Quantity | W1 | W2 | H  | G7 | MESO | CALC | AWVI(S) | Allen |
|-----------------------------------------------------|------------------------|-------|----|----|----|----|----|----|----|-----------|----------|----|----|----|----|------|------|---------|-------|
| <i>Ulmus procera</i>                                | Elm                    | 1     |    |    |    |    |    |    |    |           |          |    |    | f  |    |      |      |         |       |
| <i>Urtica dioica</i>                                | Nettle                 | 70    |    | a  |    | lf | la | y  |    |           |          | o  |    | la |    |      |      |         |       |
| <i>Valeriana officinalis</i>                        | Common valerian        | 3     |    | o  | o  | r  |    |    |    |           |          |    |    |    |    | 1    |      |         |       |
| <i>Verbascum thapsus</i>                            | Mullein                | 2     |    |    | r  |    |    |    |    |           |          | r  |    |    |    |      |      |         |       |
| <i>Veronica chamaedrys</i>                          | Germander speedwell    | 9lf   | r  | o  | o  | o  | y  | o  |    |           |          |    | o  | o  |    |      |      |         |       |
| <i>Veronica persica</i>                             | Buxbaum's speedwell    | 3lf   |    |    |    |    |    |    | o  | y         |          |    |    |    |    |      |      |         |       |
| <i>Veronica serpyllifolia</i>                       | Thyme-leaved speedwell | 1lo   |    |    |    |    |    |    |    |           |          |    |    |    |    |      |      |         |       |
| <i>Viburnum lantana</i>                             | Wayfaring tree         | 4     | r  | o  | f  |    |    |    |    |           |          | r  |    |    |    |      |      |         |       |
| <i>Vicia cracca</i>                                 | Tufted vetch           | 3r    | r  |    |    |    |    | y  |    |           |          |    |    |    |    |      |      |         |       |
| <i>Vicia sativa nigra</i>                           | Common vetch           | 3o    | r  |    |    |    |    |    | lf | y         |          |    |    |    |    |      |      |         |       |
| <i>Viola arvensis</i>                               | Wild pansy             | 2     |    |    |    |    |    |    |    |           |          |    |    |    |    |      | 2    | 2       |       |
| <i>Viola hirta</i>                                  | Hairy violet           | 3     | f  |    | f  | r  |    |    |    |           |          |    |    |    |    |      |      |         | 2     |
| <i>Viola reichenbachiana</i>                        | Wood dog violet        | 1     |    |    |    |    |    |    |    |           |          | r  |    |    |    |      |      |         |       |
| <i>Viola riviniana</i>                              | Dog violet             | 5     | o  | o  | o  | o  |    |    |    |           |          | f  | f  |    |    |      |      |         |       |
|                                                     |                        |       |    |    |    |    |    |    |    |           |          |    |    |    |    |      |      |         |       |
| Total species                                       |                        | 185   | 68 | 74 | 20 | 60 | 52 | 30 | 42 | 36        | 30       | 18 | 34 | 35 | 30 | 18   |      |         |       |
| Mesotrophic (neutral) grassland indicators          |                        | 41    | 5  | 26 | 2  | 20 | 16 | 7  | 15 | 2         | 1        | 4  | 8  | 6  | 0  | 2    |      |         |       |
| Calcareous grassland indicators                     |                        | 33    | 7  | 24 | 2  | 18 | 14 | 8  | 17 | 2         | 2        | 4  | 0  | 0  | 1  | 3    |      |         |       |
| Common indicators to neutral & calcareous grassland |                        | 19    | 2  | 14 | 1  | 11 | 8  | 5  | 12 | 1         | 0        | 3  | 0  | 0  | 0  | 2    |      |         |       |
| Ancient woodland indicators                         |                        | 14    | 0  | 1  | 0  | 2  | 1  | 0  | 0  | 1         | 0        | 0  | 10 | 7  | 0  | 1    |      |         |       |
| Total unimproved grassland indicators               |                        | 55    | 10 | 36 | 3  | 27 | 22 | 10 | 20 | 3         | 3        | 5  | 8  | 6  | 1  | 3    |      |         |       |

Note in summary rows that indicators for unimproved habitats overlap to some extent: therefore the numbers of indicator species common to both neutral and calcareous grasslands are given as well as the separate totals and an overall total for grassland.

## **Appendix 7.2**

### **Invertebrates of the Study Area**

# APPENDIX 7.2: INVERTEBRATES RECORDED FROM THE STUDY AREAS

## Status:-

- Nb - species occurring in between 16-100 10km squares of the national grid
- Local - Species which occur in 100-500 10km squares of the national grid
- UKBAP - Biodiversity Action Plan species
- HSD: Species of European importance.

## Places:

- Anyrec: scores if any record available for the species
- Appn: records for the application study area in 2004
- cSAC: Records from the study area within the Salisbury Plain candidate SAC from 2004-06-03
- I (G1,G7): 1995 records from improved or species-poor semi-improved grasslands
- U (G2-G6): 1995 records from unimproved grassland
- W: 1995 records from woodland.

Smith: records from the period 1975 to 2004 for notable or otherwise highlighted species of Lepidoptera made from nearby parts of the cSAC (understood to be wider than the Environmental Statement study area) supplied by a local moth recorder (records of common and ubiquitous species not shown).

| Latin name                            | Common name    | Status | Anyrec | Appn | cSAC | I (G1,G7) | U(G2-6) | Wood | Smith  |
|---------------------------------------|----------------|--------|--------|------|------|-----------|---------|------|--------|
| Lepidoptera (Butterflies and moths)   |                |        |        |      |      |           |         |      | (cSAC) |
| Geometridae                           |                |        |        |      |      |           |         |      |        |
| <i>Callistege mi</i>                  | Mother Shipton |        | 1      |      |      |           | 1995    |      |        |
| <i>Epirrhoe rivata</i>                | Wood carpet    | Local  | 1      |      |      |           |         |      | 1      |
| <i>Perizoma albulata</i>              | Grass rivulet  | Local  | 1      |      |      |           |         |      | 1      |
| <i>Perizoma bifaciata</i>             | Barred rivulet | Local  | 1      |      |      |           |         |      | 1      |
| <i>Semiothisa clathrata clathrata</i> | Latticed heath |        | 1      |      |      |           | 1995    |      |        |

| Latin name                     | Common name           | Status   | Anyrec | Appn | cSAC | I (G1,G7) | U(G2-6) | Wood | Smith |
|--------------------------------|-----------------------|----------|--------|------|------|-----------|---------|------|-------|
| <i>Xanthorhoe montana</i>      | Silver ground carpet  |          | 1      |      |      |           |         | 1995 |       |
| <i>Cabera pusaria</i>          | Common white wave     |          | 1      |      |      |           |         | 1995 |       |
| <i>Ematurga atomaria</i>       | Common heath          |          | 1      |      |      | 1995      | 1995    |      |       |
| <i>Euclidia glyphica</i>       | Burnet companion      |          | 1      |      |      |           | 1995    |      |       |
| <b>Hesperiidae</b>             |                       |          |        |      |      |           |         |      | 1     |
| <i>Thymelicus lineola</i>      | Essex skipper         |          | 1      |      |      |           | 1995    |      |       |
| <i>Thymelicus sylvestris</i>   | Small skipper         |          | 1      |      |      |           | 1995    |      | 1     |
| <i>Erynnis tages</i>           | Dingy skipper         |          | 1      |      |      |           | 1995    |      | 1     |
| <i>Pyrgus malvae</i>           | Grizzled skipper      |          | 1      |      |      |           |         |      |       |
| <b>Lycaenidae</b>              |                       |          |        |      |      |           |         |      |       |
| <i>Aricia agestis</i>          | Brown argus           |          | 1      |      |      |           | 1995    |      |       |
| <i>Callophrys rubi</i>         | Green hairstreak      |          | 1      |      |      |           | 1995    |      | 1     |
| <i>Celastrina argiolus</i>     | Holly blue            |          | 1      |      |      |           | 1995    |      |       |
| <i>Cupido minimus</i>          | Small blue            |          | 1      |      |      |           |         |      | 1     |
| <i>Lysandra bellargus</i>      | Adonis blue           | NaUKBAP  | 1      |      |      |           |         |      | 1     |
| <i>Lysandra coridon</i>        | Chalkhill blue        |          | 1      |      |      |           | 1995    |      |       |
| <i>Polyommatus icarus</i>      | Common blue           |          | 1      |      |      |           |         |      | 1     |
| <i>Thecla betulae</i>          | Brown hairstreak      | Nb       | 1      |      |      |           |         |      |       |
| <b>Nymphalidae</b>             |                       |          |        |      |      |           |         |      |       |
| <i>Aglais urticae (larvae)</i> | Small tortoiseshell   |          | 1      | 2004 | 2004 |           | 1995    |      |       |
| <i>Argynnis aglaia</i>         | Dark green fritillary |          | 1      |      | 2004 |           |         |      | 1     |
| <i>Inachis io</i>              | Peacock               |          | 1      | 2004 | 2004 |           | 1995    |      |       |
| <i>Eurodryas aurinia</i>       | Marsh Fritillary      | Nb (HSD) | 1      |      | 2004 |           |         |      |       |
| <i>Polygonia c-album</i>       | Comma                 |          | 1      | 2004 | 2004 |           |         |      |       |
| <b>Riodinidae</b>              |                       |          |        |      |      |           |         |      | 1     |
| <i>Hamearis lucina</i>         | Duke of burgundy      | Nb       | 1      |      |      |           |         |      |       |
| <b>Pieridae</b>                |                       |          |        |      |      |           |         |      |       |
| <i>Anthocharis cardamines</i>  | Orange tip            |          | 1      |      | 2004 |           | 1995    |      |       |
| <i>Pieris brassicae</i>        | Large white           |          | 1      |      |      |           | 1995    |      |       |

[illegible]



[illegible]

| Latin name                                  | Common name   | Status | Anyrec | Appn | cSAC | I (G1,G7) | U(G2-6) | Wood | Smith |
|---------------------------------------------|---------------|--------|--------|------|------|-----------|---------|------|-------|
| spp.                                        |               |        | 1      |      |      | 1995      | 1995    |      |       |
| <i>Biblio marci</i>                         | St Marks fly  |        | 1      |      |      | 1995      | 1995    |      |       |
| <b>Syrphidae</b>                            |               |        |        |      |      |           |         |      |       |
| <i>Baccha elongata</i>                      |               |        | 1      |      | 2004 |           |         |      |       |
| <i>Cheilosia vernalis/pagana</i>            |               |        | 1      |      |      |           | 1995    |      |       |
| <i>Dasyrphus albostriatus</i>               |               |        | 1      |      |      |           |         |      |       |
| <i>Eristalis tenax</i>                      |               |        | 1      |      |      |           |         |      |       |
| <i>Eupeodes (Metasyrphus) corollae</i>      |               |        | 1      |      |      |           |         |      |       |
| <i>Eupeodes luniger</i>                     |               |        | 1      | 2004 | 2004 |           |         |      |       |
| <i>Melanostoma dubium</i>                   |               |        | 1      |      |      |           |         |      |       |
| <i>Melanostoma mellinum</i>                 |               |        | 1      | 2004 | 2004 |           |         |      |       |
| <i>Melanostoma scalare</i>                  |               |        | 1      |      |      |           |         | 1995 |       |
| <i>Platycyberus albimanus</i>               |               |        | 1      |      |      |           |         |      |       |
| <i>Platycyberus cf. manicatus</i>           |               |        | 1      |      |      |           |         |      |       |
| <i>Rhingia campestris</i>                   |               |        | 1      |      |      |           |         |      |       |
| <i>Sphaerophoria cf. scripta</i>            |               |        | 1      | 2004 | 2004 | 1995      | 1995    |      |       |
| <b>Asilidae</b>                             |               |        |        |      |      |           |         |      |       |
| <i>Dioctria rufipes</i>                     |               |        | 1      |      |      | 1995      |         |      |       |
| <i>Dioctria atricapilla</i>                 |               |        | 1      |      |      |           | 1995    |      |       |
| <i>Leptarthrhus brevirostris</i>            |               |        |        |      |      |           |         |      |       |
| <b>Scatophagidae</b>                        |               |        | 1      |      |      |           | 1995    |      |       |
| spp.                                        |               |        |        |      |      |           |         |      |       |
| <b>Dermaptera (cockroaches and earwigs)</b> |               |        |        |      |      |           |         |      |       |
| <b>Forficulidae</b>                         |               |        |        |      |      |           |         |      |       |
| <i>Forficula auricularia</i>                | Common earwig |        | 1      | 2004 | 2004 | 1995      |         | 1995 |       |
| <b>Isopoda (woodlice)</b>                   |               |        |        |      |      |           |         |      |       |
| <i>Armadillidium vulgare</i>                |               |        | 1      | 2004 | 2004 |           | 1995    | 1995 |       |

[illegible]

[illegible]

| Latin name                         | Common name | Status | Anyrec | Appn | cSAC | I (G1,G7) | U(G2-6) | Wood | Smith |
|------------------------------------|-------------|--------|--------|------|------|-----------|---------|------|-------|
| ARACHNIDA (spiders)                |             |        |        |      |      |           |         |      |       |
| Araneidae                          |             |        |        |      |      |           |         |      |       |
| <i>Agelenatea redii</i>            |             | Local  | 1      |      | 2004 |           |         |      |       |
| <i>Hypsosinga pygmaea</i>          |             |        | 1      | 2004 | 2004 |           |         |      |       |
| Tetragnathidae                     |             |        |        |      |      |           |         |      |       |
| <i>Tetragnatha extensa</i>         |             |        | 1      |      | 2004 |           |         |      |       |
| Linyphiidae                        |             |        |        |      |      |           |         |      |       |
| <i>Erigone atra</i>                |             |        | 1      | 2004 | 2004 |           |         |      |       |
| <i>Erigone dentipalpis</i>         |             |        | 1      | 2004 | 2004 |           |         |      |       |
| <i>Oedothorax fuscus</i>           |             |        | 1      | 2004 | 2004 |           |         |      |       |
| Lycosidae                          |             |        |        |      |      |           |         |      |       |
| <i>Pardosa nigriceps</i>           |             |        | 1      | 2004 |      |           |         |      |       |
| Salticidae                         |             |        |        |      |      |           |         |      |       |
| <i>Heliophanus sp. indet.</i>      |             |        | 1      | 2004 |      |           |         |      |       |
|                                    |             |        |        |      |      |           |         |      |       |
| Coleoptera (beetles)               |             |        |        |      |      |           |         |      |       |
| Apionidae                          |             |        |        |      |      |           |         |      |       |
| <i>Exapion ulicis</i>              |             |        | 1      |      | 2004 |           |         |      |       |
| <i>Protapion dichroum</i>          |             |        | 1      | 2004 | 2004 |           |         |      |       |
| Carabidae                          |             |        |        |      |      |           |         |      |       |
| <i>Anchomenus (Agonum) dorsale</i> |             |        | 1      | 2004 |      |           |         |      |       |
| <i>Demetrias imperialis</i>        |             |        | 1      | 2004 |      |           |         |      |       |
| <i>Amara ovata</i>                 |             |        | 1      | 2004 |      |           |         |      |       |
| <i>Bembidion biguttatum</i>        |             |        | 1      | 2004 |      |           |         |      |       |
| <i>Nebria brevicollis</i>          |             |        | 1      | 2004 |      |           |         |      |       |
| <i>Notiophilus biguttatus</i>      |             |        | 1      |      |      |           |         | 1995 |       |
| <i>Pterostichus cupreus</i>        |             |        | 1      | 2004 |      |           |         |      |       |
| Cantharidae                        |             |        |        |      |      |           |         |      |       |
| <i>Cantharis sp.</i>               |             |        | 1      |      |      | 1995      |         |      |       |

[illegible]

| Latin name                            | Common name           | Status | Anyrec | Appn | cSAC | I (G1,G7) | U(G2-6) | Wood | Smith |
|---------------------------------------|-----------------------|--------|--------|------|------|-----------|---------|------|-------|
| <i>Silpha atrata</i>                  | Black carrion beetle  |        | 1      | 2004 |      |           | 1995    |      |       |
| Staphylinidae                         |                       |        | 1      | 2004 |      |           |         |      |       |
| <i>Tachyporus hypnorum</i>            |                       |        | 1      | 2004 |      |           |         |      |       |
| <i>Tachyporus nitidulus</i>           |                       |        |        |      |      |           |         |      |       |
| Odonata (dragonflies and damselflies) |                       |        |        |      |      |           |         |      |       |
| Coenagrionidae                        |                       |        | 1      |      |      |           | 1995    |      |       |
| <i>Ischnura elegans</i>               | Blue-tailed damselfly |        |        |      |      |           |         |      |       |
| Hemiptera (bugs)                      |                       |        |        |      |      |           |         |      |       |
| Anthocoridae                          |                       |        | 1      | 2004 | 2004 |           |         |      |       |
| <i>Anthocoris nemoralis</i>           |                       |        | 1      | 2004 | 2004 |           |         |      |       |
| <i>Anthocoris nemorum</i>             |                       |        |        |      |      |           |         |      |       |
| Cercopidae                            |                       |        | 1      |      |      |           | 1995    |      |       |
| <i>Cercopis vulnerata</i>             |                       |        | 1      | 2004 | 2004 |           |         |      |       |
| <i>Philaenus spumarius</i>            |                       |        |        |      |      |           |         |      |       |
| Lygaeidae                             |                       |        | 1      | 2004 |      |           |         |      |       |
| <i>Dryinus sylvaticus</i>             |                       |        | 1      | 2004 |      |           |         |      |       |
| <i>Peritrechus geniculatus</i>        |                       |        |        |      |      |           |         |      |       |
| Miridae                               |                       |        | 1      | 2004 |      |           |         |      |       |
| <i>Stenodema</i> sp.                  |                       |        |        |      |      |           |         |      |       |
| Pentatomidae                          |                       |        | 1      |      |      |           |         | 1995 |       |
| <i>Palomina prasina</i>               | Green shield bug      |        |        |      |      |           |         |      |       |
| Hymenoptera (Bees and wasps)          |                       |        |        |      |      |           |         |      |       |
| Apoidea (bees)                        |                       |        |        |      |      |           |         |      |       |
| <i>Andrena bicolor</i>                |                       |        | 1      | 2004 |      |           |         |      |       |

| Latin name                      | Common name       | Status | Anyrec | Appn | eSAC | I (G1,G7) | U(G2-6) | Wood | Smith |
|---------------------------------|-------------------|--------|--------|------|------|-----------|---------|------|-------|
| <i>Andrena minutula</i>         |                   |        | 1      | 2004 |      |           |         |      |       |
| <i>Andrena nigroaenea</i>       |                   |        | 1      | 2004 | 2004 |           |         |      |       |
| <i>Andrena pubescens</i>        |                   |        | 1      | 2004 | 2004 |           |         |      |       |
| <i>Andrena scotica</i>          |                   |        | 1      | 2004 | 2004 |           |         |      |       |
| <i>Apis mellifera</i>           | Honeybee          |        | 1      |      |      | 1995      |         |      |       |
| <i>Bombus lapidarius</i>        |                   |        | 1      | 2004 | 2004 | 1995      |         |      |       |
| <i>Bombus lucorum</i>           |                   |        | 1      | 2004 | 2004 |           |         |      |       |
| <i>Bombus pascuorum</i>         |                   |        | 1      | 2004 | 2004 |           |         |      |       |
| <i>Bombus terrestris</i>        |                   |        | 1      |      | 2004 |           |         |      |       |
| <i>Nomada flavoguttata</i>      |                   |        | 1      | 2004 | 2004 |           |         |      |       |
| <i>Lasioglossum albipes</i>     |                   |        | 1      | 2004 | 2004 |           |         |      |       |
| <i>Lasioglossum leucozonium</i> |                   |        | 1      | 2004 | 2004 |           |         |      |       |
| <i>Lasioglossum villosulum</i>  |                   |        | 1      | 2004 | 2004 |           |         |      |       |
| <i>Osmia bicolor</i>            |                   |        | 1      | 2004 | 2004 |           |         |      |       |
| <b>Formicidae (ants)</b>        |                   |        |        |      |      |           |         |      |       |
| <i>Myrmica rubra</i>            |                   |        | 1      |      |      |           | 1995    | 1995 |       |
| <i>Myrmica scabrinodis</i>      |                   |        | 1      |      | 2004 |           |         |      |       |
| <i>Lasius flavus</i>            | Yellow meadow ant |        | 1      | 2004 | 2004 |           | 1995    |      |       |
| <i>Lasius niger</i>             |                   |        | 1      | 2004 | 2004 |           |         |      |       |
|                                 |                   |        |        |      |      |           |         |      |       |
|                                 | Total species     | 23     | 195    | 72   | 77   | 23        | 58      | 43   |       |
|                                 | Local             | 11     |        |      |      |           |         |      |       |



**WESTBURY CHALK QUARRY EXTENSION**  
**PLANNING APPLICATION**  
***ENVIRONMENTAL STATEMENT***



**VOLUME 2**  
Chapters 8 - 14 & drawings.

SEPTEMBER 2004





## 8.0 Archaeology

### 8.1 DESK-BASED ARCHAEOLOGICAL ASSESSMENT

#### *Introduction*

- 8.1.1 The whole of the archaeological investigations were undertaken as specified in a Brief prepared by Wiltshire County Council Archaeological Service (WCC March 1995). Stage 1 of this process was the production of a desk-based assessment of the archaeological background and potential of the site. The purpose of this assessment was to appraise the archaeological and historic background of the site and the likely impacts of the proposals. In accordance with the Brief an area encompassing all the land within 1km of the area of the proposed development area was examined. This was used to refine Stage 2, which consisted of archaeological field evaluation, and in turn Stage 3, trenching. These later stages are reported below.
- 8.1.2 A variety of published and unpublished sources of information were consulted (see section 8.6 below). These included the Wiltshire Sites and Monuments Record (WSMR), the National Archaeological Record (NAR) held by Royal Commission for the Historic Monuments of England (RCHME) and historic maps, plans and other documents held by Wiltshire County Council and the Bodleian Library Oxford. Aerial photographs of the site held by the Wiltshire Sites and Monuments Record and the Royal Commission for Historic Monuments of England were examined: no additional cropmark sites were identified within the study area.
- 8.1.3 The use of the word 'potential' in the context of an archaeological desk-based assessment should be explained. It is in the nature of archaeological features and deposits that their quality and state of preservation can only be ascertained by trenching or excavation. Non-intrusive prospecting methods – eg surface artefact collection, geophysical survey, etc – can only indicate the presence of archaeological deposits and not their condition or quality. A site which has produced evidence – stray archaeological finds, evidence from air photographs, even earthworks, etc – for the presence of archaeological features has 'potential'. Where potential is identified, only trenching or excavation would confirm the actual archaeological value of the site or area, by revealing the extent to which features or deposits survive, their condition and the quality of the evidence recovered.

#### *Location of the Study Area (see Figure 8.1)*

- 8.1.4 The study area for the desk-based assessment was centered on the existing chalk pit which is located at the top of the chalk escarpment forming the northwestern edge of Salisbury Plain and overlooking the town of Westbury. Two areas – Area A to the north-east and Area B to the south-west of the existing pit – were

identified for field evaluation. The study area for the desk-based assessment includes these areas and extends for 1km beyond them. The archaeological remains within Areas A and B were considered separately from the remains in the rest of the study area.

- 8.1.5 Area A, to the north-east of the area of current chalk working, falls on generally flat ground currently used for arable agriculture and Area B, to the south-west of the current chalk pit, is characterised by the presence of two steep sided dry valleys and lies within the area of the Salisbury Plain SSSI. Between these valleys is a rounded spur of downland, Dilton Middle Down. This is currently in pastoral use although it appears to have been ploughed in the past. The study area incorporates chalk downland to the south and east of the quarry and to the north-west extends into the valley at the foot of the scarp slope.

#### *Archaeology of the Study Area*

- 8.1.6 The study area lies at the centre of an area of extensive multi-period archaeology. In particular it shows considerable evidence of prehistoric and later activity. The primary monument in the area is Bratton Camp (OAU no 9)<sup>1</sup>, a bivallate Iron Age Hill fort that lies approximately 750m north-east of the quarry. Although this monument is primarily Iron Age it is surrounded by evidence of both earlier and later activity: the interior of the fort contains a probable Neolithic long barrow with secondary, possibly Early Saxon, inhumations (OAU no 10) and immediately to the south lie the remains of a possible Bowl Barrow (OAU no 11). This earthwork was excavated in the 18th century and produced an (intrusive?) central inhumation with axe and sword (Saxon?). Excavations in the 18th and 19th centuries reputedly produced quantities of Roman and Saxon coins from the hill fort and its surrounding area.
- 8.1.7 The Downs to the east of the quarry contain further evidence of Prehistoric, Roman and later occupation and activity. Both Four Hundred Down and Thirteen Hundred Down contain Bronze Age Barrow cemeteries (OAU nos 29 & 33). Wardens Down, further to the east, contains the soil mark of a possible Barrow (OAU no 19), the remains of an undated field system (OAU no 20) and a probable Romano-British farmstead (OAU no 18). To the northwest of this, in the area around White Horse Farm, lie the remains of a Bronze Age Round Barrow (OAU no 12) and the site of a possibly Romano-British earthwork enclosure (OAU no 13) which has produced sherds of Romano-British pottery.
- 8.1.8 Upton Cow Down, to the south of the present chalk quarry, contains further evidence of prehistoric and later activity including a Bronze Age Round Barrow (OAU no 38), undated earthworks including a bivallate bank and ditch and linear earthwork (OAU no 37) and the ploughed out remains of a large, probably Romano-British field system (OAU no 42).
- 8.1.9 Immediately to the west of the present Chalk Quarry, on Beggars Knoll, lies a

---

<sup>1</sup> Numbering refers to Oxford Archaeological Unit Gazetteer, in Appendix 8.1

further Bowl Barrow (OAU no 23). Field investigation of plough damage discovered human bones on the surface, which indicated the possibility that this barrow contained an intrusive, possibly Saxon inhumation. Both the fields immediately adjacent to area A have produced archaeological finds including Roman coins and a Bronze Age arrowhead (OAU no 22).

- 8.1.10 To the west of the area of the study area lie the lower slopes of the Downs and the town of Westbury, situated on the strip of Upper Greensand which divides the chalk uplands from the Gault and Kimmeridge Clay plain. The town of Westbury itself is mentioned in Domesday (1086) and is almost certainly a Saxon foundation but the surrounding area has produced considerable evidence of settlement from the Bronze Age onwards. The largest concentration of evidence of archaeological activity came from early 20th century excavations on the site of the Westbury Ironworks (outside the area mapped on Figure 8.1, at NGR SP 863523) which produced quantities of early Iron Age finds and the site of a possible Roman Villa and settlement site (VCH Wilts Vol. 1 76-77). Further evidence comes from the lower slopes of the Down between the study area and Westbury. This area contains a number of springs and ponds which appear, from the level of recorded archaeological activity to have acted as a focus for settlement. Excavation at Wellhead Springs, just to the southwest of the study area has produced evidence of Romano-British settlement and industry, including iron working and pottery production as well as evidence of Iron Age and Early Saxon activity. Bridewell Springs, just to the northwest of the study area, is at the centre of an area of Bronze Age and Roman finds (including OAU nos 1-7) and to the northeast are Tiswell Springs which lies at the centre of an area of Bronze Age, Iron Age and Roman find spots.

*Archaeology of the Present Quarry and Areas A and B*

- 8.1.11 A number of sites are recorded from the area that has already been subject to chalk extraction. Prior to extraction the area produced chance finds of a Bell Beaker and a barbed and tanged arrowhead (OAU no 26) whilst a further barbed and tanged arrowhead is reported to have been found within the now quarried area in 1968 (also centrally located as OAU no 26). The Wiltshire Sites and Monuments Record [WSMR] records that formerly there had been at least two low mounds (OAU no 24), and possibly a third (OAU no 25) within the current extraction area. These may have been ploughed out round barrows, but they appear to have been destroyed without further investigation.
- 8.1.12 Area A contains no recorded Archaeological Sites. However 'Long River Road', Colt Hoare's 'Great Trackway', (OAU no 45) (Figure 8.3) which forms its southern boundary is probably of some antiquity. It is marked on early maps of the area including Andrew and Drury's 1773 map of Wiltshire and the 1808 Inclosure Award map and appears to have formed part of the network of paths and tracks linking Westbury with the Downs and Bratton Camp.
- 8.1.13 Area B contains a number of recorded archaeological sites and findspots. The northern part of the area contains an undated field system (OAU no 30). To the

south the area is crossed by a long ditch (OAU no 34), which is almost certainly a post-medieval field boundary. To the south of this boundary lies Dilton Middle Down, which contains the findspots of a Bronze Age bronze axe (OAU no 31) and the probable location of a Neolithic Bowl Barrow (OAU no 32) (Fig 3). This feature was excavated by Colt-Hoare in the early 19th century and was found to contain '7 or 8 disarticulated unaccompanied inhumations' along with a quantity of sarsens and flints (Colt-Hoare 1812, 53).

#### *Possible Archaeological Impacts*

- 8.1.14 Area A contained no known archaeological sites although the general level of archaeological activity in the surrounding area coupled with the fact that the adjoining fields have produced the findspots of Roman Coins (OAU no 22) and a Bronze Age Arrowhead (OAU no 17) raises the possibility that the area may contain undetected archaeological deposits. However on the basis of the desk study it appeared to have less archaeological potential than Area B.
- 8.1.15 Area B contains two known archaeological sites (OAU nos 30 & 34) and may contain further areas of archaeological deposits. The latter include the possible remains of the Neolithic Bowl Barrow (OAU no 32) excavated by Colt-Hoare in the early 19th century. Although no trace of this feature now exists above ground and its exact location is uncertain the description given by Colt Hoare (1813, 53) and its location on his accompanying map (see Figure 8.3) suggests that it lies towards the southwestern tip of Dilton Middle Down and may be affected by any extraction within this area. This feature is likely to have been damaged during Colt Hoare's early 19th century investigation and may have suffered subsequent plough damage. However it is possible that subsoil remains of this feature still exist. The majority of Round Barrows excavated in this country have been assigned a Bronze Age date and Neolithic Round Barrows, although no longer as rare as was once thought (Kinnes 1979, 50), are still a relatively rare occurrence.
- 8.1.16 Chalk extraction within Area B may affect remains connected with the undated field system (OAU no 30). The exact significance and state of preservation of this feature, which may represent evidence of prehistoric or Roman cultivation of the edge of the Downs, is uncertain without field investigation. The WSMR records that no trace of this feature was discovered when the site was examined in 1979: although the area is now in pasture it is understood that it has been in arable use in the past and it is possible that this feature has suffered further plough damage.
- 8.1.17 Chalk extraction within Area B may affect unknown multi-period archaeological deposits. In particular the presence within the surrounding area of a high concentration of Neolithic and Bronze Age Barrows, coupled with the possibility that further barrows (OAU nos 24 & 25) were destroyed during previous chalk quarrying may suggest that hitherto unsuspected Barrows or associated features may be affected.

- 8.1.18 Both Areas A and B may have been affected by small scale (post-medieval?) stone quarrying. The 1808 inclosure map and later maps of the area show an area, marked as 'Old stone pits' located within the area now occupied by the modern quarry. Although all remnants of this quarry has now been destroyed by the later chalk quarry it is possible that other areas of stone quarrying may lie within the study area and may have already affected any archaeological deposits.

*Conclusions from Desk Study*

- 8.1.19 In general terms, the archaeological potential of the study area is believed to be high. It contains archaeological evidence for multi-period human activity. Furthermore, the presence of evidence for considerable Prehistoric, Roman and Saxon activity in the wider landscape raises the general archaeological profile of the study area.
- 8.1.20 Within the Study Area, it should be noted that the area of the current quarry produced a number of prehistoric finds, including a Bronze Age bronze axe, and contained at least three earthworks which may have been the remains of round barrows.
- 8.1.21 Area A appears to contain little evidence for archaeological remains. The fieldwalking evidence for this Area is considered in a separate report, but would appear to confirm the lack of significant archaeological evidence from other sources. The archaeological potential of Area A is limited. Area B contains the remains of at least two archaeological sites (OAU nos 30 & 34), and possibly more. It has archaeological potential.
- 8.1.22 On the basis of these conclusions, fieldwalking was undertaken over Areas A and B, and the results are reported in the following sections.

## 8.2 AREA A FIELDWALKING

*Introduction*

- 8.2.1 Area A, which forms the subject of this section is composed of two field (OS parcels 5400 and 8903 (part)). The land is Ministry of Defence (MOD) property and forms part of the Salisbury Plain Training Area (SPTA). Parts of both Areas A and B lie within the live firing range ('Danger Area' on Figure 8.1). Because of access requirements relating to the MOD ranges, the fieldwalking of Area A was done in two stages, with field 5400 being walked in April 1995 and field 8903 (part) in October 1995.

*Topography and Geology*

- 8.2.2 The site lies on high ground – at an elevation of at least 220 m – on the chalk escarpment forming the north-west edge of Salisbury Plain. It overlooks the town of Westbury and the wide valley of the Avon to the north and west. Field

5400 slopes gently from east to west, and has a slight dip in its western corner. Field 8903 has a slight slope from east north-east to west south-west.

#### *Archaeological background*

- 8.2.3 Bratton Camp, a bivallate Iron Age hill fort, lies to the northeast of the site. In the areas to the south and southeast of Area A there is evidence for occupation from early prehistoric to the post-medieval periods. There are no known archaeological remains from within Area A. Long River Road which runs along the southwest edge of the two field, and the road which runs northeast between fields 5400 and 8903, are both long established roads.

#### *Crop and ground conditions*

- 8.2.4 Both fields were under arable cultivation. The first stage of fieldwalking took place in April 1995 after sowing in field 5400; at the time of the fieldwalking the cereal crop was quite well advanced and varied over the field from just showing through to thick. In the north corner of the field the crop was most advanced and it was only just practical to fieldwalk in this area. The weather conditions during the first part of the fieldwalking exercise were dry and sunny. In October when OS parcel 8903 (part) was walked the weather was overcast. The field had not long been drilled and the cereal crop was just beginning to show through.

#### *Methodology*

- 8.2.5 The grid for the surface collection was aligned on the OS grid and the fieldwalking lines, or transects, spaced 25 m apart. Within the lines the search units were of 25 m length. In accordance with guidelines set by WCC, each transect was identified by the grid reference of its south end (Table 8.1) (WCC County Archaeological Service, Standards for Archaeological Assessment and Field Evaluation in Wiltshire, [draft] April 1995, section 5.5.1). The transects in both fields were numbered, lettered, from west to east. During fieldwork the transects were walked from south to north.
- 8.2.6 The finds recovered during the surface collection exercise were processed (washed and boxed), quantified and the data entered into a database. The data were then plotted onto a CAD generated digital plan. The finds are plotted at the north end of the relevant collection unit.

#### *Results*

- 8.2.7 The quantities of artefacts recovered during fieldwalking are small (see Appendices 8.2 and 8.3) and the inferences which can be drawn from them limited. There are more finds of all categories from Field 5400 than from Field 8903 (Figures 8.4 – 8.9). The main classes of material found were flint, both worked and burnt unworked, and ceramic building materials. The flint is not sufficiently distinctive to be closely dated, but is of prehistoric date, possibly Neolithic or Bronze Age. The bulk of the flint was recovered from field 5400,



during the first phase of fieldwalking. The ceramic building materials are post-medieval in date.

*Table 8.1 : Transect grid references and correlation between transects from April and October field walking exercises*

| Fieldwork<br>Transect<br>label        | Transect Grid<br>Reference (south<br>end) |   | Fieldwork<br>Transect<br>label | Transect Grid<br>Reference (south<br>end) |
|---------------------------------------|-------------------------------------------|---|--------------------------------|-------------------------------------------|
| OS Parcel 8903 (part)<br>October 1995 |                                           |   | OS Parcel 5400<br>(April 1995) |                                           |
|                                       |                                           |   | 1                              | 389317 150974                             |
|                                       |                                           |   | 2                              | 389340 150960                             |
|                                       |                                           |   | 3                              | 389365 150936                             |
|                                       |                                           |   | 4                              | 389390 150919                             |
|                                       |                                           |   | 5                              | 389414 150913                             |
|                                       |                                           |   | 6                              | 389437 150888                             |
|                                       |                                           |   | 7                              | 389460 150869                             |
|                                       |                                           |   | 8                              | 389484 150850                             |
|                                       |                                           |   | 9                              | 389509 150841                             |
|                                       |                                           |   | 10                             | 389534 150817                             |
| A                                     | 389559 150794                             | = | 11                             | 389558 150837                             |
| B                                     | 389583 150781                             | = | 12                             | 389584 150584                             |
| C                                     | 389608 150766                             | = | 13                             | 389608 150877                             |
| D                                     | 389633 150752                             | = | 14                             | 389633 150897                             |
| E                                     | 389656 150736                             | = | 15                             | 389658 150918                             |
| F                                     | 389681 150719                             | = | 16                             | 389684 150942                             |
| G                                     | 389708 150701                             | = | 17                             | 389710 150963                             |
| H                                     | 389731 150689                             | = | 18                             | 389735 150981                             |
| J                                     | 389755 150676                             |   |                                |                                           |
| K                                     | 389780 150707                             |   |                                |                                           |
| L                                     | 389803 150753                             |   |                                |                                           |
| M                                     | 389831 150799                             |   |                                |                                           |
| N                                     | 389851 150844                             |   |                                |                                           |

*Flint (Figures 8.5 and 8.6)*

- 8.2.8 The flint recovered consisted of worked flint (mainly flakes but including 1 core and 3 or 4 pieces of waste or debitage) and unworked burnt flint. (A brief report on the flint can be found in Appendix 8.4.). The quantity of material is small and reveals no real concentrations. Its absence over much of field 8903 is the most obvious point.
- 8.2.9 A very small quantity of flint was recovered from field 8903. The worked flint distribution (Figure 8.5) appears to centre on Transect H, but it must be stressed that the numbers involved are small: a total of 9 flakes and 1 piece of waste. The quantity of burnt unworked flint recovered from field 8903 was negligible (only 3 pieces) (Figure 8.6).

- 8.2.10 Much more flint was recovered from field 5400 than from 8903: 70 flakes, 1 core, 3 possible waste pieces and 91 pieces of burnt flint. The material was quite evenly spread across the field with no obvious concentrations). The largest quantities of flint were found on Transects 9, 12 and 13 (Table 8.2 and Figure 8.5). It must be stressed that the quantities of flint involved are not large – see Table 8.2. Transect 13 also produced the largest quantity of burnt flint (Figure 8.6); but again the actual figures are small – only 20 pieces. To the east of Transect 13 the absence of worked flint is noticeable.

*Table 8.2 : Quantities of flint from Transects 9, 12 and 13 (Field 5400) and Transect H (Field 8903)*

| Transect | Flake | Core | Waste | Burnt Flint |
|----------|-------|------|-------|-------------|
| 9        | 18    | 0    | 21    | 20          |
| 12       | 10    | 0    | 0     | 1           |
| 13       | 14    | 0    | 0     | 20          |
| H        | 8     | 0    | 0     | 1           |

*Ceramic building materials [CMB] (Figure 8.7)*

- 8.2.11 Ceramic building materials consists of brick, tile and material which could be either brick or tile, but which is too small to identify with certainty. The distribution is limited to the western part of both parcel 5400 and to a spread across the middle of 8903. In the latter case the material seems mainly to be distributed away from the roads bordering the field. In the former case the distribution may in part be a product of the topography: the western corner of the field is the lowest lying part. The distribution of other finds is confined to this part of the field.

*Other materials (Figures 8.8 and 8.9)*

- 8.2.12 Other materials were recovered in such small quantities during the field walking that their distributions are not particularly significant. They do however show a similar pattern to that for ceramic building materials in that they are concentrated in the western part of the field 5400. Very little pottery was recovered and none of this was early in date. The earliest ceramics were early post-medieval (16th to 17th – century in date). The absence of pottery and other finds, other than flint, of prehistoric, Romano-British or medieval date is noteworthy.

*Discussion and Interpretation*

- 8.2.13 The only significant finds found during the fieldwalking of Area A were worked flint and pieces of burnt unworked flint. The quantities of both worked and burnt flint were the small, and the worked flint insufficiently distinctive to be closely datable. It is possibly Neolithic or Bronze Age in date. There is an absence of

other prehistoric finds and in particular pottery. No Iron Age or Romano British material was found, and no Saxon or medieval finds. The bulk of the finds consisted of post-medieval building materials. Farm buildings are known to have existed in the area in the past, for example Bournes Barn within the bounds of the present quarry (OAU no 44), and the building materials may be derived from these.

### 8.3 AREA B FIELDWALKING

#### *Introduction*

- 8.3.1 Area B, which forms the subject of this section, is also MOD property and forms part of the SPTA. In line with the WCC brief, it was proposed to excavate a series of test-pits in Area B since the land was not under plough and surface collection was not therefore an option. The excavation of test pits was not acceptable at this stage on the grounds of safety, since part of the site lay within the live firing range and it was possible that unexploded ordnance would be present. After a series of negotiations, it was agreed that the land would be ploughed to enable fieldwalking to be carried out. The ground was ploughed between one and two weeks prior to the surface collection exercise. The fieldwork was undertaken at the end of August and beginning of September 1996.

#### *Topography and Geology (Figure 8.10)*

- 8.3.2 The site lies on high ground, on the top of the chalk escarpment which forms the north-west edge of Salisbury Plain. The site overlooks the town of Westbury and the Avon valley to the north and west. Area B comprises undulating chalk downland, sloping away both to the southwest and to the southeast. In the centre of the site and running to the southwest from Westbury Down is the spur called Dilton Middle Down. To the southwest, the site slopes down from Dilton Middle Down into a steep-sided dry valley. The west flank of the dry valley is formed by the back of the chalk escarpment, which to the south becomes Upton Cow Down. The southeast margin of the site slopes quite steeply to the southeast from the east flank of Dilton Middle Down and Westbury Down.

#### *Archaeological background*

- 8.3.3 The major site close to the present study area is Bratton Camp, a bivallate Iron Age hillfort containing a possible long barrow, which lies to the north-east of the site. Within Area B itself there is the site of a bowl barrow (OAU no 32), a findspot of a looped and socketed Bronze Age axe (OAU no 31), a post-medieval field boundary (OAU no 34), and a field system of possible archaeological significance (OAU no 30). An old trackway (OAU no 46) runs up Dilton Middle Down.

### *Crop and ground conditions*

- 8.3.4 Area B was certified clear of unexploded ordnance and was ploughed in mid to late August 1996 before fieldwalking began. At the time the walking commenced the soil, a very chalky loam, had weathered slightly, and finds were relatively easy to identify on the surface. There was heavy rainfall on the first day of fieldwork, but otherwise weather conditions were for the most part sunny, and remained dry throughout. Conditions were good for the collection of surface finds.

### *Methodology*

- 8.3.5 This was the same as for Area A.

### *Results*

- 8.3.6 The main types of material recovered during fieldwalking were flint, both worked and burnt unworked, and ceramic building materials. With the exception of the worked flint, the quantities of materials are small (see Appendix 8.6) and the inferences that can be drawn from them limited.

### *Flint (Figures 8.11 and 8.12) - worked flint*

- 8.3.7 A total of 750 pieces of flint were collected in the course of field walking at this site. This included 46 pieces of burnt unworked flint.
- 8.3.8 The flint is generally very heavily corticated; most is white in colour and fresh breaks indicate the raw material was originally a very dark grey, good quality flint. Much of the material was abraded, a few pieces bore iron staining.
- 8.3.9 The bulk of the collection was made up of struck flakes, a total of 558 pieces. Far smaller numbers of blade-like flakes and blades were recovered and a few flakes had dorsal blade scars. Both hard and soft hammers were used and most flake butts were plain or unprepared. 54 cores were collected; these were mostly flake cores of single and multi-platform type, though a few blade cores, a discoidal core and a crude tortoise core were also recovered. Retouched pieces were few and consisted mainly of the occasional edge-retouched flake and scrapers. A probable laurel leaf roughout was found in transect C2.
- 8.3.10 The lack of diagnostic pieces make dating difficult, but the dominance of irregular flake cores and broad flakes would suggest a later Neolithic or Bronze Age date for the bulk of the collection. The blade cores and few blade-like pieces may be datable to the earlier Neolithic or Mesolithic. The tortoise core is datable to the later Neolithic and the laurel leaf roughout to the earlier Neolithic.

### *The distribution of the worked and unworked burnt flint (Figures 8.11 and 8.12)*

- 8.3.11 The quantity of burnt unworked flint is small, but a good sized collection of

worked was recovered. The bulk of the worked material was recovered from the dry valley to the southwest of the site, and it is probable that the distribution results from a combination of topography and recent ploughing (Figure 8.11). The material was recovered from the bottom and from both sides of the dry valley. A small cluster of worked flint was located down slope from and the northeast of Westbury Down centred at NGR ST 8938 5027. The distribution of burnt unworked flint (Figure 8.12) is comparable to that for the worked flint.

*Prehistoric pottery (not plotted)*

- 8.3.12 The only other interesting find was a solitary sherd of prehistoric pottery. This had a lug and was of later prehistoric – probably Bronze Age – date. It was found near the centre point of Transect C2. This location is just down slope from the possible Bronze Age field system (OAU no 30).

*Post-medieval pottery (Figure 8.13)*

- 8.3.13 The concentration of the small amount of post-medieval pottery is centered at NGR ST 8856 4990 within the dry valley. The concentration matches the distribution of ceramic building materials (below and Figure 8.14).

*Ceramic building materials [CBM] (Figure 8.14)*

- 8.3.14 The ceramic building materials consists of brick, roof tile and material which could be either brick or tile, but which is too small to identify with certainty. Brick and tile, both in small and large pieces, was recovered from an area centred on NGR ST 8856 4990 within the dry valley to the west of the Dilton Middle Down. The distribution of CBM matches that for post-medieval pottery.

*Other materials (not plotted)*

- 8.3.15 There were small quantities of post-medieval ceramics and glass, the odd piece of bone and coal. One sherd of Samian (from Transect U) was the only Romano-British pottery recovered. No medieval pot was found.

*Discussion and Interpretation*

- 8.3.16 The marked concentration of finds within the dry valley to the south-west of the study area and their absence from most of the rest of the site suggests that the distribution of recovered material is partly at least the result of ploughing activity and resultant soil creep and is heavily influenced by the topography of the site. However, the small concentrations of post-medieval pottery and ceramic building materials, centred at NGR ST 8856 4990 within the dry valley, suggests either limited dumping of material at this point, or the existence of a small barn or similar building (Figures 8.13 and 8.14). It should be stressed that the quantity of material is limited.
- 8.3.17 The only significant finds recovered were worked flint, burnt unworked flint and

the single sherd of prehistoric pot. A much greater quantity of struck flint (554 pieces) was recovered from Area B than was found during fieldwalking in Area A (84 pieces) to the north of the present quarry. The worked flint from Area B was spread throughout the length of the dry valley flanking Dilton Middle Down. Some of this material will have been derived from the top of the escarpment to the northwest of the valley, and some from Dilton Middle Down, where Colt Hoare excavated a Neolithic bowl barrow in the early 19th century. Its precise location is not known but both Colt Hoare's map (Colt Hoare 1812; Figure 8.3) and the First Edition of the OS 1" map show a barrow at the end of Dilton Middle Down. It seems probable that much of the flint came from the possible Bronze Age field system (Figure 8.1: OAU no 30) on Westbury Down to the north-east of Dilton Middle Down. A small secondary scatter of flints was located in the northern extension of Area B (centred at ST 8938 5027). The distribution of burnt unworked flint mirrored that of worked flint, except that it lacked any distribution outside the dry valley. No trace of the field system was seen, and very few finds were encountered on its presumed location, although the single sherd of prehistoric (Late Bronze Age) pottery was found on or just adjacent to the site. Given that most of the recovered finds came from down slope of the field system on Westbury Down, and that little was located on the site of the system, it is possible that much of the evidence for the field system may have been ploughed away.

## 8.4 STAGE 3 ARCHAEOLOGICAL EVALUATION

### *Introduction*

- 8.4.1 Following the first two stages of evaluation, reported above, Wiltshire County Archaeological Service issued a brief for Stage 3: archaeological evaluation by means of trial trenching. This Stage 3 evaluation is described below.

### *Area A(N) and Area A(S)*

- 8.4.2 Area A is located immediately to the north-east of the existing quarry, and is divided into two parts: Areas A(N), a single field extending to some 8.4ha adjacent to the existing quarry face; Area A(S), 4.8ha, being part of a field within the range control area of SPTA. At the time of the evaluation, both fields were in stubble from a recently harvested arable crop.
- 8.4.3 The area lies some 750m west of the ramparts of the Iron Age fort of Bratton Camp. Plots of aerial photographs held as part of the Wiltshire SMR records show undated cropmarks - possibly field boundaries - to the north, but prior to the evaluation programme there were no recorded sites or findspots within or more immediately adjacent to the area. The fieldwalking exercise undertaken as the Stage 2 evaluation had identified a general scatter of both worked and burnt flint, but no specific concentrations had been identified.
- 8.4.4 The Area forms part of a relatively flat plateau, but with an increasing gradient

towards the northern corner of Area A(N) where the ground falls towards the scarp slope. In the absence of either significant topographical variation or significant archaeological indications, the Stage 3 evaluation trenching plan was based on a series of regularly-spaced trenches orientated at right-angles: Trenches 1 to 19 in Area A(N) and Trenches 20 to 31 in Area A(S); trenches were laid out and excavated in accordance with the plan provided by the Wiltshire County Archaeology Service as part of the Brief

#### *Area B*

- 8.4.5 Area B is located to the south of the existing quarry and extends to an area of some 33ha. The whole of this part of the site lies within the range control area of SPTA. At the time of evaluation, Area B was partially in pasture and partly within stubble from recently harvested arable.
- 8.4.6 The Stage 1 desk-top study recorded the presence of a find of a Bronze Age looped and socketed axe (WSMR ST84NE 150) not precisely located but within Area B and a linear feature, interpreted as a post-medieval field boundary, crossing the ridge from north to south (WSMR ST84NE 677). The site of a possible barrow is considered below.
- 8.4.7 Stage 2 field surface collection programme had established three areas of particular archaeological potential:
- Zone 1: located at the southern end of the application area, fieldwalking had identified a concentration of worked flint and burnt flint; this part of the site was also considered to be a likely location for a (Bronze Age) round barrow recorded in the early 19th century but subsequently lost. A 3% sample of the area was examined by means of six machine-excavated trenches (Trenches 82 to 87 inclusive; see Figure 8.18).
  - Zone 2: located on more level ground forming the saddle of the NE -SW aligned ridge, field surface collection had again produced higher than average densities of prehistoric worked flint and burnt flint. In the western part of the Area quantities of post-medieval pottery and ceramic building material had also been recovered. As shown on Figure 8.17, the zone was also apparently crossed by a number of linear features plotted from air photographs in the WSMR, where they have been interpreted as the remains of a field system of unknown date. A 3% sample of this area was examined by means of 10 machine-excavated trenches (Trenches 57 to 66 inclusive; see Figure 8.18), including eight trenches 100m or greater in length.
  - Zone 3: located on the east-facing slope and adjacent to the edge of the present chalk pit, this area had yielded densities of prehistoric worked flint and burnt flint in an apparently separate concentration from Zone 2. A 3% sample of the area was examined by means of six machine-excavated trenches (Trenches 39 to 44 inclusive; see Figure 8.18).

8.4.8 In the intervening areas, 35 trenches (each nominally 30m in length) were laid out on alternating E-W and N-S alignments on a staggered grid so as to comprise a 1% sample of the remainder of Area B.

8.4.9 The location, alignment and orientation of the trenches was established in the field by means of measurements from field boundaries and other landmark points; checking of distances between trenches etc confirmed that the trench plan conformed to the layout as set out in the Brief

#### *Methodology*

8.4.10 The layout of trenches was that defined by the Wiltshire County Archaeological Service's Brief. Trenches were excavated to the lengths specified in that document and to a width of 2m.

8.4.11 All trenches were excavated by a 360° mechanical excavator equipped with a toothless bucket operating under constant archaeological supervision and direction. Following discussions with and advice from the Wiltshire Assistant County Archaeologist (D. Coe) and the DEO(L)(SW) Archaeologist (I Barnes) it was determined that where a rubbly chalk subsoil horizon was encountered, this should be examined for archaeological features and - if no archaeological deposits were visible - thereafter removed by machine to a depth sufficient to establish that no features were present.

8.4.12 Where archaeological features were suspected (or where the stripped surface was considered to be too unclear to allow their possible presence to be determined) limited hand-cleaning of the base of the trench was undertaken. Sections at least 1m wide were excavated across (linear) archaeological features, which were planned at a scale of 1:20 with sections drawn at a scale of 1:10. A selection of features initially considered as natural (ie non-archaeological) was also sampled by excavation to verify the interpretation; as a result of these investigations, no features were reclassified.

8.4.13 Spoil heaps were walked and scanned for displaced artifacts, and finds were retrieved from the sides of the excavated trenches during cleaning and recording. All pre-20th-century material was collected.

#### *Results, Area A*

8.4.14 A summary of the trenches, their dimensions and contents for Area A(N) and Area A(S) is given in Appendix 8.7 (Tables 1 and 2 respectively). Within this section, the two zones are considered together.

8.4.15 The quality of the underlying chalk bedrock was recorded as being moderate to good over most of the area, with surfaces regarded as poor in only five trenches (all in Area A(N)).



- 8.4.16 The average overall depth of the trenches (some 250mm) remained relatively uniform across the area, although the thickness of a rubbly chalk subsoil at the interface of topsoil and bedrock increased from typical values of 50 - 60mm at the southern end of Area (S) to over 100mm at the western end of Area A(N). It was particularly thick (up to 350mm) at the northern end of Trench 3 near to the site's northern boundary, probably due to local erosional factors perhaps connected with the adjacent roadway and the increased gradient of the northern scarp of Salisbury Plain.
- 8.4.17 With the exception of Trench 23, no unstratified finds were recovered from the spoil heaps or topsoil in Area A(S). Very sparse quantities of worked flint (including an end scraper from Trench 7) were retrieved from Area A(N), generally from those trenches located towards the middle of the field. Overall quantities of finds were too small to be able to identify significant concentrations, however.
- 8.4.18 No obvious archaeological features or other deposits were present within any of the Area A trenches. A number of probable tree-root hollows and periglacial (geological) features were investigated, but none produced any archaeological finds or any indication that they should be regarded as being other than of wholly natural origin.

*Results, Area B*

- 8.4.19 A summary of the trenches, their dimensions and contents is given separately for Zone 1, Zone 2, Zone 3 and other parts of Area B) (Appendix 8.7, Tables 3 to 6 respectively).
- 8.4.20 The quality of the underlying chalk bedrock was variable, but is recorded as being poor or very poor in many of those trenches closest to the top of the ridge, including much of the area of Zone 2.
- 8.4.21 The average depth of trenches also varies across the area: a little over 200mm in Zone 1, c320mm in Zone 2 and c375mm in Zone 3. Overall, the average depth of trenches across Area B is some 300mm. Variation in depth is not wholly governed by topography; the presence of greater depths of rubbly subsoil at the interface of the topsoil and bedrock in many trenches can be related to higher than average numbers of tree-root hollows or periglacial features which have damaged and eroded the chalk surface.
- 8.4.22 A significantly different soil profile was present within Trench 56, which ran across a shallow combe (see Figure 8.18 for trench location and Figure 8.15 for an indication of the topography in this area). Here a sequence of colluvial (hillwash) deposits to a maximum thickness of 830mm overlay the chalk bedrock (see Figure 8.19 for section drawing). These comprised a primary fill of chalk rubble (context 5605), above which was a stabilisation horizon - a buried soil and possible turfline (contexts 5603 and 5604) - in turn overlain by a series of silty loam soils (contexts 5601 and 5602). Very few archaeological finds were

recovered from the sequence, comprising a single flint flake from buried soil context 5604 and two other flakes from context 5601. Eight flakes and one scraper from the topsoil (context 5600) are not directly related to the mulling of the combe. Soil samples have been taken and retained, but preliminary visual inspection does not suggest the survival or presence in significant quantities of larger plant macrofossils or snails. On the basis of the available evidence, it is not possible to date the onset of soil movement or the stabilisation horizon, nor quantify the rate of accumulation of the deposits.

- 8.4.23 Excepting the material recovered from the Trench 56 combe deposits (where a volume of soil significantly larger than elsewhere was examined), the distribution of unstratified and topsoil finds generally equates with the results from the earlier (Stage 2) fieldwalking exercise. Finds of worked flint were recovered from most of the trenches across Zone 2 and into Zone 3, and from further to the north and east. An apparently separate grouping of worked flint was associated with the Zone 1 trenches, but only negligible quantities were present in those trenches between Zone 1 and Zone 2. Overall, however, quantities were extremely low.

- 8.4.24 Two linear archaeological features (one re-appearing in four trenches) were identified and examined:

*Trench 55 (Figure 8.20)*

- 8.4.25 A single archaeological feature was investigated within Trench 55. Feature F5502 comprised a shallow linear gully, aligned roughly northwest - southeast, with moderately sloping concave sides merging with a gently concave base. Cut through the weathered chalk bedrock, F5502 contained a single fill (5503). This deposit was a fairly soft pale brown silty loam with moderate small sub-angular chalk fragments, moderate pea grit and sparse chalk flecks. Finds recovered from fill (5503) included six flint waste flakes, one flint core and two tins' fragments of Samian pottery (weight < 1g) of Roman date.

*Trenches 63, 64, 66, and 74 (Figures 8.21 – 8.23 inclusive)*

- 8.4.26 Lengths of what is interpreted as the same linear earthwork were recorded and examined in four trenches across the southern fringe of Zone 2. This feature - which corresponds to the plotted linear feature WSMR ST84NE 677, the course of which can be traced on Figure 8.17 as the discontinuous (southernmost) feature running across the ridge - is also shown on Figure 8.23. Separate segments of the feature were examined as follows:

- Trench 63: Trench 63 contained a single feature F6303. This proved to be a linear ditch, aligned approximately northwest – southeast, with moderate to steeply sloping convex sides leading abruptly to a slightly uneven base. Ditch F6303 is cut into the natural chalk bedrock, which is poorly degraded at the upper sides, but well consolidated to the base of the cut. Two fills were recorded within the ditch. The upper fill (6301) is

a friable dark yellowish brown silty loam containing sparse small angular chalk fragments, rare small irregular flint fragments and moderate chalk flecks. Finds from this fill comprised three flint waste flakes and a partial flake core. The lower fill (6302) is a firm yellowish brown silty clay loam containing profuse small angular and sub-angular chalk fragments and pea grit, with rare small irregular flint fragments. No finds were recovered from this context. Ditch F6303 is directly aligned with ditch F6403 in the adjacent Trench 64, and it is likely that these are elements of the same overall feature.

- Trench 64: Trench 64 contains two features, ditches F6403 and F6406, both approximately northwest - southeast aligned, with ditch F6403 appearing in plan to represent a larger recut of the earlier, smaller ditch F6406. A quadranted section excavated at the junction of these features proved this to be the case, although no secure dating evidence was recovered from either feature. Ditch F6403 is linear in plan, with moderately sloping to near vertical convex sides leading abruptly to a flat base. Measuring 1.76m wide and 0.66m deep, ditch F6403 is exposed for a length 6.7m. The size of the recut has totally truncated the 'original' ditch F6406, with the relationship recorded in the longitudinal section. Ditch F6403 contained three fills. The uppermost, (6401), is a very dark brown friable silty loam up to 0.23m deep, containing moderate small angular chalk fragments and sparse small irregular flint fragments. Seven flint waste flakes and a single small fragment of burnt animal bone (weight 5g) were recovered from this fill.

The middle fill of F6403, fill (6402), is a friable yellowish brown silty clay loam containing common small sub-angular chalk fragments and rare small irregular flint fragments. Up to 0.16m deep, fill (6402) yielded three flint waste flakes and two very small pieces of animal bone (weight 2g).

The primary fill of F6403 is a firm off-white calcareous clayey silt (6408). Containing profuse small sub-angular chalk fragments and with a depth of 0.12m, (6408) produced no dating evidence.

As previously mentioned, ditch F6403 appears to be a recut of an earlier, smaller ditch. This feature, F6406, is also linear in plan, with moderate to steeply sloping convex sides leading to a flattish base. Measuring 1.20m wide and 0.29m deep, ditch F6406 is cut into the natural weathered chalk and is exposed for a length of 4.4m, extending beyond the trench to the northwest. Ditch F6406 contained two fills.

The upper fill (6404) is a dark brown friable silty loam containing sparse small sub-angular chalk fragments and rare small irregular flint fragments, up to 0.17m deep. Seven flint waste flakes and a single small piece of burnt animal bone (weight 2g) were recovered from this fill.

The primary fill of F6406 (6405), is a firm yellowish brown silty clay loam containing profuse small sub-angular chalk fragments and rare small irregular flint fragments. no finds were recovered from (6405).

- Trench 66: A single ditch was recorded within Trench 66. Aligned roughly northwest - southeast, ditch F6603 is linear in plan, with moderate to steeply sloping convex sides leading to a flattish base. Measuring 1.95m wide. with a depth of 0.55m, ditch F6603 is cut into the degraded natural chalk.

Ditch F6603 contained two fills. The upper fill (6601) is a friable dark brown silty clay loam containing sparse small sub-angular chalk fragments up to 0.30m deep. Finds from this context comprised two flint waste flakes and a single piece of animal bone (weight 11g).

The primary fill (6602) is a greyish brown friable clayey silt containing common small to medium sub-angular chalk fragments. 0.22m deep. No finds were recovered from this fill.

- Trench 74: Within Trench 74 was recorded a ditch F7401. Linear in plan and aligned northwest - southeast, F7401 has shallow to very steep convex sides with a well-defined squared base and lower sides. The upper sides of the feature are cut through very badly degraded chalk, with subsequent weather damage and tree root disturbance, although the mid and lower sides are well-preserved. Ditch F7401 measures 2.8m wide with a depth of 0.85m. and contained three fills.

The uppermost fill (7402) is a dark brown friable silty clay loam containing sparse small sub-angular chalk fragments, 0.28m deep. No finds were recovered.

The middle fill (7403) is a yellowish brown friable silty clay containing common small sub-angular chalk fragments. 0.20m deep. No finds or dating evidence were encountered.

The primary fill (7404) is a compact off-white calcareous silty clay containing profuse small sub-angular chalk fragments and rare small irregular flint fragments. 0.37m deep. No finds were recovered.

8.4.27 It may be noted that the ditches recorded in Trenches 63, 64, 66 and 74 share a general northwest - southeast alignment. If the courses of these features are extended each other it becomes apparent that - although no firm dating evidence has been established for the fills of any of the ditches - they are likely to be elements of the same linear feature, and can be equated with the feature interpreted as a post-medieval boundary previously interpreted as being of post-medieval date.

8.4.28 The recut in Trench 64 - F6403 - shares the same profile and fill descriptions as

ditch F6303 in Trench 63 and F7401 in Trench 74, suggesting these are all contemporaneous. It cannot be conclusively established that ditch F6406 in Trench 64 and ditch F6603 in Trench 66 are the same feature. The evidence would suggest otherwise, as the dimensions of the cut of F6603 are substantially larger than those of F6406, with different fill types. The likelihood is that F6603 represents a recut of an original, smaller ditch whose surviving length extends from Trench 64 northwest towards Trench 66 for an unknown distance. Of further note is an extant field boundary to the northwest of the evaluation area which is in alignment with the ditch/ditches discussed above, and which may indicate a later rather than earlier origin for these features.

- 8.4.29 A very low linear mound which runs parallel to the ditch/ditches at a distance of approximately 10m to the southwest. This feature was only apparent due to the shadow cast when the sun was low, and was imperceptible in section, although a slight rise in the level of the grass was visible in the area of Trench 74. This feature may be a remnant field boundary or hedge line. The absence of a chalk fragment concentration along the line of this feature makes it unlikely to be a ploughed-out bank formed from the upcast of the ditch/ditches.
- 8.4.30 A number of probable tree-root hollows and periglacial features in other trenches were investigated, but none produced archaeological finds or any indication that they should be regarded as being other than of wholly natural origin.

#### *Finds*

- 8.4.31 Finds by context within each Area / Zone are quantified in Appendix 8.7, Tables 7 to 12.
- 8.4.32 The majority of finds comprised undiagnostic, patinated flint flakes. Very few retouched items or recognisable tools were present, but the types of scraper, the cores and general appearance of the flint industry would be consistent with a late Neolithic or earlier Bronze Age date. Other than the observations made above, quantities were too small to allow any detailed consideration of distribution across or the identification of clustering within the site.
- 8.4.33 The only pre-modern pottery comprised two minute, fragmentary scraps weighing less than 1g but recognisable as Samian ware, of Roman (AD 1st- or 2nd-century) date recovered from the fill of ditch 5502 in Trench 55. Later pottery and ceramic building material (tile and brick) was rarely encountered, and a possible concentration of post-medieval finds identified by the Stage 2 fieldwalking on the western side of Area B Zone 2 was not apparent from the trenching exercise.

#### *Discussion and Conclusions*

- 8.4.34 The evaluation trenches exposed surfaces of very variable quality across the site. Within Area A, the chalk bedrock was generally in good condition and archaeological features - if present - should have been readily visible. A

sufficient number of non-archaeological features were investigated to demonstrate that the absence of archaeological deposits was not due to misinterpretation. Poorer quality surfaces were encountered across Area B, particularly on the higher (more exposed) parts of the ridge in the areas corresponding with the Stage 2 Zone 2 worked / burnt flint concentrations. Again, the investigation of a number of non-archaeological features indicates that archaeological deposits were not overlooked because of misidentification. It is possible that smaller features (such as post-holes and smaller pits) could have been missed in those trenches where rubbly subsoil deposits were present, but the removal by machine of depths of this horizon should have ensured that larger (deeper) features and linear features would have been seen and recognised.

- 8.4.35 Variations in bedrock quality are in part due to topographical considerations (the more exposed areas particularly of Area B being noticeably poor) and are also related to the occurrence of periglacial features and tree-hollows, which have fractured the chalk surface and apparently locally enhanced erosion processes. The Stage 1 desk-study does not include any detailed information on the land-use history of either Area A or Area B.
- 8.4.36 Scanning of spoil heaps recovered only small quantities of unstratified finds. Although the number of items of worked flint was too small to determine any patterning, the overall distribution (particularly in respect of Area B Zones 1 and 2) is not unrelated to the concentrations determined on the basis of systematic field surface collection carried out as the Stage 2 evaluation. A suggested late Neolithic / earlier Bronze Age emphasis for the flintwork accords with the broad conclusions reached for the fieldwalking exercise. However, the quantities of flint recovered from the fieldwalking (554 items from Area B and 84 items for Area A) were also small given the size of the areas examined.
- 8.4.37 As would be expected, material recovered from spoil heap scanning is more limited in quantity and more restricted in range than was encountered during fieldwalking. From the trenching exercise, burnt flint is certainly under-represented by comparison with the results from fieldwalking. Although material of late date was routinely collected, it was not possible to detect the concentration of post-medieval finds west of Area B Zone 2 identified in fieldwalking, nor verify the existence of any structures of recent date, which had been suggested (Dalton 1997, 6) on the basis of that evidence.
- 8.4.38 One linear feature, a shallow gully within Area B Trench 55, contained no finds other than extremely small fragments of Roman (Samian) pottery. It is not however clear that the feature itself is of Roman date; no other Roman finds were made (either in the vicinity of Trench 55 or elsewhere during the evaluation), and the fragments are so small that they may easily have been introduced into the feature and cannot be considered to provide positive dating evidence.
- 8.4.39 The linear feature crossing Area B Zone 2 and appearing in Trenches 63, 64, 66 and 74 is also not conclusively dated. The fills contained only very sparse

quantities of worked flint which are likely to be residual. The desk-based assessment implies that the ditch is a post-medieval field boundary, although no evidence is presented in that study.

- 8.4.40 Although crossed by a number of the Zone B trenches, other than the linear feature noted in Trenches 63, 64, 66 and 74 no evidence was found for the presence of ditches plotted on the basis of air photographs (as shown on Figure 8.18). Those cropmark features shown in the eastern part of Zone 2 correspond with shallow combe-like depressions running downslope to the east of the site and beyond, and may be of natural (ie non-archaeological) origin. The other features - in the main aligned along the crest of the ridge - were not noted as extant subsoil features in any of the trenches which would have been expected to have crossed them.
- 8.4.41 No evidence was recovered for the existence of the round barrow recorded by Colt Hoare (his plan of 1812; Figure 8.3) and on the Ordnance Survey 1st edition 1" map of 1808 (Figure 8.2) within or close by Zone 1 of Area B. The scale and level of detail of the maps is insufficient to allow the location of the barrow to be accurately plotted, but it is possible that its site lies south of the trenched area outside the proposed chalk pit extension. This position would have been consistent with allowing the mound to be seen as a prominent, elevated feature from Ranscombe Bottom to the south.

## 8.5 OVERALL CONCLUSIONS

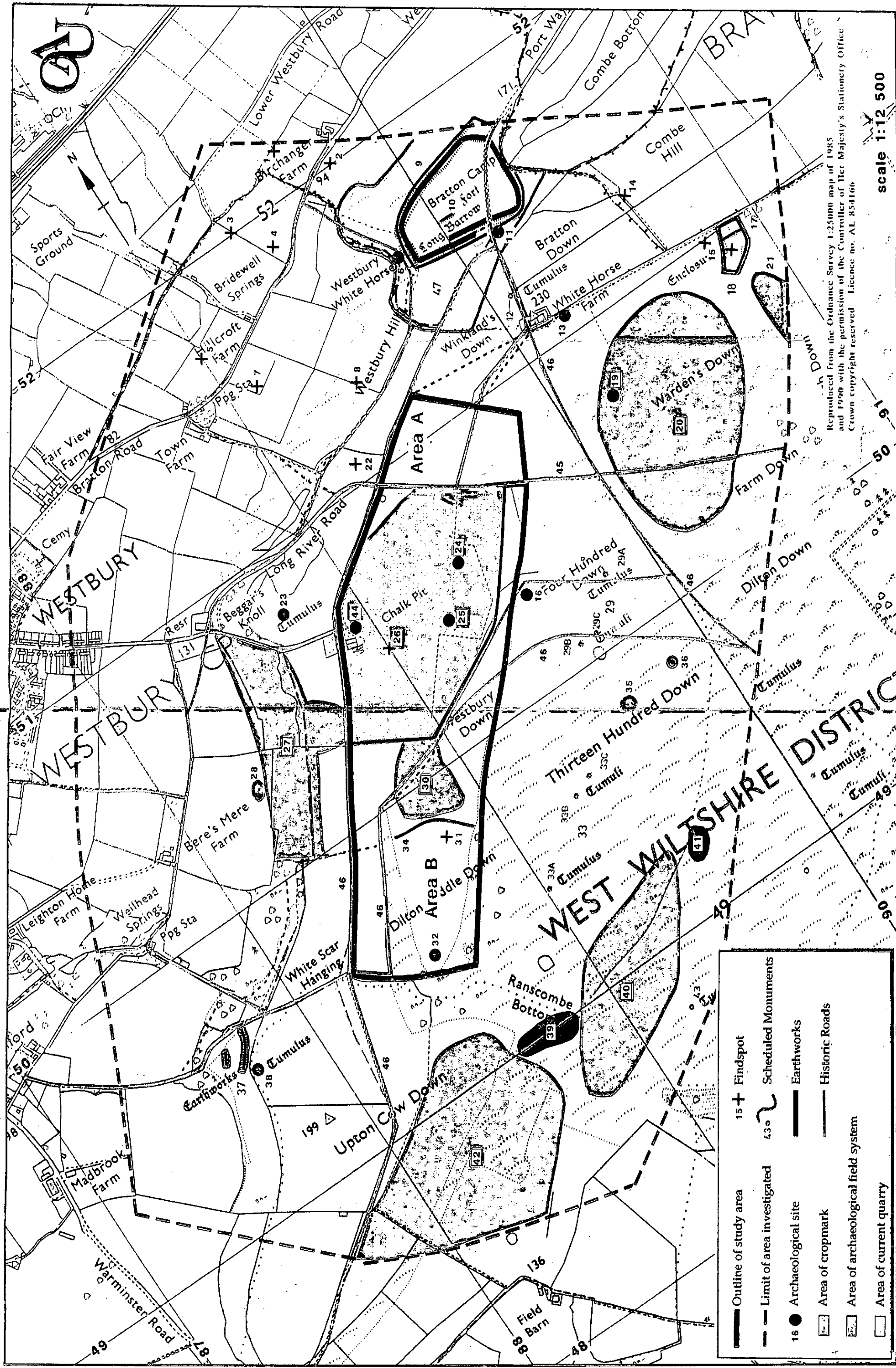
- 8.5.1 Although the extension areas are located within a potentially rich archaeological context, exhaustive site investigations have demonstrated that nothing of consequence exists. The County Archaeologist's letter of 18 November 1998 (see Appendix 8.8) states that there are no archaeological constraints upon granting planning permission for the quarry extension, and no planning conditions relating to archaeology will be necessary.

## 8.6 REFERENCES

- WCC CAS (1995a), WCC County Archaeological Service, Archaeological Evaluation Brief – Westbury Cement Works – Chalk Pit Extension, 2 March 1995
- WCC CAS (1995b) WCC County Archaeological Service, Standards for Archaeological Assessment and Field Evaluation in Wiltshire, [draft] April 1995
- Colt Hoare, Sir Richard (1812), The Ancient History of South Wiltshire
- Cunliffe, B (1993), Wessex to AD1000
- Gover, JEB at al (1939), The place names of Wiltshire
- Kinnes, I (1979) Round barrows and ring-ditches in the British Neolithic (British Museum Occasional Paper no.7)

- VCH (1957, 1973, 1965), The Victoria History of the counties of England: Wiltshire, vol 1 part 1; vol 1 part 2; vol 8
- OS 1<sup>st</sup> edition 1" (1810-12), 1<sup>st</sup> edition 25" (1887), 2<sup>nd</sup> edition 25" (1901), 3<sup>rd</sup> edition 25" (1924)
- Andrews & Dury's map of Wiltshire (1773)
- Warminster, Station II (Map of archaeological remains in the Warminster area, in Colt Hoare 1812)
- Westbury Inclosure Map (1808)
- Westbury Tithe Map (1842)



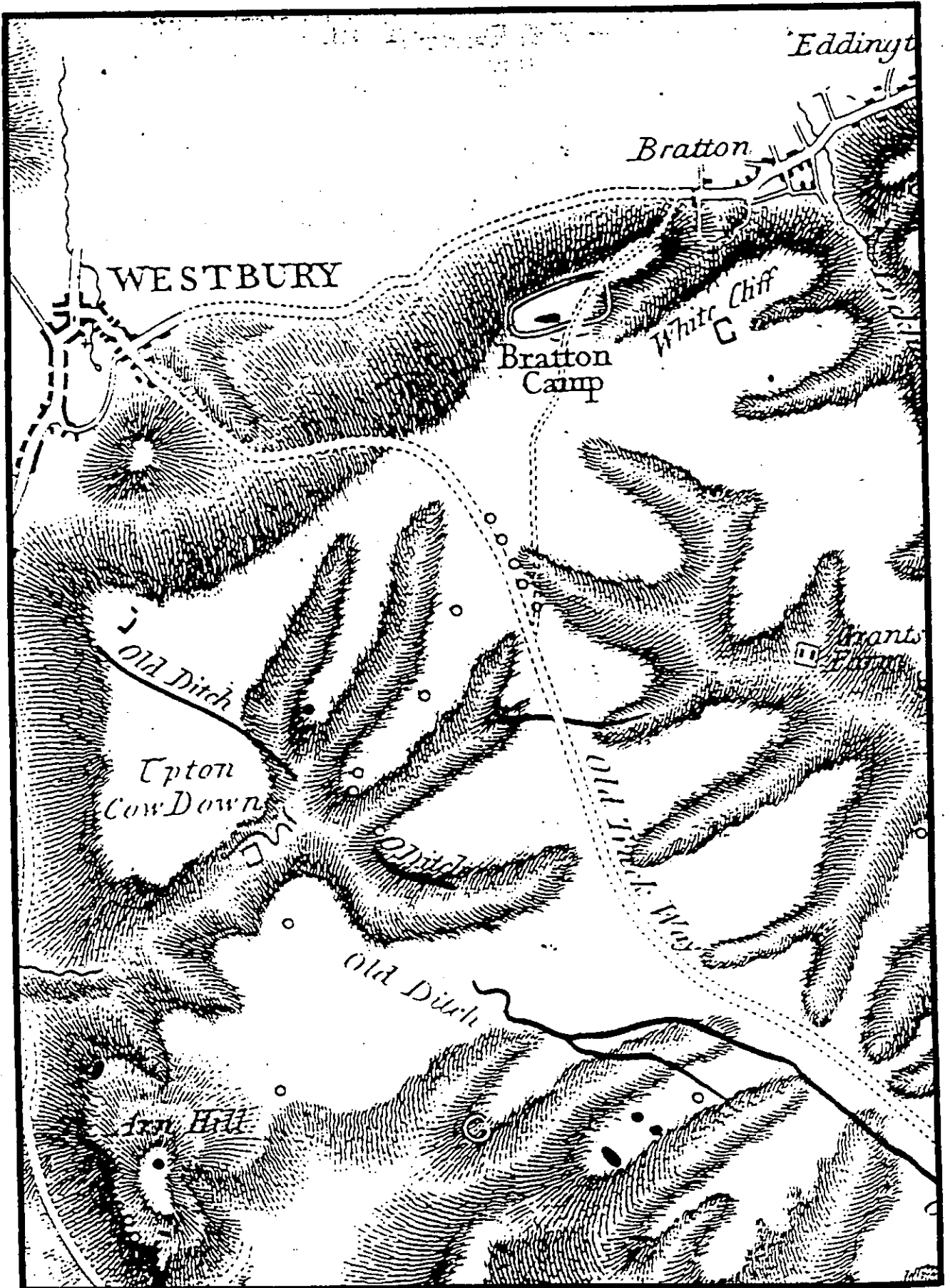


### b. Location of Archaeological Remains

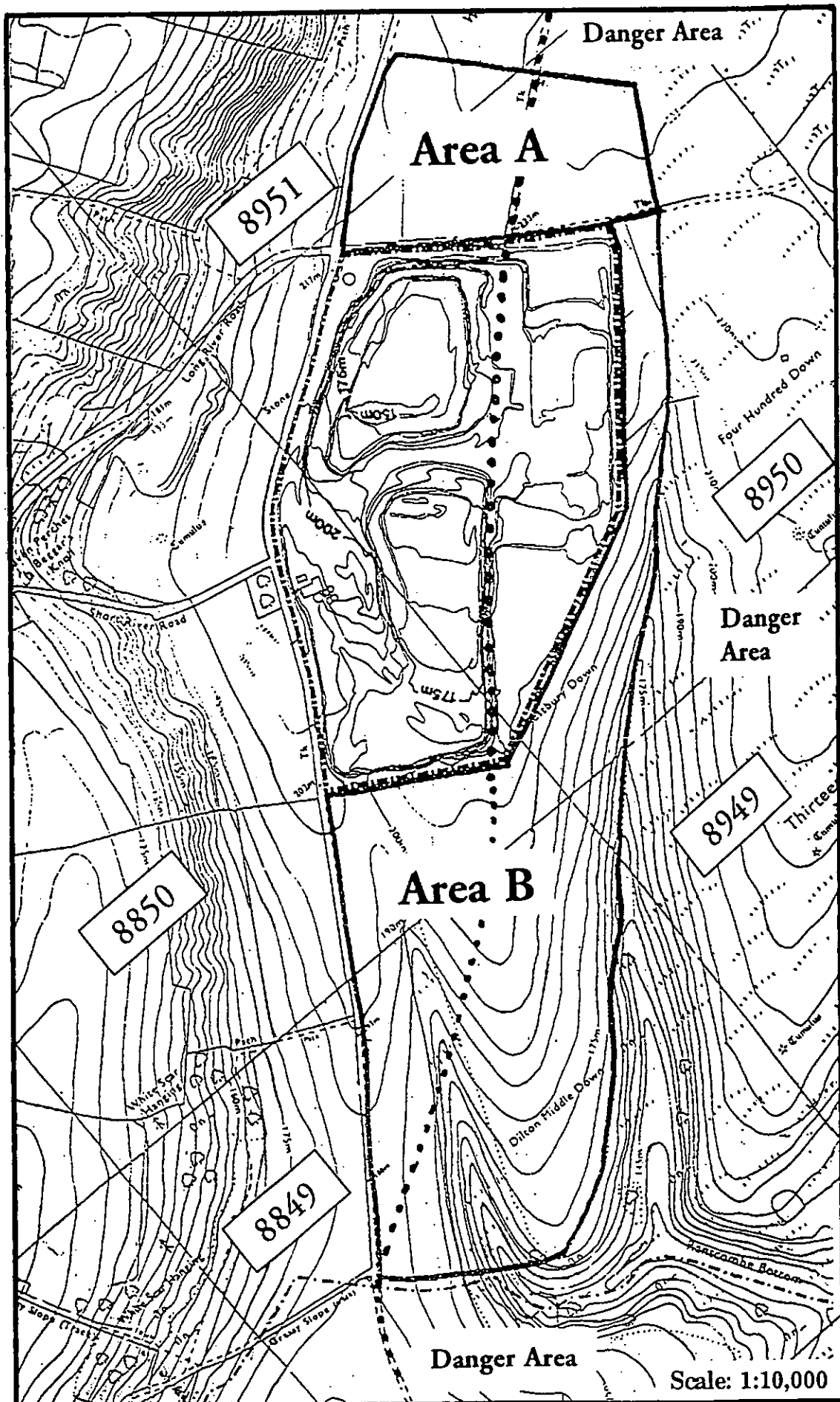


Extract from OS 1st edition 1" (1808)

Figure 8.2

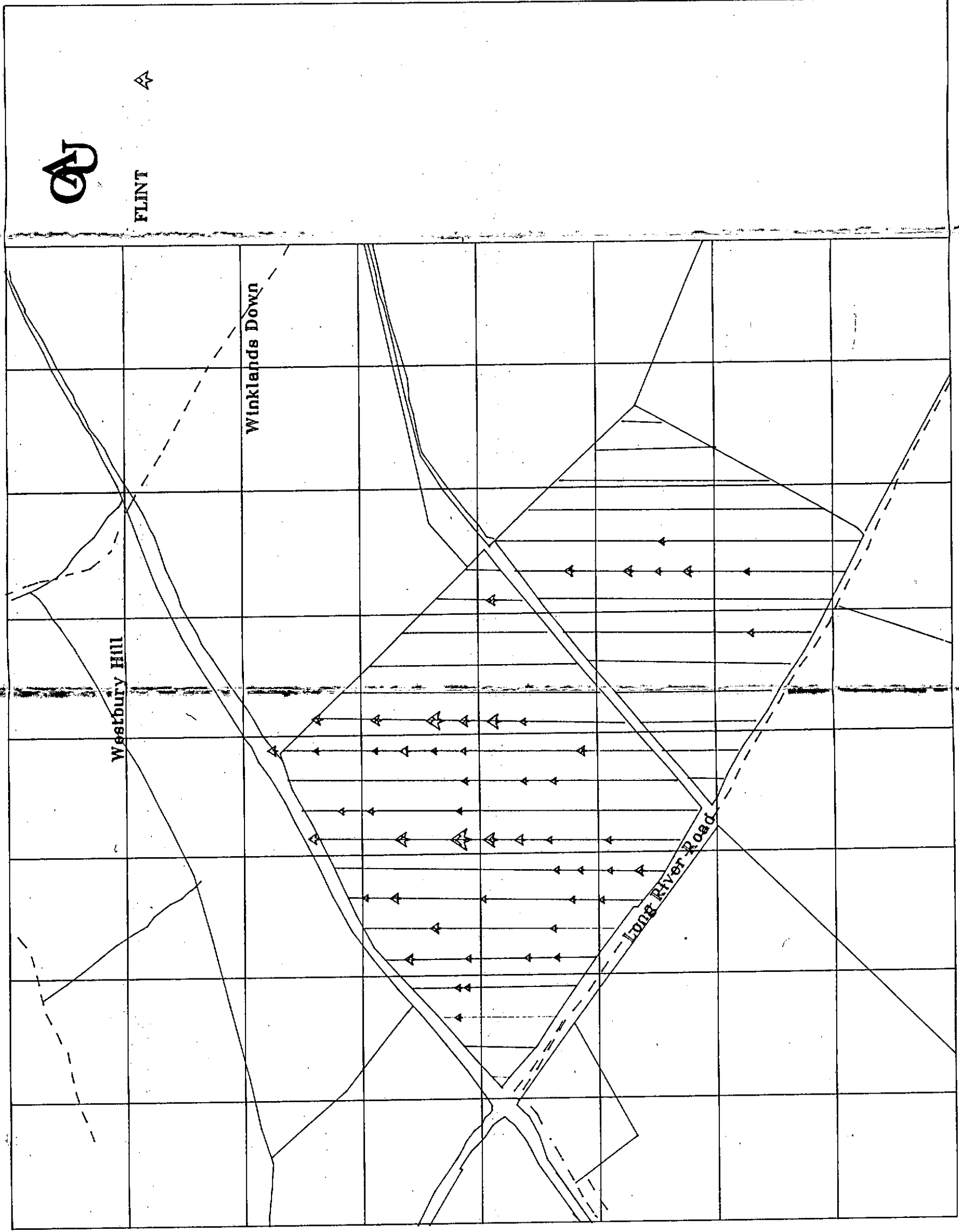


Extract from Colt Hoare's Map of the Antiquities of Wiltshire (1812)  
(Location of barrow is marked by black spot)



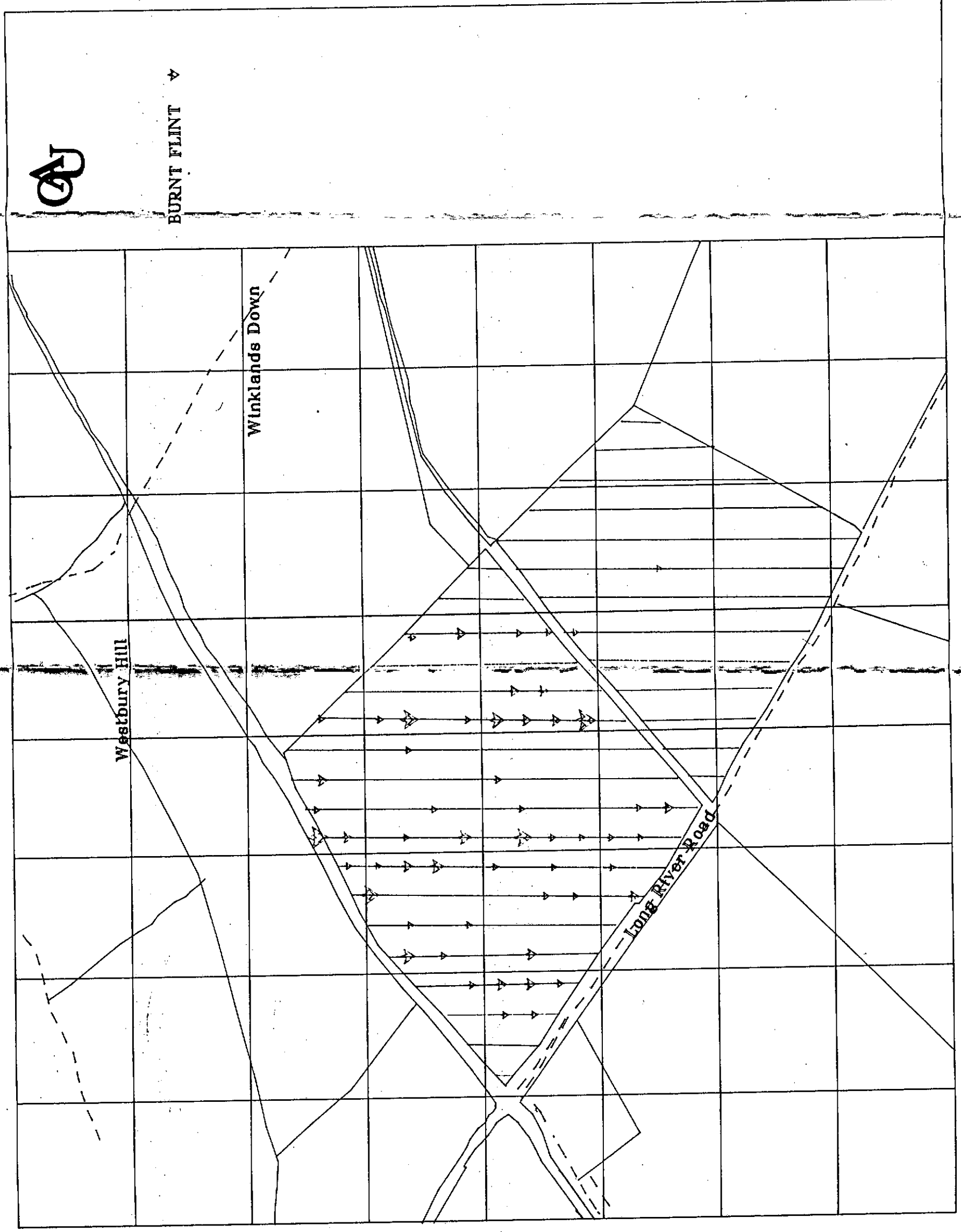
© Crown Copyright

Westbury Chalk Quarry (WECQU 95): Location of Evaluation Areas A and B



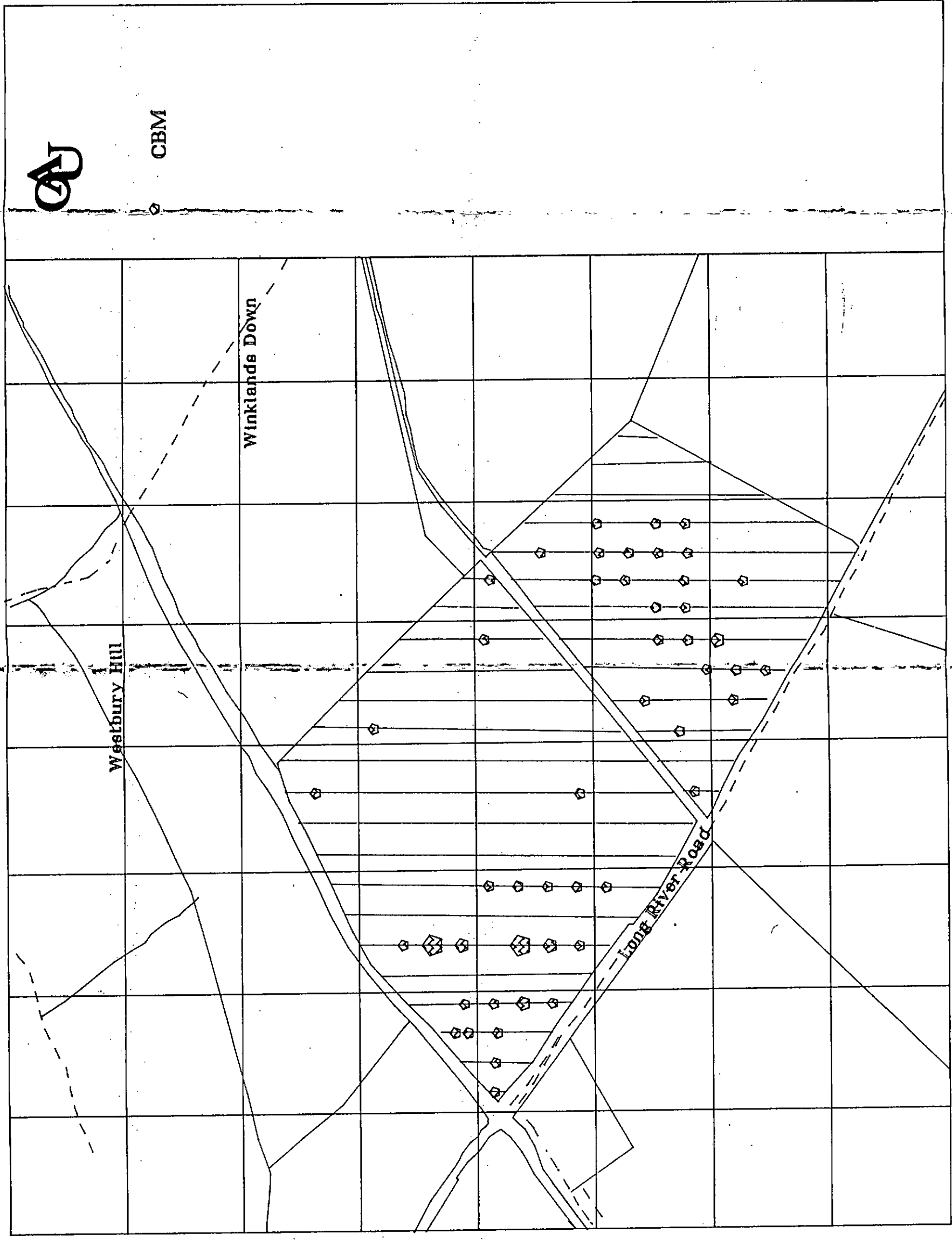
Results of Field walking at Westbury Chalk Quarry, 1995

Figure 8.5:  
Distribution of worked flint



Results of Field walking at Westbury Chalk Quarry 1995

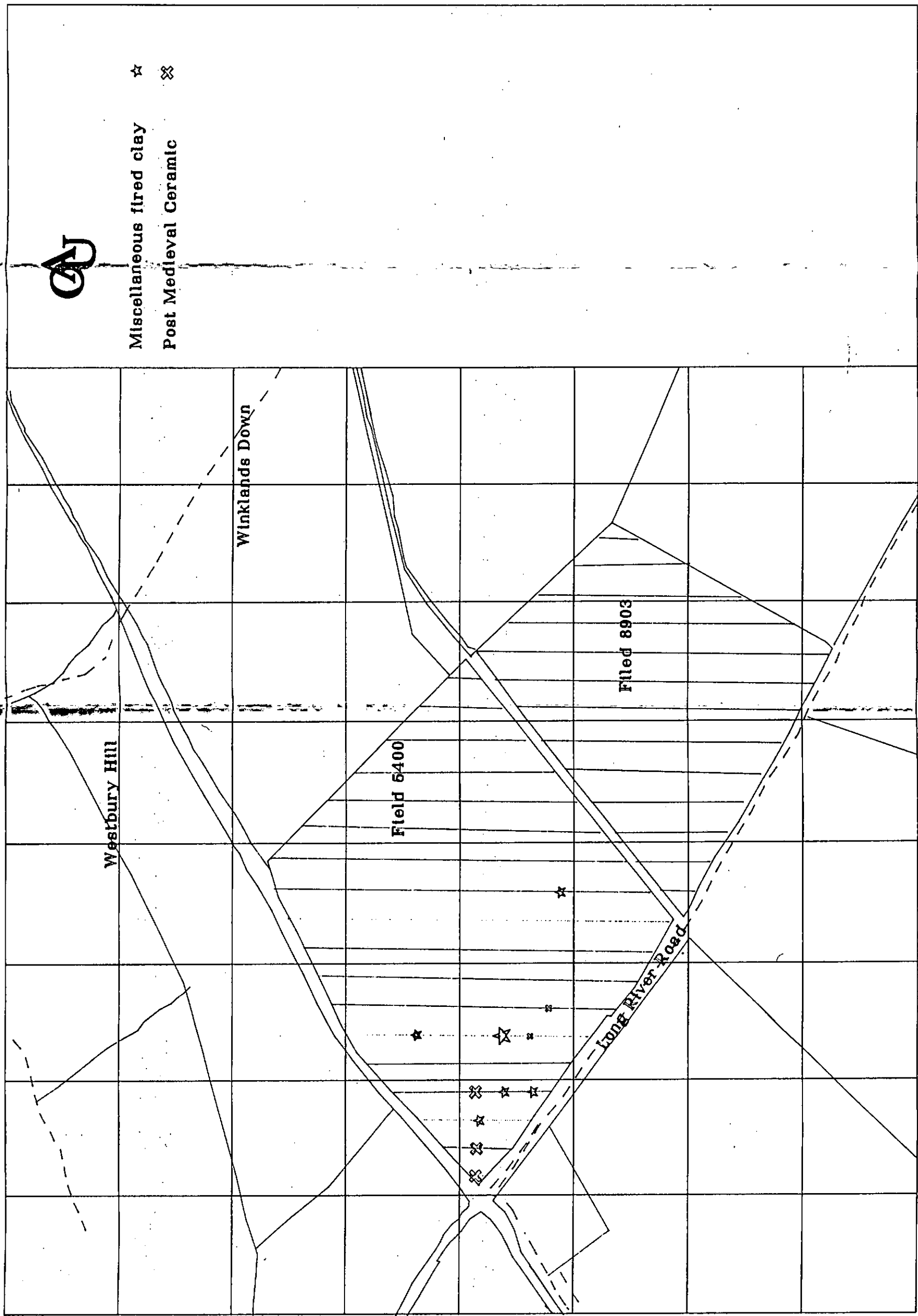
Figure 8.6:  
Distribution of burnt unworked flint



Results of Field walking at Westbury Chalk Quarry 1995

Figure 8.7:  
Distribution of ceramic  
building materials

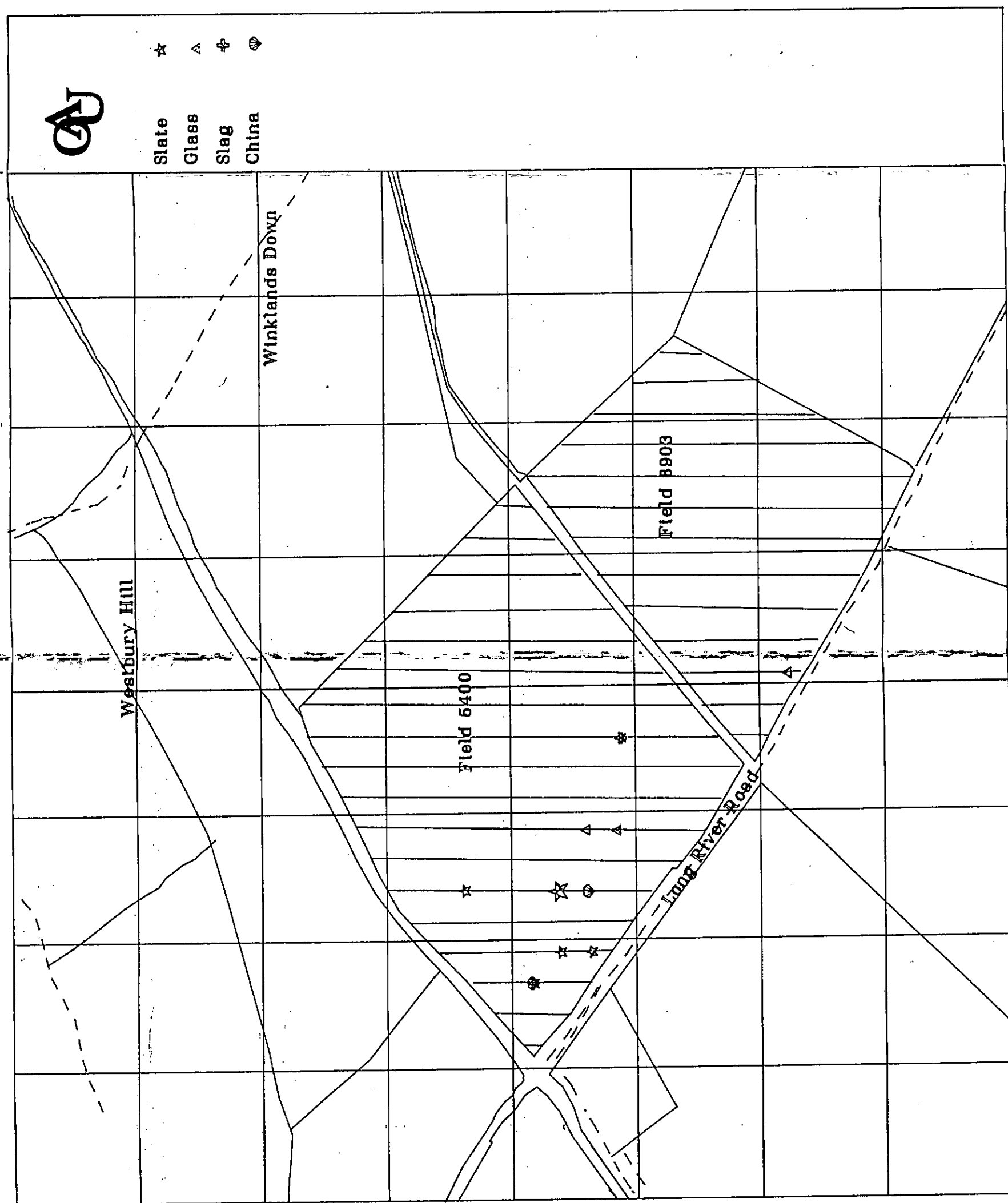




Results of Field walking at Westbury Chalk Quarry 1995

Figure 8.8:  
Distribution of miscellaneous fired  
clay and post-medieval ceramics





### Results of Field walking at Westbury Chaik Quarry 1996

**Figure 8.9:**  
**Distribution of miscellaneous materials**

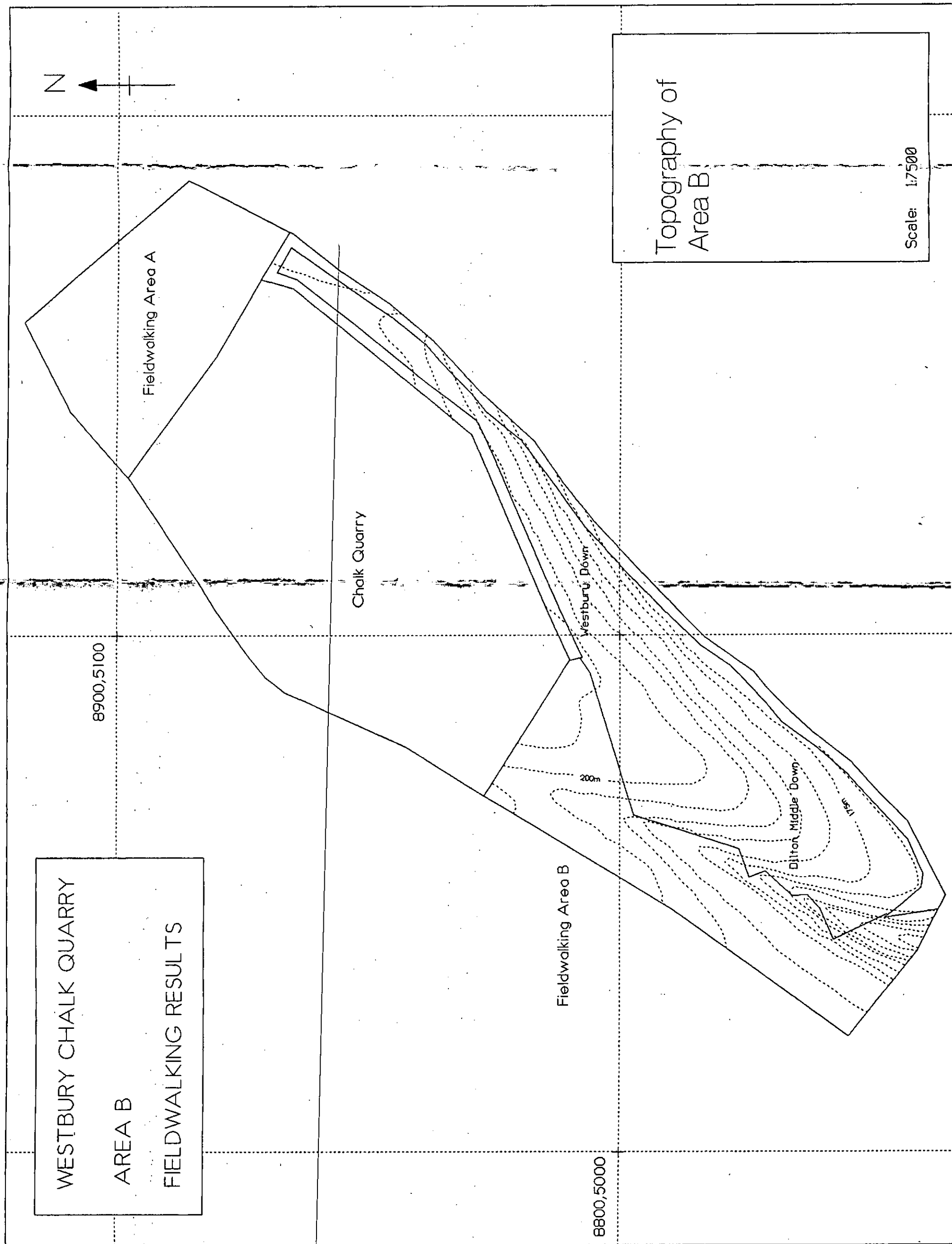


Figure 8.10

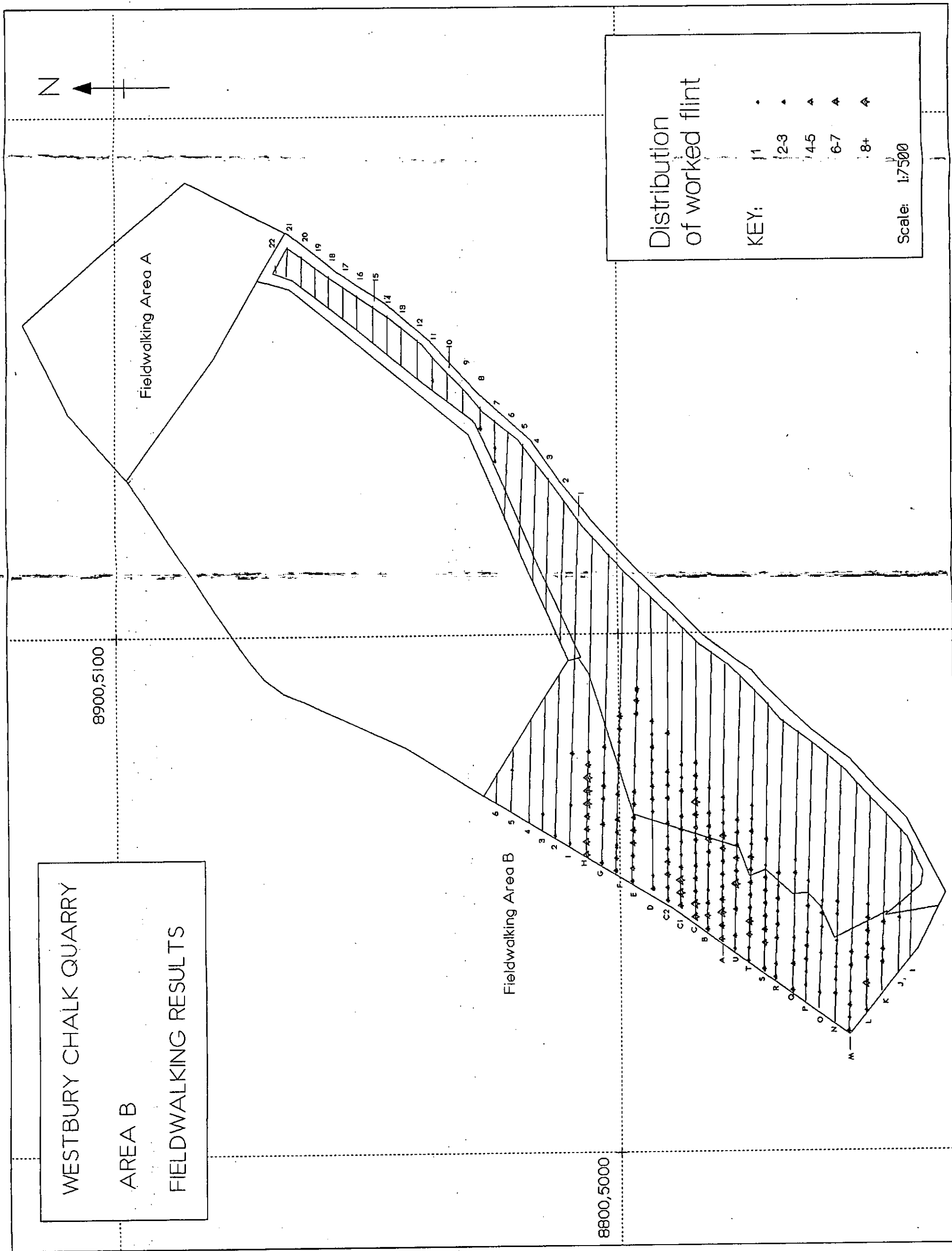


Figure 8.11

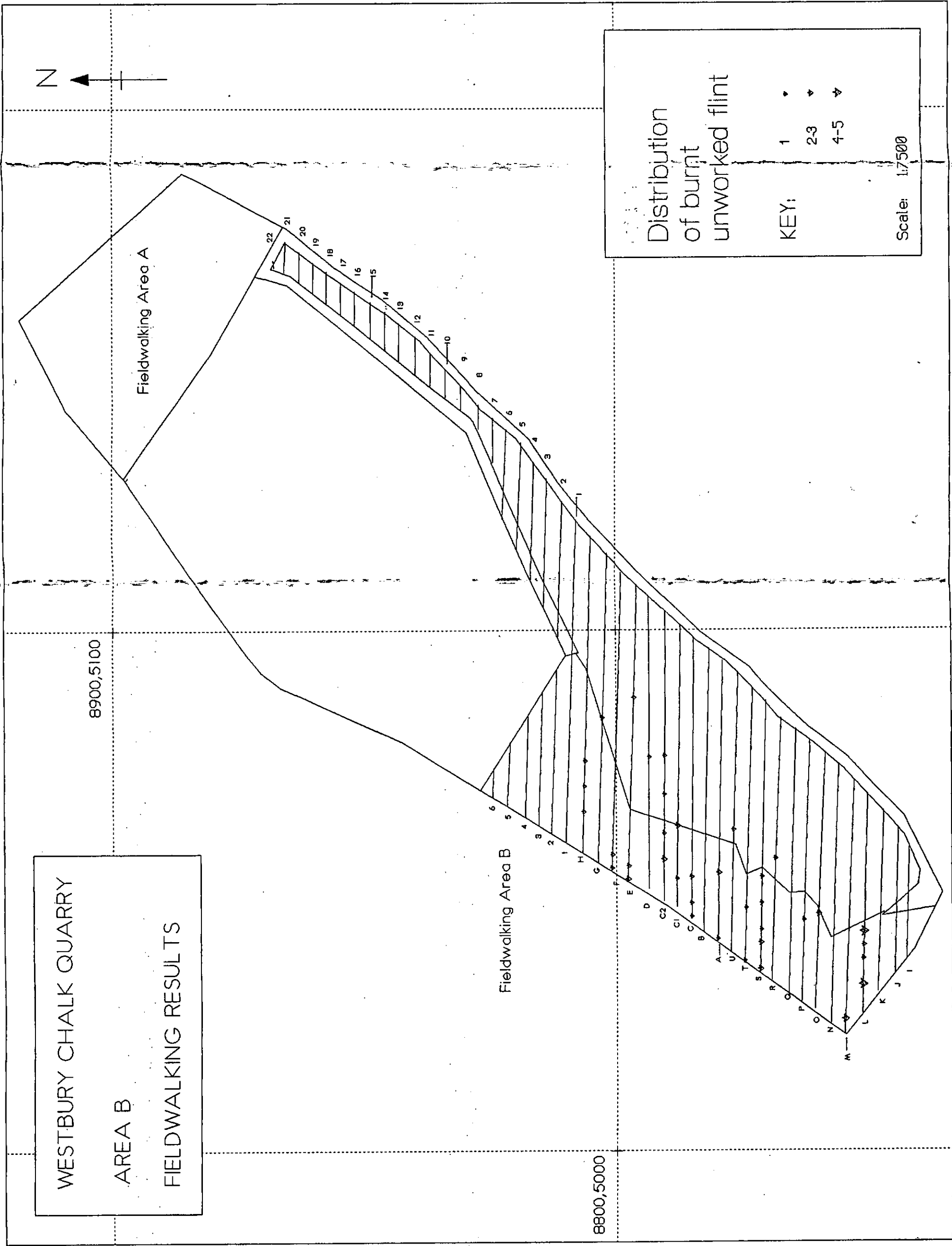


Figure 8.12

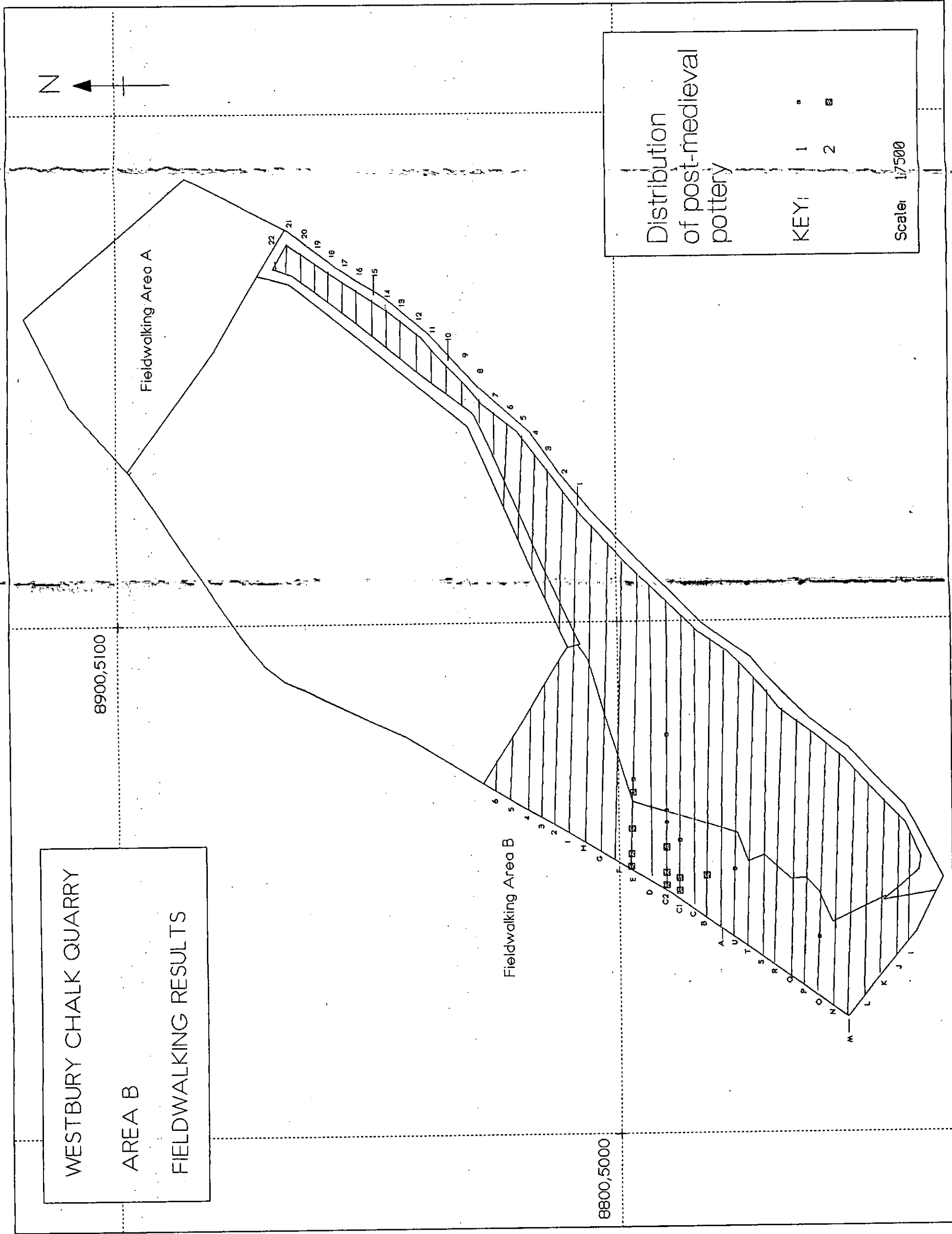


Figure 8.13

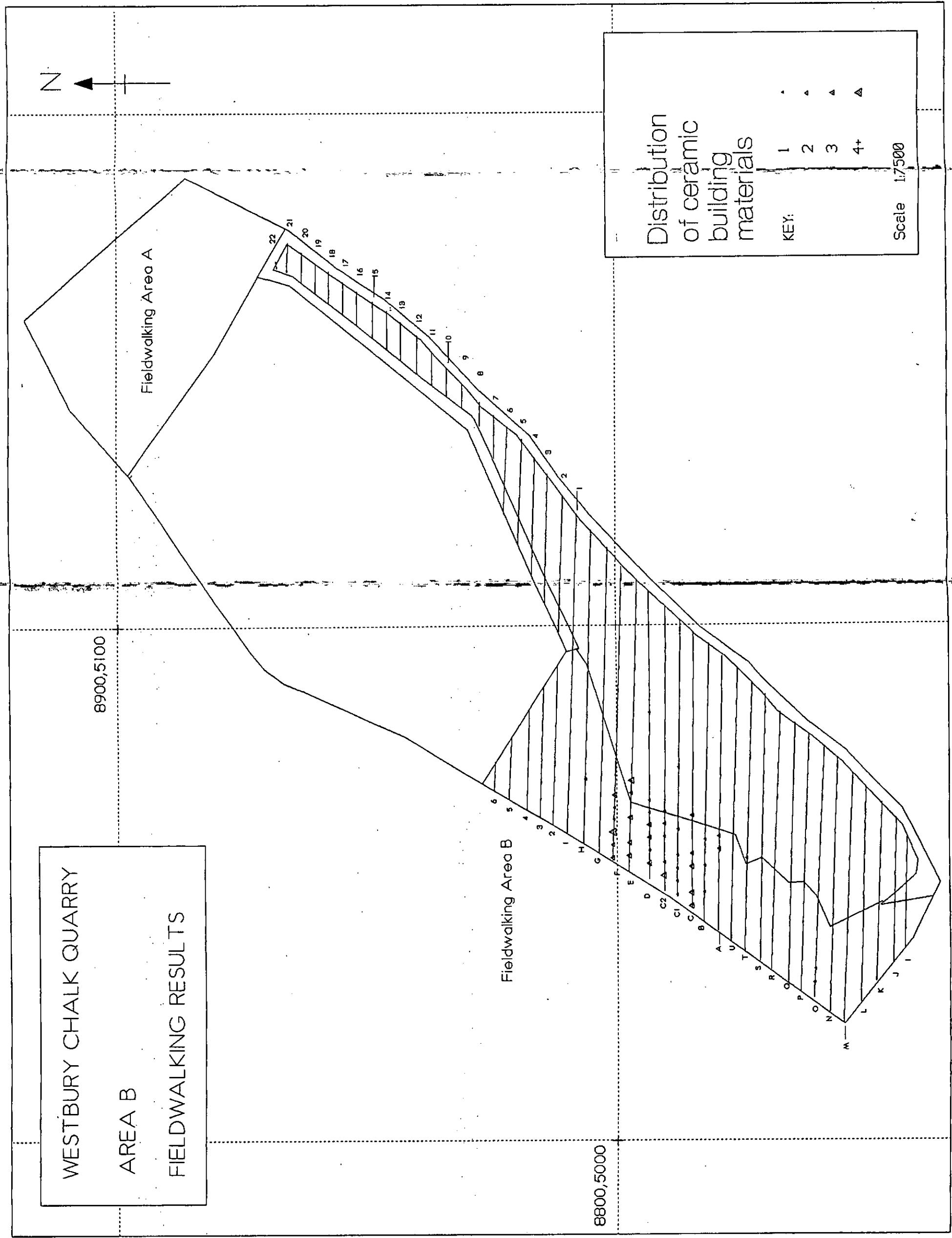
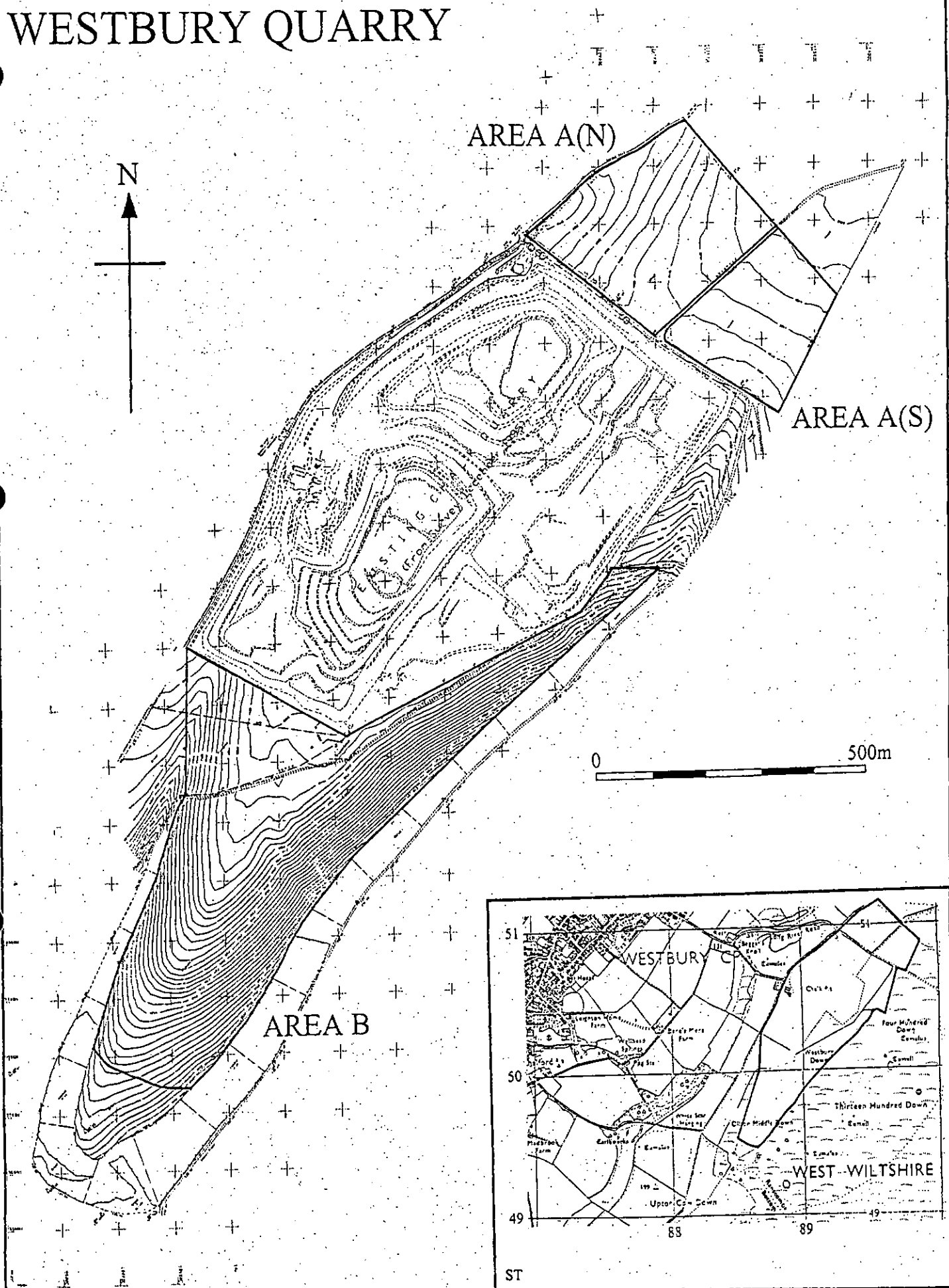


Figure 8.14



# WESTBURY QUARRY



## Site location and evaluation areas

(plan adapted from Simmons Survey 0/073/96)

Inset: Based upon the 1990 Ordnance Survey 1:25 000 map with the permission of The Controller of Her Majesty's Stationery Office, © Crown copyright AC archaeology, Chicklade, Wiltshire; Licence no. AL52475A0001

Figure 8.15

# WESTBURY QUARRY EVALUATION AREA A

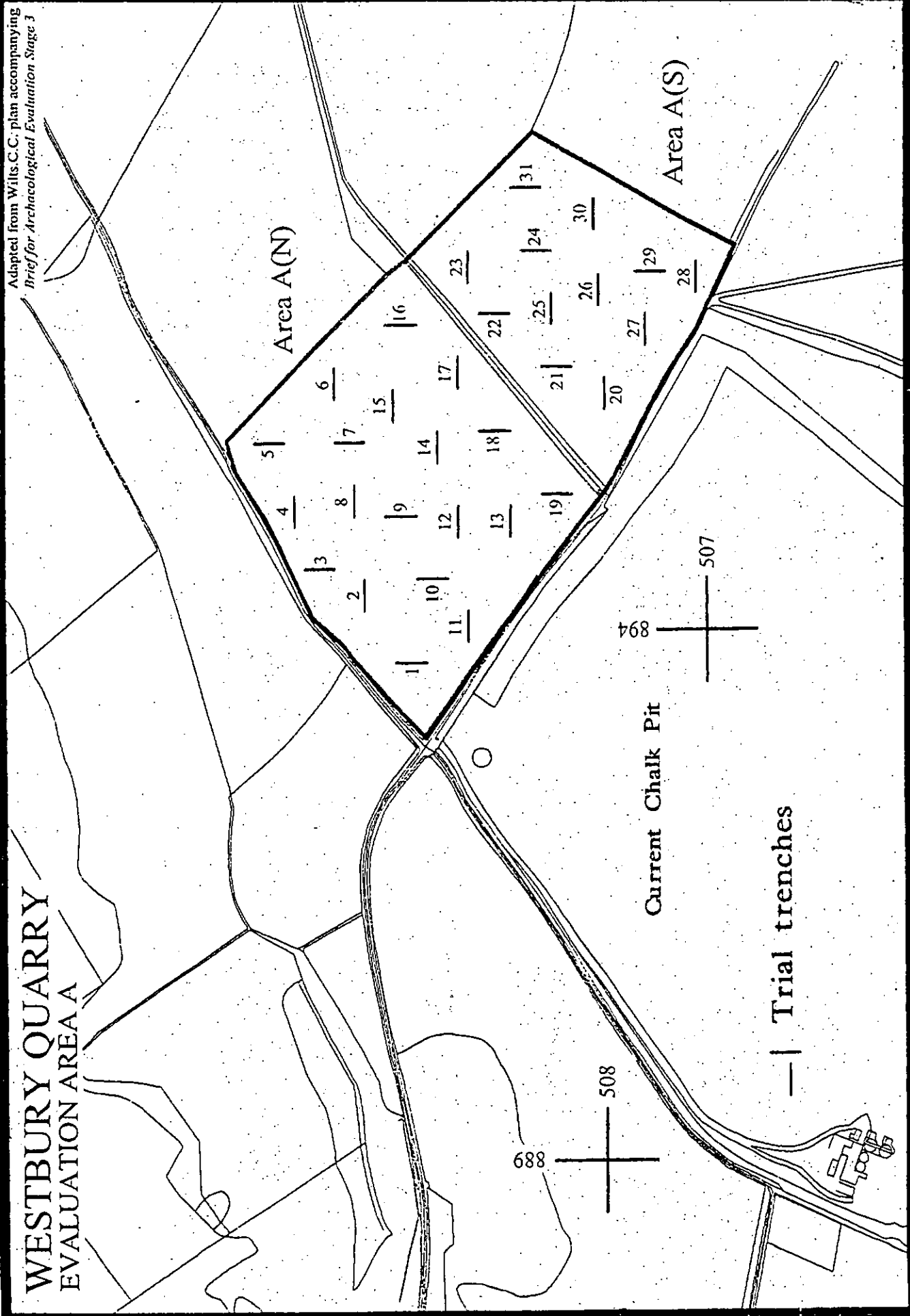


Figure 8.16



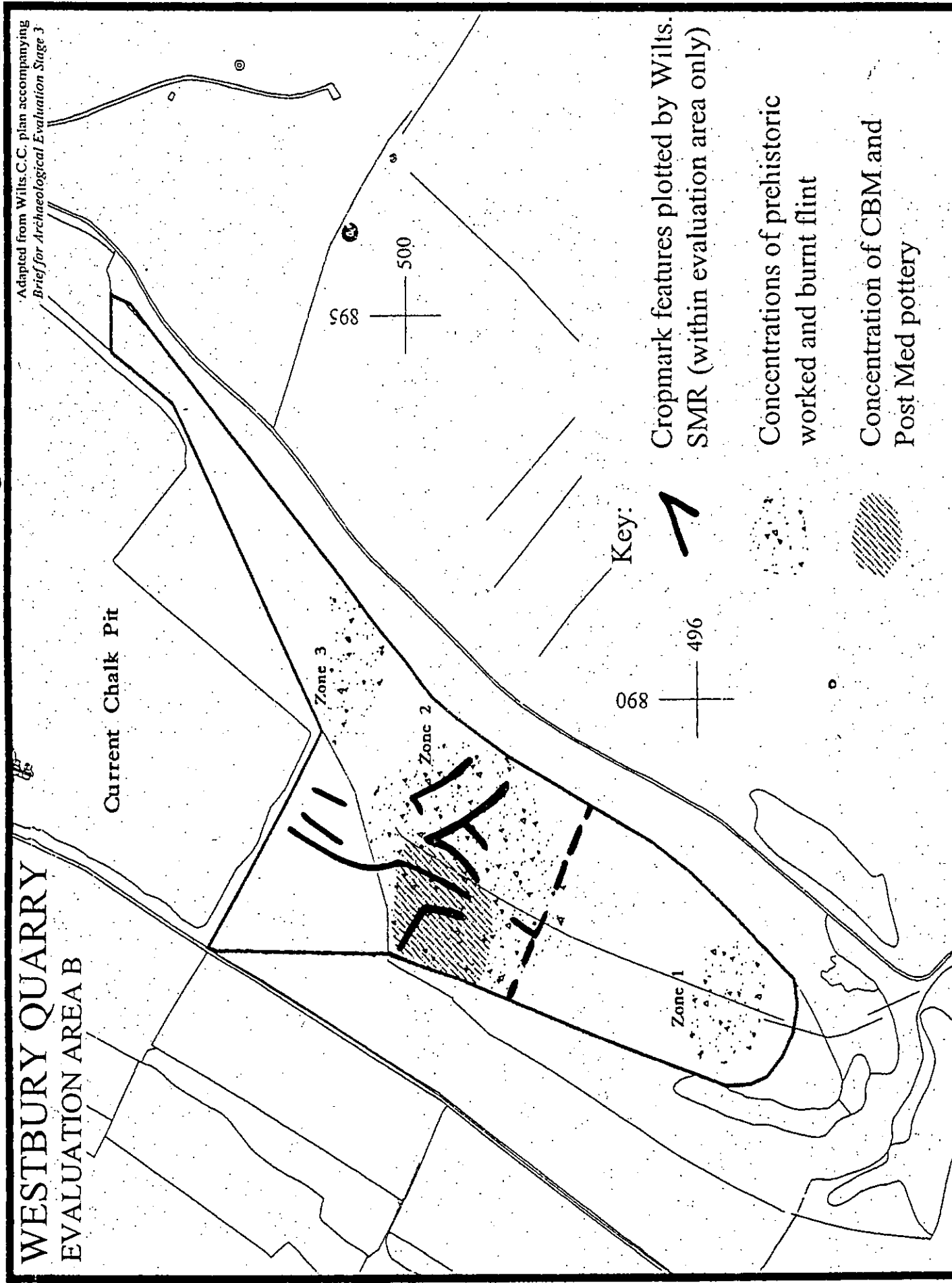


Figure 8.17

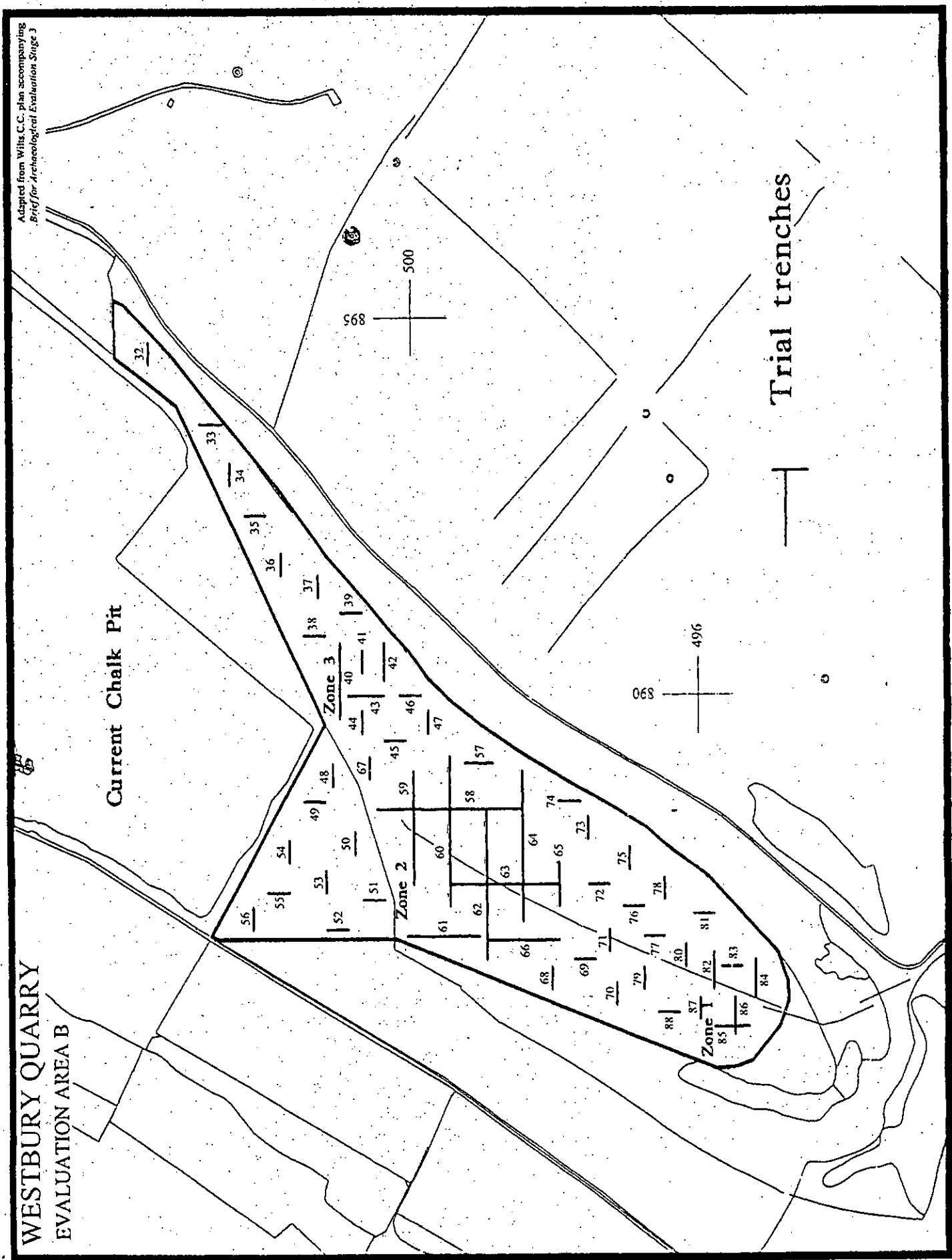
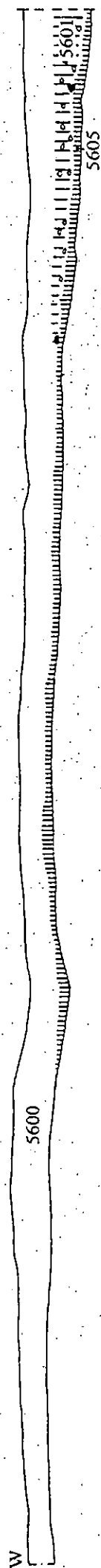
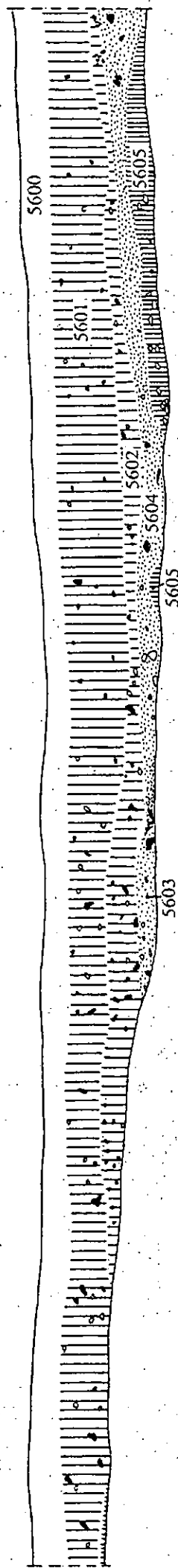


Figure 8.18

# WESTBURY QUARRY



0 10m



Key: Topsoil

Silty loam

Degraded chalk

Buried soil

## TRENCH 56

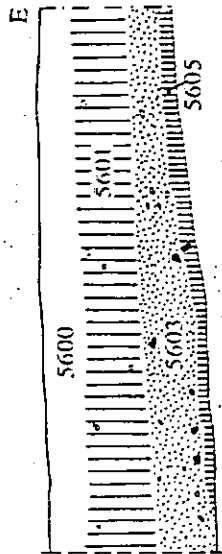
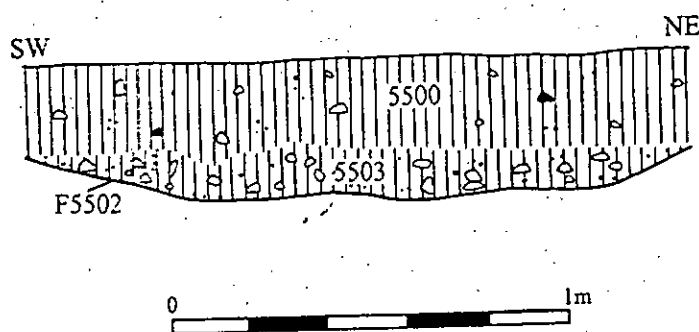
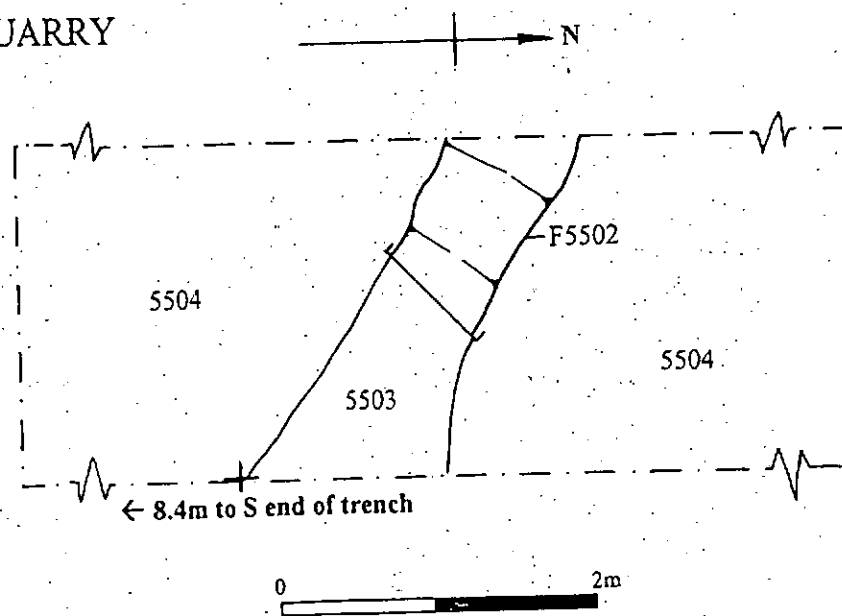


Figure 8.19

# WESTBURY QUARRY

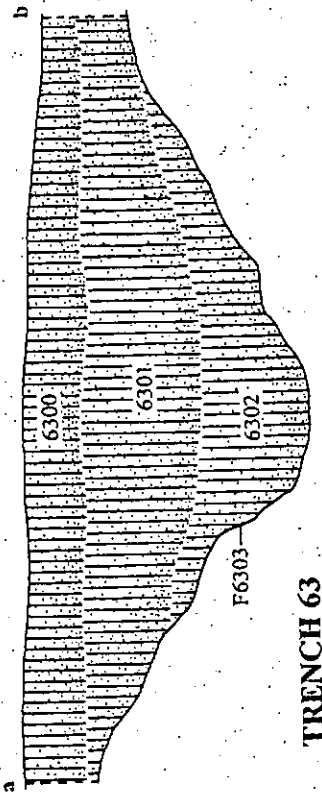


**TRENCH 55**

**Figure 8.20 Plan and section of Ditch F5502**

# WESTBURY QUARRY

A

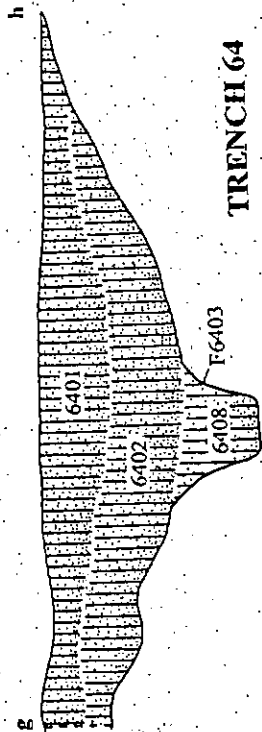


TRENCH 63

Key:

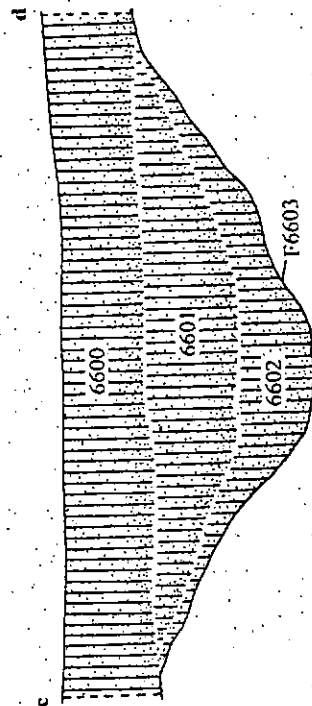
- Silty clay loam
- Silty clay
- Clauky clay

B



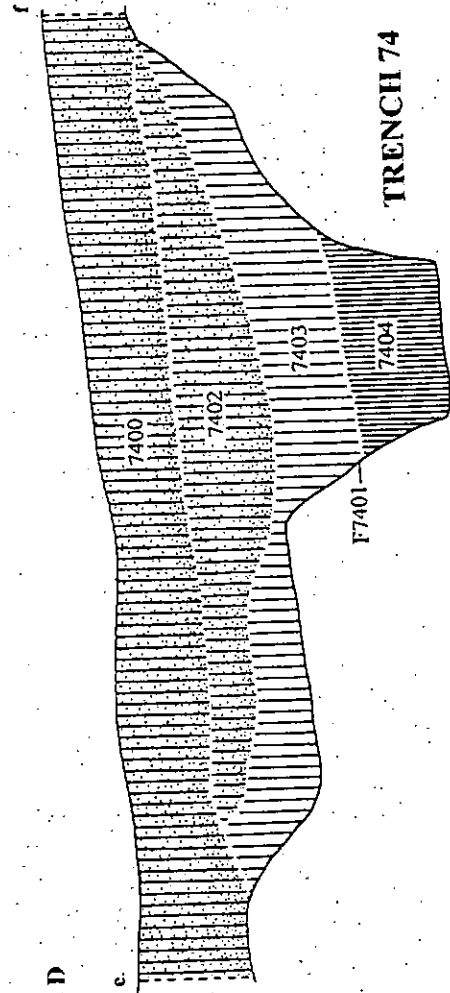
TRENCH 64

C



TRENCH 66

D



TRENCH 74

Figure 8.21

Sections across linear ditch (F6303; F6403; F6603 F7401)

# WESTBURY QUARRY

Plan of Ditch - Tr63 / Tr64 / Tr66 / Tr74

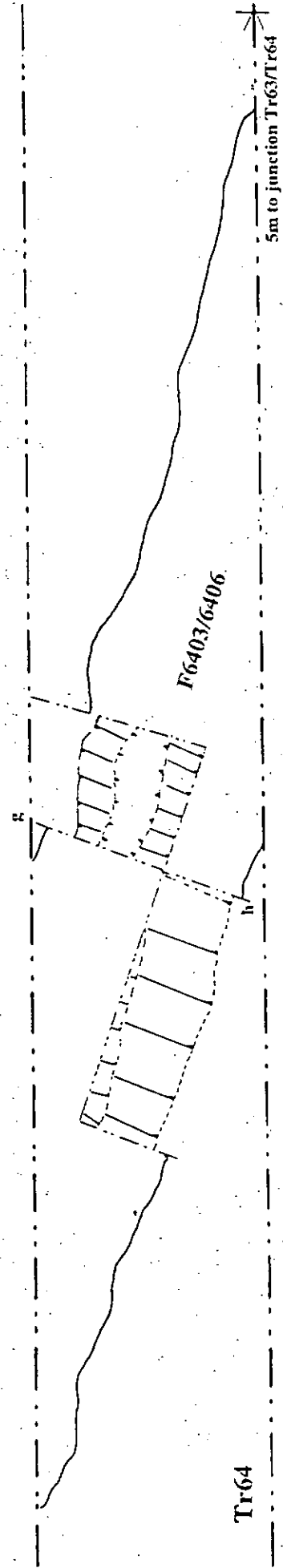
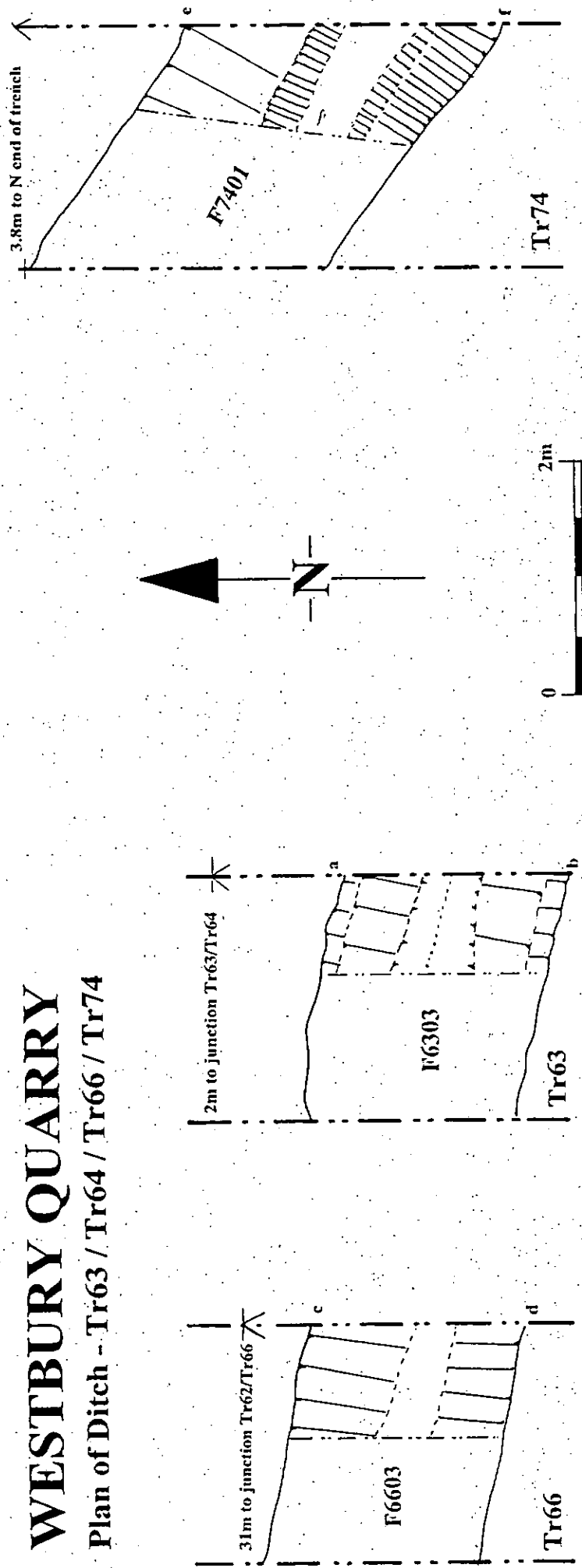


Figure 8.22

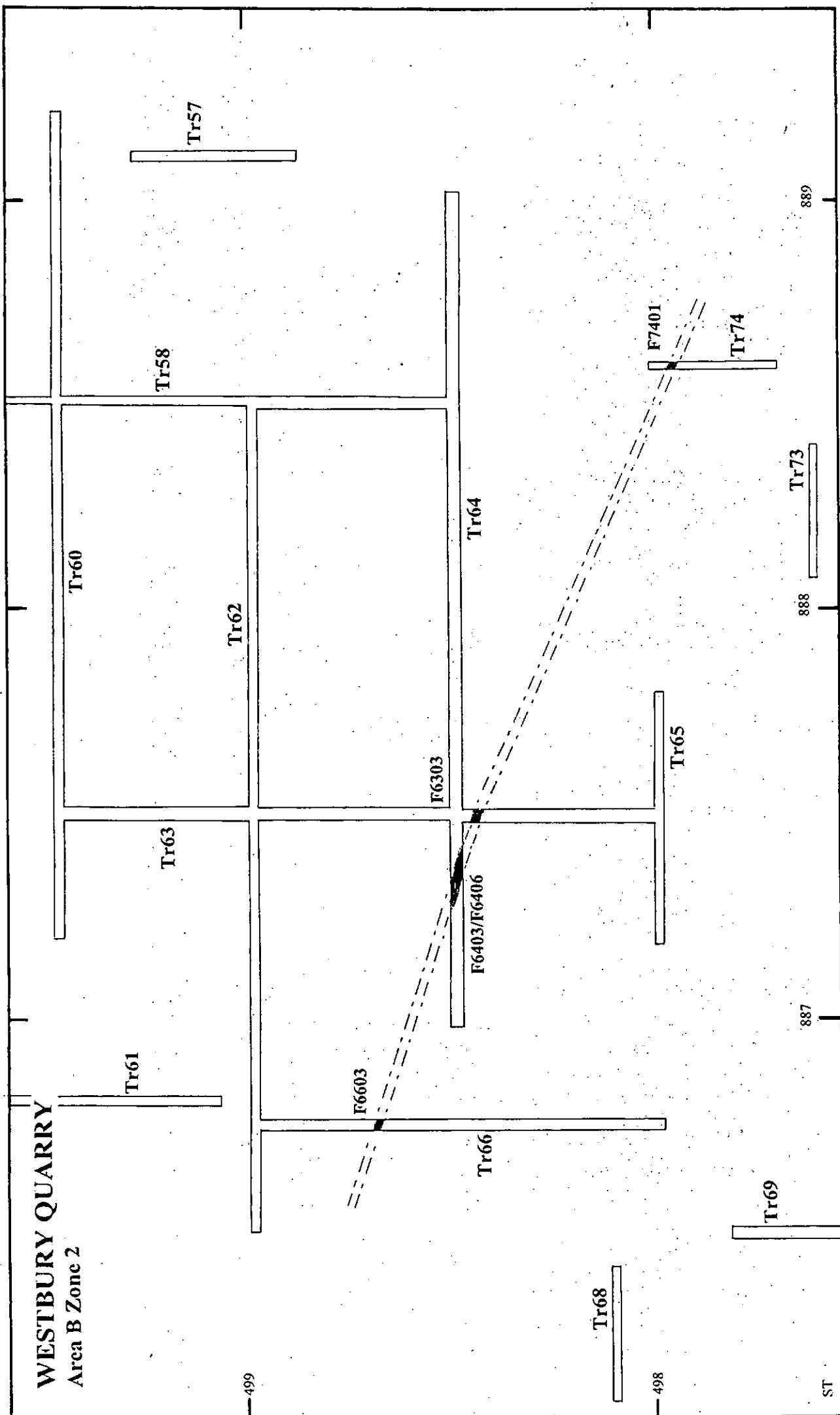


Figure 8.23

**Appendix 8.1**  
Gazetteer of Archaeological Sites



## Appendix 8.1

### Gazetteer of Archaeological Sites within the Study Area

| OAU no | Description                                                                                                                                                                                                                                                                                            | SMR/<br>NAR<br>no       |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 1      | Romano-British findspot. Finds include a coin, silver finger ring and a spindle whorl.                                                                                                                                                                                                                 | NAR<br>TQ 85<br>SE 34   |
| 2      | Findspot of a Roman coin. Roman coin of Hadrian discovered in 1985.                                                                                                                                                                                                                                    | NAR<br>TQ 85<br>SE 33   |
| 3      | Findspot of Romano-British pottery and metalwork. Romano-British finds including pottery, steelyard weight, nine lead pieces and two fragments of bronze.                                                                                                                                              | NAR<br>TQ 85<br>SE 44   |
| 4      | Sherds of Bronze Age Pottery recovered in 1984 and 1987.                                                                                                                                                                                                                                               | NAR<br>ST 85 SE<br>46   |
| 5      | General Bronze Age and Roman findspot. Finds include part of a Bronze Age socketed axe fragment, part of a Romano-British Brooch and a Roman coin.                                                                                                                                                     | NAR<br>ST 85<br>SE      |
| 6      | Westbury White Horse. Probably Post-medieval. First mentioned in 1742, Drawing of a horse facing south published in 1772, this horse was apparently destroyed in 1778 and replaced by one facing north. Restored in 1853, 1873, 1903, 1936 and 1983. Part of Scheduled Ancient Monument Wiltshire WI37 | WSMR<br>ST 85<br>SE 526 |
| 7      | Bronze Age and Roman findspot. Finds include a sherd of Bronze Age Pottery, an undated fragment of bronze and the neck of a small Romano-British flagon.                                                                                                                                               | NAR<br>ST 85<br>SE 45   |
| 8      | Bronze Age and Romano-British findspot. Findspot of a Bronze Age flint razor and thirteen 2nd-4th century Roman coins.                                                                                                                                                                                 | NAR<br>ST 85<br>SE 32   |
| 9      | Iron Age Hill Fort. Bivallate Iron Age Hill Fort. Scheduled Ancient Monument Wilts 37. Investigated by Whittaker in the 18th century: it is thought that he discovered Roman and Saxon coins within the vicinity of the camp.                                                                          | NAR<br>ST 95<br>SW 1.   |

| OAU<br>no | Description                                                                                                                                                                                                                                                                                                                                                                                                      | SMR/<br>NAR<br>no     |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| 10        | Neolithic Long Barrow with possible Saxon secondary inhumations. Excavated in 18th and 19th centuries the barrow contained at least one cremation as well as pottery, animal bones and antler fragments. Further excavation in 1866 revealed three inhumations quite close to the surface: these are generally believed to be secondary Saxon inhumations.                                                       | NAR<br>ST 95<br>SW 2  |
| 11        | Probable Bronze Age Bowl Barrow with secondary Saxon inhumation. Excavated by Whittaker during the 18th century, who discovered an inhumation with axe and sword. This is generally believed to be a secondary Saxon burial.                                                                                                                                                                                     | NAR<br>ST 95<br>SW 24 |
| 12        | Bronze Age Bowl Barrow. Scheduled Ancient Monument Wilts 10012. Excavated by Thurnam in the 19th century it contained a contracted inhumation.                                                                                                                                                                                                                                                                   | NAR<br>ST 95<br>SW 11 |
| 13        | Site of Enclosure, possibly Romano-British. Described as a small square earthen enclosure with entrance to the SE. Sherds of Roman pottery recovered in the 1950's and 1970's. No trace of the earthwork is visible on the ground.                                                                                                                                                                               | NAR<br>ST 95<br>SW 9  |
| 14        | Findspot of a Bronze Age Barbed and tanged arrowhead.                                                                                                                                                                                                                                                                                                                                                            | NAR<br>ST 95<br>SW 75 |
| 15        | Findspot of undated worked flint implements comprising fragment of a flint axe, two scrapers and two blades.                                                                                                                                                                                                                                                                                                     | NAR<br>ST 95<br>SW 34 |
| 16        | Location of building marked on OS 1st ed 25" (1887). Building still extant in 1927.                                                                                                                                                                                                                                                                                                                              |                       |
| 17        | Findspot of undated flint scraper and six waste flakes, recovered from interior of Romano-British Enclosure (OAU 18).                                                                                                                                                                                                                                                                                            | NAR<br>ST 95<br>SW 74 |
| 18        | Romano-British Enclosure and possible farmstead. Scheduled Ancient Monument Wiltshire 10013. Five-sided kite-shaped enclosure, internally sub-divided with a small platform, probably a habitation site, on its South-western side. The site has produced tile and pottery fragments. The surviving remains of a square enclosure, possibly predating the rest of the earthwork occupy its north-western corner. | NAR<br>ST 95<br>SW 8  |

| OAU<br>no | Description                                                                                                                                                                                                                                                                                    | SMR/<br>NAR<br>no                |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| 19        | Soil-mark of a Round Barrow, no surface evidence located during site inspection in 1977.                                                                                                                                                                                                       | NAR<br>ST 95<br>SW 28            |
| 20        | Undated field system identified from AP's.                                                                                                                                                                                                                                                     | NAR<br>ST 95<br>SW 73            |
| 21        | Area of undated field lynchets identified from AP's.                                                                                                                                                                                                                                           | NAR<br>ST 95<br>SW 72            |
| 22        | General findspot of Romano-British coins. 'Numerous' Roman coins found during metal detecting in this field when it had been recently ploughed.                                                                                                                                                | WSMR<br>ST 85 SE<br>309          |
| 23        | (site of) Bronze Age Round Barrow with (probably) intrusive Saxon inhumation. Bowl Barrow clearly visible on AP's but no longer visible on the ground. Field investigation in 1967 revealed human bones on the surface after ploughing: this may indicate an intrusive early Saxon inhumation. | WSMR<br>ST 85<br>SE 600          |
| 24        | (Former site of) undated earthwork features. Two low mounds recorded in ploughed field prior to extension of chalk quarry. Tentative suggestion that they may have been ploughed out Round Barrows although the WSMR describes them as 'rather irregular'.                                     | WSMR<br>ST 85<br>SE 606          |
| 25        | (Former site of) low earthwork. Low earthwork in ploughed field recorded prior to extension to chalk quarry. Possibility that this was a ploughed out round barrow although it may also have been the junction of two gullies.                                                                 | WSMR<br>ST 85<br>SE 609          |
| 26        | Bronze Age Findspot. Findspot of a Bell Beaker and a flint arrowhead recorded by VCH. A Barbed and tanged arrowhead was also discovered close to this spot in 1968.                                                                                                                            | WSMR<br>ST 85<br>SE 150          |
| 27        | Area of former field system. A series of linear features, identified from AP's, probably representing former field terraces and a field system.                                                                                                                                                | WSMR<br>ST 85<br>SE 604<br>& 637 |
| 28        | Cropmark of a small enclosure. Small irregular enclosure with a possible entrance on the SE side visible on AP's. No features visible on the ground.                                                                                                                                           | WSMR<br>ST 85<br>SE 627          |

| OAU<br>no | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | SMR/<br>NAR<br>no       |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 29        | Barrow cemetery containing at least three Bronze Age Bowl Barrows (29a, b & C), all Scheduled Ancient Monuments (Wilts 10009-10011). The NAR also identifies the Ring Ditch of a possible fourth Barrow, seen on AP's. The three Barrows are on Downland and are quoted as being extant, no trace could be located of the possible fourth Barrow.                                                                                                                                                                                                | NAR<br>ST 85<br>SE 7    |
| 30        | Area of possible Field System. Linear features, probably representing former field terraces visible on AP's.                                                                                                                                                                                                                                                                                                                                                                                                                                     | WSMR<br>ST 85<br>SE 628 |
| 31        | Findspot of a Bronze Age looped and socketed Bronze Axe found on 'recently cultivated section of downland' in 1966.                                                                                                                                                                                                                                                                                                                                                                                                                              | WSMR<br>ST 84<br>NE 150 |
| 32        | (Approximate site of) Neolithic Bowl Barrow. A Neolithic Bowl Barrow, 60 feet in diameter and 4½ feet high was excavated by Colt-Hoare in the early 19th century 'north of the eastern declivity of Upton Down'. It was surrounded by a series of circular quarries instead of a ditch and contained 7 or 8 disarticulated unaccompanied inhumations and a quantity of sarsens and flints. Exact location uncertain, no trace of it is visible on the ground, but Hoares Map shows it clearly at the end of the spur forming Dilton Middle Down. | WSMR<br>ST 84<br>NE 601 |
| 33        | Barrow Cemetery. Three Bowl Barrows on Thirteen Hundred Down. All Scheduled Ancient Monuments (Wilts 10073-75). WSMR records that Barrows 33a and 33c have been badly damaged by 19th century excavations and that all have suffered some more recent damage.                                                                                                                                                                                                                                                                                    | NAR<br>ST 84<br>NE 11.  |
| 34        | Post-Medieval field boundary. 400 yard ditch long visible on AP's. Almost certainly a post-medieval field boundary, similar ditches occur widely in the area.                                                                                                                                                                                                                                                                                                                                                                                    | WSMR<br>ST 84<br>NE 677 |
| 35        | Cropmark of Enclosure. Trapezoidal enclosure, identified on AP's. Not located during fieldwork for the Salisbury Plain Training Area survey in 1987.                                                                                                                                                                                                                                                                                                                                                                                             | WSMR<br>ST 84<br>NE 651 |
| 36        | Dewpond. Described by NAR as extant.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | NAR<br>ST 84<br>NE 91   |

| OAU<br>no | Description                                                                                                                                                                                                                                                        | SMR/<br>NAR<br>no                |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| 37        | Two areas of undated linear earthworks consisting of 35 yard long Bank and Ditch crossing small natural spur and 180 yard long Bivallate Bank and Ditch to the east, with larger Bank to the SW. Scheduled Ancient Monument Wilts 887.                             | WSMR<br>ST 84<br>NE 622<br>& 623 |
| 38        | Bowl Barrow with vague traces of a Ditch. De-Scheduled in 1991.                                                                                                                                                                                                    | WSMR<br>ST 84<br>NE 619          |
| 39        | Earthworks of trackway complex. Earthworks of undated trackway complex described by NAR as being 'visible up to a height of 2m'.                                                                                                                                   | NAR<br>ST 84<br>NE 97            |
| 40        | Undated Field system identified from AP's and field investigation. Small field system consisting of a number of linear features/lynchets. Described by Salisbury Plain Training Area Survey (1984) as being in 'very good condition, still standing up to 1m high. | WSMR<br>ST 84<br>NE 684          |
| 41        | Undated Earthwork. Ditch which follows hedgeline before turning SSE.                                                                                                                                                                                               | WSMR<br>ST 84<br>NE 631          |
| 42        | Extensive undated field system, mostly ploughed out although some still survives on steep slopes.                                                                                                                                                                  | WSMR<br>ST 84<br>NE 626          |
| 43        | Bronze Age Bowl Barrow identified on Aerial Photographs. Traces of ditch on SW are clearly visible.                                                                                                                                                                | NAR<br>ST 84<br>NE 12            |
| 44        | Site of Bournes Barn, first marked on 1808 Inclosure map.                                                                                                                                                                                                          |                                  |
| 45        | Long River Road. Called 'The Old or Great Trackway' by Colt Hoare.                                                                                                                                                                                                 |                                  |
| 46        | Network of trackways and Drove Roads as marked on early 19th century maps.                                                                                                                                                                                         |                                  |
| 47        | Limits of Scheduled Area of Bratton Camp.                                                                                                                                                                                                                          | SAM WI<br>37                     |

**Appendix 8.2**  
Field Walking Area A Phase 1 Finds

## (i) Flint

| Transect | Bag | flakes | cores | other | burnt flint | Comments |
|----------|-----|--------|-------|-------|-------------|----------|
| 1        | -   | -      | -     | -     | -           |          |
| 2        | -   | -      | -     | -     | -           |          |
| 3        | 1   | -      | -     | -     | 1           |          |
|          | 2   | -      | -     | -     | 1           |          |
|          | 4   | 1      | -     | -     | -           |          |
| 4        | 1   | -      | -     | -     | 1           |          |
|          | 2   | -      | -     | -     | 1           |          |
|          | 3   | 1      | -     | -     | 2           |          |
|          | 4   | 1      | -     | -     | 1           |          |
|          | 5   | 1      | -     | -     | -           |          |
| 5        | 2   | 1      | -     | -     | -           |          |
|          | 3   | 1      | -     | -     | 2           |          |
|          | 5   | 1      | -     | -     | -           |          |
|          | 6   | -      | -     | -     | 1           |          |
|          | 7   | 2      | -     | -     | 3           |          |
| 6        | 2   | 1      | -     | -     | -           |          |
|          | 5   | 1      | -     | -     | 1           |          |
|          | 6   | 1      | -     | -     | -           |          |
|          | 7   | -      | -     | -     | 1           |          |
| 7        | 1   | -      | -     | -     | 2           |          |
|          | 2   | 1      | -     | -     | -           |          |
|          | 3   | 1      | -     | -     | 1           |          |
|          | 4   | -      | -     | -     | 1           |          |
|          | 6   | 1      | -     | -     | -           |          |
|          | 9   | 2      | -     | -     | -           |          |
|          | 10  | 1      | -     | -     | 1           |          |
|          | 11  | -      | -     | -     | 3           |          |

| Transect | Bag | flakes | cores | other | burnt flint | Comments                  |
|----------|-----|--------|-------|-------|-------------|---------------------------|
| 8        | 1   | 1      | -     | ?1*   | -           | *possible irregular waste |
|          | 2   | 1      | -     | -     | -           |                           |
|          | 3   | 1      | -     | -     | 1           |                           |
|          | 4   | -      | 1     | -     | 1           |                           |
|          | 6   | -      | -     | -     | 1           |                           |
|          | 8   | -      | -     | -     | 3           |                           |
|          | 9   | -      | -     | -     | 2           |                           |
|          | 10  | -      | -     | -     | 1           |                           |
|          | 11  | -      | -     | -     | 1           |                           |
| 9        | 1   | -      | -     | -     | 1           |                           |
|          | 2   | 1      | -     | -     | 1           |                           |
|          | 3   | -      | -     | -     | 1           |                           |
|          | 4   | 1      | -     | -     | 1           |                           |
|          | 5   | 2      | -     | -     | 4           |                           |
|          | 6   | 3      | -     | -     | -           |                           |
|          | 7   | 6      | -     | ?1*   | 3           | *possible irregular waste |
|          | 9   | 3      | -     | -     | 1*          | *large                    |
|          | 11  | -      | -     | -     | 2           |                           |
|          | 12  | 2      | -     | -     | 6           |                           |
| 10       | 2   | -      | -     | -     | 1           |                           |
|          | 5   | -      | -     | -     | 2           |                           |
|          | 6   | -      | -     | -     | 1           |                           |
|          | 8   | 1      | -     | -     | -           |                           |
|          | 9   | -      | -     | -     | 1           |                           |
|          | 11  | 1      | -     | -     | -           |                           |
|          | 12  | 1      | -     | -     | -           |                           |
|          | 13  | -      | -     | -     | 1           |                           |
| 11       | 4   | 1      | -     | -     | -           |                           |
|          | 5   | 1      | -     | -     | -           |                           |
|          | 6   | -      | -     | -     | 1           |                           |



## Oxford Archaeological Unit

| Transect     | Bag | flakes | cores | other | burnt<br>flint | Comments                  |
|--------------|-----|--------|-------|-------|----------------|---------------------------|
| 11<br>(cont) | 7   | 1      | -     | -     | -              |                           |
|              | 12  | -      | -     | -     | 2              |                           |
| 12           | 2   | 2      | -     | -     | -              |                           |
|              | 6   | 1      | -     | -     | -              |                           |
|              | 7   | 1      | -     | -     | -              |                           |
|              | 8   | 2      | -     | -     | 1              |                           |
|              | 9   | 1      | -     | -     | -              |                           |
|              | 11  | 1      | -     | -     | -              |                           |
|              | 13  | 2      | -     | -     | -              |                           |
| 13           | 2   | -      | -     | -     | 6              |                           |
|              | 3   | -      | -     | -     | 2              |                           |
|              | 4   | 1      | -     | -     | 2              |                           |
|              | 5   | 3      | -     | -     | 3              |                           |
|              | 6   | 2      | -     | -     | 1              |                           |
|              | 7   | 4      | -     | -     | -              |                           |
|              | 8   | -      | -     | -     | 4              |                           |
|              | 9   | 2      | -     | -     | 1              |                           |
|              | 11  | 2      | -     | -     | 1              |                           |
| 14           | 2   | -      | -     | -     | 2              |                           |
|              | 3   | -      | -     | -     | 2              |                           |
| 15           | -   | -      | -     | -     | -              |                           |
| 16           | 1   | -      | -     | -     | 1              |                           |
|              | 3   | -      | -     | -     | 2              |                           |
|              | 5   | -      | -     | -     | 1              |                           |
| 17           | 1   | ?1     | -     | ?1*   | -              | *possible irregular waste |
| 18           | -   | -      | -     | -     | -              |                           |
| Totals       |     | 70     | 1     | 3     | 91             |                           |

Appendix 1: Fieldwalking, phase 1, April 1995 - OS parcel 5400

(ii) Finds other than Flint

| Transect | Bag | CBM | earthen ware | misc fired clay | other finds    | Comments                                              |
|----------|-----|-----|--------------|-----------------|----------------|-------------------------------------------------------|
| 1        | 1   | 1   | 2*           | -               | -              | *post-med                                             |
| 2        | 1   | 2   | 1*           | -               | -              | * (uncertain date)                                    |
| 3        | 2   | 1   | -            | 1               | 1*             | *slate                                                |
|          |     |     |              |                 | 1+             | +china, transfer-printed                              |
|          | 3   | 1   | -            | -               | -              |                                                       |
|          | 4   | 1   | -            | -               | -              |                                                       |
| 4        | 1   | 1   | -            | 1               | 1*             | *slate                                                |
|          | 2   | 2   | -            | 3               | 1*             | *slate                                                |
|          | 3   | 3   | 2*           | -               | -              | *post-med                                             |
|          | 4   | -   | -            | 2               | -              |                                                       |
| 5        | -   | -   | -            | -               | -              | -                                                     |
| 6        | 1   | -   | -            | 1               | -              |                                                       |
|          | 2   | 2   | 1*           | 4               | 1+             | *post-med<br>+china, white                            |
|          | 3   | 12  | 3*           | -               | 1+<br>2#       | * glazed, post- med<br>+tile, stone<br>#coal          |
|          | 5   | 2   | -            | 3               | -              |                                                       |
|          | 6   | 12  | 1*           | -               | 1+<br>1#<br>1- | *glazed, post- med<br>+flowerpot<br>#slate<br>-cinder |
|          | 7   | 1   | -            | -               | -              |                                                       |
|          |     |     |              |                 |                |                                                       |
| 7        | 3   | -   | 1*           | -               | -              | *glazed, late med/post med                            |
| 8        | 2   | 1   | -            | -               | -              |                                                       |
|          | 3   | 1   | -            | -               | 1*             | *glass, ?bottle                                       |
|          | 4   | 2   | -            | -               | 1*             | *glass, brown bottle                                  |

Oxford Archaeological Unit

| Transect    | Bag | CBM | earthen<br>ware | misc<br>fired<br>clay | other<br>finds | Comments  |
|-------------|-----|-----|-----------------|-----------------------|----------------|-----------|
| 8<br>(cont) | 5   | 1   | -               | -                     | -              |           |
|             | 6   | 1   | -               | -                     | -              |           |
| 9           | -   | -   | -               | -                     | -              | -         |
| 10          | -   | -   | -               | -                     | -              | -         |
| 11          | 2   | -   | 1*              | -                     | -              | *post med |
|             | 3   | 3   | -               | -                     | 1*             | *slate    |
|             |     |     |                 |                       | 2+             | +slag     |
|             | 12  | 2   | -               | -                     | -              |           |
| 12          | -   | -   | -               | -                     | -              | -         |
| 13          | 9   | 1   | -               | -                     | -              |           |
| 14          | -   | -   | -               | -                     | -              | -         |
| 15          | -   | -   | -               | -                     | -              | -         |
| 16          | 2   | 1   | -               | -                     | -              |           |
| 17          | -   | -   | -               | -                     | -              | -         |
| 18          | -   | -   | -               | -                     | -              | -         |
| Totals      |     | 54  | 12              | 15                    | 16             |           |

**Appendix 8.3**  
Field Walking Area A Phase 2 Finds

## Fieldwalking, phase 2, October 1995 - OS parcel 8903 (part)

## (i) Flint

| Transect | Bag | flakes | cores | other | burnt<br>unworked<br>flint | Comments           |
|----------|-----|--------|-------|-------|----------------------------|--------------------|
| A        | -   | -      | -     | -     | -                          |                    |
| B        | -   | -      | -     | -     | -                          |                    |
| C        | -   | -      | -     | -     | -                          |                    |
| D        | -   | -      | -     | -     | -                          |                    |
| E        | -   | -      | -     | -     | -                          |                    |
| F        | 2   | 1      | -     | -     | -                          |                    |
|          | 8   | -      | -     | -     | 1                          |                    |
|          | 9   | -      | -     | -     | 1                          |                    |
| G        | -   | -      | -     | -     | -                          |                    |
| H        | 4   | 1      | -     | -     | -                          |                    |
|          | 6   | 2      | -     | -     | -                          |                    |
|          | 7   | 1      | -     | -     | 1                          |                    |
|          | 8   | 2      | -     | -     | -                          |                    |
|          | 10  | 1      | -     | -     | -                          |                    |
|          | 11  | 1      | -     | -     | -                          |                    |
| J        | 7   | -      | -     | 1     | -                          | irregular debitage |
| K        | -   | -      | -     | -     | -                          |                    |
| L        | -   | -      | -     | -     | -                          |                    |
| M        | -   | -      | -     | -     | -                          |                    |
| N        | -   | -      | -     | -     | -                          |                    |
| Totals   |     | 9      | 0     | 1     | 3                          |                    |

Appendix 2: Fieldwalking, phase 2, October 1995 - OS parcel 8903 (part)

(ii) Finds other than flint

| Transect | Bag | CBM | earthen<br>ware | Misc<br>fired<br>clay | other<br>finds | Comments                  |
|----------|-----|-----|-----------------|-----------------------|----------------|---------------------------|
| A-       | 1   | 1   | -               | -                     | -              |                           |
| B        | -   | -   | -               | -                     | -              | -                         |
| C        | 1   |     |                 |                       | 1*             | *glass, lt green, ?window |
|          | 3   | 2   | -               | -                     | -              |                           |
| D        | 2   | 2   | -               | -                     | -              |                           |
|          | 5   | 1   | -               | -                     | -              |                           |
| E        | 1   | 3   | -               | -                     | -              |                           |
|          | 2   | 2   | -               | -                     | -              |                           |
|          | 3   | 1   | -               | -                     | -              |                           |
| F        | 2   | 5   | -               | -                     | -              |                           |
|          | 3   | 1   | -               | -                     | -              |                           |
|          | 5   | 1   | -               | -                     | -              |                           |
| G        | 5   | 2   | -               | -                     | -              |                           |
|          | 6   | 1   | -               | -                     | -              |                           |
| H        | 4   | 2   | -               | -                     | -              |                           |
|          | 6   | 2   | -               | -                     | -              |                           |
|          | 8   | 1   | -               | -                     | -              |                           |
|          | 9   | 2   | -               | -                     | -              |                           |
|          | 12  | 1   | -               | -                     | -              |                           |
| I        | -   | -   | -               | -                     | -              | -                         |
| J        | 6   | 1   | -               | -                     | -              |                           |
|          | 7   | 1   | -               | -                     | -              |                           |
|          | 8   | 2   | -               | 1                     | -              |                           |
|          | 9   | 1   | -               | -                     | -              |                           |
|          | 11  | -   | -               | 1                     | -              |                           |

Oxford Archaeological Unit

| Transect | Bag | CBM | earthen<br>ware | Misc<br>fired<br>clay | other<br>finds | Comments |
|----------|-----|-----|-----------------|-----------------------|----------------|----------|
| K        | 5   | 1   | -               | -                     | -              |          |
|          | 6   | 1   | -               | -                     | -              |          |
|          | 8   | 1   | -               | -                     | -              |          |
| L        | -   | -   | -               | -                     | -              | -        |
| M        | -   | -   | -               | -                     | -              | -        |
| N        | -   | -   | -               | -                     | -              | -        |
| Totals   |     | 38  | 0               | 2                     | 1              |          |

## **Appendix 8.4**

### **Worked Flint**



## The Worked Flint

by Philippa Bradley

The flint is generally very heavily corticated being white or bluish grey in colour; cortex where present is thin and white, cream or light brown in colour. The material was abraded and a few pieces were iron-stained. The burnt unworked flint is mostly very heavily calcined, a few pieces were less heavily burnt and a light grey in colour.

### OS Parcel 5400

A small assemblage of 74 pieces of worked flint and 81 burnt unworked flints was recovered from fieldwalking in Field 5400. The assemblage consists of 70 flakes, three pieces of irregular waste and a core. Both hard- and soft-hammers were used. There appeared to be little in the way of platform preparation. The core has two platforms but had not been extensively worked. The majority of the burnt unworked flints are small c 5-10 g although there are a few pieces weighing up to 200 g. The flint seems to be thinly distributed across the field although there seemed to be some bias in the recovery in some areas (eg transects 1-2 and 14-18).

The lack of retouched forms or diagnostic debitage make dating this assemblage difficult. However, this material would not be out of place in a Neolithic or Bronze Age context.

### OS Parcel 8903 (part)

Ten pieces of worked flint and three pieces of burnt unworked flint were recovered from the fieldwalking in Field 8903.

The assemblage consisted of nine flakes and one piece of irregular debitage. The flint is very similar in character to the material recovered from the initial phase of fieldwalking and may be of the same date. However, the lack of diagnostic retouched forms or debitage and the size of this assemblage hamper dating. The quantity of flint from field 8903 was very sparse.

**Appendix 8.5**  
Field Walking Area B Finds

| TRANSECT | COLL. UNIT | OBJECT | MATERIAL    | NOS | PERIOD | COMMENTS                                               |
|----------|------------|--------|-------------|-----|--------|--------------------------------------------------------|
| 11       | 37         |        | FLINT       | 1   |        | flake                                                  |
| 1        | 12         |        | FLINT       | 1   |        | flake                                                  |
| 1        | 87         |        | FLINT       | 1   |        | flake                                                  |
| 1        | 187        |        | FLINT       | 1   |        | flake                                                  |
| 1        | 187        |        | FLINT       | 1   |        | end scraper                                            |
| 2        | 12         |        | FLINT       | 1   |        | irregular waste                                        |
| 3        | 37         |        | FLINT       | 1   |        | flake                                                  |
| 5        | 87         |        | FLINT       | 1   |        | multiplatform flake core, partially worked down        |
| 7        | 12         |        | FLINT       | 1   |        | flake                                                  |
| 7        | 37         |        | FLINT       | 1   |        | flake                                                  |
| 8        | 12         |        | FLINT       | 1   |        | flake                                                  |
| 8        | 12         |        | FLINT       | 1   |        | tested nodule, bashed lump                             |
| A        | 12         |        | BURNT FLINT | 1   |        |                                                        |
| A        | 12         |        | FLINT       | 4   |        | flakes                                                 |
| A        | 12         |        | FLINT       | 1   |        | single platform blade core, fairly crude, few removals |
| A        | 12         |        | FLINT       | 1   |        | blade                                                  |
| A        | 12         |        | FLINT       | 1   |        | unclassifiable/fragmentary core                        |
| A        | 37         |        | FLINT       | 7   |        | flakes; one has a prepared platform                    |
| A        | 37         |        | FLINT       | 1   |        | retouched flake, possible edge retouch                 |
| A        | 62         |        | FLINT       | 11  |        | flakes                                                 |
| A        | 62         |        | FLINT       | 1   |        | multiplatform flake core                               |
| A        | 87         |        | FLINT       | 4   |        | flakes                                                 |
| A        | 87         |        | FLINT       | 1   |        | end scraper                                            |
| A        | 87         |        | FLINT       | 1   |        | blade-like flake                                       |
| A        | 112        |        | FLINT       | 2   |        | flakes                                                 |
| A        | 137        |        | BURNT FLINT | 2   |        |                                                        |
| A        | 137        |        | FLINT       | 2   |        | flakes                                                 |
| A        | 137        |        | FLINT       | 1   |        | blade-like flake                                       |
| A        | 162        |        | CBM         | 2   |        |                                                        |
| A        | 162        |        | FLINT       | 2   |        | flakes                                                 |
| A        | 162        |        | FLINT       | 1   |        | end scraper                                            |
| A        | 187        |        | CBM         | 2   |        |                                                        |
| A        | 187        |        | FLINT       | 6   |        | flakes                                                 |
| A        | 212        |        | FLINT       | 10  |        | flakes                                                 |
| A        | 212        |        | FLINT       | 1   |        | blade-like flake                                       |
| A        | 237        |        | FLINT       | 1   |        | flake                                                  |
| A        | 262        |        | FLINT       | 1   |        | flake                                                  |
| A        | 287        |        | FLINT       | 1   |        | flake                                                  |
| A        | 287        |        | FLINT       | 1   |        | end scraper                                            |
| B        | 12         |        | FLINT       | 2   |        | flakes                                                 |
| B        | 12         |        | FLINT       | 1   |        | multiplatform flake core                               |
| B        | 12         |        | FLINT       | 1   |        | end scraper                                            |
| B        | 12         |        | FLINT       | 1   |        | irregular waste                                        |
| B        | 37         |        | FLINT       | 6   |        | flakes                                                 |
| B        | 37         |        | FLINT       | 1   |        | blade-like flake                                       |
| B        | 62         |        | CBM         | 1   | PM     |                                                        |
| B        | 62         |        | FLINT       | 1   |        | flake                                                  |
| B        | 62         |        | FLINT       | 1   |        | unclassifiable/fragmentary core                        |
| B        | 87 POTTERY |        | CERAMIC     | 2   | PM     | 1 glazed                                               |
| B        | 87         |        | FLINT       | 1   |        | flake, dorsal blade scars                              |
| B        | 112        |        | CBM         | 1   | PM     | glazed brick                                           |

## Westbury Chalk Quarry Fieldwalking Finds - Area B

|    |     |         |             |      |                                          |
|----|-----|---------|-------------|------|------------------------------------------|
| B  | 137 |         | FLINT       | 1    | flake                                    |
| B  | 137 |         | FLINT       | 1    | blade-like flake                         |
| B  | 137 |         | SLAG        | 2    | ?iron slag                               |
| B  | 162 |         | CBM         | 1    |                                          |
| B  | 162 |         | FLINT       | 4    | flakes                                   |
| B  | 162 |         | FLINT       | 1    | blade-like flake                         |
| B  | 187 |         | FLINT       | 5    | flakes                                   |
| B  | 187 |         | FLINT       | 1    | multiplatform flake core                 |
| B  | 187 |         | FLINT       | 1    | blade-like flake                         |
| B  | 187 |         | FLINT       | 2    | irregular waste                          |
| B  | 212 |         | FLINT       | 3    | flakes                                   |
| B  | 212 |         | FLINT       | 1    | blade-like flake                         |
| B  | 212 |         | FLINT       | 1    | edge retouch inverse left side           |
| B  | 237 |         | FLINT       | 2    | flakes                                   |
| B  | 237 |         | FLINT       | 1    | blade-like flake                         |
| B  | 287 |         | FLINT       | 1    | flake                                    |
| C  | 12  |         | BURNT FLINT | 1    |                                          |
| C  | 12  |         | CBM         | 3    |                                          |
| C  | 12  |         | FLINT       | 10   | flakes                                   |
| C  | 12  |         | FLINT       | 1    | single platform flake core, few removals |
| C  | 12  | OBJECT  | IRON        | 1    | strip                                    |
| C  | 37  |         | BURNT FLINT | 1    |                                          |
| C  | 37  |         | CBM         | 3    |                                          |
| C  | 37  |         | FLINT       | 11   | flakes                                   |
| C  | 37  |         | FLINT       | 1    | keeled non-discoidal flake core          |
| C  | 37  |         | FLINT       | 1    | blade-like flake                         |
| C  | 62  |         | FLINT       | 4    | flakes                                   |
| C  | 87  |         | BURNT FLINT | 1    |                                          |
| C  | 87  |         | CBM         | 3    |                                          |
| C  | 87  |         | FLINT       | 2    | flakes                                   |
| C  | 87  |         | FLINT       | 1    | tested nodule, bashed lump               |
| C  | 112 |         | CBM         | 2    |                                          |
| C  | 112 |         | FLINT       | 1    | flake                                    |
| C  | 112 |         | FLINT       | 1    | end scraper                              |
| C  | 137 |         | FLINT       | 1    | flake                                    |
| C  | 162 |         | FLINT       | 3    | flakes                                   |
| C  | 162 | OBJECT  | IRON        | 1    |                                          |
| C  | 187 |         | CBM         | 2    |                                          |
| C  | 187 |         | FLINT       | 3    | flakes                                   |
| C  | 212 |         | FLINT       | 5    | flakes                                   |
| C  | 212 |         | FLINT       | 1    | end scarper, dorsal blade scars          |
| C  | 237 |         | FLINT       | 1    | single platform blade core, few removals |
| C  | 237 |         | FLINT       | 11   | flakes                                   |
| C  | 262 |         | FLINT       | 4    | flakes                                   |
| C  | 287 |         | BONE        | 1    |                                          |
| C  | 287 |         | FLINT       | 2    | flakes                                   |
| C  | 287 | OBJECT  | IRON        | 1    |                                          |
| C  | 312 |         | FLINT       | 3    | flakes                                   |
| C1 | 12  |         | CBM         | 1    |                                          |
| C1 | 12  | POTTERY | CERAMIC     | 2 PM | glazed                                   |
| C1 | 12  |         | FLINT       | 7    | flakes                                   |
| C1 | 12  |         | FLINT       | 1    | single platform blade core, few removals |
| C1 | 37  |         | CBM         | 1    |                                          |

## Westbury Chalk Quarry Fieldwalking Finds - Area B

|    |     |         |             |    |        |                                                      |
|----|-----|---------|-------------|----|--------|------------------------------------------------------|
| C1 | 37  | POTTERY | CERAMIC     | 2  | PM     | glazed                                               |
| C1 | 37  |         | FLINT       | 12 |        | flakes                                               |
| C1 | 37  |         | FLINT       | 1  |        | blade-like flake                                     |
| C1 | 62  |         | BURNT FLINT | 1  |        |                                                      |
| C1 | 62  |         | CBM         | 1  |        |                                                      |
| C1 | 62  |         | FLINT       | 12 |        | flakes                                               |
| C1 | 62  |         | FLINT       | 1  |        | end scraper                                          |
| C1 | 62  |         | GLASS       | 1  | MODERN |                                                      |
| C1 | 87  |         | CBM         | 1  |        |                                                      |
| C1 | 87  |         | FLINT       | 3  |        | flakes                                               |
| C1 | 112 | POTTERY | CERAMIC     | 1  | PM     | unglazed                                             |
| C1 | 112 |         | FLINT       | 1  |        | flake                                                |
| C1 | 137 |         | CBM         | 1  |        |                                                      |
| C1 | 137 |         | FLINT       | 1  |        | flake                                                |
| C1 | 162 |         | BURNT FLINT | 2  |        |                                                      |
| C1 | 162 |         | FLINT       | 3  |        | flakes                                               |
| C1 | 187 |         | FLINT       | 2  |        | flakes                                               |
| C1 | 187 |         | FLINT       | 1  |        | end scraper                                          |
| C1 | 237 |         | FLINT       | 4  |        | flakes                                               |
| C1 | 262 |         | CBM         | 1  |        |                                                      |
| C1 | 262 |         | FLINT       | 1  |        | flake                                                |
| C1 | 262 |         | GLASS       | 1  | MODERN |                                                      |
| C1 | 287 |         | FLINT       | 1  |        | flake                                                |
| C1 | 312 |         | FLINT       | 1  |        | flake                                                |
| C2 | 12  | POTTERY | CERAMIC     | 2  | PM     |                                                      |
| C2 | 12  |         | COAL        | 1  |        |                                                      |
| C2 | 12  |         | FLINT       | 2  |        | flakes                                               |
| C2 | 12  |         | FLINT       | 1  |        | single platform flake core                           |
| C2 | 37  |         | CBM         | 4  |        |                                                      |
| C2 | 37  | POTTERY | CERAMIC     | 2  | PM     |                                                      |
| C2 | 37  |         | COAL        | 1  |        |                                                      |
| C2 | 37  |         | FLINT       | 1  |        | flake                                                |
| C2 | 37  |         | FLINT       | 1  |        | roughout?                                            |
| C2 | 37  |         | FLINT       | 1  |        | blade-like flake                                     |
| C2 | 62  |         | CBM         | 1  |        |                                                      |
| C2 | 62  |         | FLINT       | 6  |        | flakes                                               |
| C2 | 62  |         | FLINT       | 1  |        | single platform flake core, some blade-like removals |
| C2 | 62  |         | FLINT       | 1  |        | blade-like flake                                     |
| C2 | 87  |         | BURNT FLINT | 2  |        |                                                      |
| C2 | 87  | POTTERY | CERAMIC     | 1  | PM     |                                                      |
| C2 | 87  | POTTERY | CERAMIC     | 1  | PM     | white china                                          |
| C2 | 87  |         | FLINT       | 7  |        | flakes                                               |
| C2 | 87  |         | FLINT       | 1  |        | multiplatform flake core                             |
| C2 | 112 |         | CBM         | 1  |        |                                                      |
| C2 | 112 |         | FLINT       | 2  |        | flakes                                               |
| C2 | 137 |         | BURNT FLINT | 1  |        |                                                      |
| C2 | 137 |         | CBM         | 2  |        |                                                      |
| C2 | 137 | POTTERY | CERAMIC     | 1  | PM     |                                                      |
| C2 | 137 |         | FLINT       | 1  |        | tested nodule, bashed lump                           |
| C2 | 162 |         | BONE        | 1  |        |                                                      |
| C2 | 162 |         | CBM         | 1  |        |                                                      |
| C2 | 162 | POTTERY | CERAMIC     | 1  | PM     |                                                      |
| C2 | 162 |         | FLINT       | 2  |        | flakes                                               |
| C2 | 212 |         | BURNT FLINT | 1  |        |                                                      |
| C2 | 212 |         | FLINT       | 3  |        | flakes                                               |

Westbury Chalk Quarry Fieldwalking Finds - Area B

|    |     |         |             |   |     |                                                     |
|----|-----|---------|-------------|---|-----|-----------------------------------------------------|
| C2 | 237 |         | FLINT       | 3 |     | flakes                                              |
| C2 | 237 |         | FLINT       | 1 |     | blade-like flake                                    |
| C2 | 262 |         | FLINT       | 3 |     | flakes                                              |
| C2 | 287 |         | BURNT FLINT | 1 |     |                                                     |
| C2 | 312 | POTTERY | CERAMIC     | 1 | LBA | Bronze Age sherd with lug                           |
| C2 | 337 |         | FLINT       | 2 |     | flakes                                              |
| C2 | 337 |         | FLINT       | 1 |     | blade-like flake                                    |
| D  | 12  |         | FLINT       | 1 |     | flake                                               |
| D  | 12  |         | FLINT       | 1 |     | single platform flake core,<br>narrow flake removal |
| D  | 37  |         | CBM         | 3 |     |                                                     |
| D  | 37  |         | FLINT       | 1 |     | flake                                               |
| D  | 62  |         | CBM         | 1 |     |                                                     |
| D  | 87  |         | CBM         | 2 |     |                                                     |
| D  | 112 |         | CBM         | 3 |     |                                                     |
| D  | 137 |         | CBM         | 1 |     |                                                     |
| D  | 162 |         | CBM         | 1 |     |                                                     |
| D  | 162 |         | FLINT       | 1 |     | multiplatform flake core                            |
| D  | 187 |         | FLINT       | 1 |     | flake                                               |
| D  | 187 |         | FLINT       | 1 |     | multiplatform flake core                            |
| D  | 212 |         | FLINT       | 2 |     | flakes                                              |
| D  | 237 |         | FLINT       | 1 |     | flake                                               |
| D  | 262 |         | BURNT FLINT | 1 |     |                                                     |
| D  | 262 |         | FLINT       | 1 |     | tested nodule, bashed lump                          |
| D  | 287 |         | FLINT       | 2 |     | flakes                                              |
| D  | 287 |         | FLINT       | 1 |     | multiplatform flake core                            |
| D  | 287 |         | FLINT       | 1 |     | tortoise core, late Neolithic                       |
| D  | 312 |         | FLINT       | 1 |     | flake                                               |
| D  | 337 |         | CBM         | 1 |     |                                                     |
| D  | 337 |         | FLINT       | 2 |     | flakes                                              |
| E  | 12  |         | BURNT FLINT | 2 |     |                                                     |
| E  | 12  | POTTERY | CERAMIC     | 2 | PM  | unglazed                                            |
| E  | 12  |         | FLINT       | 2 |     | flakes                                              |
| E  | 37  |         | BURNT FLINT | 1 |     |                                                     |
| E  | 37  |         | CBM         | 3 |     | unglazed tiles                                      |
| E  | 37  | POTTERY | CERAMIC     | 2 | PM  |                                                     |
| E  | 37  |         | FLINT       | 2 |     | flakes                                              |
| E  | 37  |         | FLINT       | 1 |     | multiplatform flake core                            |
| E  | 62  |         | CBM         | 3 |     | 2 brick, 1 tile                                     |
| E  | 62  |         | FLINT       | 3 |     | flakes                                              |
| E  | 62  |         | FLINT       | 1 |     | side scraper                                        |
| E  | 62  |         | FLINT       | 1 |     | blade-like flake                                    |
| E  | 87  | POTTERY | CERAMIC     | 2 | PM  | unglazed                                            |
| E  | 87  |         | FLINT       | 3 |     | flakes                                              |
| E  | 87  |         | FLINT       | 1 |     | single platform flake core                          |
| E  | 87  |         | FLINT       | 1 |     | multiplatform flake core                            |
| E  | 87  |         | FLINT       | 1 |     | blade-like flake                                    |
| E  | 112 |         | CBM         | 3 |     | tile                                                |
| E  | 112 |         | FLINT       | 8 |     | flakes                                              |
| E  | 137 |         | COAL        | 2 |     |                                                     |
| E  | 137 |         | FLINT       | 3 |     | flakes                                              |
| E  | 137 |         | STONE       | 1 |     |                                                     |
| E  | 162 |         | CBM         | 2 |     |                                                     |
| E  | 162 | POTTERY | CERAMIC     | 2 | PM  |                                                     |
| E  | 162 |         | FLINT       | 3 |     | flakes                                              |
| E  | 187 |         | CBM         | 4 |     | tile                                                |

## Westbury Chalk Quarry Fieldwalking Finds - Area B

|   |     |         |             |    |    |                                      |
|---|-----|---------|-------------|----|----|--------------------------------------|
| E | 187 | POTTERY | CERAMIC     | 1  | PM | unglazed                             |
| E | 187 |         | FLINT       | 4  |    | flakes                               |
| E | 187 |         | FLINT       | 1  |    | end scraper                          |
| E | 187 |         | STONE       | 1  |    |                                      |
| E | 237 |         | FLINT       | 1  |    | flake                                |
| E | 337 |         | FLINT       | 2  |    | flakes                               |
| E | 362 |         | BURNT FLINT | 1  |    |                                      |
| E | 362 |         | FLINT       | 5  |    | flakes                               |
| E | 362 |         | FLINT       | 1  |    | single platform flake core           |
| E | 387 |         | FLINT       | 1  |    | flake                                |
| E | 387 |         | FLINT       | 1  |    | blade-like flake                     |
| E | 387 |         | FLINT       | 1  |    | irregular waste                      |
| F | 12  |         | BURNT FLINT | 1  |    |                                      |
| F | 12  |         | CBM         | 2  |    | roof tile                            |
| F | 12  |         | COAL        | 1  |    |                                      |
| F | 12  |         | FLINT       | 4  |    | flakes                               |
| F | 12  |         | FLINT       | 1  |    | side scraper                         |
| F | 37  |         | BURNT FLINT | 1  |    |                                      |
| F | 37  |         | CBM         | 2  |    |                                      |
| F | 37  |         | FLINT       | 2  |    | flakes                               |
| F | 62  |         | CBM         | 5  |    |                                      |
| F | 62  |         | FLINT       | 1  |    | flake                                |
| F | 87  |         | CBM         | 1  |    |                                      |
| F | 87  |         | FLINT       | 4  |    | flakes                               |
| F | 87  |         | STONE       | 2  |    |                                      |
| F | 112 |         | CBM         | 1  |    | roof tile                            |
| F | 112 |         | FLINT       | 4  |    | flakes                               |
| F | 137 |         | CBM         | 3  |    | roof tile                            |
| F | 137 |         | COAL        | 2  |    |                                      |
| F | 162 |         | FLINT       | 3  |    | flakes                               |
| F | 212 |         | FLINT       | 1  |    | flake                                |
| F | 237 |         | FLINT       | 1  |    | flake                                |
| F | 262 |         | FLINT       | 1  |    | flake                                |
| F | 287 |         | FLINT       | 2  |    | flakes                               |
| F | 312 |         | FLINT       | 6  |    | flakes                               |
| G | 12  |         | FLINT       | 1  |    | single platform flake core           |
| G | 12  |         | FLINT       | 1  |    | irregular waste                      |
| G | 87  |         | FLINT       | 2  |    | flakes                               |
| G | 137 |         | FLINT       | 1  |    | flake                                |
| G | 137 |         | FLINT       | 1  |    | single platform flake core           |
| G | 162 |         | FLINT       | 2  |    | flakes                               |
| G | 187 |         | FLINT       | 1  |    | flake                                |
| G | 237 |         | FLINT       | 2  |    | flakes                               |
| G | 287 |         | BURNT FLINT | 1  |    |                                      |
| H | 12  |         | FLINT       | 9  |    | flakes                               |
| H | 12  |         | FLINT       | 1  |    | multiplatform flake core             |
| H | 12  |         | FLINT       | 1  |    | Levallois/other discoidal flake core |
| H | 37  |         | FLINT       | 10 |    | flakes                               |
| H | 62  |         | FLINT       | 6  |    | flakes                               |
| H | 87  |         | BURNT FLINT | 1  |    |                                      |
| H | 87  |         | FLINT       | 5  |    | flakes                               |
| H | 87  |         | FLINT       | 1  |    | end scraper                          |
| H | 112 |         | FLINT       | 20 |    | flakes                               |
| H | 112 |         | FLINT       | 2  |    | multiplatform flake core             |
| H | 112 |         | FLINT       | 1  |    | irregular waste                      |

Westbury Chalk Quarry Fieldwalking Finds - Area B

|   |     |             |    |                                          |
|---|-----|-------------|----|------------------------------------------|
| H | 137 | BURNT FLINT | 1  |                                          |
| H | 137 | CBM         | 1  |                                          |
| H | 137 | FLINT       | 13 | flakes                                   |
| H | 137 | FLINT       | 1  | multiplatform flake core                 |
| H | 137 | FLINT       | 1  | unclassifiable/fragmentary core          |
| H | 162 | FLINT       | 13 | flakes                                   |
| H | 187 | BURNT FLINT | 1  |                                          |
| H | 187 | FLINT       | 5  | flakes                                   |
| H | 187 | FLINT       | 1  | unclassifiable/fragmentary core          |
| H | 187 | FLINT       | 1  | irregular waste                          |
| H | 212 | FLINT       | 3  | flakes                                   |
| H | 212 | FLINT       | 1  | single platform blade core, few removals |
| J | 112 | FLINT       | 1  | flake                                    |
| J | 137 | FLINT       | 1  | unclassifiable/fragmentary core          |
| K | 62  | FLINT       | 1  | single platform flake core               |
| K | 62  | FLINT       | 1  | blade-like flake                         |
| K | 87  | FLINT       | 3  | flakes                                   |
| K | 137 | FLINT       | 4  | flakes                                   |
| K | 137 | FLINT       | 1  | blade-like flake                         |
| L | 12  | FLINT       | 1  | flake                                    |
| L | 62  | BURNT FLINT | 5  |                                          |
| L | 62  | FLINT       | 8  | flakes                                   |
| L | 62  | FLINT       | 1  | tested nodule, bashed lump               |
| L | 112 | BURNT FLINT | 1  |                                          |
| L | 112 | FLINT       | 2  | flakes                                   |
| L | 137 | BURNT FLINT | 1  |                                          |
| L | 137 | FLINT       | 2  | flakes                                   |
| L | 137 | FLINT       | 1  | irregular waste                          |
| L | 162 | BURNT FLINT | 4  |                                          |
| L | 162 | FLINT       | 2  | flakes                                   |
| L | 187 | FLINT       | 2  | flakes                                   |
| L | 212 | FLINT       | 1  | flake                                    |
| M | 12  | FLINT       | 1  | flake                                    |
| M | 12  | FLINT       | 1  | multiplatform flake core                 |
| M | 37  | BURNT FLINT | 3  |                                          |
| M | 37  | FLINT       | 1  | flake                                    |
| M | 62  | FLINT       | 5  | flakes                                   |
| M | 87  | FLINT       | 1  | flake                                    |
| M | 137 | FLINT       | 1  | flake                                    |
| M | 137 | FLINT       | 2  | end scraper                              |
| M | 137 | FLINT       | 1  | blade-like flake, dorsal blade scars     |
| M | 162 | FLINT       | 2  | flakes                                   |
| N | 62  | FLINT       | 2  | flakes                                   |
| N | 87  | FLINT       | 1  | flake                                    |
| N | 112 | FLINT       | 1  | flake, dorsal blade scars                |
| N | 137 | FLINT       | 1  | multiplatform flake core                 |
| N | 162 | FLINT       | 1  | flake                                    |
| N | 212 | FLINT       | 1  | flake                                    |
| N | 237 | FLINT       | 2  | flakes                                   |
| N | 237 | FLINT       | 1  | multiplatform flake core                 |
| N | 237 | STONE       | 1  |                                          |
| O | 37  | CBM         | 1  |                                          |
| O | 37  | FLINT       | 1  | side scraper                             |
| O | 62  | CBM         | 1  |                                          |



Westbury Chalk Quarry Fieldwalking Finds - Area B

|   |     |         |             |   |    |                                                   |
|---|-----|---------|-------------|---|----|---------------------------------------------------|
| O | 112 | POTTERY | CERAMIC     | 1 | PM | glazed                                            |
| O | 112 |         | FLINT       | 1 |    | multiplatform flake core                          |
| O | 162 |         | FLINT       | 1 |    | flake                                             |
| O | 187 |         | BURNT FLINT | 2 |    |                                                   |
| O | 187 |         | FLINT       | 1 |    | single platform flake core                        |
| O | 187 |         | FLINT       | 1 |    | unclassifiable/fragmentary core                   |
| O | 187 |         | FLINT       | 1 |    | awl                                               |
| O | 212 |         | FLINT       | 1 |    | flake                                             |
| P | 37  |         | FLINT       | 1 |    | single platform flake core                        |
| P | 62  |         | FLINT       | 1 |    | flake                                             |
| P | 87  |         | FLINT       | 1 |    | flake                                             |
| P | 87  |         | FLINT       | 2 |    | irregular waste                                   |
| P | 112 |         | FLINT       | 2 |    | irregular waste                                   |
| P | 137 |         | FLINT       | 1 |    | irregular waste                                   |
| P | 162 |         | BURNT FLINT | 1 |    |                                                   |
| P | 187 |         | FLINT       | 2 |    | flakes                                            |
| P | 237 |         | FLINT       | 1 |    | irregular waste                                   |
| Q | 12  |         | FLINT       | 3 |    | flakes                                            |
| Q | 62  |         | FLINT       | 3 |    | flakes                                            |
| Q | 87  |         | FLINT       | 1 |    | flake                                             |
| Q | 112 |         | FLINT       | 1 |    | flake                                             |
| Q | 237 |         | FLINT       | 1 |    | flake                                             |
| Q | 237 |         | FLINT       | 1 |    | blade-like flake                                  |
| Q | 262 |         | BONE        | 1 |    |                                                   |
| Q | 262 |         | FLINT       | 1 |    | flake                                             |
| R | 12  |         | BONE        | 1 |    |                                                   |
| R | 12  |         | FLINT       | 1 |    | flake                                             |
| R | 12  |         | FLINT       | 1 |    | tested nodule, bashed lump                        |
| R | 37  |         | FLINT       | 1 |    | flake                                             |
| R | 87  |         | FLINT       | 3 |    | flakes                                            |
| R | 87  |         | FLINT       | 1 |    | multiplatform flake core                          |
| R | 87  |         | FLINT       | 1 |    | unclassifiable/fragmentary core                   |
| R | 112 |         | FLINT       | 1 |    | flake                                             |
| R | 112 |         | FLINT       | 1 |    | multiplatform flake core                          |
| R | 137 |         | FLINT       | 1 |    | flake                                             |
| R | 162 |         | FLINT       | 1 |    | flake                                             |
| R | 162 |         | FLINT       | 1 |    | tested nodule, bashed lump                        |
| R | 187 |         | FLINT       | 1 |    | irregular waste                                   |
| R | 212 |         | FLINT       | 2 |    | flakes                                            |
| R | 237 |         | BURNT FLINT | 1 |    |                                                   |
| S | 12  |         | BURNT FLINT | 2 |    |                                                   |
| S | 12  |         | FLINT       | 2 |    | flakes                                            |
| S | 12  |         | FLINT       | 1 |    | irregular waste                                   |
| S | 62  |         | BURNT FLINT | 2 |    |                                                   |
| S | 62  |         | FLINT       | 4 |    | flakes                                            |
| S | 62  |         | FLINT       | 1 |    | tested nodule, bashed lump                        |
| S | 62  |         | FLINT       | 1 |    | blade-like flake, taken from a bipolar blade core |
| S | 87  |         | BURNT FLINT | 1 |    |                                                   |
| S | 87  |         | FLINT       | 7 |    | flakes                                            |
| S | 87  |         | FLINT       | 1 |    | tested nodule, bashed lump                        |
| S | 112 |         | FLINT       | 5 |    | flakes                                            |
| S | 137 |         | BURNT FLINT | 1 |    |                                                   |
| S | 137 |         | FLINT       | 3 |    | flakes                                            |
| S | 137 |         | FLINT       | 1 |    | crude end scraper                                 |
| S | 162 |         | FLINT       | 1 |    | blade                                             |

Westbury Chalk Quarry Fieldwalking Finds - Area B

|   |     |                 |       |                                    |
|---|-----|-----------------|-------|------------------------------------|
| S | 162 | FLINT           | 1     | blade-like flake                   |
| S | 162 | FLINT           | 1     | irregular waste                    |
| S | 187 | BURNT FLINT     | 1     |                                    |
| S | 187 | FLINT           | 1     | flake                              |
| S | 187 | FLINT           | 1     | blade-like flake                   |
| S | 212 | FLINT           | 1     | flake                              |
| S | 262 | FLINT           | 3     | flakes                             |
| T | 12  | BURNT FLINT     | 1     |                                    |
| T | 12  | FLINT           | 1     | flake                              |
| T | 37  | FLINT           | 1     | flake                              |
| T | 62  | FLINT           | 6     | flakes                             |
| T | 62  | FLINT           | 1     | large blade                        |
| T | 87  | FLINT           | 9     | flakes; one has dorsal blade scars |
| T | 112 | BURNT FLINT     | 1     |                                    |
| T | 112 | FLINT           | 5     | flakes                             |
| T | 137 | FLINT           | 2     | flakes                             |
| T | 137 | FLINT           | 1     | blade-like flake                   |
| T | 162 | FLINT           | 2     | flakes                             |
| T | 187 | CBM             | 1     |                                    |
| T | 187 | FLINT           | 2     | flakes                             |
| T | 187 | FLINT           | 1     | end and side scraper               |
| T | 212 | FLINT           | 8     | flakes                             |
| T | 237 | FLINT           | 1     | flake                              |
| T | 262 | FLINT           | 2     | flakes                             |
| T | 287 | FLINT           | 1     | flake                              |
| T | 312 | FLINT           | 1     | flake                              |
| U | 12  | FLINT           | 1     | single platform flake core         |
| U | 37  | FLINT           | 2     | flakes                             |
| U | 87  | FLINT           | 4     | flakes                             |
| U | 87  | FLINT           | 1     | unclassifiable/fragmentary core    |
| U | 137 | POTTERY CERAMIC | 1 ROM | Samian                             |
| U | 137 | FLINT           | 9     | flakes                             |
| U | 137 | FLINT           | 1     | blade                              |
| U | 137 | FLINT           | 2     | blade-like flakes                  |
| U | 162 | FLINT           | 3     | flakes                             |
| U | 162 | FLINT           | 2     | blade-like flakes                  |
| U | 187 | FLINT           | 8     | flakes                             |
| U | 212 | FLINT           | 3     | flakes                             |
| U | 212 | FLINT           | 1     | blade-like flake                   |
| U | 237 | BURNT FLINT     | 1     |                                    |
| U | 237 | FLINT           | 3     | flakes                             |
| U | 262 | FLINT           | 2     | flakes                             |

**Appendix 8.6**  
Transect Co-ordinates

| TRANSECT | START_EASTING | START_NORTHING | END_EASTING | END_NORTHING |
|----------|---------------|----------------|-------------|--------------|
| 1        | 8858.60       | 5009.80        | 8921.30     | 5007.60      |
| 2        | 8860.20       | 5012.70        | 8924.80     | 5010.40      |
| 3        | 8861.90       | 5015.20        | 8928.90     | 5013.40      |
| 4        | 8863.20       | 5017.90        | 8931.80     | 5016.00      |
| 5        | 8865.50       | 5021.50        | 8935.40     | 5018.50      |
| 6        | 8867.20       | 5024.40        | 8937.80     | 5021.50      |
| 7        | 8931.80       | 5024.10        | 8940.00     | 5024.10      |
| 8        | 8938.00       | 5027.00        | 8942.50     | 5027.00      |
| 9        | 8941.50       | 5030.40        | 8945.80     | 5030.40      |
| 10       | 8943.80       | 5033.50        | 8949.00     | 5033.50      |
| 11       | 8945.90       | 5036.50        | 8952.30     | 5036.50      |
| 12       | 8948.10       | 5039.40        | 8955.40     | 5039.40      |
| 13       | 8950.80       | 5042.70        | 8958.00     | 5042.70      |
| 14       | 8952.80       | 5045.50        | 8960.20     | 5045.50      |
| 15       | 8955.10       | 5048.30        | 8962.10     | 5048.30      |
| 16       | 8957.50       | 5051.50        | 8964.10     | 5051.50      |
| 17       | 8959.70       | 5054.30        | 8965.80     | 5054.30      |
| 18       | 8961.90       | 5057.10        | 8967.90     | 5057.10      |
| 19       | 8963.80       | 5059.80        | 8969.50     | 5059.70      |
| 20       | 8966.00       | 5062.50        | 8971.60     | 5062.50      |
| 21       | 8967.80       | 5065.50        | 8973.50     | 5065.30      |
| 22       | 8968.60       | 5067.50        | 8969.90     | 5067.70      |
| A        | 8839.80       | 4979.80        | 8893.70     | 4978.70      |
| B        | 8841.70       | 4982.60        | 8896.10     | 4981.40      |
| C        | 8844.00       | 4985.00        | 8898.10     | 4984.40      |
| C1       | 8846.20       | 4987.90        | 8900.50     | 4987.10      |
| C2       | 8847.30       | 4990.50        | 8903.50     | 4990.00      |
| D        | 8849.60       | 4993.40        | 8906.40     | 4993.30      |
| E        | 8851.10       | 4997.50        | 8908.90     | 4995.60      |
| F        | 8853.20       | 5000.70        | 8911.30     | 4998.70      |
| G        | 8854.80       | 5003.50        | 8914.90     | 5001.50      |
| H        | 8856.40       | 5006.50        | 8918.20     | 5004.70      |
| I        | 8836.20       | 4942.40        | 8857.40     | 4941.90      |
| J        | 8833.50       | 4944.80        | 8861.20     | 4944.00      |
| K        | 8830.10       | 4948.10        | 8864.40     | 4946.90      |
| L        | 8826.00       | 4951.20        | 8867.70     | 4950.10      |
| M        | 8822.00       | 4954.70        | 8870.30     | 4952.70      |
| N        | 8824.20       | 4957.50        | 8873.50     | 4955.80      |
| O        | 8826.90       | 4960.60        | 8875.80     | 4958.40      |
| P        | 8828.30       | 4963.30        | 8878.20     | 4961.50      |
| Q        | 8829.90       | 4965.80        | 8880.40     | 4964.20      |
| R        | 8832.40       | 4969.20        | 8882.50     | 4967.20      |
| S        | 8834.00       | 4971.40        | 8885.90     | 4970.20      |
| T        | 8835.60       | 4974.50        | 8888.40     | 4972.80      |
| U        | 8837.90       | 4977.20        | 8891.40     | 4975.70      |

## Westbury Chalk Quarry transect co-ordinates

| TRANSECT | START_EASTING | START_NORTHING | END_EASTING | END_NORTHING |
|----------|---------------|----------------|-------------|--------------|
| 1        | 8858.60       | 5009.80        | 8921.30     | 5007.60      |
| 2        | 8860.20       | 5012.70        | 8924.80     | 5010.40      |
| 3        | 8861.90       | 5015.20        | 8928.90     | 5013.40      |
| 4        | 8863.20       | 5017.90        | 8931.80     | 5016.00      |
| 5        | 8865.50       | 5021.50        | 8935.40     | 5018.50      |
| 6        | 8867.20       | 5024.40        | 8937.80     | 5021.50      |
| 7        | 8931.80       | 5024.10        | 8940.00     | 5024.10      |
| 8        | 8938.00       | 5027.00        | 8942.50     | 5027.00      |
| 9        | 8941.50       | 5030.40        | 8945.80     | 5030.40      |
| 10       | 8943.80       | 5033.50        | 8949.00     | 5033.50      |
| 11       | 8945.90       | 5036.50        | 8952.30     | 5036.50      |
| 12       | 8948.10       | 5039.40        | 8955.40     | 5039.40      |
| 13       | 8950.80       | 5042.70        | 8958.00     | 5042.70      |
| 14       | 8952.80       | 5045.50        | 8960.20     | 5045.50      |
| 15       | 8955.10       | 5048.30        | 8962.10     | 5048.30      |
| 16       | 8957.50       | 5051.50        | 8964.10     | 5051.50      |
| 17       | 8959.70       | 5054.30        | 8965.80     | 5054.30      |
| 18       | 8961.90       | 5057.10        | 8967.90     | 5057.10      |
| 19       | 8963.80       | 5059.80        | 8969.50     | 5059.70      |
| 20       | 8966.00       | 5062.50        | 8971.60     | 5062.50      |
| 21       | 8967.80       | 5065.50        | 8973.50     | 5065.30      |
| 22       | 8968.60       | 5067.50        | 8969.90     | 5067.70      |
| A        | 8839.80       | 4979.80        | 8893.70     | 4978.70      |
| B        | 8841.70       | 4982.60        | 8896.10     | 4981.40      |
| C        | 8844.00       | 4985.00        | 8898.10     | 4984.40      |
| C1       | 8846.20       | 4987.90        | 8900.50     | 4987.10      |
| C2       | 8847.30       | 4990.50        | 8903.50     | 4990.00      |
| D        | 8849.60       | 4993.40        | 8906.40     | 4993.30      |
| E        | 8851.10       | 4997.50        | 8908.90     | 4995.60      |
| F        | 8853.20       | 5000.70        | 8911.30     | 4998.70      |
| G        | 8854.80       | 5003.50        | 8914.90     | 5001.50      |
| H        | 8856.40       | 5006.50        | 8918.20     | 5004.70      |
| I        | 8836.20       | 4942.40        | 8857.40     | 4941.90      |
| J        | 8833.50       | 4944.80        | 8861.20     | 4944.00      |
| K        | 8830.10       | 4948.10        | 8864.40     | 4946.90      |
| L        | 8826.00       | 4951.20        | 8867.70     | 4950.10      |
| M        | 8822.00       | 4954.70        | 8870.30     | 4952.70      |
| N        | 8824.20       | 4957.50        | 8873.50     | 4955.80      |
| O        | 8826.90       | 4960.60        | 8875.80     | 4958.40      |
| P        | 8828.30       | 4963.30        | 8878.20     | 4961.50      |
| Q        | 8829.90       | 4965.80        | 8880.40     | 4964.20      |
| R        | 8832.40       | 4969.20        | 8882.50     | 4967.20      |
| S        | 8834.00       | 4971.40        | 8885.90     | 4970.20      |
| T        | 8835.60       | 4974.50        | 8888.40     | 4972.80      |
| U        | 8837.90       | 4977.20        | 8891.40     | 4975.70      |

**Appendix 8.7**  
Evaluation Trenching Tables

# ***TABLES***

| Trench # | Length | Level N/W | Level S/E | Depth N/W | Depth S/E | Nature of Subsoil / Geology                                                                      | Archaeological Finds                             |
|----------|--------|-----------|-----------|-----------|-----------|--------------------------------------------------------------------------------------------------|--------------------------------------------------|
| 1        | 30m    | N215.50m  | S216.50m  | 260mm     | 320mm     | 0.10m chalk rubble subsoil above moderate bedrock chalk                                          | -                                                |
| 2        | 30m    | W216.50m  | E217.60m  | 250mm     | 280mm     | 0.10m chalk rubble subsoil above periglacially disturbed chalk                                   | U/S (200) - 4 flint flakes                       |
| 3        | 30m    | N217.50m  | S217.50m  | 570mm     | 260mm     | Up to 0.35m loose chalk rubble above badly degraded chalk                                        | U/S (300) - 1 flint flake                        |
| 4        | 30m    | W218.40m  | E219.00m  | 290mm     | 190mm     | 0.07m chalk rubble subsoil above moderate bedrock chalk                                          | U/S (400) - 1 flint flake                        |
| 5        | 30m    | N220.50m  | S219.60m  | 340mm     | 300mm     | 0.14m chalk rubble subsoil above moderate bedrock chalk                                          | -                                                |
| 6        | 30m    | W222.50m  | E223.30m  | 220mm     | 190mm     | 0.10m chalk rubble subsoil over root disturbed poor chalk                                        | -                                                |
| 7        | 30m    | N221.00m  | S221.80m  | 200mm     | 280mm     | 0.12m chalk rubble subsoil over moderate bedrock chalk - single tree bole present (investigated) | U/S (700) - 1 flake, 1 flake end scraper         |
| 8        | 30m    | W220.20m  | E219.50m  | 270mm     | 150mm     | 0.08m chalk rubble subsoil above periglacially disturbed chalk                                   | U/S (800) - 3 flint flakes                       |
| 9        | 30m    | N219.80m  | S220.50m  | 160mm     | 220mm     | 0.07m chalk rubble subsoil above plough damaged good chalk                                       | U/S (900) - 2 flakes                             |
| 10       | 30m    | N218.70m  | S219.40m  | 300mm     | 210mm     | 0.04m loose chalk rubble above moderate chalk bedrock. Three tree boles present                  | U/S (1000) - clay pipe: 1/2g post-med pot: 3/24g |
| 11       | 30m    | W218.00m  | E219.00m  | 180mm     | 210mm     | 0.09m chalk rubble subsoil over good, plough striated chalk                                      | U/S (1100) - clay pipe: 1/2g post-med pot: 1/2g  |
| 12       | 30m    | W220.80m  | E221.50m  | 240mm     | 210mm     | 0.08m chalk rubble over poor chalk cut by tree boles & burrows                                   | U/S (1200) - 4 flint flakes                      |
| 13       | 30m    | W221.00m  | E221.50m  | 200mm     | 190mm     | 0.10m chalk rubble subsoil over good chalk bedrock                                               | U/S (1300) - 1 flint flake                       |
| 14       | 30m    | W221.50m  | E222.50m  | 180mm     | 190mm     | 0.07m chalk rubble subsoil above degraded chalk & flint seams                                    | -                                                |
| 15       | 30m    | W222.50m  | E223.10m  | 210mm     | 230mm     | 0.11m chalk rubble subsoil above moderate chalk bedrock                                          | U/S (1500) - 2 flint flakes                      |
| 16       | 30m    | N223.80m  | S223.90m  | 220mm     | 270mm     | 0.10m chalk rubble over poor, periglacially striated chalk                                       | -                                                |
| 17       | 30m    | W222.80m  | E223.10m  | 300mm     | 250mm     | 0.10m chalk rubble subsoil over moderate to poor chalk bedrock                                   | -                                                |
| 18       | 30m    | N222.50m  | S222.60m  | 290mm     | 230mm     | 0.04m chalk rubble over poor, periglacially disturbed chalk                                      | -                                                |
| 19       | 30m    | N221.60m  | S221.50m  | 220mm     | 230mm     | 0.09m chalk rubble subsoil above moderate chalk bedrock                                          | -                                                |

Table 1: Summary of Evaluation Trenches within Area A(N)



| Trench # | Length | Level N/W | Level S/E | Depth N/W | Depth S/E | Nature of Subsoil / Geology                                 | Archaeological Finds                                                          |
|----------|--------|-----------|-----------|-----------|-----------|-------------------------------------------------------------|-------------------------------------------------------------------------------|
| 20       | 30m    | W221.20m  | E221.50m  | 250mm     | 380mm     | 0.11m chalk rubble subsoil above moderate chalk bedrock     | -                                                                             |
| 21       | 30m    | N222.30m  | S223.00m  | 320mm     | 210mm     | 0.08m chalk rubble subsoil above degraded chalk bedrock     | -                                                                             |
| 22       | 30m    | N223.50m  | S223.00m  | 230mm     | 200mm     | 0.07m chalk rubble subsoil above degraded chalk bedrock     | -                                                                             |
| 23       | 30m    | W224.20m  | E224.50m  | 210mm     | 310mm     | 0.05m chalk rubble above moderate chalk bedrock             | U/S (2300) - burnt flint 38g<br>1 scraper - all round retouch<br>1 flake core |
| 24       | 30m    | N223.80m  | S223.50m  | 210mm     | 250mm     | 0.03m loose chalk rubble over good chalk bedrock            | -                                                                             |
| 25       | 30m    | W222.70m  | E223.00m  | 280mm     | 210mm     | 0.10m chalk rubble subsoil over moderate flint seamed chalk | -                                                                             |
| 26       | 30m    | W222.20m  | E222.50m  | 180mm     | 220mm     | 0.06m loose chalk rubble over moderate chalk bedrock        | -                                                                             |
| 27       | 30m    | W220.70m  | E221.00m  | 210mm     | 220mm     | 0.05m loose chalk rubble over good, plough striated chalk   | -                                                                             |
| 28       | 30m    | W220.00m  | E220.30m  | 280mm     | 300mm     | 0.05m chalk rubble subsoil over degraded chalk bedrock      | -                                                                             |
| 29       | 30m    | N221.90m  | S221.20m  | 260mm     | 260mm     | 0.05m chalk rubble over moderate, plough striated chalk     | -                                                                             |
| 30       | 30m    | W222.80m  | E222.80m  | 260mm     | 270mm     | 0.06m chalk rubble above periglacially disturbed good chalk | -                                                                             |
| 31       | 30m    | N224.50m  | S224.20m  | 300mm     | 310mm     | 0.10m chalk rubble subsoil above moderate chalk bedrock     | -                                                                             |

**Table 2: Summary of Evaluation Trenches within Area A(S)**

| Trench # | Length | Level N/W | Level S/E | Depth N/W | Depth S/E | Nature of Subsoil / Geology                                  | Archaeological Finds                                            |
|----------|--------|-----------|-----------|-----------|-----------|--------------------------------------------------------------|-----------------------------------------------------------------|
| 82       | 50m    | W178.00m  | E175.50m  | 250mm     | 250mm     | ploughsoil above moderate to good chalk bedrock              | U/S (8200) - 7 flint flakes                                     |
| 83       | 30m    | N175.00m  | S172.50m  | 200mm     | 150mm     | ploughsoil above moderately weathered chalk bedrock          | U/S (8300) - 2 flint flakes                                     |
| 84       | 50m    | W173.50m  | E170.50m  | 250mm     | 260mm     | ploughsoil above moderate to poor degraded chalk             | U/S (8400) - 2 flint flakes<br>burnt flint 62g                  |
| 85       | 50m    | N178.00m  | S174.50m  | 200mm     | 220mm     | ploughsoil above moderate chalk cut by tree boles/burrows    | U/S (8500) - 2 flint flakes<br>burnt flint 10g                  |
| 86       | 50m    | W176.00m  | E175.50m  | 150mm     | 190mm     | ploughsoil above moderate chalk cut by burrowing disturbance | U/S (8600) - 4 flint flakes<br>1 flake core                     |
| 87       | 30m    | W179.00m  | E179.00m  | 240mm     | 260mm     | ploughsoil above periglacially striated moderate chalk       | U/S (8700) - 3 flint flakes<br>1 flake core<br>burnt flint 152g |

**Table 3: Summary of Evaluation Trenches within Area B (Zone 1)**

| Trench # | Length | Level N/W | Level S/E | Depth N/W | Depth S/E | Nature of Subsoil / Geology                                     | Archaeological Finds                                                                                                         |
|----------|--------|-----------|-----------|-----------|-----------|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| 57       | 40m    | N192.00m  | S186.00m  | 250mm     | 250mm     | 0.10m chalk rubble subsoil above poor, degraded chalk           | U/S (5700) - 1 flint flake                                                                                                   |
| 58       | 200m   | N203.50m  | S189.00m  | 200mm     | 350mm     | ploughsoil above very poor, shattered chalk cut by tree boles   | U/S (5800) - 24 flakes<br>2 flake cores; 1 scraper<br>post-med CBM: 1/12g                                                    |
| 59       | 150m   | W202.00m  | E200.50m  | 350mm     | 500mm     | ploughsoil above very poor, shattered chalk cut by tree boles   | U/S (5900) - 22 flakes<br>1 flake core; 1 scraper<br>post-med CBM: 3/74g                                                     |
| 60       | 200m   | W199.50m  | E193.00m  | 300mm     | 350mm     | ploughsoil above poor, degraded chalk cut by tree boles/burrows | U/S (6000) - 2 scrapers<br>12 flint flakes<br>post-med CBM: 5/200g                                                           |
| 61       | 100m   | N195.00m  | S193.50m  | 380mm     | 400mm     | ploughsoil above poor, degraded chalk with tree boles/burrows   | U/S (6100) - 1 flake core<br>post-med CBM: 5/132g                                                                            |
| 62       | 200m   | W184.50m  | E196.00   | 360mm     | 390mm     | ploughsoil above poor, badly shattered chalk                    | U/S (6200) - 14 flakes<br>1 flake core<br>post-med CBM: 3/81g                                                                |
| 63       | 200m   | N201.50m  | S195.00m  | 320mm     | 450mm     | ploughsoil above moderate to poor chalk cut by tree boles       | U/S (6300) - 11 flakes<br>1 burnt flint flake<br>1 flake core, 1 Fe. nail<br>post-med CBM: 13/396g<br>Ditch F6303 (see text) |
| 64       | 200m   | W197.50m  | E181.00m  | 300mm     | 280mm     | ploughsoil above moderate to good chalk bedrock                 | U/S (6400) - 7 flakes<br>1 flake core<br>Ditch F6403, Gully F6406<br>(see text)                                              |
| 65       | 60m    | W196.00m  | E192.00m  | 250mm     | 200mm     | ploughsoil above moderate to poor variable chalk                | -                                                                                                                            |
| 66       | 100m   | N193.50m  | S194.00m  | 250mm     | 250mm     | ploughsoil above moderate to poor plough striated chalk         | U/S (6600) - 3 flakes<br>post-med CBM: 1/10g<br>Ditch F6603 (see text)                                                       |

Table 4: Summary of Evaluation Trenches within Area B (Zone 2)

| Trench # | Length | Level N/W | Level S/E | Depth N/W | Depth S/E | Nature of Subsoil / Geology                                                                                         | Archaeological Finds                               |
|----------|--------|-----------|-----------|-----------|-----------|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| 39       | 30m    | N191.30m  | S186.30m  | 400mm     | 420mm     | 0.12m chalk rubble subsoil above moderate chalk bedrock                                                             | U/S (3900) - 1 flint flake                         |
| 40       | 100m   | W200.50m  | E194.30m  | 570mm     | 280mm     | 0.10m chalk rubble above moderate chalk bedrock. Extensive modern quarrying disturbance/redeposition to W of trench | U/S (4000) - 3 flint flakes                        |
| 41       | 30m    | W194.00m  | E190.40m  | 400mm     | 350mm     | 0.15m chalk rubble subsoil above good chalk bedrock                                                                 | U/S (4100) - An. bone: 1/22g<br>3 flint flakes     |
| 42       | 50m    | W191.50m  | E185.90m  | 260mm     | 380mm     | 0.14m chalk rubble over good chalk cut by tree boles/burrows                                                        | -                                                  |
| 43       | 50m    | N199.00m  | S193.70m  | 370mm     | 310mm     | 0.13m chalk rubble subsoil over good flint scamed chalk                                                             | U/S (4300) - 1 flint flake                         |
| 44       | 30m    | W200.70m  | E198.50m  | 460mm     | 570mm     | 0.25m chalk rubble subsoil above poor, shattered chalk                                                              | U/S (4400) - 7 flint flakes<br>1 burnt flint flake |

**Table 5: Summary of Evaluation Trenches within Area B (Zone 3)**

| Trench # | Length | Level N/W | Level S/E | Depth N/W | Depth S/E | Nature of Subsoil / Geology                                   | Archaeological Finds                                                                          |
|----------|--------|-----------|-----------|-----------|-----------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 32       | 30m    | W201.80m  | E200.80m  | 270mm     | 260mm     | 0.05m loose chalk rubble over plough striated chalk           | -                                                                                             |
| 33       | 30m    | N200.10m  | S197.00m  | 270mm     | 240mm     | 0.10m chalk rubble over good chalk disturbed by burrowing     | U/S (3300) - 1 flint flake                                                                    |
| 34       | 30m    | W199.80m  | E198.30m  | 220mm     | 260mm     | 0.09m chalk rubble over plough striated moderate chalk        | U/S (3400) - 1 flint flake                                                                    |
| 35       | 30m    | N199.00m  | S195.20m  | 400mm     | 340mm     | 0.14m chalk rubble over moderate chalk cut by tree boles      | U/S (3500) - 3 flint flakes                                                                   |
| 36       | 30m    | W200.00m  | E197.50m  | 310mm     | 280mm     | 0.12m chalk rubble subsoil above degraded chalk bedrock       | U/S (3600) - 1 flint flake                                                                    |
| 37       | 30m    | W194.70m  | E192.80m  | 350mm     | 320mm     | 0.10m chalk rubble subsoil above degraded chalk bedrock       | U/S (3700) - 1 flake core<br>8 flint flakes                                                   |
| 38       | 30m    | N199.30m  | S196.30m  | 350mm     | 360mm     | 0.15m chalk rubble over degraded chalk cut by two tree boles  | U/S (3800) - 3 flint flakes                                                                   |
| 45       | 30m    | N198.00m  | S195.50m  | 350mm     | 380mm     | 0.16m chalk rubble over moderate chalk cut by tree boles      | U/S (4500) burnt flint: 36g                                                                   |
| 46       | 30m    | N191.00m  | S187.00m  | 320mm     | 350mm     | 0.15m chalk rubble over good chalk cut by tree boles/burrows  | -                                                                                             |
| 47       | 30m    | W191.00m  | E187.90m  | 450mm     | 350mm     | 0.15m chalk rubble subsoil over good chalk bedrock            | U/S (4700) - 4 flint flakes                                                                   |
| 48       | 30m    | W201.00m  | E202.00m  | 410mm     | 220mm     | 0.13m chalk rubble subsoil over poor, degraded chalk          | U/S (4800) - 4 flakes<br>1 thumbnail scraper                                                  |
| 49       | 30m    | N202.00m  | S201.00m  | 500mm     | 370mm     | 0.20m loose chalk rubble over poor, shattered chalk           | -                                                                                             |
| 50       | 30m    | W201.00m  | E201.00m  | 290mm     | 390mm     | 0.15m loose chalk rubble over very poor, shattered chalk      | U/S (5000) - 1 flint flake                                                                    |
| 51       | 30m    | N198.70m  | S198.60m  | 380mm     | 220mm     | 0.08m loose chalk rubble above moderate chalk bedrock         | -                                                                                             |
| 52       | 30m    | N193.00m  | S193.30m  | 540mm     | 270mm     | Up to 0.32m calcareous colluvium over good flint seamed chalk | -                                                                                             |
| 53       | 30m    | W199.00m  | E200.00m  | 200mm     | 260mm     | 0.07m chalk rubble subsoil above moderate chalk bedrock       | -                                                                                             |
| 54       | 30m    | W200.50m  | E202.00m  | 400mm     | 440mm     | 0.15m chalk rubble over periglacially striated chalk          | -                                                                                             |
| 55       | 30m    | N198.90m  | S198.50m  | 450mm     | 250mm     | 0.11m chalk rubble subsoil above good natural chalk           | U/S (5500) - 2 flint flakes<br>ditch/gully F5502 - see text                                   |
| 56       | 30m    | W197.40m  | E196.50m  | 230mm     | 830mm     | see text for description of coombe deposits                   | U/S (5600) - 1 scraper<br>8 flint flakes<br>(5601) - 2 flint flakes<br>(5604) - 1 flint flake |

Table 6 (Part 1): Summary of Evaluation Trenches within Area B (other than within Zones 1-3)

| Trench # | Length | Level N/W | Level S/E | Depth N/W | Depth S/E | Nature of Subsoil / Geology                             | Archaeological Finds                                           |
|----------|--------|-----------|-----------|-----------|-----------|---------------------------------------------------------|----------------------------------------------------------------|
| 67       | 30m    | W203.50m  | E204.00m  | 250mm     | 250mm     | ploughsoil above very poor, badly shattered chalk       | U/S (6700) - 4 flint flakes                                    |
| 68       | 30m    | W184.00m  | E189.50m  | 300mm     | 300mm     | ploughsoil above moderately weathered chalk bedrock     | U/S (6800) - 1 flint flake<br>2 flake cores<br>burnt flint 50g |
| 69       | 30m    | N190.00m  | S185.50m  | 250mm     | 270mm     | ploughsoil above moderately weathered chalk bedrock     | U/S (6900) - 3 flint flakes                                    |
| 70       | 30m    | W181.50m  | E185.00m  | 250mm     | 240mm     | ploughsoil above moderate to poor variable chalk        | -                                                              |
| 71       | 30m    | W189.00m  | E190.50m  | 300mm     | 250mm     | ploughsoil above moderate to poor variable chalk        | U/S (7100) - 3 flint flakes<br>burnt flint 42g                 |
| 72       | 30m    | N190.50m  | S187.00m  | 260mm     | 250mm     | ploughsoil above moderately weathered chalk             | -                                                              |
| 73       | 30m    | W184.50m  | E180.50m  | 250mm     | 240mm     | ploughsoil above good to moderate plough striated chalk | -                                                              |
| 74       | 30m    | N183.00m  | S178.50m  | 250mm     | 230mm     | ploughsoil above moderate to poor weathered chalk       | Ditch F7401                                                    |
| 75       | 30m    | W178.00m  | E181.50m  | 300mm     | 310mm     | ploughsoil above moderate to poor weathered chalk       | -                                                              |
| 76       | 30m    | N187.00m  | S183.50m  | 200mm     | 190mm     | ploughsoil above poor, degraded chalk                   | U/S (7600) - 1 flint flake                                     |
| 77       | 30m    | N185.00m  | S181.00m  | 250mm     | 270mm     | ploughsoil over poor chalk cut by tree boles            | -                                                              |
| 78       | 30m    | W179.00m  | E175.50m  | 200mm     | 250mm     | ploughsoil above poor, shattered chalk                  | -                                                              |
| 79       | 30m    | W183.50m  | E185.00m  | 250mm     | 250mm     | ploughsoil above poor, shattered chalk                  | U/S (7900) - 2 flint flakes                                    |
| 80       | 30m    | W180.00m  | E178.50m  | 300mm     | 310mm     | ploughsoil above moderate to poor degraded chalk        | U/S (8000) - 2 flint flakes                                    |
| 81       | 30m    | N175.50m  | S171.50m  | 250mm     | 200mm     | ploughsoil above moderately weathered chalk             | U/S (8100) - 1 flint flake                                     |
| 88       | 30m    | N182.00m  | S180.00m  | 150mm     | 150mm     | ploughsoil above moderately weathered chalk bedrock     | U/S (8800) - 1 flint flake<br>burnt flint 82g                  |

Table 6 (Part 2): Summary of Evaluation Trenches within Area B (other than within Zones 1-3)

**Westbury Chalk Pit - Finds Quantification**  
All finds quantified by number and by weight in grams

Table 7: Area A - North

| Trench | Context | WORKED FLINT (No.s) |                  |       |              | Burnt Flint | Romano British Pottery | Post Medieval Pottery | Clay Pipe | Ceramic Building Material |
|--------|---------|---------------------|------------------|-------|--------------|-------------|------------------------|-----------------------|-----------|---------------------------|
|        |         | Tools               | Retouched Flakes | Cores | Other Flakes |             |                        |                       |           |                           |
| 2      | 200     |                     |                  |       | 4            |             |                        |                       |           |                           |
| 3      | 300     |                     |                  |       | 1            |             |                        |                       |           |                           |
| 4      | 400     |                     |                  |       | 1            |             |                        |                       |           |                           |
| 7      | 700     | 1 scraper           |                  |       | 1            |             |                        |                       |           |                           |
| 8      | 800     |                     |                  |       | 3            |             |                        |                       |           |                           |
| 9      | 900     |                     |                  |       | 2            |             |                        |                       |           |                           |
| 10     | 1000    |                     |                  |       |              |             |                        |                       | 1/2g      | 3/24g                     |
| 11     | 1100    |                     |                  |       |              |             |                        | 1/2g                  | 1/2g      |                           |
| 12     | 1200    | 2 bladelets         |                  |       | 2            |             |                        |                       |           |                           |
| 13     | 1300    |                     |                  |       | 1            |             |                        |                       |           |                           |
| 15     | 1500    |                     | 1                |       | 1            |             |                        |                       |           |                           |
|        | Totals  | 3                   | 1                | -     | 16           | -           | -                      | 1/2g                  | 2/4g      | 3/24g                     |

Table 8: Area A - South

| Trench | Context | WORKED FLINT (No.s) |                  |       |              | Burnt Flint | Romano British Pottery | Post Medieval Pottery | Clay Pipe | Ceramic Building Material |
|--------|---------|---------------------|------------------|-------|--------------|-------------|------------------------|-----------------------|-----------|---------------------------|
|        |         | Tools               | Retouched Flakes | Cores | Other Flakes |             |                        |                       |           |                           |
| 23     | 2300    | 1 scraper           |                  | 1     |              | 1/38g       |                        |                       |           |                           |
|        | Totals  | 1                   | -                | 1     | -            | 1/38g       | -                      | -                     | -         | -                         |

Table 9: Area B - Zone 1

| Trench | Context | WORKED FLINT (No.s) |                  |       |              | Burnt Flint | Romano British Pottery | Post Medieval Pottery | Clay Pipe | Ceramic Building Material |
|--------|---------|---------------------|------------------|-------|--------------|-------------|------------------------|-----------------------|-----------|---------------------------|
|        |         | Tools               | Retouched Flakes | Cores | Other Flakes |             |                        |                       |           |                           |
| 82     | 8200    |                     |                  |       | 7            |             |                        |                       |           |                           |
| 83     | 8300    |                     |                  |       | 2            |             |                        |                       |           |                           |
| 84     | 8400    |                     |                  |       | 2            | 1/62g       |                        |                       |           |                           |
| 85     | 8500    |                     |                  |       | 2            | 1/10g       |                        |                       |           |                           |
| 86     | 8600    |                     | 1                | 1     | 3            |             |                        |                       |           |                           |
| 87     | 8700    |                     |                  | 1     | 3            | 6/152g      |                        |                       |           |                           |
|        | Totals  | -                   | 1                | 2     | 19           | 8/224g      | -                      | -                     | -         | -                         |

Table 10: Area B - Zone 2

| Trench | Context | WORKED FLINT (No.s) |                  |       |              | Burnt Flint | Animal Bone | Post Medieval Pottery | Clay Pipe | Ceramic Building Material |
|--------|---------|---------------------|------------------|-------|--------------|-------------|-------------|-----------------------|-----------|---------------------------|
|        |         | Tools               | Retouched Flakes | Cores | Other Flakes |             |             |                       |           |                           |
| 57     | 5700    |                     |                  |       | 1            |             |             |                       |           |                           |
| 58     | 5800    | 1 scraper           | 1                | 2     | 23           |             |             |                       |           | 1/12g                     |
| 59     | 5900    | 1 scraper           | 1                | 1     | 21           |             |             |                       |           | 3/74g                     |
| 60     | 6000    | 2 scrapers          |                  |       | 12           |             |             |                       |           | 5/200g                    |
| 61     | 6100    |                     |                  | 1     |              |             |             |                       |           | 5/132g                    |
| 62     | 6200    |                     | 3                | 1     | 11           |             |             |                       |           | 3/81g                     |
| 63     | 6300    |                     |                  | 1     | 12           |             |             |                       |           | 13/396g                   |
|        | 6301    |                     |                  | 1     | 3            |             |             |                       |           |                           |
| 64     | 6400    |                     |                  | 1     | 7            |             |             |                       |           |                           |
|        | 6401    |                     |                  |       | 7            |             | 1/4g        |                       |           |                           |
|        | 6402    |                     |                  |       | 3            |             | 2/2g        |                       |           |                           |
|        | 6404    |                     |                  |       | 7            |             | 1/1g        |                       |           |                           |
| 66     | 6600    |                     |                  |       | 3            |             |             |                       |           | 1/10g                     |
|        | 6601    |                     |                  |       | 2            |             | 1/10g       |                       |           |                           |
|        | Totals  | 4                   | 5                | 8     | 112          | -           | 5/17g       | -                     | -         | 30/715g                   |

Table 11: Area B - Zone 3

| Trench | Context | WORKED FLINT (No.s) |                  |       |              | Burnt Flint | Animal Bone | Post Medieval Pottery | Clay Pipe | Ceramic Building Material |
|--------|---------|---------------------|------------------|-------|--------------|-------------|-------------|-----------------------|-----------|---------------------------|
|        |         | Tools               | Retouched Flakes | Cores | Other Flakes |             |             |                       |           |                           |
| 39     | 3900    |                     |                  |       | 1            |             |             |                       |           |                           |
| 40     | 4000    |                     |                  |       | 3            |             |             |                       |           |                           |
| 41     | 4100    |                     |                  |       | 3            |             | 1/22g       |                       |           |                           |
| 43     | 4300    |                     |                  |       | 1            |             |             |                       |           |                           |
| 44     | 4400    |                     |                  |       | 8            |             |             |                       |           |                           |
|        | Totals  | -                   | -                | -     | 16           | -           | 1/22g       | -                     | -         | -                         |



Table12: Area B - Other Trenches

| Trench | Context | WORKED FLINT (No.s) |                     |       |                 | Burnt Flint | Romano<br>British<br>Pottery | Post<br>Medieval<br>Pottery | Clay<br>Pipe | Ceramic<br>Building<br>Material |
|--------|---------|---------------------|---------------------|-------|-----------------|-------------|------------------------------|-----------------------------|--------------|---------------------------------|
|        |         | Tools               | Retouched<br>Flakes | Cores | Other<br>Flakes |             |                              |                             |              |                                 |
| 33     | 3300    |                     |                     |       | 1               |             |                              |                             |              |                                 |
| 34     | 3400    |                     | 1                   |       |                 |             |                              |                             |              |                                 |
| 35     | 3500    |                     |                     |       | 3               |             |                              |                             |              |                                 |
| 36     | 3600    |                     |                     |       | 1               |             |                              |                             |              |                                 |
| 37     | 3700    |                     |                     | 1     | 8               |             |                              |                             |              |                                 |
| 38     | 3800    |                     |                     |       | 3               |             |                              |                             |              |                                 |
| 45     | 4500    |                     |                     |       |                 | 2/36g       |                              |                             |              |                                 |
| 47     | 4700    |                     |                     |       | 4               |             |                              |                             |              |                                 |
| 48     | 4800    | 1<br>scraper        | 1                   |       | 3               |             |                              |                             |              |                                 |
| 50     | 5000    |                     |                     |       | 1               |             |                              |                             |              |                                 |
| 55     | 5500    |                     |                     |       | 2               |             |                              |                             |              |                                 |
|        | 5503    |                     |                     | 1     | 6               |             | 2/1g                         |                             |              |                                 |
| 56     | 5600    | 1<br>scraper        |                     |       | 8               |             |                              |                             |              |                                 |
|        | 5601    |                     |                     |       | 2               |             |                              |                             |              |                                 |
|        | 5604    |                     |                     |       | 1               |             |                              |                             |              |                                 |
| 67     | 6700    |                     |                     |       | 4               |             |                              |                             |              |                                 |
| 68     | 6800    |                     |                     | 2     | 1               | 1/50g       |                              |                             |              |                                 |
| 69     | 6900    |                     |                     |       | 3               |             |                              |                             |              |                                 |
| 71     | 7100    |                     |                     |       | 3               | 1/42g       |                              |                             |              |                                 |
| 76     | 7600    |                     | 1                   |       |                 |             |                              |                             |              |                                 |
| 79     | 7900    |                     | 1                   |       | 1               |             |                              |                             |              |                                 |
| 80     | 8000    |                     |                     |       | 2               |             |                              |                             |              |                                 |
| 81     | 8100    |                     |                     |       | 1               |             |                              |                             |              |                                 |
| 88     | 8800    |                     |                     |       | 1               | 2/82g       |                              |                             |              |                                 |
| Totals |         | 2                   | 4                   | 4     | 58              | 6/210g      | 2/1g                         | -                           | -            | -                               |

**Appendix 8.8**  
Letter from County Archaeologist



EDUCATION & LIBRARIES DEPARTMENT

Lindsey Davies, BSc, MBA, PhD  
Chief Education Officer

Dr C G Down  
Manor House  
Church Street  
CHURCHOVER  
Nr. Rugby  
Warwickshire CV23 0EW

**Wiltshire**  
COUNTY COUNCIL

Libraries and Heritage Bythesea Road  
Trowbridge Wiltshire BA14 8BS  
Fax: (01225) 713993  
Telephone:  
Operator: (01225) 713000  
Direct Dial: (01225) 713734

**Appendix 8.8**

Please ask for:

Our ref:

Your ref:

Duncan Coe

DC/MJU/98DC027

18 November 1998

Dear Dr Down

**Westbury Chalk Pit: Archaeological Evaluation**

Thank you for your letter of 10 November 1998 and the accompanying report on the archaeological field evaluation recently undertaken at Westbury.

The quality of the work on site was perfectly acceptable and generally the report is of an appropriate standard. One slight concern I have is with the illustrations in the report. No attempt has been made to plot the overall distribution of features in plan form and the features in trenches 63, 64, 66 and 74 are not shown in plan form at all.

I would totally agree with your conclusion that there are no archaeological constraints on the granting of planning permission for quarrying on this site. Additionally no conditions relating to archaeology will be necessary.

I assume that you will now produce a summary of the various archaeological reports for inclusion in the Environmental Statement and the reports themselves will be attached as appendices.

If you would like to discuss this site further please do not hesitate to contact me.

Yours sincerely

Duncan Coe  
Assistant Archaeologist  
Libraries & Heritage



## 9.0 Rights-of-Way

### 9.1 EXISTING SITUATION

- 9.1.1 There is an extensive network of public rights-of-way in the locality and this is illustrated on Drawing UKTD-WH036. In summary, these comprise a network of parallel bridleways running more or less along the crest of the scarp, half way down the scarp, and towards its foot (numbers 35, 44, 61), which are linked up the scarp by 47 and which continue northeast as 44 to the quarry entrance. Here it turns southeast, beside the current limit of the quarry, and terminates at the vedette post.
- 9.1.2 From here, the network continues northeast as either footpaths (49, 50, 59) or byways (44, 23).
- 9.1.3 These rights of way in some cases form part of two wider networks, the Wessex Ridgeway and the Imber Range Perimeter Path, which are extensive, well publicised and well used routes.
- 9.1.4 Development of the extended quarry would conflict with certain of these rights of way. Details of these conflicts, and proposed mitigation, as given below.

### 9.2 NORTHEAST QUARRY EXTENSION

- 9.2.1 Extending the quarry to the northeast will require closure of about 280m of bridleway 48 and 290m of footpath 59. These form two sides of what is, virtually, a square, the other sides being formed by part of byway 44 and footpath 50, which between them therefore provide an alternative route. The combined distance to be closed is therefore 570m, while the existing alternative is also 570m and is, therefore, an equally convenient alternative in terms of both length and topography.
- 9.2.2 However, byway 44 is a tarmac-surface road, which at times carries fairly heavy car traffic of visitors to Bratton Camp Fort.
- 9.2.3 It is therefore proposed, notwithstanding that a suitable alternative route already exists, to provide a second alternative, of bridleway status throughout, paralleling byway 44 and footpath 50, within the Lafarge boundary and outside the landscaped bund. This is also shown on Drawing UKTD-WH036. Its length is the same as the routes proposed for closure, but it offers the worthwhile benefit that walkers will be able to avoid conflict with vehicular traffic on what is the narrowest and least suitable stretch of the highway.
- 9.2.4 Because the quarry development programme requires the northeast area to be opened up first, these proposed closures and replacements will need to be

installed promptly. If planning permission is granted for the quarry development, therefore, application for the necessary closure orders will follow quickly.

- 9.2.5 Overall, it is considered that because there is an existing alternative of the same length and convenience as the routes proposed for closure, and because a new parallel alternative, free of motor traffic, will be created, the changes will be neutral or slightly beneficial as compared to the present day.

### 9.3 SOUTHWEST QUARRY DEVELOPMENT

- 9.3.1 As the quarry develops further, working will move southwards and in due course require development beyond the existing southern boundary. Three rights of way will require closure here. Bridleway 46 is a dead-end in terms of its status, although it links to footpaths 56 and (part) 45. These routes are seldom used.
- 9.3.2 It is proposed to close them and replace them by a shorter diversion, of footpath status. The total closures will be about 240m of bridleway and 340m of footpath, with the replacement footpath being about 320m long.
- 9.3.3 These routes do not form part of any wider through route. The actual length available will be reduced by about 260m, but a similar range of countryside will be visible. Within the context of many tens of kilometres of rights-of-way available locally, the loss of 260m is not considered to be a material loss.

### 9.4 CONCLUSIONS

- 9.4.1 The overall level of change to the extensive local footpath network is very modest and is not considered significant in terms either of the length of the new routes, or their amenity values compared with the present day.



## 10.0 Soils and Agriculture

### 10.1 INTRODUCTION

- 10.1.1 A study of the agricultural baseline conditions relevant to an area of land adjacent to the existing Westbury Chalk Quarry was undertaken in January 2002. The work comprised a survey of the soil resources and agricultural land quality of the site, and a survey of the occupiers of the site and adjacent land. This chapter sets out the findings of those surveys, together with an initial appraisal of the agricultural land quality of potential alternative sites.

### 10.2 SITE AND CLIMATIC CHARACTERISTICS

#### *General features and landform*

- 10.2.1 All of the survey area lies within the Ministry of Defence's military training area and is bounded to the northwest by the existing quarry; to the northeast by Winkland's Down; to the southeast by Four Hundred Down and Thirteen Hundred Down and to the southwest by Dilton Middle Down.
- 10.2.2 The total area surveyed extends to about 39.6ha, of which most (35.3ha) is agricultural land under grass or arable cultivation growing winter cereals. The remaining 'Other Land' (4.3ha) comprises a partly wooded embankment, access tracks and a small strip of woodland.
- 10.2.3 The highest ground is in the northeast and lies at an altitude of about 225m AOD where the land forms a gently sloping plateau. The land then slopes moderately to moderately steeply to the southeast and southwest to the lower ground at about 170m AOD.
- 10.2.4 Surface form across the site is mainly smooth to gently undulating.

#### *Soil parent materials and natural drainage*

- 10.2.5 There is one main soil parent material across the site, Cretaceous Middle and Upper Chalk, which is covered by varying thicknesses of flinty and chalky silty and loamy drift.
- 10.2.6 There are two main soil profiles derived. The most extensive occurs on the strongly sloping land to the southeast and the flattish plateau to the northwest. Soil profiles typically comprise greyish brown or dark brown, extremely calcareous, silty or loamy upper layers overlying chalk at shallow depth. On the flattish plateau to the southwest, soil profiles typically comprise very dark greyish brown, organic, silty upper layers also overlying chalk at shallow depth.



- 10.2.7 Natural drainage of both these soil types is mainly by free vertical percolation down through the soil profile layers then through the permeable chalk below.

*Climatic factors*

- 10.2.8 Climatic factors affecting land quality, especially by their interactions with soil factors have been interpolated from the Meteorological Office's standard 5 km grid point data set for three representative locations ST 890500, ST892503 and ST 895510 at 200, 210 and 221m AOD. These are set out below.

- Average annual rainfall (AAR): 840-842mm
- Accumulated temperature >0°C (AT0): 1300-1324 day°
- Field Capacity Days (FCD): 184 days
- Moisture deficit - winter wheat (MDw): 85-87mm
- Moisture deficit - potatoes (MDp): 72-75mm

- 10.2.9 The local climate is cool and moderately wet. The combination of AAR and AT0 is inherently limiting to grade 2 regardless of other more favourable soil characteristics. The FCD regime is well above the national average for lowland England (150 days) and the "key" crop-adjusted moisture deficits are moderate.

### 10.3 AGRICULTURAL LAND QUALITY AND MAIN SOIL CHARACTERISTICS

*Soil survey methods*

- 10.3.1 Forty-four soil profiles were examined on a 100m grid basis using an Edelman (Dutch) auger and spade at the approximate locations shown on Plan RAC 1, giving an observation density on the agricultural land of about 1.2 per ha. Soil physical characteristics were also examined in more detail in three soil inspection pits (at the locations of selected auger borings): the locations of these are also shown on Figure 10.1.
- 10.3.2 At each observation point the following characteristics were examined for each main soil horizon to a depth of 1.2m: texture; significant stoniness; colours (especially darker colours indicating larger topsoil organic matter content), density, degree of fissuring and macroporosity (together indicating structural conditions, permeability and rooting opportunities); free calcium carbonate; organic matter content and thickness.
- 10.3.3 Soil Wetness Class (WC) was inferred from the presence or absence of, and depth to, greyish and ochreous gley mottling and/or poorly permeable subsoil layers at least 150mm thick.

*Agricultural Land Classification (ALC) and main limitations*

- 10.3.4 Soil, site and climatic constraints were evaluated mainly by reference to MAFF's 1988 revised guidelines and criteria.
- 10.3.5 The most extensive limitation across the site is soil droughtiness from reduced soil profile moisture holding capacity. This constraint limits land to subgrade 3a.
- 10.3.6 On the strongly sloping ground to the southwest and southeast, gradients of between 7 and 11° are limiting to subgrade 3b.
- 10.3.7 Where topsoil textures are heavy loamy, land is additionally constrained to subgrade 3a by a workability limitation.
- 10.3.8 The extent and distribution of land in the different ALC subgrades is shown on Figure 10.2. Two thirds of the agricultural land (66%) is higher quality subgrade 3a (23.2 ha). The remaining land is lower quality in subgrade 3b (12.1 ha: 34%).

*Brief description of the land grades and subgrades*

*Subgrade 3a*

- 10.3.9 Land in this subgrade is the most extensive. Soil profiles on land to the north-east and south-east typically comprise greyish brown or dark brown, slightly to moderately stony, calcareous, medium clay loam, medium silty clay loam or heavy silty clay loam topsoils over very thin subsoils comprising fragmented chalk and brownish or greyish heavy silty clay soil. Hard chalk is usually encountered between 350 and 400mm.
- 10.3.10 On the higher ground to the south-west, soil profiles typically comprise very dark greyish brown, slightly to moderately stony, calcareous, organic heavy silty clay loam topsoils; over varying thicknesses of fragmented chalk mixed with dark brown, heavy silty clay subsoil; over hard chalk is usually encountered between 350 and 400mm.
- 10.3.11 There are scattered areas of deeper soils, which have yellowish brown, moderately stony, calcareous, medium or heavy silty clay loam subsoils overlying hard chalk between 500 and 800mm depth.
- 10.3.12 These soils are all well drained (WC 1), but mainly constrained by a droughtiness limitation. Locally, where topsoil textures are heavy there is an additional workability limitation.

*Subgrade 3b*

- 10.3.13 Land in this subgrade occurs to the southwest and southeast of the existing quarry. Soil profiles are similar to those described above in subgrade 3a, but

are constrained to subgrade 3b by moderately severe gradients of between 7 and 11°.

*Comparison with earlier MAFF survey*

- 10.3.14 The Ministry of Agriculture, Fisheries and Food (MAFF) carried out an Agricultural Land Classification of part of the site in 1994 in relation to the Wiltshire Mineral Local Plan. The arable field to the northeast of the quarry (south-west of Winkland's Down) was surveyed and classified as subgrade 3a (see attached plan), in agreement with the findings of the RAC survey. The remainder of the site was not surveyed because it falls within the Ministry of Defence Danger Area but the MAFF report indicates that:

*"It is anticipated that this area would also be Subgrade 3a except where there is steeper land in the dry valleys which would be downgraded."*

- 10.3.15 This indication is also in line with the findings of the current survey.

## 10.4 SOIL RESOURCE

*Introduction*

- 10.4.1 The objective is to categorise the different soil materials according to their compatible - or contrasting - properties. This is to assist optimum recovery of the more valuable parts of the soil resource so that the potential for successful restoration to agriculture (or any other vegetation-based restoration) can be realised.
- 10.4.2 The primary separation is between topsoil and subsoil. Secondary separations are made within the topsoil based on differing levels of organic matter.

*Topsoil Resource (Figure 10.3)*

- 10.4.3 There is one main topsoil type, Type A, which has a subdivision Type A\*. Type A typically comprises greyish brown or dark brown, slightly to moderately stony, calcareous, medium clay loam or medium or heavy silty clay loam. Thicknesses vary from 200 to 300mm; however, the optimum recoverable thickness is considered to be about 250mm. Therefore, the resource of Type A has an estimated volume of approx. 71,500m<sup>3</sup>.
- 10.4.4 Type A\* occurs on the higher ground to the south-west and has been separated from the main area of Type A due to the relatively large organic matter content. It typically comprises very dark greyish brown, slightly to moderately stony, calcareous, organic, medium or heavy silty clay loam. The optimum recoverable thickness is considered to be about 250mm. Therefore, the Type A\* resource is estimated as approx. 25,000m<sup>3</sup>.

### *Subsoil Resource*

- 10.4.5 Across the site there is a patchy development of brownish, medium silty clay loam subsoil mixed with varying amounts of fragmented rubbly chalk and flint. The thickness varies, but is usually only about 100-150mm thick overlying hard chalk. It is considered generally impracticable to recover any as a separate resource. Locally, deeper soil profiles occur which have a reasonable thickness of subsoil (250-550mm), but these areas are considered to be too small to map out separately. It is considered that there would be little advantage in seeking to recover any such material for re-use as subsoil, but a decision to do so could be taken after topsoil has been stripped and the extent examined in more detail.

## 10.5 ALTERNATIVE SITE SEARCH

- 10.5.1 As discussed in Chapter 3, consideration has been given to possible alternative quarry sites. The areas chosen for the alternative site search lies within an 8 km (5 mile) radius of the cement works (See Drawing UKTD-WQ035)
- 10.5.2 Three potential areas have been considered in soils terms
- Tinhead Hill
  - Bratton Down
  - Land between Arn Hill Down and Warminster Down
- 10.5.3 Land at Tinhead Hill has been mapped as Andover 1 Association on the Regional Soil map of South West England. The main soils are shallow, well drained, calcareous and silty over chalk on slopes and crests. Locally there can be deep, calcareous and non-calcareous fine silty soils particularly in valley bottoms. In terms of land quality these soils are likely to be a mixture of higher quality land in subgrade 3a constrained by droughtiness limitations and lower quality land in subgrade 3b constrained by gradient limitations.
- 10.5.4 Bratton Down is the only one of these areas that is contiguous with the existing quarry. Icknield Association is mapped across this area that has shallow, mostly humose, well drained, calcareous soils over chalk on steep slopes and hill tops. Locally, deeper, flinty, calcareous, silty soils can occur in small coombes and dry valleys. A detailed soil survey of part of Bratton Down was carried out by MAFF in 1994 as part of a survey of a much larger area. This shows the site to be mainly higher quality subgrade 3a land constrained by droughtiness limitations, with a smaller area of lower quality grade 5 downgraded due to the presence of historical mounds associated with Bratton Camp Fort that precludes arable cropping.

10.5.5 Icknield and Andover 2 Associations are mapped across the land between Arn Hill Down and Warminster Down. Icknield Association has already been described above, whilst Andover 2 Association has shallow, well-drained, calcareous, silty soils over chalk and associated with deeper, non-calcareous, variably flinty, well drained, fine silty and fine silty over clayey soils. This land is also likely to be a mixture of higher quality land in subgrade 3a and lower quality land in subgrade 3b.

10.5.6 Without site-specific plans of each of the alternatives it is difficult to estimate the likely proportions of land in the different ALC subgrades. However, it is likely that more land in subgrade 3a will be affected than in subgrade 3b, which is comparable to the distribution found at the proposed extension.

## 10.6 FARM STRUCTURE AND LAND USE

10.6.1 Two tenants of the Ministry of Defence occupy the proposed extension site (see Figure 10.4). Mr R Gale of Reeves Farm, Bratton, tenants the three fields to the north, comprising 18.2ha. The field to the southwest of Winkland's Down is Schedule 1 land and is tenanted on a full agricultural tenancy; the other two fields are Schedule 3 land and farmed on a licence that is renewed every three years.

10.6.2 Reeves Farm extends to approximately 315ha in a single block of land extending eastwards from the chalk quarry to Bratton and Imber Road. It is predominantly in an arable rotation of three wheats with a break crop of peas or spring oil seed rape. There are approximately 40ha of permanent pasture used for grazing a suckler herd of about 70 cows and additional store cattle. There are two main sets of buildings associated with the farm at Reeves Farm on Imber Road and at White Horse Farm. Both of these include grain stores and cattle buildings. In addition, the farmhouse, office and some general storage buildings are located in the centre of Bratton.

10.6.3 Mr J Duffosee of Tascroft Farm, Warminster, tenants approximately 17ha of land to the east and south. The land within the proposed extension site forms the northern extremity of a block of 198ha at Upton Cow Down and Dilton Middle Down, which is rented from the Ministry of Defence on a 10-year Farm Business Tenancy. The land is all Schedule 3 land which was farmed originally on a 3-year renewable licence but amended to a Farm Business Tenancy to accommodate its inclusion within the Organic Farming Scheme, which requires that an occupier has control over the management of the land for a minimum period of 5 years (and up to 10 years).

10.6.4 The block of land at Upton Cow Down is farmed in association with approximately 100ha at Parsonage Farm, Warminster, also rented from the Ministry of Defence, and 75ha at Tascroft Farm, Warminster, rented from the Longleat Estate. Mr Duffosee also has a grazing licence (running from

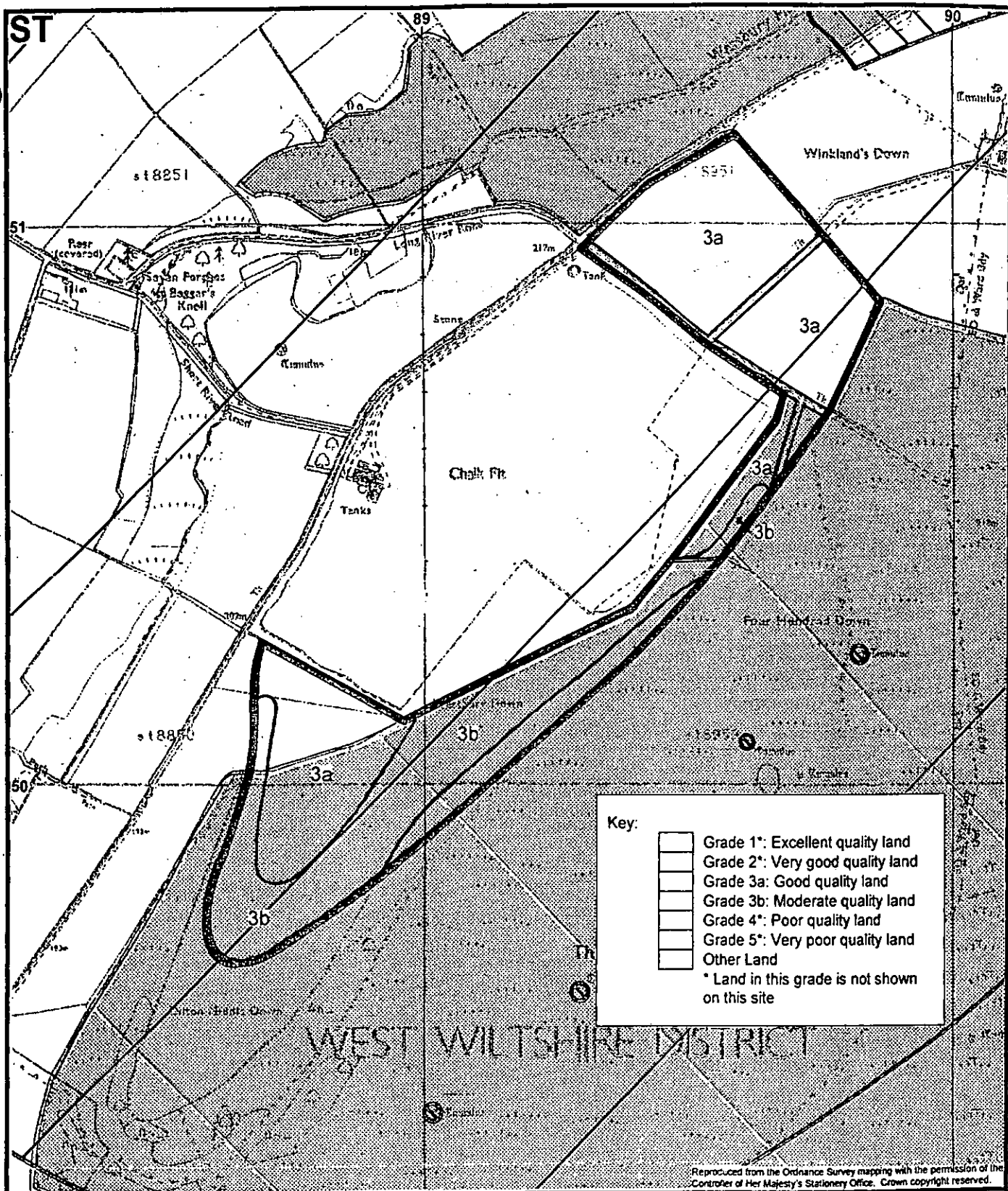
September to the March inclusive) on approximately 140ha of Thirteen Hundred Down (to the immediate east of the land at Upton Cow Down).

- 10.6.5 The land at Upton Cow Down is mostly in pasture, although there is ploughing consent on 10ha of Schedule 3 land at Dilton Middle Down, which would be affected by the extension. The land is used for grazing and fodder production to support an organic sheep flock of approximately 400 ewes and an organic herd of 50 suckler cows with followers. The block of land for which there is ploughing consent is within a rotation of organic oats and a grass ley. There are two sets of buildings to the south of Upton Cow at Windy Ridge Farm (rented from a relative) and Field Barn (rented from the Ministry of Defence).

## 10.7 CONCLUSIONS

- 10.7.1 The detailed Agricultural Land Classification has found that approximately two-thirds (23.2ha) of the agricultural land on the proposed extension site is classified as subgrade 3a, with the remainder (12.1ha) classified as subgrade 3b. The subgrade 3a land is within the 'best and most versatile' category.
- 10.7.2 An earlier survey carried out by MAFF also found that part of the site was classified as subgrade 3a and indicated that the unsurveyed land was likely to be mostly subgrade 3a with lower quality land on steeper slopes.
- 10.7.3 The initial assessment of three potential alternative sites indicates that these are likely to be mostly subgrade 3a with some subgrade 3b, in line with the classification for the proposed extension site.
- 10.7.4 The soils resource survey has found that there is a total of 96,500m<sup>3</sup> of topsoil on the extension site, which is mostly of one type (a subdivision of approximately 25,000m<sup>3</sup> may be made on soils to the south-west which have a higher organic matter content). Subsoils are generally thin over hard chalk and are unlikely to be recoverable as a separate soil resource.
- 10.7.5 There are two agricultural tenants of the Ministry of Defence occupying the proposed extension site on a mixture of tenancies. The land is in a mixture of arable and grassland, with the latter supporting an organic sheep flock and organic beef herd. The site lies at the extremity of these units, both of which are relatively large farm holdings. The land to the south and southeast of the quarry has been in the Organic Farming Scheme for the last two and a half years.





Client: Blue Circle Industries

Fig 10.2 Agricultural Land Classification (ALC)

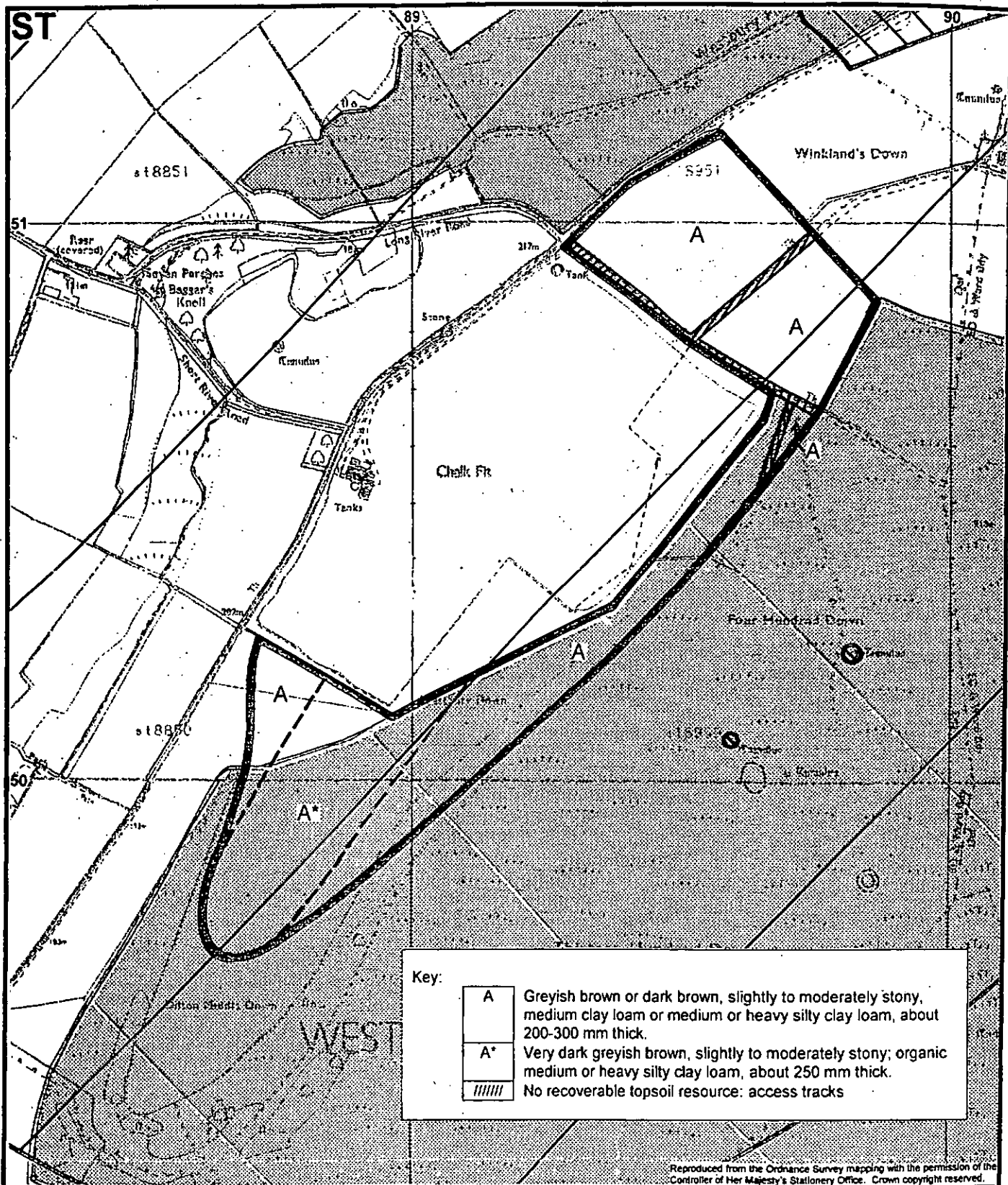
Proposed Extension to  
Westbury Cement Works  
Westbury  
Wiltshire

**Reading  
Agricultural  
Consultants**



Races Farm, Aston Street, Aston Tirrold, Didcot, Oxon.  
OX11 9DJ Tel: (01235) 851515 Fax: (01235) 851511





Client: Blue Circle Industries

Fig. 10.3 : Topsoil Types

Proposed Extension to  
Westbury Cement Works  
Westbury  
Wiltshire

**Reading  
Agricultural  
Consultants**



Races Farm, Aston Street, Aston Tirrold, Didcot, Oxon.  
OX11 9DJ Tel: (01235) 851515 Fax: (01235) 851511

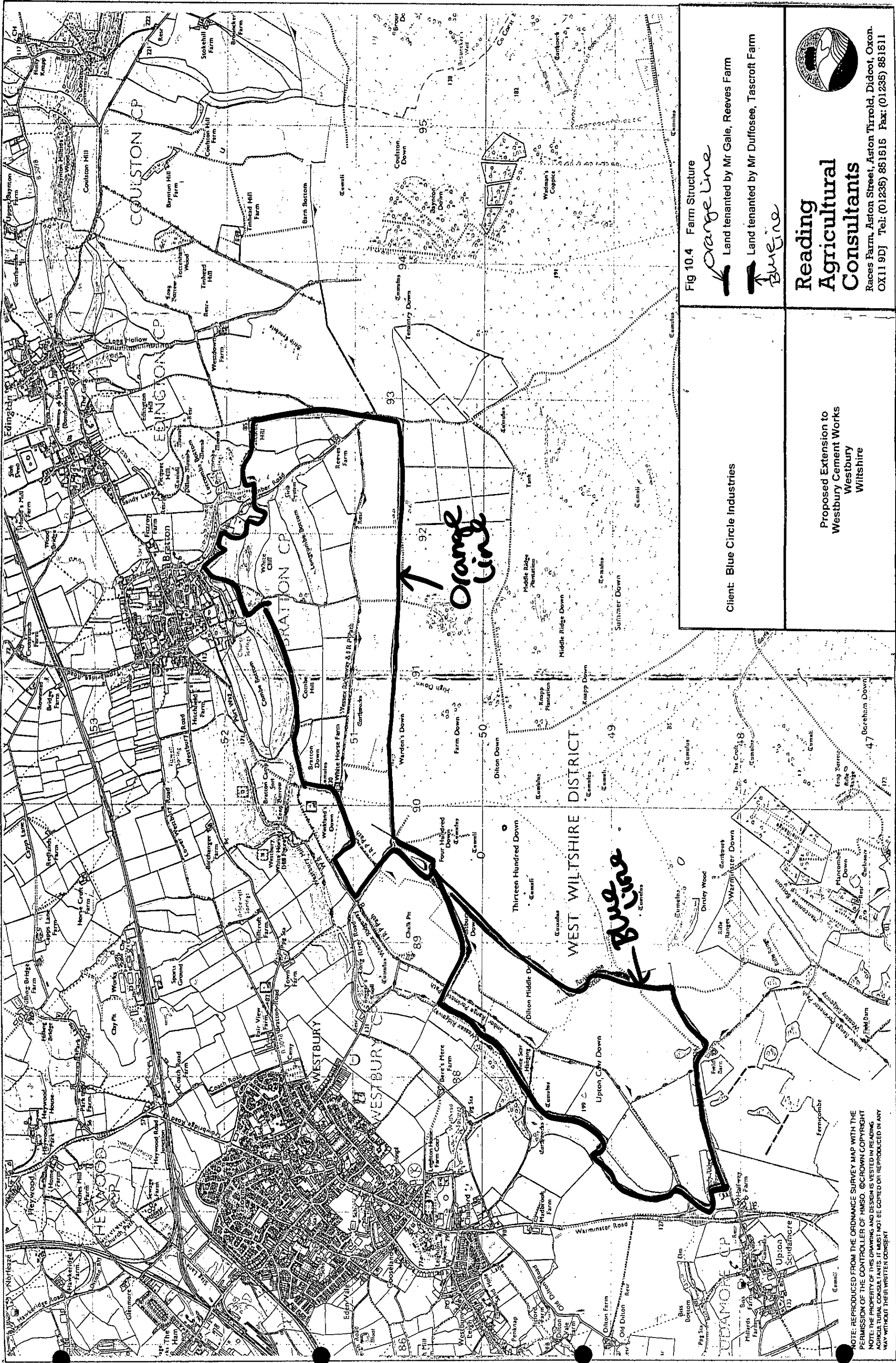


Fig 10.4 Farm Structure

**Orange line**

Land tenanted by Mr Gale, Reeves Farm

**Blue line**

Land tenanted by Mr Duffosee, Tascroft Farm

**Reading  
Agricultural  
Consultants**

Races Farm, Aston Street, Aston Tirrold, Didcot, Oxon.  
OX11 9DJ Tel: (01235) 851515 Fax: (01235) 851511

Proposed Extension to  
Westbury Cement Works  
Wiltshire

Client: Blue Circle Industries

NOTE: REPRODUCED FROM THE ORDNANCE SURVEY MAP WITH THE  
PERMISSION OF THE CONTROLLER OF HMSO. ©CROWN COPYRIGHT  
NOTE: THE PROPERTY OF THIS DRAWING AND DESIGN IS VESTED IN READING  
AGRICULTURAL CONSULTANTS. IT MUST NOT BE COPIED OR REPRODUCED IN ANY  
WAY WITHOUT THEIR WRITTEN CONSENT



## 11.0 Noise

### 11.1 INTRODUCTION

- 11.1.1 This chapter reports upon a noise assessment of the proposed extension activities, to quantify their effects on the nearest residential properties.
- 11.1.2 In order to assist the assessment, community noise level measurements have been carried out at four representative community locations closest to the quarry operations, and noise level data has also been obtained for the items of mobile plant likely to be used in the operations.
- 11.1.3 The present quarry has been in continuous operation for more than forty years, during which time there has been no history of noise complaint from nearby residents. Due to the local topography, many residents are unaware of the quarry's existence, as it cannot be seen from the community. The residential properties are located in the valley to the northwest of the quarry, with the quarry situated behind and below the brow of the hill to the southeast. No residential properties lie south of the quarry, as this land is owned by the Ministry of Defence and is used for military purposes.
- 11.1.4 Although chalk quarrying operations are planned to progress into two new areas to the north east and the south west of the present site, as shown in Figure 11.1, the location and operation of the central chalk processing plant will remain unchanged at its present location within the current quarry. For this reason, it has not been included in the noise assessments for either of the two new quarry development areas.

### 11.2 NOISE MEASUREMENT PROCEDURE

- 11.2.1 All noise level measurements were carried out using two Bruel & Kjaer type 2231 precision sound level meters incorporating type BZ 7115 statistical analysis modules and Bruel & Kjaer free field microphones with purpose designed windshields. The meters comply with IEC Regulation 651 for type 1 sound level meters and have current "UKAS" accreditation certification (cert no. 0004575 dated 18 October 2000). The meters were calibrated before and after use with a Bruel & Kjaer type 4230 calibrator, which also carries "UKAS" accreditation certification (cert no. 0004574 dated 18 October 2000).
- 11.2.2 All the noise level measurements were made with the sound level meters attached to tripods and positioned 1.5m above the ground. Four community measurement positions were chosen to assess the current community noise levels, and their locations are shown in Figure 11.2. At each community location the measurements were taken as close as practicable to the facade of the nearest houses facing the quarry, and also more than 3.5m from any reflective surface other than the ground. During each measurement period,

the average wind speed was measured using an Airflow Developments anemometer, and the air temperature was measured using a Whatman electronic thermometer.

### *Community Measurements*

- 11.2.3 Two series of community measurements were carried out; the first was made 3 December 2003 and the second 15 December 2003. On each occasion four consecutive 15 minute measurements were taken over a total period of one hour at each position, and the results of these measurements are given in Tables 11.1 and 11.2.

*Table 11.1 : Community Measurements 3 December 2003*

| Measurement Position  | L <sub>Aeq</sub>               | L <sub>A1</sub> | L <sub>A10</sub> | L <sub>A50</sub> | L <sub>A90</sub> | L <sub>A99</sub> |
|-----------------------|--------------------------------|-----------------|------------------|------------------|------------------|------------------|
| Bratton – Castle Road | 40.4                           | 46.7            | 43.2             | 39.2             | 35.7             | 33.7             |
|                       | 40.0                           | 49.2            | 42.7             | 38.2             | 34.7             | 32.7             |
|                       | 40.9                           | 50.2            | 43.2             | 38.7             | 35.2             | 32.7             |
|                       | 40.8                           | 47.7            | 42.7             | 39.2             | 36.7             | 34.2             |
|                       | <b>Hourly mean values 40.5</b> | <b>48.5</b>     | <b>43.0</b>      | <b>38.8</b>      | <b>35.6</b>      | <b>33.3</b>      |
| Newtown               | 52.0                           | 63.2            | 54.7             | 47.2             | 44.2             | 42.2             |
|                       | 53.3                           | 65.2            | 53.2             | 48.7             | 45.7             | 43.7             |
|                       | 53.5                           | 65.2            | 53.2             | 49.2             | 46.2             | 44.7             |
|                       | 53.2                           | 62.7            | 54.7             | 49.7             | 46.2             | 44.7             |
|                       | <b>Hourly mean values 53.0</b> | <b>64.1</b>     | <b>54.0</b>      | <b>48.7</b>      | <b>45.6</b>      | <b>43.8</b>      |
| Upland Rise           | 43.1                           | 51.2            | 44.2             | 41.7             | 40.2             | 39.2             |
|                       | 42.7                           | 48.7            | 44.2             | 41.2             | 39.7             | 38.2             |
|                       | 40.1                           | 46.7            | 41.7             | 39.2             | 37.7             | 36.7             |
|                       | 41.4                           | 47.2            | 43.2             | 40.7             | 39.2             | 38.2             |
|                       | <b>Hourly mean values 42.0</b> | <b>48.5</b>     | <b>43.3</b>      | <b>40.7</b>      | <b>39.2</b>      | <b>38.1</b>      |
| Sports Centre         | 41.4                           | 48.7            | 42.7             | 40.2             | 39.2             | 38.2             |
|                       | 47.6                           | 60.2            | 46.2             | 40.2             | 38.2             | 36.7             |
|                       | 42.3                           | 52.2            | 43.7             | 39.7             | 37.7             | 36.2             |
|                       | 40.5                           | 47.2            | 42.7             | 38.7             | 37.2             | 36.2             |
|                       | <b>Hourly mean values 44.0</b> | <b>52.0</b>     | <b>43.8</b>      | <b>39.7</b>      | <b>38.1</b>      | <b>36.8</b>      |

- 11.2.4 The measurements were taken during the period 12.00 - 15.00 hrs. During this period the wind was from the northeast with an average speed of 2m/s, the air temperature was 8°C, and the weather was cloudy and damp. The quarry was inaudible at all positions; the measured noise resulted from distant traffic, with occasional aircraft and distant train noise.

Table 11.2 : Community Measurements 15 December 2003

| Measurement Position  | L <sub>Aeq</sub>               | L <sub>A1</sub> | L <sub>A10</sub> | L <sub>A50</sub> | L <sub>A90</sub> | L <sub>A99</sub> |
|-----------------------|--------------------------------|-----------------|------------------|------------------|------------------|------------------|
| Bratton - Castle Road | 50.9                           | 62.7            | 53.2             | 44.2             | 40.2             | 38.2             |
|                       | 49.3                           | 60.2            | 51.7             | 44.7             | 39.2             | 36.7             |
|                       | 46.5                           | 58.2            | 48.2             | 42.7             | 39.7             | 37.7             |
|                       | 44.1                           | 50.7            | 47.7             | 42.2             | 38.2             | 36.7             |
|                       | <b>Hourly mean values 48.4</b> | <b>58.0</b>     | <b>50.2</b>      | <b>43.5</b>      | <b>39.3</b>      | <b>37.3</b>      |
| Newtown               | 47.8                           | 54.7            | 48.2             | 44.7             | 42.7             | 41.2             |
|                       | 46.5                           | 54.2            | 48.2             | 45.2             | 42.7             | 41.2             |
|                       | 46.3                           | 52.2            | 48.2             | 45.7             | 43.7             | 42.7             |
|                       | 47.4                           | 52.2            | 48.7             | 46.2             | 44.2             | 43.2             |
|                       | <b>Hourly mean values 47.0</b> | <b>53.3</b>     | <b>48.3</b>      | <b>45.5</b>      | <b>43.3</b>      | <b>42.1</b>      |
| Upland Rise           | 43.4                           | 48.2            | 44.7             | 42.7             | 41.7             | 40.7             |
|                       | 43.9                           | 49.7            | 45.7             | 42.7             | 41.2             | 40.2             |
|                       | 43.7                           | 49.2            | 45.2             | 43.2             | 41.7             | 40.2             |
|                       | 44.1                           | 49.7            | 45.2             | 42.7             | 40.7             | 39.7             |
|                       | <b>Hourly mean values 43.8</b> | <b>49.2</b>     | <b>45.2</b>      | <b>42.8</b>      | <b>41.3</b>      | <b>40.2</b>      |
| Sports Centre         | 46.6                           | 55.7            | 48.2             | 43.2             | 41.7             | 40.2             |
|                       | 44.7                           | 54.7            | 46.2             | 42.7             | 40.7             | 39.2             |
|                       | 44.0                           | 51.7            | 46.2             | 42.2             | 40.2             | 38.7             |
|                       | 45.0                           | 54.7            | 46.7             | 42.7             | 39.7             | 37.7             |
|                       | <b>Hourly mean values 45.2</b> | <b>54.2</b>     | <b>46.8</b>      | <b>42.7</b>      | <b>40.6</b>      | <b>39.0</b>      |

- 11.2.5 The measurements were taken during the period 12.00 - 15.00 hrs. During this period the wind was from the northwest with an average speed of 1m/s, the air temperature was 6°C, and the weather was sunny with little or no cloud. As before, the quarry was inaudible at all measurement positions; the measured noise resulted from distant traffic, with occasional aircraft and distant train noise.

#### *Historical Community Measurements*

- 11.2.6 Some historical community noise level data taken 28 June 1995 are available for the Bratton community position, for a community location at the southern border of the cemetery, and for a community position to the side of the Hospital (near the Upland Rise position). These measurements were carried out for a period of 1hr at each position using a Bruel & Kjaer modular type 2231 precision sound level meter and type BZ 7115 statistical analysis module. The measurements were carried out over the period 11.00 - 15.00 hrs during which time the weather was fine, the air temperature was 24°C and the wind was from the east with a speed of 2m/s. These data have been included in Table 11.3 below for completeness.

*Table 11.3 : Community Measurements 28 June 1995*

| Measurement Position  | L <sub>Aeq</sub> | L <sub>A1</sub> | L <sub>A10</sub> | L <sub>A50</sub> | L <sub>A90</sub> | L <sub>A99</sub> |
|-----------------------|------------------|-----------------|------------------|------------------|------------------|------------------|
| Bratton - Castle Road | 46.8             | 65.0            | 48.0             | 40.0             | 36.5             | 34.5             |
| Cemetery              | 46.8             | 55.0            | 49.5             | 45.0             | 41.5             | 39.5             |
| Hospital              | 48.6             | 58.0            | 49.0             | 42.0             | 39.5             | 38.0             |

### *Plant Measurements*

- 11.2.7 The chalk winning operation at Westbury Quarry is carried out using a mobile track mounted diesel powered excavator. After digging the chalk from the working face, the excavator loads the chalk directly into diesel powered dumper trucks, which transport the chalk along designated quarry roads to the chalk intake crusher situated at the central washmill complex. After passing through the intake crusher the chalk is stored in a stockpile prior to being fed to the washmill system using a diesel powered front-end loader.
- 11.2.8 In the washing process, the chalk is mixed with water and ground via a series of milling operations to form fine chalk slurry. This product is pumped to an intermediate storage tank at the entrance to the quarry and thence to the main works site where it is mixed with clay to produce the final kiln feed material.
- 11.2.9 The washmill complex is located at a permanent site adjacent to the centre of the northwestern boundary of the present quarry and has been in continuous operation since the quarry first commenced operation some 40 years ago. Much of the milling operations are carried out within the plant buildings and the whole complex is completely screened from all parts of the community to the north, east and west by the brow of the intervening hill. In addition to this natural screening, it is also located some 15-20m below ground level behind a vertical chalk face (see photograph 11.5).
- 11.2.9 Noise level measurements of the current chalk winning and dumper loading operations were carried out on two separate occasions, enabling data to be obtained with the excavator operating at two different quarry locations and at two different operating levels within the quarry.
- 11.2.10 The first series of measurements was carried out 22 December 2003. During the measurement period the weather was sunny, the wind speed was less than 1m/s from the south and the air temperature was 2°C. Measurements were made at two positions 30m from the excavator while operating in the centre rear section of the quarry and approximately 25m from the rim. A measurement distance of 30m from the activity was chosen for two reasons. Firstly both noise sources were large and separated by several metres, and secondly it was considered that this was the minimum practicable distance

for safety reasons. The measurement procedure adopted was to measure a number of complete dumper loading cycles (approx. 5 minutes duration). During each measurement period, the excavator operated continuously and the dumper engine was idling during the loading process; the noise level meter was started when an approaching empty dumper was 100m from the excavator and was stopped when the departing loaded dumper had travelled 100m from the excavator. The measurement period therefore represented the maximum noise level arising from the dumper/excavator loading activity. The results of these measurements are given in Table 11.4.

*Table 11.4 - Excavator/Dumper Measurements 22 December 2003*

|                    | <b>L<sub>Aeq</sub></b> | <b>L<sub>A1</sub></b> | <b>L<sub>A10</sub></b> | <b>L<sub>A50</sub></b> | <b>L<sub>A90</sub></b> | <b>L<sub>A99</sub></b> |
|--------------------|------------------------|-----------------------|------------------------|------------------------|------------------------|------------------------|
| <b>Left Side</b>   |                        |                       |                        |                        |                        |                        |
| Measurement 1      | 74.7                   | 83.2                  | 77.2                   | 72.2                   | 71.2                   | 69.2                   |
| Measurement 2      | 75.2                   | 84.2                  | 78.2                   | 73.2                   | 72.2                   | 70.9                   |
| <b>Right Side</b>  |                        |                       |                        |                        |                        |                        |
| Measurement 3      | 76.0                   | 84.2                  | 77.7                   | 74.2                   | 73.2                   | 72.9                   |
| Measurement 4      | 77.3                   | 87.7                  | 78.7                   | 74.7                   | 73.7                   | 72.7                   |
| <b>Mean values</b> | <b>75.9</b>            | <b>84.8</b>           | <b>78.0</b>            | <b>73.6</b>            | <b>72.6</b>            | <b>71.4</b>            |

11.2.11 The second series of measurements was carried out 16 February 2004 and during the measurement period, the weather was overcast and damp, the wind speed was less than 1m/s from the north west and the air temperature was 7°C.

11.2.12 The same measurement procedure was adopted using two positions, each 30m from the operation. During the second measurement period the excavator was operating at the eastern boundary of the quarry and close to the quarry bottom. The results of the second series of measurements are given in Table 11.5.

*Table 11.5 - Excavator/Dumper Measurements 16 February 2004*

|                    | <b>L<sub>Aeq</sub></b> | <b>L<sub>A1</sub></b> | <b>L<sub>A10</sub></b> | <b>L<sub>A50</sub></b> | <b>L<sub>A90</sub></b> | <b>L<sub>A99</sub></b> |
|--------------------|------------------------|-----------------------|------------------------|------------------------|------------------------|------------------------|
| <b>Left Side</b>   |                        |                       |                        |                        |                        |                        |
| Measurement 1      | 72.7                   | 82.2                  | 76.2                   | 70.2                   | 68.2                   | 66.2                   |
| Measurement 2      | 72.0                   | 81.2                  | 74.7                   | 69.2                   | 67.2                   | 65.9                   |
| <b>Right Side</b>  |                        |                       |                        |                        |                        |                        |
| Measurement 3      | 73.2                   | 83.2                  | 76.2                   | 70.2                   | 69.2                   | 66.9                   |
| Measurement 4      | 74.3                   | 84.7                  | 76.7                   | 71.7                   | 69.7                   | 66.7                   |
| <b>Mean values</b> | <b>73.2</b>            | <b>82.8</b>           | <b>76.0</b>            | <b>70.3</b>            | <b>68.6</b>            | <b>66.4</b>            |



## 11.3 DISCUSSION OF RESULTS

### *Community Noise Level Criteria*

- 11.3.1 Guidance on setting planning noise level limits for quarries is contained within Minerals Planning Guidance MPG11 – The Control of Noise at Surface Mineral Workings. The planning guide advises a method for setting noise limits for mineral sites which can be incorporated into planning conditions and which takes account of the environmental and operating features peculiar to the site in question. These guidelines have been used to set appropriate limits for each of the four community locations. The mean  $L_{A90}$  levels obtained for the four community measurement positions in each test period (see Tables 11.1 and 11.2) have been rounded to the nearest decibel, and are listed in Table 11.6.
- 11.3.2 In order to ensure that the most stringent option is taken in setting the MPG11 criterion for each position, the lowest of the two community  $L_{A90}$  measurement values at each position has been used as the key value rather than the mean of the two. The MPG11 criterion for each location has been set assuming that the nominal level of 55db  $L_{Aeq,1hr}$  would be inappropriate, and that the more stringent rural area option would be required. This value is obtained by adding 10dB to the measured  $L_{A90}$  community level as advised in MPG11 (paragraphs 37 and 38).

*Table 11.6 : MPG 11 Community Noise Level Criteria  
(All values to nearest dB)*

| Position      | 1 <sup>st</sup> Series<br>( $L_{A90}$ ) | 2 <sup>nd</sup> Series<br>( $L_{A90}$ ) | MPG11 Criterion<br>( $L_{Aeq,1hr}$ ) | Current Noise<br>Source |
|---------------|-----------------------------------------|-----------------------------------------|--------------------------------------|-------------------------|
| Bratton       | 36                                      | 39                                      | $36 + 10 = 46$                       | Traffic                 |
| Newtown       | 46                                      | 43                                      | $43 + 10 = 53$                       | Traffic                 |
| Upland Rise   | 39                                      | 41                                      | $39 + 10 = 49$                       | Traffic                 |
| Sports Centre | 38                                      | 41                                      | $38 + 10 = 48$                       | Traffic                 |

### *Prediction of Excavator and Dumper Loading Noise*

- 11.3.3 In order to assess the effect of the excavator and dumper loading noise at the four community positions when working at either of the two proposed extension areas, “worst case” operating situations have been assumed, and an operating noise level of 76dB  $L_{Aeq}$  (highest of the two measured values) has been used for the excavator/dumper loading operation. The logic of this approach being that if the worst case conditions are acceptable, then all other less arduous conditions will also comply with a safety margin.

### *North Eastern Extension*

- 11.3.4 In making the calculations for the excavator and dumper loading operations for the four community locations, it has been assumed that the excavator will be at the surface (no quarry face screening) on the northern boundary of the extension, and at the nearest position to each of the four community positions. It has also been assumed that the worst-case location for the vehicle/excavator noise source (engine silencers) would be 2.5m above ground level.
- 11.3.5 At all four positions the excavator will be below the direct line of sight to the quarry due to the local topography, and in order to calculate the noise attenuation produced by this natural screening, the potential barrier correction graph (page 46, Calculation of Road Traffic Noise) has been used in conjunction with the calculated path difference created by the intervening hill. This approach was considered appropriate as the major noise component from the excavator and loading operation is vehicle engine noise.
- 11.3.6 To calculate the attenuation produced due to the distance between the excavator / dumper and the community positions, the basic attenuation / distance relationship expressed in BS: 5228 has been used in conjunction with the measured dumper/excavator noise level data obtained at 30m. It has also been assumed (worst case) that the operation will be continuous with no allowance for the normal reduction in noise level that occurs between dumper arrivals. The calculated results for each community position are listed in Table 11.7.

*Table 11.7 : Calculation of Excavator/Dumper loading Noise ( $L_{Aeq,1hr}$ ) at Community*

| Position      | Dist   | Dist Atten | Path Diff | Barrier Atten | Calculated Level        |
|---------------|--------|------------|-----------|---------------|-------------------------|
| Bratton       | 1675 m | -35dB      | >3.00     | -20dB         | $76 - (35 + 20) = 21dB$ |
| Newtown       | 1150 m | -32dB      | 0.62      | -14dB         | $76 - (32 + 14) = 30dB$ |
| Upland Rise   | 1700 m | -35dB      | 0.10      | -9dB          | $76 - (35 + 9) = 32dB$  |
| Sports Centre | 2160 m | -37dB      | 0.36      | -11dB         | $76 - (37 + 11) = 28dB$ |

### *South Western Extension*

- 11.3.7 In making calculations for the noise from the excavator and dumper loading operations at the four community locations when the operations are in the south western extension, similar assumptions have been made regarding "worst case" surface operation at the closest positions to each of the four community locations. The results of these calculations are listed in Table 11.8.

Table 11.8 : Calculation of Excavator/Dumper Loading Noise ( $L_{Aeq,1hr}$ ) at Community

| Position      | Dist   | Dist Atten | Path Diff | Barrier Atten | Calculated Level        |
|---------------|--------|------------|-----------|---------------|-------------------------|
| Bratton       | 2875 m | 39dB       | >3.00     | 20dB          | $76 - (39 + 20) = 17dB$ |
| Newtown       | 1000 m | 30dB       | 0.02      | 7dB           | $76 - (30 + 7) = 39dB$  |
| Upland Rise   | 1200 m | 32dB       | 0.39      | 12dB          | $76 - (32 + 12) = 32dB$ |
| Sports Centre | 2160 m | 37dB       | 0.36      | 11dB          | $76 - (37 + 11) = 28dB$ |

### Prediction of Dumper Haul Road Noise

- 11.3.8 To predict the community noise level produced by the dumpers running from each of the new working faces to the existing chalk intake, the following equation listed in BS: 5228 has been employed:

$$L_{Aeq} = L_{WA} - 33 + 10 \log Q - 10 \log V - 10 \log d$$

Where  $L_{WA}$  = sound power level of dumper

Where  $Q$  = number of dumper movements per hour

Where  $V$  = average dumper speed (km/hr)

Where  $d$  = distance of receiving position from haul road (m)

- 11.3.9 In making the calculations, it has been assumed that there will be 20 dumper movements per hour, that the average dumper speed will be 30km/hr and that the sound power level of each dumper is 112dB (from BS:5228). Because each of the residential positions is exposed to considerably less than a  $180^\circ$  angle of haul road, the angle correction recommended in MPG11 has also been used to make the appropriate correction. The equation is as follows:

$$A = 10 \log \left( \frac{\text{angle of view}}{180} \right)$$

Where  $A$  = angular correction (nearly always negative)

### North Eastern Extension

- 11.3.10 It is difficult to be precise about the locations of the haul roads, as they will move as the quarry develops, and their noise contribution will also decrease as the quarry deepens. In making the calculations a worst case situation has been assumed with the dumpers operating only one working face (3m below the surface - excavator at the surface) for the whole of their journey to and from the washmill intake hopper. The results of these calculations are given in Table 11.9.

*Table 11.9 – Calculation of Dumper Haul Road Noise at Community*

| Position      | Dist | Calc level | Ang Corr <sup>n</sup> | Screening | Final Noise level |
|---------------|------|------------|-----------------------|-----------|-------------------|
| Bratton       | 2125 | 44         | -12                   | -20       | 12dB              |
| Newtown       | 1050 | 47         | -6                    | -14       | 27dB              |
| Upland Rise   | 1600 | 45         | -8                    | -9        | 28dB              |
| Sports Centre | 2050 | 44         | -9                    | -11       | 24dB              |

*South Western Extension*

- 11.3.11 In making the calculations for the noise from the excavator and dumper loading operations for the four community locations when the dumpers are operating in the south western extension, similar calculations and assumptions have been made regarding “worst case” surface operation at the closest positions to each community location. The results of these calculations are listed in Table 11.10.

*Table 11.10 – Calculation of Dumper Haul Road Noise at Community*

| Position      | Dist(m) | Calc level | Ang Corr <sup>n</sup> | Screening | Final Noise level |
|---------------|---------|------------|-----------------------|-----------|-------------------|
| Bratton       | 2975    | 43         | -12                   | -20       | 11dB              |
| Newtown       | 1000    | 47         | -6                    | -7        | 34dB              |
| Upland Rise   | 1250    | 46         | -7                    | -12       | 27dB              |
| Sports Centre | 1500    | 46         | -8                    | -11       | 27dB              |

**11.4 TOTAL “WORST CASE” CALCULATED COMMUNITY NOISE LEVELS FROM QUARRY EXTENSIONS**

- 11.4.1 The total “worst case” community noise levels from the activities at both of the proposed quarry extensions at each community position will be the sum of the worst case noise contributions from the excavator/dumper loading operation, plus the worst case noise contributions from the dumpers on the haul road carrying the chalk from the quarry face to the chalk intake.

*North Eastern Quarry Extension*

- 11.4.2 The total noise levels emanating from the proposed north eastern quarry extension operations at the four community positions are given below in Table 11.11.

*Table 11.11 – Calculation of Chalk Loading and Haul Road Noise at Community*

| Position      | Excav/Dumper Contribution | Haul Rd Contribution | Total | MPG11 Criterion | Difference |
|---------------|---------------------------|----------------------|-------|-----------------|------------|
| Bratton       | 21                        | 12                   | 22    | 46              | -24        |
| Newtown       | 30                        | 27                   | 32    | 53              | -21        |
| Upland Rise   | 32                        | 28                   | 34    | 49              | -15        |
| Sports Centre | 28                        | 24                   | 30    | 48              | -18        |

*South Western Quarry Extension*

11.4.3 The total noise levels emanating from the proposed south western quarry extension operations at the four community positions are given below in Table 11.12.

*Table 11.12 – Calculation of Chalk Loading and Haul Road Noise at Community*

| Position      | Excav/Dumper Contribution | Haul Rd Contribution | Total | MPG11 Criterion | Difference |
|---------------|---------------------------|----------------------|-------|-----------------|------------|
| Bratton       | 17                        | 11                   | 18    | 46              | -28        |
| Newtown       | 39                        | 34                   | 40    | 53              | -13        |
| Upland Rise   | 32                        | 27                   | 33    | 49              | -16        |
| Sports Centre | 28                        | 27                   | 31    | 48              | -17        |

11.4.4 The data in tables 11.11 and 11.12 indicate that the worst case predicted noise levels from the new operations in both the north eastern and the south western quarry extensions will meet the anticipated MPG11 day time planning requirements for each of the four local community positions with a margin of safety ranging from 13 to 28dB.

## 11.5 RISK OF NOISE COMPLAINTS

11.5.1 In order to assess the risk of noise complaint from the proposed operations at each residential position, the procedure outlined in BS 4142 has also been applied to the noise data for both extension areas. As before, worst-case operating conditions have been used, even though these represent only a very short period of the quarry operational life.

### *North Eastern Extension*

#### **Daytime BS 4142 Assessment for Bratton Position**

|                                               |          |
|-----------------------------------------------|----------|
| Calculated plant noise level $L_{Aeq\ 1hr}$   | = 22 dB  |
| Background Noise level $L_{A90\ 1hr}$         | = 36 dB  |
| Specific noise level                          | = 22 dB  |
| Acoustic feature correction                   | = +5 dB  |
| Rating level (22 + 5)                         | = 27 dB  |
| Excess rating over background level (27 - 36) | = - 9 dB |

Assessment indicates complaints are unlikely

#### **Daytime BS 4142 Assessment for Newtown Position**

|                                               |          |
|-----------------------------------------------|----------|
| Calculated plant noise level $L_{Aeq\ 1hr}$   | = 32 dB  |
| Background Noise level $L_{A90\ 1hr}$         | = 43 dB  |
| Specific noise level                          | = 32 dB  |
| Acoustic feature correction                   | = +5 dB  |
| Rating level (32 + 5)                         | = 37 dB  |
| Excess rating over background level (37 - 43) | = - 6 dB |

Assessment indicates that complaints are unlikely

#### **Daytime BS 4142 Assessment for Upland Rise Position**

|                                               |         |
|-----------------------------------------------|---------|
| Calculated plant noise level $L_{Aeq\ 1hr}$   | = 34 dB |
| Background Noise level $L_{A90\ 1hr}$         | = 39 dB |
| Specific noise level                          | = 34 dB |
| Acoustic feature correction                   | = +5 dB |
| Rating level (34 + 5)                         | = 39 dB |
| Excess rating over background level (39 - 39) | = 0 dB  |

Assessment indicates complaints are unlikely

#### **Daytime BS 4142 Assessment for Sports Centre Position**

|                                               |          |
|-----------------------------------------------|----------|
| Calculated plant noise level $L_{Aeq\ 1hr}$   | = 30 dB  |
| Background Noise level $L_{A90\ 1hr}$         | = 38 dB  |
| Specific noise level                          | = 30 dB  |
| Acoustic feature correction                   | = +5 dB  |
| Rating level (30 + 5)                         | = 35 dB  |
| Excess rating over background level (35 - 38) | = - 3 dB |

Assessment indicates complaints are unlikely

### *South Western Extension*

#### **Daytime BS 4142 Assessment for Bratton Position**

|                                               |          |
|-----------------------------------------------|----------|
| Calculated plant noise level $L_{Aeq\ 1hr}$   | = 18 dB  |
| Background Noise level $L_{A90.1hr}$          | = 36 dB  |
| Specific noise level                          | = 18 dB  |
| Acoustic feature correction                   | = +5 dB  |
| Rating level (18 + 5)                         | = 23 dB  |
| Excess rating over background level (23 - 36) | = -13 dB |

Assessment indicates complaints are unlikely

#### **Daytime BS 4142 Assessment for Newtown Position**

|                                               |         |
|-----------------------------------------------|---------|
| Calculated plant noise level $L_{Aeq\ 1hr}$   | = 40 dB |
| Background Noise level $L_{A90.1hr}$          | = 43 dB |
| Specific noise level                          | = 40 dB |
| Acoustic feature correction                   | = +5 dB |
| Rating level (40 + 5)                         | = 45 dB |
| Excess rating over background level (45 - 43) | = 2 dB  |

Assessment indicates complaints are marginal

#### **Daytime BS 4142 Assessment for Upland Rise Position**

|                                               |         |
|-----------------------------------------------|---------|
| Calculated plant noise level $L_{Aeq\ 1hr}$   | = 33 dB |
| Background Noise level $L_{A90.1hr}$          | = 39 dB |
| Specific noise level                          | = 33 dB |
| Acoustic feature correction                   | = +5 dB |
| Rating level (33 + 5)                         | = 38 dB |
| Excess rating over background level (38 - 39) | = -1 dB |

Assessment indicates complaints are unlikely

#### **Daytime BS 4142 Assessment for Sports Centre Position**

|                                               |         |
|-----------------------------------------------|---------|
| Calculated plant noise level $L_{Aeq\ 1hr}$   | = 31 dB |
| Background Noise level $L_{A90.1hr}$          | = 38 dB |
| Specific noise level                          | = 31 dB |
| Acoustic feature correction                   | = +5 dB |
| Rating level (31 + 5)                         | = 36 dB |
| Excess rating over background level (36 - 38) | = -2 dB |

Assessment indicates complaints are unlikely

- 11.5.2 It has been assumed that any quarry noise that might be audible at the residential positions will have a recognisable acoustic feature (engine noise); the acoustic feature penalty of 5dB has therefore been applied in all cases.

- 11.5.3 The results of the BS 4142 assessments indicate that even under worst case operating conditions the risk of noise complaints from the nearest residential positions is marginal to unlikely.

## 11.6 OTHER CONSIDERATIONS

### *Site Overburden Stripping and Bund Preparation*

- 11.6.1 During the early preparation of each of the new quarry areas, the top soil will need to be removed to expose the underlying chalk. This topsoil will be used to construct a 2 metre high bund along the northern boundary of each quarry area to provide additional local acoustic and visual screening. This will be particularly beneficial at the northeastern quarry extension in reducing the impact of the quarry operations on visitors to the White Horse car park.
- 11.6.2 During the overburden removal and bund construction operation, it is probable that a bulldozer will be employed to carry out the task. It is estimated that the maximum  $L_{Aeq,1hr}$  noise level at the White Horse recreation area during this very limited period will be in the range 55 to 60 db  $L_{Aeq,1hr}$  depending on the type of bulldozer employed. MPG11 suggests a limit of 65dB  $L_{Aeq,1hr}$  for open spaces that are used by the public for recreation

### *Vehicle Reversing Alarms*

- 11.6.3 There have been occasional noise complaints from local residents in respect of quarry vehicle reversing alarms. As a direct result of these complaints all factory fitted alarms on current quarry mobile plant are now set to their lowest (quietest) level commensurate with providing adequate local warning. It is a legal requirement to have clearly audible reversing alarms on all quarry plant, notwithstanding this the contractors are investigating the possibility of using broad band noise generators in the near future, rather than the current pure tone bleeping type.

## 11.6 CONCLUSIONS

- 11.6.1 Current community noise level data together with current quarry plant operating noise levels have been measured in order to make both MPG11 and BS 4142 assessments of the impact of the proposed quarry extensions on the local community. Four community positions were selected to represent typical locations closest to the quarry.
- 11.6.2 At all four community positions the calculations indicate that compliance with the individual requirements of MPG11 (Minerals Planning Guidance: The Control of Noise at Surface Minerals Workings) can be achieved for



both extensions and at all times, including short term "worst case" working conditions.

- 11.6.3 Applying BS 4142 (Rating industrial noise affecting mixed residential and industrial areas) to each position and using "worst case" operating conditions indicates that the risk of noise complaint from both quarry extensions is in the marginal to unlikely category.
- 11.6.4 It can be expected that as each quarry area develops, the additional screening offered by the developing quarry faces will increase the local screening and hence the overall noise attenuation at the various community positions.



## 12.0 Other Issues

### 12.1 AIR QUALITY

#### *Introduction*

- 12.1.1 The only air quality issue that could arise in the context of Westbury chalk quarry is that of potential dust emissions. Dust, defined as particulate matter in the range 1-75 micrometers ( $\mu\text{m}$ ), is produced as a result of the crushing and abrading of rocks. Whether dust is released from its point of generation depends upon factors such as climate, wind speed, and quarry activity. Whether its release, where it occurs, has any adverse impact depends upon the nature of the dust and the presence or absence of sensitive receptors. There is therefore a range of different factors to be considered.
- 12.1.2 The Department of the Environment, Minerals Division, published in 1995 a technical report and best practice guide "The Environmental Effects of Dust from Surface Mineral Working." In terms of dust dispersion, it concludes:
- "Previous research has shown that large dust particles (greater than 30 $\mu\text{m}$ ), that make up the greatest proportion of dust emitted from mineral working will largely deposit within 100m of source. Intermediate sized particles (10-30 $\mu\text{m}$ ) are likely to travel up to 250-500m. Smaller particles (less than 10 $\mu\text{m}$ ) which make up a small proportion of dust emitted from most workings can travel up to 1km from sources."*
- 12.1.3 The principal cause for concern over dust release is that of nuisance to nearby residents. Other impacts can arise from the visual appearance of dust plumes, penetration of dust into sensitive equipment or machinery, or chemical and physical effects on agricultural and ecological interests.
- 12.1.4 More recently concern has been expressed about the health effects of fine particles, below 10 $\mu\text{m}$  in size (PM<sub>10</sub>). Although reviewed in the 1995 report, more recent indications of Government advice have been given in Mineral Planning Guidance Note 11, "Controlling and Mitigating the Environmental Effects of Minerals Extraction in England," which was issued for consultation in May 2000.
- 12.1.5 The latter reports the outcome of studies around opencast coal sites, concluding that although such sites do have some impact on levels of airborne particulates in communities, levels of asthma, wheeze and bronchitis are "broadly similar" and the rates of consultation with general practitioners were "still very low".

### *Dust assessment*

- 12.1.6 Government guidance makes clear that the extent of dust assessment should be related to the degree of risk. It states "*The degree of assessment will be influenced by the type and scale of working and proximity of sensitive land uses in surrounding areas*". That guidance is set in the context of opencast coal mining which, generally, has been considered as "worst case" in terms of dust risk.
- 12.1.7 At Westbury quarry, over forty year's experience is of assistance in clarifying this risk. The quarry produces predominantly chalk with minimal soil stripping and no overburden. That is a substantially different situation when compared with an opencast coal sites, where 1 coal : 15-20 waste rock is common. Therefore, Westbury quarry will produce far less waste than the opencast sites considered in guidance. Hence it will have a proportionately minimal potential for nuisance.
- 12.1.8 In addition, there are certain features of the quarry that indicate its low potential for dust generation. First, the chalk itself is an inherently moist rock and therefore the likelihood of dust formation and release is low. Second, the clay element of the strata tends to stick particles together, again reducing dust. Third, one of the main potential sources of quarry dust – drilling and blasting – is not undertaken at Westbury.
- 12.1.9 The first key factor in assessing dust is whether or not there is a community within 1km of the site. At Westbury, the nearest communities are Westbury itself, which is over 0.8km northwest of the quarry, and Bratton 1.6km northeast.
- 12.1.10 Therefore, there is a presumption in guidance that detailed assessment is not required. Nor is there any reason to expect that PM<sub>10</sub> will exceed the National Air Quality Objectives. Therefore, attention should be directed towards best practice control measures.
- 12.1.11 One particular comment is required on the matter of ecological impacts of dust release. Westbury is a chalk quarry, and as the nearest main plant communities nearby are also calcareous, there should be no risk of ecological change due to chemically different dust.
- 12.1.12 It is also the case that no ecological impact from dust has been disclosed in forty years of quarrying to date.

### *Control measures*

- 12.1.13 There is a well-established list of control measures available for quarry dust control. The measures listed in Table 12.1 will be applied to ensure that dust control achieves required standards:

*Table 12.1 Proposed dust control measures*

| Activity            | Proposed control                                                                                |
|---------------------|-------------------------------------------------------------------------------------------------|
| Soil handling       | Restrict activity to favourable wind conditions; seed storage mounds as soon as possible        |
| Overburden handling | None excavated                                                                                  |
| Loading/unloading   | Minimise drop heights of material                                                               |
| Haulage             | Restrict vehicle speeds; water unsurfaced haul roads; keep all haul roads clean and well graded |
| Management          | Develop and implement formal environmental management system (this is already in place)         |

### *Conclusions*

- 12.1.14 The remote location of the quarry, experience of its operation over forty years, and the availability of established dust control techniques confirm that no dust nuisance nor health hazard will arise from either the existing quarry operations nor its proposed extension.

## 12.2 LISTED BUILDINGS

- 12.2.1 There are no listed buildings within 1km of the quarry. Three lie just beyond that distance and are associated with Westbury Cemetery on Bratton Road. Figure 12.1 locates them and full details are given in Appendix 12.1. Summary details are given in Table 12.2.

*Table 12.2 Listed buildings near Westbury Quarry*

| Listing Number      | Name             | Description                                                      |
|---------------------|------------------|------------------------------------------------------------------|
| ST85SE 1/ and 2/120 | Lopes Mausoleum  | Built ca 1910, Norman-style chapel                               |
| ST85SE 1/121        | Ludlow Mausoleum | Built 1886-1900, Lopes family mausoleum                          |
| ST85SE 1/122        | Phipps Mausoleum | Built ca 1871, largest and most impressive structure in cemetery |

- 12.2.2 These three chapels or mausoleums are located within this well-wooded cemetery and are completely invisible from the existing quarry or its proposed extension. Consequently, no impacts upon them can occur.

## 12.3 SCHEDULED ANCIENT MONUMENTS

- 12.3.1 There are several Scheduled Ancient Monuments (SAMs) in the locality. These are located on Figure 12.1 and their citations are given in Appendix 12.2. Summary details are given in Table 12.3.

Table 12.3 Summary details of SAMs

| SAM/SMR number | Grid Reference | Name/Type                 | Description                                                         |
|----------------|----------------|---------------------------|---------------------------------------------------------------------|
| 10009/1        | ST89615007     | Bowl barrow               | One of group of three; unusual with ditch and bank, ca 22m diameter |
| 10010/1        | ST89715001     | Bowl barrow               | Ca 14m diameter                                                     |
| 10011/1        | ST89825023     | Bowl barrow               | Ca 10m diameter, low but undamaged                                  |
| 10012/1        | ST90085124     | Bowl barrow               | Ca 18m diameter, possibly part-excavated                            |
| 10073/1        | ST89024941     | Bowl barrow               | One of group of three; ca 13m diameter; signs of excavation         |
| 10075/1        | ST89284963     | Bowl barrow               | Ca 12m diameter                                                     |
| 10076/1        | ST89374967     | Bowl barrow               | Ca 10m diameter; mutilated                                          |
| 33526          | ST87674959     | Cross-ridge dykes         | East of Wellhead Farm, ca 40m and 96m lengths                       |
| 26708          | ST90125163     | Bratton Camp, White Horse | Iron Age hillfort, barrows and trackways                            |
|                |                |                           |                                                                     |

- 12.3.2 The impact of the development upon the principle SAMs is considered in the landscape assessment (Chapter 5). It is concluded that although visitors would be slightly affected due to the presence of the screening bunds, these would be a safe distance away and not give rise to any significant sense of encroachment.

## 12.4 TRANSPORT

- 12.4.1 All mineral from the quarry is currently despatched as a slurry in an underground pipeline to Westbury cement works. That will continue. The proposals involve no change to the pipelines, which are therefore unaffected. The only traffic using the public highway will continue to be delivery of supplies and equipment, and movement of personnel. These activities do not have a significant adverse impact.

## 12.5 LIGHTING

- 12.5 Quarrying is normally limited to daylight hours, and no artificial lighting is required for the quarry itself. That situation will not change and therefore the proposal involves no new environmental effects. Loading chalk from stockpile into the primary crusher, and its subsequent processing to a slurry, are 24 hour activities, and the plant area and access are already lit to the minimum extent consistent with employee safety. That situation will continue. As existing lights require replacement, they are progressively upgraded with low-energy bulbs and directional and/or shielded enclosures. That process of improvement will also continue. Indeed, recent improvements have eliminated light visible from Bratton Road. Therefore, the proposals give rise to no new or unacceptable adverse impacts.

## 12.6 SOCIO-ECONOMIC

- 12.6.1 Socio-economic impacts arise not so much from the quarries themselves, but from conversion of their raw materials to cement. The quarries can be considered together, therefore, in terms of enabling cement manufacture. The effects occur at national, regional and local level.
- 12.6.2 UK cement production runs at 12-13 million tonnes per annum (Mt/a), requiring the quarrying of about 16 Mt/a of limestone and chalk. In 2000, the latest figures available, this quarried production split roughly in 10 Mt/a limestone and 6 Mt/a chalk. Production has been stable for a decade and in broad terms is expected to remain so. Smaller quantities of shale and clay, some 2.1 Mt/a are also won for cement manufacture.
- 12.6.3 Production at Westbury cement works equates to some 5% of UK production and the works is therefore of national importance.
- 12.6.4. Although Westbury's markets are widely spread, with some minor tonnages despatched far afield, the bulk of its sales are in the South West and South East and the works therefore is of regional significance also. There is no other cement works in the South West Region.
- 12.6.5 Locally, Westbury's importance is apparent through both its provision of direct non-seasonal employment and its indirect economic benefits.
- 12.6.6 Westbury Works employs directly just over 128 people. Table 12.4 indicates where they live.
- 12.6.7 In addition, Westbury employs large numbers of contractors and thus contributes indirectly to maintaining numerous other jobs.

- 12.6.8 Economically, the works puts some £10 million into the local economy each year, of which £6.5 million is salaries and wages and £3.5 million paid for local supplies. Despite the highly competitive nature of the cement industry, Westbury works still manages to invest substantial sums in environmental improvement.

*Table 12.4 : Employee places of residence*

| Place of Residence             | Number %          |
|--------------------------------|-------------------|
| Westbury                       | 61 (48%)          |
| Trowbridge                     | 22 (17%)          |
| Warminster                     | 14 (11%)          |
| Frome                          | 7 (5%)            |
| Melksham                       | 4 (4%)            |
| Out of area more than 10 miles | 20 (15%)          |
| <b>TOTAL</b>                   | <b>128 (100%)</b> |

## 12.7 VEDETTE POST

- 12.7.1 At present, access to this area of the Salisbury Plain Training Area (SPTA) can be gained either via Long River Road, or a hardcore track via White Horse Farm. These meet at the current northern limit of the quarry, where an MoD vedette post (a small building housing security staff) controls access to the SPTA in the interests of public safety.
- 12.7.2 Portions of these accesses, and the vedette post itself, will be closed and quarried away as part of the quarry extension to the northeast.
- 12.7.3 It is proposed that in future access to the SPTA will be gained via the White Horse Farm road only, and a new vedette post will be installed near there by the MoD. A replacement MoD access track will skirt the outside of the northeast bund, to connect to existing internal military roads.



[illegible]

10009

WEST WILTSHIRE DIST

Listed Building

**+ 122**

Scale: N.T.S.

Listed buildings &amp; SAM's

**Works:** Westbury Chalk Quarry  
**Project:** Planning Application & EIS

## 12.1

Date: September 2004



When Cycles



United Kingdom

**Appendix 12.1**  
**Listed Buildings**

1.  
5411

WESTBURY

BRATTON ROAD  
(South Side)

No 50

ST 8751 6/119

II

GV

2.  
Mid C19 detached villa. 2 storeys red brick with corner piers. Sprocket eaves to hipped slate roof. 2 set back chimneys, each with 3 octagonal shafts. 3 windows on 1st floor, 2 on ground floor, glazing bar sashes with brick flat arches. Central 6 panel door (upper 2 glazed) with large canopied porch of lattice work. 2 storey extension to left of one window and with a similar chimney stack at right angles. Dwarf wall in front with 2 central and 2 end rustic piers. Low spearhead rails with dog rails, 2 gates.

1.  
5411

WESTBURY

BRATTON ROAD  
(South Side)

Lopes Mausoleum in  
Westbury Cemetery

ST 85 SE 1/120  
ST 85 SE 2/120

II

2.  
Locally called the Lopes Mausoleum. Circa 1910. 2 bay Norman style chapel with apse. Rough faced rubble basement for vault, reached by steps on South side. Ashlar built with moulded cill and impost strings, latter carried over round headed windows. Moulded eaves cornice to stone tile roof. Coped verges with segmental capped footstones. Gable end to East. Oculus in gable. Arcaded band below. Round headed entrance of 3 orders, centre enriched with chevron ornament. Tudor arch doorway with 16 panel doors. 2 shields in tympanum. Buried within are George Ludlow and his wife Georgina [died 1912].

1.  
5411

WESTBURY

BRATTON ROAD  
(South Side)

Ludlow Mausoleum in  
Westbury Cemetery

ST 85 SE 1/121

II

2.  
Built between 1886 and 1900, Lopes family [Barons Ludlow] mausoleum. Late C19. Hexagonal. Rough faced snecked rubble with parapet, angle finials,

cupola and gabled lantern. Blind tracery to parapet, centre panel taller with light. Finials have poppy heads, gablets and shield-form corbels. Each face of main wall has a 4 centre arch window containing 2 trefoil headed lancets and centre lights. Chamfered plinth. Basement below further chamfered plinth, reached by dog leg stairs. The structure is enclosed by cast iron railings with fleur de lys headed stanchions on dwarf wall.

1.  
5411

WESTBURY

BRATTON ROAD  
(South Side)

Phipps Mausoleum in  
Westbury Cemetery

ST 85 SE 1/122

II\*

2.  
Circa 1871 [when John Lewis Phipps buried there. On the 1886 OS map]. The largest and most impressive of the structures in the cemetery. Ashlar. Square base becoming octagonal for main chamber and above. Blind tracery parapet. Short steeple with 8 gabled lantern capped by spirelet. Griffin-type gargoyles below parapet. 8 windows, with blind crocketed canopies carried on angle stops having blind traceried oculus in each with shield. 4 main windows contain 2 lights with 3 foiled over lights and blind panel below with shields. The other 4 windows are blind with similar tracery cut short by spurs from square base, the shields in blind window area. Chevron imbricated plinth. The basement is reached by steps. Large pointed entrance with moulded orders and carved head stops, pink granite nook shafts. Blind oculus in tympanum with quatrefoil containing heraldic shield. Double doors with heavy wrought iron work. 2 blind arcades to right in area before entrance. A further door to left and an archway to stairs. Enclosed by large pierced stone balustrade of oculi containing quatrefoils. Piers with stunted heads occur every 2 quatrefoils. The balustrade is to North and South of mausoleum and has extension to East on 3 sides to enclose entrance.

1.  
5411

WESTBURY

BROOK LANE

Brook Farmhouse

ST 85 SE 1/124

II

2.  
Early to mid C18. 2 storeys, rendered brick with pantile roof and 2 brick ridge chimneys. Main part of the house has 3 windows on 1st floor, outer 3 lights, centre 2 light over doorways, 2 tripartite windows on ground floor, right hand altered. 6 panel door (flush type, upper 2 glazed). Modern trellis porch with segmental hood. Partly stone built extension to right now with uniform rendering, eaves and ridge height as main part: 1 range of 3 light casement windows, hipped roof. 2 gabled extension to rear of unequal length.



**Appendix 12.2**  
Scheduled Ancient Monuments

SMR MAP ✓  
" DATABASE ✓

8 FEB 1996

ENGLISH HERITAGE



ST955W200  
601  
ST855E526 643  
634  
487

Sites and Monuments Records Officer  
Library and Museum Service  
Wiltshire County Council  
County Hall  
Bythesea Road  
TROWBRIDGE  
BA14 8BS

Ref. : MPP23/ AA 70096/1

Date : 2nd February 1996

MONUMENT NAME : Bratton Camp Iron Age hillfort, the Westbury White Horse,  
barrows and trackways on Bratton Down  
DISTRICT : WEST WILTSHIRE  
COUNTY : WILTSHIRE  
MONUMENT NUMBER : 26708

Dear Sir/Madam

ANCIENT MONUMENTS AND ARCHAEOLOGICAL AREAS ACT 1979, AS AMENDED

The above-named monument is already included in the Schedule compiled and maintained by the Secretary of State under Section 1 of the Ancient Monuments and Archaeological Areas Act 1979, as amended. I am requested to inform you that the scheduled area of the monument has now been revised to that shown outlined in black and highlighted in red on the enclosed map extract. The monument, as revised, has been included in the Schedule. Please ensure that papers that refer to the former scheduled area of this monument are destroyed.

Please amend your records accordingly.

Yours faithfully

Scheduling Section  
English Heritage

P. BARRACLOUGH

Encs: map extract, Schedule entry (where required)

SCHEDULE ENTRY COPY

ENTRY IN THE SCHEDULE OF MONUMENTS COMPILED AND MAINTAINED BY THE SECRETARY OF STATE UNDER SECTION 1 OF THE ANCIENT MONUMENTS AND ARCHAEOLOGICAL AREAS ACT 1979 AS AMENDED.

MONUMENT: Bratton Camp Iron Age hillfort, the Westbury White Horse, barrows and trackways on Bratton Down

PARISH: BRATTON

COUNTY: WILTSHIRE

DISTRICT: WEST WILTSHIRE

NATIONAL MONUMENT NO: 26708

NATIONAL GRID REFERENCE(S): ST90125163

DESCRIPTION OF THE MONUMENT

The monument includes Bratton Camp Iron Age hillfort, together with the 18th century Westbury White Horse, a Neolithic long barrow, Bronze Age round barrows and a group of sunken trackways. The monument lies at a height of 225m OD in a prominent position overlooking Westbury at the edge of the Salisbury Plain chalk escarpment.

The Iron Age hillfort is multivallate, possessing two circuits of ditch and bank which together enclose a pentagonal area of approximately 9.3ha. The hillfort, which has one clearly defined entrance on the south side, measures internally 430m east-west by 120m at the west end and 300m at the east end. The short west side and the long north side occupy the crest of steep escarpment slopes and the ditches are stepped one above the other, the rampart slopes rising 5m to 6m above the base of the ditches. The defences here span a total width of approximately 30m. 200

The south side of the hillfort and the southern half of the east side cross Bratton Down and here the twin ramparts are of roughly equal height and again approximately 30m in total width. The northern half of the east side crosses the head of a re-entrant valley where the outer rampart and ditch have been largely destroyed by quarrying or landslips and the construction of a farm track. The short north east side straddles a narrow steep-sided ridge up which runs the Port Way. This passes through a further and possibly original entrance, at which point the two ramparts have separated to form a small annexe, the outer ditch of which has, in places, been removed by quarrying. Quarrying has, in the past, also taken place within parts of the interior of the fort. 487

Excavations in the 18th century by Whitaker in the interior of the hillfort produced quernstones and a collection of large pebbles suggested as possible sling stones.

Abutting the western rampart of the hillfort is the Westbury White Horse, the first documentary record of which is in 1742. The original horse, according to a drawing published in 1772, faced south, but was destroyed in 1778 and replaced by the present one, facing north. This horse, which is cut into a very steep slope immediately below the western defences of the fort, is naturalistic in form and has, since 1936, been redefined using concrete. The long barrow, which lies within the interior of the fort, is a substantial mound 73m long and, at its widest point, over 17m across. It is approximately 3m high at the highest (eastern) end, the height reducing to a little over 2m at the west end. The barrow has been partially excavated on at least three 100

(Continued ..)

SIGNED BY: I Newton

On behalf of the Secretary of State for National Heritage.



Continued from previous page ..

NATIONAL MONUMENT NO: 26708

#### DESCRIPTION OF THE MONUMENT (Continued)

occasions, initially in the 18th century by Whitaker without recorded results. In the early 19th century two investigations by Cunnington revealed first pottery, animal bones, and a bead, and subsequently three skeletons. In the mid 19th century further investigations were carried out by Thurnham who found a primary cremation platform for one or two adults.

The remains of two Bronze Age round barrows are recorded as lying within the defences of the hillfort. The most pronounced, a mound 16m in diameter and 1.2m high, with a clearly defined central hollow and traces of a surrounding ditch, lies between the inner rampart and the out-turned outer rampart to the east of the southern entrance. This was investigated by Cunnington in 1802, without recorded result. The second example, described as a small flat barrow encircled by a ditch, was also apparently excavated in 1802 without recorded result and can no longer be located on the ground. 601 643

A complex system of sunken trackways lies parallel to the Port Way along the narrow steep-sided ridge to the north east of the hillfort. Although most likely to be of medieval or later date they may relate to the possible hillfort entrance at this point. Their complexity, together with that of the quarrying adjacent to the hillfort ramparts, may mask additional elements of the hillfort itself. 634

Excluded from the scheduling are all roads, areas of hard standing, fences, posts, gates, steps, stiles and drinking troughs, although the ground beneath these features is included.

The monument is in the care of the Secretary of State.

#### ASSESSMENT OF IMPORTANCE

Large multivallate hillforts are defined as fortified enclosures of between 5ha and 85ha in area, located on hills and defined by two or more lines of concentric earthworks set at intervals of up to 15m. They date to the Iron Age period, most having been constructed and used between the sixth century BC and the mid-first century AD. They are generally regarded as centres of permanent occupation, defended in response to increasing warfare, a reflection of the power struggle between competing elites.

Earthworks usually consist of a rampart and ditch, although some only have ramparts. Access to the interior is generally provided by two entrances although examples with one and more than two have been noted. These may comprise a single gap in the rampart, inturned or offset ramparts, oblique approaches, guardrooms or outworks. Internal features generally include evidence for intensive occupation, often in the form of oval or circular houses. These display variations in size and are often clustered, for example, along streets. Four- and six-post structures, interpreted as raised granaries, also occur widely while a few sites appear to contain evidence for temples. Other features associated with settlement include platforms, paved areas, pits, gullies, fencelines, hearths and ovens. Additional evidence, in the form of artefacts, suggests that industrial activity such as bronze- and iron-working as well as pottery manufacture occurred on many sites.

Large multivallate hillforts are rare with around 50 examples recorded nationally. These occur mostly in two concentrations, in Wessex and the Welsh Marches, although scattered examples occur elsewhere.

In view of the rarity of large multivallate hillforts and their importance in understanding the nature of social organisation within the Iron Age period, all examples with surviving archaeological potential are believed to be of

(Continued ..)

SIGNED BY: I Newton

On behalf of the Secretary of State for National Heritage.

Continued from previous page ..

NATIONAL MONUMENT NO: 26708

ASSESSMENT OF IMPORTANCE (Continued)

national importance.

Bratton Camp is a well preserved example of its class. It survives as extensive and substantial earthworks within an area of public access and consequently has value as a public amenity. The fort, although the most visually impressive element of the hilltop, was preceded by funerary monuments of both Neolithic and Bronze Age date; the Neolithic long barrow is one of only 500 examples recorded nationally. A complex of substantial hollow trackways, probably of medieval or later date approaches the hillfort from the north east where in the 18th century, the slopes of the hill were utilised for the construction of the Westbury White Horse, a major landmark feature providing a visual identity to this particular area of Wessex. Together the diverse elements of this monument provide evidence for the use of Bratton Down for funerary, defensive and display purposes over a period of five millennia.

MAP EXTRACT

The site of the monument is shown on the attached map extract outlined in black and highlighted in red. It includes a 2 metre boundary around the archaeological features, considered to be essential for the monument's support and preservation.

-----  
SCHEDULING HISTORY

Records show that the monument was included in the Schedule on 26th June 1924 as:

COUNTY/NUMBER: Wiltshire 37

NAME: Bratton camp and slopes thereof including the White Horse, Westbury

Monument's inclusion in the Schedule was confirmed on 9th October 1981.

Monument included as:

COUNTY/NUMBER: Wiltshire 37

NAME: Bratton Camp and White Horse

Monument placed in Guardianship on 15th September 1930

COUNTY/NUMBER: Wiltshire 37

NAME: Bratton camp and White Horse, Westbury

-----  
The reference of this monument is now:

NATIONAL MONUMENT NUMBER: 26708

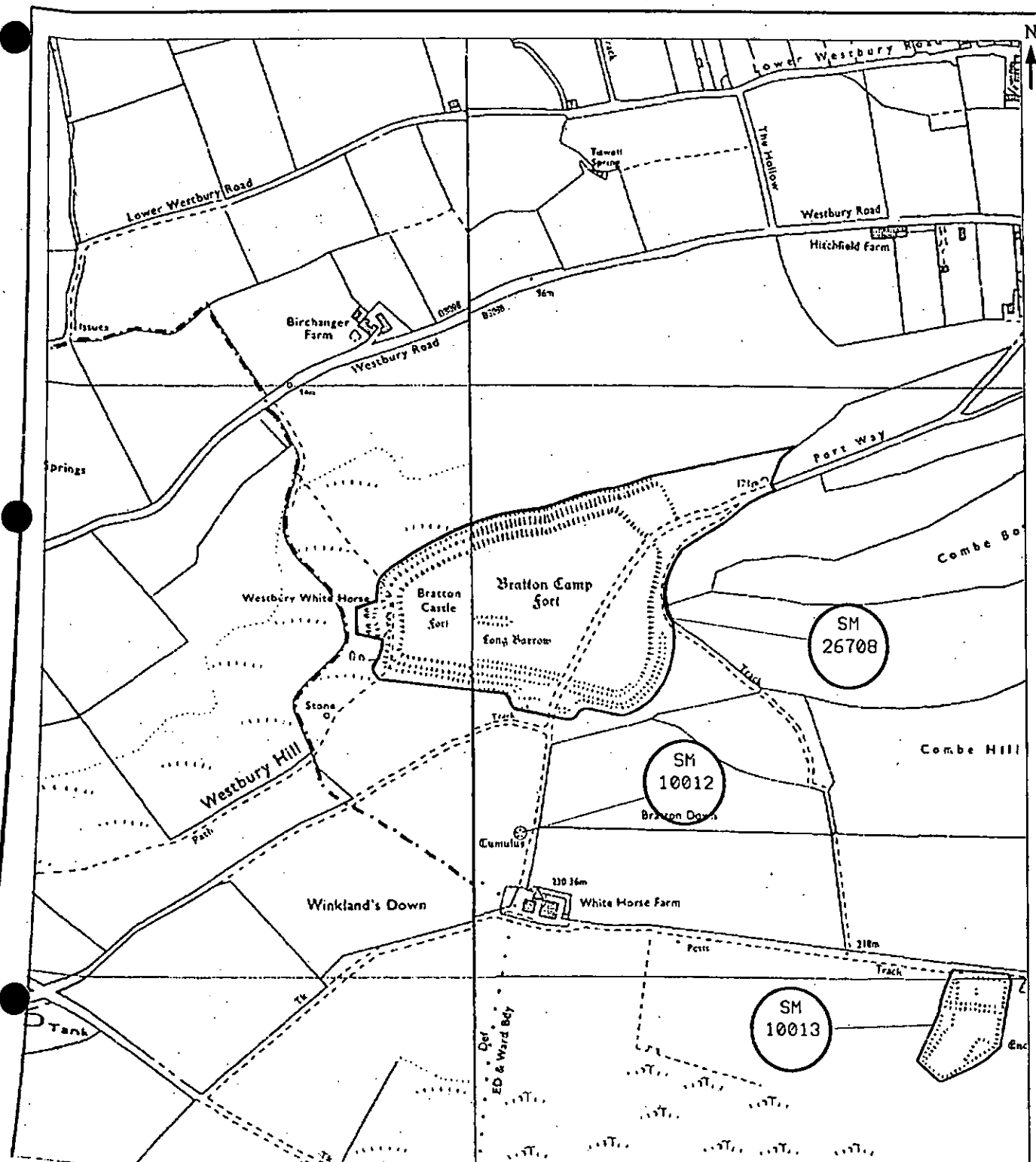
NAME: Bratton Camp Iron Age hillfort, the Westbury White Horse, barrows and trackways on Bratton Down

SCHEDULING REVISED ON 22nd January 1996

SIGNED BY: I Newton

On behalf of the Secretary of State for National Heritage.

## Scheduled Monument



© Crown copyright reserved

For identification purposes only

**Site Name:** Bratton Camp Iron Age hillfort, the Westbury White Horse, barrows & trackways on Bratton Down

**County:** Wiltshire

**District:** West Wiltshire

**Parish:** Bratton

**Notes:**

For exclusions - see text record  
Guardianship

**Key:** Monument No. Location/extent of site



**Scale:** 1:10000

**Derived from:** 1:10000

**Centred on NGR:** ST90125163

**Extract from OS sheet:** ST95SW

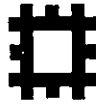
**Date:** 31.8.95

**Monument No:** SM26708

**English Heritage**

Fortress House 23 Savile Row London W1X 1AB Telephone 071-973 3000 Fax 071-973 3001

SMR Map  
" Database



ENGLISH HERITAGE

ST84NE 622  
623

-5.100.200

County Archaeological Officer  
Library, Museums & Archive HQ  
Wiltshire County Council  
County Hall  
Bythesea Road  
Trowbridge  
Wiltshire  
BA14 8BS

Ref. : MPP24/ AA 75594/1

Date : 31st January 2001

MONUMENT NAME : Two cross ridge dykes 710m and 790m east of Wellhead Farm  
DISTRICT : WEST WILTSHIRE  
COUNTY : WILTSHIRE  
MONUMENT NUMBER : 33526

Dear Sir/Madam

ANCIENT MONUMENTS AND ARCHAEOLOGICAL AREAS ACT 1979, AS AMENDED

The above-named monument is included in the Schedule compiled and maintained by the Secretary of State under Section 1 of the Ancient Monuments and Archaeological Areas Act 1979, as amended.

We are currently reviewing all known sites and monuments in England, including those already scheduled, so that those which are of national importance can be considered for statutory protection. Existing scheduled monuments will receive a new national number and, where appropriate, may be renamed.

This monument has been reviewed and I am requested by the Secretary of State to inform you that, as a result, the scheduling of the monument has been affirmed. This means that the scheduled area is unchanged and the monument remains protected under the Act although its name may be different.

I enclose a map extract depicting the scheduled area, together with the name of the monument and its new national number. This replaces the previous record.

Please amend your records accordingly.

Yours faithfully

EMILY MORRISSEY

Scheduling Section  
English Heritage

Encs: map extract, Schedule entry (where required)

SCHEDULE ENTRY COPY

ENTRY IN THE SCHEDULE OF MONUMENTS COMPILED AND MAINTAINED BY THE SECRETARY OF STATE UNDER SECTION 1 OF THE ANCIENT MONUMENTS AND ARCHAEOLOGICAL AREAS ACT 1979 AS AMENDED.

MONUMENT: Two cross ridge dykes 710m and 790m east of Wellhead Farm

PARISH: WESTBURY

DISTRICT: WEST WILTSHIRE

COUNTY: WILTSHIRE

NATIONAL MONUMENT NO: 33526

NATIONAL GRID REFERENCE(S): ST87674959  
ST87774964 - ST87694953

DESCRIPTION OF THE MONUMENT

The monument, which falls into two areas of protection, includes two cross ridge dykes, situated 710m and 790m east of Wellhead Farm on the eastern edge of Upton Cow Down, an area of elevated chalk downland forming the western edge of Salisbury Plain. The earthworks cross a spur of Middle Chalk which protrudes slightly from the scarp above a small wood known as White Scar Hanging. From this location there are impressive views over the West Wiltshire clay vale. The shorter of the two earthworks comprises a bank flanked to the west by a ditch running approximately NNE-SSW across a narrow section of the spur. The ditch is 0.9m deep and 5.6m wide and the bank is 0.7m high and 11.9m wide. The entire length of the earthwork is 40m. To the north east it ends at a small hollow way running down the scarp to the west while to the south it ends at the top of the steep south facing scarp.

The larger earthwork crosses a wider section of the spur 70m to the east, curving slightly to the west but with the same general orientation. It is in two sections with a break towards the northern end. The southern section which is 96m long comprises a ditch which is 1.4m deep and up to 8.4m wide flanked on either side by a bank. The larger bank, to the west is up to 0.8m high and 6.1m wide. The bank to the east is 3m wide and up to 0.3m high, but absent in places. This section runs across the slope. The northern section runs down the slope for a length of 40m and terminates at a hollow way to the north. Here the ditch is 0.3m deep and the bank to the west is 0.2m high. The earthworks were visited and recorded by the antiquarian, Sir Richard Colt-Hoare in the early 19th century.

ASSESSMENT OF IMPORTANCE

Cross dykes are substantial linear earthworks typically between 0.2km and 1km long and comprising one or more ditches arranged beside and parallel to one or more banks. They generally occur in upland situations, running across ridges and spurs. They are recognised as earthworks or as cropmarks on aerial

(Continued ...)

---

AUTHORISED BY: A R Middleton

On behalf of the Secretary of State for Culture, Media and Sport under  
batch no: 10924

Continued from previous page ..

NATIONAL MONUMENT NO: 33526

ASSESSMENT OF IMPORTANCE (Continued)

photographs, or as combinations of both. The evidence of excavation and analogy with associated monuments demonstrates that their construction spans the millennium from the Middle Bronze Age, although they may have been re-used later. Current information favours the view that they were used as territorial boundary markers, probably demarcating land allotment within communities, although they may also have been used as trackways, cattle droveways or defensive earthworks. Cross dykes are one of the few monument types which illustrate how land was divided up in the prehistoric period. They are of considerable importance for any analysis of settlement and land use in the Bronze Age. Very few have survived to the present day and hence all well-preserved examples are considered to be of national importance.

The two cross ridge dykes 710m and 790m east of Wellhead Farm on the eastern spur of Upton Cow Down are well-preserved, almost complete examples which provide an important insight into the division of land in the late prehistoric period and in particular, the farming activities of prehistoric communities on the high chalk downland. The earthworks will contain archaeological and environmental information which relates to the people who built them and the landscape in which they lived.

MAP EXTRACT

The site of the monument is shown on the attached map extract. It includes a 2 metre boundary around the archaeological features, considered to be essential for the monument's support and preservation.

-----

SCHEDULING HISTORY

Monument included in the Schedule on 15th October 1976 as:  
COUNTY/NUMBER: Wiltshire 887  
NAME: Two earthworks on Upton Cow Down

-----

The reference of this monument is now:

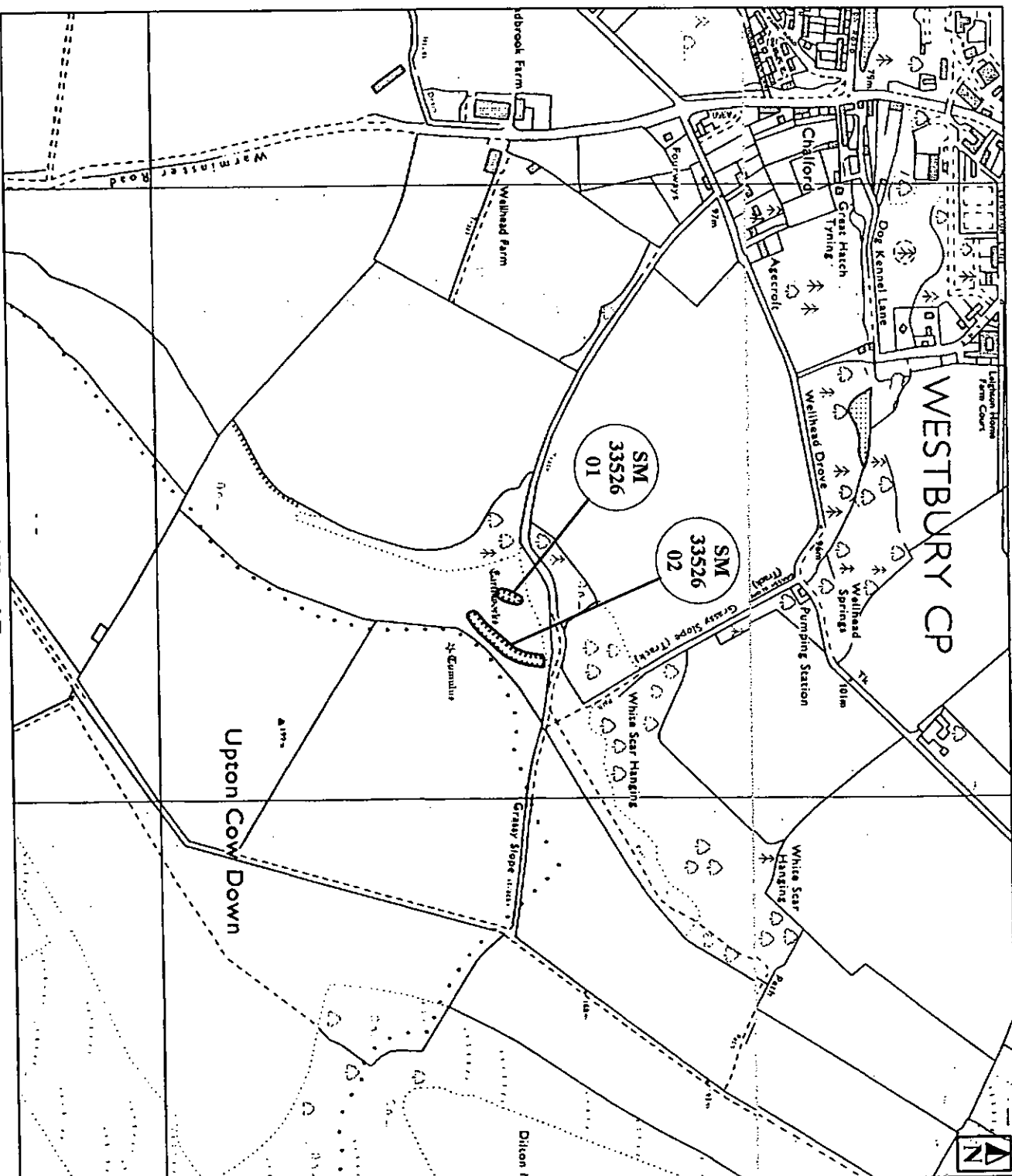
NATIONAL MONUMENT NUMBER: 33526  
NAME: Two cross ridge dykes 710m and 790m east of Wellhead Farm

SCHEDULING AFFIRMED ON 24th November 2000

AUTHORISED BY: A R Middleton  
On behalf of the Secretary of State for Culture, Media and Sport under  
batch no: 10924

# Scheduled Monument

WESTBURY CP



Name: Two cross ridge dykes 710m and 790m E of Wellhead Farm

Number:

SM33526

County/UA: WILTSHIRE

District: WEST WILTSHIRE

Parish: WESTBURY

Notes:  
Monument NGR: ST87674959. Site consists of parts 1-2:  
other NGR is ST87754958

For further information on this monument please contact English Heritage.

Map centred on NGR: ST8766949594

Boundary captured at: 10000

Map scale: 1:10,000

Extract from OS sheet(s): ST84NE, ST85SE

Key:



Confirmed

Unverified



Exclusion



Undefined

Sheet 1 of 1

Print date: 23 January 2001

This map is reproduced from the OS map by English Heritage with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationary Office. © Crown Copyright. All rights reserved. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings.  
Licence Number OD0308390. © English Heritage



ENGLISH HERITAGE

23 Savile Row, London W1S 2ET  
Telephone 020 7973 3000 Fax 020 7973 3001

smr database  
SAF

FILE: AA77276

AN ENTRY IN THE SCHEDULE OF MONUMENTS COMPILED AND  
MAINTAINED BY THE SECRETARY OF STATE FOR THE ENVIRONMENT  
UNDER SECTION 1 OF THE ANCIENT MONUMENTS AND ARCHAEOLOGICAL  
AREAS ACT 1979 AS AMENDED BY THE NATIONAL HERITAGE ACT 1983

MONUMENT

Bowl barrow: one of three round barrows on Thirteen  
Hundred Down

PARISH Westbury

DISTRICT West Wiltshire

COUNTY Wilts

NATIONAL NUMBER 10076

CONSTRAINT AREA NO 10076/1

NGR ST89374967

DESCRIPTION OF MONUMENT

A small bowl barrow originally c.10m in diameter. It is  
part of an aligned group of three similar monuments on  
Thirteen Hundred Down. The barrow is now mutilated.

ASSESSMENT OF IMPORTANCE

The most complete and extensive survival of chalk  
downland archaeological remains in central southern  
England occurs on Salisbury Plain, particularly in  
those areas lying within the Salisbury Plain Training  
Area. These remains represent one of the few extant  
archaeological "landscapes" in Britain and are  
considered to be of special significance because they  
differ in character from those in other areas with  
comparable levels of preservation. Individual sites  
on Salisbury Plain are seen as being additionally  
important because the evidence of their direct  
association with each other survives so well.

Some 470 round barrows, funerary monuments dating to  
the late Neolithic and early Bronze Age, are known to  
have existed in the Salisbury Plain Training Area,  
many grouped together as cemeteries. The total  
includes some 70 barrows of rare types. Such is the  
quality of the survival of the archaeological  
landscape, over 300 of these barrows have been  
identified as nationally important.

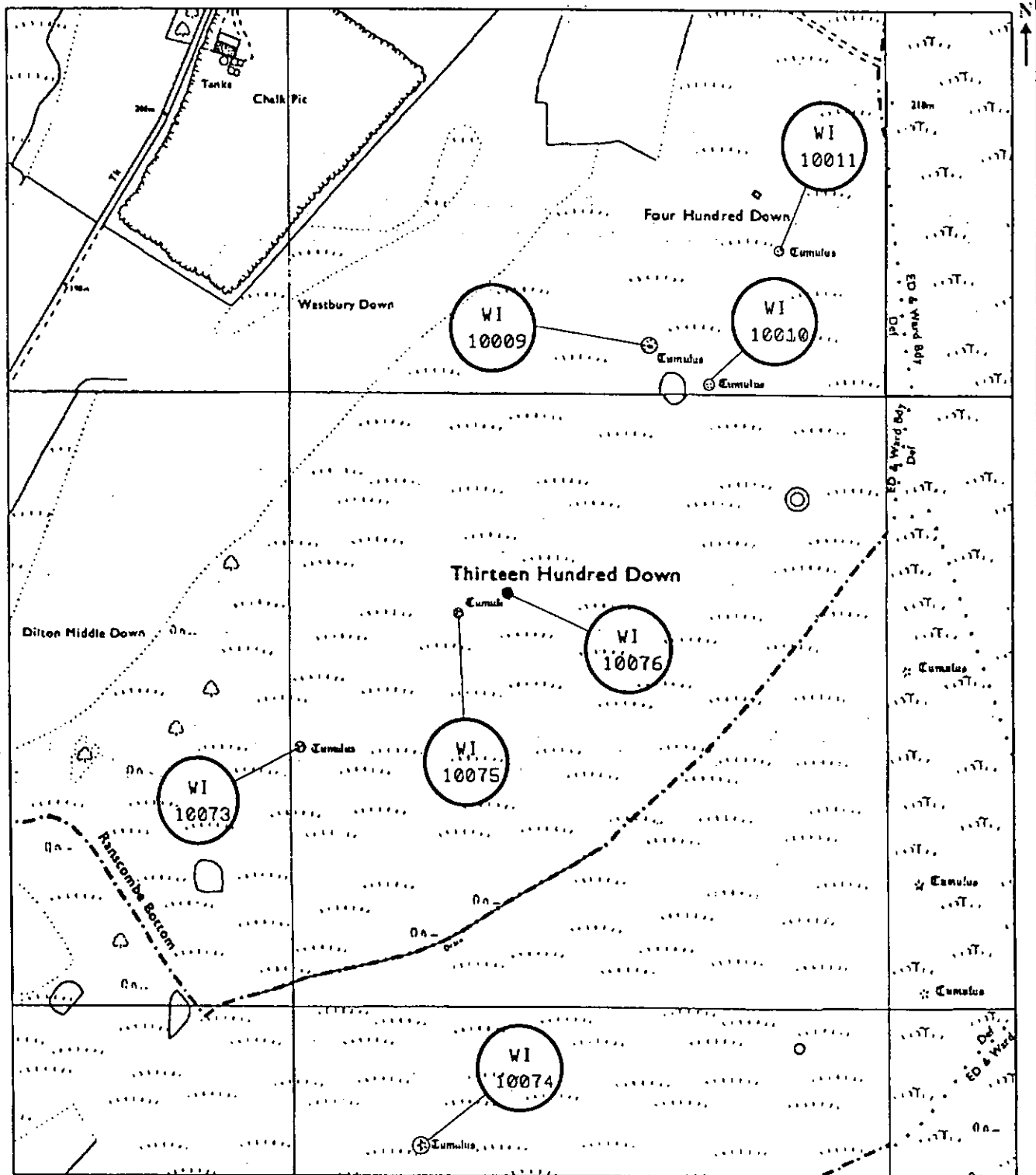
-----  
The site of the monument is shown on the attached map outlined  
in black and highlighted in red, and includes a 2 metre boundary  
around the archaeological features, considered to be essential  
for the monument's support and preservation.  
-----

MONUMENT INCLUDED IN THE SCHEDULE ON:..... 13 March 1990

SIGNED.....  
on behalf of the Secretary of State for the Environment



# Scheduled Monument



©Crown copyright reserved

For identification purposes only

Site Name: Bowl barrow: one of three round barrows on Thirteen Hundred Down

County: Wiltshire

District: West Wiltshire

Parish: Westbury

Notes:



English Heritage

Historic Buildings & Monuments Commission for England  
Fortress House, 23 Savile Row, London W1X 2HE  
Telephone 01-734 6010

Key: Location/extent of site

Extract from OS sheet: ST84NE

Date: 17.4.90

Scale: 1:10000

NGR: ST89374967

Derived from: 1:10000

County No: WI10076

Sm Database  
SMR

FILE: AA77275

AN ENTRY IN THE SCHEDULE OF MONUMENTS COMPILED AND MAINTAINED BY THE SECRETARY OF STATE FOR THE ENVIRONMENT UNDER SECTION 1 OF THE ANCIENT MONUMENTS AND ARCHAEOLOGICAL AREAS ACT 1979 AS AMENDED BY THE NATIONAL HERITAGE ACT 1983

MONUMENT

Bowl barrow: one of three round barrows on Thirteen Hundred Down

PARISH Westbury DISTRICT West Wiltshire

COUNTY Wilts NATIONAL NUMBER 10075

CONSTRAINT AREA NO 10075/1 NGR ST89284963

DESCRIPTION OF MONUMENT

A small bowl barrow with a mound c.12m in diameter. It is part of an aligned group of three similar monuments on Thirteen Hundred Down. The top is flattened and uneven but the cause is not known.

ASSESSMENT OF IMPORTANCE

The most complete and extensive survival of chalk downland archaeological remains in central southern England occurs on Salisbury Plain, particularly in those areas lying within the Salisbury Plain Training Area. These remains represent one of the few extant archaeological "landscapes" in Britain and are considered to be of special significance because they differ in character from those in other areas with comparable levels of preservation. Individual sites on Salisbury Plain are seen as being additionally important because the evidence of their direct association with each other survives so well.

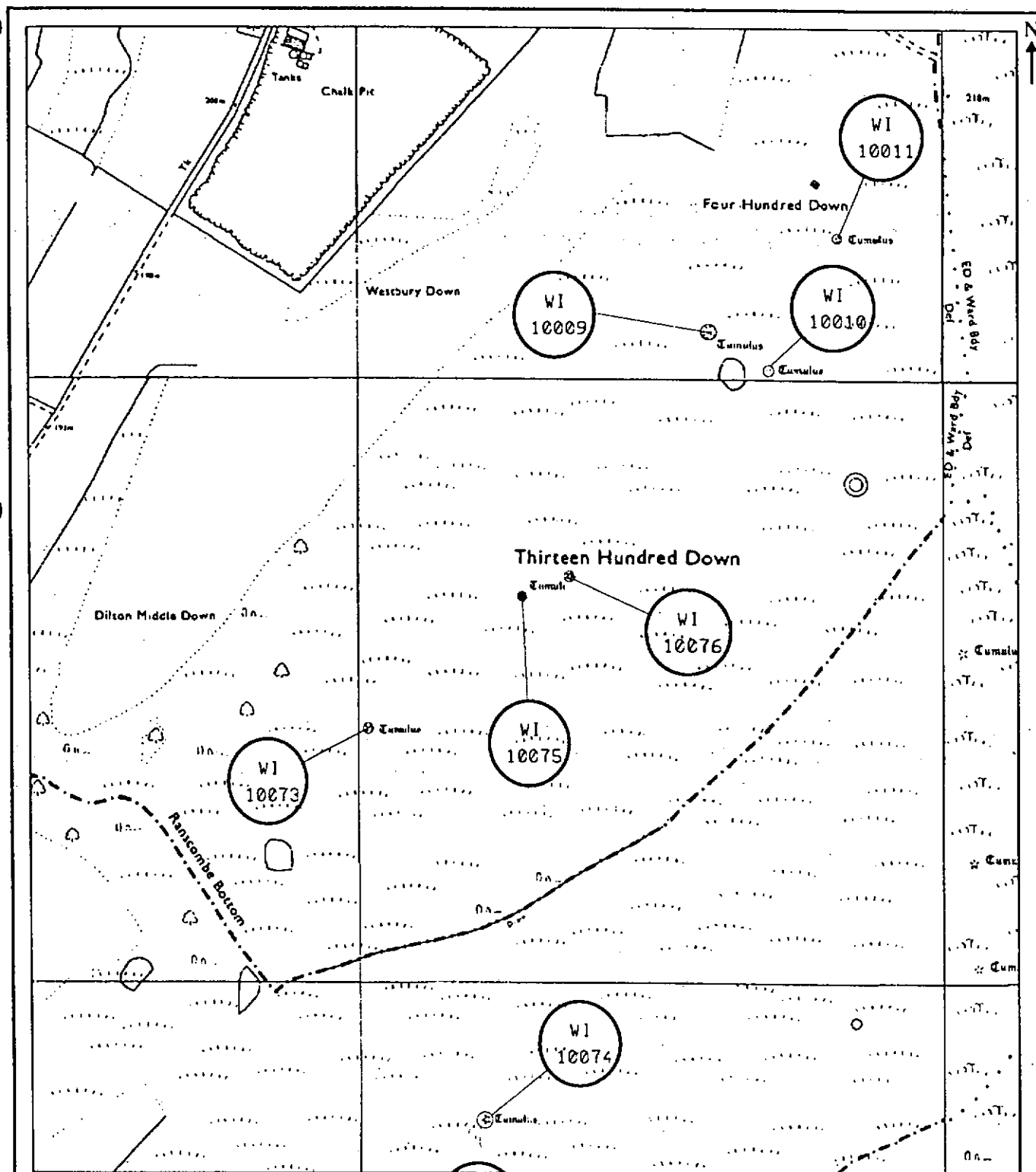
Some 470 round barrows, funerary monuments dating to the late Neolithic and early Bronze Age, are known to have existed in the Salisbury Plain Training Area, many grouped together as cemeteries. The total includes some 70 barrows of rare types. Such is the quality of the survival of the archaeological landscape, over 300 of these barrows have been identified as nationally important.

-----  
The site of the monument is shown on the attached map outlined in black and highlighted in red, and includes a 2 metre boundary around the archaeological features, considered to be essential for the monument's support and preservation.  
-----

MONUMENT INCLUDED IN THE SCHEDULE ON.....13 March 1990.....

SIGNED.....  
on behalf of the Secretary of State for the Environment

# Scheduled Monument



©Crown copyright reserved

For identification purposes only

**Site Name:** Bowl barrow: one of three round barrows on Thirteen Hundred Down

**County:** Wiltshire

**District:** West Wiltshire

**Parish:** Westbury

**Notes:**



**English Heritage**

Historic Buildings & Monuments Commission for England  
Fortress House, 23 Savile Row, London W1X 2HE  
Telephone 01-734 6010

**Key:**  Location/extent of site

**Extract from OS sheet:** ST84NE

**Date:** 20.3.90

**Scale:** 1:10000

**NGR:** ST89284963

**Derived from:** 1:10000

**County No:** WI10075

*Smr Database*  
*SAR*

*ST. 11. 60*

FILE: AA77273

AN ENTRY IN THE SCHEDULE OF MONUMENTS COMPILED AND MAINTAINED BY THE SECRETARY OF STATE FOR THE ENVIRONMENT UNDER SECTION 1 OF THE ANCIENT MONUMENTS AND ARCHAEOLOGICAL AREAS ACT 1979 AS AMENDED BY THE NATIONAL HERITAGE ACT 1983

MONUMENT

Bowl barrow: one of three round barrows on Thirteen Hundred Down

PARISH Westbury DISTRICT West Wiltshire

COUNTY Wilts NATIONAL NUMBER 10073

CONSTRAINT AREA NO 10073/1 NGR ST89024941

DESCRIPTION OF MONUMENT

A small bowl barrow with a mound c.13m in diameter. It is part of an aligned group of three similar monuments on Thirteen Hundred Down. There are signs of previous but unrecorded excavation, probably in the 19th century.

ASSESSMENT OF IMPORTANCE

The most complete and extensive survival of chalk downland archaeological remains in central southern England occurs on Salisbury Plain, particularly in those areas lying within the Salisbury Plain Training Area. These remains represent one of the few extant archaeological "landscapes" in Britain and are considered to be of special significance because they differ in character from those in other areas with comparable levels of preservation. Individual sites on Salisbury Plain are seen as being additionally important because the evidence of their direct association with each other survives so well.

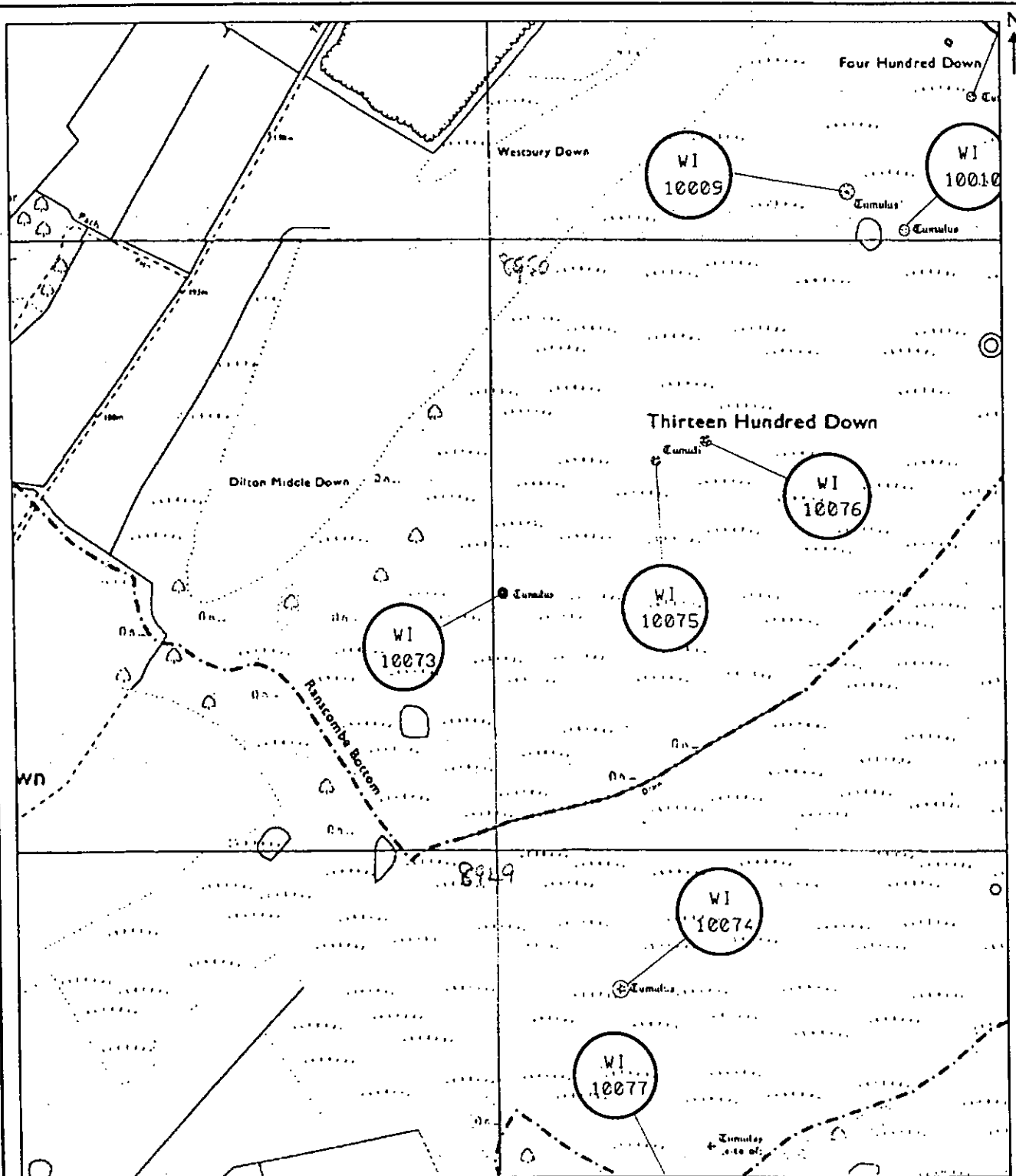
Some 470 round barrows, funerary monuments dating to the late Neolithic and early Bronze Age, are known to have existed in the Salisbury Plain Training Area, many grouped together as cemeteries. The total includes some 70 barrows of rare types. Such is the quality of the survival of the archaeological landscape, over 300 of these barrows have been identified as nationally important.

-----  
The site of the monument is shown on the attached map outlined in black and highlighted in red, and includes a 2 metre boundary around the archaeological features, considered to be essential for the monument's support and preservation.  
-----

MONUMENT INCLUDED IN THE SCHEDULE ON..... *13 March 1990* .....

SIGNED..... *J. Lacey* .....  
on behalf of the Secretary of State for the Environment

# Scheduled Monument



©Crown copyright reserved

For identification purposes only

Site Name: Bowl barrow: one of three round barrows on Thirteen Hundred Down

County: Wiltshire

District: West Wiltshire

Parish: Westbury

Notes:



English Heritage

Historic Buildings & Monuments Commission for England  
Fortress House, 23 Savile Row, London W1X 2HE  
Telephone 01-734 6010

Key:  Location/extent of site

Extract from OS sheet: ST84NE

Date: 20.3.90

Scale: 1:10000

NGR: ST89024941

Derived from: 1:10000

County No: WI10073

Compag ✓  
SMR described  
SMR mapping

ST95SW 602

FILE: AA72326

AN ENTRY IN THE SCHEDULE OF MONUMENTS COMPILED AND MAINTAINED BY THE SECRETARY OF STATE FOR THE ENVIRONMENT UNDER SECTION 1 OF THE ANCIENT MONUMENTS AND ARCHAEOLOGICAL AREAS ACT 1979 AS AMENDED BY THE NATIONAL HERITAGE ACT 1983

MONUMENT

Bowl barrow north of White Horse Farm

PARISH Bratton DISTRICT West Wiltshire

COUNTY Wilts NATIONAL NUMBER 10012

CONSTRAINT AREA NO 10012/1 NGR ST90085124

DESCRIPTION OF MONUMENT

A bowl barrow originally described as having a ditch, but now with no sign of one. Probably c.18m original diameter. Possible partial excavation took place in the 19th century.

ASSESSMENT OF IMPORTANCE

The most complete and extensive survival of chalk downland archaeological remains in central southern England occurs on Salisbury Plain, particularly in those areas lying within the Salisbury Plain Training Area. These remains represent one of the few extant archaeological "landscapes" in Britain and are considered to be of special significance because they differ in character from those in other areas with comparable levels of preservation. Individual sites on Salisbury Plain are seen as being additionally important because the evidence of their direct association with each other survives so well.

Some 470 round barrows, funerary monuments dating to the late Neolithic and early Bronze Age, are known to have existed in the Salisbury Plain Training Area, many grouped together as cemeteries. The total includes some 70 barrows of rare types. Such is the quality of the survival of the archaeological landscape, over 300 of these barrows have been identified as nationally important.

---

The site of the monument is shown on the attached map outlined in black and highlighted in red, and includes a 2 metre boundary around the archaeological features, considered to be essential for the monument's support and preservation.

---

continued overleaf

SIGNED.....  
on behalf of the Secretary of State for the Environment

Monument included in the schedule on 27 January 1965 as:  
COUNTY/NUMBER: Wilts 566  
NAME: Round barrow on Bratton Down

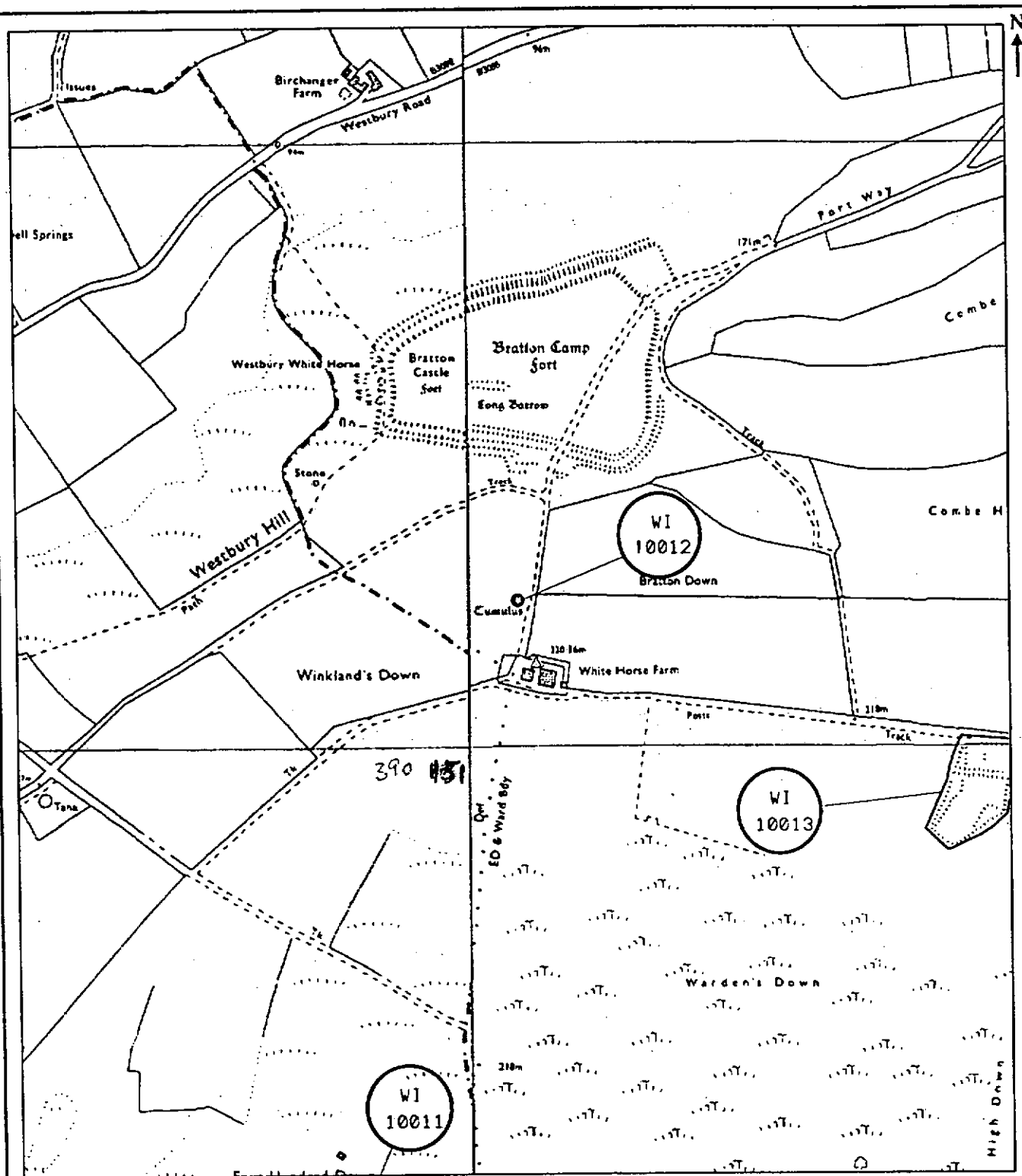
The reference of this monument is now:

NATIONAL NUMBER: 10012

NAME: Bowl barrow north of White Horse Farm

SIGNED.....*[Signature]*.....DATE *4 January 1990*.....  
on behalf of the Secretary of State for the Environment

# Scheduled Monument



©Crown copyright reserved

For identification purposes only

Site Name: Bowl barrow N of White Horse Farm

County: Wiltshire

District: West Wiltshire

Parish: Bratton

Notes:



English Heritage

Historic Buildings & Monuments Commission for England  
Fortress House, 23 Savile Row, London W1X 2HE  
Telephone 01-734 6010

Key: Location/extent of site

Extract from OS sheet: ST95SW

Date: 15.3.90

Scale: 1:10000

NGR: ST90085124

Derived from: 1:10000

County No: WI10012



2-1 ✓  
Sue 24/1/90  
SMB

FILE: AA77211

AN ENTRY IN THE SCHEDULE OF MONUMENTS COMPILED AND MAINTAINED BY THE SECRETARY OF STATE FOR THE ENVIRONMENT UNDER SECTION 1 OF THE ANCIENT MONUMENTS AND ARCHAEOLOGICAL AREAS ACT 1979 AS AMENDED BY THE NATIONAL HERITAGE ACT 1983

MONUMENT

Bowl barrow: one of three round barrows on Four Hundred Down

PARISH Westbury DISTRICT West Wiltshire

COUNTY Wilts NATIONAL NUMBER 10011

CONSTRAINT AREA NO 10011/1 NGR ST89825023

DESCRIPTION OF MONUMENT

A small bowl barrow c.10m diameter, it is low but undamaged. It is part of a small dispersed group.

ASSESSMENT OF IMPORTANCE

The most complete and extensive survival of chalk downland archaeological remains in central southern England occurs on Salisbury Plain, particularly in those areas lying within the Salisbury Plain Training Area. These remains represent one of the few extant archaeological "landscapes" in Britain and are considered to be of special significance because they differ in character from those in other areas with comparable levels of preservation. Individual sites on Salisbury Plain are seen as being additionally important because the evidence of their direct association with each other survives so well.

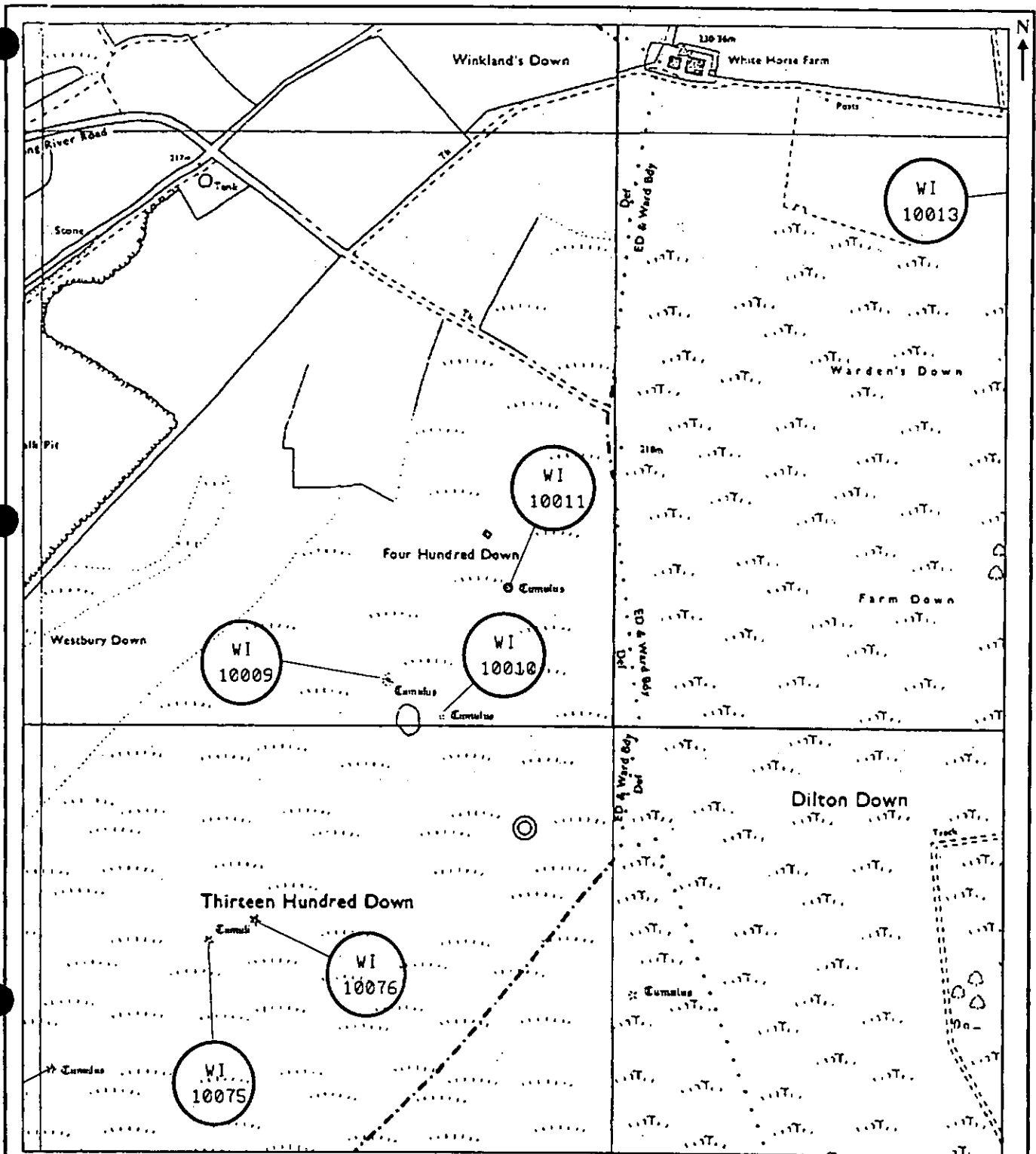
Some 470 round barrows, funerary monuments dating to the late Neolithic and early Bronze Age, are known to have existed in the Salisbury Plain Training Area, many grouped together as cemeteries. The total includes some 70 barrows of rare types. Such is the quality of the survival of the archaeological landscape, over 300 of these barrows have been identified as nationally important.

-----  
The site of the monument is shown on the attached map, outlined in black and highlighted in red and includes a 2 metre boundary around the archaeological features, considered to be essential for the monument's support and preservation.  
-----

MONUMENT INCLUDED IN THE SCHEDULE ON, 4 January 1990.....

SIGNED.....  
on behalf of the Secretary of State for the Environment

# Scheduled Monument



©Crown copyright reserved

For identification purposes only

Site Name: Bowl barrow: one of three round barrows on Four Hundred Down

County: Wiltshire

District: West Wiltshire

Parish: Westbury

Notes:



English Heritage

Historic Buildings & Monuments Commission for England

Fortress House, 23 Savile Row, London W1X 2HE

Telephone 01-734 6010

Key:  Location/extent of site

Extract from OS sheet: ST85SE

Date: 15.3.90

Scale: 1:10000

NGR: ST89825023

Derived from: 1:10000

County No: WI10011

Copy ✓  
SME database  
SME ✓

FILE: AA71110

AN ENTRY IN THE SCHEDULE OF MONUMENTS COMPILED AND  
MAINTAINED BY THE SECRETARY OF STATE FOR THE ENVIRONMENT  
UNDER SECTION 1 OF THE ANCIENT MONUMENTS AND ARCHAEOLOGICAL  
AREAS ACT 1979 AS AMENDED BY THE NATIONAL HERITAGE ACT 1983

MONUMENT

Bowl barrow: one of three round barrows on Four Hundred  
Down

PARISH Westbury DISTRICT West Wiltshire

COUNTY Wilts NATIONAL NUMBER 10010

CONSTRAINT AREA NO 10010/1 NGR ST89715001

DESCRIPTION OF MONUMENT

A small bowl barrow 14m diameter with no apparent ditch.  
It is part of a small dispersed group.

ASSESSMENT OF IMPORTANCE

The most complete and extensive survival of chalk  
downland archaeological remains in central southern  
England occurs on Salisbury Plain, particularly in  
those areas lying within the Salisbury Plain Training  
Area. These remains represent one of the few extant  
archaeological "landscapes" in Britain and are  
considered to be of special significance because they  
differ in character from those in other areas with  
comparable levels of preservation. Individual sites  
on Salisbury Plain are seen as being additionally  
important because the evidence of their direct  
association with each other survives so well.

Some 470 round barrows, funerary monuments dating to  
the late Neolithic and early Bronze Age, are known to  
have existed in the Salisbury Plain Training Area,  
many grouped together as cemeteries. The total  
includes some 70 barrows of rare types. Such is the  
quality of the survival of the archaeological  
landscape, over 300 of these barrows have been  
identified as nationally important.

-----  
The site of the monument is shown on the attached map outlined  
in black and highlighted in red, and includes a 2 metre boundary  
around the archaeological features, considered to be essential  
for the monument's support and preservation.  
-----

, continued overleaf

SIGNED.....  
on behalf of the Secretary of State for the Environment

Monument's inclusion in the schedule was confirmed on  
9th October 1981. Monument included as:  
COUNTY/NUMBER: Wilts 177  
NAME: Bowl barrow on Four Hundred Down

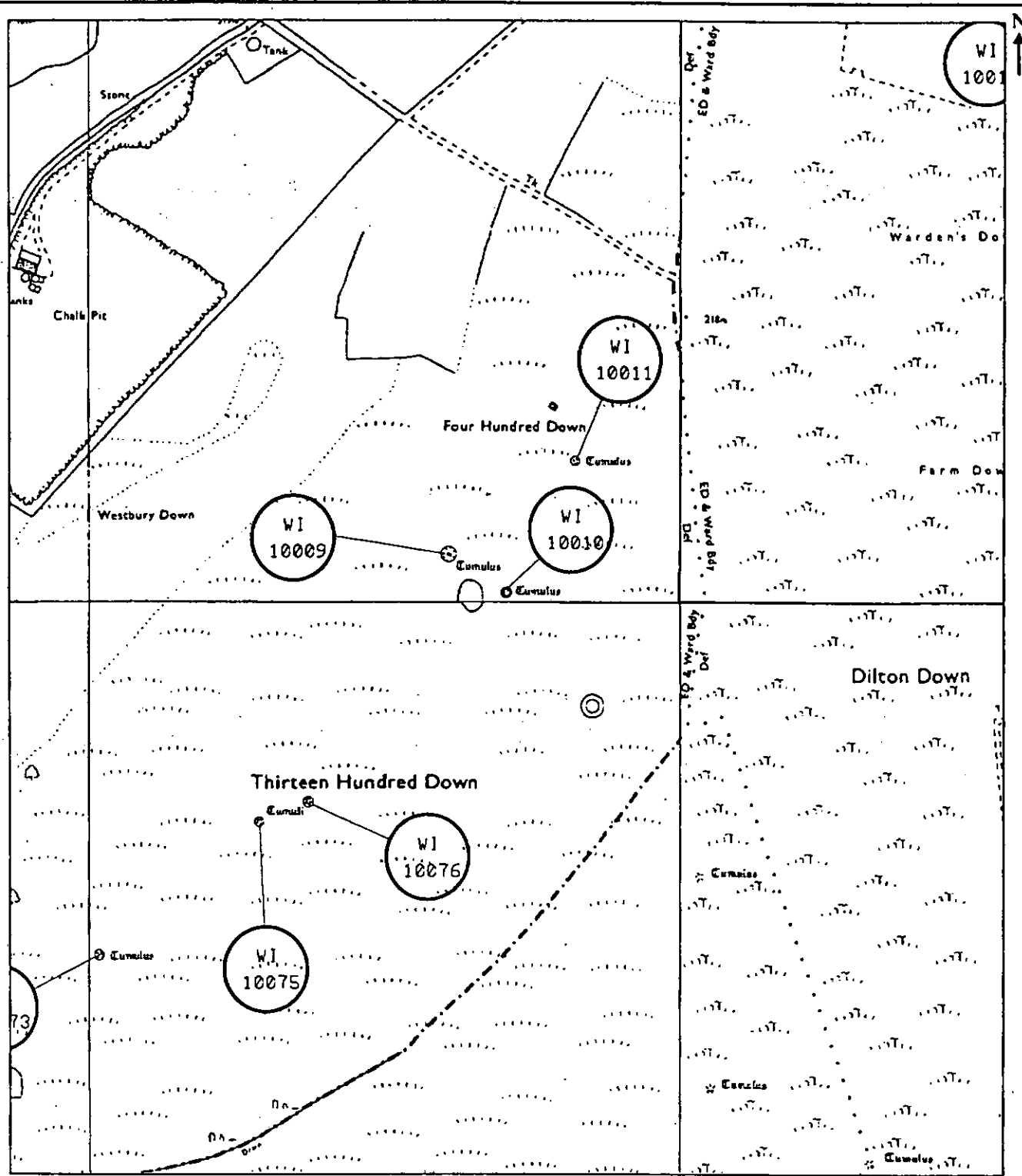
The reference of this monument is now:

NATIONAL NUMBER: 10010

NAME: Bowl barrow: one of three round barrows on Four Hundred  
Down

SIGNED.....*J. K. Soley*.....DATE.....*12 March 1990*.....  
on behalf of the Secretary of State for the Environment

## Scheduled Monument



©Crown copyright reserved

For identification purposes only

**Site Name:** Bowl barrow: one of three round barrows on Four Hundred Down

County: Wiltshire

**District:** West Wiltshire

Parish: Westbury

**Notes:**



English Heritage

Fortress House, 23 Savile Row, London W1X 2HE  
Telephone 01-734 6010

**Key:**  **Location/extent of site**

**Extract from OS sheet: ST&SE**

**Date:** 20.3.90

**Scale:** 1:10000

NGR: ST89715001

Derived from: 1:10000

County No: WI10010

SMR

FILE: AA73378

AN ENTRY IN THE SCHEDULE OF MONUMENTS COMPILED AND MAINTAINED BY THE SECRETARY OF STATE FOR THE ENVIRONMENT UNDER SECTION 1 OF THE ANCIENT MONUMENTS AND ARCHAEOLOGICAL AREAS ACT 1979 AS AMENDED BY THE NATIONAL HERITAGE ACT 1983

MONUMENT

Bowl barrow: one of three round barrows on Four Hundred Down

PARISH Westbury DISTRICT West Wiltshire

COUNTY Wilts NATIONAL NUMBER 10009

CONSTRAINT AREA NO 10009/1 NGR ST89615007

DESCRIPTION OF MONUMENT

An unusual bowl barrow with both ditch and outer bank. The diameter to the outer edge of the bank is c.22m. It is part of a small dispersed group.

ASSESSMENT OF IMPORTANCE

The most complete and extensive survival of chalk downland archaeological remains in central southern England occurs on Salisbury Plain, particularly in those areas lying within the Salisbury Plain Training Area. These remains represent one of the few extant archaeological "landscapes" in Britain and are considered to be of special significance because they differ in character from those in other areas with comparable levels of preservation. Individual sites on Salisbury Plain are seen as being additionally important because the evidence of their direct association with each other survives so well.

Some 470 round barrows, funerary monuments dating to the late Neolithic and early Bronze Age, are known to have existed in the Salisbury Plain Training Area, many grouped together as cemeteries. The total includes some 70 barrows of rare types. Such is the quality of the survival of the archaeological landscape, over 300 of these barrows have been identified as nationally important.

-----  
The site of the monument is shown on the attached map outlined in black and highlighted in red, and includes a 2 metre boundary around the archaeological features, considered to be essential for the monument's support and preservation.  
-----

continued overleaf

SIGNED.....  
on behalf of the Secretary of State for the Environment

Monument included in the schedule on 22 April 1966 as:

COUNTY/NUMBER: Wilts 793

NAME: Round barrow south east of Bourne's Barn, Westbury

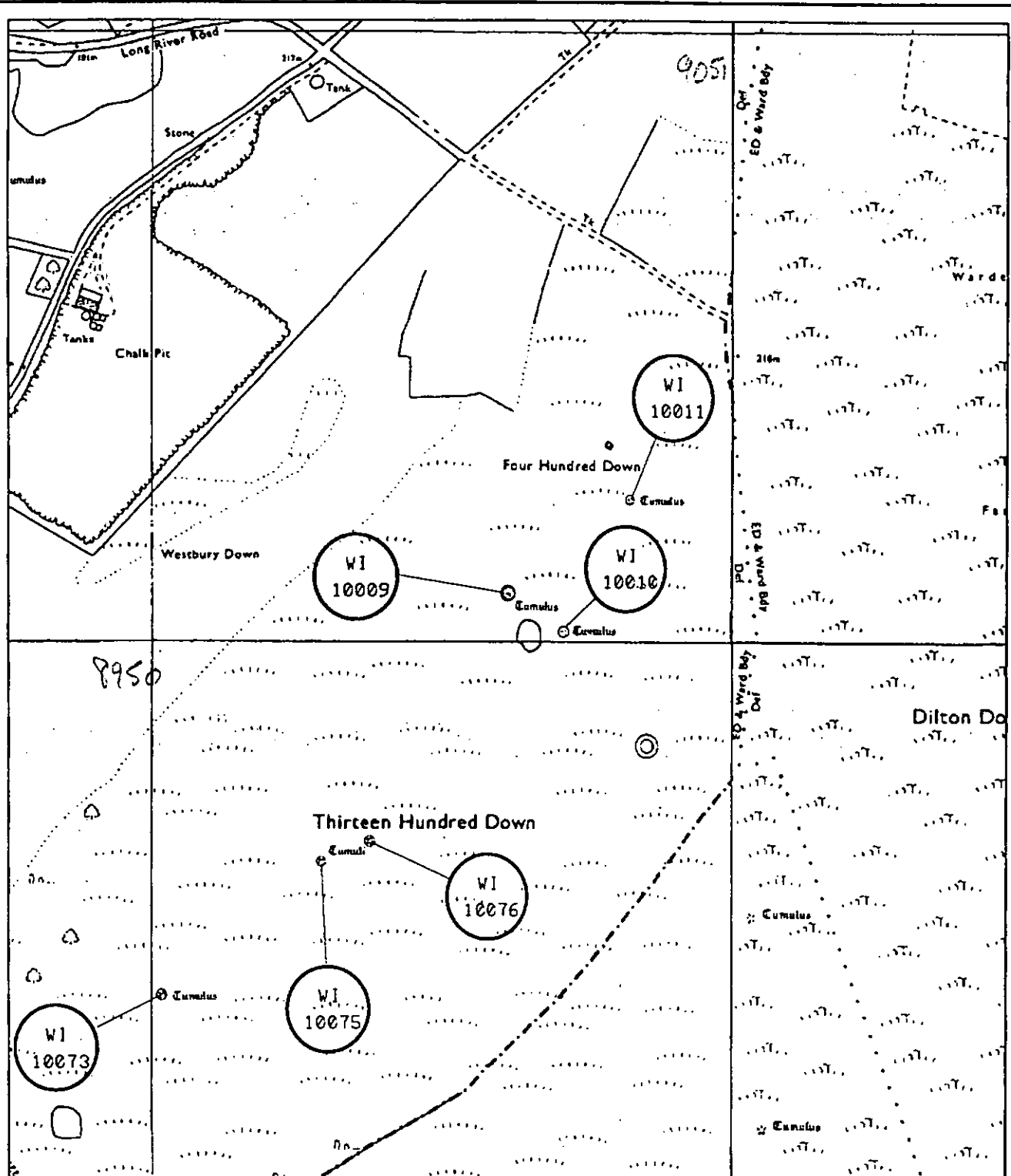
The reference of this monument is now:

NATIONAL NUMBER: 10009

NAME: Bowl barrow: one of three round barrows on Four Hundred  
Down

SIGNED.....*[Signature]*.....DATE.....*4 January 1990*.....  
on behalf of the Secretary of State for the Environment

# Scheduled Monument



©Crown copyright reserved

For identification purposes only

Site Name: Bowl barrow: one of three round barrows on Four Hundred Down

County: Wiltshire

District: West Wiltshire

Parish: Westbury

Notes:



English Heritage

Historic Buildings & Monuments Commission for England  
Fortress House, 23 Savile Row, London W1X 2HE  
Telephone 01-734 6010

Key: ☐ Location/extent of site

Extract from OS sheet: ST85SE

Date: 20.3.90

Scale: 1:10000

NGR: ST89615007

Derived from: 1:10000

County No: WI10009





## **13.0 Cumulative Impacts**

### **13.1 INTRODUCTION**

- 13.1.1 There appear to be no impacts that could, cumulatively with the quarry development, give rise to a greater adverse environmental impact than either might cause separately.
- 13.1.2 Many of the individual topics studied and reported upon earlier, could in theory have cumulative impacts. For example, quarry noise could combine with a third-party noise source, each acceptable in themselves, to give an unacceptable combination. However, the baselines established for noise (and all other topics, such as landscape, hydrology, ecology and so on) already include all third-party emissions and impacts. Therefore, the cumulative impact of the quarry development proposed together with any such third-party contributions has already been assessed, and found to meet applicable standards.
- 13.1.3 The extension of the chalk quarry would create no requirement for additional clay to be permitted. The usage of clay for cement manufacture has diminished in recent years and the existing permission contains sufficient clay to support the additional chalk reserves.
- 13.1.4 Lafarge are unaware of any proposed or pending third-party development that could alter that conclusion. The only other potential project is the A350 Westbury bypass, proposed to run around the east of Westbury. That route is not inter-visible with the proposed quarry extension, and lies at a sufficient distance that cumulative impacts upon noise or air quality would not occur.



## 14.0 Minerals Local Plan Policy

### 14.1 INTRODUCTION

- 14.1.1 The Wiltshire & Swindon Minerals Local Plan (MLP) was adopted in November 2001. The MLP sets out the general approach to minerals policy within its area, of which the overarching theme is:

*“To strike an appropriate balance between meeting essential human needs and protecting Wiltshire's and Swindon's environment especially non-renewable resources including the best and most versatile agricultural lands; and the amenity of its residents”*  
(paragraph 1.3.2)

- 14.1.2 This fundamental aim is qualified by a series of other principles, of which the most relevant are: safeguarding mineral resources; meeting mineral requirements without unacceptably prejudicing environmental and amenity interests; and ensuring that mineral working sites are restored to a beneficial afteruse at the earliest opportunity.

- 14.1.3 The MLP then establishes a series of policies applicable to all mineral development proposals, setting out the criteria upon which permissions might be granted. In summary, the most relevant of these are:

- Policy 1 – where material planning objections arise, the need for the development and the lack of alternative preferable sources will be considered and may outweigh the objections
- Policy 2 – all likely adverse impacts will be kept to an acceptable minimum
- Policy 3 – proposals will be assessed against need, adverse impacts, restoration, cumulative impacts, and mitigation proposals
- Policy 5 – mineral resources will be safeguarded within mineral consultation areas and mineral safeguarding areas

- 14.1.4 Turning to controlling the impacts of mineral working in general, the MLP then sets out the following policies:

- Policy 13 – safeguards the amenity and character of any nearby dwellings and settlements
- Policy 14 – presumption in favour of not working best and most versatile agricultural land
- Policy 15 – protection of water flows, levels and quality

- Policy 17 – requires hydrological/hydrogeological monitoring in appropriate cases
- Policy 19 – protects wildlife sites of international and national importance from material reduction in nature conservation value
- Policy 21 – protects wildlife habitats and protected species from significant adverse impact, and seeks to maintain or enhancement of biodiversity and habitats
- Policy 23 – protects landscapes of local importance
- Paragraph 3.8.9 – requires assessment of archaeological impacts
- Policy 30 – safeguards public right-of-way
- Policy 31 – requires appropriate restoration and beneficial afteruse, at the earliest practicable opportunity
- Policy 32 – similar to policy 31, but specifically sets the priority for restoration as nature conservation (or forestry or agriculture)
- Policy 33 – where appropriate, seeks wider benefits through the mechanism of planning obligations

14.1.5 There are, finally, policies specific to the cement industry, namely:

- Policy 48 – maintaining a landbank of raw materials according to Government guidance
- Policy 49 – identifies preferred areas of cement raw materials and the criteria for granting permission
- Policy 50 – sets out criteria for sources of raw materials outside preferred areas.

14.1.6 Chapter 6 of the MLP then sets out how these policies apply to non-aggregate minerals, specifically chalk for cement manufacture. Relevant extracts from the MLP are given in Appendix 14.1, as follows:

- Section 6.3 Raw Material Provision for Westbury Cement Works
- Section 6.4 Preferred Areas of Cement Raw Materials
- Section 6.5 Raw Materials for Cement Outside Preferred Areas
- Site Assessment of Preferred Area for Chalk, Adj. To Existing Pit

- Extract from the Proposals Map

## 14.2 COMMENTARY UPON THE PROPOSED DEVELOPMENT IN RESPECT OF THE MLP

- 14.2.1 It is for the Mineral Planning Authority (MPA), Wiltshire County Council, to determine whether or not the proposed development complies with the Development Plan and should be granted planning permission.
- 14.2.2 Those MLP policies concerned with environmental protection in its various forms have already been addressed via the various technical studies and assessments reported in previous chapters. Whether statutory or other accepted standards of environmental control exist in respect of any particular environmental matter (for example, noise), or whether standards are more matters of professional judgement (for example, landscape), the MLP policies can be regarded as setting their own series of tests by which compliance may be judged. As noted in previous chapters, the conclusions are in each case that the standards, MLP or other, are met.
- 14.2.3 The outstanding matters, that remain to be considered, are those policies connected with need. These are MLP policies 1, 3(1) and 48. In addition, the Adopted Wiltshire Structure Plan (WSP) of 2001, policies MSP1 and MSP6, establishes similar policies for landbanks and need.
- 14.2.4 Mineral Planning Guidance note 10 (MPG10), *"The Provision of Raw Materials for the Cement Industry"*, sets out the Government's position, as follows:

*"57. Mineral planning authorities should therefore maintain landbanks of permitted reserves of raw materials for cement plants, providing that the industry come forward with sufficient environmentally acceptable proposals .... There should be a landbank calculated for each site."*

*"58. The size of the cement industry's landbank should be directly linked to the scale of capital investment envisaged at a site .... Mineral planning authorities should normally aim to maintain cement plant with a stock of permitted reserves of at least 15 years ...."*

*"59. .... Sufficient land should be allocated to maintain this landbank throughout, and at the end of, the plan period."*

- 14.2.5 The MLP identifies a Preferred Area for chalk extraction, estimated to contain an additional 23.78Mt of chalk, or a further 21 years of life.
- 14.2.6 The calculations in the MLP had been based upon what was then the nominal clinker capacity of Westbury cement works, 765,000 tpa, as quoted in MPG10. However, the Works has subsequently been reassessed and a

lower clinker capacity of 721,000 tpa is now adopted, as noted previously in Chapter 4. On that basis, arithmetically the Preferred Area could support slightly a longer life.

- 14.2.7 However, it is generally the case that as quarry designs progress from concept to detail, potential reserves shrink because various practical and environmental factors exert constraining influences. In the present case, the imperatives of remaining above the ground water table, maintaining an acceptable chemical blend, and achieving final slopes that are both more stable and more restorable than hitherto, have reduced the landbank that granting the current application would achieve.
- 14.2.8 The horizon of the MLP is to 2006 and therefore national policy expressed in MPG10 suggests that a landbank to at least 2021 (2006 + at least 15 years) should be anticipated.
- 14.2.9 As now designed, the quarry applied for would create a landbank of:
- Remaining existing permitted chalk will last for just over 9 years from 31/12/2003, i.e. to 2013
  - Additional reserves now applied for would add 19.4 years, i.e. to 2032
- 14.2.10 This is to be compared with the MLP expectation which, on different production and raw material criteria, created a landbank of:
- Remaining permitted chalk at 1992 would last for 21 years, i.e. to 2013
  - Additional reserves in Preferred Area would add 21 years, i.e. to 2034
- 14.2.11 The difference between the MLP's 2034 and this application's 2032 is not great, but does reduce the exceedance above the 15 year minimum.
- 14.2.12 The year 2032 is beyond the minimum date of 2021 suggested by policy, but it is important to emphasise that 15 years is a minimum, not a maximum. In the present case, there are two factors justifying the approach now adopted.
- 14.2.13 The first is that an important benefit of the application is the opportunity to secure more stable and restorable quarry slopes, and thereby obtain important gains in terms of MLP policy and biodiversity. Those objectives entail working the extended quarry to a much flatter slope angle than hitherto, which, in turn, reduces the yield of chalk per hectare. If a reserve conforming to no more than the MPG10 minimum was all that was permissible, it could be obtained from the northeast extension only, worked to the maximum (63°) slopes currently used. If, on the other hand, the slopes are to be made flatter, then there is a need to develop the southwest extension as well. If that is to be developed to achieve a meaningful restoration landform, then the slight excess of reserves over the MPG10

minimum is essential.

14.2.14 The second reason is that Westbury cement works is receiving substantial additional capital expenditure to remove past inefficiencies and obtain improved performance. When “*significant new investment (such as a new kiln)*” is agreed, MPG10 paragraph 58 advises that the minimum landbank should be “*at least 25 years*” during and at the end of the plan period; that is, to at least 2031. The currently approved capital investment is not of the same magnitude as a new kiln, but is nevertheless very substantial, and will achieve improved environmental control and production efficiency in the next four years. That is in addition to routine levels of capital expenditure.

14.2.15 Overall, the necessity of obtaining certainty in terms of quarry planning to achieve improved restoration, on which basis this application is designed, plus the substantial capital investment being made at the cement works, justify the position that the minimum 15 year landbank period to 2021 ought in this case to be more generous.

### 14.3 CONCLUSIONS

14.3.1 Overall, the compliance with environmental policy in the MLP and other elements of the Development Plan is considered to be satisfactory.

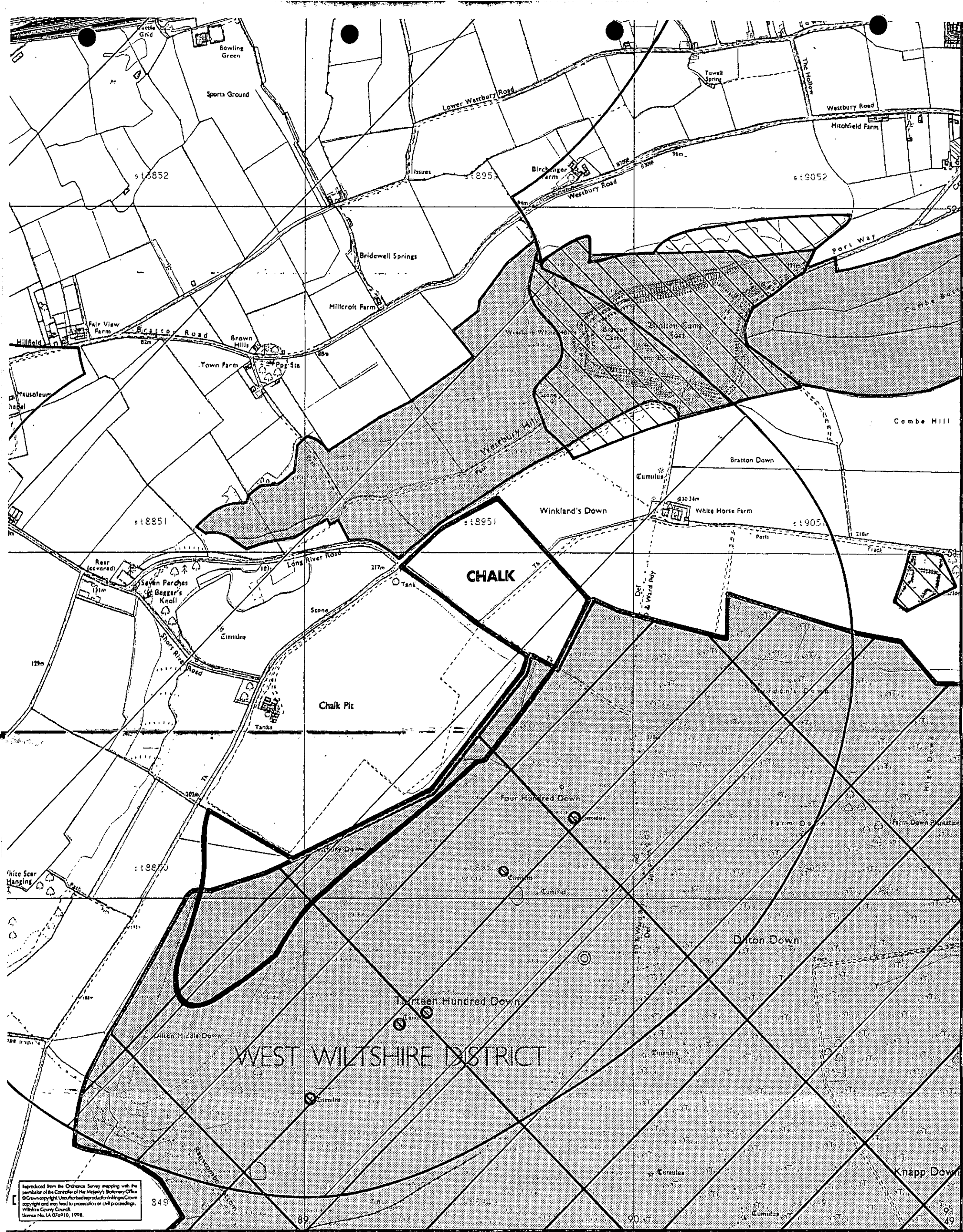
14.3.2 With regard to need for the development, if the quarry were only to supply the MPG10 minimum period of 15 years, it would not be proposed to work in the way now intended. Instead, more chalk would be extracted from the northeast area and none from the southwest. The outcome would be a reduced land take, but no environmental gains in terms of stability and restorability of what would be much steeper quarry faces.

14.3.3 Reducing slope angles means that quarrying needs to be developed into the southwest area as well, in order to achieve a restoration landform that sits happily in its surroundings. Moreover, that landform is the only one that would achieve the biodiversity gains compared with the current arable farming.

14.3.4 It is therefore concluded that in the light of the planning benefits achievable, the need for the volume of chalk now sought is demonstrated.

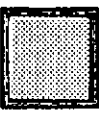


**Appendix 14.1**  
Extracts from Minerals Local Plan



Wiltshire and Swindon Minerals Local Plan, Proposals Map Inset : Westbury

Scale 1:10,000

|                                                 |                                                                                     |                                        |                                                                                       |                                           |                                                                                       |
|-------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------|
| General Consultation Area (Policy 5)            |  | Special Protection Area (Policy 19)    |  | Preferred Area (Policy 49)                |  |
| Area of Special Scientific Interest (Policy 19) |  | Scheduled Ancient Monument (Policy 24) |  | Special Areas of Conservation (Policy 19) |  |