NATURAL ENGLAND

GEO05/02/165

NE - Z People, Landscape & Biodiversity

SMB - 1156 - HAM HILL SSSI - Somerset ST41

TNT Box Ref - NE/WAR/02027
DO NOT DESTROY until speaking to Senior Geologist

REN000BJ56

ENFS21905410 TNT

SITE DOCUMENTATION/MANAGEMENT BRIEF

HAM HILL

COMPILED BY D. H. EVANS (ENGLISH NATURE), 3/95

Updated .....

2.1.1. SITE DESCRIPTION

PRACTICAL ASPECTS

Ham Hill consist of an area of approximately 0.1 km^2 on the plateau forming Hamdon Hill and Bacon Hill 5 km east of Petherton Somerset. The site itself consists of a series of disused and working quarries, worked for the Ham Hill Stone, a high quality freestone used in buildings throughout the country. The site stretches from the northern side to the south side of the hill, and apart from the quarries, includes some open woodland forming small copses and areas of improved grassland. The site excludes the depots of the Montacute Estate which own the land forming the top of Hamdon Hill.

The SSSI overlaps with an Iron Age hill fort and is a scheduled monument. Although owned by the Montacute Estate the top of Ham Hill has been designated Somerset County Council as a Special Landscape Area and is administered as Ham Hill Country Park. As a consequence of its status as a country park, Ham Hill has a high volume of visitors and is covered by a large number of tracks and paths.

Within the site, the only working quarry is at the southern end. This provides an almost complete section through the Ham Hill Stone. The quarry is partly filled with it own waste. This provides the support for access roads into the quarry and allows them to be hidden from view. Except at access points, tipped material is kept away from the faces so that they remain available for study. The working life of the quarry is largely dependent upon gaining planning permissions for extensions when required. At present there appears to be an agreement that faces showing the geological features of importance will be preserved at the end of the quarries working life.

The other quarries to the south are all disused. Of these, all except two are accessible; one being unsafe and the other overgrown in a private garden. All the accessible quarries show features of interest and the most northerly of the two quarries close to the south side of the road through the site contains an interpretation board placed their by EN.

The photographs were taken by Dr. A. H. King on a field visit in July 1994. Dr. A. H. King gratefully acknowledges the assistance of Mr. H. Prudden in the field and in providing advice on the geology of this site.

Health and safety

There are a number of issues to address. The southern quarry is working. This means that hard hats are required, an indemnity form needs to be signed and an awareness of quarry machinery needs to be maintained. Apart from the most southerly of the two quarries close to the south side of the road though the site, the quarries are safe if treated sensibly. the quarries are not fenced off along the tops of the faces. this may constitute a hazard.

SCIENTIFIC ASPECTS

The quarries on Hamdon Hill provide exposures of rocks belonging to the later part of the Toarcian Stage (Upper Lias, Lower Jurassic). These exposures are of interest because the sediments exposed and known as the Ham Hill Stone, differ from those of the Yeovil Sands by which they are surrounded laterally, as well as being underlain and overlain by them. The sedimentology of the Ham Hill Stone and its interpretation has repercussions on the way in which the palaeogeography of the Somerset—Dorset area is interpreted during Toarcian times.

Distribution. The Ham Hill Stone, reaching a maximum thickness of about 40 m has a remarkably restricted horizontal distribution. It occurs as a series of outcrops forming a south southwest —north northeast trend about 3 km wide and 5 km long, northeast of Crewkerne. It thins rapidly at its eastern and western margins, forming a lenticular shaped body within the Yeovil Sands.

Succession, sediments and faunas. The succession at Hamdon Hill has been recorded a number of times (Woodward 1897; Buckman 1889; Davies 1969; Jefferson 1993). Despite this, few of the records are comprehensive in scope and the succession given below is a compilation of Davies (1969) and Jefferson (1993).

	Description	Thickness m
Ham Hill Stone	Thinly bedded, trough cross-stratified, coarse fragmental biosparitic limestones.	6.2
	Conglomerate	0.25
	Erosional surface	0
	Alternating beds of thin limestone and cross laminated, very fine grained sand	3.9
	Cross laminated, very fine grained sand with thin sandstones, calcareous sandstones and thin limestones.	4.5
	Trough cross-stratified, coarse fragmental biosparitic limestones.	12.0
	Conglomerate	0.5
Yeovil Sands	Dull yellow, silty, extensively burrowed sandstones.	Base not seen.

The sand units of the Ham Hill Stone were regarded as essentially of the same lithology as the surrounding Yeovil Sands (Davies 1969); that is they consist of sands containing detrital minerals (quartz, feldspar and mica) and a variety of heavy minerals. The mean current flow direction indicated by the trough cross bedding in the limestones is to the north and northeast (Davies 1969) and the bioclasts consist of molluscan fragments. The lower horizons of both the main limestone units lack detrital minerals, and these only reappear in the upper portions of the limestones. The lower conglomerate has only recently been described (Hart, Prudden and Edwards 1992). Both conglomerates were described as containing indurated, bored and encrusted fragments of the Yeovil Sands, while the conglomerate matrix contained shell debris together with ammonites, belemnites and frequent oysters. Generally the fauna of the Ham Hill Stone is rather sparse, but includes the brachiopods *Rhynchonelloidea* cf. *subangulata, Cymatorhynchia* sp.; the bivalves *Pseudolimea pectinoides, P. duplicata, Ctenostreon* sp., *Chlamys* sp., *Eopecten* sp., and *Variamussium pumilum* (Wilson, Welch, Robbie and Green 1969). The ammonite *Dumortieria moorei* has been recorded, indicating the *moorei* Subzone. There is a brachiopod bed about 1.8 m below the base of the upper conglomerate containing the rhynchonellid *Homeorhynchia cynocephala meridionalis*. This forms a distinct marker horizon.

Although the lower conglomerate may occasionally be seen in the bottom of the working quarry at the south of the site, the lower junction with the Yeovil Sands can

only be seen in Hedgecock Hill Woods outside the site boundary in the north (see annotated map).

Interpretation. The environment of deposition of the Ham Hill Stone has been subjected to several interpretations: as a tidal channel (Davies 1969); a shell rich sand wave (Knox, Morton and Lott 1982); and as a fault controlled high starved of detrital clastic sediment (Jenkyns and Senior 1991).

Davies (1969) model was based upon a sedimentological analysis of Toarcian sediments across the Wessex basin and to the north of the Mendip axis. He interpreted the Yeovil Sands as a sand bar stretching east to west and separating a for bar facies (represented by the Bridport Sands from a back bar facies (also represented by the Yeovil Sands). The Ham Hill Stone was interpreted as a tidal channel linking the fore bar and back bar facies. The evidence cited in support of this interpretation of the depositional environment of the Ham Hill Stone is based upon the rapid east—west thickness changes across the Ham Hill Stone outcrop, the trough cross-bedding of the limestones and the presence of a conglomerate at the base of the upper limestone. The conglomerate was interpreted as a channel lag. The sands intervening between the two limestone units were interpreted as a tidal flat succession. Thus the repetition of the channel sequence may be seen as reflecting the migration of the channel across the area, and must also imply subsidence or sea level rise to account for the thickness of the tidal flat sequence.

The interpretation proposed by Knox *et al.* (1982) does not seem to accord with the presence of trough cross-bedding in the limestones. It seems likely that if the Ham Hill Stone represented a sand wave, then the structure within the limestones would be expected to consist of a stack of cross-bedded units with planar tops and bases, reflecting the passage of mega-ripples across the area. This is not seen.

Jenkyns and Senior (1991) noted the relationship of the distribution of the to the Coker Fault, stating that the main outcrops of the Ham Hill Stone occurred to the north of the fault (a major east—west structure downthowing to the south). The Ham Hill Stone north of the fault being 40 m in thickness and only 6 m south of the fault, where it unit rapidly disappears to the south. The pure carbonate nature of the limestones was seen is indicating that the facies was shielded in some way from clastic input. It was presumed that deposition took place on a fault controlled topographic high, were carbonate bodies could accumulate with little or no clastic input. The presence of the Coker fault was seen to be a possible control, but Jenkyns and Senior also pointed out that where similar facies occur intercalated with the Bridport Sands and Yeovil Sands in the Winterborne Kingston and Marchwood boreholes, there was no evidence of a relationship to synsedimentary faulting.

Hart, Prudden and Edwards (1992) briefly discussed the various interpretations of the Ham Hill Stone, considering the lower conglomerate to represent a channel lag deposit, thus supporting Davies' model. But it was further noted that the basal part of the limestone was poor in detrital quartz, and that significant clastic content is only present in the upper portions of the limestone units. This was considered to support the clastic-starvation model. Doubts were expressed with regard to this model in that the pattern of faults and joints within the quarries corresponded to a north northeast—south southwest trend rather than east—west pattern. It was noted, however, that the present outcrop pattern of the Ham Hill Stone was strongly controlled by an east—west fault pattern.

Conclusions. The Ham Hill Stone represents a laterally restricted facies within the Toarcian Yeovil Sands consisting of two 'cycles' of trough cross-bedded limestones, the lower unit being overlain by detrital sediments similar to the Yeovil Sands. The bases of both limestone units are erosional and the basal portion of each succession contains a 'lag' conglomerate. Several models have been proposed for the depositional

scenario of the Ham Hill Stone, but all appear to have weaknesses. An understanding of the depositional environment of the Ham Hill Stone is important in the broader syntheses of the depositional environments and basin analysis of the Toarcian of southwest England. As such, it can be expected that the Ham Hill Stone will be the focus of much future research.

REFERENCES

BUCKMAN, S. S. 1889. On the Cotteswold, Midford, and Yeovil Sands, and the division between Lias and Oolite. *Quarterly Journal of the geological Society of London,* **45,** 440-474.

DAVIES, D. K. 1969. Shelf sedimentation: an example from the Jurassic of Britain. *Journal of Sedimentary Petrology,* **39,** 1344-1370.

HART, M. B., PRUDDEN, H. C. and EDWARDS, S. 1992. New observations on the Ham Hill Stone (Lower Jurassic). *Proceedings of the Ussher Society,* **8,** 73.

JEFFERSON, D. P. 1993. Building stone: the geological dimension. *Quarterly Journal of Engineering Geology,* **26,** 305-319.

JENKINS, H. C. and SENIOR, J. R. 1991. Geological evidence for intra-Jurassic faulting in the Wessex Basin and its margins. *Journal of the geological Society of London,* **148,** 245-260.

KNOX, R. W. O'B, MORTON, A. C. and LOTT, G. K. 1982. Petrology of the Bridport Sands in the Winterborne Kingston borehole. PP. 107-121. *In* RHYS, G. H., LOTT, G. K. and CALVER, M. A. (Eds.) *The Winterborne Kingston borehole, Dorset, England.* Report of the Institute of Geological Sciences, **81/3.**

WILSON, V., WELCH, F. B. A., ROBBIE, J. A. and GREEN, G. W. 1958. *Geology of the Country around Bridport and Yeovil.* Institute of geological Sciences. xii+239 pp. HMSO

WOODWARD, H. B. 1897. Note on the Ham Hill Stone. *Proceedings of the Somerset Archaeological and Natural History Society,* **32,** 112-114.

2.1.2. THREATS

PDO's — numbers **7, 12, 14, 15, 21, 22, 23, 24.** EN does not require consultation for the dumping of materials away from the quarry faces; clearance of boulders, large stones, loose rock or scree; or the construction, removal or destruction of roads, fences, and banks that do not interfere with the quarry faces.

At present, the site appears to be well managed; and apparently with agreements in place regarding the end of the quarries working life. While the site remains within the boundary of the designated part of a Special Landscape Area and a Scheduled Monument, it would seem unlikely that anything much could happen to the site. There are, however, a number of points to be made. It should not be assumed that the various interests in the site are mutually protective. The filling in of the quarries would not affect the archaeological interests of Ham Hill (except in so far as some of the quarries are Roman and Medieval), nor necessarily those of the landscape aspect. It is possible to envisage a situation (although unlikely) where the quarries could be filled for reasons of safety.

The only other threat at this site is the long term and inevitable degradation of quarry faces through weathering, the development of a talus cover and the overgrowth be vegetation.

Vulnerability and Threshold — With regard to the above comments, this site does not seem to be particularly vulnerable, and with the number of faces present on the site it seems unlikely that it could be quickly or extensively damaged.

The threshold of acceptability for this site is that when the exposures of the Ham Hill Stone become inaccessible through becoming permanently covered. At the present time, this threshold has not been reached.

2.2.5/2.4.1. PRINCIPLES OF CONSERVATION AND ENHANCEMENTS

The principle of conservation at Ham Hill is to conserve and preserve the exposures of the Ham Hill Stone in the working and disused quarries on the site. Under the present conditions and management of the site, all this requires is regular monitoring of the site and occasional clearance of talus and vegetation from faces. Some remedial action should be taken to deal with the lack of fences above some of the disused quarries, this is both for safety purposes and to reduce the risk of filling because they might be considered unsafe.

There is already an interpretation board present.

The junction of the Yeovil Sands with the Ham Hill Stone lies outside the notified area in Hedgecock Hill Wood. This is a critical part of the section. A modification of the notified boundary to include this area should be considered.

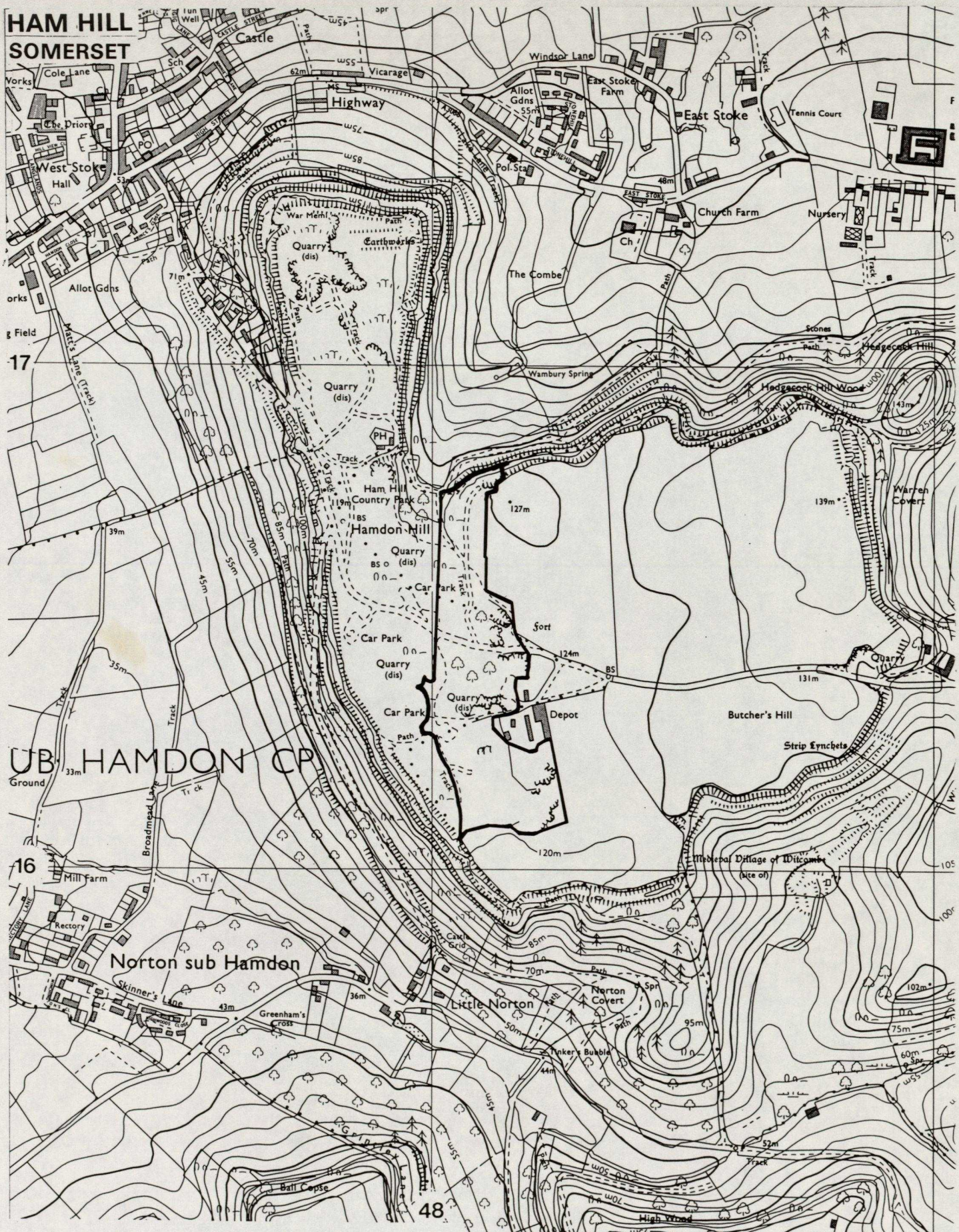
Any research proposed which is to be carried out on an acknowledged scientific basis at this site should receive the support of English Nature.

2.4.2. ACTION POINTS

The site is not regarded as particularly vulnerable and is not likely to be extensively damaged rapidly. The site appears to be well managed and there seems no reason to believe that this situation will change in the near future. On this basis, a monitoring period of 4-5 years is recommended. Consideration should be given to the possibility of extending the site boundary to include the Sands—Ham Hill Stone junction in Hedgecock Hill Wood.

APPENDICES TO THE DESCRIPTION

1. Statement of interest.
2. Annotated site map.
3. Text figures.
4. Photographs of the site.



NATURE CONSERVANCY COUNCIL

Site boundary thus ——

Scale 1:10 000

0 Metres 600

0 Yards 600

YEOVIL CO CONST

COUNTY: SOMERSET SITE NAME: HAM HILL

DISTRICT: YEOVIL

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: Yeovil District Council, Somerset County Council

National Grid Reference: ST 482162 Area: 11.1 (ha) 27.6 (ac)

Ordnance Survey Sheet 1:50,000: 193 1:10,000 ST 41 NE

Date Notified (Under 1949 Act): 1971 Date of Last Revision:

Date Notified (Under 1981 Act): 1985 Date of Last Revision:

Other Information:

Site boundary amended by deletion and extension.

Description:

Ham Hill is important because of the exposures of the sandy limestone known as Ham Hill Stone which occur here. The stone is restricted to a small area in the Ham Hill district and is particularly important to geologists because of the assemblages of fossils which it contains, the sedimentary features which it displays and the way it relates to other rocks of equivalent age in the close vicinity.

During early Jurassic times, some 180 million years ago, southern England lay beneath a shallow sea in which a series of marine sediments accumulated. The rocks seen at Ham Hill were laid down in the part of the early Jurassic known as the Toarcian Stage, and are an unusual local development of massive limestones which occur in a restricted area around Ham Hill. When the rocks are followed away from Ham Hill they can be seen to change laterally into a thick series of rocks known as the Yeovil and Bridport Sands, which were laid down at the same time as the Ham Hill Stone but under different environmental conditions. This observation, together with detailed study of the fossil ammonites and brachiopods which occur within the Ham Hill Stone, and also with study of the sedimentary features of the stone, enable geologists to build up a detailed understanding of the evolution of southern England during early Jurassic times.

HAM HILL

OPERATIONS REQUIRING PRIOR CONSULTATION WITH THE NATURE CONSERVANCY COUNCIL

1. Dumping, spreading or discharge of any materials (7).

2. Tree-planting, including afforestation or reafforestation (12).

3. Water utilisation through the afteruse of disused quarries for water storage (14).

4. Infilling of pits (15).

5. Construction, removal or destruction of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables (21).

6. Storage of materials against any quarry faces (22).

7. Erection of permanent or temporary structures or the undertaking of engineering works (23).

8. Clearance of boulders, large stones, loose rock or scree, battering, buttressing, grading or seeding any rock outcrop (24).

HAM HILL SSSI - FORMAL LETTER OF CONSENT

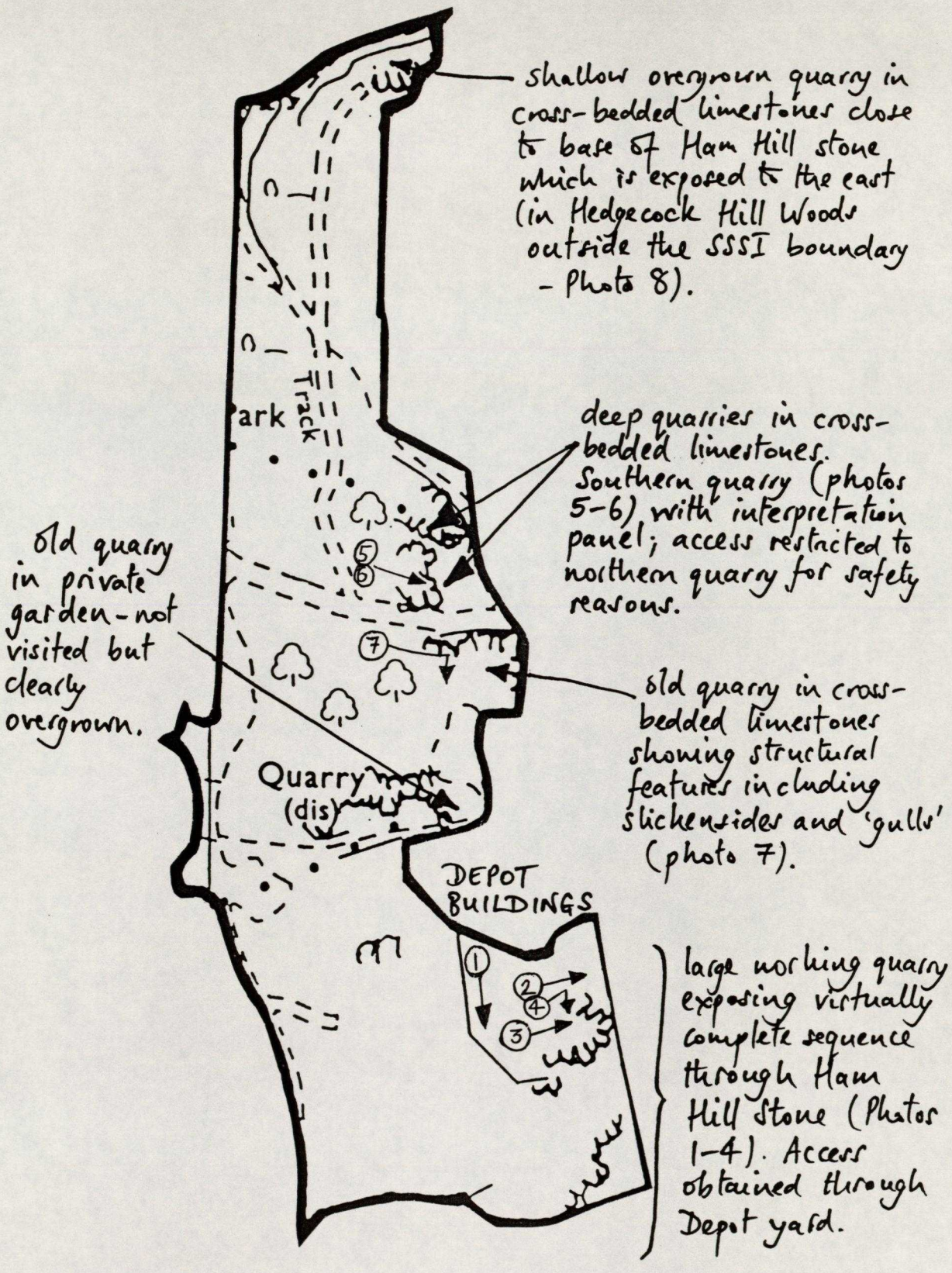
The NCC is conscious of the need to avoid unnecessary disruption of the established management of Ham Hill.

There is therefore no requirement to consult the NCC when:-

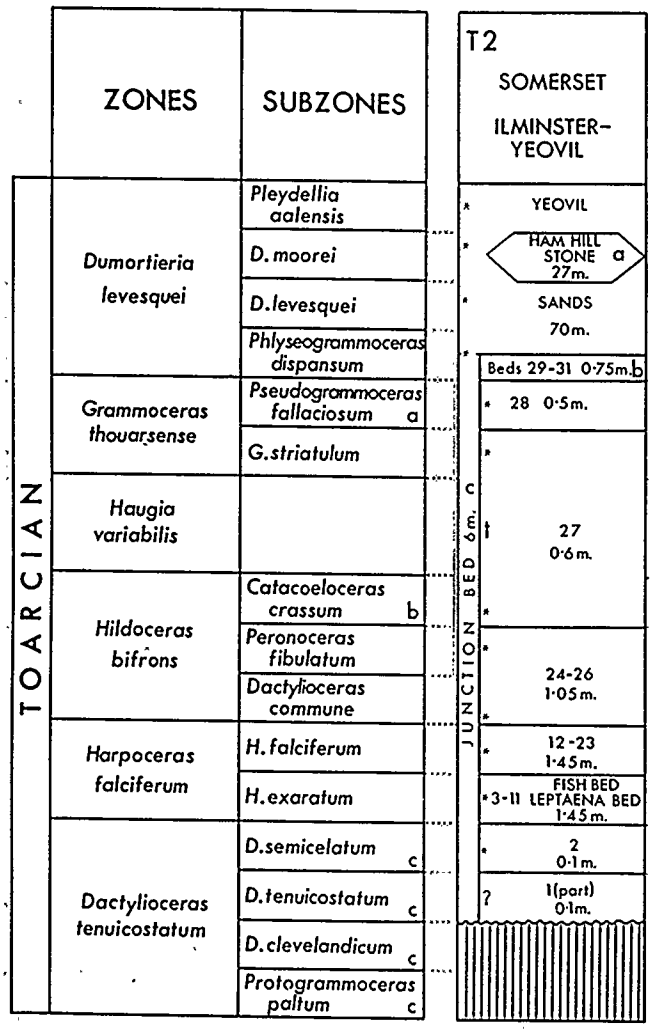
1. Dumping any materials in areas not immediately adjacent to the quarry faces.

2. Clearing boulders, large stones, or loose rock or scree.

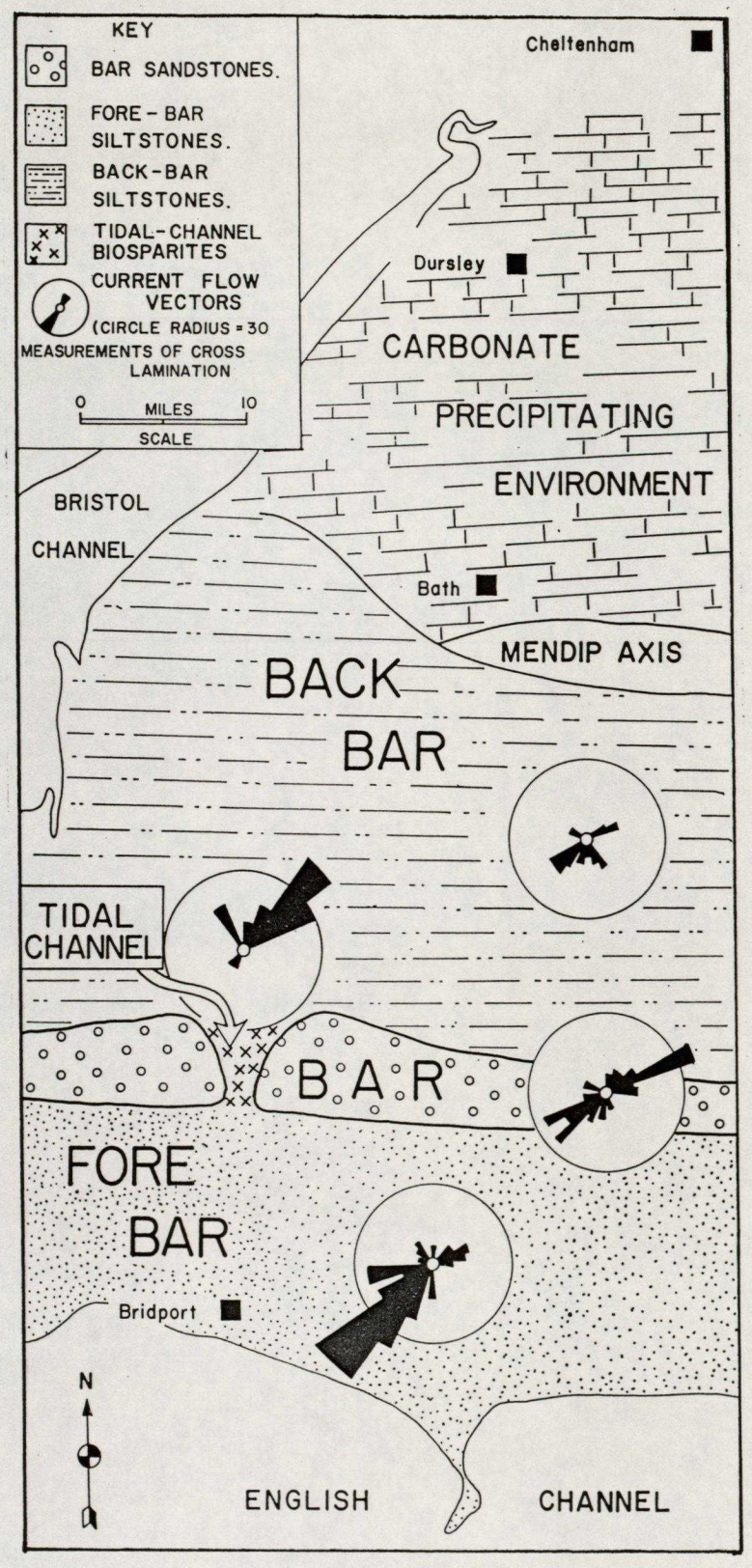
3. Constructing, removing or destroying roads, tracks, fences and banks which do not interfere with the quarry faces.



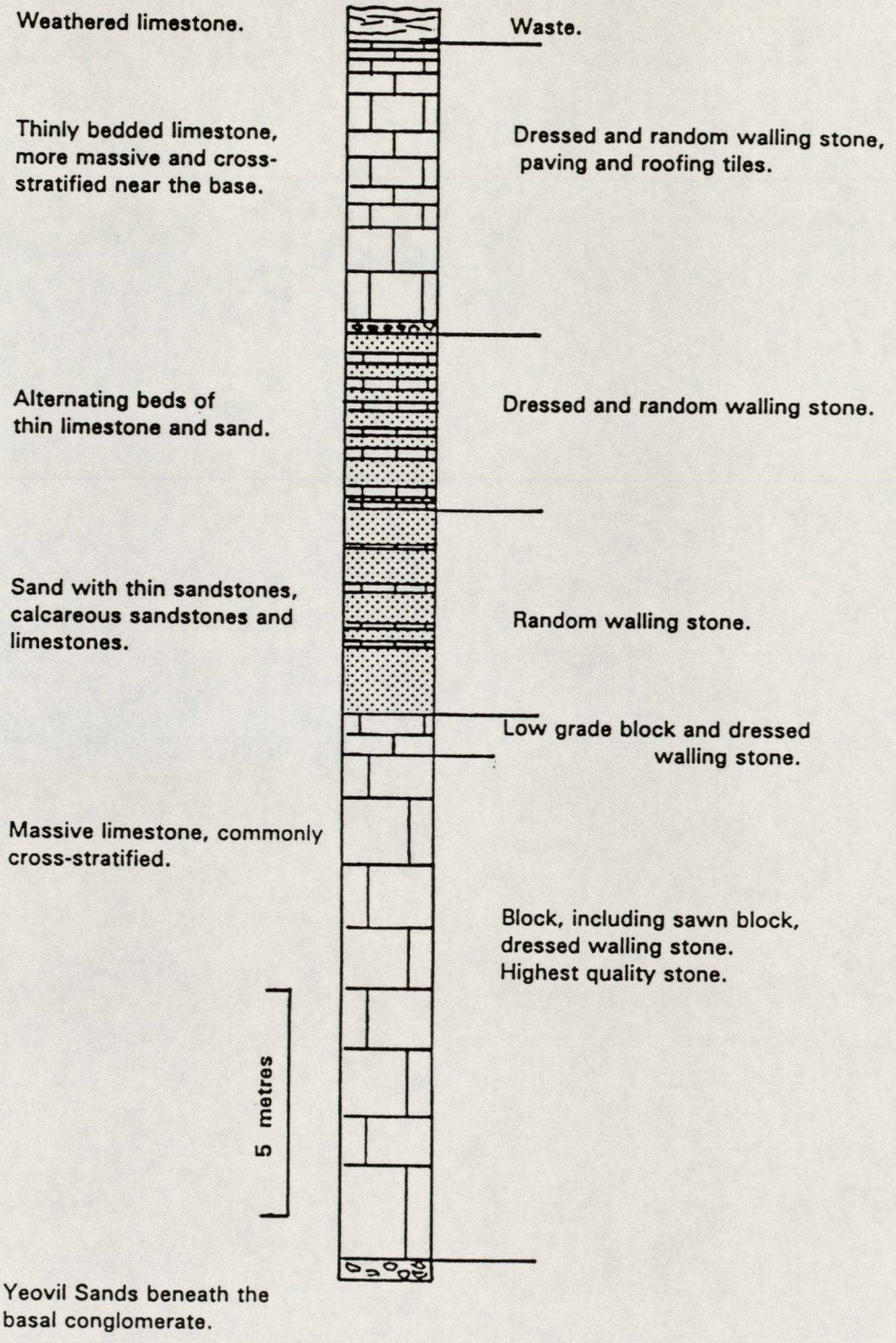
ANNOTATED SITE MAP (NUMBERED ARROW HEADS MARK THE APPROXIMATE POSITION AND DIRECTION IN WHICH THE SITE PHOTOGRAPHS WERE TAKEN)



CORRELATION OF UPPER LIAS (TOARCIAN) STRATA IN THE ILMINSTER-YEOVIL AREA INDICATING STRATIGRAPHICAL POSITION OF THE HAM HILL STONE WITHIN THE YEOVIL SANDS



Spatial arrangement of depositional environments and sediment dispersal directions developed during *Dumortieria moorei* (subzone) times.



The geological sequence in Ham Hill quarry, together with the products obtained from the different horizons.

PHOTO 1. GENERAL VIEW OF LARGE WORKING QUARRY (AT SOUTHERN END OF HAM HILL) VIEWED TOWARDS THE SOUTH

PHOTO 2. NORTH WESTERN FACE OF LARGE WORKING QUARRY EXPOSING NEAR COMPLETE SEQUENCE THROUGH HAM HILL STONE (THE SLOPE ARROWED SUPPORTS A RARE FLORA)

Ham Hill

PHOTO 3. WESTERN FACE OF LARGE WORKING QUARRY EXPOSING NEAR COMPLETE SEQUENCE THROUGH THE HAM HILL STONE. THE DIFFERENT FACIES IDENTIFIED BY JEFFERSON (1993) ARE ALL REPRESENTED

PHOTO 4. DETAIL OF THE BASAL CONGLOMERATE (LOOSE BLOCK) PERIODICALLY EXPOSED AT THE BASE OF THE WORKING QUARRY. THIS CONGLOMERATE COMPRISES BORED AND ENCRUSTED CLASTS OF LIMESTONE AND YEOVIL SAND WITH SHELLY DEBRIS, FOSSIL OYSTERS, AMMONITES AND BELEMNITES (ARROWED)

Ham Hill

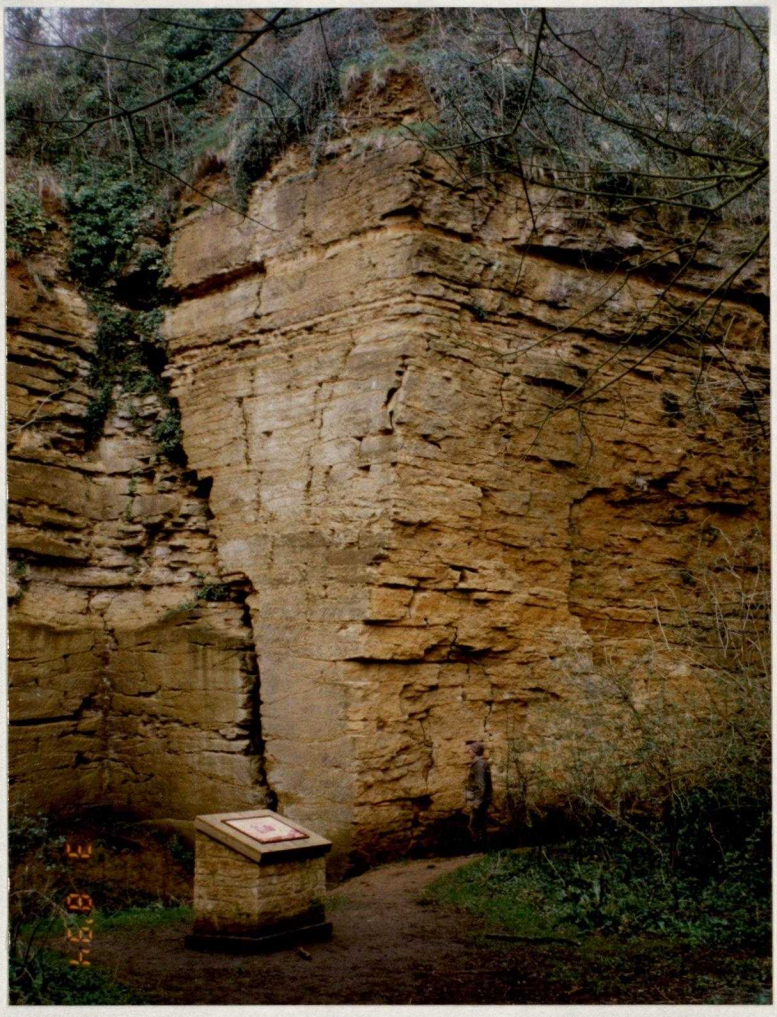


PHOTO 5. DISUSED DEEP QUARRY IN MASSIVE CROSS-STRATIFIED LIMESTONES IN LOWER PART OF HAM HILL STONE. NOTE INTERPRETATION PANEL

PHOTO 6. DETAIL OF ABOVE ILLUSTRATING CROSS-STRATIFICATION (PENCIL FOR SCALE)

Ham Hill

PHOTO 7. OLD QUARRY FACE IN CROSS-STRATIFIED LIMESTONES EXHIBITING NEAR HORIZONTAL SLICKENSIDES CAUSED BY ADJACENT FAULTING

PHOTO 8. BASE OF HAM HILL STONE (CONGLOMERATE) OVERLYING YEOVIL SANDS (TOP MARKED BY PENCIL) EXPOSED IN HEDGECOCK HILL WOODS JUST OUTSIDE SSSI BOUNDARY

Ham Hill